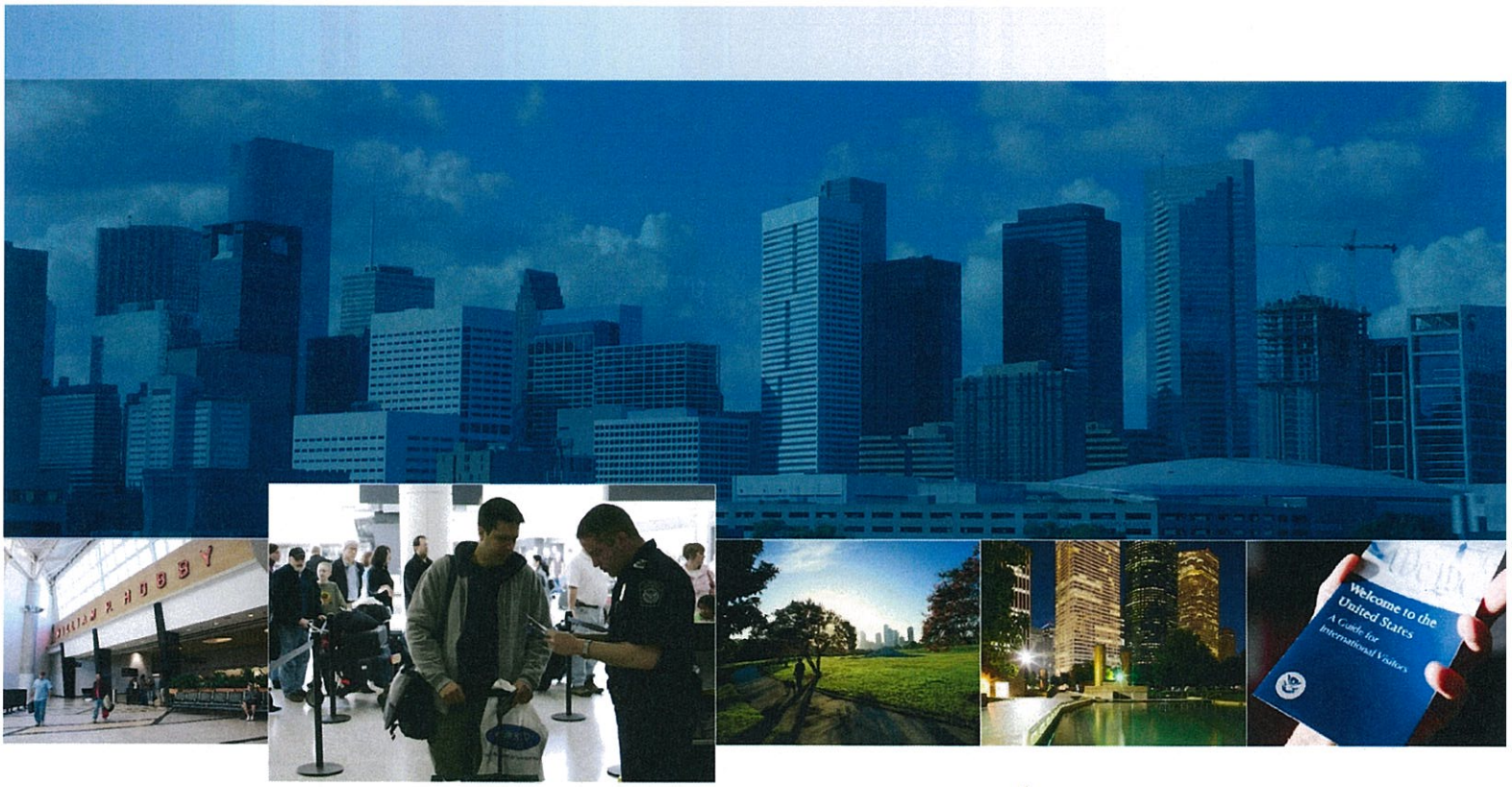

The Economic Impact of International Commercial Air Service at William P. Hobby Airport

April 4, 2012
Prepared for
Houston Airport System

Prepared by
GRA, Incorporated
Inter*VISTAS* Consulting LLC

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Executive Summary

Southwest Airlines (Southwest) seeks to expand its services in Houston by starting international air service at Houston's William P. Hobby Airport (Houston Hobby) to Mexico, the Caribbean, Central America, and northern South America. Other airlines also have expressed an interest in providing international services at Houston Hobby.

Southwest, through its acquisition of AirTran, has already begun or announced international service from Atlanta, Austin, Baltimore, Denver, Orange County, Orlando and San Antonio. Southwest's interest in new international service at Houston Hobby stems from the region's dynamic economy, its expected population growth, its large base of Hispanic residents, and Southwest's ability to connect traffic with its existing 130 daily domestic flights at Houston Hobby. Because international service at Houston Hobby would be complementary to its domestic services, Southwest has indicated that it is not feasible to begin new international service from Houston's George Bush Intercontinental/Houston (Houston Bush Intercontinental) and that this is not an option.

Director of the Houston Airport System (HAS), Mario Diaz, asked Inter*VISTAS* Consulting LLC and GRA, Incorporated to prepare a report examining the likely air traffic scenarios and the economic impact for the Greater Houston region of such services, including the value of such future air services for the residents of Greater Houston.

This report first reviews the local market and industry-wide trends, current state of competition in the market, and the experience of other metropolitan regions with multiple airports that offer international service. Next, the report provides a forecast of the likely air services to be initiated, the passenger impact at both Houston Hobby and Houston Bush Intercontinental, and the number of jobs to be created and economic benefit for the residents of Houston.

Report Highlights

- Although Houston benefits from the presence of numerous air carriers, the city is served primarily by two major airlines – United Airlines (United) at Houston Bush Intercontinental and Southwest at Houston Hobby – which provide the residents of Houston with competition on domestic routes.

- Internationally, Houston enjoys direct service to 67 markets, of which 50 are in Mexico, the Caribbean, Central America, and northern South America. United and its Star Alliance partners have a near monopoly on this service, operating 97 percent of the seats; all scheduled international operations are provided at Houston Bush Intercontinental.

- Restoring Houston Hobby's status as an international airport for commercial operations would provide competition in these markets, just as Houston enjoys domestically. It is not reasonable to expect that Southwest could operate international service from Houston Bush Intercontinental when its domestic connecting flights are at Houston Hobby.

- Numerous other metropolitan areas, including New York, Los Angeles, Chicago, Miami/Ft. Lauderdale, Washington/Baltimore, and the San Francisco Bay Area, have multiple international airports. In each of these, the international markets have supported more than one carrier and competition between carriers at different airports has successfully lowered fares and grown the air travel market.

- Southwest will continue expanding internationally at other cities even if it does not do so at Houston Hobby, leading to passenger diversion from Houston airports instead of growth at Houston airports. Failure to allow Southwest's expansion at Houston Hobby would therefore represent a missed opportunity for Greater Houston businesses and travelers.

- **New international air service at Houston Hobby and the resulting competition would generate the following benefits for the residents of Houston:**

  1. **<u>Lower air fares</u> and increased travel options, with over 1.5 million more passengers travelling through the Houston airports each year**

  2. **<u>Creation of over 10,000 jobs</u> across the greater Houston metropolitan area**

  3. **<u>Economic impact of over $1.6 billion annually</u>**

Market Analysis, Forecast & Economic Impact

1. Background of the Houston Market

1.1 Introduction

This report presents results from an assessment of the economic impact for Greater Houston from scenarios for scheduled international air service at Houston Hobby. HAS initiated this study in response to an inquiry from Southwest regarding its interest in conducting international operations at Houston Hobby and the new Federal Inspection Services (FIS) facilities that would be necessary to support such operations; other airlines have expressed a similar interest. HAS director Mario Diaz asked InterVISTAS Consulting LLC and GRA, Incorporated to conduct this assessment. It relies on an analysis of projected traffic levels at both Houston Hobby and Houston Bush Intercontinental airports in markets where new international service is projected to be established. With increased competition and reduced average fares in those markets, this new international service will stimulate traffic growth. Because of network connectivity, the new international service may also stimulate growth on domestic flight segments that connect with the new international passenger flights. Part of the analysis involved projecting the numbers of new local and connecting passengers, resident and visitor travel shares, and the shares of business and leisure travelers among the visitors. These increased travel numbers would be accompanied by travel and related expenditures which are projected to increase employment, earnings and economic activity in the Houston regional economy. The new services would also provide Greater Houston residents with more affordable air travel options in the expanded international markets.

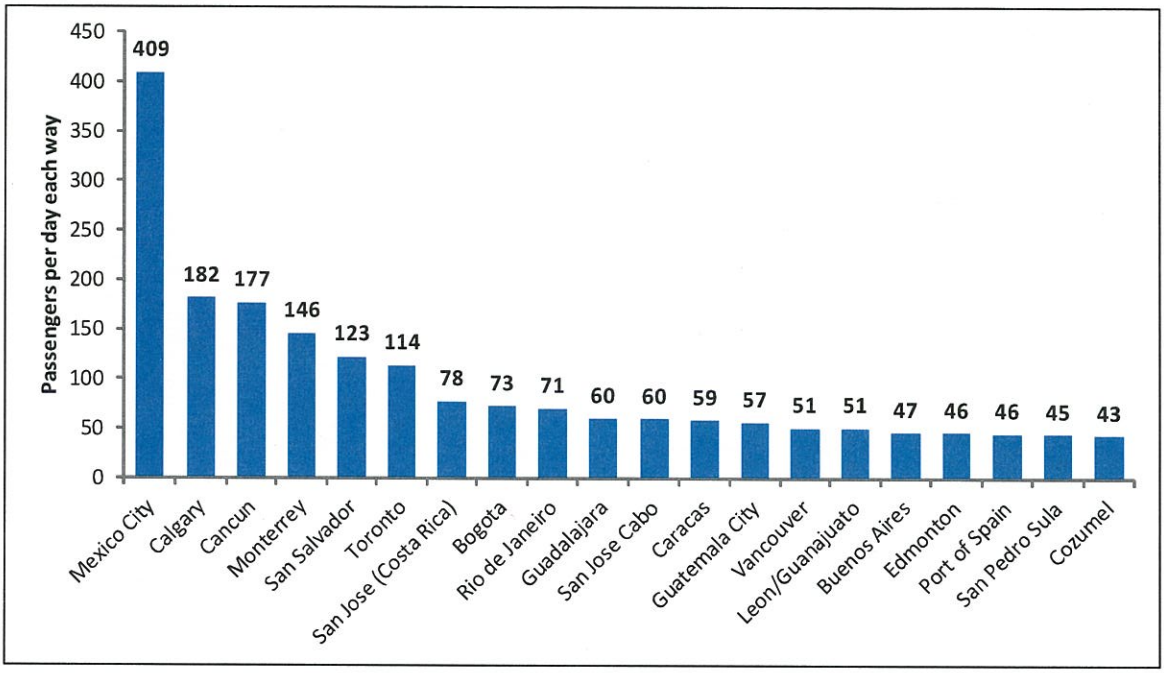
This report examines local market characteristics and factors that affect the air service offerings currently available at the two airports. Based on these characteristics and the markets being served in Mexico, the Caribbean and Central/South America, possible scenarios for new international services from Houston Hobby are presented and examined. Likely growth in passenger flows from both Houston Bush Intercontinental and Houston Hobby in these markets is projected, along with the impacts on market fare levels and air transportation networks serving those markets. Those changes in passenger flows, combined with the characteristics of

the passengers in them, are then examined to project the gains in employment, earnings and economic activity that the changes would bring to the Greater Houston economy.

1.2 Background

The number of Greater Houston's air passengers to and from international destinations in the Western Hemisphere continues to grow based on the strength of local business, leisure and ethnic travel markets. All scheduled international service is provided from Houston Bush Intercontinental. Between 2005 and 2010, Houston Bush Intercontinental increased its international passengers (enplanements and deplanements) by 26.8 percent, nearly double the national increase of 14.8 percent over the same period. Exhibit 1 shows that points in Mexico, the Caribbean, Central and South America, especially the short-haul destinations, dominate the international opportunities from Houston. Mexico City is by far the largest Houston market in this hemisphere, and there are many attractive destinations in the Latin American market that have little competition. The economics of low-cost services have proven particularly successful for shorter-haul routes, while the transoceanic model has had only limited success for low-cost carriers. Canadian and Caribbean markets, while prominent, were less attractive for consideration in this analysis, in part because Houston is not the most logical gateway for most domestic passengers traveling to Canada and the Caribbean, given Houston's geographical location. In addition, many of the largest markets in those regions, such as Nassau, Toronto and Calgary, have U.S. pre-clearance facilities and thus do not require the availability of an FIS at Houston Hobby for nonstop flights to be initiated in those markets. Both regions could, however, offer opportunities for future international service at Houston Hobby. While current fares were analyzed in the scenario development stage (see Section 3), the impact of low-fare competition was calculated using this project's traffic forecast and economic impact analysis.

Exhibit 1: Top International Markets in the Western Hemisphere from Houston

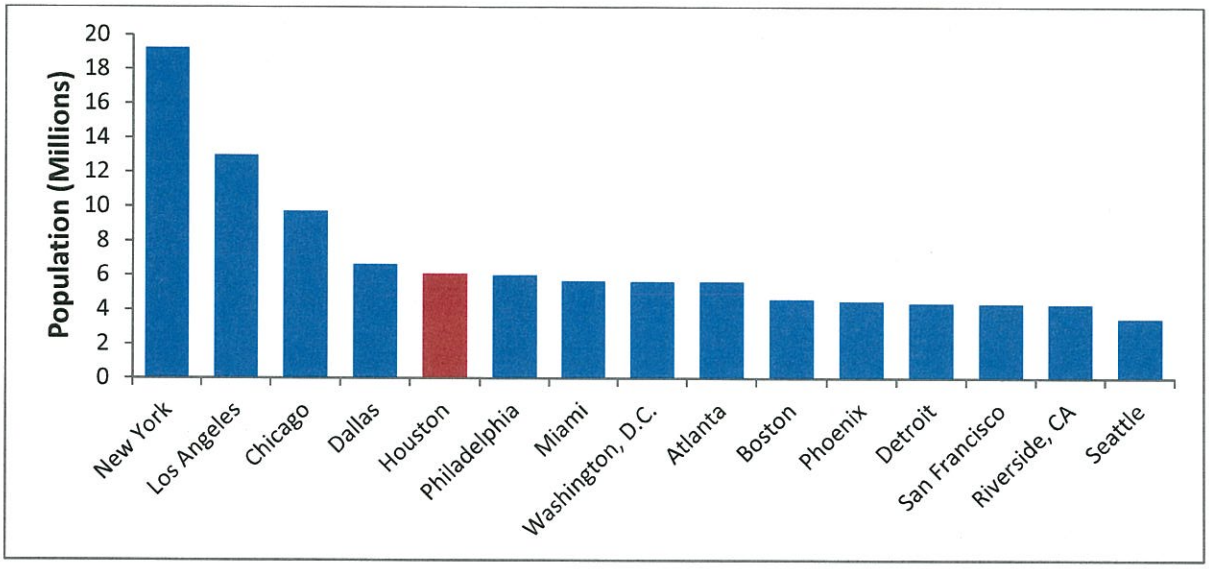


Source: Sabre ADI, 2011

Greater Houston has witnessed impressive, rapid population growth over the past decade, which is forecast to continue. Exhibit 2 shows that Houston currently is the fifth largest U.S. Metropolitan Statistical Area (MSA) in terms of population. Between 2000 and 2009, the Houston MSA experienced population growth of 24.4 percent, compared to national population growth of 9.1 percent. Net migration accounts for approximately 49 percent of Houston's population growth since 2000 and net international immigration accounts for an overwhelming 58 percent of net migration (some 300,000 people) from the 2000 census to mid-2009.[1]

[1] http://www.houston.org/economic-development/facts-figures/demographics/index.aspx.

Exhibit 2: 2011 MSA Population Ranking

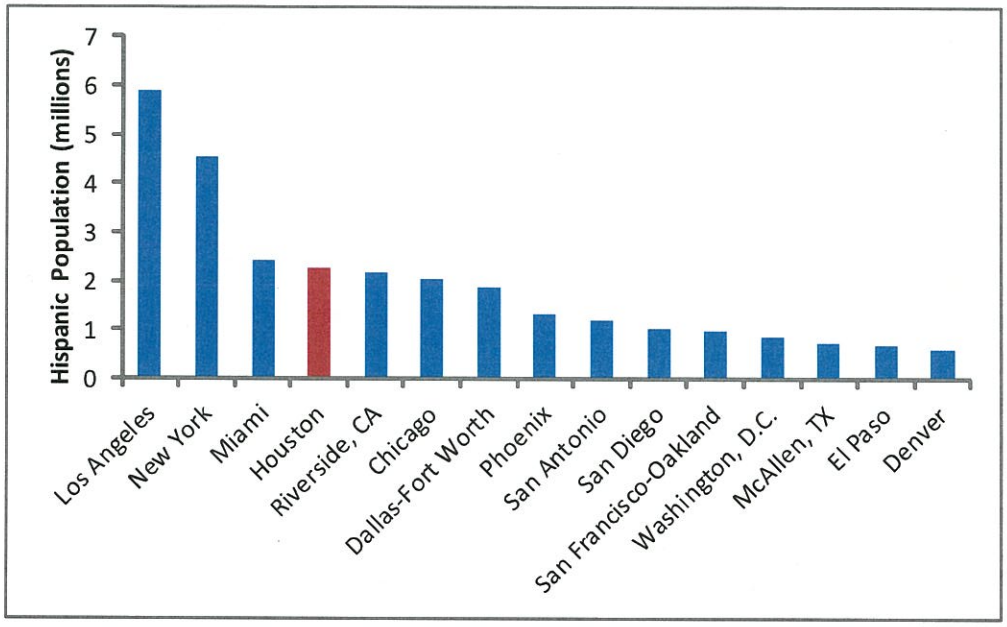


Source: Woods and Poole Economics, U.S. Census

Due to its dynamism, global reach, cultural diversity and economic strength and vitality, the Houston region has not only increased its local population, it continues to see increases in the number of foreign-born residents. Houston, in addition to expected population growth, also benefits from a large Hispanic population with links to Mexico and countries in Central America. Exhibit 3 shows that the Houston MSA currently has the fourth largest Hispanic population in the United States and is expected to see healthy growth (3.4 percent annually[2]) in the next five years. Population and other demographic links with Mexico, El Salvador, Colombia and other key Latin American markets were incorporated into the development of scenarios in this study. These factors support the likely success of new international flights.

[2] Woods and Poole Economics, U.S. Census.

Exhibit 3: Largest Hispanic Populations by U.S. MSA (2012)

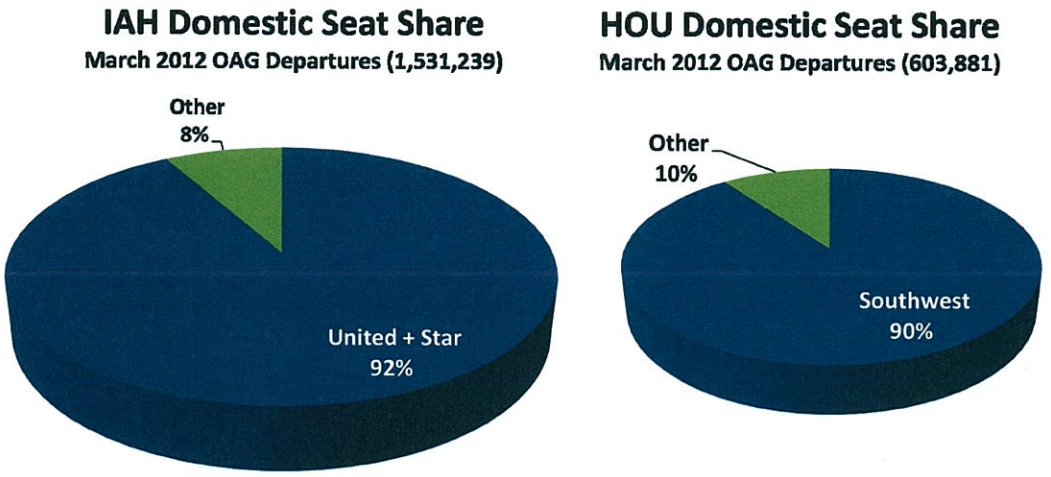


Source: Woods and Poole Economics, U.S. Census

1.3 Current Commercial Air Service in the Houston Area

Commercial air service in the Houston area is provided from both Houston Bush Intercontinental and Houston Hobby airports, with service dominance at each by United and Southwest, respectively. As seen in Exhibit 4, which shows the distribution of annual domestic seat offerings at each airport, by airline or airline alliance, United and the Star Alliance provide 92 percent of domestic services at Houston Bush Intercontinental, while Southwest provides 90 percent of domestic services at Houston Hobby.

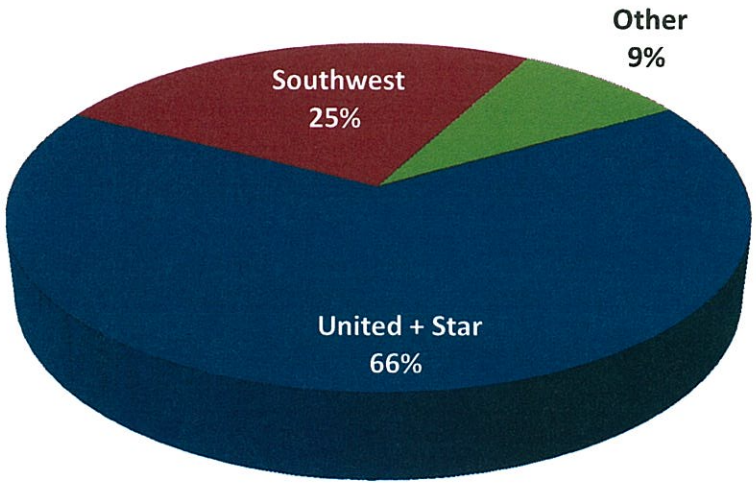
Exhibit 4: Domestic Seat Shares by Airport



Source: Official Airline Guide

For Houston as a whole, which receives domestic service at both airports, the distribution of domestic service offerings from which Houston residents and visitors may choose is more competitive than for the airports considered individually. This distribution of domestic seat offerings for Houston as a whole is shown in Exhibit 5; United and the Star Alliance provide 66 percent of domestic services overall, while Southwest provides 25 percent overall.

Exhibit 5: Domestic Seat Shares for Houston Bush Intercontinental and Houston Hobby



Source: Official Airline Guide

However, there is no inter-airport competition between Houston Bush Intercontinental and Houston Hobby for international services. International commercial services are dominated by United at Houston Bush Intercontinental, with an even greater dominance in seat share by United and the Star Alliance (87 percent of total seat share in all international markets).[3]

In international markets, the degree of competition varies significantly by region and by length of haul.

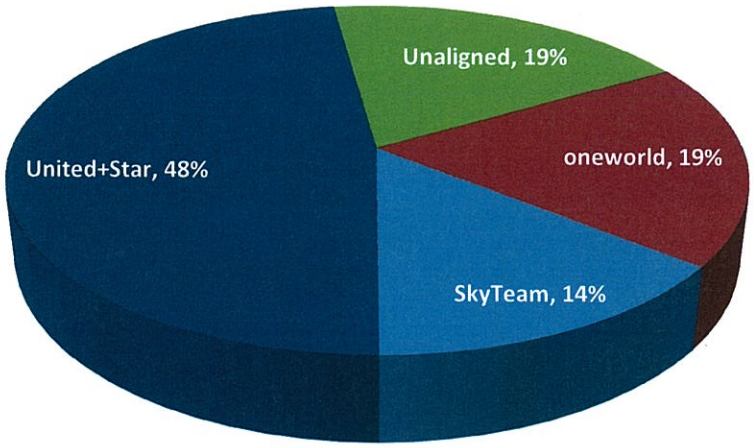
(a) Long-Haul Markets

In the transatlantic market (Europe, Russia and the Middle East), while United and its Star Alliance partners hold a strong position with 48 percent of the seats, there is significant competition in the market from carriers in the SkyTeam (14

[3] Official Airline Guide, March 2012.

percent), oneworld (19 percent), alliances and some large non-aligned carriers (19 percent) as shown in exhibit 6.

Exhibit 6: Current Distribution of Seats by Alliance from Houston to Transatlantic Markets (Europe, Russia and the Middle East)

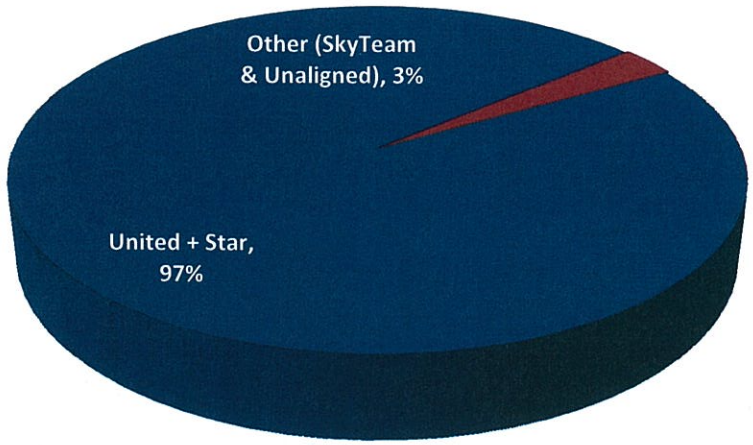


Source: Official Airline Guide, March 2012 Schedules

To Latin America, however – another important region for Houston travelers - there is significantly less competition. United and its Star Alliance partners hold a dominating position with 97 percent of the market (Exhibit 7). Because the major Latin American carriers are not as strong as their European counterparts, new competition in the market for United and Star from foreign flag carriers out of Houston Bush Intercontinental is less likely. Some shifts in international alliances may affect market share. For example, the largest Brazilian carrier, TAM, is currently in a merger process with LAN-affiliated carriers, which could lead to its shift from Star Alliance to oneworld. However, Avianca /TACA and Copa are planning to join Star later in 2012. Thus, United will continue to carry a lot of the network traffic southbound from Houston Bush Intercontinental due to its dominance. United's code-sharing arrangements with

Latin American carriers further support this dominance, since under most such arrangements United is the operating carrier and the foreign carrier merely places its code on a United flight.[4] While United's strength in Latin America provides extremely valuable international service to the Houston region, the dominance of this service, both today and potentially in the future, supports the rationale for reviewing new opportunities for inter-airport and inter-airline competition.

Exhibit 7: Current Distribution of Seats from Houston to Latin America and the Caribbean



Source: Official Airline Guide, March 2012 Schedules, Avianca/TACA coded as "Unaligned"

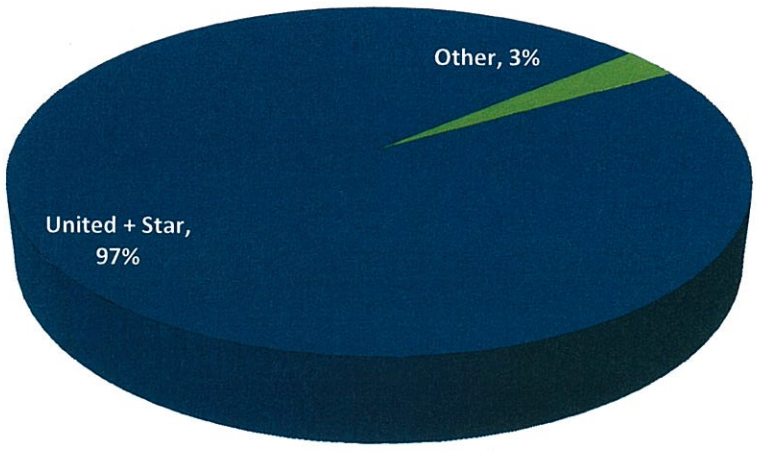
(b) Short-Haul Markets:

Latin America certainly is a strong market for the Houston region and its travelers. However, runway length limits the size of aircraft that can land at Houston Hobby, thus shrinking the sphere of potential new markets to short-haul southbound international markets including Mexico, Central America, the

[4] For example, United, through its merger partner Continental Airlines, has had a long history of cooperation (including code-sharing) with Copa Airlines of Panama. A new chapter involving deeper integration will start later in 2012 when the carrier joins the Star Alliance. However, , the carrier does not fly to Houston Bush Intercontinental with its own aircraft.

Caribbean and northern South America (Colombia, Venezuela and Ecuador). While the major Canadian cities are also within this range limitation, all of them have U.S. preclearance facilities and therefore could have service to Houston Hobby today if a carrier desired to offer it. Exhibit 8 below illustrates the current seat share in this more defined region of Latin America by alliance; United and Star dominate, with 97 percent of total services, all provided from Houston Bush Intercontinental.

Exhibit 8: Current Distribution of Short-Haul International Seats for Houston Commercial Service Airports[5]



Source: Official Airline Guide March 2012 Schedules

[5] Short-Haul International defined as Mexico, Central America, the Caribbean and northern South America (comprising Colombia, Venezuela and Ecuador).

2. Relevant Industry Trends

2.1 Growth of Low Cost Carriers in Short-Haul International Markets

It is important to understand how short-term and long-term changes will likely occur with or without a new FIS at Houston Hobby, given developments in the overall North American airline industry. Since 2008, when deregulation of the Mexican domestic market resulted in a period of rapid expansion by new entrants, the overall competitive landscape in the Mexican, Caribbean and South American region has changed. The main industry dynamics for the short-haul international markets in this region include the following:

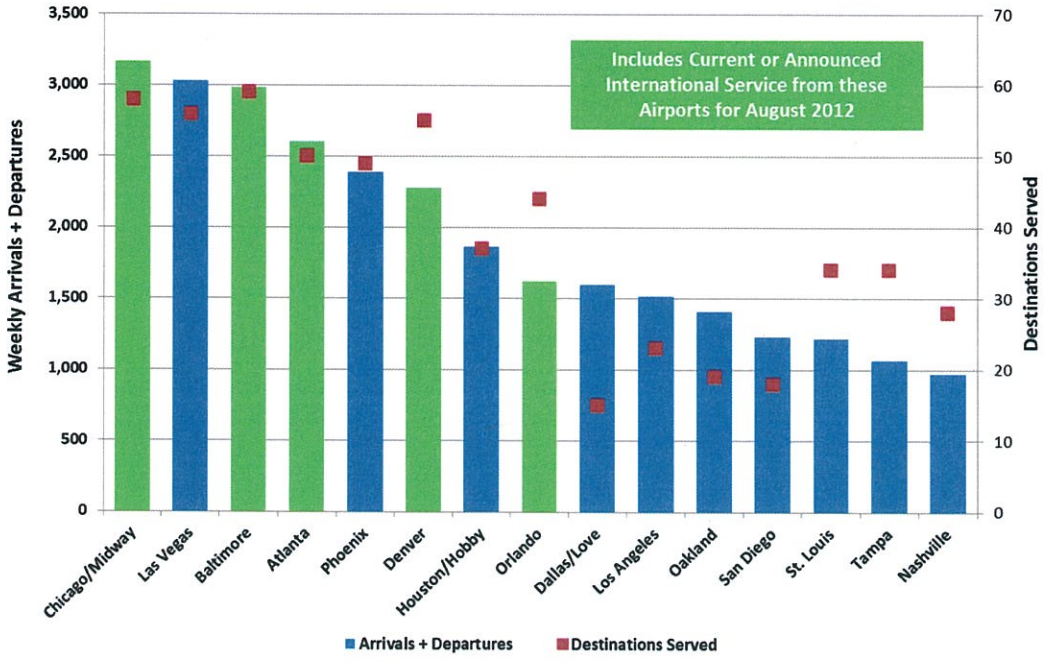
- A number of new low-cost carrier (LCC) brands have entered the domestic Mexican market (such as Volaris, VivaAerobus, Avolar, Alma and Interjet). While Avolar and Alma have failed, the other carriers have grown and now offer a significant amount of domestic market capacity in competition with Aeromexico and the now-defunct Mexicana.
- Mexicana, formerly a significant carrier in the Mexican domestic market and the largest international airline based in Mexico, ceased operations in August 2010 after filing for bankruptcy protection. Interjet, Volaris and VivaAerobus achieved combined domestic passenger traffic growth of 41 percent in 2011 due in part to the Mexicana situation. In Mexico's international markets, passenger numbers grew by a larger 91 percent, albeit from a smaller traffic base.[6]
- Several Mexican and U.S. carriers expanded their service to fill the void left by Mexicana's market exit. Notable immediate service expansion came from Aeromexico, several U.S. network carriers and Volaris. However, more recently both Interjet and VivaAerobus have also increased their services.
- The broader short-haul market to other destinations in Central America, northern South America and the Caribbean have also been a top target for new international services, the majority of which have been on U.S. low-cost carriers such as JetBlue and Spirit.
- Southwest's acquisition of AirTran has created a merged company that can expand its international services from many U.S. cities to a broad range of short-haul international destinations by virtue of AirTran's pre-existing international operations. As of March

[6] Centre for Aviation Article: *"Mexican LCCs Interjet, Volaris and VivaAerobus plan more rapid growth for 2012"*, January 2012 and Statistics from the Mexico DGAC.

2012, the companies are operating under a single FAA operating certificate, enabling Southwest to utilize AirTran's reservations system (designed to include international flights) and its U.S. government-issued operating authority permitting international services, thereby supporting Southwest's growing international footprint.

Recent route announcements by Southwest demonstrate that growth in short-haul southbound international markets is a key strategic imperative. Exhibit 9 shows the new top airports in the combined Southwest/AirTran system based on August 2012 OAG schedules.[7] This trend closely parallels the increased role that low-cost carriers such as JetBlue, Spirit, Volaris and Interjet are having in these short-haul international markets.

Exhibit 9: New Top Airports in the Combined Southwest/AirTran System



Source: Official Airline Guide

[7] August schedules were selected to match the phase-out of discontinued AirTran markets post-merger.

Greater Houston in general, and Houston Hobby in particular, offer added benefits to low-cost carriers by having a large local population that consists of leisure, ethnic and business travelers. For Southwest specifically, Greater Houston and Houston Hobby also present an excellent south-central U.S. location to connect traffic into the U.S. market.

Southwest's existing 130 daily domestic flights at Houston Hobby combined with the local, connecting and geographical advantages found at Houston Hobby present a unique opportunity for both Southwest and Houston. However, without the addition of an FIS at Houston Hobby, the potential increased southbound international flights and their associated economic benefits will instead accrue to other major cities and thus increase the services offered at some of the other top airports that are listed in Exhibit 9. It is reasonable to expect that Southwest would utilize other potential connecting gateways for its international services, as it is already beginning to do, if Houston Hobby is not able to handle such flights. This includes new point-to-point services out of Orange County's John Wayne Airport (SNA), scheduled to begin in June of this year. The new service will take advantage of a new FIS that was recently built there and helps Southwest and other carriers tap into the potential of the larger Los Angeles Basin/Southern California marketplace.

2.2 Peer Regions with Multiple Airports Offering International Service

The concept of opening up a second airport capable of supporting international services in a large U.S. metropolitan area is not unique to Houston. It has been successfully implemented in numerous other U.S. cities. As shown in Exhibit 10, this includes peer metropolitan regions such as Chicago, Miami/Fort Lauderdale, Los Angeles, New York City, San Francisco's Bay Area and Washington/Baltimore, all of which have multiple airports offering international service (note that Westchester County (HPN), New York LaGuardia (LGA) and Washington Reagan National (DCA) have scheduled international service only from foreign airports with U.S. preclearance facilities). Interestingly, five of these six metropolitan regions (all but Miami/Fort Lauderdale) have a United hub at one of the region's airports, and four of those (all but New York City) have a major Southwest focus city[8] operation as well. If United can co-

[8] In the airline industry, a focus city is a location from which an airline has multiple nonstop flights to several destinations.

exist with Southwest and other low-fare carriers offering international services at its hubs in five other U.S. metropolitan regions, there is no apparent reason why that would not be the case in the Houston region if international services are introduced at Houston Hobby.

Exhibit 10: Peer Metropolitan Regions with Multiple International Airports

Source: Official Airline Guide

But this phenomenon is not limited to metropolitan regions in the United States. Many other large metropolitan regions around the world also have multiple airports offering international services. This includes London (with no less than *four* such airports), Paris, Tokyo, Shanghai, Bangkok, Mexico City, Buenos Aires and Sao Paulo. In some regions, one of the metropolitan airports might focus on low-fare operations, while in other regions there is no meaningful distinction between the types of services offered at the different airports.

Among the six major U.S. metropolitan regions identified in Exhibit 10 above, there are two areas that currently have low-cost carrier international services from one local airport while one or more legacy carriers provide comparable international service from a different local international (hub) airport. These are South Florida, encompassing the Miami (MIA) and Fort Lauderdale (FLL) airports, and Chicago with its O'Hare (ORD) and Midway (MDW) airports.

These are the most prominent examples serving as comparisons to the potential value of similar international service expansion for the Greater Houston region.

Both of the above metropolitan regions have large airlines competing for local and connecting traffic at different airports within the broader composite region. In South Florida, the Miami/Fort Lauderdale MSA has roughly 5.7 million people and geographical advantages that help the region act as a primary gateway between Latin America and the world. American Airlines (American) and its oneworld partners operate a large-scale domestic and international transfer hub at MIA, while Spirit Airlines (Spirit) and, to a lesser extent, JetBlue Airways (JetBlue), operate key regional international hubs at FLL. In Chicago, with an MSA population of approximately 9.7 million, American (with its oneworld partners) and United (with its Star Alliance partners) operate large-scale domestic and international transfer hubs at ORD while Southwest (and its recently acquired AirTran subsidiary) carries a majority of the traffic to and from MDW. At MDW, an international facility reopened in 2002 and currently has scheduled international service on multiple airlines, including new service on two Mexican low-fare carriers to several cities in Mexico. It should be noted that the reopening of MDW's international facility helped to return that airport to the prominence it had achieved when it was Chicago's only commercial airport (prior to the opening of ORD to commercial services in 1955). The similarity of MDW's revival to Houston Hobby's historical situation with regard to Houston Bush Intercontinental cannot be overstated.

The larger of these two metropolitan areas in terms of nonstop air service to Latin America and the Caribbean, Miami/Ft. Lauderdale, has two low-cost carriers (JetBlue and Spirit) operating from FLL while American has its largest (and supposedly most profitable) international hub operation at MIA. While the aggregate of JetBlue's and Spirit's FLL departures declined by three percent in March 2012 over March 2010, these two carriers still constitute 13 percent of the departures at the two airports combined. Two Mexican low-cost carriers (VivaAerobus and Interjet) have also started service since 2010 at MIA, adding to the stimulation generated by the two U.S. low-cost carriers operating at FLL. In addition, Southwest soon will be rebranding AirTran's nonstop Fort Lauderdale – San Juan service under the Southwest name. While not itself an international market, it is indicative of the potential for true southbound international

service operated by Southwest from that airport. With a similar regional population and Southern location, the Miami/Fort Lauderdale area provides the best analogy to the Houston region in terms of the inter-airport dynamics that could be seen with expanded international services at Houston Hobby.

The smaller of these two metropolitan areas in terms of nonstop air service to Latin America and the Caribbean, Chicago, has two Mexican low-cost carriers (VivaAerobus and Volaris) operating from MDW, while American and United have large international hub operations at ORD. The entry of the two Mexican carriers at MDW has caused American and United to increase their ORD departures by 29 percent and 46 percent, respectively, in March 2012 over March 2010. In addition, as part of a U.S. Department of Transportation (DOT) route case that is nearing completion, Southwest (through its subsidiary AirTran) has been tentatively selected to offer new nonstop service from MDW to Cancun (CUN) in competition with the nonstop services currently offered to CUN by the two hub carriers at ORD, with a final decision by the DOT to be made soon.[9] The upcoming inter-airport competition in the broader Chicago-CUN market is very similar to the type of competition that could be seen in Houston between United at Houston Bush Intercontinental and Southwest at Houston Hobby if international services are introduced at the latter airport.

Exhibit 11 below illustrates the year-over-year changes (from March 2010 to March 2012) that have been seen in capacity, in terms of departures and seats, to Latin America and the Caribbean by the airports in these two Houston peer metropolitan markets. Each of the four airports experienced an overall net gain in both capacity metrics, with even American at MIA showing a gain despite its already extremely large base. American also expanded its FLL services in direct competition with two major LCCs. Of all the carriers, only Spirit at FLL saw a reduction in its international departures and seats, primarily related to its greater emphasis recently on domestic operations. **But the most interesting fact is that both American and United increased their Latin American and Caribbean services at their large MIA and ORD hubs despite LCC service additions at nearby FLL and MDW, respectively.**

[9] As of March 30, 2012, a final DOT decision on the Southwest/AirTran application for service between Midway and Cancun was still pending.

Exhibit 11: Peer Region Departure and Seat Changes – March 2010 vs. March 2012

City	Airport	Airline	March 2010		March 2012		Percent Change	
			Departures	Seats	Departures	Seats	Departures	Seats
Chicago	MDW	VivaAerobus	0	0	1	148	N/M	N/M
		Volaris	0	0	61	8,113	N/M	N/M
	ORD	American Airlines	164	24,000	211	32,220	29%	34%
		United Airlines	164	25,097	239	37,948	46%	51%
South Florida	FLL	American Airlines	31	4,960	62	9,920	100%	100%
		JetBlue Airways	124	13,950	155	17,050	25%	22%
		Spirit Airlines	440	63,800	392	62,021	-11%	-3%
	MIA	American Airlines	3,396	551,675	3,500	577,789	3%	5%
		Interjet	0	0	53	8,480	N/M	N/M
		VivaAerobus	0	0	7	1,036	N/M	N/M

Source: Official Airline Guide (N/M= New Market)

The Houston metropolitan area stands to gain a significant increase in its traffic if international flights by low-cost carriers are started at Houston Hobby. This would be comparable to the results seen by the Miami area in terms of traffic stimulated by Spirit and American operating similar services from FLL and MIA, respectively, with four of the international markets entered by Spirit from FLL during the past decade more than doubling in size. Exhibit 12 below shows these rates of stimulation and the change in the average fare and total revenues in the markets that low-cost carrier Spirit Airlines entered, comparing the year prior to service entry with the year after such entry. In some markets, fares decreased by as much as 43 percent. But while the average fare went down in each market, overall composite revenues still increased in each market due to the significant passenger stimulation rates (i.e., overall carrier revenues increased).

Exhibit 12: Fare and Service Stimulation in South Florida Markets

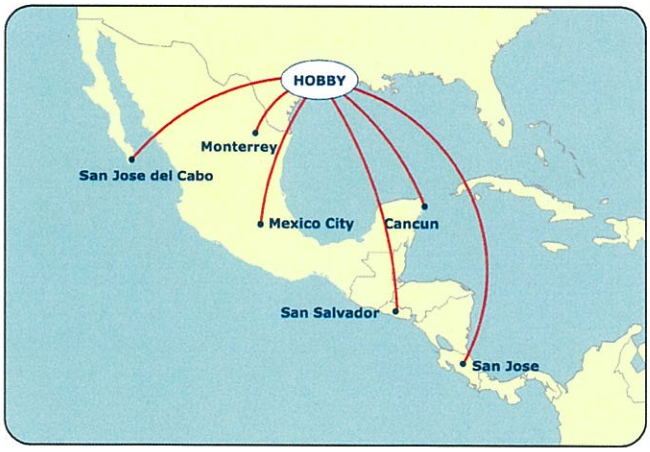
Destination	Spirit Starts Service from FLL	Composite Stimulation Factor	Change in Composite Average Fare	Change in Total Revenues
Cancun	2003	149%	-6%	133%
San Pedro Sula	2007	132%	-43%	33%
Montego Bay	2005	130%	-27%	68%
Lima	2007	120%	-25%	66%
Guatemala City	2007	68%	-37%	7%
San Jose	2007	67%	-31%	16%

Source: U.S. Department of Transportation DB1B (U.S. Carrier), Composite Market includes Fort Lauderdale (FLL) and Miami (MIA)

3. Scenario Projections and Inter*VISTAS* Analysis Methodology

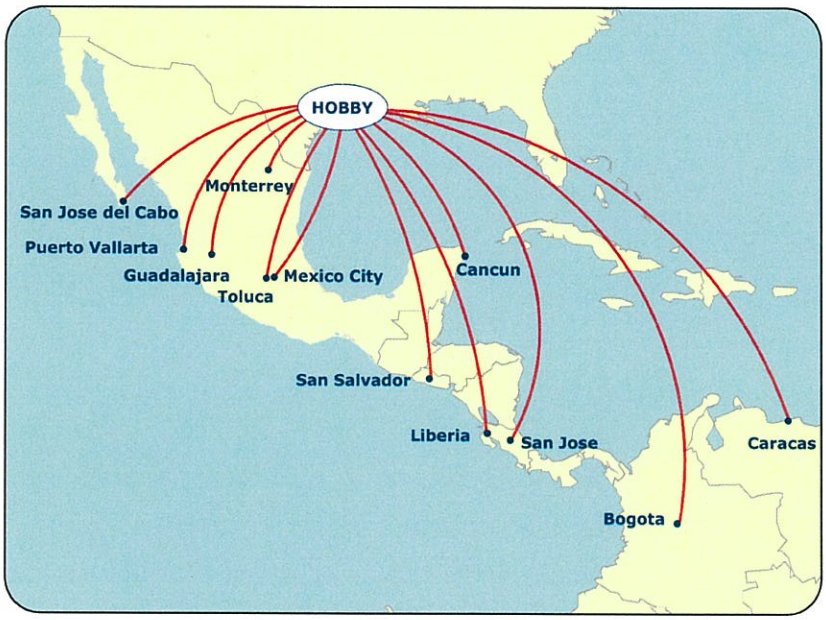
After analysis of the competitive dynamics in the region, airline business models and a review of other large U.S. markets with two international airports, Inter*VISTAS* identified an Initial Phase Scenario (which is transitional in nature) and a Developed Phase Scenario for the traffic forecast (see Exhibits 13 and 14 for a description of the projected services levels in each scenario). Intelligence from prior research and meetings with current and potential new entrant air carriers to Houston, including Southwest Airlines, was incorporated. While a majority of this analysis includes anticipated new Southwest service, there is strong interest in new service starts from foreign-based low-cost carriers, including Volaris, Interjet and VivaAerobus. As part of the scenario definitions, it was assumed that no other U.S.-based carrier had expressed an interest in serving international destinations from Houston Hobby (although, as a practical matter, this may well occur).

Exhibit 13: Initial Phase Scenario Route Map and Service Level Summary



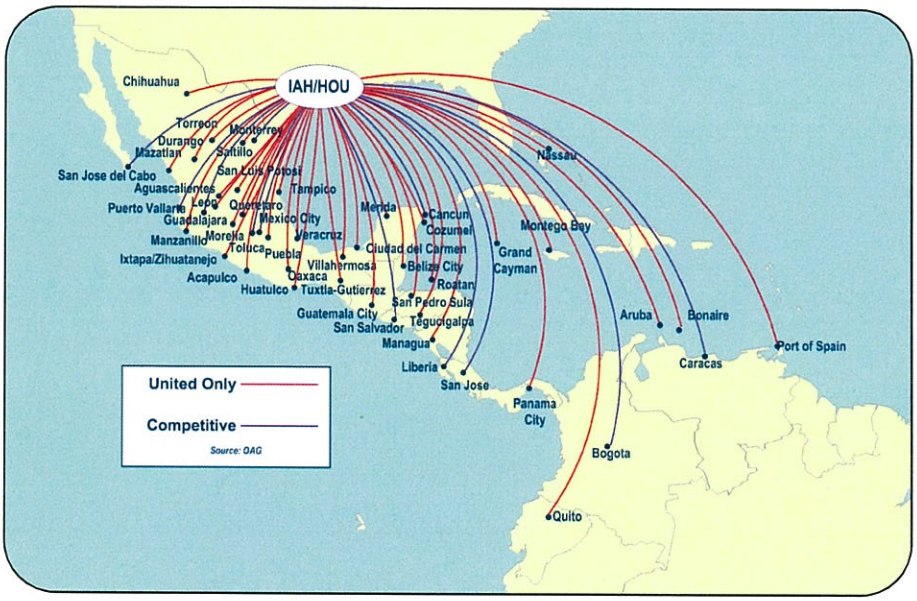
Destination	Airline	Frequency
Cancun	Southwest	3 Daily
Mexico City	Southwest Volaris	3 Daily 1 Daily
Monterrey	VivaAerobus	5 weekly
San Jose (Costa Rica)	Southwest	1 Daily
San Jose del Cabo	Southwest	2 Daily
San Salvador	Southwest	1 Daily
Total	**3 Airlines**	**12 Daily**

Exhibit 14: Developed Phase Scenario Route Map and Service Level Summary



Destination	Airline	Frequency
Bogota	Southwest	1 Daily
Cancun	Southwest	4 Daily
Caracas	Southwest	1 Daily
Guadalajara	Southwest	1 Daily
Liberia (Costa Rica)	Southwest	1 Daily
Mexico City	Southwest Volaris	4 Daily 2 Daily
Monterrey	Southwest VivaAerobus	2 Daily 1 Daily
Puerto Vallarta	Southwest	1 Daily
San Jose (Costa Rica)	Southwest	1 Daily
San Jose del Cabo	Southwest	2 Daily
San Salvador	Southwest	1 Daily
Toluca	Interjet	1 Daily
Total	**4 Airlines**	**23 Daily**

Exhibit 15: Overview of Nonstop Route Competition in the Developed Phase



Source: Official Airline Guide & Inter*VISTAS* analysis

Exhibit 15 above shows the markets that are anticipated to have service competition in the Developed Phase Scenario. There would be increased competition in some city-pairs not only from Southwest for local and connecting traffic but also with the addition of Volaris, Interjet and VivaAerobus (which has been assumed to shift its service from Houston Bush Intercontinental to Houston Hobby) for the local market. The Developed Phase Scenario has no assumptions that any current carrier at Houston Bush Intercontinental brings additional seats into the market as new Houston Hobby flights are introduced. **Even with competition from the projected new international services at Houston Hobby, United's seat share would still be at 73 percent of the nonstop market to southbound short-haul international destinations.** If United does respond to this competition with larger gauge aircraft or more frequency (or both) on certain routes, it would retain an even larger percentage seat share.

Inter*VISTAS* uses the Sabre Profit Essentials forecast model. Profit Essentials uses a Quality of Service Index (QSI) based methodology to forecast the performance of air services based on numerous passenger preference factors, such as elapsed travel time and aircraft type, among others. The model's coefficients and parameter files are calibrated by Sabre on a regular basis. Additionally, Inter*VISTAS* calibrated the model using proxy markets to ensure that the current operational environment was reflected as accurately as possible. The model is used by airlines, airports, aircraft manufacturers, governments and consultants around the world. It has been in commercial use for many years and is highly valued for the reliability of its predictions.

Specific schedules were based on service patterns currently operated by U.S. and Mexican carriers, as well as taking into account each market's passenger characteristics such as leisure, business or mixed (i.e. business and leisure). Using the specific schedules developed for the assumed new services, the Profit Essentials model was used to develop a list of routes, both local and connecting, that were candidates for the new services. These new local and connecting routes were then categorized by itinerary level and analyzed. Using the QSI-based analysis, the forecast market share, the total onboard passenger level and impact on existing carriers and gateway airports was calculated for each flight.

Base market size and fare data was sourced from the Sabre Airport Data Intelligence (ADI) database. This data is based on Market Information Data Transfer (MIDT) ticket booking data, scaled by Sabre to account for non - MIDT bookings (e.g., carrier direct sales). Sabre uses more than 25 booking and reporting data sources, including DOT data, to develop and calibrate market sizes. The base data set used in the model was from the year ended September 30, 2011, which was the most recent data available at the time of the analysis.

In addition to the base market sizes (i.e. current demand), the market growth that resulted from new services (referred to as market "stimulation") was estimated and included when calculating both the performance of the new flights as well as the impact on existing carriers and gateway airports. Specifically, stimulation was assumed to result from two sources: 1) lower prices; and 2) improved quality of air service. Price stimulation rates were based on

market price elasticities, the Southwest yield curve, the degree of market power of the new entrant carrier and the available capacity on new flights. Quality of service stimulation rates were calculated using a method based on the improvement in quality of air service (measured by QSI value). It has conservatively been assumed that new services receive their fair share (i.e., forecast market share) of stimulation.

4. Developed Phase Scenario Results

4.1 Incremental Passenger Forecast

The overall results for the Developed Phase Scenario, in terms of traffic diversion and recapture, **indicate that more than 1.5 million additional passengers will travel through the two Houston commercial service airports.** While initially it is anticipated that there will be some diversion of traffic from Houston Bush Intercontinental to Houston Hobby, projections for the Developed Phase Scenario show not only that this traffic will be recaptured at Houston Bush Intercontinental through market stimulation, **there will be a notable net traffic *gain* at Houston Bush Intercontinental.** These results are summarized in Exhibit 16 below.

Exhibit 16: Developed Phase Scenario Results

Developed Phase Results (000s)	HOU	IAH	Houston
Houston Market Stimulation	599	-	599
Diversion from Other Cities	423	-	423
Diversion from IAH	445	(445)	-
IAH Market Stimulation/Recapture	-	539	539
Total Incremental Passengers	1,468	94	1,562

Source: Inter*VISTAS* analysis

It is important to understand that diversion is a reallocation of passengers on new services before stimulation, while recapture is allocating price-stimulated passengers back into the market based on fair share market principles. **In the Developed Phase Scenario, the recapture is greater than the diversion and therefore both Houston Hobby and Houston Bush Intercontinental will see increased passengers.**

In the context of today's market, the projected diversion figures for both phases are a very small percentage (approximately one percent) of total Houston Bush Intercontinental traffic, which totaled 40.1 million passengers in 2011. It is estimated that 50 percent of the Houston Bush Intercontinental passengers in 2011 were on connecting itineraries. These connecting passengers are primarily in markets that would be unaffected by any new short-haul

international service at Houston Hobby. The 1.6 million projected net new annual passengers that would come to the broader Houston market in the Developed Phase Scenario would represent an important addition to Houston's air travel marketplace, providing a significant positive economic impact for the Houston region and its residents.

4.2 Current and Projected Air Fares

DOT data shows that in recent years there has been a trend towards higher average fares and fare premiums for domestic markets at Houston Bush Intercontinental.[10] A major feature of the traffic forecast for Houston Hobby's international services is that similar circumstances exist in international markets served at Houston Bush Intercontinental, and that low-cost carrier service and pricing would be introduced into the Greater Houston international air service market by Southwest's commencement of international flights at Houston Hobby. For this projection, Southwest's domestic market pricing was used as a proxy for its pricing of new international services. It should be noted that international fare data comparable to the domestic fare data used in the DOT reports and rankings is not publicly available.

A parallel example can be seen in the expansion of international services at Chicago's Midway Airport, in competition with the international services offered at O'Hare, described above. Exhibit 17 demonstrates the significantly higher fares being paid by Houston travelers to many of the destinations also served by Chicago airports. The comparisons shown in the Exhibit highlight the potential for fare decreases in Houston if similar competition is provided to Houston Bush Intercontinental's existing international services by new international services at Houston Hobby.

[10] See, for example, the Bureau of Transportation Statistics (BTS) ranking of U.S. airports by average domestic air fares at http://www.bts.gov/programs/economics_and_finance/air_travel_price_index/html/table_08.html , where Houston Bush Intercontinental is ranked as having the 4th highest average domestic fares in the country for the third quarter of 2011, and the Greater Houston metropolitan area is ranked with the highest average domestic fares for the second quarter of 2011. In March 2012, the *Domestic Airline Fares Consumer Report* of the DOT's Office of Aviation Analysis ranked the airport markets served from Houston Bush Intercontinental as having the second highest fare premium in the country in markets with more than 20 passengers per day for the third quarter of 2011. The report also states that no passengers using IAH have access to low fare airlines operating at the airport. This report can be downloaded at http://ostpxweb.dot.gov/aviation/domfares/web20113.pdf , and the rankings are reported in Table 7 of the report. The DOT defines a fare premium as the extra cost that consumer pay to travel in a market, compared with the average nationwide cost of domestic air travel.

Exhibit 17: Chicago vs. Houston Fare Comparison

Destination	Houston Average Fare	Distance to Houston (mi)	Nonstop Carriers in Houston	Chicago Average Fare	Distance to Chicago (mi)	Nonstop Carriers in Chicago	Chicago vs. Houston Fare Difference
Bogota	$738	2,228	United	$387	2,712	None	$351
Caracas	$775	2,262	United	$512	2,510	None	$263
Cancun	$208	812	United	$182	1,448	American, United, USA 3000**	$26
Guadalajara	$226	821	United	$174	1,733	Aeromexico, Volaris*	$52
Liberia, (Costa Rica)	$309	1,481	United	$256	2,173	United, USA 3000**	$53
Mexico City	$231	765	United, Aeromexico	$240	1,689	American, Aeromexico, United	**$9**
Monterrey	$173	411	Aeromexico, United, VivaAerobus	$244	1,317	Aeromexico	**$71**
Puerto Vallarta	$206	892	United	$196	1,785	American, United, USA 3000**	$10
San Salvador	$259	1,212	TACA, United	$261	1,973	TACA	**$2**
San Jose del Cabo	$265	1,005	United	$246	1,808	American, United	$19
San Jose, (Costa Rica)	$324	1,557	United	$237	2,221	None	$87

*Volaris operates from Chicago Midway while all other Chicago service is operated from Chicago O'Hare.
** USA 3000 service has been replaced by Frontier in Liberia, Costa Rica, and Puerto Vallarta. No replacement has been finalized by the U.S. DOT for Chicago-Cancun.
Note: VivaAerobus started Chicago Midway-Monterrey after the time period of the above dataset. In addition, Aeromexico's Houston-Monterrey service has since been discontinued.
Source: Sabre ADI YE 3Q 2011

On current services from Houston Bush Intercontinental to the destinations projected to be served from Houston Hobby in the Developed Phase Scenario, the average fares from Chicago to all destinations other than Mexico City, Monterrey and San Salvador were less than the fares in the same markets from Houston (see Exhibit 17 above). In most cases, the fares

were lower from Chicago due to increased competition in the nonstop markets. Similarly, in the three markets where Houston had lower fares than Chicago, United was not the only carrier offering nonstop service. It should also be recognized that while Chicago is nearly 1,000 miles further from these cities than is Houston, it also allows for a number of single-connection options from Chicago through various gateways like Atlanta, Miami, Dallas/Ft. Worth or Houston Bush Intercontinental. This type of connecting service often has a moderating influence on fares offered by operators of nonstop flights. But in most of the above markets, making a connection is not a realistic option for Houston travelers due to Houston's location near the southern border of the country. In contrast to Houston's local fares to cities in Mexico and Central America, the fares to both Bogota and Caracas are very high; notably, there is no nonstop competition.

Competition in the above Chicago markets has been heightened by the start of new low-fare carrier service at MDW. During 2011, Volaris started nonstop MDW--Guadalajara service, and has since added nonstop service to Mexico City. VivaAerobus also began nonstop service from MDW to Monterrey, Mexico, and pending final U.S. Government approval, Southwest (through its AirTran subsidiary) intends to begin new nonstop service between MDW and Cancun.

Exhibit 18 below summarizes a comparison between the current average fares and the projected lower fares introduced into the analysis. Significant cost savings for Houston travelers are anticipated.

Exhibit 18: Current and Projected Fares for Houston Markets

Market	Average One-Way Base Fare	Projected Average One-Way Fare under New LCC	Decrease in Fare	Decrease in Fare (Percentage)
Houston - Bogota	$739	$133	$606	-82%
Houston - Cancun	$207	$108	$99	-48%
Houston - Caracas	$768	$134	$634	-83%
Houston - Guadalajara	$230	$108	$122	-53%
Houston - Liberia (Costa Rica)	$311	$122	$189	-61%
Houston – Mexico City**	$233	$106	$127	-55%
Houston – Monterrey	$174	$93	$81	-47%
Houston - Puerto Vallarta	$207	$110	$97	-47%
Houston – San Jose (Costa Rica)	$323	$123	$200	-62%
Houston - San Jose del Cabo	$266	$113	$153	-58%
Houston – San Salvador	$262	$117	$145	-55%

Source: Current Fare Data from Sabre ADI adjusted data, YE 3Q 2011
*Analysis of current Southwest pricing in the U.S. domestic market, YE 3Q 2011
** The same pricing for Mexico City was applied to the local Toluca market

5. Economic Impact

5.1 2011 GRA Economic Impact Study for Houston Airport System

The economic impact analysis of new international air service at Houston Hobby follows the same methodology that was used in a 2011 study to calculate the total economic impact of the three HAS airports. The 2011 study found the three HAS airports, taken together, are responsible for over 234,000 jobs, over $8.8 billion in earnings and over $27.5 billion in annual economic output in the Houston MSA (Exhibit 19). Houston Hobby contributed 16 percent ($4.5 billion) of this total economic output.

Exhibit 19: Total Economic Impacts of HAS Airports

Type of Impact	Regional Employment	Earnings $Billions	Output $Billions
Direct	47,456	$3.2	$8.7
Indirect	47,713	$1.1	$3.7
Induced	139,113	$4.6	$15.2
Total	234,282	$8.9	$27.6

In the 2011 study and in the present analysis, economic impacts are identified as direct, indirect and induced. Direct impacts are generated by air transportation services and other direct uses of the airports. These impacts are measured in the forms of employment, earnings, and output or economic activity associated with airport dependent companies and government entities. Indirect impacts are derived by estimating the regional expenditures of air travelers who visit the Houston area. Induced impacts represent the economic effects of the spending and repeated re-spending of these earnings as they cycle through the Houston area economy.[11]

[11] Induced impacts are estimating using the U.S. Bureau of Economic Analysis RIMS II Model. (http://www.bea.gov/regional/rims/). This model makes it possible to use the direct and indirect impact estimates to derive the follow-on, "induced" effects of those expenditures throughout the Houston economy.

Using the 2011 report, GRA calculated the direct, indirect and induced impacts-per-enplanement for the Initial Phase Scenario and the Developed Phase Scenario for the following sectors: Airlines, Airport Passenger Services, Passenger Ground Transportation, Airport and Aircraft Services, Cargo Services, Non-Airlines Aircraft Operations, Government, Dept. of Defense and Visitor. This impact-per-enplanement calculator is used to identify how a change in the number of enplanements due to new services affects the impact of that airport and the overall HAS-wide impact for a given year.

5.2 Impact of New International Service at Houston Hobby

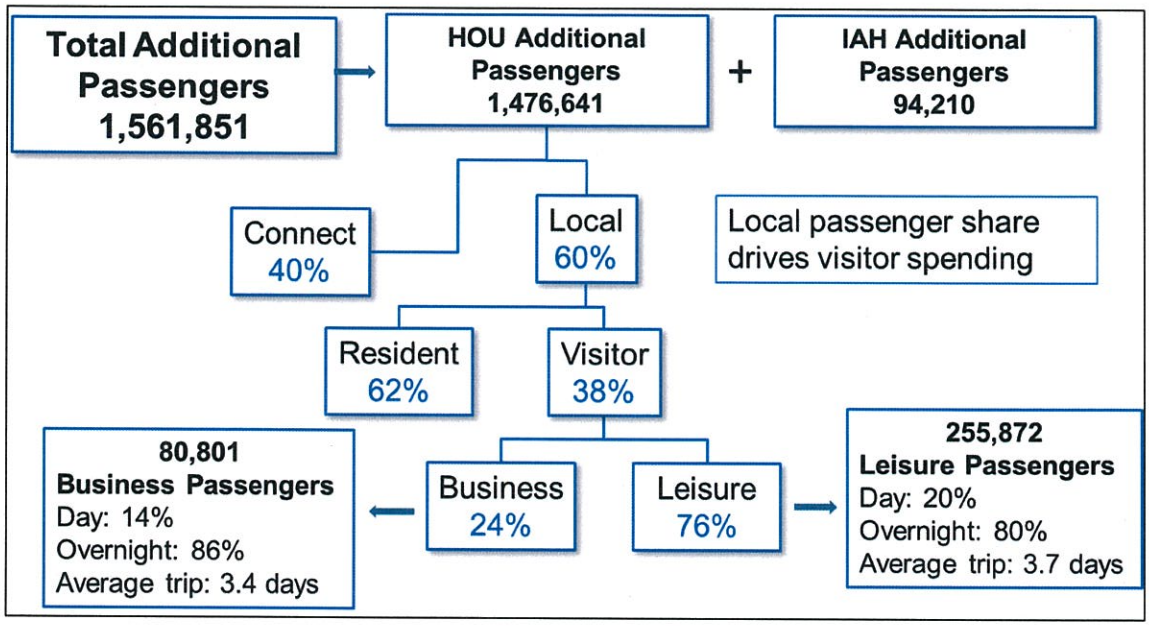
The incremental impacts of new international service are assessed and quantified, both at a system level and for the individual airports, using the economic values and relationships developed in that study. The present analysis looks at the impact of new service by four carriers to an additional 12 Mexican, Central American and South American markets. The carriers are Southwest,[12] Volaris,[13] VivaAerobus[14] and Interjet.[15] **It is estimated that the projected international services will result in an additional 846,514 international passengers at Houston Hobby in the transitional Initial Phase Scenario of this new service and 1,467,641 such passengers in the Developed Phase Scenario. As a result of these new services, Houston Bush Intercontinental would also see a net gain in international passengers, for a combined overall gain at both airports of over 1.5 million passengers in the Developed Phase Scenario.**

Exhibit 20 below disaggregates the additional passengers projected for the Developed Phase Scenario into the local/connecting, resident/visitor and business/leisure shares anticipated for Houston Hobby. The ratios of business and leisure passengers are important to capture because they affect visitor spending impacts. It is these increases in air travel that lead to a projected increase in the economic impact on the Houston regional economy. Simply put, more travel by Houston residents means that there would be additional employment and income

[12] Proposed markets: Mexico City, Cancun, Monterrey, San Jose del Cabo, San Jose (Costa Rica), Guadalajara, Puerto Vallarta, San Salvador, Bogota, Caracas and Liberia (Costa Rica)
[13] Proposed market: Mexico City
[14] Proposed market: Monterrey
[15] Proposed market: Toluca

in the airport and airport-related sectors. In addition to increases in these sectors, more visitors to Houston results in more money being spent for shopping, hotels, restaurant and other meals, and local travel, among other categories.

Exhibit 20: New International Passenger Composition in Developed Phase Scenario



In the Developed Phase Scenario, new international service at Houston Hobby increases the economic impact of the Houston Airport System by $1.62 billion. Exhibit 21 below presents the incremental impacts of the new service by airport and by type of impact. Incremental impact is the impact of the additional passengers only; the total impact of the airport or airport system is not reported here. As can be seen, the largest economic impacts are at Houston Hobby. However, Houston Bush Intercontinental also serves additional international passengers and generates additional economic impacts for the region because the increased service levels and fare competition stimulate the overall Houston market.

Exhibit 21: Developed Phase Scenario Incremental Impacts by Type

	Direct ("on Airport")	Indirect ("Visitor Spending")	Induced ("Houston MSA")	Total
HOU				
Regional Jobs	2,931	3,489	10,523	**16,943**
Earnings (mil)	$192.9	$72.5	$330.4	**$595.8**
Output (mil)	$371.3	$305.5	$794.2	**$1,471.0**
IAH				
Regional Jobs	236	225	707	**1,168**
Earnings (mil)	$17.1	$5.3	$24.1	**$46.5**
Output (mil)	$50.5	$17.2	$84.4	**$152.1**
HAS				
Regional Jobs	3,167	3,714	11,230	**18,111**
Earnings (mil)	$210.0	$77.8	$354.5	**$642.3**
Output (mil)	$421.8	$322.7	$878.6	**$1,623.1**

6. Conclusion

The analysis presented in this report shows that, in the context of existing patterns of international service at the Houston airports, the addition of international airline services at Houston Hobby will have a significant positive impact on the region's economy. More air travel means additional traveler spending and increased local employment at the airports and in the travel and tourism sector that serves these passengers. This includes beneficial impacts for the shopping and retail sector, the lodging and entertainment sector, and restaurants of all types.

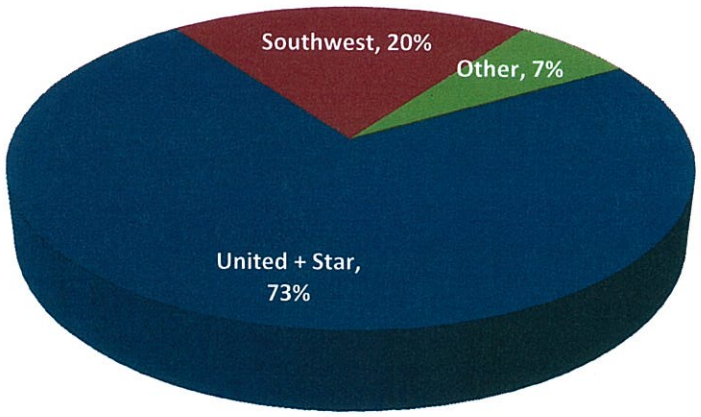
Much of this impact comes about as a result of increased competition in the international markets projected to be served from Houston Hobby by Southwest and other airlines. With international services at Houston Hobby, Houston would join other major U.S. metropolitan areas that provide international services from more than one airport in their region, such as Chicago, Los Angeles, Miami, New York, San Francisco and Washington, DC. It is important to recognize that Southwest's new international service is highly likely to occur even if it is not provided from Houston Hobby and is provided instead from U.S. airports outside the Houston region. Because of this, and because Southwest will not split its Houston services and provide international flights from Houston Bush Intercontinental, some of the competitive effects that will influence service patterns at Houston Bush Intercontinental will take place, to a greater or lesser degree, regardless of whether the new operations use Houston Hobby. However, the economic benefits for Greater Houston projected in this report depend on the new international services by Southwest and the other airlines actually being provided at Houston Hobby.

As noted earlier in the report, each of the Houston commercial service airports is dominated by a single carrier (United at Houston Bush Intercontinental and Southwest at Houston Hobby). However, when taken together, the domestic services at Houston Hobby and Houston Bush Intercontinental provide a competitive balance for one another for HAS and the Greater Houston region overall, which benefits Houston residents and businesses. However, there is no similar competition or balance for international services. Expanding this competition through introduction at Houston Hobby of service to a number of markets in Mexico, the Caribbean, and Central and South America will further extend the benefits of competition, lower fares and greater service options to more Houston residents and visitors. These new services

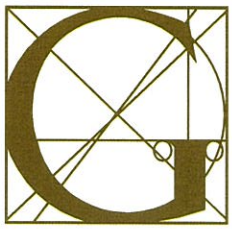
at Houston Hobby will not negatively impact the long-haul international offerings at Houston Bush Intercontinental because of the different types of aircraft that service these markets and the limited runway length at Houston Hobby.

Exhibit 22 below illustrates the distribution of seats in international service in Latin American and Caribbean markets for Houston commercial service airports in the projected Developed Phase Scenario of new international service at Houston Hobby. Even in this scenario, United and Star Alliance are projected to retain a 73 percent market share. This projected distribution of international activity between the two airports is in contrast to the complete absence of scheduled international passenger air service for Houston residents and visitors at Houston Hobby, as shown earlier in Exhibit 8. **For Greater Houston, it is this change, which occurs due to the introduction of new nonstop services at Houston Hobby to Mexico, Central America, and northern South America by Southwest and other airlines, that is the principal source of the regional economic benefits described in this report.**

Exhibit 22: Distribution of Short-Haul International (Mexico, Caribbean, Central America and Northern South America) Seats for Houston Commercial Service Airports in the Developed Phase Scenario



Source: Official Airline Guide & Inter*VISTAS* Developed Phase Scenario



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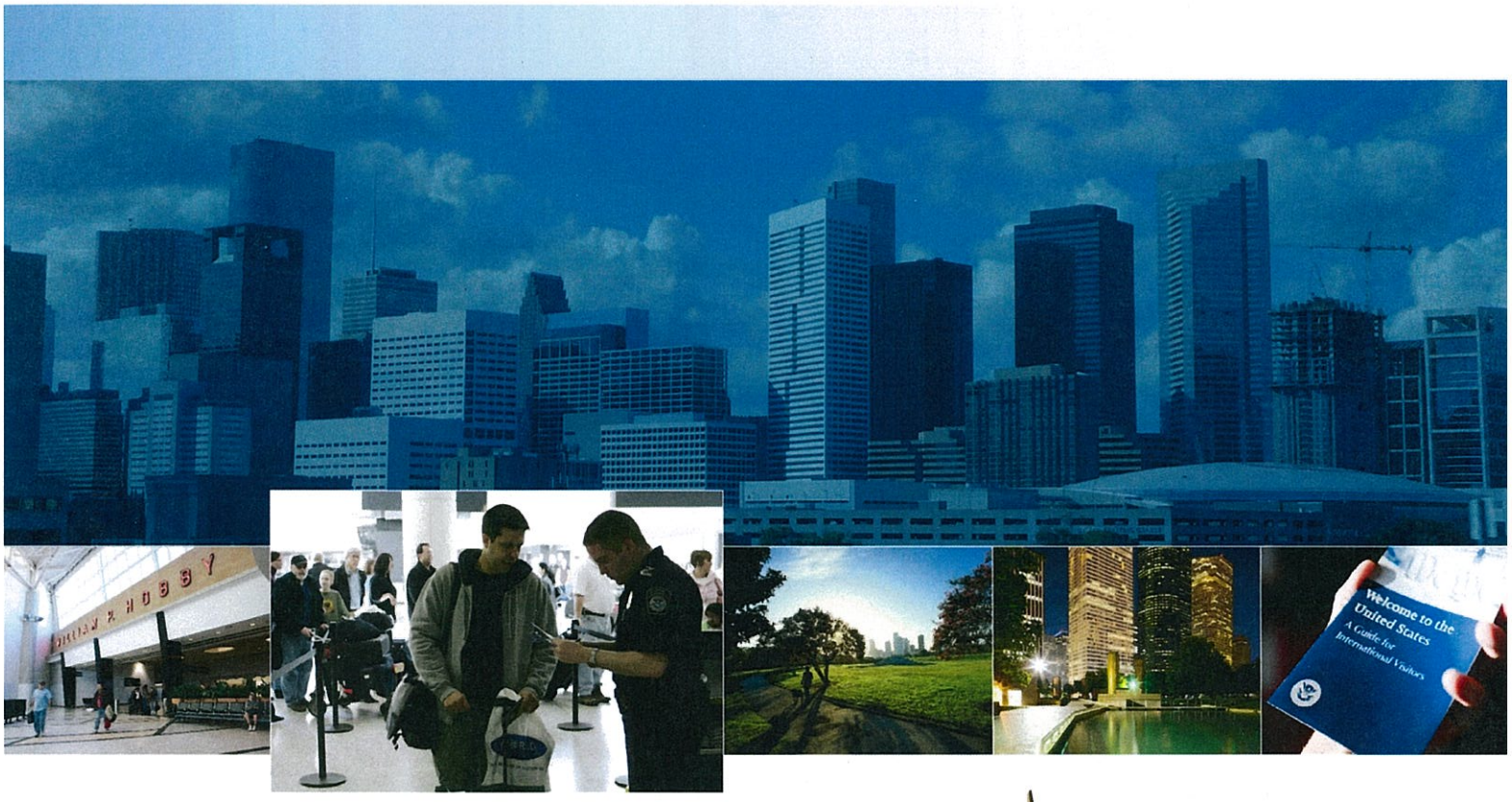


Technical Appendices for *The Economic Impact of International Commercial Air Services at William P. Hobby Airport*

April 2, 2012
Prepared for
Houston Airport System
Prepared by
GRA, Incorporated
Inter*VISTAS* Consulting LLC

Contents

Appendix I – Inter*VISTAS* Assumptions and Methodology

The InterVISTAS Model

The Quality of Service Index (QSI) is a tool for analyzing and forecasting market share and traffic levels. QSI model results will indicate:

a) The change in total traffic in individual markets and in the aggregate;

b) The change in the quality of service in each market and for each individual carrier operating on that route; and

c) The level of traffic carried by individual carriers on each route and in the aggregate. This allows the computation of forecast market share changes, the total number of tickets sold by each carrier and the extent to which each carrier's ticket sales consists of its existing traffic, traffic diverted from competitors due to improved service quality, and the share of newly generated traffic ("stimulation") that the carrier captures.

The QSI model was originally designed for regulatory use by the U.S. Civil Aeronautics Board (CAB) in the 1970s. At the time, the CAB was required to implement a public convenience and necessity (PCN) test when considering applications for increased air service. The CAB had also been facing endless requests for fare increases in what it perceived to be an endless quality – fare spiral. If a carrier added a flight in an authorized market,[1] its costs increased. It would then seek authorization for a fare increase. This, in turn, made the addition of further capacity profitable and the cycle was repeated. By the early 1970s, this type of service-cost-price spiral resulted in the average load factor in U.S. commercial air service dropping below 50%.[2] In response to PCN and fare increase evaluations, the CAB developed a model to predict traffic levels on a route and the division of market share among carriers on the

[1] In the later years of the regulated era in the U.S., the CAB did not regulate domestic flight frequency or seat capacity.

[2] The U.S. Air Transport Association reports that in 1970, the average passenger load factor was 49.7% and that in 1971 it fell to 48.5%. After rising briefly, it reached an all-time low of 46.5% in 1974. Source: *http://www.airlines.org/Economics/ DataAnalysis/Pages/AnnualResultsUSAirlines.aspx.* Note that the load factor was 63% in 1956, and declined throughout the late 1950s and 1960s to the lows of 1970/71. While 1971 was a recession year, the load factor weakening was systemic during the previous 15 years.

route. The model was based on the level of service offered by carriers (consisting of the number of flights and aircraft type) and other factors (essentially brand loyalty factors). The development of the model enabled a policy where both PCN and fare increases were based on a CAB-specified level of service for each route. Fare increase requests based on a higher frequency of service or seat capacity than the CAB saw as appropriate for the route generally would not be authorized.

While the QSI methodology was originally developed for regulatory purposes, it has been widely used by carriers and route analysts (e.g., for airport marketing purposes) around the world to assess the effect of any changes to service levels on a route. QSI is a route level tool that is not designed to optimize a carrier's route network, but rather to predict what traffic and market share it will achieve on any particular route when it commits or withdraws capacity, engages in code-sharing, etc.

The QSI model assigns a score to each carrier based on a range of factors. While the original QSI model developed by the CAB was based, in part, on econometric analysis, in practice over the thirty-plus years it has been in use, researchers have instead used a calibration approach whereby most of the model parameters (e.g., the effects of frequency and aircraft types) are established on a trial and error basis for a general market so as to produce forecasts which are reasonably consistent with actual traffic and market shares. Some model factors are then calibrated to individual markets (e.g., city presence) when actual traffic shares differ in a systematic way from the predictions of the general parameters.

Profit Essentials QSI

The QSI analysis in this report uses Sabre's Profit Essentials QSI model. Sabre is one of the world's largest information technology providers to the aviation industry. Profit Essentials is a commercial network planning software package developed, maintained and updated by Sabre. It is used by airlines, airports, aircraft manufacturers, governments and consultants around the world. Current and past airline users include Delta Air Lines, Alaska Airlines, Gulf Air and others.

The model is designed to identify valid flight itineraries on given origin/destination city-pairs, and to quantify the 'quality' of each itinerary by applying coefficients to a number of

factors which influence consumer choice among carriers. The methodology is one which models the consumer's choice of carrier on an origin-destination pair. The Profit Essentials model's coefficients and parameter files are calibrated by Sabre on a regular basis. The long period of time in which this model has been in commercial use is testimony to the reliability of its predictions.

Model Factors

An overall QSI value is calculated for each itinerary based upon up to ten factors. For the analysis of international service at Houston Hobby, five of the model's factors were utilized[3]:

- **Directness of service.** This reflects passenger preference for nonstop flights versus stopover or connecting flights. Nonstop flights receive a QSI coefficient of 1.0 in the model. One-stop flights receive a coefficient of 0.245 (i.e., they are approximately 24.5% as attractive as a nonstop flight). Similarly, single connection flights receive a coefficient of 0.092 (i.e., they are approximately 9.2% as attractive as a nonstop flight).

- **Elapsed travel time**, which reflects passenger preference for itineraries with shorter total travel time (including connecting time, where applicable). The model applies a coefficient of 1.0 for the itinerary with the shortest elapsed travel time within each category of flight (i.e., the fastest nonstop flight receives 1.0, the fastest one-stop flight receives 1.0, and the fastest connecting flight receives 1.0). Flights with longer elapsed times are penalized if their elapsed times exceed defined thresholds: itineraries with elapsed times more than 90 minutes greater than the 'best' itinerary receive a coefficient of 0.5 (a 50% penalty), while those with times more than 180 minutes greater than the 'best' itinerary receive a coefficient of 0.25 (a 75% penalty).

- **Aircraft type.** This factor reflects that passengers generally prefer the speed, comfort and baggage capacity of larger aircraft to those characteristics on smaller aircraft. Coefficients for each itinerary are based on seat capacity ranges; aircraft with more seats receive higher coefficients. Jet aircraft receive higher coefficients than turboprop aircraft, even if seat capacities are the same. A narrowbody jet with 121-140 seats receives a coefficient of 1.0048. By comparison, a 50-seat regional jet

[3] Profit Essentials QSI values include five additional factors that were not used in the estimates for the international service results at Houston Hobby. These five factors are city presence, carrier preference, time of day, yield and share gap.

receives a coefficient of 0.79, while a 300-seat widebody jet receives a coefficient of 1.53.

- **Day-of-week.** Certain days are more popular for air travel than others. Friday and Sunday are popular days for business travelers, while Saturday is generally the least popular travel day. Day-of-week coefficients are defined such that itineraries which operate on a daily basis receive a coefficient of 1.00. Those which operate on a less-than-daily basis receive a coefficient less than 1.00 or greater than 1.00, depending on the attractiveness of the specific days operated.[4] Note that this coefficient is subsequently multiplied by the number of flights, so a daily flight would receive a score of 7.00 per week, while a flight operating only on Saturday would receive a score of 0.881 and a Sunday and Friday set of flights might receive a score of 2.126.
- **Flight frequency.** Passengers value the increased scheduling flexibility of high-frequency air service (daily flights are preferable to less-than-daily, double-daily are preferable to daily, etc.). As a result, the model adjusts the QSI values for each itinerary based on the scheduled flight frequency. All else being equal, a carrier operating twice as many flights in a market as its competitor will receive double the QSI value.

As described earlier, the QSI value for a given itinerary is simply the product of the coefficients (C) for that itinerary and the frequency of the service: QSI value = C(directness of service) x C(elapsed travel time) x C(aircraft type) x C(day-of-week) x monthly frequency. The following example illustrates the QSI scoring for a new Southwest St. Louis – Mexico City itinerary using Profit Essentials coefficients. The flight departs St. Louis at 08:00, connects in Houston Hobby and then arrives at 14:20 in Cancun, and is operated with a 737-700 on each sector six times a week.

[4] Specific day-of-week coefficients are as follows: Monday 0.984, Tuesday 0.946, Wednesday 1.016, Thursday 1.046, Friday 1.064, Saturday 0.881 and Sunday 1.062. To calculate the coefficient for a specific itinerary, Profit Essentials applies the average coefficient for the days of the week that itinerary operates.

The applicable coefficients are shown in Exhibit 1-1 below:

Exhibit 1-1: Coefficients

Directness of service:	0.09252
x Elapsed travel time:	0.50000
x Aircraft type:	1.00480
x Day of week:	1.05156
Product of above =	**0.04888**
x Monthly frequency:	24
= Total QSI Value:	**1.17315**

The InterVISTAS Model Assumptions

The following assumptions were made in developing the model for this analysis of new international air service at Houston Hobby Airport:

Base Model Assumptions

1) Schedules used in the model were based on those filed by airlines in December 2011 for service to be operated in June 2012.
2) All AirTran markets that already have been, or soon will be, discontinued were not included: Huntsville (HSV), Sarasota (SRQ), Lexington, KY (LEX), Allentown (ABE), Harrisburg (MDT), White Plains (HPN) and Newport News (PHF).
3) All other AirTran operated services were changed to Southwest operated services.
4) New services from Austin and Denver to Mexico announced in January 2012, and Profit Essentials' associated connections to those services, have been taken into account.
5) Market circuity has been capped at 140% (i.e., no city pair has been included in the analysis if a connecting itinerary via HOU would involve more than 140% of the great circle distance for that city pair).

6) Inter*VISTAS* further calibrated the Profit Essentials QSI values for new flights by using a market share methodology. The following proxy markets were used to calibrate the QSI values of new flights in the local Houston markets, but not in any connecting markets:
    a. VivaAerobus: Houston – Monterrey
    b. Volaris: San Francisco Bay Area – Guadalajara / Mexico City
    c. Southwest: the average of the Chicago Area (Chicago O'Hare and Chicago Midway) to all domestic markets.
7) Market sizes were sourced from the Sabre Airport Data Intelligence (ADI) database. Market sizes and average fares presented were for the twelve months ended September 30, 2011. Market sizes have not been further scaled to reflect growth prior to service start-up (i.e., between the present time and the date when the services ultimately begin).
8) For the Initial Phase and Developed Phase scenarios that were created, there was no assumed additional growth specific to the Houston and U.S. markets to international points. This is a conservative approach because Inter*VISTAS* did not apply growth to the other aspects of any carrier's Houston services or total network.
9) No codeshare service between Southwest and Volaris has been considered. Volaris passengers are considered to be local to Houston.
10) A Minimum Connect Time (MCT) of 60 minutes was assumed at Houston Hobby due to the projected size of the facility and the increased presence of trusted traveler programs in the future. This MCT is similar to those found at other airports with a large Southwest presence such as Fort Lauderdale and Chicago Midway.
11) Although Toluca and Mexico City share a composite market, their QSIs have not been combined for the purpose of this analysis. However, the Mexico City - Houston market size and average fare were used as a proxy for Toluca - Houston.
12) Average fares do not include taxes and fees.

<u>Industry-Related Assumptions</u>

1) No growth in flight or seat capacity by United or any other carrier at either Houston airport, beyond the specific new flights assumed to be added at Houston Hobby, was recognized in the analysis.
2) It was assumed that Houston Hobby would have a maximum of only five gates in the international facility in the Developed Phase Scenario so that terminal capacity and the potential for growth in new entrant flights would be bounded.

3) Given Houston Hobby's 7,600 foot runway length, it was assumed that all new international flights at Houston Hobby would be operated with aircraft no larger than the Boeing B737 and Airbus A320 families of aircraft, effectively limiting the range of any new international flights that could be added.
4) Southwest will add six seats to each Boeing 737-700 aircraft, bringing the seat capacity up to 143 seats per aircraft.

Bilateral Issues

All new international airline services, including those anticipated to be added at Houston Hobby, take place within the framework of bilateral and multilateral intergovernmental agreements (generally referred to as "bilaterals") that delineate the services that may be provided between the U.S. and the applicable foreign country. While nearly all U.S. domestic air service markets have been "deregulated" - generally enabling carriers to freely select the cities they serve, the number of flights they offer and the fares they can charge - for international flights, both the U.S. and the foreign government must first issue specific authority and may do so only if permitted under the applicable bilateral agreement.

Historically, many bilaterals have included significant limitations on the type and extent of the authority that can be approved. Today the United States has a policy of negotiating "Open Skies" bilaterals with foreign governments that remove restrictions on most international airline market decisions, but not all countries have been willing to sign such agreements. In developing the Initial Phase and Developed Phase scenarios for international services at Houston Hobby, we reviewed the bilateral agreements applicable to the destinations targeted. In all cases but two - Mexico and Venezuela - an Open Skies agreement is in effect, enabling carriers to freely select the markets they will serve from the U.S. While the Mexico and Venezuela bilaterals include some limitations on the extent to which new services can be commenced immediately, the U.S. government has in place an ongoing effort to reach full liberalization in all markets. With respect to Mexico in particular, the close linkages between the U.S. and Mexican

economies and their respective large markets already support a broad set of nonstop routes and low-cost flights operated by airlines of both nations despite the absence of an Open Skies agreement.

While any bilateral hurdles are being resolved, Southwest and the foreign carriers included in the scenarios may in the shorter term choose to utilize their aircraft in fewer or different markets where bilateral impediments are not present, but this does not change the conclusions of the Developed Phase Scenario.

Assessing Potential Routes and Creating Scenarios

Inter*VISTAS* and the HAS team analyzed market size data for the year ended September 30, 2011, to understand the Houston area market dynamics as well as the broader U.S. market to the Caribbean, Mexico, Central America, and northern South America.[5] The team also received intelligence from carriers at various conferences and meetings with HAS staff, and solicited interest from various airlines including U.S. carriers as well as Mexican low-cost carriers (LCCs).

After numerous markets were reviewed for their potential, Inter*VISTAS* and HAS finalized the two following scenarios for Initial and Developed phases, as described in Exhibits 1-2 and 1-3 below:

[5] The data source was SabreADI (which contains 25+ booking and reporting data sources, including the U.S. DOT, to develop market sizes).

Exhibit 1-2: Initial Phase Scenario Service Frequency by Carrier and Market

Destination	Airline	Frequency
Cancun	Southwest	3 Daily
Mexico City	Southwest Volaris	3 Daily 1 Daily
Monterrey	VivaAerobus	5 Weekly
San Jose, Costa Rica	Southwest	1 Daily
San Jose del Cabo	Southwest	2 Daily
San Salvador	Southwest	1 Daily
Total	3 Airlines	Approx. 12 Daily

Exhibit 1-3: Developed Phase Scenario Service Frequency by Carrier and Market (in addition to those introduced in the Initial Phase Scenario)

Destination	Airline	Frequency
Bogota, Colombia	Southwest	1 New Daily
Cancun	Southwest	1 Additional Daily
Caracas, Venezuela	Southwest	1 New Daily
Guadalajara	Southwest	1 New Daily
Liberia, Costa Rica	Southwest	1 New Daily
Mexico City	Southwest Volaris	1 Additional Daily 1 Additional Daily
Monterrey	Southwest VivaAerobus	2 New Daily 2 Additional Weekly
Puerto Vallarta	Southwest	1 New Daily
Toluca	Interjet	1 New Daily
Total	4 Airlines	23 Daily

In developing these scenarios, it was assumed that Southwest's domestic services at Houston Hobby would increase to include new once-daily nonstop service to Detroit, Columbus, Salt Lake City and Sacramento. These four cities were among the top domestic O&D markets (for Southwest) that were not served on a nonstop basis from Houston Hobby. This assumed nonstop market growth follows the recent pattern established by Southwest of expanding its Houston Hobby operation at least as fast as anywhere else on its system. Within the past two years, the carrier has added new year-round nonstop service from HOU to Charleston (SC), Greenville/Spartanburg, Panama City (FL) and Newark, as well as seasonal nonstop service to Raleigh/Durham, Kansas City and Seattle. In addition, VivaAerobus, which currently operates from Houston Bush Intercontinental Airport, would be expected to shift its services to Houston Hobby once the airport has developed and opened a Federal Inspection Station (FIS).

Schedule Creation

Schedules were developed based on similar patterns currently operated by U.S. and Mexican carriers. New markets were broken out by Leisure, Business or Mixed (Business and Leisure) categories as noted in Exhibit 1-4 below:

Exhibit 1-4: Market Characteristics

DESCRIPTION	LEISURE	MIXED	BUSINESS
Market Dynamics	**Market has components that are largely concentrated on outbound Leisure and inbound/outbound Ethnic VFR traffic**	**Traffic has dynamics between Leisure and Business**	**Market predominantly is driven by Business traffic**
Impact on Schedules	**Market would tend to leave Houston in the morning, then additional frequencies after a period of time**	**Spread throughout the day, focused on connections**	**Largely focused on afternoon departure and return in morning**
Markets	**Price Sensitive – Low Fares would have a strong impact on stimulation of new passengers**	**Price Sensitivity not as strong as leisure but still evident**	**Low Fares stimulate but business traffic likely to have least amount of response**

Itinerary Development

After schedules had been created for individual markets and flights, a list of routes, both local and connecting, that were attributed to the new services was created using the Profit Essentials model.[6] These new local and connecting routes were then broken down to an itinerary level and analyzed. Each itinerary was given a specific QSI value following the methodology described above. Additionally, at this stage, the composite natures of certain markets were accounted for. Composite markets are those which have multiple airports serving the same region, such as Houston with both Bush Intercontinental and Hobby. Exhibit 1-5 below shows the markets that were considered composites for the analysis:

Exhibit 1-5: Markets

AIRPORTS CONSIDERED	COMPOSITE MARKET
EWR, LGA, ISP, JFK	New York City (NYC+)
IAD, DCA, BWI	Washington, D.C. (DC+)
MIA, FLL	South Florida (SFL+)
IAH, HOU	Houston (HOU+)
DFW, DAL	Dallas/Ft. Worth (DAL+)
ORD, MDW	Chicago (CHI+)
SFO, SJC, OAK	San Francisco Bay Area (SF+)
SNA, ONT, BUR, LGB, LAX	Los Angeles Basin (LA+)

After the markets had been composited, all itineraries were classified as existing services (if the itinerary was not related to new services) or a new service (if the itinerary involved a new flight). An example of a new itinerary would be OKC-HOU-MEX where the QSI value was created specifically due to the new service option via Houston Hobby. An example of an existing service itinerary would be OKC-IAH-MEX where the QSI value was attributed to an

[6] Itineraries were based on June 2012 Official Airline Guide schedules as of December 2011.

existing service option. Itineraries were also classified by the affected 'gateway' (or connecting airport). For example, DFW would be considered the gateway for a passenger traveling on a STL-DFW-CUN itinerary. This information was used to understand the impact of new service at Houston Hobby on other U.S. – Latin America gateways.

Itinerary level QSI data was then aggregated by airline, composite market, gateway and service type (new or existing).

Market Sizes

Base market sizes used in the model were sourced from the Sabre Airport Data Intelligence (ADI) database. This data is based on MIDT ticket booking data, scaled by Sabre to account for non-MIDT bookings (e.g., carrier-direct sales). Sabre uses more than 25 booking and reporting data sources, including U.S. Department of Transportation (DOT) data, to develop and calibrate market sizes. The base data set used in the model was from the year ended September 30, 2011 (YE 3Q 2011), which was the most recent data available at the time of the analysis. Market sizes were incorporated on a composite level.

Circuity

Circuity analyzes the difference between the actual distance traveled and the nonstop distance of a particular market, and it is usually calculated as a percentage. For example, a passenger traveling between Los Angeles and Guadalajara via Houston Hobby would have an itinerary circuity of 167% (or said another way, it would be 67% more circuitous than traveling on a nonstop flight). The analysis incorporates the limitation that new flights offered at Houston Hobby will carry only those passengers traveling on itineraries which have a circuity of 140% or less. Passengers traveling on itineraries with a circuity greater than 140%, like Los Angeles – Houston Hobby – Guadalajara, or Orlando – Houston Hobby – Cancun, have not been considered as a part of this analysis. In reality, however, there will always be some passengers that will travel on highly circuitous routings for a variety of reasons, such as a lower fare, seat availability or frequent flier program benefits. So in this regard, the model is modestly conservative.

Stimulation Assumptions

Two sources of traffic stimulation will result from the addition of new flights at Houston Hobby:

- "Price Stimulation" or "Stimulation from Price Elasticity" – new passengers travelling due to the introduction of lower fares in the markets, which is estimated based on price elasticity calculations; and
- "Service Stimulation" – new passengers travelling due to the convenience resulting from an improved quality of service, which is estimated based on relative QSI value increases.

The following methodology has been used to allocate 'stimulated' passengers among itinerary options in each market:

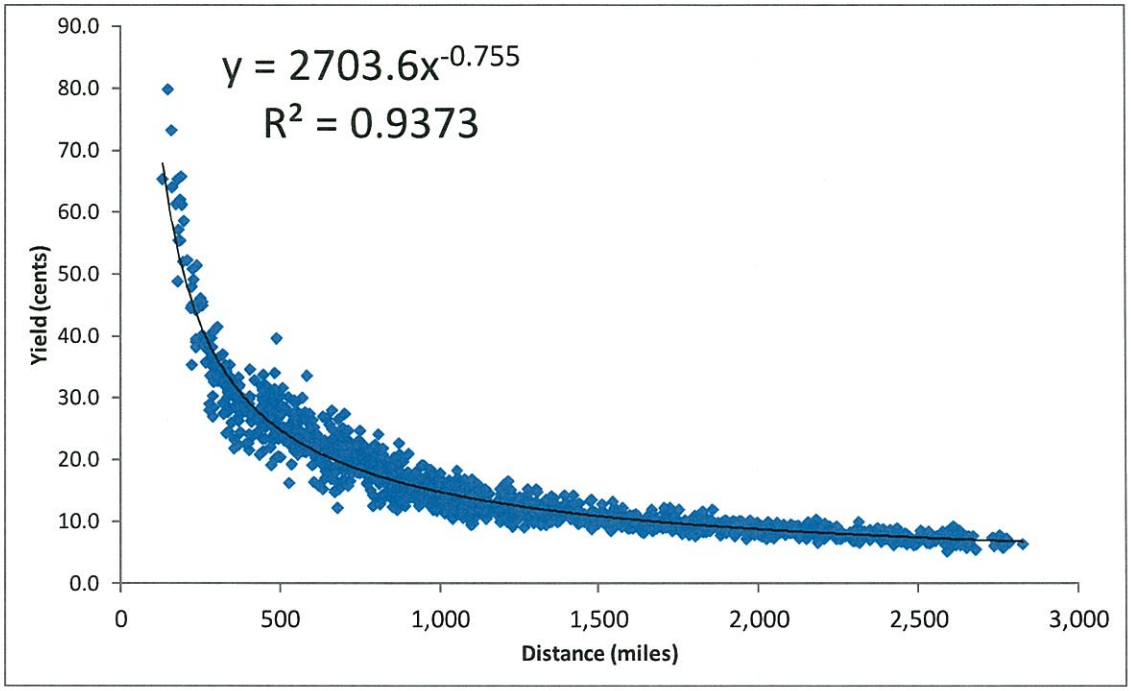
1) Price stimulated passengers represent the theoretical number of new passengers that would be generated by the reduction in average fares, assuming that no capacity constraints existed in the market.
2) Stimulated passengers are allocated to the new flights based on each flight's QSI fair share. Competing airlines' flights were also allocated their fair share of stimulated passengers, since it was assumed that they would also reduce their fares to match those of the new entrant.
3) Unlike Stimulation from Price Elasticity, Service Stimulation (the stimulation from changes in QSI values) was assumed to be concentrated on the new entrant. By definition, market stimulation passengers are travelling solely because of the service quality improvement provided by the new flight(s). While competitors can easily match fares, they cannot as easily match the service level offered by a new entrant. Furthermore, the analysis assumed that there would be no competitor reaction in terms of changes to flight frequencies or seating capacity. Thus, competing airlines' flights were allocated no Service Stimulation.
4) Service Stimulation was capped at 25% (i.e., no market received more than 25% stimulation from the effects of QSI increases due to a new entrant in that market).

Stimulation from Price Elasticity

Price elasticity is a fundamental economic analysis concept where a decrease in cost leads to a subsequent increase in demand. In the context of passenger airline service, price elasticity reflects the amount by which passenger demand changes due to changes in the fare level. As an example, with a price elasticity of -1.0, for a given downward percentage change in fare, an equal upward percentage change in passenger demand will occur. In this analysis, stimulation from price elasticity is passenger stimulation generated by lower fares offered in a market due to increased competition in that market as a result of the new flights being added and due to the assumed competitive pricing response by incumbent airlines. In order to calculate and quantify the new market sizes based on price elasticity, new average fares were calculated. The expected average fare was calculated using a Southwest yield curve as a proxy for all airlines and the new route distance as a proxy for new average fare calculations. The yield curve was created by considering markets and distances on all current Southwest services with over 10 passengers per day each way. New fares were calculated from the new yield using the equation noted in the curve identified in Exhibit 1-6 below[7]:

[7] Source: Year Ended 3rd Quarter 2011, U.S. DOT O&D Data.

Exhibit 1-6: Southwest Yield Curve



Source: U.S. Department of Transportation OD1B, YE 3Q 2011

Using the following methodology as a base, new average fares were calculated for every market, both local and connecting, that was considered in the analysis.

These new fares were used to calculate new market sizes based on price elasticity. Exhibit 1-7 below shows the price elasticities that have been used for each new market:

Exhibit 1-7: New Markets and Price Elasticities

DESCRIPTION	LEISURE	MIXED	BUSINESS
Markets	Cancun, Liberia, San Jose del Cabo, San Jose (CR), San Salvador, Puerto Vallarta, Toluca	Bogota, Guadalajara, Mexico City, Monterrey,	Caracas
Impact on Stimulation (Price Elasticity)	Price Sensitive – Low Fares have a strong stimulation of new passengers	Price Sensitivity not as strong as leisure but still evident	Low Fares Stimulate but business traffic likely to have least amount of response
Price Elasticity (Ep) Coefficients	-1.3	-1.2	-1.1

The price elasticities defined above were applied to base market sizes. Base average fares and the new calculated average fares were used to determine unconstrained new market sizes using the following formula:

Exhibit 1-8: New Passenger Formula

$$\text{New Pax} = \frac{\text{Base Pax (Base Price (1 – Ep) + New Price (1 + Ep)}}{\text{Base Price (1 + Ep) + New Price (1 – Ep)}}$$

As an example of the process defined above, consider St. Louis – Mexico City (one-way)[8]:

Current One-Way Annual Market Size	Current Average One-Way Fare	New Average One-Way Fare	Unconstrained Market Size	Passenger Growth Rate
5,370	$282	$122	15,310	182%

After new unconstrained market sizes are created, pricing power methodology is applied to create a realistic market size to be used in the calculations.

Pricing Power

The analysis assumes that the new entrants will generate stimulation from price elasticity based on their degree of pricing power. Pricing power is added to the new unconstrained market sizes to scale down new market sizes in markets where new carriers will not have as much of a pricing effect. Carriers were considered to have full pricing power (i.e., they were the price leader) in all local Houston markets and in any connecting markets where they were forecast to achieve a dominant market share (i.e., greater than 50%). In these markets which have full pricing power, competing carriers are expected to match the new carrier's fares, and the new market sizes were not scaled down. For markets where new carriers were forecast to have less than a 50% market share, those new carriers were determined to have some level of pricing power which was proportional to their market share, and therefore those new market sizes did not receive the full amount of stimulation and were thus scaled back to the factor proportional to their market share.

[8] The convention is that these process explanations are not numbered exhibits because they illustrate a simple calculation, rather than present data or results.

As an example of the process defined above, again consider St. Louis – Mexico City (one-way):

Forecast Growth Rate	Pricing Power Factor	Adjusted Growth Rate	New Market Size
182%	10%	18%	6,622

It is important to note that this stimulation methodology assumes that new carriers will receive their QSI share, or "fair share", of this stimulation. This means that if the overall market is stimulated, existing carriers will receive their QSI share of that stimulation as well.

Service Stimulation and Final Market Sizes

Service stimulation was generated by an improvement in the quality of air service (as indicated by improvements to frequency, capacity, convenience, etc.) as a result of the new flights. As market stimulation was based on the improvement in the quality of air service, it was forecast based on the improvement in the QSI value resulting from the new flight(s) in a given market, as shown by the formula in Exhibit 1-9 below:

Exhibit 1-9

$$\frac{\text{Square Root of New QSI Value}}{\text{Square Root of Old QSI Value}} \text{ --- } 1$$

With this calculation, markets that experienced a greater improvement in air service quality achieved greater market stimulation. Applying the square root function reflected the expectation that traffic growth would occur at a lower rate than QSI value growth. Stimulated passengers were allocated to the new flights based on QSI fair share to further dampen the market stimulation impact and to increase the conservatism of the analysis. This value was applied to the new market size.

Continuing with the St. Louis – Mexico City (one-way) example:

Market Size after Price Elasticity and Pricing power (from above)	Service Stimulation	Final One-Way Annual Market Size
6,622	6%	7,034

These new market sizes were considered in the rest of the analysis.

Calculating Final QSI Values and Base Load Factors

QSI values were calibrated to reduce the market share gap, the difference between the calculated QSI market share and the actual carrier market share. Inter*VISTAS* considered similar market dynamics for each new entry carrier to develop a factor based on forecast QSI shares vs. historical reported market shares to calibrate the new QSI values. This process was only considered for the local markets. After calibrating QSI values and applying adjustment factors for frequencies, final QSI values were calculated. Once the final QSI values were calculated, all QSI values were split up by market and by flight.

For each individual origin/destination market, itinerary market share was then calculated as:
QSI value for new itinerary / Total QSI value for all itineraries in market = Market Share

Onboard Passengers were then calculated as:
Total Market Size x QSI Market Share (calculated above) = Onboard Passengers

If we continue with the St. Louis – Mexico City example:

Specific Flight's New QSI for STL-MEX	Total QSI value for STL-MEX	Specific Flight's Market Share
2.94	69.11	4.2%

One-Way Annual Market Size (from above)	Specific Flight's Market Share (from above)	Specific Flight's Onboard Passengers
7.034	4.2%	299

All onboard passengers for all possible itineraries, both local and connecting, were then summed by flight to calculate the flight's load factor. The load factor was calculated as:

Sum of Onboard Passengers per Flight / (Total Capacity x completion factor) = Load Factor

As an example, we can consider a new Houston Hobby – Mexico City service:

Summation of Onboard Passengers (annually)	Total Capacity[9] including Completion Factor[10]	Specific Flight's Load Factor
34,319	51,011	67%

Capping Load Factors

It is assumed that airline revenue management systems will increase fares as flights approach their "effective capacity." By definition, passengers stimulated by price elasticity are

[9] The number of seats on an aircraft times the number of operations per year.
[10] It is assumed that a service will operate only 98% of the year because of cancellations due primarily to weather, Air Traffic Control and mechanical issues. It is assumed that all passengers on cancelled flights will be accommodated on alternative flights operated by the carrier.

the most price-sensitive and thus they will not travel if fares are too high. Each new market for Southwest, Volaris and Interjet was capped to the average of what United/Continental experienced at Houston Bush Intercontinental during the YE 3Q 2011 in order to be conservative in the forecast for Houston Hobby. It is also assumed that VivaAerobus will achieve load factors similar to those they are currently achieving at Houston Bush Intercontinental. Specific capped load factors are as noted in Exhibit 1-10 below[11]:

Exhibit 1-10: Capped Load Factors

Market	United/Continental Load Factors at IAH[12]
Mexico City	73%
Cancun	82%
Monterrey	69%
San Jose del Cabo	77%
San Jose, Costa Rica	84%
Guadalajara	83%
Puerto Vallarta	82%
San Salvador	66%
Bogota	67%
Caracas	70%
Liberia	78%
Toluca (Interjet)	74%
Mexico City (Volaris)	73%
Monterrey (VivaAerobus)	61%[13]

This is the not-to-exceed average load factor for each market, but certain individual well-performing flights exceeded that level.[14]

[11] Source: YE 3Q 2011 U.S. DOT T-100 Onboard Data.
[12] U.S. DOT T-100 Onboard YE 3Q 2011.
[13] This is VivaAerobus' current MTY-IAH load factor.

Spilling Traffic

Spill is needed to cap load factors so that they do not exceed the specified load factors shown above, and it is the difference between passengers needed to reach the specified load factor and forecast onboard passengers. In these cases, it is assumed that airline revenue management systems will increase fares as flights approach their "effective capacity". By definition, passengers stimulated by price elasticity are the most price-sensitive, and they will not travel if fares are too high. Passengers from stimulation and passengers from base market size for both local and connecting markets were broken out. If all spill came from stimulation, connecting passengers from stimulation were removed first, followed by local passengers from stimulation.

If further spill is required to achieve capped load factors, new QSI values on a flight were penalized by a factor to reduce a small share of the flight's traffic.[15] The total spill was then 'returned to the market place' and was used to calculate potential recapture (as explained below).

Load Factor and Spill Assumptions

1) Market load factors were the average of all load factors on all new flights in a market, so some flights in a given market may have recorded load factors higher than that noted in the market's overall results, while some flights in that market may have seen lower load factors than that shown in the market's overall results.
2) No individual flight was permitted to have an average load factor higher than 87% (i.e., its "effective capacity").
3) Stimulated passengers were spilled if the load factor on a given new flight from Houston Hobby exceeded the average load factor that was observed in the same market from Houston Bush Intercontinental. In those cases, it was assumed that airline revenue management systems would increase the fares on those flights that approach their "effective capacity". By definition, passengers stimulated by price elasticity are the most price-sensitive, and they will not travel if fares are too high. These passengers were the first to be spilled. In those cases where spill was greater than the number of passengers

[14] This step was applied in the Developed Phase scenario, meaning the Initial Phase scenario had slightly higher load factors.
[15] This only occurs on 4 flights out of 50, all to or from Cancun.

created by stimulation, the forecast number of existing passengers attracted from competitors was also reduced. This adjustment was made to ensure that the flight's load factor was no higher than 87%, effectively allowing competing airlines to recapture those passengers who would otherwise have been lost to the new entrant.

Impact

The Impact portion of the analysis helps us understand "What happens at other airports if these new services begin?" The impact on new services involves understanding which itinerary each passenger on the new flights is coming from, as if the new service had not commenced. During initial steps, the new and existing itineraries were broken out by gateway. The specific gateways that were isolated include San Antonio, Atlanta, Dallas / Ft. Worth, Houston Bush Intercontinental and Phoenix. To calculate the impact on these primary gateways, the new QSI values are effectively ignored (as is stimulation) and the impact was calculated as:

Existing QSI market share (before new services) x new service onboard passengers (without stimulation) = Impact

Completing the St. Louis – Mexico City example:

Onboard Passengers Without Stimulation totals 611 passengers

Gateway	SAT	ATL	DFW	IAH	PHX	OTHER	TOTAL
QSI Market Share (before new services)	0%	28%	27%	32%	3%	10%	100%
Onboard Passengers	0	170	163	196	19	63	611

Recapture

Because new services are receiving their fair share of stimulation, it is assumed that other carriers, operating through other airports, will also see their fair share of passenger growth assuming that the competing airline will match low-cost carrier pricing. Recapture quantifies this value by taking a gateway's new QSI market share after new services have been taken into

account and distributing the price elastic stimulation across gateways using the following formula:

Existing QSI market share (after new services) x passengers from price elastic stimulation = Estimated Recapture

Exhibit 1-11 below shows how the recapture amount for Houston Bush was calculated:

Exhibit 1-11: Recapture

New Flights Constrained Stimulation	**293,958**
New Flights Share of Stimulation	**26%**
Total Implied Stimulation of Entire Market	**1,138,537**
IAH QSI Share of Stimulation	**47%**
IAH Constrained Stimulation (Recapture)	**539,437**

Applying Point-of-Sale Logic

Market data was also pulled by point-of-sale location.[16] Point-of-sale data identifies in which country a ticket is purchased, enabling a determination of whether a passenger is a 'U.S. resident' or a 'visitor'. In the analysis, it was assumed that if a ticket is bought in the United States, the passenger is a 'U.S. resident', and if the ticket is bought outside of the United States, the passenger is considered a 'visitor.' Data was also broken out by local and connecting passengers. A passenger who begins or ends their journey in Houston is a local passenger.[17] The following ratios (shown in Exhibit 1-12 below) were developed for the resident component of point-of-sale traffic for local Houston passengers:

[16] YE 3Q 2011 Sabre ADI data was used throughout the analysis.
[17] This includes passengers traveling on foreign carriers and connecting in foreign hubs, as their origin or destination is still Houston.

Exhibit 1-12: Ratios of Residents and Visitors by Market

Market	Local	
	Resident	Visitor
BOG	48%	52%
CCS	20%	80%
CUN	93%	7%
GDL	60%	40%
LIR	94%	6%
MEX	50%	50%
MTY	43%	57%
PVR	88%	12%
SAL	77%	23%
SJD	96%	4%
SJO	75%	25%
TLC	54%	46%

These ratios were then applied to the final onboard passengers calculated using the method defined above.

InterVISTAS Model Results

Initial Phase Scenario

The results shown in Exhibit 1-13 for changes in international flights and passengers are representative of the Initial Phase Scenario and highlight what could happen upon the opening of a new FIS facility at Houston Hobby.

Exhibit 1-13: Initial Phase Scenario Results

Carrier	Market	Market City	Weekly Frequencies	Aircraft Type	Seats Per Flight	Average Load Factor
Southwest	MEX	Mexico City	21	73G	143	76.4%
	CUN	Cancun	21	73G	143	78.6%
	SJD	San Jose del Cabo	14	73G	143	53.3%
	SJO	San Jose, CR	7	73G	143	72.3%
	SAL	San Salvador	7	73G	143	65.9%
Volaris	MEX	Mexico City	7	319	144	78.4%
VivaAerobus	MTY	Monterrey	5	733	135	60.9%
TOTAL			**82**		**143**	**69.4%**

Carrier	Market	Market City	LOCAL PASSENGERS			CONNECTING PASSENGERS	TOTAL ONBOARD PASSENGERS		
			Resident	Visitor	TOTAL		Resident	Visitor	TOTAL
Southwest	MEX	Mexico City	55,313	55,952	111,265	122,462	122,807	110,920	233,728
	CUN	Cancun	84,991	6,785	91,776	148,908	215,666	25,019	240,685
	SJD	San Jose del Cabo	57,024	2,507	59,531	49,140	101,009	7,662	108,671
	SJO	San Jose, CR	28,913	9,484	38,397	35,400	54,770	19,027	73,797
	SAL	San Salvador	35,820	10,713	46,533	20,699	52,119	15,114	67,232
Volaris	MEX	Mexico City	40,021	40,483	80,503	-	40,021	40,483	80,503
VivaAerobus	MTY	Monterrey	18,008	23,888	41,897	-	18,008	23,888	41,897
TOTAL			**320,091**	**149,812**	**469,903**	**376,611**	**604,401**	**242,113**	**846,514**
Resident / Visitor Ratio			**68%**	**32%**	**100%**	**100%**	**71%**	**29%**	**100%**
Local / Connect Ratio			**56%**			**44%**	**100%**		

In the Initial Phase Scenario, approximately 12 new daily nonstop services were projected to be added in six international markets from Houston Hobby on three carriers: Southwest, Volaris and VivaAerobus. All of the flights would be operated with Boeing 737 or comparable Airbus A320 family aircraft. These carriers are forecast to carry 846,514 passengers, of which 469,903 passengers would be local Houston passengers while the remaining 376,611 passengers would be Southwest connecting passengers behind or beyond Houston Hobby to or from other points in the United States. The total local passenger values were divided into resident and visitor (as described above) and provided to GRA for inclusion in the economic analysis. The Initial Phase Scenario analysis covering all six markets yielded an average load factor of 69.4%, which is conservative, with a local vs. connecting passenger ratio of 56% local vs. 44% connecting. 68% of all local passengers would originate in the Houston area while the other 32% would be visitors to the Houston area. In terms of total onboard passengers on the new international services at Houston Hobby, 604,401 passengers (or 71% of the total onboard traffic) would originate their travel in the United States, while the remaining 242,113 passengers (or 29%) would originate their travel in other countries.

Impact – Initial Phase Scenario

The presence of new services at Houston Hobby would alter and expand the range of travel choices available to potential travelers in the markets served. While the total impact of these changes for Houston is an increase in passengers at both Houston Bush Intercontinental and Houston Hobby, the modeling and simulation tools used in this analysis divided this overall passenger response into conceptually distinct segments of response. These include the diversion of passengers from existing services at Houston Bush Intercontinental and other U.S. gateways to the new flights projected to be offered at Houston Hobby, as well as the stimulation of passenger traffic at all of these airports providing connecting international services to Mexico, the Caribbean, Central America and northern South America due to lower fares and increased service options; it also includes the recapture of passenger traffic at Houston Bush Intercontinental. Taken together, these aggregate to the overall passenger response to the changed market circumstances.

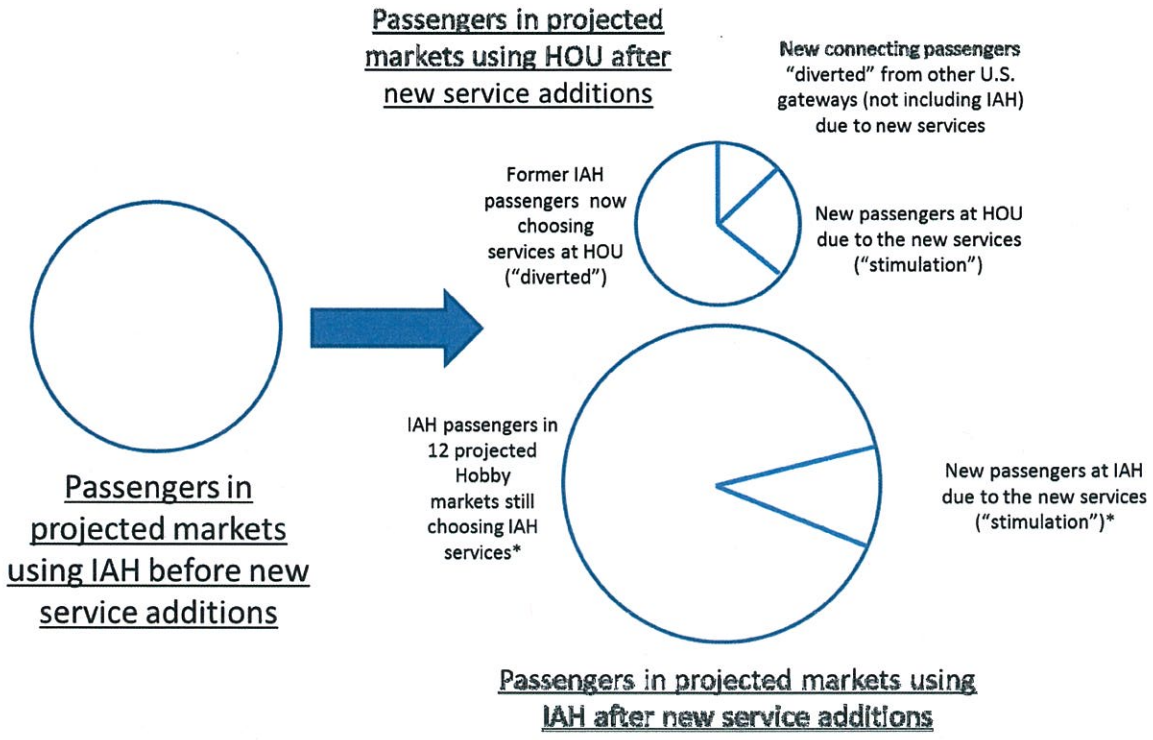
The effect on passengers at Houston Bush Intercontinental, and for HAS generally, due to the start of new services in selected markets at Houston Hobby is illustrated in Exhibit 1-14 below. It shows that the introduction of competing services in specific markets from Houston Hobby positively affects traffic at both HAS commercial service airports. At Houston Hobby, passengers in the new markets would include:

- Those that had formerly used local or connecting services at Houston Bush Intercontinental but now would choose to use the new services at Houston Hobby;
- Those that had formerly used connecting services at other U.S. gateways such as Atlanta, Dallas/Ft. Worth and Phoenix but now would choose to use the new connecting services at Houston Hobby; and
- Those induced to travel by the new services and fares offered at Houston Hobby and choosing to use the new services there.

After the introduction of the projected new services at Houston Hobby, the passengers using competitive services at Houston Bush Intercontinental would include:

- Those that had formerly used local or connecting services at Houston Bush Intercontinental and still prefer to use the existing services offered there;
- Those that had formerly used connecting services at other U.S. gateways but now would choose to use the existing connecting services at Houston Bush Intercontinental; and
- New passengers induced to travel by the new services and fares offered at Houston Hobby but choosing to use the existing services at Houston Bush Intercontinental instead.

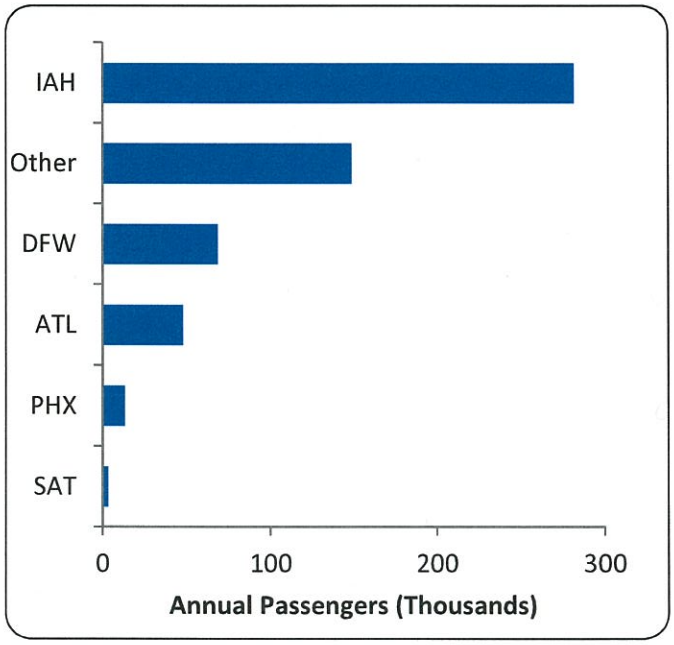
Exhibit 1-14: International Passenger Changes at HAS Airports Due to New Houston Hobby International Service[18]



[18] This exhibit is for explanatory purposes only, and the proportions shown in the figures are not intended to reflect the numerical simulation results for scenarios reported in Exhibits 1-16 and 1-19. Former IAH passengers now choosing services at HOU ("diverted") includes both local and connecting passengers.

Simulation of the Initial Phase Scenario at Houston Hobby would result in a diversion of nearly 565,000 annual passengers who currently travel through Houston Bush Intercontinental or a competing hub in another city (see Exhibit 1-15 below). Of these, nearly 282,000 annual passengers who currently travel through Houston Bush Intercontinental would use the new facility at Houston Hobby in response to the new service offerings. An additional 283,000 passengers would be diverted to Houston Hobby services from other competing hubs such as Los Angeles (LAX), Miami (MIA), Dallas/Ft. Worth (DFW), Atlanta (ATL) and Chicago O'Hare (ORD) and bring new passenger traffic to Houston.

Exhibit 1-15: Passenger Diversion from Competing Hub Airports – Initial Phase Scenario



An additional 281,500 passengers would come to Houston Hobby from Market Stimulation and Stimulation from Price Elasticity. Due to the changed market conditions, Houston Bush Intercontinental would recover nearly 446,300 passengers from their fair share of stimulated traffic, resulting in a net addition of approximately 164,000 passengers in these markets for Houston Bush Intercontinental. As shown in Exhibit 1-16 below, the Houston Airport System (Houston Bush Intercontinental and Houston Hobby) would see a combined net increase of 1.01 million passengers that are not currently travelling via either Houston airport.

Exhibit 1-16: Total HAS Incremental Passengers – Initial Phase Scenario

Source of Passengers	Number of Passengers
IAH Diversion	282,243
Diversion from Non-Houston Airports	282,800
Total Diversion	565,043
Price Stimulation	152,286
Service Stimulation	129,184
Total Passengers	846,514
IAH Estimated Recapture from Stimulation	446,260
Net Passenger Traffic Change at IAH	164,017
Total Incremental Passengers to Houston Airports[19]	1,010,531

Developed Phase Scenario

The results shown in Exhibit 1-17 are representative of the subsequent Developed Phase Scenario and highlight what could happen several years after the completion of a new FIS facility at Houston Hobby:

[19] This equals "Total Passengers" plus "IAH Estimated Recapture from Stimulation" minus "IAH Diversion."

Exhibit 1-17: Developed Phase Scenario Results

Carrier	Market	Market City	Weekly Frequencies	Aircraft Type	Seats Per Flight	Average Load Factor
Southwest	MEX	Mexico City	28	73G	143	72.7%
	CUN	Cancun	28	73G	143	74.4%
	MTY	Monterrey	14	73G	143	29.7%
	SJD	San Jose del Cabo	14	73G	143	53.1%
	SJO	San Jose, CR	7	73G	143	72.3%
	GDL	Guadalajara	7	73G	143	39.5%
	PVR	Puerto Vallarta	7	73G	143	67.5%
	SAL	San Salvador	7	73G	143	65.9%
	BOG	Bogota	7	73G	143	67.1%
	CCS	Caracas	7	73G	143	70.3%
	LIR	Liberia	7	73G	143	63.1%
Volaris	MEX	Mexico City	14	319	144	69.5%
VivaAerobus	MTY	Monterrey	7	733	135	60.9%
Interjet	TLC	Toluca	7	320	150	39.2%
TOTAL			**161**		**143**	**60.4%**

Carrier	Market	Market City	LOCAL PASSENGERS			CONNECTING PASSENGERS	TOTAL ONBOARD PASSENGERS		
			Resident	Visitor	TOTAL		Resident	Visitor	TOTAL
Southwest	MEX	Mexico City	75,589	76,462	152,051	144,629	155,300	141,380	296,680
	CUN	Cancun	115,279	9,203	124,482	179,247	272,578	31,152	303,730
	MTY	Monterrey	16,126	21,391	37,517	23,117	26,301	34,333	60,634
	SJD	San Jose del Cabo	56,761	2,495	59,257	49,140	100,746	7,650	108,397
	SJO	San Jose, CR	28,913	9,484	38,397	35,400	54,770	19,027	73,797
	GDL	Guadalajara	9,782	6,388	16,170	24,118	26,334	13,954	40,288
	PVR	Puerto Vallarta	19,866	2,637	22,503	46,351	61,207	7,647	68,855
	SAL	San Salvador	35,820	10,713	46,533	20,699	52,119	15,114	67,232
	BOG	Bogota	21,911	23,922	45,833	22,607	32,855	35,585	68,440
	CCS	Caracas	11,091	43,327	54,418	17,352	12,888	58,882	71,770
	LIR	Liberia	34,833	2,298	37,131	27,287	61,118	3,300	64,418
Volaris	MEX	Mexico City	70,993	71,813	142,805	-	70,993	71,813	142,805
VivaAerobus	MTY	Monterrey	25,212	33,444	58,655	-	25,212	33,444	58,655
Interjet	TLC	Toluca	22,848	19,092	41,941	-	22,848	19,092	41,941
TOTAL			**545,023**	**332,671**	**877,694**	**589,947**	**975,269**	**492,372**	**1,467,641**
Resident / Visitor Ratio			**62%**	**38%**	**100%**	**100%**	**66%**	**34%**	**100%**
Local / Connect Ratio			**60%**			**40%**	**100%**		

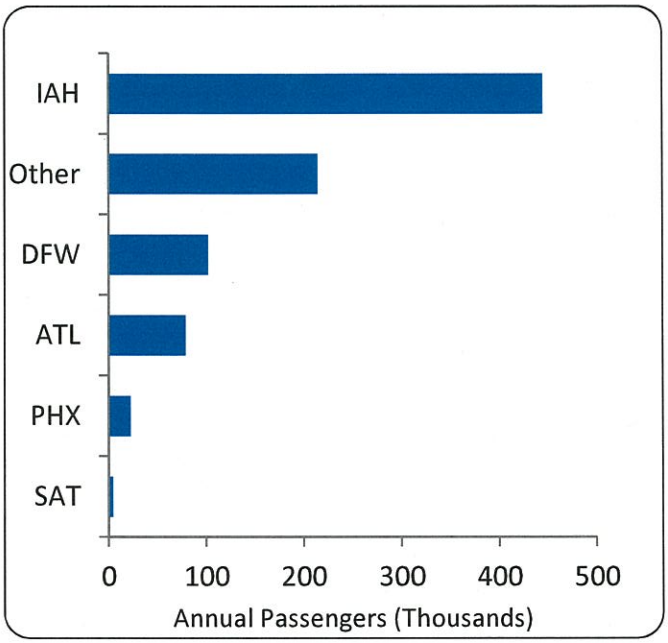
In the Developed Phase Scenario, approximately 11 additional daily nonstop flights to international destinations would be added to the services offered in the Initial Phase Scenario at Houston Hobby, providing even greater service choices to passengers to and from Houston in these markets. This would take place in six additional markets on four carriers: Southwest, Volaris, VivaAerobus and Interjet (the latter being a new addition in the Developed Phase Scenario). All of the additional services would be operated with Boeing 737 or comparable Airbus A320 family aircraft, the same types of aircraft as contemplated in the Initial Phase

Scenario. These four airlines would carry 1,467,641 passengers, of which 877,694 would be local Houston passengers while the remaining 589,947 would be Southwest connecting passengers behind or beyond Houston Hobby to or from other points in the United States. The total local passenger values were divided into resident and visitor (as described above) and provided to GRA for inclusion in the economic analysis. The Developed Phase Scenario analysis covering all 12 markets yielded an average load factor of 60.4%, which is conservative, with a local vs. connecting passenger ratio of 60% local vs. 40% connecting. 62% of all local passengers would originate in the Houston area while the other 38% would be visitors to the Houston area. In terms of total onboard passengers on all of the new international services at Houston Hobby, 975,269 passengers (or 66% of the total onboard traffic) would originate their travel in the United States, while the remaining 492,372 passengers (or 34%) would originate their travel in other countries.

Impact – Developed Phase Scenario

Modeling and simulation of the overall passenger response to changes in international services at the Houston airports for the Developed Phase Scenario at Houston Hobby results in a diversion effect of about 868,000 annual passengers who currently travel through Houston Bush Intercontinental or competing gateways in other cities (see Exhibit 1-18 below). Of these, nearly 445,000 passengers annually would move from Houston Bush Intercontinental to the new facility at Houston Hobby. However, the remaining 423,000 passengers would come from other competing hubs such as LAX, MIA, DFW, ATL and ORD

Exhibit 1-18: Passenger Diversion from Competing Hub Airports – Developed Phase Scenario



An additional 599,300 passengers would come from Market Stimulation and Stimulation from Price Elasticity. Houston Bush Intercontinental would serve nearly 539,400 of these passengers, based on its simulated share of the traffic stimulated by the new service in the expanded market. Combined with the simulated diversion impacts described above for the Developed Phase Scenario, Houston Bush Intercontinental would gain about 94,200 annual passengers overall as a result of the market changes. As shown in Exhibit 1-19 below, the two Houston commercial service airports would see a combined net increase of 1.56 million passengers that are not currently travelling via either Houston airport.

Exhibit 1-19: Total HAS Incremental Passengers – Developed Phase Scenario

Source of Passengers	Number of Passengers
IAH Diversion	445,226
Diversion from Non-Houston Airports	423,149
Total Diversion	868,376
Price Stimulation	293,964
Service Stimulation	305,302
Total Passengers	1,467,641
IAH Estimated Recapture from Stimulation	539,437
Net Passenger Traffic Change at IAH	94,211
Total Incremental Passengers to Houston Airports[20]	1,561,852

Conclusion

This appendix has described the methodology, assumptions and data that InterVISTAS used to project new flight and passenger activity that could occur with the introduction of international service at Houston Hobby. It also reports the results of the simulation for Houston Hobby. These results are also reported in the main report, entitled *The Economic Impact of International Air Service at William P. Hobby Airport.*

[20] This equals "Total Passengers" plus "IAH Estimated Recapture from Stimulation" minus "IAH Diversion."

Appendix II – GRA Methodology

Introduction

The purpose of this analysis is to estimate the impact on the region's economy from new international air services at Houston Hobby. These are based on the Inter*VISTAS* analysis of market opportunities for new Houston Hobby services to Mexico, the Caribbean, Central and South America. The Inter*VISTAS* analysis posits low fare service which will increase the overall size of the air services market in Houston for both local and connecting passengers, and is projected to increase the numbers of passengers served at both Houston Hobby and Houston Bush Intercontinental. In this appendix we briefly review the current domestic and international services at each airport. In addition we review data on the Houston economy, demographics, and Mexican visitors to Houston. Finally, we look at the impacts of new international service at Houston Hobby.

Current Air Services

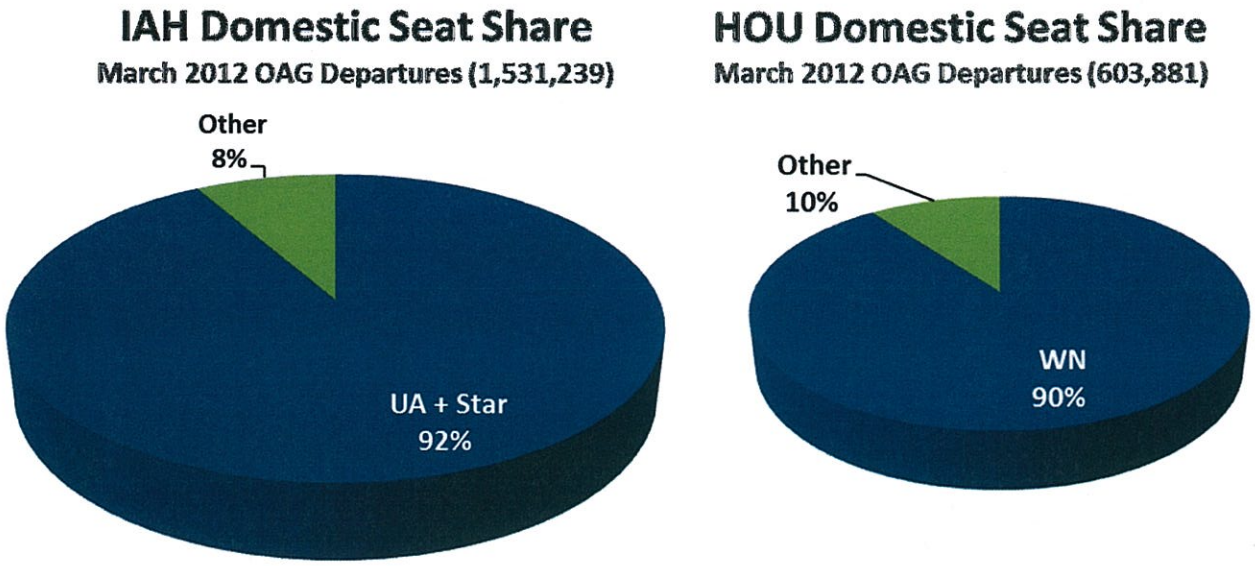
Houston Hobby currently serves a share of the domestic air travel needs for the Houston region. Houston Hobby is known for having frequent service and low fares, and is a focus airport for Southwest. Houston Hobby handled approximately nine million passengers during the 2010 fiscal year, with almost 140,000 commercial aircraft operations.[1] The new international airline service at Houston Hobby will provide a competitive alternative to services at Houston Bush intercontinental and flights over hubs in other cities for the residents and businesses in Houston as well as for foreign visitors to the metro area.

[1] Because of its proximity to downtown, Houston Hobby is also an important general aviation (GA) airport serving the business travel needs of the many companies in the region. Most of this GA activity is with high-performance turbine engine aircraft that operate throughout the U.S. and overseas, and most of the turbine GA aircraft based in the Houston region are located at Houston Hobby.

At present, all of Houston's international commercial airline service operates from Houston Bush Intercontinental. Currently, of all HAS air carriers, United[2] dominates the shares of seats, both domestically and internationally, as can be seen in the Exhibits below.

Exhibit 2-1 shows the shares of major carriers at Houston Bush Intercontinental and Houston Hobby. At Houston Bush Intercontinental, United and its affiliates control 92 percent of domestic seat capacity while at Houston Hobby Southwest has 90 percent of the domestic seat capacity. The interaction among airports is important to competition. As shown in Exhibit 2-2, when showing combined domestic seat shares for Houston Bush Intercontinental and Houston Hobby, Southwest is an important competitive alternative to United and its affiliates.

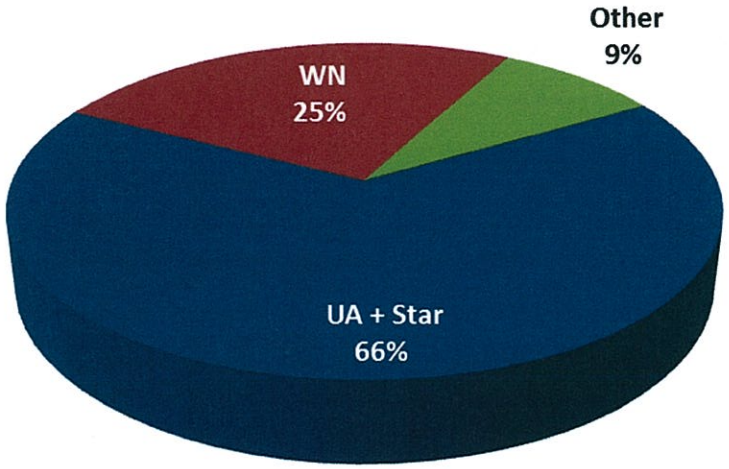
Exhibit 2-1: Domestic Seat Shares by Airport



Source: Official Airline Guide

[2] Includes seats from Star Alliance affiliates.

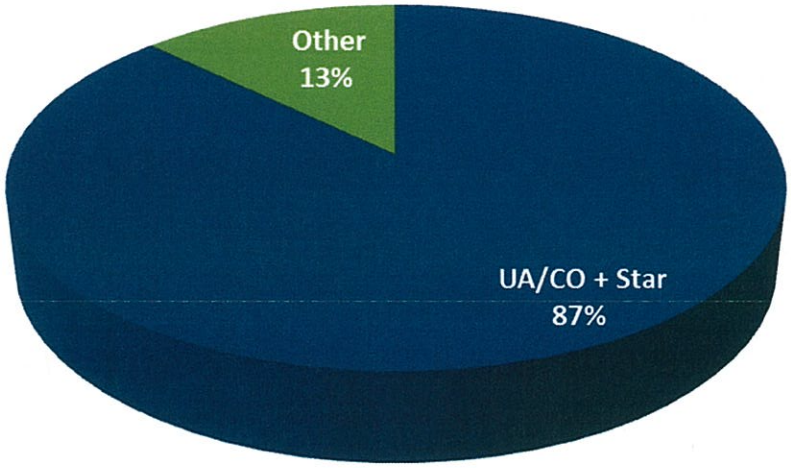
Exhibit 2-2: Domestic Seat Share at Houston Bush Intercontinental and Houston Hobby



Source: Official Airline Guide

Exhibit 2-3 shows the shares of international seats at Houston Bush Intercontinental, which is dominated by United and its partners.

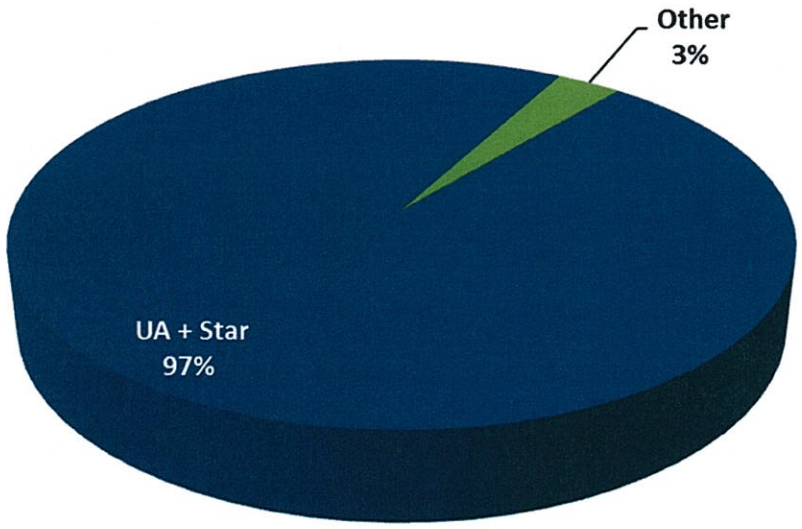
Exhibit 2-3: International Seat Shares at Houston Bush Intercontinental



Source: Official Airline Guide

The dominance in market share is even more pronounced when looking at the shares of seats for flights specifically to Mexico and Central America. Exhibit 2-4 shows United controls the market with a 97 percent share/.

Exhibit 2-4: Mexico and Central America Seat Share at Houston Bush Intercontinental (No current service from Houston Hobby)



Source: Official Airline Guide

Houston Demographics

The Houston-Sugar Land-Baytown Metropolitan Statistical Area (Houston MSA) consists of 10 counties: Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, San Jacinto and Waller. The Houston metro area ranks fifth among U.S. metropolitan statistical areas with a population of 5,867,489 as of mid-2009.[3] Between 2000 and 2009, the Houston MSA experienced population growth of 24.4 percent, compared to national population growth of 9.1 percent.[4] Net migration accounts for approximately 49 percent of Houston's population growth since 2000 and net international immigration accounts for an overwhelming 58 percent

[3] http://www.houston.org/economic-development/facts-figures/index.aspx
[4] http://www.houston.org/economic-development/facts-figures/index.aspx

of net migration (some 300,000 people) from the 2000 census to mid-2009.[5] In 2009, according to the Census Bureau's American Community Survey (ACS), the Houston Metropolitan Statistical Area contained an estimated 1.28 million residents born outside the United States. Mexico alone accounts for nearly half of all foreign-born Houston residents.

In 2010, the City of Houston's population was just under 2.1 million people, 43.8 percent of whom are of Hispanic or Latino descent, and had an average median household income of $42,962.[6] Houston's regional economy is historically based in the energy and petrochemical industries. In recent decades, it has experienced growth in the high technology, medical research, health care and professional services industries. Today, oil and gas exploration, basic petroleum refining, petrochemical production, medical research and health care delivery, and high-technology (computer, environmental, aerospace, etc.) are the Houston region's five largest industries.[7] Houston is an international hub for the energy and petrochemicals industries with linkages throughout the world. Houston serves as the headquarters for 25 Fortune 500 companies.[8]

Characteristics of Visitors from Mexico

In 2010, there were a total of 60 million international visitors to the US, of which, visitors from Canada and Mexico made up 56 percent.[9] In 2010 there were 13.5 million visitors from Mexico (23 percent of the total visitors to the U.S.) and thirteen percent (1,647,913) of the Mexican visitors to the U.S. traveled by air. Mexican visitors to the U.S. increased 23 percent between 2000 and 2010 and Mexico was the second ranked market for international visitors to the U.S., behind Canada. Exhibit 2-5 shows the top ports of entry for Mexican visitors traveling by air to the U.S., with 64 percent arriving through Houston and 24 percent arriving through Dallas.

[5] http://www.houston.org/economic-development/facts-figures/index.aspx
[6] http://quickfacts.census.gov/qfd/states/48/4835000.html.
[7] http://visithoustontexas.com.
[8] Fortune 500, April 2010.
[9] Office of Travel and Tourism Industries "International Visitation to the United States: A Statistical Summary of U.S. Visitation (2010)".

Exhibit 2-5: Ports of Entry for Mexican Air Visitors to Texas

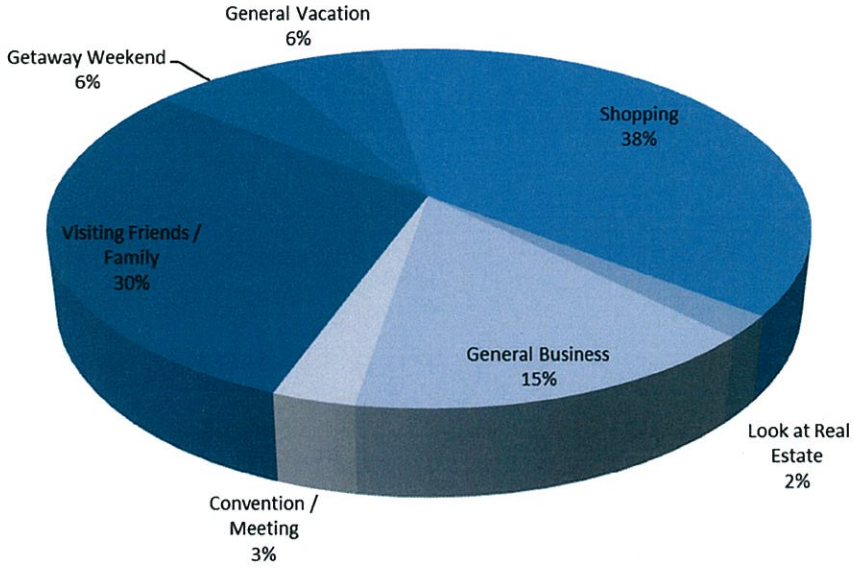
Air Arrivals Port of Entry	Mexican (air)
Estimated Travelers	342,000
Houston, TX	64.3%
Dallas/Ft. Worth, TX	24.3%
Miami, FL	1.5%
Los Angeles, CA	0.5%
New York, NY	0.2%
Newark, NJ	0%
Chicago, IL	0.1%
Atlanta, GA	3.7%
San Francisco, CA	0%
Washington, DC	0%

Source: State of Texas. "2010 Overseas and Mexican (Air) Visitors to Texas" July 2011

Exhibit 2-6 and 2-7 compare the purpose of stay of Mexican visitors to Texas and Mexican visitors to Houston.[10] In Houston, a higher proportion of Mexican visitors engage in business activities while a smaller proportion cite shopping as their primary trip purpose when compared to the State of Texas overall. Additionally, a higher proportion of visitors list "getaway weekend" and "general vacation" as their primary trip purpose for Houston compared to the State as a whole.

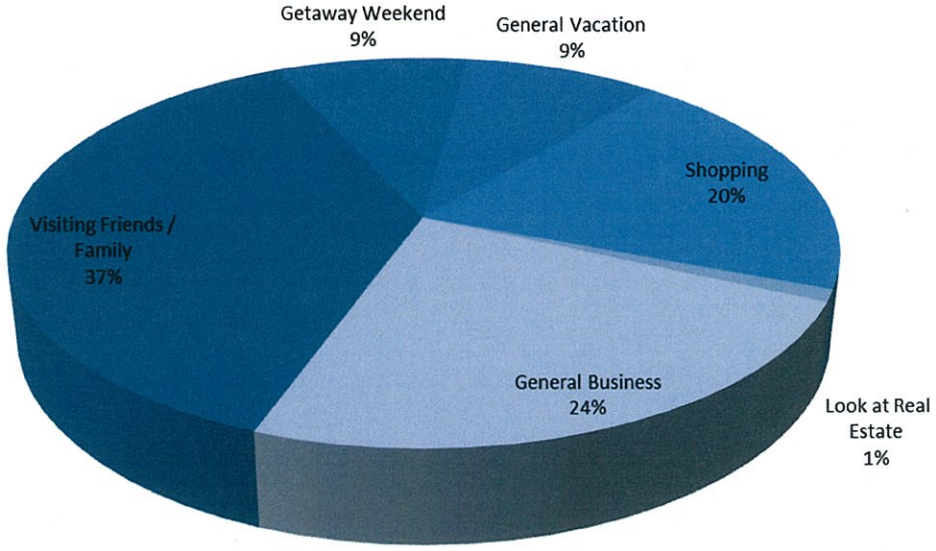
[10] "2009 study of Mexican Overnight Travelers to Texas" Conducted by D.K. Shifflet & Associates, Ltd., Commissioned by the Economic and Tourism Division of the State of Texas' Governor's Office.

Exhibit 2-6: Purpose of Stay - Mexican Travelers to Texas



Source: 2009 Study of Mexican Overnight Travelers to Texas

Exhibit 2-7: Purpose of Stay: Mexican Travelers to Houston



Source: 2009 Study of Mexican Overnight Travelers to Texas

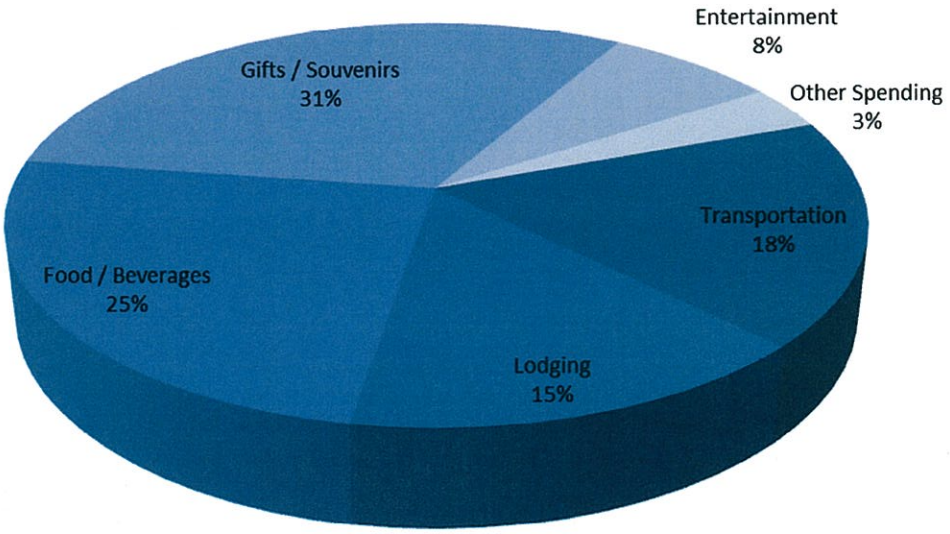
Between 2003 and 2010, Mexican travel by air to the U.S. increased by 23 percent.[11] In 2010, roughly 70 percent of Mexican visitors to the U.S. travelled for leisure purposes, while 27 percent travelled for business purposes or to attend a convention of conference.[12] Comparing the U.S. trends with trends for Mexican visitors to the state of Texas, we can see that a higher proportion of Mexican visitors travel to Texas for leisure purposes while a smaller proportion travel for business purposes. In 2009, 82 percent of Mexican visitors to Texas traveled for leisure purposes, such as visiting friends or relatives, shopping, looking at real estate or on vacation, while 18 percent traveled for business purposes. [13]

Texas maintains a high percentage of repeat visitors from Mexico; in 2009, one study found that 79 percent of travelers from Mexico have taken an overnight trip to Texas in the past.[14] For the city of Houston specifically, 76 percent of Mexican visitors traveled for leisure purposes, while the remaining 24 percent were there for various leisure purposes. Many Mexicans traveling for leisure purposes choose to stay with friends or family; Texas has the second highest Hispanic household population by state, second only to California.[15] The average length of stay was 4.3 days and total expenditures for the most recent trip to Houston by Mexican travelers totaled approximately $1,313.[16]

Exhibit 2-8 shows average itemized expenditures by Mexican visitors to Texas traveling by air per trip per visitor. Over half of spending is on food and beverages and gifts / souvenirs combined, with the remainder of spending split between lodging (15 percent), transportation (18 percent), entertainment (8 percent) and other spending (3 percent).

[11] Office of Travel and Tourism Industries "2010 Market Profile: Mexico (Air Only)".
[12] *Id.* These do not add up to 100% as the study only provides the top 4 of 8 main purpose of trip categories.
[13] "2009 study of Mexican Overnight Travelers to Texas" Conducted by D.K. Shifflet & Associates, Ltd., Commissioned by the Economic and Tourism Division of the State of Texas' Governor's Office.
[14] "2009 study of Mexican Overnight Travelers to Texas" Conducted by D.K. Shifflet & Associates, Ltd., Commissioned by the Economic and Tourism Division of the State of Texas' Governor's Office.
[15] The American Community – Hispanics. 2004.
[16] The American Community – Hispanics. 2004.

Exhibit 2-8: Average Itemized Expenditures in Texas by Mexican Air Travelers (per Trip per Visitor)



Source: State of Texas. "2010 Overseas and Mexican (Air) Visitors to Texas" July 2011

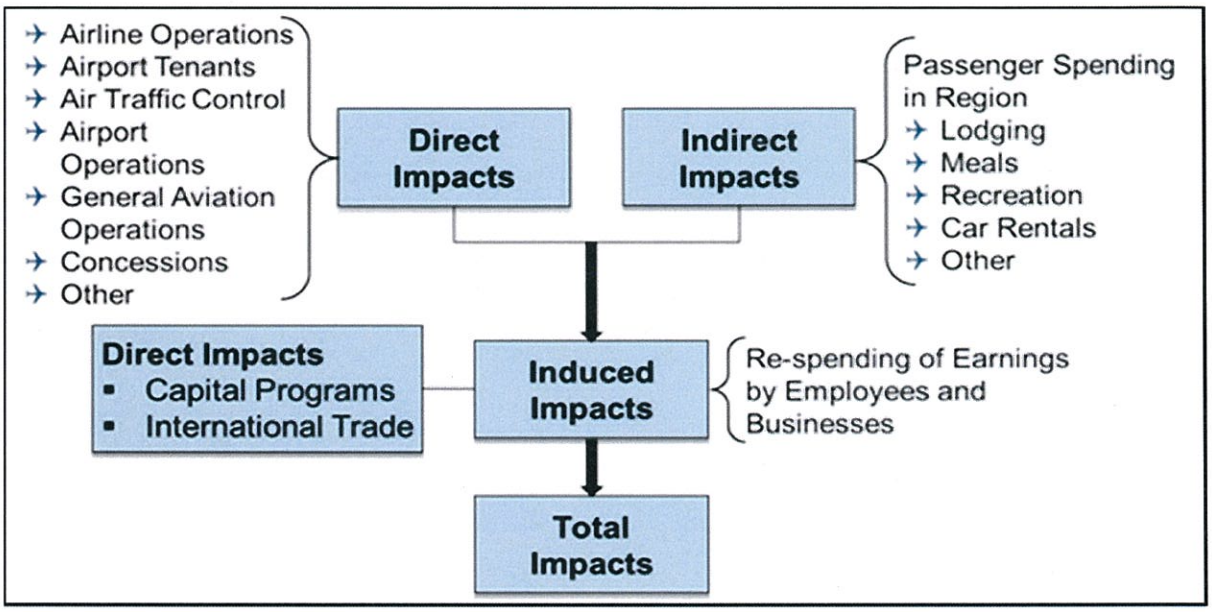
Summary Results of the 2011 HAS Economic Impact Study

GRA completed a study in 2011, and a broad overview of the study process and results is presented in Exhibit 2-9. Generally, an airport's economic impacts stem from both air travel services and air passenger spending within the local region. These impacts include expenditures made at the airport and those for local ground transportation. Industries that are directly impacted by air transportation are industries that support passenger or cargo movements (including their subcontractors). In this analysis, GRA measured direct impacts for industries that directly receive revenues from air passengers or cargo shipments, support activities for airlines and airports, and government and non-commercial entities that support airport activities. The study did not incorporate airline ticket sales; rather it measured the spending by the airlines and others to produce air transportation service in the region. In addition, spending by visitors to Houston is a major part of the economic impact of HAS airports.

Exhibit 2-9: Economic Impact Process Summary

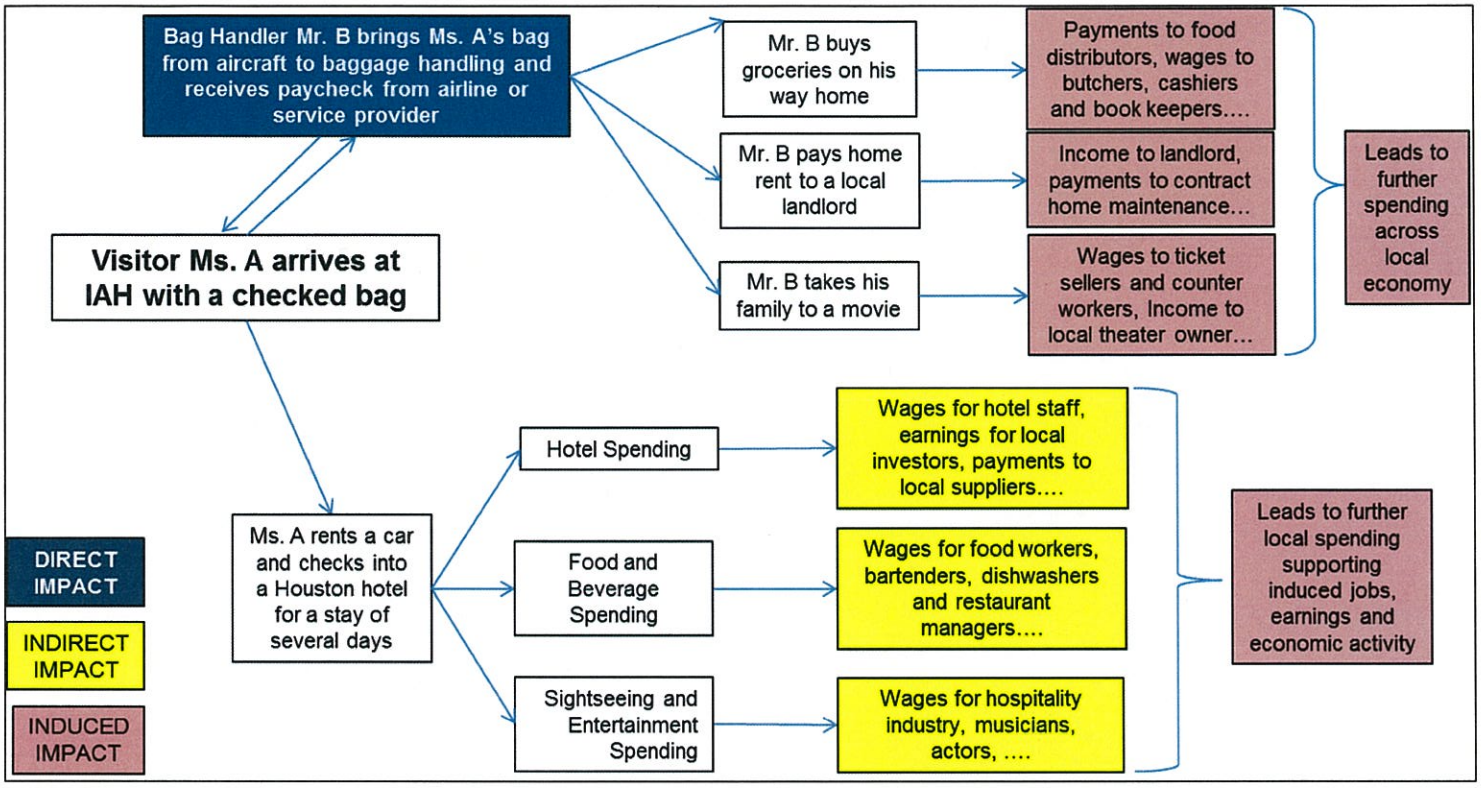
As shown in Exhibit 2-10, the total economic impacts come from the sum of direct impacts(airport dependent sectors), indirect impacts (passenger spending), induced impacts (re-spending of earnings).

Exhibit 2-10: Economic Impact Study Overview



Impacts are identified as direct, indirect and induced. Direct impacts are generated by air transportation services and other direct uses of the airports. These impacts are measured in the forms of employment, earnings, and output or economic activity associated with the airport dependent companies and government entities. Indirect impacts are derived by estimating the expenditures of air travelers who visit the Houston area. Induced impacts represent the economic effects of the spending and repeated re-spending of these earnings as they cycle through the Houston area economy (includes direct and indirect sectors as well as other industries that provide them with goods and services) and are estimated using the U.S. Bureau of Economic Analysis RIMS II Model. This model makes it possible to use the direct and indirect impact estimates to derive the follow-on effects of those expenditures throughout the Houston economy.

Exhibit 2-11: Illustration of Impacts



For entities operating at an airport, the number of employees, total earnings, and the total annual sales or budget of the entity contribute to the direct impact of the airport. These data were collected through a web-based survey of companies identified by HAS. The survey results were supplemented by other databases, which provided employment figures, earnings figures, and/or total sales/budget levels. In some cases, estimates were made based upon data provided by HAS, some activity-level measurements and company size measurements. HAS also provided data on airport concessions and the budgets for airport-related public services.

The indirect visitor spending impacts were estimated using passenger survey data developed by HAS and others for Houston Bush Intercontinental and Houston Hobby, such as the distribution of origin-destination passengers and connecting passengers, and tourism data for the Houston region developed by the Greater Houston Convention & Visitors Bureau. Local air visitors were estimated using GRA aviation forecasts, U.S. DOT air carrier statistics and

general aviation operations statistics for the three HAS airports. Average visitor expenditures were estimated using Houston area tourism data, which allowed the separation of visitors by both trip duration and trip purpose. (It was found that, on average, business visitors to the Houston region tend to spend considerably more than leisure visitors, for example.) Using these sources, GRA allocated traveler spending to various travel-related industries (e.g., "Traveler Accommodations"). These categorized expenditures were used to represent the gross sales of the various industries, and, subsequently, earnings and employment were estimated using industry statistics from numerous sources, such as the Department of Labor and the U.S. Economic Census.

Induced impacts were derived from the direct and indirect impacts using industry-specific BEA RIMS-II multipliers for the 10-county Houston MSA, which were acquired for the study from the BEA.

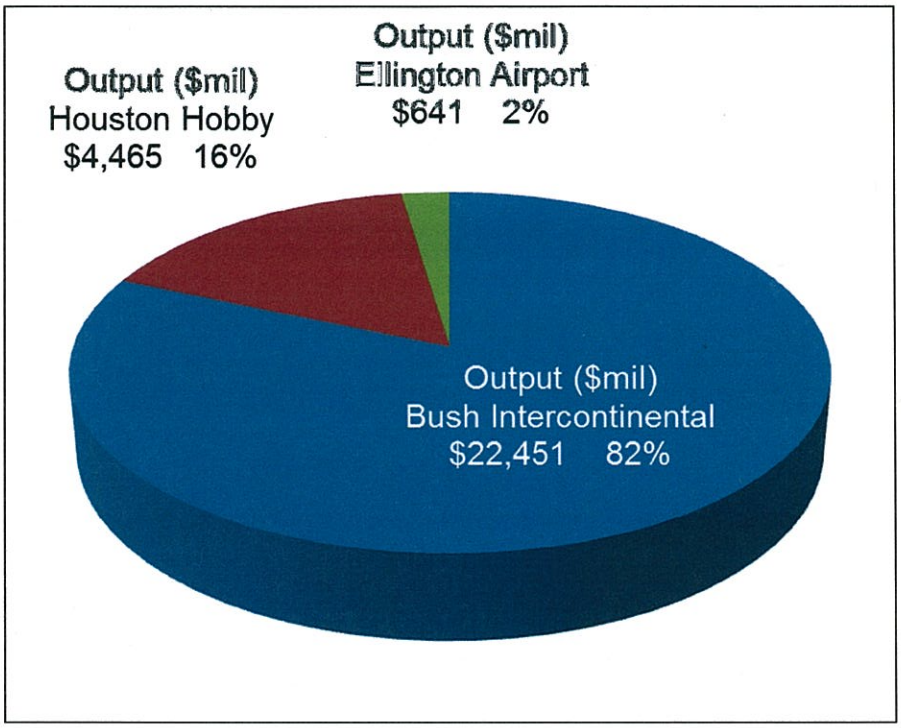
Exhibit 2-12 below shows the combined economic impacts of the three HAS airports. Exhibit 2-13 shows the economic impact per airport. Houston Bush Intercontinental makes up 82 percent of the total economic impact, while Houston Hobby and Ellington Airport (EFD)[17] make up 16 percent and two percent, respectively.

Exhibit 2-12: Total Economic Impacts of HAS Airports

Type	Employment	Earnings $millions	Output $millions
Direct	47,456	$3,132.7	$8,666.7
Indirect	47,713	$1,125.0	$3,663.6
Induced	139,113	$4,593.2	$15,227.4
Total	234,281	$8,850.9	$27,557.8

[17] As a reliever airport, Ellington Airport (EFD) primarily serves general aviation and military aircraft operations, and is the base for NASA flight operations at the Johnson Space Center. U.S. government flight units and military reserve units as well as the Texas Air National Guard have large operations at EFD.

Exhibit 2-13: Total Impacts by Airport



Economic Impact of New International Air Service - Methodology

To quantify the economic impacts, GRA worked in conjunction with Inter*VISTAS*, which developed incremental passenger forecasts based on new service to Mexico and elsewhere in Central and South America. These forecasts contained the increase in international passengers at Houston Hobby where there would be substantial growth in response to the new service. This would reduce the growth of international passengers at Houston Bush Intercontinental until a new competitive equilibrium is reached. This difference in passenger growth is important to capture and account for to ensure that, at the airport system level, passengers, and therefore impacts, are not double counted.

Using the 2011 GRA Economic Impact Report prepared for HAS, we calculated the direct, indirect and induced impacts-per-enplanement in 2010 for the following sectors: Airlines, Airport Passenger Services, Passenger Ground Transportation, Airport and Aircraft Services, Cargo Services, Non-Airlines Aircraft Operations, Government, Dept. of Defense, Visitor

Spending – Commercial and Visitor Spending – General Aviation. We then applied FAA Terminal Area Forecasts (TAF) of enplanements for each HAS airport and used the impact-per-enplanement to estimate total impacts for the Initial Phase and Developed Phase because we assume the sectors listed above are driven by the number of passengers using the airport. The baseline is what these levels of passengers would have been without the new service at Houston Hobby. Using this impact-per-enplanement calculator, we can see how a change in the number of enplanements due to new services affects the impact at that airport and the overall HAS-wide impact for each scenario. We can then compare this new impact with the impact had there been no change in air services to see the economic effect of an increase or decrease in enplanements due to new international air services at Houston Hobby. This process is illustrated in Exhibit 2-14.

As a more concrete example, we start with direct, indirect, induced and total impacts for each sector at Houston Hobby, Houston Bush Intercontinental, Ellington Airport and HAS as a whole. To simulate new market services, we add the projected passengers to Houston Hobby from the Inter*VISTAS* analysis to the baseline to get the change in passenger enplanements, we then estimate the economic impacts associated with the increases in local and connecting passengers at Houston Hobby. We also change passenger counts at George Bush Intercontinental per Inter*VISTAS* forecasts in the impact calculator to get new impacts based on the change in enplanements. Then we calculate the difference between the baseline impacts and the scenario impacts with the addition of the new services at Houston Hobby to show the effects that new service at Houston Hobby has on Houston Hobby and Houston Bush Intercontinental.

Exhibit 2-14: Approach to Develop Impacts of International Service

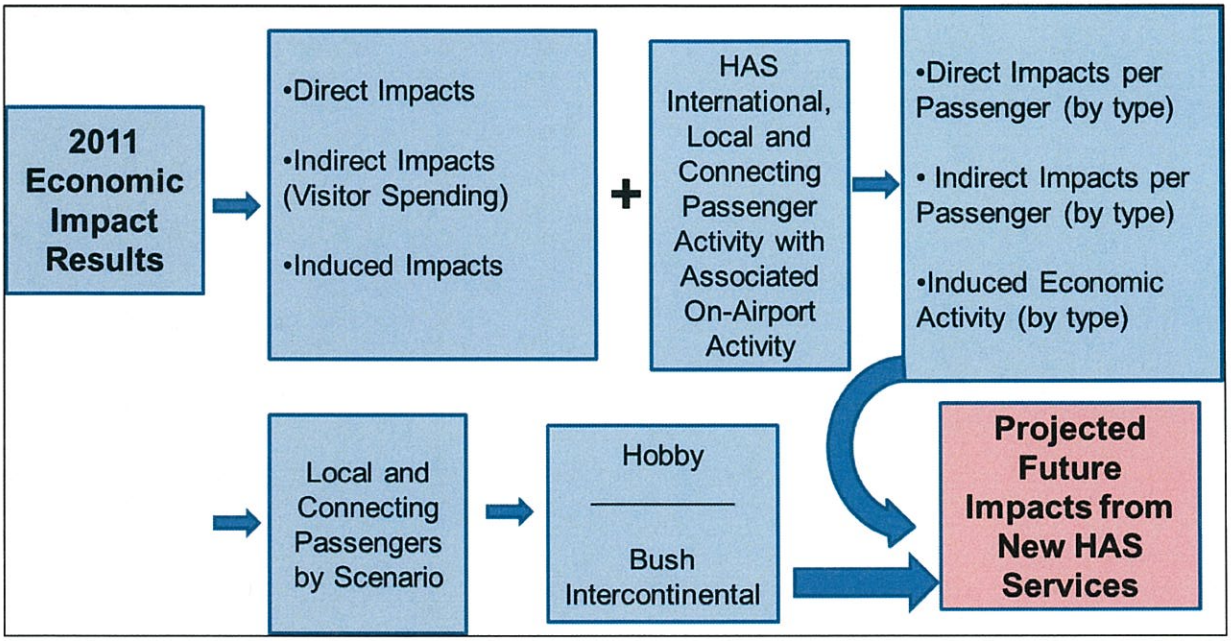


Exhibit 2-15 shows the breakout of additional passengers between the two airports in the initial and developed phase.

Exhibit 2-15: Additional Passengers in the Scenarios

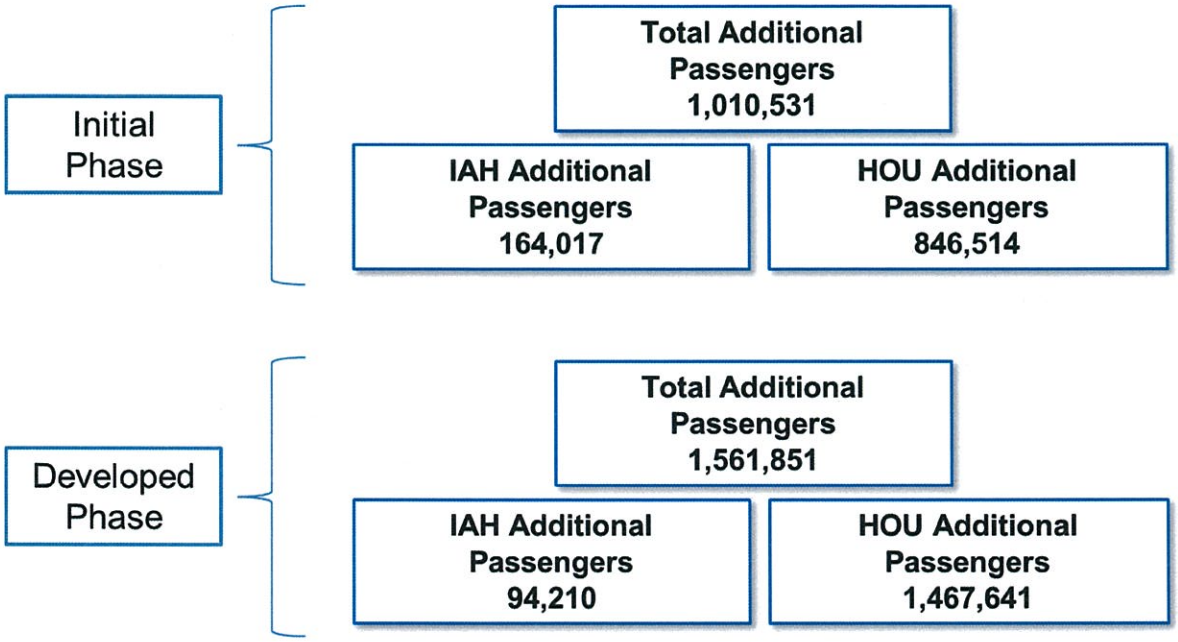


Exhibit 2-16 shows that in the Initial Phase, there are a total of 1,010,531 additional passengers moving through HAS airports as a result of the new market. Of those, 164,017 are assumed to travel to Houston Bush Intercontinental while the remaining 846,514 travel to Houston Hobby. Additionally, of the 846,514 new passengers at Houston Hobby, 47 percent are connecting and 53 percent of which are local. Of the local passengers, 69 percent are residents and 31 percent are visitors. Of the visitors, 24 percent (34,457) are assumed to be business travelers while 76 percent (109,112) are assumed to be leisure travelers.

Exhibit 2-16: New International Passenger Composition - Initial Phase Scenario

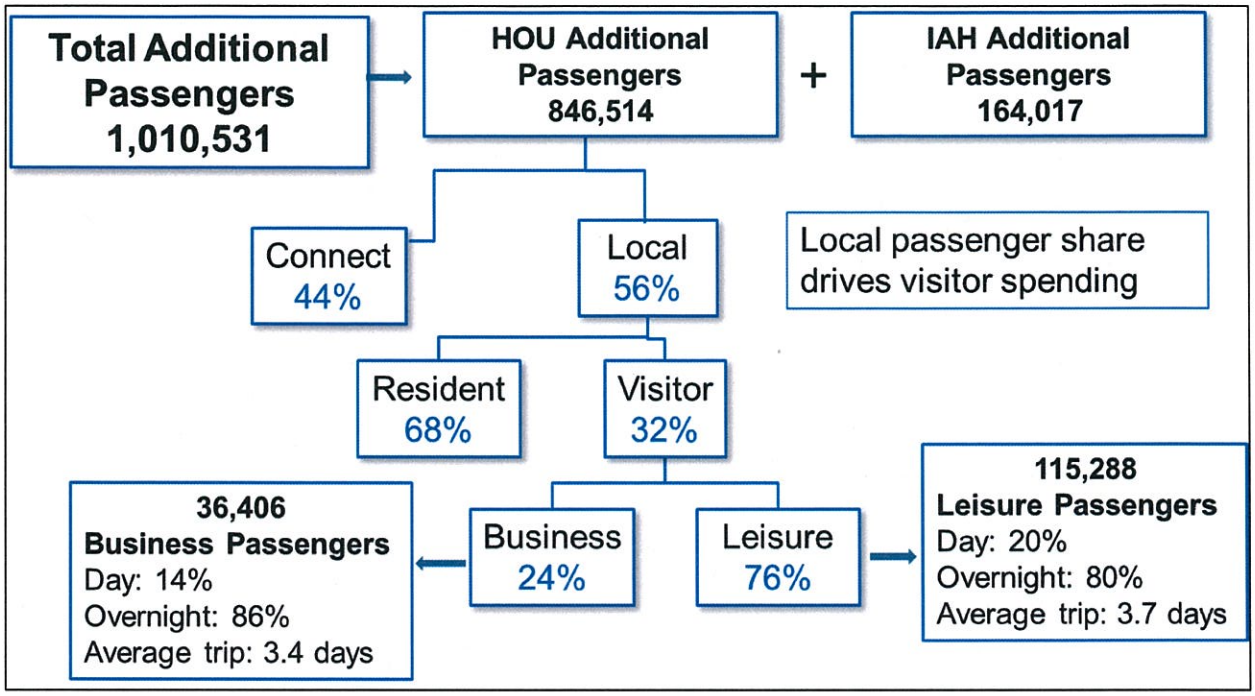
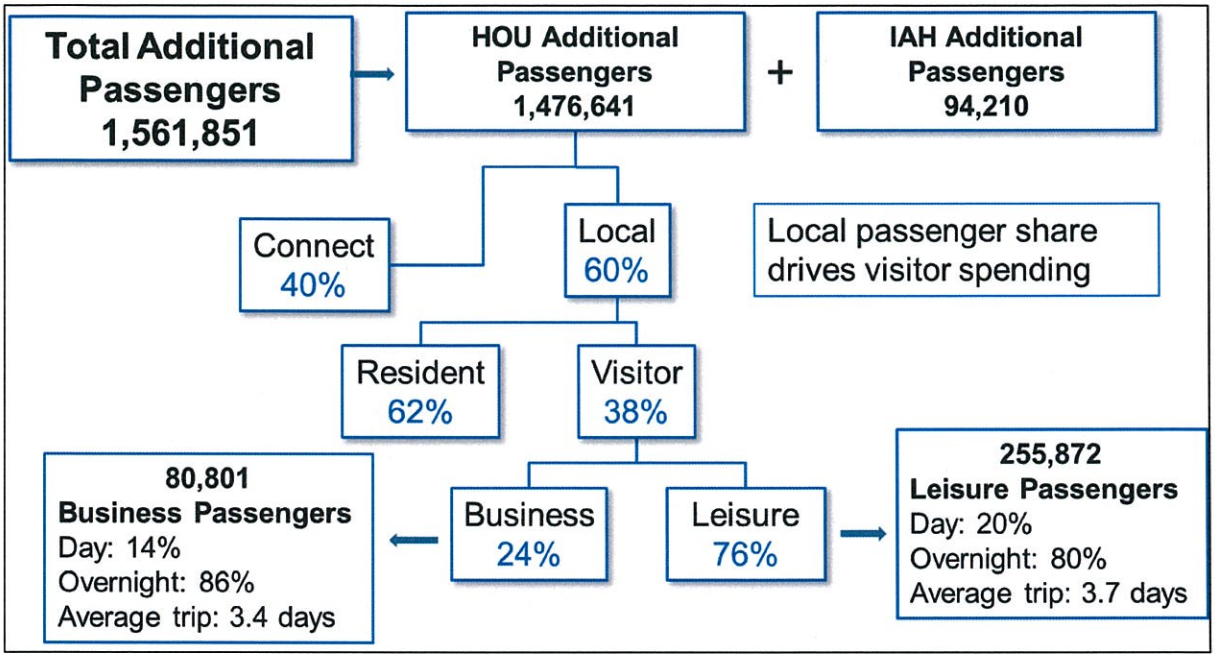


Exhibit 2-17 shows that in the Developed Phase, there are a total of 1,561,851 additional passengers moving through HAS airports as a result of the new market. Of those, 94,210 are assumed to travel to Houston Bush Intercontinental while the remaining 1,476,641 travel to Houston Hobby. Of these additional 1,467,641 passengers at Houston Hobby, 42 percent are connecting while 58 percent are local. Of the local passengers, 63 percent are residents and 37 percent are visitors. Of the visitors, 24 percent (76,053) are business travelers and 76 percent (240,834) are leisure travelers. The passenger ratios of connecting/local, resident/visitor and business/leisure are important because it affects the visitor spending component of the overall impacts.

Exhibit 2-17: New International Passenger Composition - Developed Phase Scenario



Results

In the Initial Phase, new international service at Houston Hobby increases the economic impact of the Houston Airport System by $947 million. Exhibit 2-18 presents the incremental impacts of new service by airport and by type of impact. By incremental impact, we mean the impact only of the additional passengers (we do not report the total impact of the airport or airport system here). As can be seen, the largest economic impacts are at Houston Hobby; however, Houston Bush Intercontinental also serves additional international passengers because the increased service levels and low fare competition stimulate the overall market.

Exhibit 2-18: Incremental Impacts – Initial Phase Scenario

	Direct ("on Airport")	Indirect ("Visitor Spend")	Induced ("Houston MSA")	Total
HOU				
Jobs	1,613	1,375	5,251	**8,238**
Earnings (mil)	$106.1	$28.6	$163.9	**$298.6**
Output (mil)	$204.2	$120.4	$387.8	**$712.5**
IAH				
Jobs	364	347	1,090	**1,801**
Earnings (mil)	$26.3	$8.1	$37.2	**$71.7**
Output (mil)	$77.8	$26.5	$130.2	**$234.5**
HAS				
Jobs	1,977	1,722	6,341	**10,039**
Earnings (mil)	$132.4	$36.7	$201.1	**$370.2**
Output (mil)	$282.1	$146.9	$518.0	**$947.0**

Exhibit 2-19 below shows the incremental impacts by sector at Houston Hobby in the Initial Phase. These include direct, indirect and induced impacts in terms of jobs, earnings and output. These jobs are created throughout the Houston economy and reflect the direct impact at the airport, the indirect impacts of visitor spending and the multiplier effects associated with the re-spending generated by the direct and indirect impacts based on the RIMS II model for the Houston MSA. The big increase in impacts in the airlines sector is due to the increased flight operations at Houston Hobby as well as the based flight and maintenance crews of Southwest at Houston Hobby.

The airline sector includes commercial airlines and scheduled air charter operations (both passenger and cargo). The airport passenger services sector includes concessionaires, kiosks, and other passenger amenities in the airport terminals. Passenger ground transportation includes rental car companies, parking lots and taxi and limousine service. The airport and aircraft services sector includes services such as aircraft maintenance and repair and airlines catering as well as general airport terminal maintenance services. The cargo services sector captures all air cargo service providers operating at the airport and the non-airlines aircraft operations sector includes general aviation operators and flight schools. The government and Department of Defense sectors include government agencies supporting airport use such as FAA, TSA, DHS and National Guard activities.

Exhibit 2-19: Incremental Impact per Sector – Initial Phase Scenario

	Jobs	Earnings	Output
Airlines	1,982	$ 119,986,780	$ 242,393,533
Airport Passenger Services	306	$ 6,544,561	$ 17,405,311
Passenger Ground Transportation	2,600	$ 63,522,689	$ 100,975,782
Airport and Aircraft Services	209	$ 9,045,759	$ 29,248,594
Cargo Services	-	$ -	$ -
Non-Airlines Aircraft Operations	-	$ -	$ -
Government	423	$ 25,768,860	$ 78,321,604
Dept. of Defense	-	$ -	$ -
Visitor Spending Commercial	2,719	$ 73,682,801	$ 244,127,293
Visitor Spending General Aviation	-	$ -	$ -
TOTAL	**8,238**	**$ 298,551,449**	**$ 712,472,117**

In the Developed Phase scenario, international service at Houston Hobby increases the economic impact of HAS by over $1.6 billion, of which $1.4 billion is accounted for by growth at Houston Hobby and $152 million by growth at Houston Bush Intercontinental. Exhibit 2-20 below presents the incremental impacts of new service by airport and by type of impact for the Developed Phase Scenario.

Exhibit 2-20: Incremental Impacts – Developed Phase Scenario

	Direct ("on Airport")	Indirect ("Visitor Spending")	Induced ("Houston MSA")	Total
HOU				
Regional Jobs	2,931	3,489	10,523	**16,943**
Earnings (mil)	$192.9	$72.5	$330.4	**$595.8**
Output (mil)	$371.3	$305.5	$794.2	**$1,471.0**
IAH				
Regional Jobs	236	225	707	**1,168**
Earnings (mil)	$17.1	$5.3	$24.1	**$46.5**
Output (mil)	$50.5	$17.2	$84.4	**$152.1**
HAS				
Regional Jobs	3,167	3,714	11,230	**18,111**
Earnings (mil)	$210.0	$77.8	$354.5	**$642.3**
Output (mil)	$421.8	$322.7	$878.6	**$1,623.1**

Exhibit 2-21 below shows the incremental impacts by sector at Houston Hobby in the Developed Phase. Again, the largest increase occurs in the airline sector, which is reasonable as the new activity will be performed by additional pilots and cabin crew being added to Southwest's Crew base at Houston Hobby.

Exhibit 2-21: Incremental Impacts per Sector – Developed Phase Scenario

	Jobs	Earnings	Output
Airlines	3,602	218,119,332	440,637,841
Airport Passenger Services	556	11,897,105	31,640,443
Passenger Ground Transportation	4,727	115,475,442	183,559,973
Airport and Aircraft Services	379	16,443,937	53,169,889
Cargo Services	-	-	-
Non-Airlines Aircraft Operations	-	-	-
Government	768	46,844,215	142,377,820
Dept. of Defense	-	-	-
Visitor Spending Commercial	6,911	187,027,532	619,585,694
Visitor Spending General Aviation	-	-	-
TOTAL	**16,943**	**$ 595,807,562**	**$ 1,470,971,660**

Limitations of Study

This study estimates the impact of new international service at Houston Hobby on the region's economy. It is not a financial feasibility or benefit-cost analysis of the modifications needed to support such service. Also, there are several limitations present that could affect the results of this study. First, the RIMS II coefficients used reflect current inter-industry relationships. These relationships are likely to change in the future, but the extent to which is unknowable. Additionally, no construction costs have been included. We can assume including the impacts of building a new terminal for example will increase the total impacts through the spending it takes to build and operate a terminal.

Conclusion

This appendix has looked at data on the Houston economy, Houston demographics, and characteristics of Mexican visitors to Houston as well as the impacts of new international service at Houston Hobby Airport. The results show that the additional service at Houston Hobby results in more competition and travel and has an impact of $1.6 billion in the Developed Phase.