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For

**An Update of Airport Master Plan 2030
Economic Impact Study**

For

The Hong Kong International Airport

Prepared by Enright, Scott & Associates Limited

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Executive Summary

The Hong Kong International Airport (HKIA) has been in operation since 1998. The airport has experienced dramatic growth in passenger numbers, cargo throughput, and aircraft movements. This growth caused the Airport Authority (AA) to examine the potential to add capacity at HKIA. The AA commissioned Enright, Scott & Associates, Ltd (ESA) to carry out an economic impact assessment as part of their “Master Plan 2030,” which culminated in a Final Report delivered to the AA in May 2011.¹

In 2014, the AA commissioned ESA to update the May 2011 report, based on updated traffic forecasts and cost estimates, and incorporating more recent statistical data. This update is reported in this document. It addresses the present impact of HKIA on Hong Kong’s economy; the projected economic impact of HKIA in a “Status Quo Situation” representing capacity provided by investments already committed before 2012 for the 2012 to 2015 period, in a Scenario 1 in which two runway capacity is optimised, and in a Scenario 2 in which a third runway is also constructed; and the projected economic impacts of the investment programmes associated with the scenarios.

The Study uses variations of traditional economic impact techniques that are tailored to the particular situation of Hong Kong. Economic impact analysis attempts to quantify the impact that an investment, event, or decision can have on a given economy. It is frequently used in order to determine whether capital investments should be made. The economic impact analysis consisted of five major components for the present impact of HKIA. First, the direct, indirect, and induced impacts of aviation-related industries were estimated. Second, estimates were made of the direct, indirect, and induced impacts of other businesses that are carried out on Chek Lap Kok, the airport island. Third, estimates were made for the impact of aviation-facilitated tourism, both for inbound tourism only and for net tourism in which the effect of lost spending from outbound tourists is netted against the effect of the local spending by inbound visitors. Fourth, estimates were developed for the impact of trade facilitated by HKIA. Fifth, areas of additional, but non-quantifiable impacts were identified and rough indicators of their importance to the Hong Kong economy were described where possible.

Looking forward, passenger and cargo throughput projections generated by the AA’s Consultants were used to project the quantifiable economic impact of HKIA in the Status Quo Situation, and in the two investment scenarios described above. Next, the potential economic impacts under the scenarios were projected. The potential economic benefits in terms of “Economic Net Present Value” (ENPV) and “Economic Internal Rate of Return” (EIRR) were estimated for both investment scenarios. Given the fact that economic impact analyses of airports around the world vary in terms of methodology and inclusiveness, a variety of results are reported so that they can be compared to each other and potentially to other analyses.

This Report focuses on an analysis in which airport traffic grows up to the year 2030 and then remains constant afterwards.

¹ Enright, Scott & Associates, May 2011, Contract C011-08 For Airport Master Plan 2030 Economic Impact Study For The Hong Kong International Airport, Final Report

Existing contribution of HKIA to Hong Kong's economy

As we have indicated, there is variability among previous studies in terms of what is covered in the economic impact analysis of airports. Thus we have chosen to report economic impact results for:

1. The combined direct, indirect, and induced effects of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA;
2. The combination of the direct, indirect, and induced aviation-related businesses in Hong Kong and non-aviation businesses at HKIA PLUS the direct impact of aviation-facilitated tourism (inbound only) and trade;
3. The combination of the direct, indirect, and induced aviation-related businesses in Hong Kong and non-aviation businesses at HKIA PLUS the direct impact of aviation-facilitated tourism (inbound and outbound) and trade;
4. The combination of the direct, indirect, and induced aviation-related businesses in Hong Kong and non-aviation businesses at HKIA PLUS the total (direct plus indirect plus induced) impact of aviation-facilitated tourism (inbound only) and trade;
5. The combination of the direct, indirect, and induced aviation-related businesses in Hong Kong and non-aviation businesses at HKIA PLUS the total (direct plus indirect plus induced) impact of aviation-facilitated tourism (inbound and outbound) and trade;

The reasons for the complex reporting include:

1. The combined direct, indirect, and induced impacts of aviation-related businesses in a location and non-aviation businesses at an airport tend to be more comparable in terms of methodologies across studies;
2. Some studies include only the impact of inbound tourism, while others include the impacts of both inbound and outbound tourism;
3. Some studies include only the direct impacts of catalytic effects such as those on tourism and trade, while others report the total impacts (direct + indirect + induced), at least for tourism.

Estimates of the quantifiable economic impacts of aviation in Hong Kong for the year 2012 are presented in Exhibits ES.1 and ES.2. In ES.1, the tourism impacts only include aviation-facilitated tourism inbound to Hong Kong, while in ES.2, the tourism impacts include both inbound and outbound tourism impacts. Note that the "Direct," "Direct + Indirect," and "Direct + Indirect + Induced" lines in Exhibits ES.1 and ES.2 include only aviation-related businesses in Hong Kong and non-aviation businesses at HKIA. The "Direct + Indirect + Induced + Catalytic Direct Only" line adds in the direct effects of tourism and trade while the "Direct + Indirect + Induced + Catalytic Total" line adds in the direct, indirect, and induced impact of tourism and trade.

According to our economic impact estimates, the combined direct, indirect, and induced value added impact of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA was HK\$94,241 million in 2012, equivalent to 4.6 percent of Hong

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Kong's GDP.² The relevant employment impact was 148,158 people employed, equivalent to 4.1 percent of Hong Kong's total employment in that year.

Depending on whether outbound tourism is included as well as inbound tourism and whether the total catalytic effect (direct, indirect, and induced contributions of catalytic tourism and trade) is included or just the direct catalytic effect, the value added impact estimates when catalytic effects are included ranged from HK\$155,011 million to HK\$335,319 million in 2012, or equivalent to between 7.6 and 16.5 percent of Hong Kong's 2012 GDP. The estimates of the associated employment impacts ranged from 226,531 to 590,090, or from 6.2 to 16.1 percent of Hong Kong's total employment. The estimates that include net tourism are lower than those that include only inbound tourism because Hong Kong runs a net tourism deficit by air (Hong Kong residents departing by air spend more on travel outside of Hong Kong than foreign residents arriving by air spend inside Hong Kong).

The estimates indicate that aviation has an extremely large impact on Hong Kong's economy. This is not at all surprising. Aviation itself is a major portion of Hong Kong's economy compared to national economies or the global economy, as would be expected for a city economy containing a major air hub. In addition, Hong Kong's share of global international air cargo is roughly 12 times its share of global GDP.³ Hong Kong's trade dependence is just over 7 times that of the global average⁴ and just over a third of the value of Hong Kong's trade is carried by air.⁵ Hong Kong's economy is significantly more tourism-dependent than the global average according to World Travel and Tourism Council figures⁶ and 24 percent of Hong Kong's inbound tourists arrive by air.⁷

The importance of aviation to Hong Kong is even greater than the estimates would indicate when one realises that there are numerous additional non-quantifiable impacts that are not taken into account in Exhibits ES.1 and ES.2, such as the importance of aviation to Hong Kong's finance, professional service, regional headquarters, management, and business coordination activities. The importance of aviation to Hong Kong is due to Hong Kong's small size, its location, its internationally-oriented economy, the importance of trade to Hong Kong, its distinctive business makeup, and its unique history in that for most of the time since the 1960s air transport has been the main way that Hong Kong has interacted with the rest of the world and until relatively recently using airports in the Chinese Mainland was not an option. The importance of aviation to Hong Kong means that any decisions that will influence the competitiveness of HKIA will have a disproportionate influence on Hong Kong's overall competitiveness and its economic development.

² We focus on value added rather than revenue because value added represents the contribution to GDP.

³ Comparison of GDP and cargo figures from the World Bank, *World Development Indicators 2012* and ACI, *Air Cargo Traffic Statistics 2012*.

⁴ Calculated from data in World Bank, *World Development Indicators 2012*.

⁵ Hong Kong Census and Statistics Department and Enright, Scott & Associates, Ltd. analysis.

⁶ See World Travel and Tourism Council, *Travel and Tourism Economic Impact: Hong Kong 2012 and Travel and Tourism Economic Impact: World 2012*.

⁷ 11.6 million visitors by air out of a total 48.6 million in 2012 according to the Hong Kong Tourism Board.

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Exhibit ES.1. Quantifiable Economic Impact from Operations of Hong Kong International Airport, 2012 (Includes only Inbound Tourism)

Impact	2012	Percentage of Hong Kong GDP / Employment
Revenue (HK\$ Millions)		
Direct	237,266	
Direct + Indirect	421,656	
Direct + Indirect + Induced	451,375	
Direct + Indirect + Induced + Catalytic Direct Only	1,964,865	
Direct + Indirect + Induced + Catalytic Total	2,671,231	
Value Added (HK\$ Millions)		
Direct	52,876	2.6
Direct + Indirect	77,985	3.8
Direct + Indirect + Induced	94,241	4.6
Direct + Indirect + Induced + Catalytic Direct Only	185,507	9.1
Direct + Indirect + Induced + Catalytic Total	335,319	16.5
Employment (Persons)		
Direct	62,968	1.7
Direct + Indirect	111,072	3.0
Direct + Indirect + Induced	148,158	4.1
Direct + Indirect + Induced + Catalytic Direct Only	300,380	8.2
Direct + Indirect + Induced + Catalytic Total	590,090	16.1

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Exhibit ES.2. Quantifiable Economic Impact from Operations of Hong Kong International Airport, 2012 (Includes both Inbound and Outbound Tourism – “Net Tourism”)

Impact	2012	Percentage of Hong Kong GDP / Employment
Revenue (HK\$ Millions)		
Direct	237,266	
Direct + Indirect	421,656	
Direct + Indirect + Induced	451,375	
Direct + Indirect + Induced + Catalytic Direct Only	1,886,099	
Direct + Indirect + Induced + Catalytic Total	2,530,376	
Value Added (HK\$ Millions)		
Direct	52,876	2.6
Direct + Indirect	77,985	3.8
Direct + Indirect + Induced	94,241	4.6
Direct + Indirect + Induced + Catalytic Direct Only	155,011	7.6
Direct + Indirect + Induced + Catalytic Total	288,299	14.2
Employment (Persons)		
Direct	62,968	1.7
Direct + Indirect	111,072	3.0
Direct + Indirect + Induced	148,158	4.1
Direct + Indirect + Induced + Catalytic Direct Only	226,531	6.2
Direct + Indirect + Induced + Catalytic Total	474,036	13.0

Note: Net tourism impact equals the impact of tourism exports (minus the impact of spending on the airport island) minus the impact of tourism imports. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Future contribution of HKIA to the Hong Kong economy

Future projections of the quantifiable economic impact of HKIA were generated for three main situations. The first is a “Status Quo Situation” in which investment committed by 2012 for the 2012 to 2015 period would be carried out plus maintenance investment to retain capacity at resulting levels. This is a “Status Quo” option and a benchmark by which to measure the impact of the investment scenarios. The second is “Scenario 1” in which capital investments are made to expand capacity in a two-runway configuration. The third is “Scenario 2” in which capital investments are made to expand capacity of the two runway system and also to construct a new third runway, with the first investments being made in 2012. In the Status Quo Situation, capital investments are made to maintain capacity at the levels attained by 2015. In both Scenario 1 and Scenario 2, annual capital investments are made to maintain existing and newly created infrastructure at their design capacity.

Projections for the net benefit attributed to Scenario 1 and Scenario 2 were generated by subtracting the economic impact of the Status Quo Situation from the economic impact of Scenario 1 and also from Scenario 2. The total incremental capital cost of the Scenario 1 investment programme was projected at HK\$28,908 million⁸ for construction and HK\$50,310 million for maintenance from 2012 until 2061. The total incremental capital cost of the Scenario 2 investment programme was projected at HK\$154,726 million⁹ for construction and HK\$95,942 million for maintenance from 2012 until 2061. The forecast throughput for the three situations is given in Exhibit ES.3 for passengers and Exhibit ES.4 for cargo.

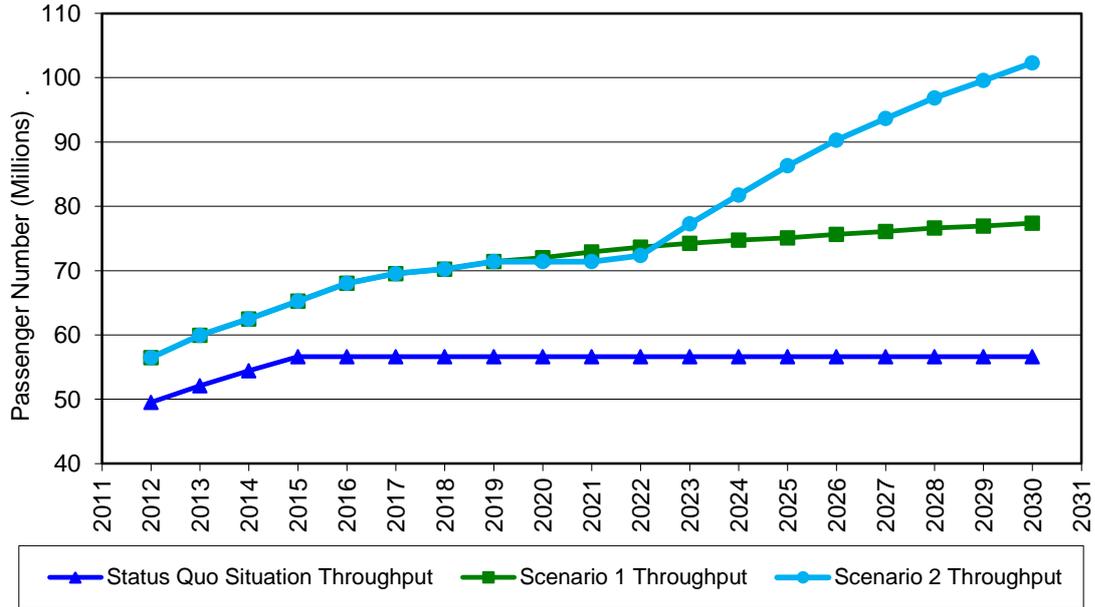
Projections for the future quantifiable impact of aviation-related businesses in Hong Kong, non-aviation businesses at HKIA, aviation-facilitated tourism, and aviation-facilitated trade for the two scenarios are given in Exhibit ES.5 including only inbound tourism and in Exhibit ES.6 including net tourism.

The economic impact of HKIA and aviation in general on Hong Kong’s economy is projected to be substantially larger in Scenario 1 than in the Status Quo Situation and substantially larger in Scenario 2 than in Scenario 1. Given the throughput forecasts, Scenario 1 yields on the order of 35 percent more passenger traffic than the Status Quo Situation by 2030, and Scenario 2 yields on the order of 79 percent more passenger traffic than the Status Quo Situation by 2030. For cargo, the results are more extreme, with Scenario 1 yielding 39 percent more cargo throughput than the Status Quo Situation in 2030 and Scenario 2 yielding 102 percent more cargo throughput than the Status Quo Situation.

⁸ Figures include 2012 spend of HK\$2,288 million, 2013 HK\$ 3,917 million, and 2014 to 2019 HK\$22,703 million. All figures in 2012 HK\$.

⁹ Figures include 2012 spend of HK\$2,288 million, 2013 HK\$ 3,917 million, 2014 to 2019 HK\$22,703 million on two runway enhancement and HK\$4,820 million on provisioning works for the third runway plus HK\$120,997 million on main works constructing the third runway. All figures in 2012 HK\$.

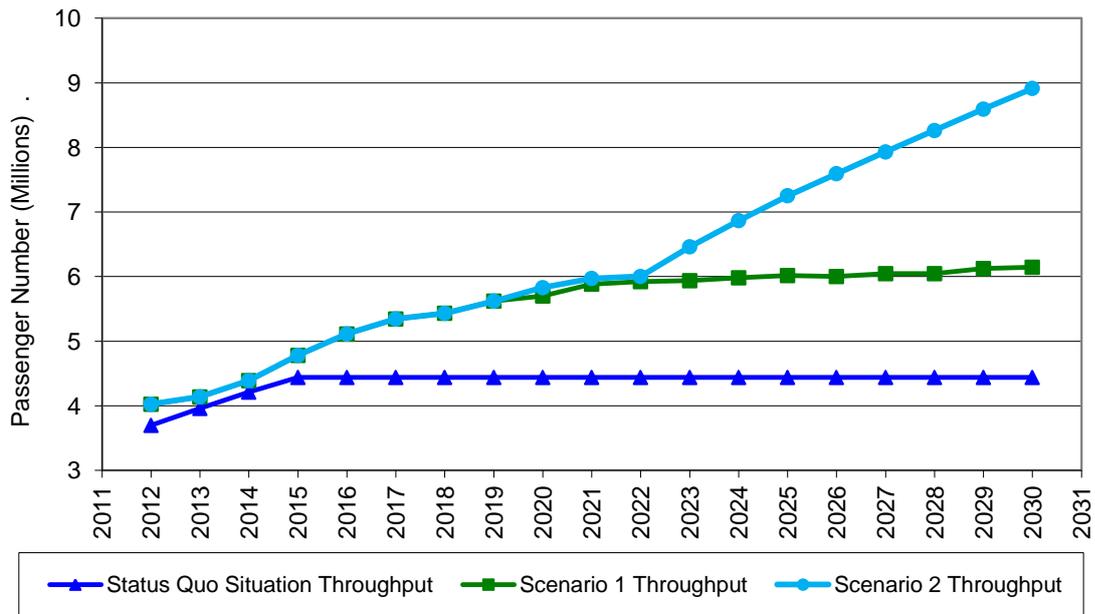
Exhibit ES.3. Passenger Throughput



Passengers (millions)	2015	2020	2025	2030
Status Quo Situation Throughput	57	57	57	57
Scenario 1 Throughput	65	72	75	77
Scenario 2 Throughput	65	71	86	102

Source: Airport Authority of Hong Kong and IATA.

Exhibit ES.4. Cargo Throughput



Cargo (million tonnes)	2015	2020	2025	2030
Status Quo Situation Throughput	4.4	4.4	4.4	4.4
Scenario 1 Throughput	4.8	5.7	6.0	6.1
Scenario 2 Throughput	4.8	5.8	7.3	8.9

Source: Airport Authority of Hong Kong and IATA.

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Exhibit ES.5. Total Economic Impact from Operations of Hong Kong International Airport (Three Situations) (Includes only Inbound Tourism)

Impact	2012	2015	2020	2025	2030
Status Quo Situation					
Revenue (HK\$ Millions)	211,653	246,368	245,685	244,636	243,608
Direct	376,157	437,881	436,690	434,860	433,067
Direct + Indirect	402,636	468,652	467,335	465,312	463,331
Direct + Indirect + Induced	1,791,450	2,134,011	2,132,058	2,129,780	2,127,060
Direct + Indirect + Induced + Catalytic Direct Only	2,438,934	2,909,704	2,907,250	2,904,771	2,901,469
Direct + Indirect + Induced + Catalytic Total					
Value Added (HK\$ Millions)					
Direct	47,150	54,855	54,680	54,412	54,150
Direct + Indirect	69,473	80,717	80,374	79,849	79,335
Direct + Indirect + Induced	83,957	97,549	97,137	96,506	95,889
D + I + I Percentage of Hong Kong's GDP	4.1%	4.3%	3.6%	3.0%	2.6%
Direct + Indirect + Induced + Catalytic Direct Only	167,000	196,397	195,738	195,009	194,106
Direct + Indirect + Induced + Catalytic Total	304,231	360,707	359,914	359,132	358,074
Total Quantifiable Impact % of Hong Kong's GDP	14.9%	15.9%	13.2%	11.2%	9.6%
Employment (Persons)					
Direct	56,089	65,157	64,872	64,435	64,007
Direct + Indirect	98,741	114,387	113,635	112,481	111,351
Direct + Indirect + Induced	131,784	152,787	151,878	150,483	149,118
Direct + Indirect + Induced + Catalytic Direct Only	269,660	316,244	314,739	313,105	311,047
Direct + Indirect + Induced + Catalytic Total	534,762	633,362	631,516	629,746	627,292
Scenario 1					
Revenue (HK\$ Millions)					
Direct	237,266	276,626	314,741	329,083	336,840
Direct + Indirect	421,656	491,628	559,399	584,922	598,737
Direct + Indirect + Induced	451,375	526,234	598,717	625,974	640,709
Direct + Indirect + Induced + Catalytic Direct Only	1,964,865	2,322,732	2,735,423	2,880,852	2,941,929
Direct + Indirect + Induced + Catalytic Total	2,671,231	3,160,704	3,730,414	3,930,559	4,013,084
Value Added (HK\$ Millions)					
Direct	52,876	61,622	70,082	73,244	74,943
Direct + Indirect	77,985	90,793	103,140	107,670	110,068
Direct + Indirect + Induced	94,241	109,723	124,647	130,125	133,027
D + I + I Percentage of Hong Kong's GDP	4.6%	4.8%	4.6%	4.1%	3.6%
Direct + Indirect + Induced + Catalytic Direct Only	185,507	217,570	251,219	263,379	268,893
Direct + Indirect + Induced + Catalytic Total	335,319	395,231	461,948	485,654	495,692
Total Quantifiable Impact % of Hong Kong's GDP	16.5%	17.5%	17.0%	15.1%	13.2%
Employment (Persons)					
Direct	62,968	73,302	83,259	86,903	88,830
Direct + Indirect	111,072	129,033	146,212	152,252	155,329
Direct + Indirect + Induced	148,158	172,218	195,277	203,481	207,706
Direct + Indirect + Induced + Catalytic Direct Only	300,380	351,662	404,351	423,303	431,722
Direct + Indirect + Induced + Catalytic Total	590,090	695,034	810,959	852,062	869,160
Scenario 2					
Revenue (HK\$ Millions)					
Direct	237,266	276,626	316,128	386,554	465,463
Direct + Indirect	421,656	491,628	561,874	687,063	827,333
Direct + Indirect + Induced	451,375	526,234	601,349	735,303	885,390
Direct + Indirect + Induced + Catalytic Direct Only	1,964,865	2,322,732	2,784,171	3,448,777	4,217,118
Direct + Indirect + Induced + Catalytic Total	2,671,231	3,160,704	3,800,068	4,711,007	5,765,671
Value Added (HK\$ Millions)					
Direct	52,876	61,622	70,382	86,045	103,593
Direct + Indirect	77,985	90,793	103,547	126,527	152,266
Direct + Indirect + Induced	94,241	109,723	125,140	152,914	184,022
D + I + I Percentage of Hong Kong's GDP	4.6%	4.8%	4.6%	4.8%	4.9%
Direct + Indirect + Induced + Catalytic Direct Only	185,507	217,570	253,866	312,289	378,417
Direct + Indirect + Induced + Catalytic Total	335,319	395,231	468,947	579,438	705,996
Total Quantifiable Impact % of Hong Kong's GDP	16.5%	17.5%	17.2%	18.1%	18.9%
Employment (Persons)					
Direct	62,968	73,302	83,584	102,127	122,897
Direct + Indirect	111,072	129,033	146,684	179,038	215,257
Direct + Indirect + Induced	148,158	172,218	195,946	239,237	287,707
Direct + Indirect + Induced + Catalytic Direct Only	300,380	351,662	408,053	501,256	606,115
Direct + Indirect + Induced + Catalytic Total	590,090	695,034	822,827	1,016,184	1,237,004

Note: All dollars are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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**Exhibit ES.6. Total Economic Impact from Operations of Hong Kong International Airport
(Includes both Inbound and Outbound Tourism “Net Tourism”)**

Impact	2012	2015	2020	2025	2030
Status Quo Situation					
Revenue (HK\$ Millions)	211,653	246,368	245,685	244,636	243,608
Direct	376,157	437,881	436,690	434,860	433,067
Direct + Indirect	402,636	468,652	467,335	465,312	463,331
Direct + Indirect + Induced	1,712,684	2,039,017	2,024,773	2,003,602	1,982,393
Direct + Indirect + Induced + Catalytic Direct Only	2,298,079	2,739,830	2,715,396	2,679,130	2,642,764
Direct + Indirect + Induced + Catalytic Total					
Value Added (HK\$ Millions)					
Direct	47,150	54,855	54,680	54,412	54,150
Direct + Indirect	69,473	80,717	80,374	79,849	79,335
Direct + Indirect + Induced	83,957	97,549	97,137	96,506	95,889
D + I + I Percentage of Hong Kong's GDP	4.1%	4.3%	3.6%	3.0%	2.6%
Direct + Indirect + Induced + Catalytic Direct Only	136,503	159,617	154,200	146,155	138,093
Direct + Indirect + Induced + Catalytic Total	257,209	303,998	295,870	283,807	271,711
Total Quantifiable Impact % of Hong Kong's GDP	12.6%	13.4%	10.9%	8.8%	7.3%
Employment (Persons)					
Direct	56,089	65,157	64,872	64,435	64,007
Direct + Indirect	98,741	114,387	113,635	112,481	111,351
Direct + Indirect + Induced	131,784	152,787	151,878	150,483	149,118
Direct + Indirect + Induced + Catalytic Direct Only	195,811	227,181	214,152	194,804	175,411
Direct + Indirect + Induced + Catalytic Total	418,707	493,399	473,443	443,835	414,138
Scenario 1					
Revenue (HK\$ Millions)					
Direct	237,266	276,626	314,741	329,083	336,840
Direct + Indirect	421,656	491,628	559,399	584,922	598,737
Direct + Indirect + Induced	451,375	526,234	598,717	625,974	640,709
Direct + Indirect + Induced + Catalytic Direct Only	1,886,099	2,227,738	2,628,139	2,754,674	2,797,262
Direct + Indirect + Induced + Catalytic Total	2,530,376	2,990,829	3,538,560	3,704,919	3,754,379
Value Added (HK\$ Millions)					
Direct	52,876	61,622	70,082	73,244	74,943
Direct + Indirect	77,985	90,793	103,140	107,670	110,068
Direct + Indirect + Induced	94,241	109,723	124,647	130,125	133,027
D + I + I Percentage of Hong Kong's GDP	4.6%	4.8%	4.6%	4.1%	3.6%
Direct + Indirect + Induced + Catalytic Direct Only	155,011	180,791	209,680	214,525	212,880
Direct + Indirect + Induced + Catalytic Total	288,299	338,522	397,901	410,329	409,329
Total Quantifiable Impact % of Hong Kong's GDP	14.2%	15.0%	14.6%	12.8%	10.9%
Employment (Persons)					
Direct	62,968	73,302	83,259	86,903	88,830
Direct + Indirect	111,072	129,033	146,212	152,252	155,329
Direct + Indirect + Induced	148,158	172,218	195,277	203,481	207,706
Direct + Indirect + Induced + Catalytic Direct Only	226,531	262,598	303,764	305,003	296,086
Direct + Indirect + Induced + Catalytic Total	474,036	555,070	652,885	666,153	656,007
Scenario 2					
Revenue (HK\$ Millions)					
Direct	237,266	276,626	316,128	386,554	465,463
Direct + Indirect	421,656	491,628	561,874	687,063	827,333
Direct + Indirect + Induced	451,375	526,234	601,349	735,303	885,390
Direct + Indirect + Induced + Catalytic Direct Only	1,886,099	2,227,738	2,676,887	3,322,599	4,072,451
Direct + Indirect + Induced + Catalytic Total	2,530,376	2,990,829	3,608,215	4,485,366	5,506,966
Value Added (HK\$ Millions)					
Direct	52,876	61,622	70,382	86,045	103,593
Direct + Indirect	77,985	90,793	103,547	126,527	152,266
Direct + Indirect + Induced	94,241	109,723	125,140	152,914	184,022
D + I + I Percentage of Hong Kong's GDP	4.6%	4.8%	4.6%	4.8%	4.9%
Direct + Indirect + Induced + Catalytic Direct Only	155,011	180,791	212,327	263,435	322,404
Direct + Indirect + Induced + Catalytic Total	288,299	338,522	404,900	504,113	619,632
Total Quantifiable Impact % of Hong Kong's GDP	14.2%	15.0%	14.9%	15.7%	16.5%
Employment (Persons)					
Direct	62,968	73,302	83,584	102,127	122,897
Direct + Indirect	111,072	129,033	146,684	179,038	215,257
Direct + Indirect + Induced	148,158	172,218	195,946	239,237	287,707
Direct + Indirect + Induced + Catalytic Direct Only	226,531	262,598	307,466	382,956	470,479
Direct + Indirect + Induced + Catalytic Total	474,036	555,070	664,754	830,274	1,023,851

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Projections for the net economic impacts associated with airport operations in Scenario 1 and Scenario 2 (ignoring construction impacts) were generated by subtracting the economic impact of HKIA projected for the Status Quo Situation from the economic impact of HKIA projected for Scenarios 1 and 2. These projections are given in Exhibit ES.7. Note that subtracting the results of Scenario 1 from Scenario 2 for the impact from operations would NOT give an accurate picture of the total differences between scenarios given the vast differences in construction and maintenance costs. The proper way to compare the two Scenarios is through comparing the difference in Economic Net Present Values (ENPVs) including construction and maintenance costs. This is done below.

Exhibit ES.7. Net Economic Impact from Operations of Scenario 1 and 2 Investment Programmes

Impact	2012	2015	2020	2025	2030
Scenario 1					
Revenue (HK\$ Millions)					
Direct	25,613	30,257	69,056	84,448	93,232
Direct + Indirect	45,501	53,746	122,710	150,064	165,670
Direct + Indirect + Induced	48,741	57,581	131,383	160,664	177,379
Direct + Indirect + Induced + Catalytic Direct Only	173,417	188,720	603,367	751,075	814,870
Direct + Indirect + Induced + Catalytic Total	232,299	250,999	823,165	1,025,789	1,111,616
Value Added (HK\$ Millions)					
Direct	5,726	6,767	15,402	18,832	20,794
Direct + Indirect	8,512	10,076	22,765	27,821	30,733
Direct + Indirect + Induced	10,284	12,173	27,509	33,619	37,138
D + I + I Percentage of Hong Kong's GDP	0.50%	0.54%	1.01%	1.05%	0.99%
Direct + Indirect + Induced + Catalytic Direct Only	18,507	21,173	55,479	68,371	74,787
Direct + Indirect + Induced + Catalytic Total	31,087	34,524	102,031	126,524	137,620
Total Quantifiable Impact % of Hong Kong's GDP	1.5%	1.5%	3.7%	3.9%	3.7%
Employment (Persons)					
Direct	6,879	8,145	18,387	22,468	24,823
Direct + Indirect	12,331	14,647	32,577	39,771	43,978
Direct + Indirect + Induced	16,374	19,433	43,399	52,998	58,589
Direct + Indirect + Induced + Catalytic Direct Only	30,720	35,419	89,612	110,199	120,676
Direct + Indirect + Induced + Catalytic Total	55,328	61,671	179,441	222,317	241,868
Scenario 2					
Revenue (HK\$ Millions)					
Direct	25,613	30,257	70,443	141,918	221,856
Direct + Indirect	45,501	53,746	125,184	252,203	394,268
Direct + Indirect + Induced	48,741	57,581	134,014	269,990	422,061
Direct + Indirect + Induced + Catalytic Direct Only	173,417	188,720	652,115	1,318,998	2,090,060
Direct + Indirect + Induced + Catalytic Total	232,299	250,999	892,820	1,806,237	2,864,202
Value Added (HK\$ Millions)					
Direct	5,726	6,767	15,702	31,633	49,444
Direct + Indirect	8,512	10,076	23,173	46,679	72,932
Direct + Indirect + Induced	10,284	12,173	28,003	56,409	88,134
D + I + I Percentage of Hong Kong's GDP	0.50%	0.54%	1.03%	1.76%	2.35%
Direct + Indirect + Induced + Catalytic Direct Only	18,507	21,173	58,128	117,281	184,312
Direct + Indirect + Induced + Catalytic Total	31,087	34,524	109,033	220,307	347,925
Total Quantifiable Impact % of Hong Kong's GDP	1.5%	1.5%	4.0%	6.9%	9.3%
Employment (Persons)					
Direct	6,879	8,145	18,712	37,692	58,890
Direct + Indirect	12,331	14,647	33,050	66,557	103,906
Direct + Indirect + Induced	16,374	19,433	44,069	88,754	138,589
Direct + Indirect + Induced + Catalytic Direct Only	30,720	35,419	93,316	188,152	295,068
Direct + Indirect + Induced + Catalytic Total	55,328	61,671	191,312	386,438	609,710

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Economic impact of construction and maintenance investment

The investment in construction and maintenance of airport infrastructure associated with the Status Quo Situation, Scenarios 1 and 2 also would have economic impacts on Hong Kong. The projected direct, indirect, and induced economic impact for construction and maintenance investment in the Status Quo Situation, Scenario 1 and Scenario 2 are given in Exhibits ES.8, ES.9, ES.10, ES.11 and ES.12. These positive economic impacts have not been factored into the subsequent Economic Internal Rate of Return or Economic Net Present Value calculations (EIRR and ENVP) in the present Study, as they are expenditures made from Hong Kong funds that could have alternative uses in Hong Kong. We note that in situations in which external funds are injected into a project that the economic impact from construction is normally factored into the subsequent analysis.

Exhibit ES.8. Economic Impacts of Construction and Maintenance, Status Quo

Impact	Revenue (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	4,495	6,965	10,260	10,854	20,992	22,279	75,845
Indirect	3,122	4,838	7,126	7,539	14,580	15,474	52,679
Induced	1,058	1,639	2,414	2,554	4,940	5,243	17,848
Total	8,675	13,442	19,800	20,947	40,511	42,996	146,373
	Value Added (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	1,373	2,128	3,134	3,315	6,412	6,805	23,166
Indirect	544	843	1,242	1,314	2,541	2,697	9,181
Induced	579	897	1,321	1,397	2,702	2,868	9,763
Total	2,496	3,867	5,696	6,026	11,655	12,370	42,111
	Employees (Total Person-years)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	2,027	3,141	4,627	4,895	9,467	10,047	34,204
Indirect	961	1,489	2,193	2,320	4,488	4,763	16,214
Induced	1,320	2,046	3,013	3,188	6,165	6,543	22,274
Total	4,308	6,676	9,833	10,403	20,119	21,353	72,692

Note: Note: All dollar values are in 2012 dollars. Values given for each period represent the total over these periods and not an annual value. Construction assumed to have been completed by 2015 with maintenance expenditure continuing on to 2061.

Source: Airport Authority of Hong Kong data, Enright, Scott & Associates, Ltd. analysis.

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Exhibit ES.9. Incremental Economic Impacts of Construction, Scenario 1

Impact	Revenue (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	27,350	1,558	-	-	-	-	28,908
Indirect	18,996	1,082	-	-	-	-	20,078
Induced	6,436	367	-	-	-	-	6,803
Total	52,783	3,007	-	-	-	-	55,790
	Value Added (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	8,354	476	-	-	-	-	8,830
Indirect	3,311	189	-	-	-	-	3,499
Induced	3,521	201	-	-	-	-	3,721
Total	15,185	865	-	-	-	-	16,050
	Employees (Person-years)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	12,334	703	-	-	-	-	13,037
Indirect	5,847	333	-	-	-	-	6,180
Induced	8,032	458	-	-	-	-	8,490
Total	26,213	1,493	-	-	-	-	27,707

Note: Note: All dollar values are in 2012 dollars. Values given for each period represent the total over these periods and not an annual value. Construction assumed completed by 2019.

Source: Airport Authority of Hong Kong data, Enright, Scott & Associates, Ltd. analysis.

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Exhibit ES.10. Incremental Economic Impacts of Construction and Maintenance, Scenario 1

Impact	Revenue (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	27,350	1,880	1,502	3,866	14,728	29,892	79,218
Indirect	18,996	1,306	1,043	2,685	10,230	20,762	55,022
Induced	6,436	442	353	910	3,466	7,034	18,642
Total	52,783	3,628	2,899	7,460	28,424	57,689	152,882
	Value Added (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	8,354	574	459	1,181	4,499	9,130	24,196
Indirect	3,311	228	182	468	1,783	3,619	9,590
Induced	3,521	242	193	498	1,896	3,848	10,197
Total	15,185	1,044	834	2,146	8,177	16,597	43,983
	Employees (Person-years)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	12,334	848	677	1,743	6,642	13,481	35,726
Indirect	5,847	402	321	826	3,149	6,390	16,936
Induced	8,032	552	441	1,135	4,325	8,778	23,264
Total	26,213	1,802	1,440	3,705	14,116	28,650	75,925

Note: Note: All dollar values are in 2012 dollars. Values given for each period represent the total over these periods and not an annual value. Construction assumed to have been completed by 2019 with maintenance expenditure continuing on to 2061. These impacts are incremental, i.e. over and above those for the Status Quo Situation.

Source: Airport Authority provided costs, Enright, Scott & Associates, Ltd. analysis.

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Exhibit ES.11. Incremental Economic Impacts of Construction, Scenario 2

Impact	Revenue (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	104,807	49,919	-	-	-	-	154,726
Indirect	72,795	34,672	-	-	-	-	107,466
Induced	24,664	11,747	-	-	-	-	36,411
Total	202,266	96,338	-	-	-	-	298,603
	Value Added (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	32,012	15,247	-	-	-	-	47,259
Indirect	12,687	6,043	-	-	-	-	18,730
Induced	13,491	6,426	-	-	-	-	19,917
Total	58,191	27,716	-	-	-	-	85,907
	Employees (Person-years)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	42,872	17,721	-	-	-	-	60,593
Indirect	22,406	10,672	-	-	-	-	33,078
Induced	30,779	14,660	-	-	-	-	45,438
Total	96,057	43,053	-	-	-	-	139,110

Note: Note: All dollar values are in 2012 dollars. Values given for each period represent the total over these periods and not an annual value. Construction assumed to have been completed by 2023. These impacts are incremental, i.e. over and above those for the Status Quo Situation.

Source: Airport Authority provided costs, Enright, Scott & Associates, Ltd. analysis.

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Exhibit ES.12. Incremental Economic Impacts of Construction and Maintenance, Scenario 2

Impact	Revenue (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	104,807	50,241	1,603	4,714	32,837	56,467	250,668
Indirect	72,795	34,895	1,113	3,274	22,807	39,219	174,104
Induced	24,664	11,823	377	1,109	7,727	13,288	58,989
Total	202,266	96,959	3,094	9,097	63,372	108,974	483,761
	Value Added (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	32,012	15,346	490	1,440	10,030	17,247	76,564
Indirect	12,687	6,082	194	571	3,975	6,835	30,344
Induced	13,491	6,467	206	607	4,227	7,269	32,267
Total	58,191	27,895	890	2,617	18,232	31,351	139,175
	Employees (Person-years)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	42,872	17,866	723	2,126	14,809	25,465	103,861
Indirect	22,406	10,741	343	1,008	7,020	12,072	53,588
Induced	30,779	14,754	471	1,384	9,643	16,583	73,614
Total	96,057	43,361	1,536	4,518	31,472	54,119	231,063

Note: Note: All dollar values are in 2012 dollars. Values given for each period represent the total over these periods and not an annual value. Construction assumed to have been completed by 2023 with maintenance expenditure continuing on to 2061. These impacts are incremental, i.e. over and above those for the Status Quo Situation.

Source: Airport Authority provided costs, Enright, Scott & Associates, Ltd. analysis.

ENPV and EIRR for Scenarios 1 and 2

Economic Internal Rate of Returns (EIRR) and Economic Net Present Values (ENPV) were calculated for the net economic Impact from Operations of Scenarios 1 and 2. These calculations incorporated the net value added contributions to Hong Kong's economy from operations as positive cash flows, the construction and maintenance investments for Scenarios 1 and 2 as negative cash flows, and a 4 percent discount rate typically used for projects funded by the Hong Kong government. The results may be found in Exhibit ES.13. We note that the EIRR and ENPVs for both Scenarios are highly positive.¹⁰

The EIRRs for Scenario 1 are higher than in Scenario 2 because the benefits of Scenario 1 are frontloaded and the costs are much lower than in Scenario 2, while the ENPVs for Scenario 2 are higher because there is ultimately a larger recurrent benefit that goes on for a long period of time. The high EIRRs, particularly for Scenario 1, are due in part to the fact that significant leverage can be achieved with the existing assets and benefits can be readily

¹⁰ We note that for the EIRR calculation we assumed that all capital expenditures (cash outflows) occurred at the beginning of a year and all benefits were obtained at the end of a year. If we assumed both expenditures and benefits were made evenly through the year, then the net of expenditure and benefits was positive, even in the first year, yielding infinite EIRR estimates. The time shift will yield conservative EIRR estimates.

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realized from the second year of investment. We note that the typical IRR (EIRR) calculation assumes that all the benefits from the project under review are re-invested at the internally generated rate of return, yielding further returns at this same rate in the following period(s). However, if the magnitude of the returns exceeds the amount that can be re-invested in the project and the IRR is high by comparison to rates of return available in the market, then the assumption that all the returns can be re-invested at the same rate as the IRR is false and the estimated IRR may not be a good measure for project evaluation. In any case, if the IRR (EIRR) and the NPV (ENPV) give different answers in the evaluation of mutually exclusive projects, the correct answer is by NPV (ENPV).

The ENPV results would be strong indicators that either investment programme would be highly beneficial to Hong Kong, but that Scenario 2 would have greater ultimate benefit. Exhibit ES.14 shows the difference in the ENPVs across the two scenarios. These may be viewed as the foregone economic benefits if Scenario 1 is put into place versus Scenario 2.

Exhibit ES.13. Economic Internal Rate of Return and Economic Net Present Value for a 50 Year Return, Scenarios 1 and 2

Impact	EIRR (percent)	ENPV (HK\$ mn)
Scenario 1		
Direct	106%	314,739
Direct + Indirect	211%	482,969
Direct + Indirect + Induced	285%	591,214
Direct + Indirect + Induced + Catalytic Direct Only	626%	1,213,343
Direct + Indirect + Induced + Catalytic Total	1,164%	2,243,271
Scenario 2		
Direct	27%	525,722
Direct + Indirect	179%	841,521
Direct + Indirect + Induced	269%	1,045,637
Direct + Indirect + Induced + Catalytic Direct Only	623%	2,309,927
Direct + Indirect + Induced + Catalytic Total	1,163%	4,447,187

Note: The “Direct,” “Direct + Indirect,” and “Direct + Indirect + Induced” lines include only aviation-related businesses in Hong Kong and non-aviation businesses at HKIA. The “Direct + Indirect + Induced + Catalytic Direct Only” line adds in the direct benefits of aviation-facilitated tourism and trade. The “Direct + Indirect + Induced + Catalytic Total” line adds in the direct, indirect, and induced benefits of aviation-facilitated tourism and trade. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Exhibit ES.14. Economic Net Present Value for a 50 Year Return, Scenario 2 minus Scenario 1

Impact	ENPV (HK\$ mn)
Scenario 2 – Scenario 1	
Direct	210,983
Direct + Indirect	358,552
Direct + Indirect + Induced	454,423
Direct + Indirect + Induced + Catalytic Direct Only	1,096,584
Direct + Indirect + Induced + Catalytic Total	2,203,916

Note: The “Direct,” “Direct + Indirect,” and “Direct + Indirect + Induced” lines include only aviation-related businesses in Hong Kong and non-aviation businesses at HKIA. The “Direct + Indirect + Induced + Catalytic Direct Only” line adds in the direct benefits of aviation-facilitated tourism and trade. The “Direct + Indirect + Induced + Catalytic Total” line adds in the direct, indirect, and induced benefits of aviation-facilitated tourism and trade. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Cost of Delay

Given the greater positive ENPV of Scenario 2 compared to Scenario 1, it stands to reason that any delay in completing and opening the capacity projected for the third runway in Scenario 2 would impose a cost on the Hong Kong economy. The cost of this delay in ENPV terms for aviation-related businesses in Hong Kong and non-aviation businesses at HKIA only (i.e. excluding catalytic impacts) is given in Exhibit ES.15.

Exhibit ES.15. Cost of Delay in Opening the Third Runway for Aviation-related Businesses in Hong Kong and Non-Aviation Businesses at HKIA

Delay	Scenario 2 ENPV (HK\$ mn)	Cost of Delay in ENPV (HK\$ mn)	Percentage Difference
No Delay	1,045,637		
1 year	1,030,320	15,316	1.5%
2 Years	1,015,789	29,848	2.9%
3 Years	1,002,102	43,535	4.2%
4 Years	989,204	56,433	5.4%
5 Years	976,989	68,648	6.6%

Note: Cost of delay = ENPV with delay – ENPV with no delay. ENPV calculated from Direct + Indirect + Induced impacts (i.e. catalytic impacts excluded).

Source: Enright, Scott & Associates, Ltd. analysis.

Main conclusions

There are several main conclusions that come out of the present Study.

HKIA at present generates enormous economic value for Hong Kong.

According to our economic impact estimates, the combined direct, indirect, and induced value added impact of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA was HK\$94,241 million in 2012, equivalent to 4.6 percent of Hong Kong's GDP. The relevant employment impact was 148,158 people employed, equivalent to 4.1 percent of Hong Kong's total employment in that year. Depending on whether outbound tourism is included as well as inbound tourism and whether the total catalytic effect (direct, indirect, and induced contributions of catalytic tourism and trade) is included or just the direct catalytic effect, the value added impact estimates when catalytic effects are included ranged from HK\$155,011 million to HK\$355,319 million in 2012, or equivalent to between 7.6 and 16.5 percent of Hong Kong's 2012 GDP. The estimates of the associated employment impacts ranged from 226,531 to 590,090, or from 6.2 to 16.1 percent of Hong Kong's total employment.

The contribution of HKIA goes far beyond those that can be quantified.

Despite the very large estimates, we believe the contribution of HKIA goes far beyond those that can be readily estimated. Without aviation services Hong Kong would not be a major trading centre, financial centre, or business management centre. Without HKIA we doubt Hong Kong would be a leader in international investment, an important location of multinational companies, or a leading regional headquarters location. While it is impossible to estimate the impact precisely, aviation services are closely linked with the four key industries in Hong Kong's economy: financial services, trading and logistics, tourism, and professional and producer services, which together accounted for approximately 58 percent of Hong Kong's GDP in 2012.

HKIA's future contribution depends on future investment decisions.

If limited to the Status Quo Situation, based on throughput projections supplied to us by AA's Consultants, and if impacts associated only with aviation-related businesses in Hong Kong and non-aviation businesses at HKIA are taken into account, then the projected value added contribution of HKIA in 2030 is HK\$95,889 million or 2.6 percent of forecast GDP in that year. If the total catalytic impact of tourism and trade is included (in the "Inbound Tourism only" case) the figure for the Status Quo Situation would be HK\$358,074 million (9.6 percent of projected GDP). In the "Net Tourism" case, the figure for the Status Quo Situation would be HK\$271,711 million (7.3 percent of projected GDP).

In Scenario 1, in which capacity of the two runway configuration is expanded, impacts associated with aviation-related businesses in Hong Kong and non-aviation businesses at HKIA are projected to reach a value added of HK\$133,027 million in 2030, or 3.6 percent of forecast GDP in that year. When total catalytic tourism and trade impacts are also factored in, value added is projected to reach HK\$495,692 million (13.2 percent of projected GDP) in 2030 for the "Inbound Tourism only" case and HK\$409,329 million (10.9 percent of projected GDP) for the "Net Tourism" case.

In Scenario 2, in which capacity of the two runway configuration is expanded and a new third runway is built, impacts associated with aviation-related businesses in Hong Kong and non-aviation businesses at HKIA are projected to reach a value added of HK\$184,022 million, or

4.9 percent of projected GDP in 2030. When total catalytic tourism and trade impacts are factored in, value added is projected to reach HK\$705,996 million (18.9 percent of projected GDP) in 2030 for the “Inbound Tourism only” case and HK\$619,632 million (16.5 percent of projected GDP) in the “Net Tourism” case.

The results indicate that the investment programme termed Scenario 1 would enable HKIA to make a much larger contribution to Hong Kong than in the Status Quo Situation and that the investment programme termed Scenario 2 would make a much larger contribution to Hong Kong than in Scenario 1.

The projected net economic impacts of Scenario 1 and Scenario 2 are both strongly positive, with the impacts of Scenario 2 (which includes a third runway) being much higher.

Our analysis leads us to project that by 2030 the net economic impact from operations of the investment associated with Scenario 1 compared with the Status Quo Situation including only impacts associated with aviation-related businesses in Hong Kong and non-aviation businesses at HKIA would reach on the order of HK\$37,138 million in value added (1.0 percent of projected GDP) and 58,589 in employment. If the total catalytic impact of tourism and trade is included, the value added impact in 2030 is projected to be HK\$137,620 (3.7 percent of projected GDP) and the employment impact 241,868.

For Scenario 2, the net economic impacts from operations associated with aviation-related businesses in Hong Kong and non-aviation businesses at HKIA compared with the Status Quo Situation would reach on the order of HK\$88,134 million in value added in 2030 (2.4 percent of projected GDP) and 138,589 in employment. If the total catalytic impact of tourism and trade is included, the value added impact in 2030 is projected to be HK\$347,925 (9.3 percent of projected GDP) and the employment impact 609,710.

The net value added impact in both scenarios is strongly positive, with the impact of Scenario 2 just around two and a half times that of Scenario 1 in 2030.

The projected Economic Internal Rate of Return and Economic Net Present Value indicate that between Scenario 1 and Scenario 2 an investment in Scenario 2 would ultimately have the larger economic payoff.

The results of Economic Internal Rate of Return (EIRR) and Economic Net Present Value (ENPV) calculations show strongly positive ENPVs and EIRRs for the two scenarios versus the Status Quo Situation. Even if only the direct impact of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA are factored into the analysis, Scenario 1 gives an ENPV of HK\$314,739 million with an EIRR of 106 percent, and Scenario 2 gives an ENPV of HK\$525,722 million with an EIRR of 27 percent. If the indirect and induced impacts of aviation-related businesses in Hong Kong and non-aviation business at HKIA are taken into account, the Scenario 1 versus Status Quo Situation ENPV rises to HK\$591,214 million and the EIRR to 285 percent. The Scenario 2 versus Status Quo ENPV rises to HK\$1,045,637 million and the EIRR to 269 percent. This is not even including any impact for aviation-facilitated tourism or trade. When the full impact of aviation-facilitated tourism and trade are taken into account, Scenario 1 yields a projected EIRR of 1,164 percent and a projected ENPV of HK\$2,243,271 million over the Status Quo Situation, and Scenario 2 yields a projected EIRR of 1,163 percent and a projected ENPV of HK\$4,447,187 million over the Status Quo Situation.

Scenario 1 (Direct + Indirect + Induced) has a higher EIRR than Scenario 2 largely because of the large investment required to construct a third runway in Scenario 2 and the fact that the projected benefits are farther into the future. Scenario 1 benefits in this regard from the

fact that it leverages the already large investments that have been made to develop the existing two runway configuration. The high EIRRs, particularly for Scenario 1, are due in part to the fact that significant leverage can be achieved with the existing asset and benefits can be readily realized from the second year of investment. However, if the magnitude of the returns exceeds the amount that can be re-invested in the project and the IRR is high by comparison to rates of return available in the market, then the assumption that all the returns can be re-invested at the same rate as the IRR is false and the estimated IRR may not be a good measure for project evaluation. In any case, if the IRR (EIRR) and the NPV (ENPV) give different answers in the evaluation of mutually exclusive projects, the correct answer is by NPV (ENPV).

The ENPVs in Scenario 2 are around approximately twice those of Scenario 1, indicating that Scenario 2 has the greater long term economic payoff. They also indicate substantial foregone economic benefits if Scenario 1 is put in place rather than Scenario 2.

Delays would reduce the positive economic benefits as measured by ENPV of Scenario 2, which includes a third runway.

Delays in opening a third runway in Scenario 2 would reduce the overall economic benefits to Hong Kong. In essence the reduced ability to serve demand in the early years of a third runway would forego benefits that could not subsequently be recaptured. For aviation-related businesses in Hong Kong and non-aviation businesses at HKIA (excluding catalytic impacts) the costs associated with a delay in opening a third runway are estimated to range from HK\$15.3 billion in ENPV for a one year delay to HK\$68.6 billion in ENPV for a five year delay.

While other, non-economic issues must be addressed, there would appear to be a very strong economic case for expanding capacity at HKIA.

What does this mean for HKIA? Obviously, there are a range of non-economic issues, such as the impact on the environment that would have to be taken into account in the context of capacity expansion. These are being taken into account through the environmental impact assessment process. However, from an economic impact standpoint, and given the throughput and capital cost forecasts we have been provided, the economic benefit projections identified in this Report clearly show a sufficiently high return on investment to Hong Kong so that plans to expand capacity should proceed. Given the long lead time for approvals and for the construction process, time is of the essence so that Hong Kong will not face years of delays that might deny Hong Kong the economic benefits associated with meeting projected demand, erode Hong Kong's enviable position as a major aviation centre, and hinder Hong Kong's further development as a major Chinese and international business centre.

MAIN REPORT

1. Introduction

The Hong Kong International Airport (HKIA) has been in operation since 1998. The airport has experienced dramatic growth in passenger numbers, cargo throughput, and aircraft movements. This growth caused the Airport Authority (AA) to examine the potential to add capacity at HKIA. The AA previously commissioned Enright, Scott & Associates, Ltd (ESA) to carry out a “Master Plan 2030 Economic Analysis Study.”¹¹ This culminated in a Final Report delivered to the AA in May 2011. In 2014 the AA commissioned ESA to update its previous 2011 study based on updated traffic forecasts at the airport. This update is reported in this document. It addresses the present impact of HKIA on Hong Kong’s economy; the projected economic impact of HKIA in a Status Quo Situation, in a scenario in which two runway capacity is optimised, and in a scenario in which a third runway is also constructed; and the projected economic impacts of the investment programmes associated with the scenarios.

2. Background on the Study

Hong Kong and the HKIA are facing interesting challenges going forward. Hong Kong and the airport have benefited greatly from Hong Kong’s emergence as an international financial and business centre as well as the leading economic city in the Greater Pearl River Delta region, one of the world’s most dynamic economic regions. In turn, Hong Kong and its economy have benefited greatly from the presence of a world-leading airport.

2.1. Background on HKIA

Demand growth, changing aircraft mix, and operating constraints create challenges for HKIA. These challenges come at a time when other airports in the region are looking to expand their business, the economy of the region is changing, new infrastructure linkages are being constructed, other airports in Asia are looking to become major hubs, and direct links between Taiwan and the Chinese Mainland are growing. The result is a situation in which long-term planning is essential for HKIA. Recognizing this need, the AA engages in on-going long-term planning efforts.

Such planning is also essential for Hong Kong. Without a major international airport, it is hard to imagine that Hong Kong would even exist in its present form, and it certainly would be nothing like it is today. Given its unique historical circumstances, Hong Kong relied on its airport far more than most other cities in the world. Historically, travel restrictions meant that there was no airport outside of Hong Kong that could serve its needs. The fact that for many years Hong Kong did not have the option of using an airport in an adjacent city or territory, and today arriving in Hong Kong via a Guangdong airport adds the additional requirement of a China visa, inconvenient land transit, and border crossing, further underscores Hong Kong’s reliance on its airport. Today, Hong Kong’s continued reliance on HKIA can be seen in that our analysis has indicated that the economic impact of Hong Kong’s airport estimated by conventional means is substantially greater than that usually ascribed to airports globally. Thus planning at HKIA is not just a matter of concern to aviation specialists, but to the community of Hong Kong as a whole. Given Hong Kong’s importance as a hub for China and for East Asia, in fact, planning at HKIA is arguably important for a much wider region as well.

¹¹ Enright, Scott & Associates, May 2011, Contract C011-08 For Airport Master Plan 2030 Economic Impact Study For The Hong Kong International Airport, Final Report

2.2. The present Study

The Study objectives and scope are as follows:

2.2.1. Project objectives

The objectives of the Economic Impact Study are:

- To assess the present and potential impact of HKIA on Hong Kong's economy.
- To assess the economic impact of the proposed airport investment scenarios from a Hong Kong SAR perspective.
- To provide a thorough analysis on the capital costs and economic benefits of each investment scenario.
- To make recommendations on what investment scenario will benefit Hong Kong the most from an economic point of view.

2.2.2. Scope of the Study

The Study focuses on the following key questions:

- What is the current existing economic contribution of HKIA to the Hong Kong economy?
- What will be the future net economic contribution of HKIA to the Hong Kong economy in 2030 based on the following investment scenarios?
 - Status Quo Situation: No capital investment made to expand airport capacity beyond that already committed by 2012 for the 2012 to 2015 period plus maintenance investment to maintain the resulting capacity.
 - Scenario 1: Investment made to expand capacity of the 2 runway configuration beyond that in the Status Quo Situation plus maintenance expenditure to maintain pre-existing and new capacity.
 - Scenario 2: Investment made to expand capacity of the 2 runway configuration beyond that in the Status Quo Situation plus to construct a third runway at HKIA plus maintenance expenditure to maintain pre-existing and new capacity.

What will be the future net economic benefit of investing in each scenario?

The assessment of the economic contribution covers the following categories:

- **Direct benefit:** employment and income generated by the direct operation of the airport including activities of the airport operator, the airlines, aviation logistics suppliers, the concessionaires providing commercial facilities, the ground / ramp handling agents, and so on.
- **Indirect benefit:** employment and income generated in the chain of suppliers of goods and services to the direct activities of the airport, including utilities, fuel suppliers, construction and cleaning companies, food and retail good suppliers, travel

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agents, freight forwarders, land transportation supporting passengers and air cargoes, and so on.

- **Induced benefit:** the employment and income generated by the spending of incomes by the direct and indirect employees on local goods and services.
- **Catalytic benefits:** inward investment, development of business, trade, and tourism activity as a result of the presence of the airport.
- **Economic Internal Rate of Return (EIRR):** similar to an internal rate of return (IRR) in terms of its derivation, the EIRR provides a measure of the rate of return to an economy associated with a particular investment. The return incorporated into the EIRR analysis involves the value added to the economy associated with the investment.
- **Economic Net Present Value (ENPV):** similar to a net present value (NPV) in terms of its derivation, the ENPV provides an alternative measure of the returns to an economy associated with a particular investment. In ENPV analysis, the annual value added associated with an investment is discounted by a discount rate obtained from the relevant capital or opportunity cost of resources employed.

Expanding the airport would benefit Hong Kong's economic development. However, Scenario 1 and particularly Scenario 2 would involve substantial capital costs that would have to be justified in order for the proposed investments to make economic sense for Hong Kong. We further note that in accordance with the agreed scope for the Study, the analysis is to focus on the economic impact of the proposed airport expansion "from a Hong Kong perspective." This means that the impact on the other jurisdictions in the broader Greater Pearl River Delta region was only taken into account to the extent that this impact affects Hong Kong and its economy.

The economic impact and cost-benefit analysis of the present Study required projections of capital costs, and passenger and cargo throughput for each scenario over the period 2012 to 2061 as inputs to the analysis. Further the cost benefit analyses required projections of costs, passengers, and cargo for each scenario over the period 2012 to 2061 (50 years). The present Study did not entail independently assessing either the capital costs or the throughput projections as this was outside the scope of the present Study. Instead, ESA used cost projections generated by the AA and passenger and cargo throughput projections generated by AA's Consultants as inputs into the economic impact analysis and the cost-benefit analysis to advise the AA on whether investing in either scenario makes economic sense for Hong Kong.

ESA notes that it has been informed that the existence of five airports in the Greater Pearl River Delta region, and the competitive dynamics among them; the improved surface connectivity within the Greater Pearl River Delta region and to the five airports in the region including the Hong Kong-Macau-Zhuhai bridge; among others; have been taken into account in the throughput projections provided by the AA's Consultants.

3. Methodology note

This Study uses variations of traditional economic impact techniques that are tailored to the particular situation of Hong Kong. Economic impact analysis attempts to quantify the impact that an investment, event, or decision can have on a given economy. It is frequently used in order to determine whether capital investments should be made. Below is a general description of the economic impact methodology. A detailed description including data sources for individual items is provided in Appendix A. Some caveats associated with economic impact analyses can be found in Appendix C.

3.1. *General economic impact methodology*¹²

Economic impacts are measured in terms of direct impact, indirect impact, induced impact, and catalytic impact. Each level of impact attempts to quantify in a different way the benefits that are likely to accrue to a specific economy as a consequence of capital investment. The impact from a capital investment that requires construction will flow in two stages. During the first stage, impacts arise from the construction activity itself. During the second stage, impacts are derived from the on-going operation of the facility or asset that has been built.

3.1.1. Direct impact estimates

All economic impact methodologies start with projections of the direct economic impacts of a given investment, usually in terms of output, employment, and / or value added. These projections come from estimates of throughput, capital costs, and other features associated with the investments in question. The methodologies then differ in terms of how they develop indirect, induced, and catalytic economic impact projections.

3.1.2. Indirect and induced impacts

In order to develop indirect and induced economic impact projections, most economic impact studies involving airports worldwide use what is called the “Input-Output Approach.” In this approach, regional input-output models are used to generate multipliers for each industry affected by the airport that show the ripple effect of an expansion or contraction of each industry on the entire economy. The direct impact for a new investment in terms of numbers employed (or number of jobs or employees), output, and value added is then projected. The appropriate multipliers are then applied to these projections to generate projections of the indirect and induced effects.

While this approach has great appeal, in part due to its simplicity, it has a number of shortcomings. The first is that the multipliers generated through the analysis of the input-output tables are most valid for marginal changes in the direct impact projections, as they do not take into account the potential for shortages to develop in some inputs or for the potential that a large investment could bid up salaries and input costs in the local economy. For large investments with results that will materialise over many years, such models generally do not take potentially diminishing returns into account.¹³ A second shortcoming is that this method

¹² We note that there is no single universally accepted methodology for carrying out airport or aviation-related economic impact analyses. The process identified in this section and in Appendix A was developed from best practice guidelines provided by the Airport Authority of Hong Kong and tailored to the Hong Kong context by ESA.

¹³ Economists would generally refer to the basic shortcoming as failure to account for general equilibrium effects.

requires the existence of relatively detailed up-to-date input-output tables, which are not available for many economies.

A second approach to generating indirect and induced economic impact projections uses closed multi-sectorial macroeconomic models to generate economic impacts. Such models not only have input-output relations embedded within them, but also take into account the effect of increases in demand in one sector on wages and costs across the economy. Projections of the direct economic impacts are generated and then entered into the models, which then produce estimates of the indirect and induced impacts of an investment over the specified range, rather than just linear multipliers that may be valid over a relatively small range of input values or for a relatively short period of time. The advantage of this approach is that it overcomes some of the shortcomings of the multiplier approach. The disadvantages are that this approach has substantial data requirements as well as requiring the construction (or existence) of a suitable macro-model for the economy in question. It is therefore more costly and in many cases not feasible to implement.

Unfortunately, in some locations, there are no widely accepted, detailed input-output tables or suitable detailed macroeconomic models available for the economy. This makes it impossible to generate a complete set of multipliers or carry out macroeconomic model analysis in the same way as is possible in many other places in the world. The result is that economic impact analysis in such economies is often carried out by adopting “rule of thumb” multipliers derived from those used in similar settings elsewhere, or based on the judgment of the researcher to generate indirect and induced impacts from the direct impact figures. The problem with this latter method, of course, is that the multipliers generated may have little to do with the target location, and its economy. Thus it is important to choose economies as close in structure to the target economy’s as is possible if this method is used, and to liaise with government economists who have worked on related issues to ensure that the multipliers used seem reasonable for the local context.

3.1.3. Catalytic impacts

The direct, indirect, and induced benefits of an airport are related to the total revenues, value added, and employment of the aviation-related businesses and additional lines of business at the airport (direct), their expenditures on outputs from other industries (indirect), and the portion recycled by the spending of employees of the direct and indirect lines of business (induced). Catalytic benefits involve spillovers and other benefits that cannot be captured by tracing the flows of cash from aviation and airport-related businesses. The presence of an airport will have ripple effects throughout an economy. In particular, it will influence inward investment, business development, trade, and tourism activity.

While some of the catalytic effects are recognisable and quantifiable (the impact on tourism and trade, for example), others (such as the impact on inward investment, business development, and productivity throughout the economy) usually are not. For the latter group of effects, it can be extremely difficult to separate out the impact of an airport from other influences on the development of an economy.

These effects are sometimes projected through the use of large-scale surveys of businesses on the impact of an airport on their own businesses. Business survey results tend to address whether survey respondents believe the airport is important to their business, but these results can be difficult to link directly to economic activity. The difficulties associated with business surveys involve the time and expense of generating usable datasets and the challenge of relating the results to economic impacts.

A second approach is through detailed econometric investigations of relationships between air travel and investment, productivity, and other variables. The econometric investigations,

where they can be done, tend to use cross-section comparison of multiple regions with airports, estimating the catalytic impacts of air travel across cities rather than within a single city. The difficulties with econometric investigations involve the requirements for detailed datasets across multiple, otherwise similar, cities, and the time necessary to build the relevant models.

A third approach is a more eclectic one that takes several pieces of information into account and tries to weave a picture that allows rudimentary estimates of catalytic impact. This would include information from existing business surveys as to the importance of air transportation to their businesses, growth rates of key sectors that rely upon aviation services, comparisons of growth in aviation services to key economic variables (GDP, trade, and employment, for example), and results from other locations combined with judgments as to the portion of the results that can be attributed to aviation services.

We note that catalytic effects also have their direct, indirect, and induced components. For example, many economic impact studies of aviation include the impact of the spending on retail, hotel, food and beverage, and transportation of foreign visitors outside the airport that is catalysed or facilitated by air travel on output, value added, and employment (direct catalytic effects); the impact of the spending of industries upstream of retail, hotel, etc. (indirect catalytic effects); and the impact of the spending of employees of the indirect and direct tourism-related industries (induced catalytic effects). For other catalytic effects, some studies only take the direct catalytic impact into account in an effort to be conservative.

3.2. Methodology for the present Study

The methodology of the present Study followed the general economic impact methodology described above. The specifics involved the use of specific data sources for the present direct impacts, the use of specific projections and forecasts to estimate the future direct impacts, the use of Hong Kong-specific multipliers to project indirect and induced impacts, the use of Hong Kong-specific information to generate quantifiable catalytic impacts, and the compilation of suggestive Hong Kong-specific information with a bearing on non-quantifiable catalytic impacts. The details of the methodology may be found in the Appendices to this document.

In the present Study, direct revenues, value added, and employment figures for aviation-related businesses in Hong Kong were obtained from data supplied by the AA and the Hong Kong Census and Statistics Department (HKCSD). Direct revenue and employment data for construction in each scenario and the operational non-aviation businesses at HKIA were obtained from the AA. Value added estimates were generated by applying the ratio of value added to revenue from HKCSD data for the relevant lines of business. Indirect and induced multipliers were calculated from a combination of ratios derived from data available from HKCSD and economic multipliers provided by the Economic Analysis and Business Facilitations Unit, Hong Kong Financial Secretary's Office (FSO), as broad working assumptions for use in the Economic Impact Study.

While most studies of catalytic tourism impacts of aviation only take spending entering an economy due to inbound tourism into account, an increasing number also take potentially lost spending by outbound travellers into account. This Study generated economic impact estimates incorporating inbound tourism only (analogous to most studies) and incorporating the effects of both inbound and outbound tourism for sake of completeness. Direct inbound and outbound tourism revenues related to air travel were estimated from data published by the Hong Kong Tourism Board, the World Tourism Organisation, and HKCSD. Direct value added and employment estimates were generated by applying the ratio of value added and employment to revenue for the relevant industries from HKCSD data. Indirect and induced impacts of tourism were estimated by using multipliers and Hong Kong economic ratios in a

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similar fashion to that described above for aviation-related businesses in Hong Kong and non-aviation businesses at HKIA.

The catalytic impact of aviation-facilitated trade on Hong Kong's economy was estimated by first setting direct revenue equal to the total value of Hong Kong's trade by air, as calculated from HKCSD data. Direct value added and employment estimates were generated by applying the ratios of value added and employment to revenue from HKCSD data multiplied by the conventional trade ratio. Indirect and induced impacts of aviation-facilitated trade were estimated by using multipliers and Hong Kong economic ratios in a similar fashion to that described above.

In order to generate future economic impact projections, it was necessary to obtain passenger and cargo traffic forecasts and to generate scale factors that could be used to project the various lines of business and their impacts into the future. Future projections for passenger and cargo traffic were generated by the AA's Consultants. Scale factors were generated by linking the aviation-related businesses in Hong Kong, the non-aviation businesses at HKIA, the catalytic tourism impacts, and the catalytic trade impacts to passenger, cargo, and work load unit (WLU defined as one WLU = one passenger or 100 kilograms of cargo) throughput in the most recent year for which data was available.

The economic cost-benefits (net benefits) of each scenario were analysed by taking the "Economic Net Present Value" (ENPV) and Economic IRR (EIRR) of the projected net benefits of each scenario (equal to the net value added generated by each scenario minus the costs of operations). The net benefits were estimated using projections in 2012 dollars. For the ENPV an economic discount rate of 4 percent was provided by the Economic Analysis and Business Facilitations Unit, Hong Kong Financial Secretary's Office (FSO) for use in this study.

In addition, IRR (EIRR) assumes that all the benefits from the project under review are re-invested at the internally generated rate of return, yielding further returns at this same rate in the following period(s). However, if the magnitude of the returns exceeds the amount that can be re-invested in the project and the IRR is high by comparison to rates of return available in the market, then the assumption that all the returns can be re-invested at the same rate as the IRR is false and the estimated IRR may not be a good measure for project evaluation. In any case, if the IRR (EIRR) and the NPV (ENPV) give different answers in the evaluation of mutually exclusive projects, the correct answer is by NPV (ENPV).

As indicated, a more complete explanation of the methodology is in the Appendices to this document.

4. Aviation-related business in Hong Kong and non-aviation businesses at HKIA

We first assess the impact of the operation of aviation-related businesses in Hong Kong and non-aviation businesses located at HKIA on Hong Kong's economy. This Section analyses the present impact of HKIA on Hong Kong's economy. Then it examines three separate situations for HKIA's future impact on Hong Kong's economy. The Status Quo Situation posits no further capacity expansion beyond that which was committed by 2012. The Status Quo Situation in this report is similar to that used in the 2011 study. Scenario 1 posits an expansion of capacity, but retaining a two runway configuration. Scenario 2 examines the economic impact of expanding capacity of the two runways and adding a third runway at HKIA. We note that in this section the impacts are only those due to aviation-related businesses in Hong Kong and non-aviation businesses located at HKIA.

Section 5 discusses the catalytic impacts of the investment scenarios due to aviation-facilitated tourism and trade. Section 6 discusses the total quantifiable economic impact from operations stemming from aviation-related businesses in Hong Kong, non-aviation businesses at HKIA, aviation-facilitated tourism, and aviation-facilitated trade for the scenarios. Section 7 discusses further non-quantifiable impacts of aviation on Hong Kong's economy. Section 8 discusses the economic impact associated with each scenario's operational process.

We note that in the majority of economic impact studies of airports we have seen that the main focal points are the impacts of aviation-facilitated tourism and trade, and that in fact these often provide the largest impacts. In addition, some studies have claimed that the impact of aviation on overall economic development and productivity can be far larger than the impacts of aviation businesses and non-aviation businesses on airport grounds. Thus while we provide a separate analysis of just aviation-related businesses in Hong Kong and non-aviation businesses at HKIA in this Section, we strongly advise that such analysis is just a starting point and it is not best practice to make investment decisions based solely on the impacts of these industries alone.

4.1. Present impact on Hong Kong's economy

Aviation-related businesses in Hong Kong and non-aviation businesses at HKIA represent key components of the contribution of HKIA to Hong Kong's economy. Exhibit 4.1 shows the direct, indirect, and induced impacts on Hong Kong for aviation-related businesses for 2012. These include Hong Kong based airlines and helicopter companies, local representative offices of overseas airline companies, supporting services to air transport, and air cargo forwarding, among others.

Exhibit 4.2 shows the direct, indirect, and induced impacts from operations for non-aviation businesses at HKIA for 2012. These businesses include retail outlets, food and beverage providers, hotels, conventions, and exhibitions. Exhibit 4.3 shows the estimated combined impact of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA on Hong Kong's economy. The direct + indirect + induced figure for value added was equivalent to 4.6 percent of Hong Kong's GDP in 2012. The figure for employment was equivalent to 4.1 percent of Hong Kong's employment in 2012. This shows the importance of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA to Hong Kong's economy.

We note that the value added and employment results reported in Exhibit 4.3 are less than those estimated for the GDP impact of aviation in Hong Kong by the Air Transport Action

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Group and Oxford Economics in their 2014 publication on the economic impacts of aviation.¹⁴

Exhibit 4.1. Economic Impacts from Operations for Aviation-Related Businesses in Hong Kong, 2012

Impact	Revenue (HK\$ Millions)	Value Added (HK\$ Millions)	Employees (Persons)
Direct	222,209	49,028	56,694
Indirect	173,181	21,413	37,815
Induced	26,950	14,741	33,631
Total	422,340	85,182	128,140

Note: All dollar values are in 2012 dollars.

Sources: Enright, Scott & Associates, Ltd. analysis; Hong Kong Census and Statistics data; Airport Authority of Hong Kong data.

Exhibit 4.2. Economic Impacts from Operations for Non-Aviation Businesses at HKIA, 2012

Impact	Revenue (HK\$ Millions)	Value Added (HK\$ Millions)	Employees (Persons)
Direct	15,057	3,848	6,274
Indirect	11,209	3,696	10,289
Induced	2,769	1,515	3,455
Total	29,035	9,059	20,018

Note: All dollar values are in 2012 dollars.

Sources: Enright, Scott & Associates, Ltd. analysis; Hong Kong Census and Statistics data; Airport Authority of Hong Kong data.

¹⁴ Air Transport Action Group, *Aviation: Benefits Beyond Borders*, 2012.

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Exhibit 4.3. Combined Economic Impact from Operations of Aviation-Related Businesses in Hong Kong and Non-Aviation Businesses at HKIA versus ATAG Estimates, 2012

Impact	Present Analysis		ATAG / OEF Estimates	
	2012	Percentage of Hong Kong GDP / Employment	2012	Percentage of Hong Kong GDP / Employment
Revenue (HK\$ Millions)				
Direct	237,266			
Direct + Indirect	421,656			
Direct + Indirect + Induced	451,375			
Value Added (HK\$ Millions)				
Direct	52,876	2.6	69,936	3.4
Direct + Indirect	77,985	3.8	101,719	5.0
Direct + Indirect + Induced	94,241	4.6	122,078	6.0
Employment (Persons)				
Direct	62,968	1.7	91,300	2.5
Direct + Indirect	111,072	3.0	148,500	3.9
Direct + Indirect + Induced	148,158	4.1	185,100	4.9

Note: All dollar values are in 2012 dollars. ATAG results translated from US dollars at the 2012 exchange rate of HK\$7.75 = US\$1.

Source: Enright, Scott & Associates, Ltd. analysis.

4.2. Future impact on Hong Kong's economy

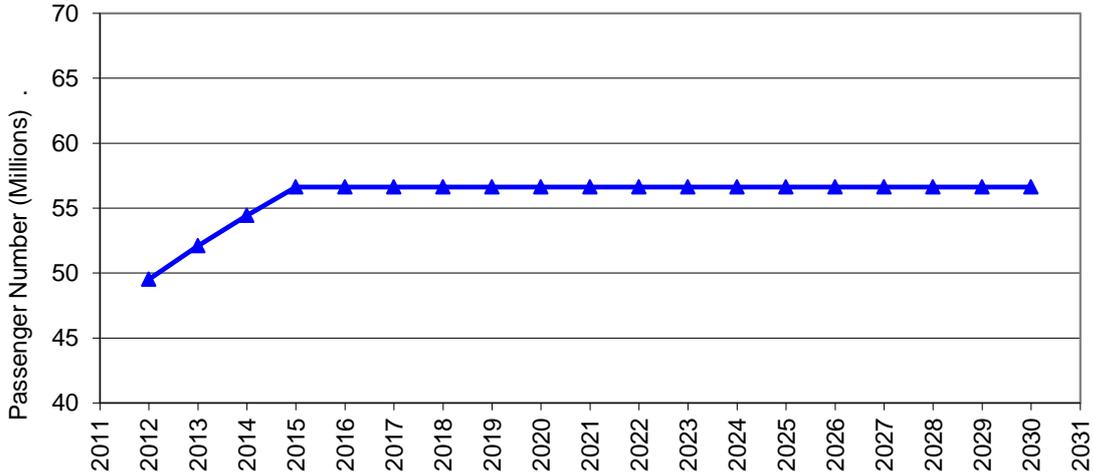
In order to project the future economic impact of HKIA and different potential investment programmes at HKIA on Hong Kong's economy, three main situations were investigated, a "Status Quo Situation" involving no more than maintenance investment after the completion of investments already committed by 2012 for the 2012 to 2015 period, a "Scenario 1" in which investments are made to optimise capacity in a two runway configuration, and a "Scenario 2" in which a third runway is also constructed. The methodology for the projections can be found in Appendix A.

4.2.1. Status Quo Situation

As a baseline for further analysis, we project the economic impact of aviation-related business in Hong Kong and non-aviation businesses at HKIA in which investment committed by 2012 for the 2012 to 2015 period would be carried out plus maintenance investment to retain capacity at resulting levels would be made. This is a "Status Quo Situation." This situation exhibits the same passenger and cargo capacity as given in the Status Quo Situation in the 2011 study.

In the present Status Quo Situation, the two runway configuration is retained. Passenger and cargo throughput projections follow the base case developed by AA's Consultants. The resulting total passenger and cargo throughput for the Status Quo Situation are given in Exhibits 4.4 and 4.5.

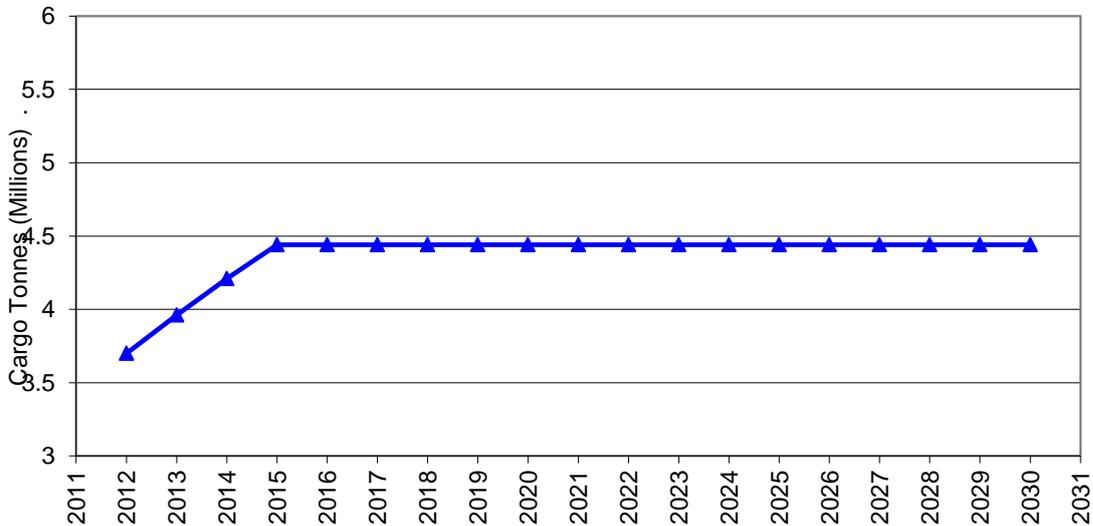
Exhibit 4.4. Status Quo Situation Passenger Throughput



Passengers (millions)	2015	2020	2025	2030
Status Quo Situation Throughput	57	57	57	57

Sources: Airport Authority of Hong Kong and IATA.

Exhibit 4.5. Status Quo Situation Cargo Throughput



Cargo (million tonnes)	2015	2020	2025	2030
Status Quo Situation Throughput	4.4	4.4	4.4	4.4

Sources: Airport Authority of Hong Kong and IATA

The projected future direct, indirect, and induced economic impacts from operations of the aviation-related businesses in Hong Kong and non-aviation businesses (retail, food, beverage, convention, and exhibition) at HKIA for the Status Quo Situation through 2030 are shown in Exhibits 4.6 and 4.7.

We note that in Exhibit 4.7 that the economic impacts of non-aviation businesses at HKIA actually decline after 2015. This is due to the passenger mix in the throughput projections, which assume all Hong Kong residents are still served even in capacity-constrained

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conditions through 2030 and that the ratio of Hong Kong residents to transfer and transit passengers and foreign visitor passengers remains constant after 2030. Since foreign visitor and transfer and transit spending in non-aviation businesses at HKIA is considered to be an injection of spending into Hong Kong, and Hong Kong resident spending in such businesses at HKIA is not (Hong Kong residents could presumably shop or eat elsewhere in Hong Kong), the result is a decrease in the economic impact of the non-aviation businesses at HKIA over time in this case.

Exhibit 4.8 shows the projected combined impact from operations of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA on Hong Kong's economy for the Status Quo Situation. The decline in GDP percentage is due to the capacity constraints in this situation.

Exhibit 4.6. Status Quo Situation Economic Impacts from Operations for Aviation-Related Businesses in Hong Kong

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	198,727	232,137	232,137	232,137	232,137
Indirect	154,881	180,919	180,919	180,919	180,919
Induced	24,102	28,154	28,154	28,154	28,154
Total	377,710	441,210	441,210	441,210	441,210
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	43,847	51,218	51,218	51,218	51,218
Indirect	19,150	22,369	22,369	22,369	22,369
Induced	13,184	15,400	15,400	15,400	15,400
Total	76,181	88,987	88,987	88,987	88,987
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	50,703	59,227	59,227	59,227	59,227
Indirect	33,819	39,505	39,505	39,505	39,505
Induced	30,077	35,134	35,134	35,134	35,134
Total	114,599	133,866	133,866	133,866	133,866

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Exhibit 4.7. Status Quo Situation Economic Impacts from Operations for Non-Aviation Businesses at HKIA

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	12,926	14,231	13,548	12,499	11,471
Indirect	9,623	10,594	10,086	9,305	8,540
Induced	2,377	2,617	2,491	2,298	2,110
Total	24,926	27,442	26,125	24,102	22,121
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	3,303	3,637	3,462	3,194	2,932
Indirect	3,173	3,493	3,325	3,068	2,816
Induced	1,300	1,432	1,363	1,257	1,154
Total	7,776	8,562	8,150	7,519	6,902
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	5,386	5,930	5,645	5,208	4,780
Indirect	8,833	9,725	9,258	8,541	7,839
Induced	2,966	3,266	3,109	2,868	2,633
Total	17,185	18,921	18,012	16,617	15,252

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Exhibit 4.8. Status Quo Situation Combined Economic Impact from Operations of Aviation-Related Businesses in Hong Kong and Non-Aviation Businesses at HKIA

Impact	2012	2015	2020	2025	2030
Revenue (HK\$ Millions)					
Direct	211,653	246,368	245,685	244,636	243,608
Direct + Indirect	376,157	437,881	436,690	434,860	433,067
Direct + Indirect + Induced	402,636	468,652	467,335	465,312	463,331
Value Added (HK\$ Millions)					
Direct	47,150	54,855	54,680	54,412	54,150
Direct + Indirect	69,473	80,717	80,374	79,849	79,335
Direct + Indirect + Induced	83,957	97,549	97,137	96,506	95,889
D + I + I % of Hong Kong's GDP	4.1%	4.3%	3.6%	3.0%	2.6%
Employment (Persons)					
Direct	56,089	65,157	64,872	64,435	64,007
Direct + Indirect	98,741	114,387	113,635	112,481	111,351
Direct + Indirect + Induced	131,784	152,787	151,878	150,483	149,118

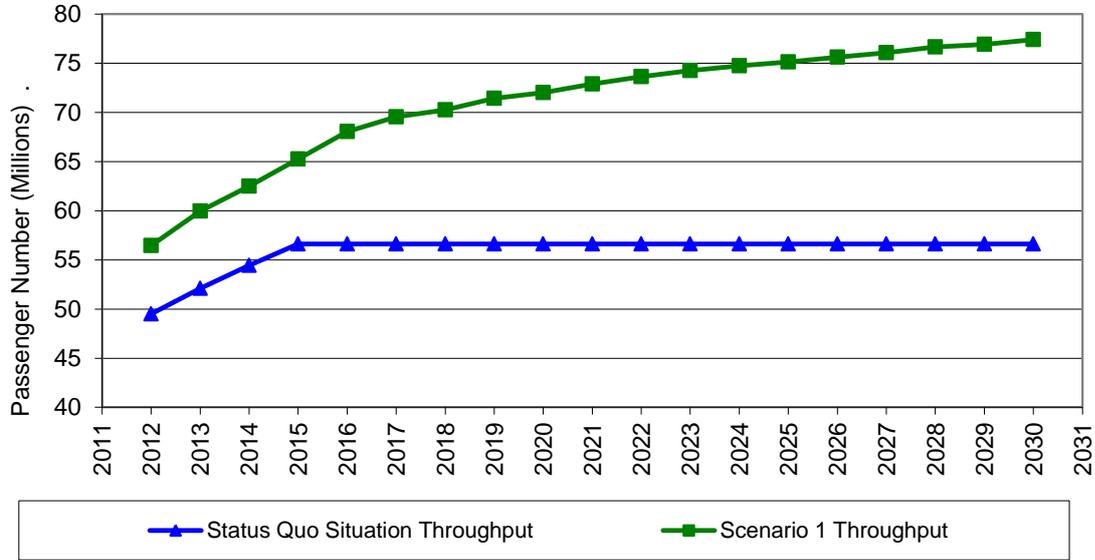
Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

4.2.2. Scenario 1

Scenario 1 involves an investment programme that would make a number of investments in mid-field and other facilities that would optimise capacity in a two runway configuration. This investment, estimated at HK\$28,908 million,¹⁵ is projected to expand capacity to 77 million passengers and 6.1 million tonnes of cargo. Projected passenger and cargo throughput for Scenario 1 are illustrated in Exhibits 4.9 and 4.10.

Exhibit 4.9. Scenario 1 Passenger Throughput

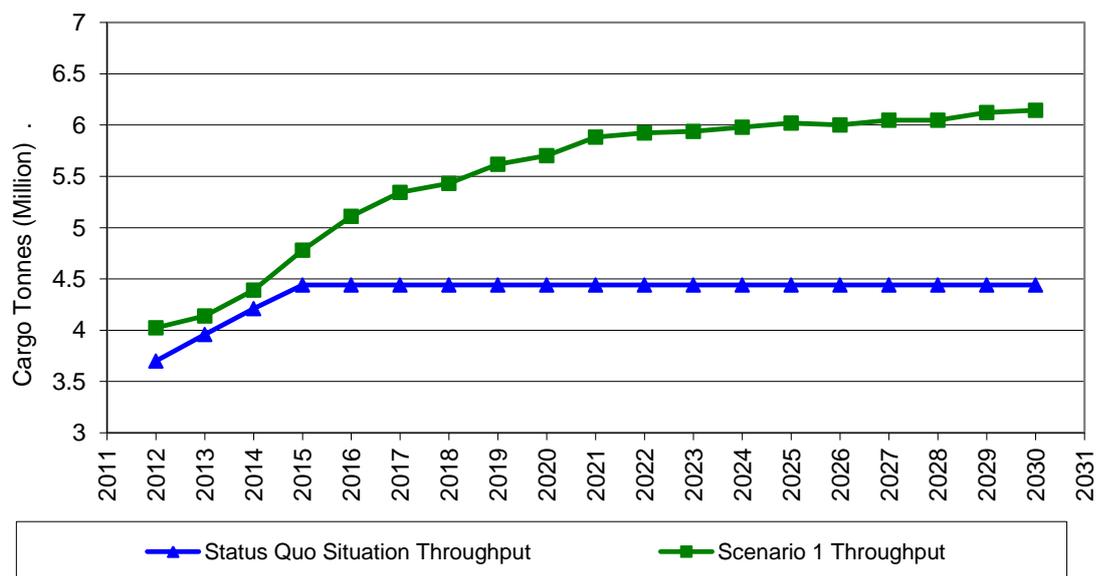


Passengers (millions)	2015	2020	2025	2030
Status Quo Situation Throughput	57	57	57	57
Scenario 1 Throughput	65	72	75	77

Sources: Airport Authority of Hong Kong and IATA

¹⁵ In 2012 HK dollars.

Exhibit 4.10. Scenario 1 Cargo Throughput



Cargo (million tonnes)	2015	2020	2025	2030
Status Quo Situation Throughput	4.4	4.4	4.4	4.4
Scenario 1 Throughput	4.8	5.7	6.0	6.1

Sources: Airport Authority of Hong Kong and IATA

4.2.2.1. Scenario 1 economic impacts

The projected future direct, indirect, and induced economic impacts from operations of the aviation-related businesses in Hong Kong and non-aviation businesses at HKIA for Scenario 1 through 2030 are shown in Exhibits 4.11 and 4.12. We note that in Exhibit 4.12 that the economic impacts of non-aviation businesses at HKIA decline after 2025, for similar reasons as described for the Status Quo Situation. Exhibit 4.13 shows the projected combined impact from operations of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA on Hong Kong’s economy.

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Exhibit 4.11. Scenario 1 Economic Impacts from Operations for Aviation-Related Businesses in Hong Kong

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	222,209	259,759	296,442	310,872	318,959
Indirect	173,181	202,446	231,035	242,282	248,585
Induced	26,950	31,504	35,953	37,703	38,684
Total	422,340	493,709	563,430	590,857	606,228
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	49,028	57,312	65,406	68,590	70,374
Indirect	21,413	25,031	28,566	29,956	30,736
Induced	14,741	17,233	19,666	20,623	21,160
Total	85,182	99,576	113,638	119,169	122,270
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	56,694	66,274	75,634	79,315	81,379
Indirect	37,815	44,205	50,448	52,904	54,280
Induced	33,631	39,314	44,866	47,050	48,274
Total	128,140	149,793	170,948	179,269	183,933

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Exhibit 4.12. Scenario 1 Economic Impacts from Operations for Non-Aviation Businesses at HKIA

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	15,057	16,867	18,299	18,211	17,881
Indirect	11,209	12,556	13,623	13,557	13,312
Induced	2,769	3,102	3,365	3,349	3,288
Total	29,035	32,525	35,287	35,117	34,481
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	3,848	4,310	4,676	4,654	4,569
Indirect	3,696	4,140	4,492	4,470	4,389
Induced	1,515	1,697	1,841	1,832	1,799
Total	9,059	10,147	11,009	10,956	10,757
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	6,274	7,028	7,625	7,588	7,451
Indirect	10,289	11,526	12,505	12,445	12,219
Induced	3,455	3,871	4,199	4,179	4,103
Total	20,018	22,425	24,329	24,212	23,773

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Exhibit 4.13. Scenario 1 Combined Economic Impact of Aviation-Related Businesses in Hong Kong and Non-Aviation Businesses at HKIA

Impact	2012	2015	2020	2025	2030
Revenue (HK\$ Millions)					
Direct	237,266	276,626	314,741	329,083	336,840
Direct + Indirect	421,656	491,628	559,399	584,922	598,737
Direct + Indirect + Induced	451,375	526,234	598,717	625,974	640,709
Value Added (HK\$ Millions)					
Direct	52,876	61,622	70,082	73,244	74,943
Direct + Indirect	77,985	90,793	103,140	107,670	110,068
Direct + Indirect + Induced	94,241	109,723	124,647	130,125	133,027
D + I + I % of Hong Kong's GDP	4.6%	4.8%	4.6%	4.1%	3.6%
Employment (Persons)					
Direct	62,968	73,302	83,259	86,903	88,830
Direct + Indirect	111,072	129,033	146,212	152,252	155,329
Direct + Indirect + Induced	148,158	172,218	195,277	203,481	207,706

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

The projected net economic impact from operations attributable to the investment programme of Scenario 1 of the aviation-related businesses in Hong Kong and non-aviation businesses at HKIA through 2030 are shown in Exhibits 4.14 and 4.15. The net impacts in these exhibits represent the Scenario 1 Impact from Operations less the Status Quo Situation Impact from Operations. Exhibit 4.16 shows the projected combined impact from operations of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA on Hong Kong's economy for Scenario 1.

Exhibit 4.14. Scenario 1 Net Economic Impact from Operations for Aviation-Related Businesses in Hong Kong

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	23,482	27,622	64,305	78,735	86,822
Indirect	18,301	21,527	50,117	61,363	67,666
Induced	2,848	3,350	7,799	9,549	10,530
Total	44,631	52,499	122,221	149,647	165,018
Value Added (HK\$ Millions)					
	2012	2015	2020	2025	2030
Direct	5,181	6,094	14,188	17,372	19,156
Indirect	2,263	2,662	6,197	7,587	8,366
Induced	1,558	1,832	4,266	5,223	5,760
Total	9,002	10,588	24,651	30,182	33,282
Employees (Persons)					
	2012	2015	2020	2025	2030
Direct	5,991	7,047	16,407	20,088	22,152
Indirect	3,996	4,701	10,943	13,399	14,775
Induced	3,554	4,181	9,732	11,916	13,140
Total	13,541	15,929	37,082	45,403	50,067

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Exhibit 4.15. Scenario 1 Net Economic Impact from Operations for Non-Aviation Businesses at HKIA

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	2,131	2,635	4,751	5,713	6,410
Indirect	1,587	1,962	3,537	4,253	4,772
Induced	392	485	874	1,051	1,179
Total	4,110	5,082	9,162	11,017	12,361
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	545	673	1,214	1,460	1,638
Indirect	523	647	1,166	1,402	1,573
Induced	214	265	478	575	645
Total	1,282	1,585	2,858	3,437	3,856
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	888	1,098	1,980	2,380	2,671
Indirect	1,456	1,801	3,247	3,904	4,380
Induced	489	605	1,090	1,311	1,471
Total	2,833	3,504	6,317	7,595	8,522

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Exhibit 4.16. Scenario 1 Net Combined Economic Impact from Operations of Aviation-Related Businesses in Hong Kong and Non-Aviation Businesses at HKIA

Impact	2012	2015	2020	2025	2030
Revenue (HK\$ Millions)					
Direct	25,613	30,257	69,056	84,448	93,232
Direct + Indirect	45,501	53,746	122,710	150,064	165,670
Direct + Indirect + Induced	48,741	57,581	131,383	160,664	177,379
Value Added (HK\$ Millions)					
Direct	5,726	6,767	15,402	18,832	20,794
Direct + Indirect	8,512	10,076	22,765	27,821	30,733
Direct + Indirect + Induced	10,284	12,173	27,509	33,619	37,138
D + I + I % of Hong Kong's GDP	0.50%	0.54%	1.01%	1.05%	0.99%
Employment (Persons)					
Direct	6,879	8,145	18,387	22,468	24,823
Direct + Indirect	12,331	14,647	32,577	39,771	43,978
Direct + Indirect + Induced	16,374	19,433	43,399	52,998	58,589

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

4.2.2.2. Scenario 1 economic benefits

The economic benefits of the aviation-related businesses in Hong Kong and non-aviation businesses at HKIA enabled by the investment programme of Scenario 1 can be estimated using calculations of the Economic IRR (EIRR) and Economic Net Present Value (ENPV). The results of the calculations of these benefits are given in Exhibit 4.17, for a 50 year return period. To ensure that the Scenario 1 and Scenario 2 economic benefits are assessed over

the same time period, the analysis is started at 2012 which matches the first investment for Scenario 1 and Scenario 2. The inputs for the calculations were the value added impact projections for the Scenario 1 net combined economic impacts of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA as positive flows and the costs associated with infrastructure expenditure to expand and maintain the capacity of the two runway configuration as negative flows. The expenditure projections for expanding capacity of the two runway configuration are discussed in Section 8. The discount rate employed was 4 percent. A full description of the method applied is given in Appendix A.4.¹⁶

Exhibit 4.17. Scenario 1 Economic Internal Rate of Return and Economic Net Present Value for a 50 Year Return

Impact	EIRR (Percent)	ENPV (HK\$ Millions)
Direct	106%	314,739
Direct + Indirect	211%	482,969
Direct + Indirect + Induced	285%	591,214

Note: Dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

The high EIRRs are due in part to the fact that significant leverage can be achieved with the existing asset and benefits can be readily realized from the second year of investment. In addition, IRR (EIRR) assumes that all the benefits from the project under review are re-invested at the internally generated rate of return, yielding further returns at this same rate in the following period(s). However, if the magnitude of the returns exceeds the amount that can be re-invested in the project and the IRR is high by comparison to rates of return available in the market, then the assumption that all the returns can be re-invested at the same rate as the IRR is false and the estimated IRR may not be a good measure for project evaluation. In any case, if the IRR (EIRR) and the NPV (ENPV) give different answers in the evaluation of mutually exclusive projects, the correct answer is by NPV (ENPV).

We note that these results do not reflect the potential impact of the investment programme on tourism and trade, or other impacts.

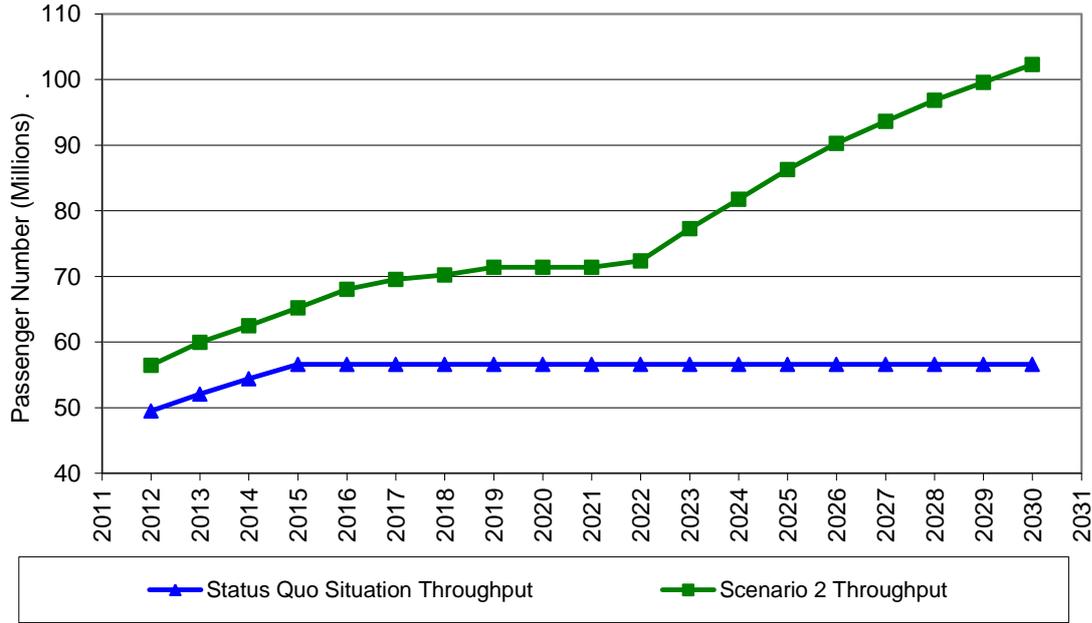
4.2.3. Scenario 2

Scenario 2 involves an investment programme that would include additional mid-field facilities and a third runway. This investment, estimated at HK\$154,726 million,¹⁷ is projected to expand capacity to 102 million passengers and 8.9 million tonnes of cargo by 2030. Projected passenger and cargo throughput for Scenario 2 are illustrated in Exhibits 4.18 and 4.19.

¹⁶ We note that for the EIRR calculation we assumed that all capital expenditures (cash outflows) occurred at the beginning of a year and all benefits were obtained at the end of a year. If we assumed both expenditures and benefits were made evenly through the year, then the net of expenditure and benefits was positive, even in the first year, yielding infinite EIRR estimates. The time shift will yield conservative EIRR estimates.

¹⁷ In 2012 HK dollars.

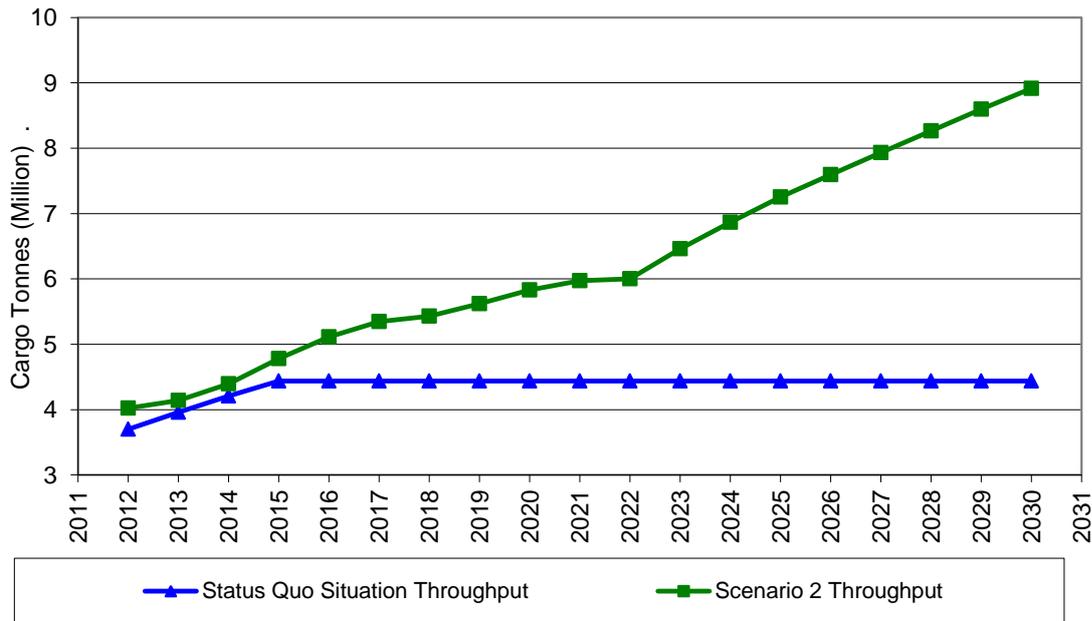
Exhibit 4.18. Scenario 2 Passenger Throughput



Passengers (millions)	2015	2020	2025	2030
Status Quo Situation Throughput	57	57	57	57
Scenario 2 Throughput	65	71	86	102

Sources: Airport Authority of Hong Kong and IATA

Exhibit 4.19. Scenario 2 Cargo Throughput



Cargo (million tonnes)	2015	2020	2025	2030
Status Quo Situation Throughput	4.4	4.4	4.4	4.4
Scenario 2 Throughput	4.8	5.8	7.3	8.9

Sources: Airport Authority of Hong Kong and IATA

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4.2.3.1. Scenario 2 economic impacts

The projected future direct, indirect,, and induced economic impacts from operations of the aviation-related businesses in Hong Kong and non-aviation businesses at HKIA for Scenario 2 through 2030 are shown in Exhibits 4.20 and 4.21. Exhibit 4.22 shows the projected combined impact from operations of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA on Hong Kong's economy.

Exhibit 4.20. Scenario 2 Economic Impacts from Operations for Aviation-Related Businesses in Hong Kong

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	222,209	259,759	298,001	364,870	439,843
Indirect	173,181	202,446	232,251	284,366	342,797
Induced	26,950	31,504	36,142	44,252	53,345
Total	422,340	493,709	566,394	693,488	835,985
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	49,028	57,312	65,750	80,504	97,046
Indirect	21,413	25,031	28,716	35,160	42,384
Induced	14,741	17,233	19,770	24,206	29,179
Total	85,182	99,576	114,236	139,870	168,609
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	56,694	66,274	76,031	93,092	112,221
Indirect	37,815	44,205	50,713	62,093	74,852
Induced	33,631	39,314	45,102	55,223	66,570
Total	128,140	149,793	171,846	210,408	253,643

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Exhibit 4.21. Scenario 2 Economic Impacts from Operations for Non-Aviation Businesses at HKIA

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	15,057	16,867	18,127	21,684	25,620
Indirect	11,209	12,556	13,495	16,143	19,073
Induced	2,769	3,102	3,333	3,988	4,712
Total	29,035	32,525	34,955	41,815	49,405
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	3,848	4,310	4,632	5,541	6,547
Indirect	3,696	4,140	4,449	5,322	6,289
Induced	1,515	1,697	1,823	2,181	2,577
Total	9,059	10,147	10,904	13,044	15,413
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	6,274	7,028	7,553	9,035	10,676
Indirect	10,289	11,526	12,387	14,818	17,508
Induced	3,455	3,871	4,160	4,976	5,880
Total	20,018	22,425	24,100	28,829	34,064

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Exhibit 4.22. Scenario 2 Combined Economic Impact from Operations of Aviation-Related Businesses in Hong Kong and Non-Aviation Businesses at HKIA

Impact	2012	2015	2020	2025	2030
Revenue (HK\$ Millions)					
Direct	237,266	276,626	316,128	386,554	465,463
Direct + Indirect	421,656	491,628	561,874	687,063	827,333
Direct + Indirect + Induced	451,375	526,234	601,349	735,303	885,390
Value Added (HK\$ Millions)					
Direct	52,876	61,622	70,382	86,045	103,593
Direct + Indirect	77,985	90,793	103,547	126,527	152,266
Direct + Indirect + Induced	94,241	109,723	125,140	152,914	184,022
D + I + I % of Hong Kong's GDP	4.6%	4.8%	4.6%	4.8%	4.9%
Employment (Persons)					
Direct	62,968	73,302	83,584	102,127	122,897
Direct + Indirect	111,072	129,033	146,684	179,038	215,257
Direct + Indirect + Induced	148,158	172,218	195,946	239,237	287,707

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

The projected net economic impact from operations attributable to the investment programme of Scenario 2 of the aviation-related businesses in Hong Kong and non-aviation businesses at HKIA through 2030 are shown in Exhibits 4.23 and 4.24. The net impacts in these exhibits represent the Scenario 2 Impact from Operations less the Status Quo Situation Impact from Operations. Exhibit 4.25 shows the projected combined impact from operations of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA on Hong Kong's economy.

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Exhibit 4.23. Scenario 2 Net Economic Impacts from Operations for Aviation-Related Businesses in Hong Kong

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	23,482	27,622	65,864	132,733	207,707
Indirect	18,301	21,527	51,332	103,447	161,879
Induced	2,848	3,350	7,988	16,098	25,191
Total	44,631	52,499	125,184	252,278	394,777
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	5,181	6,094	14,532	29,286	45,828
Indirect	2,263	2,662	6,347	12,791	20,015
Induced	1,558	1,832	4,369	8,806	13,779
Total	9,002	10,588	25,248	50,883	79,622
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	5,991	7,047	16,804	33,865	52,994
Indirect	3,996	4,701	11,209	22,588	35,347
Induced	3,554	4,181	9,968	20,089	31,436
Total	13,541	15,929	37,981	76,542	119,777

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. Analysis.

Exhibit 4.24. Scenario 2 Net Economic Impacts from Operations for Non-Aviation Businesses at HKIA

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	2,131	2,635	4,579	9,185	14,149
Indirect	1,587	1,962	3,409	6,838	10,533
Induced	392	485	842	1,689	2,602
Total	4,110	5,082	8,830	17,712	27,284
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	545	673	1,170	2,347	3,616
Indirect	523	647	1,124	2,255	3,473
Induced	214	265	461	924	1,423
Total	1,282	1,585	2,755	5,526	8,512
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	888	1,098	1,908	3,827	5,896
Indirect	1,456	1,801	3,129	6,277	9,669
Induced	489	605	1,051	2,108	3,247
Total	2,833	3,504	6,088	12,212	18,812

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Exhibit 4.25. Scenario 2 Net Combined Economic Impact from Operations of Aviation-Related Businesses in Hong Kong and Non-Aviation Businesses at HKIA

Impact	2012	2015	2020	2025	2030
Revenue (HK\$ Millions)					
Direct	25,613	30,257	70,443	141,918	221,856
Direct + Indirect	45,501	53,746	125,184	252,203	394,268
Direct + Indirect + Induced	48,741	57,581	134,014	269,990	422,061
Value Added (HK\$ Millions)					
Direct	5,726	6,767	15,702	31,633	49,444
Direct + Indirect	8,512	10,076	23,173	46,679	72,932
Direct + Indirect + Induced	10,284	12,173	28,003	56,409	88,134
D + I + I % of Hong Kong's GDP	0.50%	0.54%	1.03%	1.76%	2.35%
Employment (Persons)					
Direct	6,879	8,145	18,712	37,692	58,890
Direct + Indirect	12,331	14,647	33,050	66,557	103,906
Direct + Indirect + Induced	16,374	19,433	44,069	88,754	138,589

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

4.2.3.2. Scenario 2 economic benefits

The economic benefits from operations of the aviation-related businesses in Hong Kong and non-aviation businesses at HKIA enabled by the investment programme of Scenario 2 can be estimated using calculations of the Economic IRR (EIRR) and Economic Net Present Value (ENPV). The results of the calculations of these benefits are given in Exhibit 4.26, for a 50 year return period. To ensure that the Scenario 1 and Scenario 2 economic benefits are assessed over the same time period, the analysis is started at 2012 which matches the first investment for Scenario 1 and Scenario 2. The inputs for the calculations were the value added impact projections for the Scenario 2 net combined economic impacts of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA as positive flows and the costs associated with infrastructure expenditure to expand and maintain the capacity of the three runway configuration as negative flows. The expenditure projections for expanding capacity of the three runway configuration are discussed in Section 8. The discount rate employed was 4 percent. A full description of the method applied is given in Appendix A.4.¹⁸

¹⁸ We note that for the EIRR calculation we assumed that all capital expenditures (cash outflows) occurred at the beginning of a year and all benefits were obtained at the end of a year. If we assumed both expenditures and benefits were made evenly through the year, then the net of expenditure and benefits was positive, even in the first year, yielding infinite EIRR estimates. The time shift will yield conservative EIRR estimates.

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Exhibit 4.26. Scenario 2 Economic Internal Rate of Return and Economic Net Present Value for a 50 Year Return

Impact	EIRR (Percent)	ENPV (HK\$ Millions)
Direct	27%	525,722
Direct + Indirect	179%	841,521
Direct + Indirect + Induced	269%	1,045,637

Note: Dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

We note the strongly positive EIRR and ENPV results. These results indicate extremely large economic benefits for Scenario 2. We note that the EIRR of Scenario 2 is lower than Scenario 1 due to the much larger investment to build a third runway and longer payback period of Scenario 2. However, the ENPV in Scenario 2 is projected to be far higher than in Scenario 1, indicating a higher overall long-term benefit.

The same caveats with respect to the use of EIRR and ENPV as mentioned in Scenario 1 hold in this case as well, with ENPV being the preferred measure of economic benefits.

We also note that these results do not reflect the potential impact of the investment programme on tourism and trade, or other impacts.

5. Catalytic impacts of tourism and trade

The benefits of aviation and aviation-related investments go far beyond those generated through aviation-related businesses and non-aviation businesses at airports. The impacts of aviation on businesses outside these two areas and their supply chains are generally termed “catalytic impacts.” The two most widely investigated catalytic impacts of aviation are those of aviation-facilitated tourism and aviation-facilitated trade. This section analyses the catalytic impact of aviation-facilitated tourism and trade on Hong Kong’s economy. The methodology to carry out these assessments is described in Appendix A.

Section 5 will report the results of the quantifiable catalytic analysis. We note that Section 6 combines the results of Section 4 and Section 5 into results for the total quantifiable impacts of aviation and the projected impacts of the different scenarios on Hong Kong’s economy. In general, all of this information should be taken into account when making investment decisions. Section 7 discusses further catalytic impacts of aviation on Hong Kong’s economy that cannot be readily quantified. These further impacts also should be taken into account in making any decisions concerning aviation-related investments.

We note in this section, as in Section 4 and all other sections of this Report that the throughput projections have been taken from the work of the AA’s Consultants. It is assumed that any features that influence demand have already been incorporated into these projections.

5.1. Present impact on Hong Kong’s economy

In this Section, we will focus on the present impacts of aviation-facilitated inbound tourism, aviation-facilitated net tourism, and aviation-facilitated trade on Hong Kong’s economy.

5.1.1. Aviation-facilitated inbound tourism impacts

Tourism has a major impact on Hong Kong’s economy. The Hong Kong Census and Statistics Department has estimated that the tourism sector accounted for HK\$79.1 billion in direct value added, or 3.9 percent of GDP, and 218,800 jobs, or 6.0 percent of total employment, in Hong Kong in 2012.¹⁹

These numbers, however, cannot be used to compare the importance of tourism to Hong Kong’s economy to its importance in the global economy. For this, a source that estimates the impact both in Hong Kong and globally is required. The World Travel and Tourism Council (WTTC) reported that the tourism industry directly contribute 8.1 percent to Hong Kong’s GDP in 2012, compared to 2.9 percent globally.²⁰ According to the WTTC, using a wider definition of the tourism economy that includes investments in tourism facilities, tourism promotion efforts, and related expenditures into account, as well as the indirect and induced impacts, Hong Kong’s tourism sector would account for 18.5 percent of GDP and 16.2 percent of employment in 2012. This is compared to the WTTC’s estimate that the tourism sector had a total impact of 9.3 percent of GDP and 8.7 percent on employment globally in 2012. Thus, according to the WTTC, Hong Kong’s economy is far more

¹⁹ Hong Kong Census and Statistics Department, “The Four Key Industries and Other Selected Industries in the Hong Kong Economy,” 2012.

²⁰ World Travel and Tourism Council, *Travel and Tourism Economic Impact: Hong Kong 2013 and Travel and Tourism Economic Impact: World 2013*. Note that the WTTC includes “traditional Travel & Tourism providers such as airlines, hotels, car rental companies, etc.” in its definition of “direct impact.”

dependent on international tourism than the global average.²¹

Globally, over 52 percent of all international tourists travel by air.²² The portion in Hong Kong is lower, at 24 percent, due to the large number of visitors that arrive by land from the Chinese Mainland. Even so, Hong Kong received 11.6 million tourists by air in 2012.²³

Exhibit 5.1 shows the direct, indirect, and induced impacts related to the catalytic impact of tourists arriving to Hong Kong by air for 2012. The impacts are from the operations of the relevant industries, rather than investments in those industries. These tourists spend on retail, food and beverage, hotels, and on other items during their stay in Hong Kong. The catalytic impact shown in the exhibit is net of spend by tourists on retail, food and beverage, and hotels at HKIA. This latter spend is captured in the direct benefit estimated for non-aviation businesses at HKIA and so was eliminated here to avoid double counting.

Exhibit 5.1. Economic Impacts from Operations of Aviation-Facilitated Inbound Tourism, 2012

Impact	Revenue (HK\$ Millions)	Value Added (HK\$ Millions)	Employees (Persons)
Direct	44,722	17,315	41,930
Indirect	27,406	5,090	14,171
Induced	7,847	4,292	9,792
Total	79,975	26,697	65,893

Note: All dollar values are in 2012 dollars.

Sources: Enright, Scott & Associates, Ltd. research; Hong Kong Census and Statistics data; Airport Authority of Hong Kong data.

5.1.2. Aviation-facilitated net tourism impacts

Hong Kong experienced an export of aviation-related tourism services (spending by visitors to Hong Kong that arrived by air) equal to HK\$54.5 billion in 2012.²⁴ However, imports of aviation-related tourism services (spending by Hong Kong residents abroad that departed by air) were estimated at HK\$111.4 billion in 2012, giving a net balance of aviation-related tourism services of negative HK\$56.9 billion in 2012. Hong Kong is expected to continue to experience an air tourism deficit in the future. However, Hong Kong's tourism balance is positive at HK\$87.7 billion due mostly to visitors from the Chinese Mainland arriving overland.

²¹ World Travel and Tourism Council, *Travel and Tourism Economic Impact: Hong Kong 2013 and Travel and Tourism Economic Impact: World 2013*.

²² Air Transport Action Group, *Aviation Benefits Beyond Borders*, April 2014.

²³ Hong Kong Tourism Board, *A Statistical Review of Hong Kong Tourism 2012*

²⁴ Hong Kong Census and Statistics Department, *Report on Hong Kong Trade in Services Statistics for 2012*; Hong Kong Tourism Board, *Tourism Expenditure Associated to Inbound Tourism 2012*; Hong Kong Tourism Board, *Visitor Arrival Statistics 2012*; Hong Kong Tourism Board, *A Statistical Review of Hong Kong Tourism 2012*; Enright, Scott & Associates, Ltd. analysis.

Exhibit 5.2. Hong Kong Tourism Trade Flows, HK\$ Billions, 2012

Travel Mode	Import	Export	Balance
Land and Sea	44.3	188.9	144.6
Air	111.4	54.5	(56.9)
All	155.7	243.4	87.7

Note: Excludes Passenger International Transport Expenditure. All dollar values are in 2012 dollars.

Sources: Hong Kong Census and Statistics Department; Enright, Scott & Associates, Ltd. analysis.

In order to project net tourism figures, we assume that all of what Hong Kong outbound travellers spend outside of Hong Kong with the exception of hotel expenditures would be spent in Hong Kong if the travellers stayed in Hong Kong, and that the spending would be roughly in proportion to what inbound tourists spend in Hong Kong (retail, food and beverage, and other spending). An explanation of this methodology can be found in Appendix A.

Exhibit 5.3. Economic Impacts from Operations of Aviation-Facilitated Net Tourism, 2012

Impact	Revenue (HK\$ Millions)	Value Added (HK\$ Millions)	Employees (Persons)
Direct	(34,044)	(13,181)	(31,919)
Indirect	(20,863)	(3,875)	(10,788)
Induced	(5,973)	(3,267)	(7,454)
Total	(60,880)	(20,323)	(50,161)
- percent of GDP / employment		(1.0%)	(1.3%)

Note: Net tourism equals tourism exports minus tourism imports minus tourism spending on the airport island. Numbers in parentheses are negative numbers. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

5.1.3. Aviation-facilitated trade impacts

Hong Kong has one of the most trade dependent economies in the world. In 2012, Hong Kong's total trade to GDP ratio (exports + imports)/GDP was 450 percent, some 7 times the global average of 61 percent. In 2012, Hong Kong's share of global air cargo tonnage (4.4 percent) was 12 times its share of global GDP (0.36 percent).²⁵ According to Hong Kong's Census and Statistics Department, import-export trading accounted for HK\$428 billion in value added (or 21 percent of GDP) and 581,700 in employment (15.9 percent of total employment) in 2012. Logistics accounted for HK\$67 billion in value added (3.3 percent of GDP) and 183,200 in employment (or 5.0 percent of total employment). Manufacturing, the vast majority of which was for export, accounted for HK\$35 billion in value added (1.7 percent of GDP) and 102,834 employees (2.8 percent of employment). Thus import-export

²⁵ The global data were sourced from the World Bank, *World Development Indicators* and Airports Council International (ACI), *Air Cargo Traffic Statistics*.

trading, logistics, and manufacturing accounted for approximately 26 percent of GDP and 24 percent of employment. Hong Kong is clearly much more dependent on the import-export and logistics sectors than most other economies globally and its air cargo sector is far more important to Hong Kong's economy than that of virtually any economy in the world.²⁶

Globally, goods shipped by air account for approximately 35 percent of the total value of international trade.²⁷ In Hong Kong the value of goods shipped by air was HK\$1.56 trillion or 34.8 percent of total goods shipped in 2012.²⁸ Air transportation is particularly important for high-value and time-sensitive goods. Rapid delivery is also essential in lean production systems that try to minimise inventories in the system. According to the Air Transport Action Group (ATAG), around two-thirds of companies involved in international trade consider air services to be vital or very important in their international sales and marketing activities.²⁹

Exhibit 5.4 shows the projected direct, indirect, and induced impacts related to the catalytic impact from operations of aviation-facilitated trade for Hong Kong in 2012. We note that we have netted out the impacts of businesses that have already been captured in the aviation-related business category in Section 4 to avoid double counting.

Exhibit 5.4. Economic Impacts from Operations of Aviation-Facilitated Trade, 2012

Impact	Revenue (HK\$ Millions)	Value Added (HK\$ Millions)	Employees (Persons)
Direct	1,468,768	73,951	110,292
Indirect	608,163	105,996	187,190
Induced	62,950	34,434	78,557
Total	2,139,881	214,381	376,039
- percent of GDP / employment		10.5%	10.0%

Note: Trade services is net of trade related services that occur at the airport including Air Transport and Incidental Services, International Courier Services, Land Transport Supporting Air Cargo, Miscellaneous Services Supporting Air Cargo, and Freight Forwarding, which were included in the aviation-related businesses of Section 4. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

These figures in Exhibit 5.4 are large, but when one considers the large portion of Hong Kong's GDP associated with trade, the large portion of this trade that is carried by air, Hong Kong's much higher global share of air cargo tonnage than global GDP, and the indirect and induced ripple effects of trade, they are not surprising.

5.2. Future impact on Hong Kong's economy

As in Section 4, we examined three main situations for the future contribution of aviation-facilitated tourism and trade on Hong Kong's economy, a Status Quo Situation, Scenario 1 in which the two runway configuration is optimised, and Scenario 2 in which a third runway is

²⁶ Using figures from the World Bank for GDP and ACI for air cargo, Hong Kong's ratio of share of global air cargo to share of global GDP of 12 in 2012 exceeded that of Luxembourg (9), Singapore (5), and all other economies covered by both the World Bank and ACI.

²⁷ Air Transport Action Group, *The Economic and Social Benefits of Air Transport*, 2008.

²⁸ Hong Kong Census and Statistics Department and Enright, Scott & Associates, Ltd. analysis.

²⁹ Air Transport Action Group, *The Economic and Social Benefits of Air Transport*, 2008.

constructed. All projections were generated according to the methods described in Appendix A.³⁰

5.2.1 Status Quo Situation

The parameters of the Status Quo Situation are outlined in Section 4.

The projected future economic impacts of aviation-facilitated inbound tourism, net tourism, and trade for the Status Quo Situation through 2030 are shown in Exhibits 5.5, 5.6, and 5.7. The catalytic tourism impact shown in the exhibit is net of spending by tourists on retail, food and beverage, and hotels at HKIA. This spend is captured in the direct benefit estimated for non-aviation businesses at HKIA in Section 4, so it is netted out here to avoid double counting.

If we include the impact of spending abroad by Hong Kong residents, we obtain the net tourism impact results in Exhibit 5.6. The methodology appendices point out that in net tourism analysis the spending of Hong Kong residents travelling abroad and its various impacts is subtracted from the impacts of the spending of foreign tourists in Hong Kong. Note that the net tourism figures are influenced by the fact that hotel spending has been removed from the estimated spending of Hong Kong travellers abroad (presumably if Hong Kong travellers stay at home they will spend on retail, food, beverage, and entertainment in Hong Kong, but not hotel). Since the hotel sector has higher employment and value added to revenue ratios than the other sectors in this category, the removal of hotel spending has a larger impact on value added and employment than on revenue.

Both Exhibits 5.6 and 5.7 are influenced by the way capacity constraints are handled in the throughput projections. In particular, the throughput projections assume that demand for air travel from Hong Kong residents continues to be served based on the belief that Hong Kong residents will either have to travel or that they will be willing to put up with inconvenient schedules or greater expense more than foreign leisure travellers, who can choose to go to other destinations if schedules are inconvenient or the expense of travelling to Hong Kong is too high. Thus as demand increases in the constrained case, the number of Hong Kong residents served increases (*de facto* the capacity constraint on Hong Kong residents is assumed to involve inconvenience and higher costs, but not foregone travel) and the number of inbound visitors served decreases. This influences the balance between visitor spending in Hong Kong and Hong Kong resident spend outside of Hong Kong. This effect is projected through to 2030. Beyond that the ratio of Hong Kong to foreign visitor to transit and transfer passengers was fixed at the 2030 level.

³⁰ We have taken the future traffic forecasts to represent the traffic that would occur with the normal growth of economic activity in Hong Kong, so that there are not additional incremental investments required to generate the traffic. In such a case, going forward, the economic impact of the additional tourism and trade facilitated by expansion of HKIA are correctly attributed to the expansion of the airport. If such investments were required (for example for the creation of tourism destinations to attract visitors or facilities required to generate additional trade), then part of the catalytic impacts of aviation-facilitated tourism and trade ascribed to the airport expansion would need to be ascribed to such investments. In addition, if some part of the additional demand that is forecast would use HKIA could use other airports in the region should HKIA be constrained, then some of the catalytic benefits of aviation-facilitated tourism and trade associated with an expansion of HKIA could possibly accrue to Hong Kong without the expansion. Note that neither of these would affect the estimates of the impact of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA enabled by the airport or airport expansion.

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Exhibit 5.5. Status Quo Situation Economic Impacts from Operations of Aviation-Facilitated Inbound Tourism

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	38,943	44,526	43,890	43,635	42,896
Indirect	23,865	27,286	26,896	26,740	26,288
Induced	6,833	7,812	7,701	7,656	7,526
Total	69,641	79,624	78,487	78,031	76,710
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	15,078	17,240	16,993	16,895	16,609
Indirect	4,432	5,068	4,995	4,966	4,882
Induced	3,738	4,273	4,212	4,188	4,117
Total	23,248	26,581	26,200	26,049	25,608
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	36,512	41,746	41,150	40,911	40,218
Indirect	12,340	14,109	13,907	13,827	13,593
Induced	8,527	9,749	9,610	9,554	9,392
Total	57,379	65,604	64,667	64,292	63,203

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Exhibit 5.6. Status Quo Situation Economic Impacts from Operations of Aviation-Facilitated Net Tourism

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	(39,823)	(50,468)	(63,395)	(82,543)	(101,771)
Indirect	(24,404)	(30,927)	(38,849)	(50,584)	(62,367)
Induced	(6,987)	(8,855)	(11,123)	(14,483)	(17,857)
Total	(71,214)	(90,250)	(113,367)	(147,610)	(181,995)
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	(15,419)	(19,540)	(24,545)	(31,959)	(39,404)
Indirect	(4,533)	(5,744)	(7,215)	(9,395)	(11,583)
Induced	(3,822)	(4,844)	(6,084)	(7,922)	(9,768)
Total	(23,774)	(30,128)	(37,844)	(49,276)	(60,755)
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	(37,337)	(47,317)	(59,437)	(77,390)	(95,418)
Indirect	(12,619)	(15,992)	(20,088)	(26,156)	(32,249)
Induced	(8,720)	(11,050)	(13,881)	(18,073)	(22,284)
Total	(58,676)	(74,359)	(93,406)	(121,619)	(149,951)

Note: Net tourism impact equals the impact of tourism exports (minus the impact of spending on the airport island) minus the impact of tourism imports. Numbers in parentheses are negative numbers. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Exhibit 5.7. Status Quo Situation Economic Impacts from Operations of Aviation-Facilitated Trade

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	1,349,871	1,620,833	1,620,833	1,620,833	1,620,833
Indirect	558,932	671,128	671,128	671,128	671,128
Induced	57,854	69,467	69,467	69,467	69,467
Total	1,966,657	2,361,428	2,361,428	2,361,428	2,361,428
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	67,965	81,608	81,608	81,608	81,608
Indirect	97,415	116,970	116,970	116,970	116,970
Induced	31,646	37,999	37,999	37,999	37,999
Total	197,026	236,577	236,577	236,577	236,577
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	101,364	121,711	121,711	121,711	121,711
Indirect	172,037	206,570	206,570	206,570	206,570
Induced	72,198	86,690	86,690	86,690	86,690
Total	345,599	414,971	414,971	414,971	414,971

Note: Trade services are net of trade related services that occur at the airport. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

5.2.2. Scenario 1

The parameters of Scenario 1 are outlined in Section 4.

The projected future direct, indirect, and induced economic impacts from operations of aviation-facilitated inbound tourism, net tourism, and trade for Scenario 1 through 2030 are shown in Exhibits 5.8, 5.9, and 5.10.

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Exhibit 5.8. Scenario 1 Economic Impacts from Operations of Aviation-Facilitated Inbound Tourism

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	44,722	51,644	56,378	58,552	59,380
Indirect	27,406	31,648	34,550	35,882	36,389
Induced	7,847	9,061	9,892	10,273	10,419
Total	79,975	92,353	100,820	104,707	106,188
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	17,315	19,995	21,829	22,670	22,991
Indirect	5,090	5,878	6,417	6,664	6,758
Induced	4,292	4,957	5,411	5,620	5,699
Total	26,697	30,830	33,657	34,954	35,448
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	41,930	48,420	52,859	54,896	55,673
Indirect	14,171	16,364	17,865	18,553	18,816
Induced	9,792	11,308	12,345	12,820	13,002
Total	65,893	76,092	83,069	86,269	87,491

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Exhibit 5.9. Scenario 1 Economic Impacts from Operations of Aviation-Facilitated Net Tourism

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	(34,044)	(43,350)	(50,906)	(67,626)	(85,287)
Indirect	(20,863)	(26,566)	(31,196)	(41,442)	(52,266)
Induced	(5,973)	(7,606)	(8,932)	(11,865)	(14,964)
Total	(60,880)	(77,522)	(91,034)	(120,933)	(152,517)
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	(13,181)	(16,784)	(19,710)	(26,184)	(33,022)
Indirect	(3,875)	(4,934)	(5,794)	(7,697)	(9,707)
Induced	(3,267)	(4,161)	(4,886)	(6,490)	(8,186)
Total	(20,323)	(25,879)	(30,390)	(40,371)	(50,915)
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	(31,919)	(40,644)	(47,728)	(63,404)	(79,963)
Indirect	(10,788)	(13,736)	(16,131)	(21,429)	(27,025)
Induced	(7,454)	(9,492)	(11,146)	(14,807)	(18,674)
Total	(50,161)	(63,872)	(75,005)	(99,640)	(125,662)

Note: Net tourism impact equals the impact of tourism exports (minus the impact of spending on the airport island) minus the impact of tourism imports. Numbers in parentheses are negative numbers. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Exhibit 5.10. Scenario 1 Economic Impacts from Operations of Aviation-Facilitated Trade

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	1,468,768	1,744,854	2,080,328	2,196,326	2,241,840
Indirect	608,163	722,480	861,388	909,419	928,264
Induced	62,950	74,783	89,161	94,133	96,083
Total	2,139,881	2,542,117	3,030,877	3,199,878	3,266,187
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	73,951	87,852	104,743	110,584	112,875
Indirect	105,996	125,920	150,130	158,501	161,785
Induced	34,434	40,906	48,771	51,490	52,557
Total	214,381	254,678	303,644	320,575	327,217
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	110,292	131,024	156,215	164,926	168,343
Indirect	187,190	222,377	265,132	279,916	285,716
Induced	78,557	93,323	111,266	117,470	119,904
Total	376,039	446,724	532,613	562,312	573,963

Note: Trade services are net of trade related services that occur at the airport. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

The projected net economic impacts from operations attributable to the investment programme of aviation-facilitated inbound tourism, net tourism, and trade for Scenario 1 through 2030 are shown in Exhibits 5.11 and 5.12. The net impacts in these exhibits represent the Scenario 1 Impact from Operations less the Status Quo Situation Impact from Operations. The impacts refer just to those of the operation of the new assets, and exclude the value added, employment, and revenue generated by the construction itself.

It should be noted that the tourism impact is the same for inbound tourism only as it is when both inbound and outbound tourism (net tourism) are taken into account. The reason is, as indicated above, the throughput projections assume that Hong Kong travellers are served even when there are capacity constraints in the Status Quo Situation or Scenario 1 through 2030 and the ratios and absolute numbers of the different types of passengers stay the same beyond 2030. In such a situation the “tourism import” components (resulting from the spending of Hong Kong residents abroad) in the Status Quo Situation and Scenario 1 are identical. Since the net impacts represent the Scenario 1 Impact from Operations less the Status Quo Situation Impact from Operations, and the import components are identical, the net impacts equal the difference between the tourism exports (foreign visitor spending in Hong Kong) in Scenario 1 and those in the Status Quo Situation.

We note that the trade impact is much larger than the tourism impact. There are several reasons for this. Hong Kong is one of the world’s most trade-dependent economies and roughly one-third of the value of Hong Kong’s trade is carried by air. The trading sector itself accounted for 21 percent of Hong Kong’s GDP in 2012. Trade also has a strong ripple effect through Hong Kong’s economy.

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Exhibit 5.11. Scenario 1 Net Economic Impacts from Operations of Aviation-Facilitated Net Tourism

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	5,779	7,118	12,489	14,917	16,484
Indirect	3,541	4,362	7,653	9,141	10,102
Induced	1,014	1,249	2,191	2,617	2,892
Total	10,334	12,729	22,333	26,675	29,478
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	2,237	2,756	4,835	5,776	6,382
Indirect	658	810	1,421	1,698	1,876
Induced	555	683	1,199	1,432	1,582
Total	3,450	4,249	7,455	8,906	9,840
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	5,418	6,673	11,709	13,986	15,455
Indirect	1,831	2,255	3,957	4,727	5,223
Induced	1,265	1,558	2,735	3,266	3,609
Total	8,514	10,486	18,401	21,979	24,287

Note: Tourism services exclude tourism related services that occur at the airport. Net Tourism equals inbound tourism – outbound tourism. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Exhibit 5.12. Scenario 1 Net Economic Impacts from Operations of Aviation-Facilitated Net Trade

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	118,897	124,021	459,495	575,494	621,007
Indirect	49,231	51,353	190,260	238,291	257,136
Induced	5,096	5,315	19,694	24,665	26,616
Total	173,224	180,689	669,449	838,450	904,759
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	5,986	6,244	23,135	28,976	31,267
Indirect	8,580	8,950	33,160	41,531	44,816
Induced	2,787	2,908	10,772	13,492	14,559
Total	17,353	18,102	67,067	83,999	90,642
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	8,928	9,313	34,504	43,215	46,632
Indirect	15,153	15,806	58,561	73,345	79,146
Induced	6,359	6,633	24,576	30,780	33,214
Total	30,440	31,752	117,641	147,340	158,992

Note: Trade services are net of trade related services that occur at the airport. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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5.2.3. Scenario 2

The parameters of Scenario 2, in which a third runway is constructed at HKIA, are outlined in Section 4.

The projected future economic impacts from operations of aviation-facilitated inbound tourism, net tourism, and trade for Scenario 2 through 2030 are shown in Exhibits 5.13, 5.14, and 5.15.

Exhibit 5.13. Scenario 2 Economic Impacts from Operations of Aviation-Facilitated Inbound Tourism

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	44,722	51,644	55,880	67,549	79,101
Indirect	27,406	31,648	34,244	41,395	48,475
Induced	7,847	9,061	9,805	11,852	13,879
Total	79,975	92,353	99,929	120,796	141,455
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	17,315	19,995	21,636	26,154	30,627
Indirect	5,090	5,878	6,360	7,688	9,003
Induced	4,292	4,957	5,363	6,483	7,592
Total	26,697	30,830	33,359	40,325	47,222
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	41,930	48,420	52,392	63,332	74,163
Indirect	14,171	16,364	17,707	21,405	25,065
Induced	9,792	11,308	12,235	14,790	17,320
Total	65,893	76,092	82,334	99,527	116,548

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Exhibit 5.14. Scenario 2 Economic Impacts from Operations of Aviation-Facilitated Net Tourism

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	(34,044)	(43,350)	(51,404)	(58,629)	(65,566)
Indirect	(20,863)	(26,566)	(31,501)	(35,929)	(40,180)
Induced	(5,973)	(7,606)	(9,019)	(10,287)	(11,504)
Total	(60,880)	(77,522)	(91,924)	(104,845)	(117,250)
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	(13,181)	(16,784)	(19,903)	(22,700)	(25,386)
Indirect	(3,875)	(4,934)	(5,851)	(6,673)	(7,463)
Induced	(3,267)	(4,161)	(4,934)	(5,627)	(6,293)
Total	(20,323)	(25,879)	(30,688)	(35,000)	(39,142)
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	(31,919)	(40,644)	(48,195)	(54,968)	(61,473)
Indirect	(10,788)	(13,736)	(16,289)	(18,578)	(20,776)
Induced	(7,454)	(9,492)	(11,255)	(12,837)	(14,356)
Total	(50,161)	(63,872)	(75,739)	(86,383)	(96,605)

Note: Net tourism impact equals the impact of tourism exports (minus the impact of spending on the airport island) minus the impact of tourism imports. Numbers in parentheses are negative numbers. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Exhibit 5.15. Scenario 2 Economic Impacts from Operations of Aviation-Facilitated Trade

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	1,468,768	1,744,854	2,126,942	2,645,925	3,252,627
Indirect	608,163	722,480	880,689	1,095,581	1,346,794
Induced	62,950	74,783	91,159	113,402	139,405
Total	2,139,881	2,542,117	3,098,790	3,854,908	4,738,826
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	73,951	87,852	107,090	133,221	163,768
Indirect	105,996	125,920	153,494	190,947	234,730
Induced	34,434	40,906	49,864	62,031	76,254
Total	214,381	254,678	310,448	386,199	474,752
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	110,292	131,024	159,715	198,687	244,245
Indirect	187,190	222,377	271,073	337,216	414,538
Induced	78,557	93,323	113,759	141,517	173,966
Total	376,039	446,724	544,547	677,420	832,749

Note: Trade services are net of trade related services that occur at the airport. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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The projected net economic impact from operations attributable to the investment programme for Scenario 2 of aviation-facilitated inbound tourism, net tourism, and trade through 2030 are shown in Exhibits 5.16 and 5.17. The net impacts in these exhibits represent the Scenario 2 Impact from Operations less the Status Quo Situation Impact from Operations. The impacts refer just to those of the operation of the new assets, and exclude the value added, employment, and revenue generated by the construction itself.

Exhibit 5.16. Scenario 2 Net Economic Impacts from Operations of Aviation-Facilitated Net Tourism

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	5,779	7,118	11,991	23,915	36,205
Indirect	3,541	4,362	7,348	14,655	22,187
Induced	1,014	1,249	2,104	4,196	6,352
Total	10,334	12,729	21,443	42,766	64,744
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	2,237	2,756	4,643	9,259	14,018
Indirect	658	810	1,365	2,722	4,121
Induced	555	683	1,151	2,295	3,475
Total	3,450	4,249	7,159	14,276	21,614
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	5,418	6,673	11,242	22,422	33,945
Indirect	1,831	2,255	3,800	7,578	11,472
Induced	1,265	1,558	2,625	5,236	7,927
Total	8,514	10,486	17,667	35,236	53,344

Note: Tourism services exclude tourism related services that occur at the airport. Net Tourism equals inbound tourism – outbound tourism. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Exhibit 5.17. Scenario 2 Net Economic Impacts from Operations of Aviation-Facilitated Trade

Impact	Revenue (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	118,897	124,021	506,110	1,025,093	1,631,794
Indirect	49,231	51,353	209,562	424,453	675,666
Induced	5,096	5,315	21,691	43,935	69,937
Total	173,224	180,689	737,363	1,493,481	2,377,397
	Value Added (HK\$ Millions)				
	2012	2015	2020	2025	2030
Direct	5,986	6,244	25,482	51,613	82,160
Indirect	8,580	8,950	36,524	73,977	117,761
Induced	2,787	2,908	11,865	24,032	38,256
Total	17,353	18,102	73,871	149,622	238,177
	Employees (Persons)				
	2012	2015	2020	2025	2030
Direct	8,928	9,313	38,005	76,976	122,534
Indirect	15,153	15,806	64,502	130,645	207,967
Induced	6,359	6,633	27,069	54,827	87,276
Total	30,440	31,752	129,576	262,448	417,777

Note: Trade services are net of trade related services that occur at the airport. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

6. Total quantifiable impacts

The projections for the impacts from operations of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA in Section 4 and for the catalytic impacts of aviation-facilitated tourism and trade in Section 5 allow us to estimate what we call the “total quantifiable impacts” from operations of aviation on Hong Kong’s economy. It also allows us to project the potential future contribution to Hong Kong’s economy in the Status Quo Situation, Scenario 1, and Scenario 2. These “total quantifiable impacts” from operations are taken to be the sum of the impacts of the aviation-related businesses in Hong Kong, non-aviation businesses at HKIA, aviation-facilitated tourism, and aviation-facilitated trade. These are not the only impacts of aviation on Hong Kong, Section 7 describes several additional impacts, but these are the ones for which estimates and projections could be reasonably made at this time. They do not include the impacts of the physical construction itself, which is addressed in Section 8.

6.1. Present impact on Hong Kong’s economy

The total quantifiable present impact from operations of aviation on Hong Kong’s economy was taken to be the sum of the impacts from operations of the aviation-related businesses in Hong Kong, non-aviation businesses at HKIA, aviation-facilitated tourism, and aviation-facilitated trade.

Exhibit 6.1 provides totals where only inbound tourism is taken into account, while Exhibit 6.2 provides totals where net tourism is taken into account. The “direct,” “direct + indirect,” and “direct + indirect + induced” designations represent the sum of the appropriate categories for aviation-related businesses in Hong Kong and non-aviation businesses at HKIA only. As such, they are identical to the respective rows in Exhibit 4.3. The “direct + indirect + induced + catalytic direct only” line adds in only the direct contribution from aviation-facilitated tourism and trade. The “direct + indirect + induced + catalytic total” line adds in the direct, indirect, and induced contribution of aviation-facilitated tourism and trade. While the terminology is cumbersome, what is being presented should be clear.

As can be seen in Exhibits 6.1 and 6.2, the value added estimates run up to 16.5 percent of Hong Kong’s GDP in 2012 in the inbound tourism only case and to 14.2 percent of Hong Kong’s GDP in the net tourism case. Similarly, the employment estimates run up to 16.1 percent of Hong Kong’s employment in the inbound tourism only case and to 13.0 percent of Hong Kong’s employment in the net tourism case.

Again, these figures look large, but must be taken in the context of the importance of aviation-related businesses in Hong Kong, tourism, and trade to Hong Kong’s economy.

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Exhibit 6.1. Quantifiable Economic Impact from Operations of Hong Kong International Airport, 2012 (Includes only Inbound Tourism)

Impact	2012	Percentage of Hong Kong GDP / Employment
Revenue (HK\$ Millions)		
Direct	237,266	
Direct + Indirect	421,656	
Direct + Indirect + Induced	451,375	
Direct + Indirect + Induced + Catalytic Direct Only	1,964,865	
Direct + Indirect + Induced + Catalytic Total	2,671,231	
Value Added (HK\$ Millions)		
Direct	52,876	2.6
Direct + Indirect	77,985	3.8
Direct + Indirect + Induced	94,241	4.6
Direct + Indirect + Induced + Catalytic Direct Only	185,507	9.1
Direct + Indirect + Induced + Catalytic Total	335,319	16.5
Employment (Persons)		
Direct	62,968	1.7
Direct + Indirect	111,072	3.0
Direct + Indirect + Induced	148,158	4.1
Direct + Indirect + Induced + Catalytic Direct Only	300,380	8.2
Direct + Indirect + Induced + Catalytic Total	590,090	16.1

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Exhibit 6.2. Quantifiable Economic Impact from Operations of Hong Kong International Airport, 2012 (Includes both Inbound and Outbound Tourism – “Net Tourism”)

Impact	2012	Percentage of Hong Kong GDP / Employment
Revenue (HK\$ Millions)		
Direct	237,266	
Direct + Indirect	421,656	
Direct + Indirect + Induced	451,375	
Direct + Indirect + Induced + Catalytic Direct Only	1,886,099	
Direct + Indirect + Induced + Catalytic Total	2,530,376	
Value Added (HK\$ Millions)		
Direct	52,876	2.6
Direct + Indirect	77,985	3.8
Direct + Indirect + Induced	94,241	4.6
Direct + Indirect + Induced + Catalytic Direct Only	155,011	7.6
Direct + Indirect + Induced + Catalytic Total	288,299	14.2
Employment (Persons)		
Direct	62,968	1.7
Direct + Indirect	111,072	3.0
Direct + Indirect + Induced	148,158	4.1
Direct + Indirect + Induced + Catalytic Direct Only	226,531	6.2
Direct + Indirect + Induced + Catalytic Total	474,036	13.0

Note: Net tourism impact equals the impact of tourism exports (minus the impact of spending on the airport island) minus the impact of tourism imports. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

While these numbers look large, they are not particularly surprising when global benchmarks and Hong Kong's unique economic structure are taken into account. The Air Transport Action Group (ATAG) and Oxford Economic Forecasting estimated that the impact of aviation on the global economy was 3.4 percent of global GDP in 2012 when the direct, indirect, and induced impacts of aviation-related businesses and the catalytic impact of inbound tourism are taken into account.³¹ The same groups estimated that the impact of aviation in 2007 was 7.5 percent of global GDP when the catalytic impacts of aviation on trade and productivity were also taken into account.³² Without the productivity improvement, the ATAG 2007 estimate was an impact of 3.7 percent of global GDP in 2007.

We noted in Section 4 that ATAG's estimate for the Direct + Indirect + Induced Impact of aviation on Hong Kong's economy was equal to 6.0 percent of Hong Kong's year 2012 GDP. When ATAG added in their estimate of the contribution of aviation-facilitated inbound tourism, their estimate reached 10.7 percent of Hong Kong's year 2012 GDP, which is higher than the 9.1 percent of GDP value added estimate that included Catalytic Direct effects in the case of Inbound Tourism only reported in Exhibit 6.1. When we realise that the ATAG Hong Kong estimates did not take into account aviation-facilitated trade at all we can readily understand that the high percentage of GDP figures for Hong Kong should not be far off.

We note that in 2012, Hong Kong's trade (exports + imports) equalled 450 percent of GDP. Globally, exports + imports equalled 61 percent of GDP, or only around one-seventh of Hong Kong's trade intensity. In addition, HKIA's share of global air cargo traffic (4.4 percent in 2012) was 12 times Hong Kong's share of global GDP (0.36 percent).³³

When additional non-quantifiable impacts are included, the impact of HKIA on Hong Kong is likely to be much larger. This is due to Hong Kong's small size, location, internationally-oriented economy, distinctive business makeup, and its unique history in that for most of the time since the 1960s air transport has been the main way that Hong Kong has interacted with the rest of the world and, until relatively recently, using airports in the Chinese Mainland was not an option. These features are further elaborated in Section 7.

6.2. Future impact on Hong Kong's economy

As in Sections 4 and 5, we examined three main situations for the future economic impact of HKIA and different potential investment programmes at HKIA on Hong Kong's economy, a Status Quo Situation, Scenario 1 in which the two runway configuration is optimised, and Scenario 2 in which a third runway is constructed. All projections were generated according to the methods described in Appendix A.

6.2.1. Status Quo Situation

The parameters of the Status Quo Situation are outlined in Section 4.

The projected total future quantifiable impact of aviation-related businesses in Hong Kong, non-aviation businesses at HKIA, aviation-facilitated tourism, and aviation-facilitated trade for the Status Quo Situation are shown in Exhibit 6.3, which includes only inbound tourism, and in Exhibit 6.4, which includes both inbound and outbound tourism.

³¹ Air Transport Action Group, *Aviation: Benefits Beyond Borders*, 2012.

³² Air Transport Action Group, *The Economic and Social Benefits of Air Transport*, 2008.

³³ The global data were sourced from the World Bank, *World Development Indicators* and Airports Council International (ACI), *Air Cargo Traffic Statistics*.

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We note that in Exhibits 6.3 and 6.4, the direct + indirect + induced + catalytic revenue, value added, and employment fall off from 2015. As the two runway configuration becomes constrained, more Hong Kong residents are served in priority to inbound visitors. This assumes that it is more likely that Hong Kong residents will put up with the inconvenient schedules and costs associated with a constrained airport than transit and transfer passengers or foreign visitors. This results in a reduction in tourism revenue, value added, and employment.

Exhibit 6.3. Status Quo Situation Total Economic Impact of Aviation-Related Businesses in Hong Kong, Non-Aviation Businesses at HKIA, Aviation-Facilitated Tourism, and Aviation-Facilitated Trade (Includes only Inbound Tourism)

Impact	2012	2015	2020	2025	2030
Revenue (HK\$ Millions)					
Direct	211,653	246,368	245,685	244,636	243,608
Direct + Indirect	376,157	437,881	436,690	434,860	433,067
Direct + Indirect + Induced	402,636	468,652	467,335	465,312	463,331
D + I + I + Catalytic Direct Only	1,791,450	2,134,011	2,132,058	2,129,780	2,127,060
D + I + I + Catalytic Total	2,438,934	2,909,704	2,907,250	2,904,771	2,901,469
Value Added (HK\$ Millions)					
Direct	47,150	54,855	54,680	54,412	54,150
Direct + Indirect	69,473	80,717	80,374	79,849	79,335
Direct + Indirect + Induced	83,957	97,549	97,137	96,506	95,889
D + I + I % of Hong Kong's GDP	4.1%	4.3%	3.6%	3.0%	2.6%
D + I + I + Catalytic Direct Only	167,000	196,397	195,738	195,009	194,106
D + I + I + Catalytic Total	304,231	360,707	359,914	359,132	358,074
Total % of Hong Kong's GDP	14.9%	15.9%	13.2%	11.2%	9.6%
Employment (Persons)					
Direct	56,089	65,157	64,872	64,435	64,007
Direct + Indirect	98,741	114,387	113,635	112,481	111,351
Direct + Indirect + Induced	131,784	152,787	151,878	150,483	149,118
D + I + I + Catalytic Direct Only	269,660	316,244	314,739	313,105	311,047
D + I + I + Catalytic Total	534,762	633,362	631,516	629,746	627,292

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Exhibit 6.4. Status Quo Situation Total Economic Impact of Aviation-Related Businesses in Hong Kong, Non-Aviation Businesses at HKIA, Aviation-Facilitated Tourism, and Aviation-Facilitated Trade (Includes both Inbound and Outbound Tourism – “Net Tourism”)

Impact	2012	2015	2020	2025	2030
Revenue (HK\$ Millions)					
Direct	211,653	246,368	245,685	244,636	243,608
Direct + Indirect	376,157	437,881	436,690	434,860	433,067
Direct + Indirect + Induced	402,636	468,652	467,335	465,312	463,331
D + I + I + Catalytic Direct Only	1,712,684	2,039,017	2,024,773	2,003,602	1,982,393
D + I + I + Catalytic Total	2,298,079	2,739,830	2,715,396	2,679,130	2,642,764
Value Added (HK\$ Millions)					
Direct	47,150	54,855	54,680	54,412	54,150
Direct + Indirect	69,473	80,717	80,374	79,849	79,335
Direct + Indirect + Induced	83,957	97,549	97,137	96,506	95,889
D + I + I % of Hong Kong's GDP	4.1%	4.3%	3.6%	3.0%	2.6%
D + I + I + Catalytic Direct Only	136,503	159,617	154,200	146,155	138,093
D + I + I + Catalytic Total	257,209	303,998	295,870	283,807	271,711
Total % of Hong Kong's GDP	12.6%	13.4%	10.9%	8.8%	7.3%
Employment (Persons)					
Direct	56,089	65,157	64,872	64,435	64,007
Direct + Indirect	98,741	114,387	113,635	112,481	111,351
Direct + Indirect + Induced	131,784	152,787	151,878	150,483	149,118
D + I + I + Catalytic Direct Only	195,811	227,181	214,152	194,804	175,411
D + I + I + Catalytic Total	418,707	493,399	473,443	443,835	414,138

Note: Net tourism impact equals the impact of tourism exports (minus the impact of spending on the airport island) minus the impact of tourism imports. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

6.2.2. Scenario 1

The parameters of Scenario 1 are outlined in Section 4.

6.2.2.1. Scenario 1 total future quantifiable impact

Projections for the total future quantifiable impact of aviation-related businesses in Hong Kong, non-aviation businesses at HKIA, aviation-facilitated tourism, and aviation-facilitated trade in Scenario 1 are given in Exhibit 6.5, which includes only inbound tourism, and in Exhibit 6.6, which includes both inbound and outbound tourism.

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Exhibit 6.5. Scenario 1 Total Economic Impact of Aviation-Related Businesses in Hong Kong, Non-Aviation Businesses at HKIA, Aviation-Facilitated Tourism, and Aviation-Facilitated Trade (Includes only Inbound Tourism)

Impact	2012	2015	2020	2025	2030
Revenue (HK\$ Millions)					
Direct	237,266	276,626	314,741	329,083	336,840
Direct + Indirect	421,656	491,628	559,399	584,922	598,737
Direct + Indirect + Induced	451,375	526,234	598,717	625,974	640,709
D + I + I + Catalytic Direct Only	1,964,865	2,322,732	2,735,423	2,880,852	2,941,929
D + I + I + Catalytic Total	2,671,231	3,160,704	3,730,414	3,930,559	4,013,084
Value Added (HK\$ Millions)					
Direct	52,876	61,622	70,082	73,244	74,943
Direct + Indirect	77,985	90,793	103,140	107,670	110,068
Direct + Indirect + Induced	94,241	109,723	124,647	130,125	133,027
D + I + I % of Hong Kong's GDP	4.6%	4.8%	4.6%	4.1%	3.6%
D + I + I + Catalytic Direct Only	185,507	217,570	251,219	263,379	268,893
D + I + I + Catalytic Total	335,319	395,231	461,948	485,654	495,692
Total % of Hong Kong's GDP	16.5%	17.5%	17.0%	15.1%	13.2%
Employment (Persons)					
Direct	62,968	73,302	83,259	86,903	88,830
Direct + Indirect	111,072	129,033	146,212	152,252	155,329
Direct + Indirect + Induced	148,158	172,218	195,277	203,481	207,706
D + I + I + Catalytic Direct Only	300,380	351,662	404,351	423,303	431,722
D + I + I + Catalytic Total	590,090	695,034	810,959	852,062	869,160

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Exhibit 6.6. Scenario 1 Total Economic Impact of Aviation-Related Businesses in Hong Kong, Non-Aviation Businesses at HKIA, Aviation-Facilitated Tourism, and Aviation-Facilitated Trade (Includes both Inbound and Outbound Tourism – “Net Tourism”)

Impact	2012	2015	2020	2025	2030
Revenue (HK\$ Millions)					
Direct	237,266	276,626	314,741	329,083	336,840
Direct + Indirect	421,656	491,628	559,399	584,922	598,737
Direct + Indirect + Induced	451,375	526,234	598,717	625,974	640,709
D + I + I + Catalytic Direct Only	1,886,099	2,227,738	2,628,139	2,754,674	2,797,262
D + I + I + Catalytic Total	2,530,376	2,990,829	3,538,560	3,704,919	3,754,379
Value Added (HK\$ Millions)					
Direct	52,876	61,622	70,082	73,244	74,943
Direct + Indirect	77,985	90,793	103,140	107,670	110,068
Direct + Indirect + Induced	94,241	109,723	124,647	130,125	133,027
D + I + I % of Hong Kong's GDP	4.6%	4.8%	4.6%	4.1%	3.6%
D + I + I + Catalytic Direct Only	155,011	180,791	209,680	214,525	212,880
D + I + I + Catalytic Total	288,299	338,522	397,901	410,329	409,329
Total % of Hong Kong's GDP	14.2%	15.0%	14.6%	12.8%	10.9%
Employment (Persons)					
Direct	62,968	73,302	83,259	86,903	88,830
Direct + Indirect	111,072	129,033	146,212	152,252	155,329
Direct + Indirect + Induced	148,158	172,218	195,277	203,481	207,706
D + I + I + Catalytic Direct Only	226,531	262,598	303,764	305,003	296,086
D + I + I + Catalytic Total	474,036	555,070	652,885	666,153	656,007

Note: Net tourism impact equals the impact of tourism exports (minus the impact of spending on the airport island) minus the impact of tourism imports. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

The projected net economic impact attributable to the operations related to the investment programme for Scenario 1 of aviation-related businesses in Hong Kong, non-aviation businesses at HKIA, and aviation-facilitated tourism and trade through 2030 is shown in Exhibit 6.7. The net impacts in these exhibits represent the Scenario 1 Impact from Operations less the Status Quo Situation Impact from Operations. The impacts refer just to those of the operation of the new assets, and exclude the value added, employment, and revenue generated by the construction itself.

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Exhibit 6.7. Net Economic Impact from Operations of Scenario 1

Impact	2012	2015	2020	2025	2030
Revenue (HK\$ Millions)					
Direct	25,613	30,257	69,056	84,448	93,232
Direct + Indirect	45,501	53,746	122,710	150,064	165,670
Direct + Indirect + Induced	48,741	57,581	131,383	160,664	177,379
D + I + I + Catalytic Direct Only	173,417	188,720	603,367	751,075	814,870
D + I + I + Catalytic Total	232,299	250,999	823,165	1,025,789	1,111,616
Value Added (HK\$ Millions)					
Direct	5,726	6,767	15,402	18,832	20,794
Direct + Indirect	8,512	10,076	22,765	27,821	30,733
Direct + Indirect + Induced	10,284	12,173	27,509	33,619	37,138
D + I + I % of Hong Kong's GDP	0.50%	0.54%	1.01%	1.05%	0.99%
D + I + I + Catalytic Direct Only	18,507	21,173	55,479	68,371	74,787
D + I + I + Catalytic Total	31,087	34,524	102,031	126,524	137,620
Total % of Hong Kong's GDP	1.5%	1.5%	3.7%	3.9%	3.7%
Employment (Persons)					
Direct	6,879	8,145	18,387	22,468	24,823
Direct + Indirect	12,331	14,647	32,577	39,771	43,978
Direct + Indirect + Induced	16,374	19,433	43,399	52,998	58,589
D + I + I + Catalytic Direct Only	30,720	35,419	89,612	110,199	120,676
D + I + I + Catalytic Total	55,328	61,671	179,441	222,317	241,868

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

6.2.2.2. Scenario 1 economic benefits

The parameters for calculating the economic benefits of Scenario 1, in which the two runway configuration is optimised, are outlined in Section 4. The results of the calculations of the total benefits are given in Exhibit 6.8. The capital costs of the two runway configuration are discussed in Section 8. The discount rate employed was 4 percent. The “direct,” “direct + indirect,” and “direct + indirect + induced” lines are identical to that given in Section 4. The additional lines show the added influence of aviation-facilitated tourism and trade. We again note the caveat that EIRR estimates are not appropriate for investment analysis of this situation, but we have included them for the sake of completeness.

Exhibit 6.8. Economic Internal Rate of Return and Economic Net Present Value for a 50 Year Return, Scenario 1

Impact	EIRR (percent)	ENPV (HK\$ mn)
Direct	106%	314,739
Direct + Indirect	211%	482,969
Direct + Indirect + Induced	285%	591,214
Direct + Indirect + Induced + Catalytic Direct Only	626%	1,213,343
Direct + Indirect + Induced + Catalytic Total	1,164%	2,243,271

Note: The “Direct,” “Direct + Indirect,” and “Direct + Indirect + Induced” lines include only aviation-related businesses in Hong Kong and non-aviation businesses at HKIA. The “Direct + Indirect + Induced + Catalytic Direct Only” line adds in the direct benefits of aviation-facilitated tourism and trade. The “Direct + Indirect + Induced + Catalytic Total” line adds in the direct, indirect, and induced benefits of aviation-facilitated tourism and trade. All dollar values are in 2012 dollars.

6.2.1.3. Scenario 2

The parameters of Scenario 2, in which a third runway is constructed at HKIA, are outlined in Section 4.

6.2.1.3.1. Scenario 2 total future quantifiable impact

Projections for the total future quantifiable impact of aviation-related businesses in Hong Kong, non-aviation businesses at HKIA, aviation-facilitated tourism, and aviation-facilitated trade in Scenario 2 are given in Exhibit 6.9, which includes only inbound tourism, and in Exhibit 6.10, which includes both inbound and outbound tourism.

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Exhibit 6.9. Scenario 2 Total Economic Impact of Aviation-Related Businesses in Hong Kong, Non-Aviation Businesses at HKIA, Aviation-Facilitated Tourism, and Aviation-Facilitated Trade (Includes only Inbound Tourism)

Impact	2012	2015	2020	2025	2030
Revenue (HK\$ Millions)					
Direct	237,266	276,626	316,128	386,554	465,463
Direct + Indirect	421,656	491,628	561,874	687,063	827,333
Direct + Indirect + Induced	451,375	526,234	601,349	735,303	885,390
D + I + I + Catalytic Direct Only	1,964,865	2,322,732	2,784,171	3,448,777	4,217,118
D + I + I + Catalytic Total	2,671,231	3,160,704	3,800,068	4,711,007	5,765,671
Value Added (HK\$ Millions)					
Direct	52,876	61,622	70,382	86,045	103,593
Direct + Indirect	77,985	90,793	103,547	126,527	152,266
Direct + Indirect + Induced	94,241	109,723	125,140	152,914	184,022
D + I + I % of Hong Kong's GDP	4.6%	4.8%	4.6%	4.8%	4.9%
D + I + I + Catalytic Direct Only	185,507	217,570	253,866	312,289	378,417
D + I + I + Catalytic Total	335,319	395,231	468,947	579,438	705,996
Total % of Hong Kong's GDP	16.5%	17.5%	17.2%	18.1%	18.9%
Employment (Persons)					
Direct	62,968	73,302	83,584	102,127	122,897
Direct + Indirect	111,072	129,033	146,684	179,038	215,257
Direct + Indirect + Induced	148,158	172,218	195,946	239,237	287,707
D + I + I + Catalytic Direct Only	300,380	351,662	408,053	501,256	606,115
D + I + I + Catalytic Total	590,090	695,034	822,827	1,016,184	1,237,004

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Exhibit 6.10. Scenario 2 Total Economic Impact of Aviation-Related Businesses in Hong Kong, Non-Aviation Businesses at HKIA, Aviation-Facilitated Tourism, and Aviation-Facilitated Trade (Includes both Inbound and Outbound Tourism – “Net Tourism”)

Impact	2008	2015	2020	2025	2030
Revenue (HK\$ Millions)					
Direct	237,266	276,626	316,128	386,554	465,463
Direct + Indirect	421,656	491,628	561,874	687,063	827,333
Direct + Indirect + Induced	451,375	526,234	601,349	735,303	885,390
D + I + I + Catalytic Direct Only	1,886,099	2,227,738	2,676,887	3,322,599	4,072,451
D + I + I + Catalytic Total	2,530,376	2,990,829	3,608,215	4,485,366	5,506,966
Value Added (HK\$ Millions)					
Direct	52,876	61,622	70,382	86,045	103,593
Direct + Indirect	77,985	90,793	103,547	126,527	152,266
Direct + Indirect + Induced	94,241	109,723	125,140	152,914	184,022
D + I + I % of Hong Kong's GDP	4.6%	4.8%	4.6%	4.8%	4.9%
D + I + I + Catalytic Direct Only	155,011	180,791	212,327	263,435	322,404
D + I + I + Catalytic Total	288,299	338,522	404,900	504,113	619,632
Total % of Hong Kong's GDP	14.2%	15.0%	14.9%	15.7%	16.5%
Employment (Persons)					
Direct	62,968	73,302	83,584	102,127	122,897
Direct + Indirect	111,072	129,033	146,684	179,038	215,257
Direct + Indirect + Induced	148,158	172,218	195,946	239,237	287,707
D + I + I + Catalytic Direct Only	226,531	262,598	307,466	382,956	470,479
D + I + I + Catalytic Total	474,036	555,070	664,754	830,274	1,023,851

Note: Net tourism impact equals the impact of tourism exports (minus the impact of spending on the airport island) minus the impact of tourism imports. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

The projected operational net economic impact attributable to the investment programme for Scenario 2 of aviation-related businesses in Hong Kong, non-aviation businesses at HKIA, and aviation-facilitated tourism and trade through 2030 is shown in Exhibit 6.11. The net impacts in these exhibits represent the Scenario 2 Impact from Operations less the Status Quo Situation Impact from Operations. The impacts refer just to those of the operation of the new assets, and exclude the value added, employment, and revenue generated by the construction itself.

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Exhibit 6.11. Net Economic Impact from Operations of Scenario 2

Impact	2012	2015	2020	2025	2030
Revenue (HK\$ Millions)					
Direct	25,613	30,257	70,443	141,918	221,856
Direct + Indirect	45,501	53,746	125,184	252,203	394,268
Direct + Indirect + Induced	48,741	57,581	134,014	269,990	422,061
D + I + I + Catalytic Direct Only	173,417	188,720	652,115	1,318,998	2,090,060
D + I + I + Catalytic Total	232,299	250,999	892,820	1,806,237	2,864,202
Value Added (HK\$ Millions)					
Direct	5,726	6,767	15,702	31,633	49,444
Direct + Indirect	8,512	10,076	23,173	46,679	72,932
Direct + Indirect + Induced	10,284	12,173	28,003	56,409	88,134
D + I + I % of Hong Kong's GDP	0.5%	0.5%	1.0%	1.8%	2.4%
D + I + I + Catalytic Direct Only	18,507	21,173	58,128	117,281	184,312
D + I + I + Catalytic Total	31,087	34,524	109,033	220,307	347,925
Total % of Hong Kong's GDP	1.5%	1.5%	4.0%	6.9%	9.3%
Employment (Persons)					
Direct	6,879	8,145	18,712	37,692	58,890
Direct + Indirect	12,331	14,647	33,050	66,557	103,906
Direct + Indirect + Induced	16,374	19,433	44,069	88,754	138,589
D + I + I + Catalytic Direct Only	30,720	35,419	93,316	188,152	295,068
D + I + I + Catalytic Total	55,328	61,671	191,312	386,438	609,710

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

6.2.3.2. Scenario 2 economic benefits

The parameters for calculating the economic benefits of Scenario 2 are outlined in Section 4. The results of the calculations of the total benefits are given in Exhibit 6.12. The capital cost projections for expanding capacity are discussed in Section 8. The discount rate employed was 4 percent. The “direct,” “direct + indirect,” and “direct + indirect + induced” lines are identical to that given in Section 4. The additional lines show the added influence of aviation-facilitated tourism and trade. Again we note the caveats about using EIRR estimates in the present analysis.

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Exhibit 6.12. Economic Internal Rate of Return and Economic Net Present Value for a 50 Year Return, Scenario 2

Impact	EIRR (percent)	ENPV (HK\$ mn)
Direct	27%	525,722
Direct + Indirect	179%	841,521
Direct + Indirect + Induced	269%	1,045,637
Direct + Indirect + Induced + Catalytic Direct Only	623%	2,309,927
Direct + Indirect + Induced + Catalytic Total	1,163%	4,447,187

Note: The “Direct,” “Direct + Indirect,” and “Direct + Indirect + Induced” lines include only aviation-related businesses in Hong Kong and non-aviation businesses at HKIA. The “Direct + Indirect + Induced + Catalytic Direct Only” line adds in the direct benefits of aviation-facilitated tourism and trade. The “Direct + Indirect + Induced + Catalytic Total” line adds in the direct, indirect, and induced benefits of aviation-facilitated tourism and trade. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

7. Broader catalytic impacts

In addition to the impact on tourism and aviation-facilitated trade, HKIA has a much broader catalytic impact on Hong Kong's economy as well. In general, airports have broader catalytic impacts that include the impact on downstream industries that are substantial users of air transportation, the enlargement of markets for the region's companies, the ability to attract more factors of production, the impact of improved information exchange on productivity and innovation, and improvement of overall locational competitiveness.³⁴ This in turn can have an impact on company location decisions and company competitiveness, the ability to attract and retain companies, and to attract additional economic activities.³⁵ Aviation services have been identified as particularly critical to knowledge-intensive business development, such as financial and professional services, creative industries, and high-technology manufacturing industries.³⁶

According to a February 2006 survey carried out for the London Chamber of Commerce and Industry, 29 percent of London firms across the entire economy rated access to an airport as "very important" for their business. An additional 21.5 percent rated it "fairly important."³⁷ If this is true in London, a city with a large domestic economy compared to Hong Kong, it must be even more the case in Hong Kong. In one assessment, the catalytic impact of aviation services on investment and productivity in Europe (not including the impact on tourism and trade) was estimated to equal 4 percent of regional GDP, showing the importance of aviation to the broader economy.³⁸ Below we identify additional areas of Hong Kong's economy in which we would expect aviation to have a substantial impact.

7.1. Hong Kong as an international business centre

It is well accepted that air transportation is absolutely vital to the ability of a city to engage in international business.³⁹ The presence of a world-class airport clearly benefits Hong Kong in its role as an international business centre. The impact on trade is described above. In addition, it is hard to imagine that Hong Kong would receive as much foreign investment as it does, would be so important in the strategies of multinational companies, and would be the home of so many regional headquarters without a world-class airport. While the exact value of this impact is not possible to estimate precisely, it is relatively straight forward to conclude that a substantial part of Hong Kong's economy relies heavily on aviation, and by extension on HKIA.

³⁴ Oxford Economic Forecasting, *The Economic Catalytic Effects of Air Transport in Europe*, 2002; Oxford Economic Forecasting, *The Economic Contribution of the Aviation Industry in the UK*, 2006; R. Molina, M. Schwab, C. Wollersheim, *Using a Contingent Valuation Approach for Evaluating the Benefits of Airports for Regional Economies*, Institute of Transport Economics, University of Muenster, 2008.

³⁵ See, for example, R. Molina, M. Schwab, C. Wollersheim, *Using a Contingent Valuation Approach for Evaluating the Benefits of Airports for Regional Economies*, Institute of Transport Economics, University of Muenster, 2008 and URS, *The Economic Impact of Growth at Sydney Airport*, 2008; Mott Macdonald, *The Role of Airports as Economic Development Drivers*, 2006.

³⁶ London Chamber of Commerce and Industry, *The Business Case for Airport Expansion*, 2006; Air Transport Action Group, *The Economic and Social Benefits of Air Transport*, 2008.

³⁷ London Chamber of Commerce and Industry, *The Business Case for Airport Expansion*, 2006.

³⁸ Oxford Economic Forecasting, *The Economic Catalytic Effects of Air Transport in Europe*, 2002.

³⁹ London Chamber of Commerce and Industry, *The Business Case for Airport Expansion*, 2006; URS, *The Economic Impact of Growth at Sydney Airport*, 2008; Oxford Economic Forecasting, *The Economic Contribution of the Aviation Industry to the UK*, 2006.

7.1.1. Foreign direct investment into Hong Kong

It is well known that Hong Kong is one of the most trade dependent economies in the world. What is less known is that it is also one of the most foreign direct investment (FDI) dependent economies in the world. In recent years, Hong Kong has been one of the major destinations for foreign direct investment in Asia. This is due to its role as a management centre for foreign companies, its role as an international financial centre, and its role as a centre from which companies from the Chinese Mainland are increasingly addressing international markets. As can be seen in Exhibit 7.1, Hong Kong has the largest stock of inward foreign direct investment in Asia, accounting for 30 percent of Asia's total, far ahead even of the Chinese Mainland. Hong Kong was the second leading destination for inward FDI flows in Asia in the years 1997 through 2012, receiving total inward FDI of over US\$1,178 billion, 70 percent more than that of third place Singapore (see Exhibit 7.2). The relative importance of FDI to Hong Kong, in terms of inward FDI flows as a percentage of gross fixed capital formation or stock of inward FDI as a percentage of GDP, is far higher than for any other economy in Asia, even Singapore, whose FDI-dependent development model is well-known throughout the world (see Exhibit 7.3). Hong Kong ranked second in UNCTAD's "Inward FDI Performance Index" in 2010.⁴⁰

The importance of aviation services to foreign investment is documented in several studies, some of which have identified examples of companies not investing in particular locations due to the absence of good air transportation links. In addition, foreign investors seek out locations that have excellent networks of air connections in order to facilitate the operation and management of their businesses.⁴¹ In one survey in European cities, 52 percent of companies claimed that international air transportation links were critical to their location decisions for business in Europe.⁴² It is hard to imagine that Hong Kong would have received anywhere near the FDI that it has without a world-class international airport, which facilitates the travel necessary to arrange, make, and manage the investment.

⁴⁰ United Nations Conference on Trade and Development, Annex table 28: Inward FDI Performance and Potential Index rankings, 1990-2010, *World Investment Report 2011*.

⁴¹ Oxford Economic Forecasting, *The Economic Contribution of the Aviation Industry in the UK*, 2006; R. Molina, M. Schwab, C. Wollersheim, *Using a Contingent Valuation Approach for Evaluating the Benefits of Airports for Regional Economies*, Institute of Transport Economics, University of Muenster, 2008.

⁴² Cushman and Wakefield, *European Cities Monitor*, 2007.

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Exhibit 7.1. Inward FDI Stock in Selected Asian Economies, US\$ Millions

Economy	2005	2006	2007	2008	2009	2010	2011	2012
Hong Kong	568,711	783,065	1,226,806	873,282	994,021	1,162,625	1,184,511	1,422,375
China	272,094	292,559	327,087	378,083	473,083	587,817	711,802	832,882
Singapore	229,462	297,645	400,000	430,073	480,202	593,593	625,745	682,396
Indonesia	41,187	54,534	79,927	72,228	108,796	160,735	185,804	205,656
Thailand	62,833	80,542	96,562	96,643	110,070	142,498	150,517	159,125
Korea	104,880	115,770	121,960	94,680	121,100	134,230	133,660	147,230
Malaysia	44,460	53,710	75,763	73,601	78,995	101,620	115,064	132,400
Viet Nam	22,453	24,853	31,553	41,132	48,732	56,732	64,162	72,530
Taiwan	43,175	50,211	48,640	45,458	55,756	64,203	56,154	59,359
Philippines	14,978	16,914	20,463	21,746	22,931	25,896	28,230	31,027
Mongolia	734	980	1,353	2,197	2,821	4,949	9,461	13,151
Asia	1,702,627	2,172,413	3,006,700	2,725,614	3,270,689	3,946,001	4,173,906	4,779,316

Note: UNCTAD continuously updates its FDI numbers. Thus the numbers here for 2005 to 2010 may differ from those in the 2011 Report.

Sources: United Nations Conference on Trade and Development, UNCTADstat.

Exhibit 7.2. Inward FDI Flows into Selected Asian Economies, US\$ Millions

Economy	2006	2007	2008	2009	2010	2011	2012	1990-1996	1997-2012
China	72,715	83,521	108,312	95,000	114,734	123,985	121,080	159,388	1,177,261
Hong Kong	44,912	62,110	67,035	54,274	82,708	96,125	74,584	39,615	722,735
Singapore	36,700	46,972	12,200	24,939	53,623	55,923	56,651	49,278	425,733
Korea	9,047	8,961	11,195	8,961	10,110	10,247	9,904	8,195	120,297
Thailand	9,501	11,359	8,455	4,854	9,147	7,779	8,607	14,359	108,169
Malaysia	6,060	8,595	7,172	1,453	9,060	12,198	10,074	35,226	86,251
Indonesia	4,914	6,928	9,318	4,877	13,771	19,241	19,853	19,231	83,840
Viet Nam	2,400	6,700	9,579	7,600	8,000	7,430	8,368	8,075	64,392
Taiwan	7,424	7,769	5,432	2,805	2,492	(1,957)	3,205	9,195	47,024
Philippines	2,921	2,916	1,544	1,963	1,298	1,816	2,797	7,690	26,513
Mongolia	245	373	845	624	1,691	4,715	4,452	53	13,625
Asia	295,925	364,899	396,152	324,688	400,687	436,150	406,770	350,306	2,875,841

Source: United Nations Conference on Trade and Development, UNCTADstat.

Exhibit 7.3. Importance of FDI to Selected Asian Economies

Economy	1995-2005 average	2009	2010	2011
FDI flows as a percentage of gross fixed capital formation				
Hong Kong				
- Inward	73.9	130.3	173.5	180.5
- Outward	80.9	139.1	206.4	180.1
China				
- Inward	10.1	4.1	4.2	3.7
- Outward	1.1	2.5	2.5	2.2
Singapore				
- Inward	60.0	48.9	97.5	91.9
- Outward	34.7	47.2	46.1	43.1
East Asia				
- Inward	10.2	6.1	6.8	6.2
- Outward	5.7	5.2	6.6	5.6
World				
- Inward	11.1	9.6	10.2	10.5
- Outward	11.1	9.1	10.9	10.8
Stock of FDI as a percentage of GDP				
	1995	2010	2011	2012
Hong Kong				
- Inward	157.8	518.6	486.8	552.8
- Outward	54.7	463.5	464.1	509.1
China				
- Inward	13.4	9.9	9.9	10.3
- Outward	2.3	5.3	5.9	6.3
Singapore				
- Inward	75.4	261.1	240.8	252.3
- Outward	40.3	255.5	145.6	148.4
East Asia				
- Inward	21.3	25.7	23.2	24.8
- Outward	8.9	22.1	21.4	22.3
World				
- Inward	11.5	32.1	29.8	32.0
- Outward	12.6	33.3	30.6	33.1

Sources: United Nations Conference on Trade and Development database at current prices.

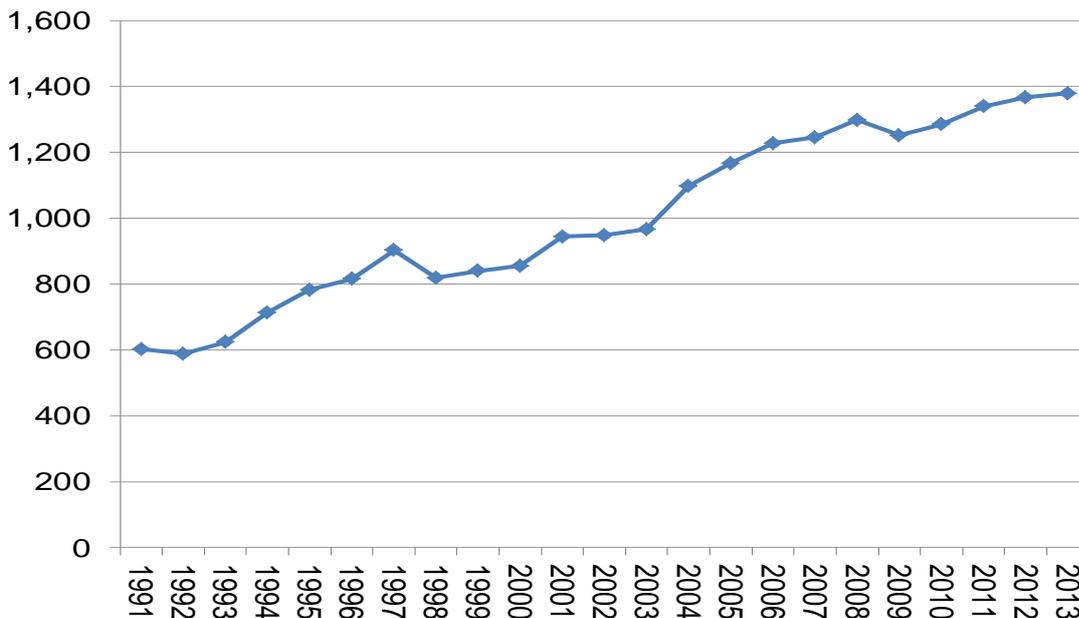
7.1.2. Hong Kong as a location for regional headquarters

Regional headquarters and regional offices of major multinational companies are particularly attractive to host cities. These investments usually bring senior decision makers and managers. They tend to result in sophisticated demand for support services, such as accounting services, financial services, legal services, communications services, and consulting services. They tend to attract high-end business visitors that spend in high-end hotels and restaurants. In other words, they have a disproportionately positive impact on a local economy. It should be noted that other studies of airport impacts have explicitly

identified attraction of regional headquarters as an impact of leadership in aviation services.⁴³

Hong Kong is by far the leading location for Asia or Asia-Pacific regional headquarters. The number of regional headquarters tracked by the Hong Kong Census and Statistics Department has grown from 602 in 1991 to just under 1,400 in 2013 (see Exhibit 7.4). The portion of Hong Kong multinational respondents to surveys undertaken by Enright, Scott & Associates, Ltd. (ESA) that indicated that their Hong Kong office was a regional headquarters or regional office (having jurisdiction over a significant set of economies other than Hong Kong) went from 49 percent in 1998 to 69 percent in 2007. It should be noted that four of the top 10 decision criteria for regional headquarters locations in the ESA survey were related to air transportation: proximity to potential customers, quality of transportation infrastructure, proximity to existing customers, and proximity to other regional markets (see Exhibit 7.5), indicating that air accessibility is critical for Hong Kong's ability to attract and retain regional headquarters operations. It is clear that Hong Kong would not be nearly so successful as a regional headquarters location without a world-class international airport.

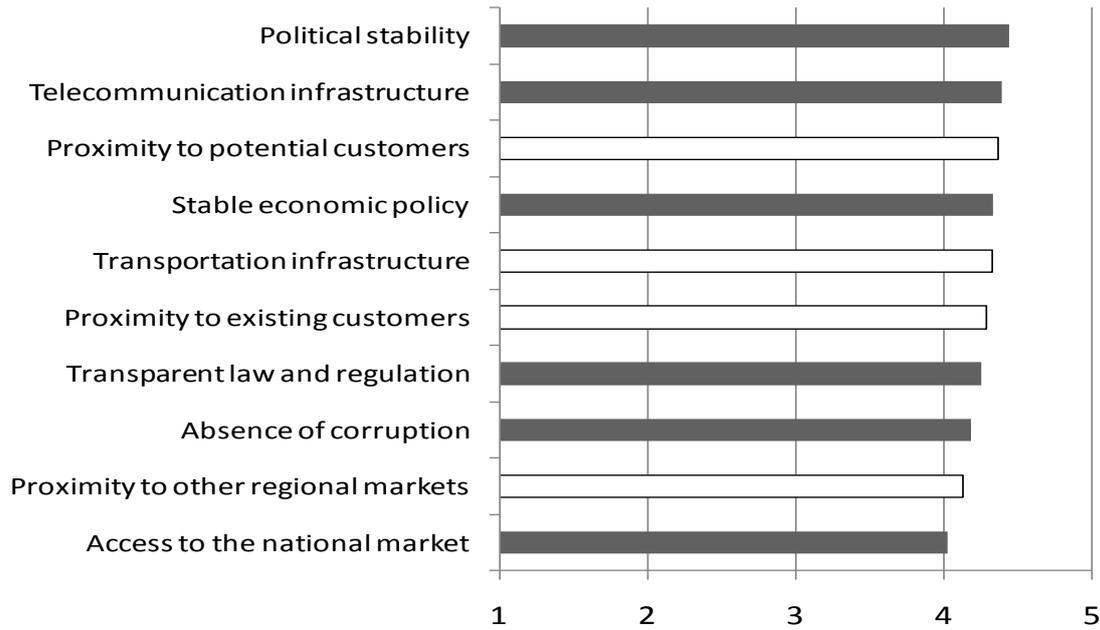
Exhibit 7.4. Number of Regional Headquarters of Foreign Multinationals in Hong Kong



Source: Hong Kong Census and Statistics Department.

⁴³ London Chamber of Commerce and Industry, *The Business Case for Airport Expansion*, 2006; URS, *The Economic Impact of Growth at Sydney Airport*, 2008; Oxford Economic Forecasting, *The Economic Contribution of the Aviation Industry to the UK*, 2006.

Exhibit 7.5. Leading Decision Criteria (out of 40) for Regional Headquarters Location



Source: Enright, Scott & Associates, Ltd., proprietary multinationals database.

7.1.3. Hong Kong as a centre for multinational business

Hong Kong is the leading location for the regional headquarters of major multinational corporations in the Asia-Pacific region. This reflects the high-level activities that the multinationals undertake in Hong Kong. A more detailed, activity-by-activity analysis underlines this conclusion (see Exhibit 7.6). It turns out that Hong Kong is most important to foreign multinationals as a location for regional corporate coordination and regional management functions. It is also important in a range of marketing and sales activities for the region. It is moderately important in terms of distribution, and is unimportant as a production and research and development location. These results show that the roles that Hong Kong plays for major multinational companies are linked tightly to activities that are relatively intensive in their use of air travel. It is hard to imagine that Hong Kong would have nearly so prominent a position in the strategies of multinational firms without a world-class international airport.

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Exhibit 7.6. The Importance of Hong Kong to the Parent Company in Performing Various Activities (1=Very Unimportant; 2=Unimportant; 3=Neutral; 4=Important; 5=Very Important)

Activity	Mean Response
Corporate Coordination	
Coordination of other operations within region	4.3
Supporting regional operations	4.2
Reporting regional activities to parent company	4.2
Regional liaison centre for parent company	4.1
Monitoring of other regional operations	4.1
Central Management Functions	
Regional Strategy Formulation	4.2
Competitor Intelligence	4.0
Senior personnel management	3.9
Business process development	3.8
Regional information technology management	3.6
Product/service development and design	3.5
Non-raw materials procurement	3.0
Finance and Accounting	
Accounting/auditing	3.7
Trade finance	3.6
Capital-investment finance	3.4
Insurance	3.3
Sales, Marketing, and Customer Service	
Marketing planning and execution	4.2
Sales planning and execution	4.2
Customer servicing and support	4.1
Sales and marketing related procurement	3.9
Market research	3.8
Distributional Activities	
Coordinating regional distribution	3.9
Order processing	3.8
Trade documentation	3.7
Warehousing finished goods	3.3
Air distribution	3.3
Sea distribution	3.3
Land distribution	3.2
Coordinating global distribution	3.1
Packaging	2.9
Production Activities	
Quality control	2.9
Testing/certification	2.8
Raw materials sourcing	2.8
Manufacturing	2.2
Assembly/processing	2.2
Research and Development	
New product development	3.0
Basic research	2.8
Process technology development	2.6
Applied research	2.5

Source: Enright, Scott & Associates, Ltd. proprietary multinationals database.

7.2. Major sectors of Hong Kong's economy

A wider view of Hong Kong's economy also suggests a major influence of air travel. Hong Kong's economy is very much oriented to international trade, international financial flows, international information flows, and international flows of people. The four key industries in Hong Kong, according to the Hong Kong Government, are the financial services sector, the trading and logistics sector, the tourism sector, and the professional and other producer services sector. These industries represented a combined 48 percent of Hong Kong's GDP in 1997 and 58 percent of GDP in 2012 (see Exhibit 7.7).⁴⁴ Each has substantial needs for air transport. This is clear for the tourism and the trading and logistics sectors. In the financial and professional service sectors, a significant portion of the business involves Hong Kong-based professionals serving clients, not just in Hong Kong, but in the Chinese Mainland and elsewhere in the Asia-Pacific region. As a result, these sectors are also sensitive to air transportation.

Financial and business services have explicitly been identified as heavy users of aviation services and as industries where location decisions are closely linked to the presence of world-class airports. While there is no direct evidence on the use of air travel by sector in Hong Kong, there has been a large scale survey of air transportation use by different sectors in the UK that provides interesting results. As can be seen in Exhibit 7.8, in the UK, banking and finance, insurance, communications, computer activities, and other business activities (a residual services category) had the largest share of aviation in total transportation demand. Insurance, extraction (mostly oil and gas in the UK), banking and finance, transport, and communications had the highest spend for employee on air travel.⁴⁵ Note that these heavy users of air transportation (with the exception of extraction) are disproportionately represented in Hong Kong's economy.

Looking at Hong Kong's "four key industries" alone, it is not hard to conclude that a substantial portion of the value added in these sectors is reliant upon, or related to, aviation in one way or another. The distinctive nature of Hong Kong's economy, plus its unique history and status, make it far more reliant on aviation than probably any other significant economy in the world.

⁴⁴ Hong Kong Census and Statistics Department, *The Four Key Industries in Hong Kong's Economy*, 2008.

⁴⁵ Oxford Economic Forecasting, *The Economic Contribution of the Aviation Industry in the UK*, 2006.

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Exhibit 7.7. Value Added in the Four Key Industries in Hong Kong's Economy

Value added at current prices (HK\$ Million)		1997		2012		
		Value added	% of GDP	Value added	% of GDP	
(1) Financial services		133,200	10.3	319,300	15.9	
	Banking	96,300	7.5	196,100	9.7	
	Insurance	11,100	0.9	59,300	2.9	
	Other financial services (e.g. stock brokerage, asset management, finance leasing and investment and holding companies)	25,800	2.0	63,900	3.2	
(2) Tourism		33,500	2.6	94,600	4.7	
	(A) Inbound	25,900	2.0	79,100	3.9	
	Retail trade	Retail trade	3,600	0.3	26,400	1.3
		Hotels and boarding houses	10,500	0.8	25,000	1.2
		Restaurants	3,100	0.2	9,100	0.5
		Cross-boundary passenger transport services	6,600	0.5	10,000	0.5
		Others	2,000	0.2	8,600	0.4
	(B) Outbound	7,700	0.6	15,400	0.8	
	Travel agents and airline ticket agents	Travel agents and airline ticket agents	3,000	0.2	6,000	0.3
		Cross-boundary passenger transport services	4,600	0.4	9,500	0.5
	(3) Trading and Logistics		282,400	21.9	495,400	24.6
	(A) Trading	233,500	18.1	428,200	21.3	
	Wholesale trade	Wholesale trade	14,000	1.1	18,200	0.9
		Import and export trade	219,500	17.0	410,100	20.4
	(B) Logistics	48,900	3.8	67,100	3.3	
	Freight transport and storage services	Freight transport and storage services	43,200	3.4	61,500	3.1
Postal and courier services		5,700	0.4	5,600	0.3	
(4) Professional Services and Other Producer Services		168,100	13.1	257,600	12.8	
	(A) Professional services	45,900	3.6	94,700	4.7	
	Legal, accounting and auditing services	Legal, accounting and auditing services	15,500	1.2	24,000	1.2
		Architectural, surveying, project engineering services; engineering and technical services; business management and consultancy services	20,000	1.6	40,100	2.0
		Other professional services (e.g. information technology related services, advertising services)	10,300	0.8	30,600	1.5
	(B) Other producer services	122,300	9.5	162,900	8.1	
Four Key Industries = (1)+(2)+(3)+(4)		617,200	47.9	1,166,800	58.0	

Source: Hong Kong Census and Statistics Department.

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Exhibit 7.8. Use of Aviation by Sector, UK, 2003

Sector	Share of air in sector's total transport demand		Spend per employee	
	(%, 2003)	Rank	(£, 2003)	Rank
Banking and finance	37.2	1	1,694	3
Insurance	27.4	2	2,238	1
Communications	24.4	3	895	5
Computer activities	23.8	4	193	14
Other business activities (services)	21.7	5	257	11
R & D	17.6	6	133	20
Other means of transport	14.6	7	219	13
Basic metals	12.4	8	136	19
Extraction	11.8	9	1,998	2
Real estate and renting	10.9	10	229	12
Precision and optical instruments	10.8	11	176	16
Hotels & catering	10.1	12	74	28
Coke, petroleum, and nuclear fuel	9.6	13	543	6
Paper, printing, publishing	9.3	14	374	7
Non-market services	8.4	15	63	30
Electronic equipment	7.8	16	161	18
Motor vehicles, parts, and accessories	7.0	17	272	9
Computers and office equipment	6.6	18	193	14
Electrical engineering	6.6	18	165	17
Construction	5.6	20	44	31
Transport	5.2	21	1,211	4
Other manufacturing	5.0	22	110	23
Mechanical engineering	4.4	23	93	26
Other chemicals	4.3	24	372	8
Metal products n.e.c	3.7	25	69	29
Textiles, leather, and clothing	3.6	26	89	27
Pharmaceuticals	3.0	27	121	22
Rubber and plastics	2.9	28	98	25
Non-metallic mineral extraction	2.8	29	267	10
Distribution	2.4	30	132	21
Agriculture, forestry, and fishing	2.2	31	22	32
Food, beverages, and tobacco	2.0	32	101	24
Electricity, gas, and water	1.4	33	17	33
Wood and wood products	0.0	34	0	34

Source: Oxford Economic Forecasting.

The impact of air cargo services and related activities is estimated above under aviation-facilitated trade. However, it should also be noted that even trade that does not travel by air is often facilitated by aviation. For example, the Hong Kong Trade Development Council has estimated that 13 percent of the new export orders of Hong Kong firms (Hong Kong-owned entities and Hong Kong operations of foreign firms) in 2007 were attributable to Hong Kong trade fairs.⁴⁶ Roughly two-thirds of the 740,000 international visitors estimated by the Hong Kong Tourism Board to have attended Hong Kong trade fairs in 2006 arrived by air. Surveys of attendees and exhibitors of Hong Kong trade fairs indicate that air connectivity is a critical feature for the location of a trade fair and that Hong Kong has far better connectivity than Guangzhou or Macau, regional competitors in the trade fair industry (see Exhibit 7.9).⁴⁷ Hong Kong's trade is also facilitated by the countless marketing calls, sales visits, and other meetings that require international air travel. Thus the impact of aviation on Hong Kong's trade is likely to be significantly understated by the aviation-facilitated trade estimates above.

⁴⁶ Hong Kong Trade Development Council, *Contribution of Trade by Hong Kong Trade Fairs*, 2008.

⁴⁷ Business Strategies Group (BSG), *Study on Trends in the Global Trade Fair Industry*, 2007.

Exhibit 7.9. Important Features and Visitor Satisfaction, Trade Fair Locations

Factor	Importance To Visitors	Hong Kong Rating	Guangzhou Rating	Macau Rating
Personal safety	8.13	8.31	6.76	6.90
Quality of Fair Organiser	8.10	8.14	7.06	6.01
Prevalence of English Language	7.85	8.26	6.03	6.33
Ease of Local Travel	7.36	8.20	6.89	6.14
Air Connectivity	7.30	8.31	7.08	6.15
Facilities of Venue	7.19	7.68	6.59	6.05
Transportation Cost	7.17	7.08	7.11	6.21
Tax and Legal Systems	7.17	7.72	6.58	6.09
Availability of Good Quality Hotels	7.12	7.68	6.84	6.78
Availability of Hotels at My Price Point	6.94	6.59	6.75	6.34
Import/ Export Duties of Host	6.77	7.47	6.53	6.16
Proximity to Supplier Factories	6.55	6.48	7.08	5.51
Shopping Facilities Near Venue	5.34	7.02	5.87	5.38
Entertainment Facilities Near Venue	5.17	6.71	5.77	6.19
Overall Rating as Trade Fair Host		8.07	6.94	5.94

Note: Ratings on a 0-10 scale.

Source: Business Strategies Group.

A 2006 survey by the Hong Kong Trade Development Council (HKTDC) indicates that Hong Kong manufacturing and trading companies that have their production activities in the Chinese Mainland still retain the bulk of their highest value activities in Hong Kong. These include the headquarters functions; finance and accounting; sales and marketing; overall management and planning; logistics, warehouse, shipping, and consolidation; trade financing and insurance arrangement; and others (see Exhibit 7.10).⁴⁸ The result is that Hong Kong gains significant value, even if the manufacturing does not take place in Hong Kong, and in many cases even when the physical goods never touch Hong Kong. Again, it is hard to imagine that Hong Kong would have such a strong role in management functions for export-oriented industries without a strong aviation sector.

⁴⁸ Hong Kong Trade Development Council, *Development and Contribution of Hong Kong's Manufacturing and Trading Sector*, 2006.

Exhibit 7.10. Hong Kong and Mainland China Activities of Hong Kong Exporters

Activity	Performed in Hong Kong (% of Respondents)	Performed in the Chinese Mainland (% of Respondents)
Trade documentation	92.3	63.0
Finance and accounting	91.0	53.2
Sales and Marketing	89.4	44.9
Overall management and planning	84.8	51.1
Logistics, warehousing, shipping and consolidation	82.5	73.2
Trade financing / insurance arrangement	82.3	31.3
Purchasing of raw materials	71.8	74.8
Human resources	69.0	62.9
Product design and development	67.7	55.9
Management and coordination of production	53.0	74.4
Quality control	50.6	79.8
Manufacturing	20.7	79.2

Note: Totals add to more than 100 percent because many companies perform some activities both in Hong Kong and the Chinese Mainland.

Source: Hong Kong Trade Development Council.

7.3. Additional considerations

While we have focused mainly on identifiable business impacts of aviation services, and therefore of the HKIA, on Hong Kong, we must remember that the impact is far more pervasive than the business impacts would indicate. One can pose the much more general question, “What would Hong Kong look like today if it did not have an airport?” or “What would Hong Kong look like today if it did not have a world-class international airport?” Historically, Hong Kong’s main international connections were by sea. Even today, the vast majority of the volume of Hong Kong’s international trade is shipped by sea. However, aviation became the dominant means of international passenger transport in the 1960s and 1970s. The presence of the airport permitted the further growth of trade, financing, business services, and headquarters activities in Hong Kong which stimulated demand for jobs in these professions, their supporting services, and in the general economy. At that time, if Hong Kong did not have an airport, it would have been largely cut off from international and regional passenger traffic, making Hong Kong a far less attractive business hub, and, therefore less attractive for immigrants and others. There is no way of telling what Hong Kong’s population and GDP would be today if it did not have an international airport, but it is safe to say that both would be significantly lower.

7.4. Summary on broader catalytic impacts

In addition to the difficulties of carrying out a standard catalytic economic impact of aviation services in Hong Kong that arise from data limitations, the standard analysis is inherently a marginal analysis that cannot provide estimates of the impact of HKIA on Hong Kong as a whole. If the comparison is between having HKIA in its present form and having no airport at all, or a substandard airport, then the economic impact of HKIA is massive and would not be properly estimated by standard methods.

For example, if Hong Kong did not have an airport, it would be a far different place than it is today. Hong Kong is not just another city in just another country. For most of its history, the option of using “the next airport over” was not a viable option. Without an international airport, Hong Kong would have been limited to connectivity by land and by sea. There is no

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way that under such conditions Hong Kong would have developed into the business hub it is today. Without an airport, Hong Kong would have been a far less attractive place for people and for business. Without an airport, Hong Kong's population would not have reached its present level, nor would its economy be nearly so well-developed. These are not minor marginal effects. These are major effects that cannot be estimated by marginal methods.

In financial services, it would be hard to imagine that Hong Kong would have won a role as an international financial centre without a major international airport. Without a major international airport, Hong Kong's financial sector would probably consist of local banking operations coupled with some trade finance. Investment banking activities, venture capital activities, loan syndication activities, private equity, and all other forms of financial activity that require international travel would have either never developed, or developed to a much lower level than today. Without good international connectivity, it is inconceivable that Hong Kong would have emerged as the leading centre for Asia and Asia-Pacific regional headquarters of major multinational corporations. In fact, it is hard to imagine that any such headquarters would have developed in Hong Kong. With much smaller financial and headquarters sectors, Hong Kong's professional service sector would be much smaller than it is now.

Without international connectivity, Hong Kong's trading sector would be a shell of its present self. Hong Kong would have never developed into a trade fair centre, an access point for the Canton Fair, or a location for international buying and sourcing offices. This, in turn, would have affected the development of Hong Kong manufacturing firms as well as sea and land transportation. Hong Kong managers and traders would not have been able to travel to visit foreign customers or suppliers nearly so easily. Nor would foreign customers or investors into South China have been able to access Hong Kong or the Pearl River Delta region so easily.

Oxford Economics has estimated that the "supply-side" catalytic impact of aviation services in Europe (productivity and investment impacts beyond the impacts on tourism and trade) equals approximately 4 percent of regional GDP.⁴⁹ Given the much larger than average impact of aviation on Hong Kong described above, we would expect that this additional benefit would be well beyond 4 percent of GDP. In fact, if the relevant ratios hold for this "other" impact, we would expect it to be twice that seen in Europe, or even higher.

⁴⁹ Oxford Economic Forecasting, *The Economic Catalytic Effects of Air Transport in Europe*, 2002.

8. Construction and maintenance costs impacts

This section provides information on the projected capital costs for the Status Quo Situation, Scenario 1 and 2 investment programmes as well as the economic impacts associated with the construction activities of these programmes. For Scenarios 1 and 2, the capital costs reported here include incremental cost associated with building new infrastructure under each scenario plus incremental costs associated with maintaining the new infrastructure created under each scenario. The capital cost projections were generated by the AA's Consultants and have not been independently verified by ESA. The construction phases would have their own economic impacts on Hong Kong. These impacts have not been factored into the economic benefit calculations in the present Study.

8.1. Status Quo Situation

In the Status Quo Situation, the majority of investment is in maintenance of the existing facilities with a portion attributed to the creation of new infrastructure that expands capacity.

Exhibit 8.1 reports the investment costs for the Status Quo Situation along with the indirect, induced, and total economic impacts of the expenditures.

Exhibit 8.1. Status Quo Economic Impacts of Construction and Maintenance

Impact	Revenue (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	4,495	6,965	10,260	10,854	20,992	22,279	75,845
Indirect	3,122	4,838	7,126	7,539	14,580	15,474	52,679
Induced	1,058	1,639	2,414	2,554	4,940	5,243	17,848
Total	8,675	13,442	19,800	20,947	40,511	42,996	146,373
	Value Added (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	1,373	2,128	3,134	3,315	6,412	6,805	23,166
Indirect	544	843	1,242	1,314	2,541	2,697	9,181
Induced	579	897	1,321	1,397	2,702	2,868	9,763
Total	2,496	3,867	5,696	6,026	11,655	12,370	42,111
	Employees (Total Person-years)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	2,027	3,141	4,627	4,895	9,467	10,047	34,204
Indirect	961	1,489	2,193	2,320	4,488	4,763	16,214
Induced	1,320	2,046	3,013	3,188	6,165	6,543	22,274
Total	4,308	6,676	9,833	10,403	20,119	21,353	72,692

Note: Note: All dollar values are in 2012 dollars. Values given for each period represent the total over these periods and not an annual value. Construction completed by 2015 with maintenance expenditure continuing on to 2061.

Source: Airport Authority of Hong Kong data, Enright, Scott & Associates, Ltd. analysis.

8.2. Scenario 1

In Scenario 1, the majority of incremental construction over the Status Quo Situation is projected to occur over the period 2012 to 2019. The main construction work is concerned with the provision of mid-field facilities and general improvements to the capacity of the two runway configuration. This work includes the Midfield Developments (Phase I, Phase 2, and Remaining Midfield Area Development), Automated People Mover (APM) Depot Underground Structure, Terminal 1 Annex Building, Intermodal Transfer Terminal, New Western Apron, Multi-storey Carpark (CP1), and North Commercial Area (NCD) Landlord Provisions, among others. The total incremental construction costs for the Scenario 1 investment programme are projected to be HK\$28,908 million.⁵⁰ Exhibit 8.2 reports these costs as the direct revenue for the construction associated with Scenario 1 along with the indirect, induced, and total economic impacts of the expenditures.

Exhibit 8.2. Scenario 1 Economic Impacts of Incremental Construction

Impact	Revenue (HK\$ millions)						Total
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	
Direct	27,350	1,558	-	-	-	-	28,908
Indirect	18,996	1,082	-	-	-	-	20,078
Induced	6,436	367	-	-	-	-	6,803
Total	52,783	3,007	-	-	-	-	55,790
	Value Added (HK\$ millions)						Total
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	
Direct	8,354	476	-	-	-	-	8,830
Indirect	3,311	189	-	-	-	-	3,499
Induced	3,521	201	-	-	-	-	3,721
Total	15,185	865	-	-	-	-	16,050
	Employees (Person-years)						Total
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	
Direct	12,334	703	-	-	-	-	13,037
Indirect	5,847	333	-	-	-	-	6,180
Induced	8,032	458	-	-	-	-	8,490
Total	26,213	1,493	-	-	-	-	27,707

Note: Note: All dollar values are in 2012 dollars. Values given for each period represent the total over these periods and not annual values. Construction is assumed completed by 2019.

Source: Airport Authority of Hong Kong data; Enright, Scott & Associates, Ltd. analysis.

Maintenance costs for assets created under Scenario 1 start from year 2012 and are incurred as long as the assets remain operational. For the purpose of the 50 year economic benefit analysis annual maintenance expenditure is extended out to 2061 at levels similar to

⁵⁰ Figures include 2012 spend of HK\$2,288 million, 2013 HK\$ 3,917 million, and 2014 to 2019 HK\$22,703 million. All figures in 2012 HK dollars.

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2046 levels (the last year for which the AA supplied whole year data). Average annual expenditure on maintenance over the 50 year period 2012 to 2061 inclusive are projected to be HK\$1,006 million; total expenditure are projected to be HK\$50,310 million. Exhibit 8.3 reports these costs as the direct revenue for the construction and maintenance associated with Scenario 1 along with the indirect, induced, and total economic impacts of the expenditures.

Exhibit 8.3. Scenario 1 Economic Impacts of Incremental Construction and Maintenance

Impact	Revenue (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	27,350	1,880	1,502	3,866	14,728	29,892	79,218
Indirect	18,996	1,306	1,043	2,685	10,230	20,762	55,022
Induced	6,436	442	353	910	3,466	7,034	18,642
Total	52,783	3,628	2,899	7,460	28,424	57,689	152,882
	Value Added (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	8,354	574	459	1,181	4,499	9,130	24,196
Indirect	3,311	228	182	468	1,783	3,619	9,590
Induced	3,521	242	193	498	1,896	3,848	10,197
Total	15,185	1,044	834	2,146	8,177	16,597	43,983
	Employees (Person-years)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	12,334	848	677	1,743	6,642	13,481	35,726
Indirect	5,847	402	321	826	3,149	6,390	16,936
Induced	8,032	552	441	1,135	4,325	8,778	23,264
Total	26,213	1,802	1,440	3,705	14,116	28,650	75,925

Note: Note: All dollar values are in 2012 dollars. Values given for each period represent the total over these periods and not an annual value. Construction is assumed completed by 2019 with maintenance expenditure continuing on to 2061.

Source: Airport Authority of Hong Kong data, Enright, Scott & Associates, Ltd. analysis.

8.2. Scenario 2

In Scenario 2, the majority of incremental construction is projected to occur over the period 2012 to 2023. The initial construction work is concerned with the provision of mid-field facilities and general improvements to the capacity of the two runway configuration and is identical to that carried out in Scenario 1. However in Scenario 2 a third runway is constructed as well. Construction costs related to the two runway configuration are identical to that in Scenario 1 at HK\$28,908 million. The construction costs of the third runway include HK\$4,820 million in initial provisioning works plus HK\$120,997 million for the main construction work. The incremental construction expenditure for Scenario 2 (over the Status Quo Situation) therefore equals HK\$154,726 million.⁵¹ Exhibit 8.4 reports these costs as the

⁵¹ All figures in 2012 HK dollars.

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direct revenue for the incremental construction associated with Scenario 2 along with the indirect, induced, and total economic impacts of the expenditures.

Exhibit 8.4. Scenario 2 Economic Impacts of Incremental Construction

Impact	Revenue (HK\$ millions)						Total
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	
Direct	104,807	49,919	-	-	-	-	154,726
Indirect	72,795	34,672	-	-	-	-	107,466
Induced	24,664	11,747	-	-	-	-	36,411
Total	202,266	96,338	-	-	-	-	298,603
	Value Added (HK\$ millions)						Total
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	
Direct	32,012	15,247	-	-	-	-	47,259
Indirect	12,687	6,043	-	-	-	-	18,730
Induced	13,491	6,426	-	-	-	-	19,917
Total	58,191	27,716	-	-	-	-	85,907
	Employees (Person-years)						Total
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	
Direct	42,872	17,721	-	-	-	-	60,593
Indirect	22,406	10,672	-	-	-	-	33,078
Induced	30,779	14,660	-	-	-	-	45,438
Total	96,057	43,053	-	-	-	-	139,110

Note: Note: All dollar values are in 2012 dollars. Values given for each period represent the total over these periods and not an annual value. Construction is assumed completed by 2023.

Source: Airport Authority of Hong Kong data, Enright, Scott & Associates, Ltd. analysis.

Maintenance expenditures for assets created under Scenario 2 start from year 2012 and recur annually for as long as the assets remain operational. For the purpose of the 50 year economic benefit analysis annual maintenance expenditure is extended out to 2061 at levels similar to 2046 levels (the last year for which the AA supplied data). Average annual expenditure on maintenance over the 50 year period 2012 to 2061 inclusive is HK\$1,919 million; total expenditure is HK\$95,942 million.

Exhibit 8.5 reports these costs as the direct revenue for the construction and maintenance associated with Scenario 1 along with the indirect, induced, and total economic impacts of the expenditures.

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Exhibit 8.5. Scenario 2 Economic Impacts of Incremental Construction and Maintenance

Impact	Revenue (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	104,807	50,241	1,603	4,714	32,837	56,467	250,668
Indirect	72,795	34,895	1,113	3,274	22,807	39,219	174,104
Induced	24,664	11,823	377	1,109	7,727	13,288	58,989
Total	202,266	96,959	3,094	9,097	63,372	108,974	483,761
	Value Added (HK\$ millions)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	32,012	15,346	490	1,440	10,030	17,247	76,564
Indirect	12,687	6,082	194	571	3,975	6,835	30,344
Induced	13,491	6,467	206	607	4,227	7,269	32,267
Total	58,191	27,895	890	2,617	18,232	31,351	139,175
	Employees (Person-years)						
	2012 to 2020	2021 to 2025	2026 to 2030	2031 to 2035	2036 to 2046	2047 to 2061	Total
Direct	42,872	17,866	723	2,126	14,809	25,465	103,861
Indirect	22,406	10,741	343	1,008	7,020	12,072	53,588
Induced	30,779	14,754	471	1,384	9,643	16,583	73,614
Total	96,057	43,361	1,536	4,518	31,472	54,119	231,063

Note: Note: All dollar values are in 2012 dollars. Values given for each period represent the total over these periods and not an annual value. Construction assumed completed by 2023 with maintenance expenditure continuing on to 2061.

Source: Airport Authority of Hong Kong data, Enright, Scott & Associates, Ltd. analysis.

9. Study Conclusions

There are several main conclusions that come out of the present Study.

HKIA at present generates enormous economic value for Hong Kong.

According to our economic impact estimates, the combined direct, indirect, and induced value added impact of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA was HK\$94,241 million in 2012, equivalent to 4.6 percent of Hong Kong's GDP. The relevant employment impact was 148,158 people employed, equivalent to 4.1 percent of Hong Kong's total employment in that year. Depending on whether outbound tourism is included as well as inbound tourism and whether the total catalytic effect (direct, indirect, and induced contributions of catalytic tourism and trade) is included or just the direct catalytic effect, the value added impact estimates when catalytic effects are included ranged from HK\$155,011 million to HK\$355,319 million in 2012, or equivalent to between 7.6 and 16.5 percent of Hong Kong's 2012 GDP. The estimates of the associated employment impacts ranged from 226,531 to 590,090, or from 6.2 to 16.1 percent of Hong Kong's total employment.

The contribution of HKIA goes far beyond those that can be quantified.

Despite the very large estimates, we believe the contribution of HKIA goes far beyond those that can be readily estimated. Without aviation services Hong Kong would not be a major trading centre, financial centre, or business management centre. Without HKIA we doubt Hong Kong would be a leader in international investment, an important location of multinational companies, or a leading regional headquarters location. While it is impossible to estimate the impact precisely, aviation services are closely linked with the four key industries in Hong Kong's economy: financial services, trading and logistics, tourism, and professional and producer services, which together accounted for approximately 58 percent of Hong Kong's GDP in 2012.

HKIA's future contribution depends on future investment decisions.

If limited to the Status Quo Situation, based on throughput projections supplied to us by AA's Consultants, and if impacts associated only with aviation-related businesses in Hong Kong and non-aviation businesses at HKIA are taken into account, then the projected value added contribution of HKIA in 2030 is HK\$95,889 million or 2.6 percent of forecast GDP in that year. If the total catalytic impact of tourism and trade is included (in the "Inbound Tourism only" case) the figure for the Status Quo Situation would be HK\$358,074 million (9.6 percent of projected GDP). In the "Net Tourism" case, the figure for the Status Quo Situation would be HK\$271,711 million (7.3 percent of projected GDP).

In Scenario 1, in which capacity of the two runway configuration is expanded, impacts associated with aviation-related businesses in Hong Kong and non-aviation businesses at HKIA are projected to reach a value added of HK\$133,027 million in 2030, or 3.6 percent of forecast GDP in that year. When total catalytic tourism and trade impacts are also factored in, value added is projected to reach HK\$495,692 million (13.2 percent of projected GDP) in 2030 for the "Inbound Tourism only" case and HK\$409,329 million (10.9 percent of projected GDP) for the "Net Tourism" case.

In Scenario 2, in which capacity of the two runway configuration is expanded and a new third runway is built, impacts associated with aviation-related businesses in Hong Kong and non-aviation businesses at HKIA are projected to reach a value added of HK\$184,022 million, or

4.9 percent of projected GDP in 2030. When total catalytic tourism and trade impacts are factored in, value added is projected to reach HK\$705,996 million (18.9 percent of projected GDP) in 2030 for the “Inbound Tourism only” case and HK\$619,632 million (16.5 percent of projected GDP) in the “Net Tourism” case.

The results indicate that the investment programme termed Scenario 1 would enable HKIA to make a much larger contribution to Hong Kong than in the Status Quo Situation and that the investment programme termed Scenario 2 would make a much larger contribution to Hong Kong than in Scenario 1.

The projected net economic impacts of Scenario 1 and Scenario 2 are both strongly positive, with the impacts of Scenario 2 (which includes a third runway) being much higher.

Our analysis leads us to project that by 2030 the net economic impact from operations of the investment associated with Scenario 1 compared with the Status Quo Situation including only impacts associated with aviation-related businesses in Hong Kong and non-aviation businesses at HKIA would reach on the order of HK\$37,138 million in value added (1.0 percent of projected GDP) and 58,589 in employment. If the total catalytic impact of tourism and trade is included, the value added impact in 2030 is projected to be HK\$137,620 (3.7 percent of projected GDP) and the employment impact 241,868.

For Scenario 2, the net economic impacts from operations associated with aviation-related businesses in Hong Kong and non-aviation businesses at HKIA compared with the Status Quo Situation would reach on the order of HK\$88,134 million in value added in 2030 (2.4 percent of projected GDP) and 138,589 in employment. If the total catalytic impact of tourism and trade is included, the value added impact in 2030 is projected to be HK\$347,925 (9.3 percent of projected GDP) and the employment impact 609,710.

The net value added impact in both scenarios is strongly positive, with the impact of Scenario 2 just around two and a half times that of Scenario 1 in 2030.

The projected Economic Internal Rate of Return and Economic Net Present Value indicate that between Scenario 1 and Scenario 2 an investment in Scenario 2 would ultimately have the larger economic payoff.

The results of Economic Internal Rate of Return (EIRR) and Economic Net Present Value (ENPV) calculations show strongly positive ENPVs and EIRRs for the two scenarios versus the Status Quo Situation. Even if only the direct impact of aviation-related businesses in Hong Kong and non-aviation businesses at HKIA are factored into the analysis, Scenario 1 gives an ENPV of HK\$314,739 million with an EIRR of 106 percent, and Scenario 2 gives an ENPV of HK\$525,722 million with an EIRR of 27 percent. If the indirect and induced impacts of aviation-related businesses in Hong Kong and non-aviation business at HKIA are taken into account, the Scenario 1 versus Status Quo Situation ENPV rises to HK\$591,214 million and the EIRR to 285 percent. The Scenario 2 versus Status Quo ENPV rises to HK\$1,045,637 million and the EIRR to 269 percent. This is not even including any impact for aviation-facilitated tourism or trade. When the full impact of aviation-facilitated tourism and trade are taken into account, Scenario 1 yields a projected EIRR of 1,164 percent and a projected ENPV of HK\$2,243,271 million over the Status Quo Situation, and Scenario 2 yields a projected EIRR of 1,163 percent and a projected ENPV of HK\$4,447,187 million over the Status Quo Situation.

Scenario 1 (Direct + Indirect + Induced) has a higher EIRR than Scenario 2 largely because of the large investment required to construct a third runway in Scenario 2 and the fact that the projected benefits are farther into the future. Scenario 1 benefits in this regard from the

fact that it leverages the already large investments that have been made to develop the existing two runway configuration. The high EIRRs, particularly for Scenario 1, are due in part to the fact that significant leverage can be achieved with the existing asset and benefits can be readily realized from the second year of investment. However, if the magnitude of the returns exceeds the amount that can be re-invested in the project and the IRR is high by comparison to rates of return available in the market, then the assumption that all the returns can be re-invested at the same rate as the IRR is false and the estimated IRR may not be a good measure for project evaluation. In any case, if the IRR (EIRR) and the NPV (ENPV) give different answers in the evaluation of mutually exclusive projects, the correct answer is by NPV (ENPV).

The ENPVs in Scenario 2 are around approximately twice those of Scenario 1, indicating that Scenario 2 has the greater long term economic payoff. They also indicate substantial foregone economic benefits if Scenario 1 is put in place rather than Scenario 2.

Delays would reduce the positive economic benefits as measured by ENPV of Scenario 2, which includes a third runway.

Delays in opening a third runway in Scenario 2 would reduce the overall economic benefits to Hong Kong. In essence the reduced ability to serve demand in the early years of a third runway would forego benefits that could not subsequently be recaptured. For aviation-related businesses in Hong Kong and non-aviation businesses at HKIA (excluding catalytic impacts) the costs associated with a delay in opening a third runway are estimated to range from HK\$15.3 billion in ENPV for a one year delay to HK\$68.6 billion in ENPV for a five year delay.

While other, non-economic issues must be addressed, there would appear to be a very strong economic case for expanding capacity at HKIA.

What does this mean for HKIA? Obviously, there are a range of non-economic issues, such as the impact on the environment that would have to be taken into account in the context of capacity expansion. These are being taken into account through the environmental impact assessment process. However, from an economic impact standpoint, and given the throughput and capital cost forecasts we have been provided, the economic benefit projections identified in this Report clearly show a sufficiently high return on investment to Hong Kong so that plans to expand capacity should proceed. Given the long lead time for approvals and for the construction process, time is of the essence so that Hong Kong will not face years of delays that might deny Hong Kong the economic benefits associated with meeting projected demand, erode Hong Kong's enviable position as a major aviation centre, and hinder Hong Kong's further development as a major Chinese and international business centre.

- End of Main Document -

Appendix A. Methodologies and data sources

This Section describes the details of how the economic impact analysis is implemented in the present Study. First, it describes the methods behind the estimation of the current economic impact of HKIA and related businesses on Hong Kong's economy. Second, it describes how future economic impacts and the specific case for the Investment Scenario are addressed. Third, it describes the methods used to carry out the net economic-cost benefit analysis.

The economic impact of HKIA is estimated for year 2012 to correspond with the AAHK study brief and currently available economic data. For future economic impact projections, year 2012 is used as the base year from which projections are scaled. Note Hong Kong statistical data for year 2012 now follows *Hong Kong Standard Industrial Classification (HSIC) Version 2.0*, and the data used is coded to this revised standard. All data inputs are updated to that available in May 2014. For the year 2012 and onwards all dollar values are quoted in 2012 dollars.

A.1. Present HKIA economic impact

The present economic impact consisted of five major components. First, the direct, indirect, and induced impacts of aviation-related industries in Hong Kong are estimated. Second, estimates are made of the direct, indirect, and induced impacts of other businesses at HKIA (on Chek Lap Kok, the airport island). Third, estimates are made for the impact of aviation-facilitated tourism, both for inbound tourism and net tourism. Fourth, estimates are developed for the impact of trade facilitated by HKIA. Fifth, areas of additional, but non-quantifiable impacts are identified and rough indicators of their importance to the Hong Kong economy are described where possible.

A.1.1. Aviation businesses in Hong Kong and non-aviation businesses at HKIA direct impacts

A.1.1.1. Aviation-related businesses in Hong Kong

Direct impacts from aviation-related businesses in Hong Kong result from the revenues, value added, and employment in aviation-related sectors in Hong Kong. The core assumption made is that these businesses would not exist without the presence of the Hong Kong International Airport (HKIA). The direct aviation-related businesses identified for the present Study correspond with the Hong Kong Census and Statistics Department (HKCSD) category "Air Transport and Incidental Services." This category includes Hong Kong-based airlines and helicopter companies, the local representative offices of overseas airline companies, air cargo forwarding services, and supporting services to air transport (including HKIA). The revenue, value added, and employment figures for this category will be taken directly from HKCSD data.⁵² It should be noted that a significant portion of the activities of the aviation-related businesses take place outside of HKIA itself.

As Exhibit A1.1 shows, the years 2008 and 2009 were atypical for Hong Kong's air transport sector when compared to the years immediately preceding. In 2008, revenue rose substantially, but value added fell, due in part to high fuel prices. In 2009, in the midst of a global economic slowdown,

⁵² Hong Kong Census and Statistics Department, direct communication.

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revenue and value added fell to approximately 2005 levels. A spike in fuel prices is again observed for 2011 and 2012, this time however revenues increased with fuel prices giving similar ratios of value added to revenue and employment to revenue as those observed pre 2008.

Exhibit A1.1. Air Transport and Incidental Services Statistics in Hong Kong

Air Transport	2005	2006	2007	2008	2009	2011	2012
Revenue (HK\$m)	177,985	189,351	206,055	223,835	173,085	225,207	222,209
Value added (HK\$m)	39,410	38,360	41,868	27,116	38,182	48,532	49,028
Number of employees (persons)	47,233	49,912	54,742	56,988	56,115	55,696	56,694
Compensation of employees (HK\$m)	16,582	17,699	19,331	20,353	20,382	24,156	25,655
Fuels (HK\$m)	18,223	22,953	24,829	47,018	17,438	42,771	43,706
Crude Oil (US\$ average per barrel)	50.0	58.3	64.2	91.5	53.5	87.0	86.5
Proportion of Revenue							
Value added	22%	20%	20%	12%	22%	22%	22%
Compensation of employees	9%	9%	9%	9%	12%	11%	12%
Fuels	10%	12%	12%	21%	10%	19%	20%

Note: Industry code 7170, 7171, 7172, and 7182 (for HSIC v1.1) in year 2000 to year 2008, and industry code 5101, 5102, 5109, 5223, and 522901 (for HSIC v2.0) in year 2009

Source: Direct communication with HKCSD, <http://www.inflationdata.com>.

A.1.1.2. Non-aviation businesses at HKIA

In addition to aviation-related businesses, there are a number of other businesses at HKIA and on Chek Lap Kok. These include retail, food and beverage, and hotels at the airport itself, as well as the exhibition and convention businesses at AsiaWorld-Expo. In order to estimate the direct impact of the retail and food and beverage businesses, data on the revenues and employment of the relevant businesses at HKIA is obtained from the AA. These figures are adjusted by removing estimates of the spending of Hong Kong residents (assumed to match the share of Hong Kong residents in passengers served by HKIA). The reason is that it can be argued that in the absence of HKIA, retail and food and beverage spending by Hong Kong residents at HKIA would go to retail and food and beverage outlets elsewhere in Hong Kong and therefore HKIA is not responsible for new spending accruing to Hong Kong by these passengers. To the extent that a full 100 percent of this expenditure would not actually occur in the absence of HKIA, the estimate will be conservative. Direct value added and employment for these sectors is estimated by applying the value added to revenue and employment to revenue ratios for these sectors reported by HKCSD⁵³ to the adjusted revenues at HKIA.

For hotels on the airport island, including the five-star Regal Airport Hotel and the five-star SkyCity Marriot Hotel, expected hotel revenue is calculated by multiplying the average occupancy rate for five-star hotels in Hong Kong by the five-star hotel average annual revenue per room⁵⁴ and by the number of rooms in each hotel.⁵⁵ Value added and

⁵³ Hong Kong Census and Statistics Department, Website Table 90: Selected Statistics for All Establishments in the Industry Sections of Import/Export, Wholesale and Retail Trades, and Accommodation and Food Services.

⁵⁴ Hong Kong Hotels Association and Hong Kong Tourism Board, *Summary of the Hong Kong Hotel Industry Review*, 2012

⁵⁵ Regal Airport Website and Airport Authority of Hong Kong,

employment is estimated by applying to the estimated revenues the value added to revenue and employment to revenue ratios reported for the hotel industry by HKCSD.⁵⁶

Revenues for the exhibition and convention business is taken to equal the industry organizer expenditure at AWE.⁵⁷ Expenditures by exhibitor and delegate staff attending the events is not estimated as we assume that these will be picked up in the hotel, retail, and food and beverage figures for HKIA as well as in the general catalytic tourism impacts described below. As HKCSD does not provide a specific category analogous to the exhibition and convention industry, value added and employment are estimated by using the ratios of value added to revenue and employment to revenue for HKCSD's "Administrative and support service activities" category.⁵⁸

A.1.2. Catalytic "direct" impacts

Although the economic impacts of aviation-facilitated tourism and trade are properly termed "catalytic" impacts, these impacts also have their direct, indirect, and induced components.

A.1.2.1. Aviation-facilitated tourism impacts

Tourism can be classified into two categories, the export of tourism services (resulting from the spending of inbound visitors to Hong Kong), and the import of tourism services (resulting from the spending of outbound Hong Kong residents abroad). Tourism exports result in a revenue, value added, and employment gain to the Hong Kong economy, while imports result in a revenue, value added, and employment loss to the Hong Kong economy.

Many studies of the economic impact of airports focus on benefits to the local economy derived from the spending of inbound tourism facilitated by the airport (tourism exports) without reference to the impacts of spending that might be lost due to outbound tourism by local residents (tourism imports).⁵⁹ However, an increasing number of studies suggest that the proper measure of the economic impact of aviation-facilitated tourism should take into account outbound tourism (tourism imports) as well. The idea is that just as the presence of an airport facilitates inbound tourism and allows a location to receive the spending of inbound tourists, the airport also facilitates outbound tourism and spending by local residents in other locations. To the extent that this outbound tourist spending would otherwise be spent locally, there is less local spending and a loss to the local economy. Several studies suggest that the spending of outbound tourists as well as inbound tourists be taken into account by determining the impact of spending by inbound tourists arriving by air and the

⁵⁶ Hong Kong Census and Statistics Department, Website Table 90, *Selected Statistics for All Establishments in the Industry Sections of Import/Export, Wholesale and Retail Trades, and Accommodation and Food Services*.

⁵⁷ Exhibition and convention industry sources.

⁵⁸ Hong Kong Census and Statistics Department, Website Table 91: *Selected Statistics for All Establishments in the Information and Communications, Financing and Insurance, Professional and Business Services Sections*.

⁵⁹ Air Traffic Action Group, *The Economic and Social Benefits of Air Transport*, 2008, focuses on the benefits of aviation to the tourism sector globally. URS, *The Economic Impact of Growth at Sydney Airport*, 2008, notes the gains to Sydney's economy from tourists and tourist-related industries, but does not discuss the impact of outbound tourism. Campbell-Hill Aviation Group, *City of Houston Department of Aviation: 2030 Economic Impact Study*, 2004, estimated the economic impact of arriving visitors to Houston, but not the impact of outgoing visitors. Connecticut Center for Economic Analysis, University of Connecticut, *Bradley International Airport Improvements: An Economic Impact Analysis*, 2001, similarly focused on the spending from additional visitors to Connecticut, but did not account for additional spending by Connecticut residents outside the state that might result from airport improvements.

impact of lost local spending due to outbound tourists departing by air and then subtracting the latter from the former.⁶⁰ The result in some cases will be a negative net tourism impact.

Some analysts argue that the facilitation of outbound tourism actually creates a substantial benefit for the local economy in terms of the ability of its residents to travel to other locations and the ability of its businesses to interact with the rest of the world and therefore any loss of spending in the local economy should not be emphasised.⁶¹ They claim that for locations with a negative tourism balance, this could lead to conclusions that air travel should be restricted rather than expanded. Other analysts argue that the gains and losses are gains and losses and should be reported as such without prejudice and that tourism gains claimed by studies that do not include the net benefit calculation overstate the potential gains from expanded aviation services.⁶² In terms of GDP impact, it is increasingly common to factor both impacts in. Ignoring the outbound tourism is equivalent to assuming that the gains to the local economy in terms of consumer welfare and other potential positive business effects exactly offset the impact of lost spending in the local economy by outbound tourists.

We provide an estimate of both the inbound tourism (exports) economic impacts and the net tourism (exports minus imports) economic impacts.

A.1.2.1.1. Direct tourism export impacts

No single data source is available for revenue, value added, or employment generated by visitors that arrive in Hong Kong by air. Tourism revenue attributable to air transport is, therefore, calculated by taking the number of tourist arrivals by air from each major region, multiplying by the average spend in Hong Kong of tourists from each region, and summing the results.⁶³ Tourism revenue is further broken down into retail, food and beverage, hotel, and other expenditure based on the average spending breakdown for visitors from each region.⁶⁴ Value added and employment attributable to air visitors is estimated by taking the resulting revenue figures by industry and applying the value added to revenue and employment to revenue ratios from HKCSD and the Hong Kong Tourism Board for the relevant industries.⁶⁵

A.1.2.1.2. Direct tourism import impacts and net tourism impacts

Estimates of Hong Kong's total number of outbound visitors and their total spending are available from the World Tourism Organisation⁶⁶ and HKCSD.⁶⁷ No data is directly available on the import of tourism services by air (resulting from the spending of Hong Kong residents travelling abroad by air). However, this can be estimated from the breakdown of outbound

⁶⁰ Reports that acknowledge a need to net tourism imports and exports in economic impact analyses include York Aviation, *The Economic and Social Impacts of Airports*, 2005; Oxford Economic Forecasting, *The Economic Contribution of the Aviation Industry in the UK*, 2006; Oxford Economic Forecasting, *The Economic Catalytic Effects of Air Transport in Europe*, 2002; CE Delft, *The economics of Heathrow expansion*, 2008; GLA, *Heathrow Economics Study*, 2006.

⁶¹ See, for example, York Aviation, *The Economic and Social Impacts of Airports*, 2005; Oxford Economic Forecasting, *The Economic Contribution of the Aviation Industry in the UK*, 2006.

⁶² See, for example, CE Delft, *The Economics of Heathrow Expansion*, 2008; GLA, *Heathrow Economics Study*, 2006.

⁶³ Hong Kong Tourism Board, *A Statistical Review of Hong Kong Tourism*, 2012.

⁶⁴ Hong Kong Tourism Board, *A Statistical Review of Hong Kong Tourism*, 2012.

⁶⁵ Hong Kong Census and Statistics Department, Website Table 90: *Selected Statistics for All Establishments in the Industry Sections of Import/Export, Wholesale and Retail Trades, and Accommodation and Food Services*. and Hong Kong Tourism Board, *A Statistical Review of Hong Kong Tourism*, 2012.

⁶⁶ <http://stat.wto.org/StatisticalProgram/WSDStatProgramHome.aspx?Language=E>

⁶⁷ Hong Kong Census and Statistics Department, *Report on Hong Kong Trade in Services Statistics*, 2012.

spending by destination provided by HKCSD. As all destinations, with the exception of the Chinese Mainland and Macau, are too distant for the vast majority of Hong Kong travellers to make the journey except by air, we have assumed that all these journeys are by air. In the case of outbound visitors to Mainland China, this cannot be assumed due to the land border. However, HKCSD⁶⁸ produced a special report on Hong Kong residents' visits to Mainland China which gives the total number of passengers and the percentage of passengers by air and their per capita spending in 2012, from which tourism imports by air from Mainland China can be calculated.

From this figure, we subtract the estimated hotel expenditures of Hong Kong outbound travellers by air. The logic is that the assumption that 100 percent of what a Hong Kong outbound traveller by air spends abroad would be spent in Hong Kong if they did not travel is extreme and since they would not have to spend on hotel should they remain in Hong Kong this can be deducted to provide a reasonable approximation.

To estimate the direct value added and employment impact of outbound tourism spending, we take the adjusted outbound spending and assume that if the Hong Kong traveller had remained at home they would have spent the remaining amount in roughly the same pattern as the typical foreign visitor to Hong Kong except for hotels (i.e. on retail, food and beverage, and related items). The relevant revenue estimates were used to generate value added and employment estimates by reference to the revenue to value added and revenue to employment ratios in the relevant categories derived from HKCSD data.

The net tourism impacts on Hong Kong's economy are estimated by subtracting the tourism import impact estimates from the tourism export impact estimates.

A.1.2.2. Aviation-facilitated trade

The starting point for the estimate of the direct economic impact of aviation-facilitated trade is to sum up the value of domestic exports, retained imports, and re-exports that arrived or departed by air in order to generate a total trade value (direct revenue) by air for Hong Kong. This revenue figure is then multiplied by the value added to revenue ratio for the "Import-Export Trading" industry and the conventional trade ratio (excluding offshore trade) to generate a value added to Hong Kong's economy through trade by air. Employment is estimated by applying the employment ratio for the "Import-Export Trading" industry to the value added figure.

Note that there is no "net trade" analysis as the bulk of Hong Kong's imports come by sea or by land and it is not plausible to suggest that in the absence of air cargo facilitated by HKIA that there would be more manufacturing in Hong Kong. Thus there is no analogous potential loss associated with inbound air cargo as there may be with spending by Hong Kong residents travelling abroad, some of which at least could be plausibly assumed would be spent in Hong Kong if they did not travel.

A.1.3. Indirect and induced impacts

Indirect impacts reflect the result of the purchases of the direct businesses. Induced impacts reflect the result of the spending of employees in the direct and indirect businesses in the wider economy. Indirect and induced multipliers were calculated from a combination of ratios

⁶⁸ Socio-economic Characteristics and Consumption Expenditure of Hong Kong Residents Making Personal Travel to the Mainland of China, 2012

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derived from data available from HKCSD and economic multipliers (see Exhibits A1.2) for year 2011 (used for 2012 and subsequent years in the economic model). The multipliers relating Direct plus Indirect Value Added to business receipts are provided by the Economic Analysis and Business Facilitation Unit (EABFU), Hong Kong Financial Secretary's Office, as broad working assumptions. These are produced based on the observed linkages between sectors and the resultant pattern of intermediate consumption, import leakages of the various economic activities, gross margin of external trade, and the ratios of value added to gross-output and business receipts for the affected sectors in recent years. Since tourism-related industries dominate the non-aviation businesses at HKIA, the tourism multipliers are used for the larger category. In addition, EABFU provided multipliers for the link between consumer spending and value added in the Hong Kong economy. We take these latter values as the Induced Value Added to Revenue Multiplier, as induced spending is consumer spending by employees in direct and indirect industries.

Exhibit A1.2. Economic Multipliers 2011

Industry	Multiplier
Direct Revenue to Direct + Indirect Value Added Multiplier	
Air Transport	0.317
Tourism	0.501
Trade (re-exports)	0.134
Trade (retained imports)	0.090
Induced Revenue to Induced Value Added to Multiplier	0.547

Note: The direct and indirect value added multipliers for re-exports and retained imports have both excluded air transport related value added.

Source: Economic Analysis and Business Facilitation Unit, Hong Kong Financial Secretary's Office; Enright, Scott & Associates, Ltd.

For aviation-related businesses in Hong Kong, non-aviation businesses at HKIA, tourism-related businesses, and trade, the Indirect Value Added is estimated by first multiplying Direct Revenue by the relevant Direct + Indirect Value Added Multiplier and then subtracting the Direct Value Added obtained through methods described above.

Indirect Value Added = (Direct Revenue x Direct Plus Indirect Value Added to Revenue Multiplier) – Direct Value Added

For aviation-related businesses in Hong Kong, non-aviation businesses at HKIA, and tourism-related businesses, Indirect Revenue is estimated by subtracting Direct Value Added from Direct Revenue. This is the same as assuming that import leakage in these businesses is balanced by the contribution of all of the local supply industries upstream of the focal industry. As there is no information available that allows either the import leakage or the contribution of the upstream local supply industries, this remains as an assumption. Since no other estimation depended on Indirect Revenues, and in the absence of a Hong Kong-specific multiplier for Direct to Indirect Revenue, this approximation is taken as the best available.

Indirect Revenue = Direct Revenue – Direct Value Added

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In the case of trade, since the extremely high import leakage makes Direct Revenue – Direct Value Added a poor proxy for Indirect Revenue, an estimate is obtained by multiplying Indirect Trade Value Added by the economy wide ratio of Revenue to Value Added.

$$\text{Indirect Trade Revenue} = \text{Indirect Trade Value Added} \times (\text{Revenue/ Value Added})_{\text{Hong Kong}}$$

For all industries, Indirect Employment is estimated by multiplying Indirect Value Added by the economy-wide ratio of Employment to Value Added. The economy-wide ratio is used because it is not possible to reverse engineer all of the upstream industries that are involved from the multiplier.

$$\text{Indirect Employment} = \text{Indirect Value Added} \times (\text{Employment/ Value Added})_{\text{Hong Kong}}$$

Induced Revenue refers to the revenue generated by the purchases of people employed in the direct and indirect industries and is calculated from the following formula:

$$\text{Induced Revenue} = [(\text{Direct VA})_{\text{Industry}} \times (\text{Comp/ VA})_{\text{Industry}} \times (1 - \text{HK SR})] + [(\text{Indirect VA})_{\text{Industry}} \times (\text{Comp/ VA})_{\text{Economy}} \times (1 - \text{HK SR})]$$

Where $(\text{Direct VA})_{\text{Industry}}$ is the direct value added for the industry, $(\text{Comp/ VA})_{\text{Industry}}$ the compensation portion of value added in the industry, HK SR the Hong Kong economy-wide savings rate, $(\text{Indirect VA})_{\text{Industry}}$ the industry's indirect value added, and $(\text{Comp/ VA})_{\text{Economy}}$ the compensation portion of value added in the Hong Kong economy. $(1 - \text{HK SR})$ or one minus the savings rate, is the portion of income that is spent by consumers in Hong Kong.

Induced Value Added is estimated by multiplying Induced Revenue by the Induced Value Added to Revenue Multiplier. Induced Employment is estimated by multiplying Induced Revenue by the ratio of retail trade Employment to Revenue for Hong Kong. The assumption here is that most induced spending will be on retail goods.

$$\text{Induced Value Added} = \text{Induced Revenue} \times$$

$$\text{Induced Value Added to Revenue Multiplier}$$

$$\text{Induced Employment} = \text{Induced Value Added} \times$$

$$(\text{Employment/Value Added})_{\text{Retail, Hong Kong}}$$

The methodology for calculating direct, indirect, and induced impacts is summarised in Exhibit A1.3

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Exhibit A1.3. Economic Impact Method Summary

	Revenue	Value Added	Employment
Direct	DREV from HKCSD data or AA	DVA from HKCSD or relevant VA/REV ratio from HKCSD	DEMP from HKCSD or relevant EMP/REV ratio from HKCSD
Indirect	INDIREV = DREV-DVA, except for trade INDIREV = INDIVA x EREV/EVA	INDIVA = DREV x MULTIPLIER₁ – DVA	INDIEMP = INDIVA x EEMP/EVA
Induced	INDUREV = DVA x (DCOMP/DVA) x (1-HKSR) + INDIVA x (ECOMP/EVA) x (1-HKSR)	INDUVA = INDUREV x MULTIPLIER₂	INDUEMP = INDUVA x Retail EMP /Retail VA

D = Direct, INDI = Indirect, INDU = Induced

REV = Revenue, VA = Value Added, EMP = Employment

E = Economy wide, COMP = Compensation

MULTIPLIER₁ = Direct + Indirect Value Added Multiplier for relevant industry

MULTIPLIER₂ = INDUREV to INDUVA Multiplier

HKSR = Hong Kong Savings Rate

A.2. Economic impact of capital investment

The expenditure on infrastructure construction and subsequent expenditure on infrastructure maintenance under the investment scenarios will generate direct, indirect, and induced economic impacts.

In order to calculate the direct construction impacts, data on the forecast material, labour and plant costs, together with the number of persons to be employed were obtained from the AA, in addition to details of the planned construction phases. A portion of the cost data provided was in nominal "Money of the Day" dollars (MOD), as all dollar values used in the economic model are in real 2012 dollars, each annual nominal cost figure was discounted back to its equivalent value in 2012 dollars using the following formula:

$$\text{Real}_{(2012 \$)} \text{Cost}_{(\text{Year } Y)} = \text{Nominal Cost}_{(\text{Year } Y)} \times \text{Real}_{(2012 \$)} \text{GDP}_{(\text{Year } Y)} / \text{Nominal GDP}_{(\text{Year } Y)}^{69}$$

The AA provided construction costs for the third runway as a single lump sum figure in 2012 dollars. As construction was planned to cover 8 years, without further information on cost allocation, a simple division of expenditure by 8 gave the average annual expenditure. The real 2012 annual expenditures were first inflated by the MOD inflation rate then deflated by the GDP deflator to give a 2012 dollar value that correctly accounts for the higher MOD inflation rate over the projected economy wide inflation rate. ESA was subsequently provided with an MOD total third runway construction cost, which closely matched that derived from a roughly even 8 year split.

$$\text{Nominal Cost}_{(\text{Year } Y)} = \text{Cost in 2012 HK\$}_{(\text{Year } Y)} \times (1 + \text{Gr}_{(\text{Year } Y)}) \times (1 + \text{Gr}_{(\text{Year } Y - 1)}) \times \dots \dots \dots (1 + \text{Gr}_{(\text{Year } 2013)})$$

Gr = Annual Nominal MOD inflation rate, as provided by HKA

$$\text{Cost in 2012 HK\$}_{(\text{Year } Y)} = \text{Nominal Cost}_{(\text{Year } Y)} \times \text{GDP in 2012 HK\$}_{(\text{Year } Y)} / \text{Nominal GDP}_{(\text{Year } Y)}$$

Direct Revenue to the construction companies is equal to the projected total sum of material, plant, and labour costs for the project. Direct Value Added is calculated as projected labour costs minus projected labour import leakages plus the projected profit margin for the construction companies. Labour leakages were estimated with reference to figures for the construction of Chek Lap Kok airport which indicate that labour import percentages ran as high as 20 percent,⁷⁰ and in consultation with the AA. Given that the project continues over a longer period and is smaller than the initial construction of Chek Lap Kok, and there are likely to be fewer major projects going on in Hong Kong at the same time than was the case then, it seems likely that there will be less competition for labour than there was when Chek Lap Kok was built, and that the need for imported labour will be mainly limited to specialists in the technical and management aspects of airport runway construction. On this basis, an estimate of 5 percent labour leakage is considered reasonable and is assumed in the present case. The projected profit margin for construction companies is 6.2 percent. This

⁶⁹ Real and Nominal GDP forecasts came from IHS Forecasts, November 2014

⁷⁰ Legislative Council Brief, *Special Importation of Labour Scheme for the New Airport and Related Projects*, Education and Manpower Branch, 1993

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was taken as the ratio of gross surplus to total revenue for the Hong Kong construction industry in 2012.

Direct Employment, measured in “person-years,” was calculated using estimates of the average “person-days” to be worked on each of the various activities involved in the construction of each scenario. The AA provided the estimated average person-day construction works schedule. The impact on Direct Employment was adjusted to take into account estimated import leakages for labour which again were assumed to be 5 percent.

Indirect revenue was estimated by taking projected costs for material and plant and adjusting them by subtracting import leakages. Import leakages for materials were assumed to be 80 percent on the basis that the majority of goods that are imported into Hong Kong arrive in a finished, or close to finished, state. Plant import leakages were assumed to be 50 percent. Although all, or nearly all, of the plant is likely to be imported, the total cost of plant includes items such as setup, on-going maintenance work, and the management of leases relating to plant, and these items are estimated to reduce overall leakage to 50 percent.

Indirect Value Added was estimated by multiplying Indirect Revenue by the economy wide ratio of Value Added to Revenue. This ratio was calculated from HKCSD data.

Indirect Employment was estimated by multiplying Indirect Value Added by the economy wide ratio of Employment to Value Added. This ratio was calculated from HKCSD data.

Induced Revenue, Value Added, and Employment were calculated following the same method as used in estimating the economic impact from operations of HKIA. Accordingly, Induced Revenue was calculated from the following formula:

$$\text{Induced Revenue} = \left[(\text{Direct VA})_{\text{Industry}} \times (\text{Comp/ VA})_{\text{Industry}} \times (1 - \text{HK SR}) \right] + \left[(\text{Indirect VA})_{\text{Industry}} \times (\text{Comp/ VA})_{\text{Economy}} \times (1 - \text{HK SR}) \right]$$

Where $(\text{Direct VA})_{\text{Industry}}$ is the Direct Value Added for the industry, $(\text{Comp/ VA})_{\text{Industry}}$ is the compensation portion of Value Added in the industry, HK SR is the economy-wide Hong Kong savings rate, $(\text{Indirect VA})_{\text{Industry}}$ is the industry's Indirect Value Added, and $(\text{Comp/ VA})_{\text{Economy}}$ is the compensation portion of Value Added in the Hong Kong economy.

Induced Value Added is estimated using the multiplier on private consumption expenditure provided by the Economic Analysis and Business Facilitation Unit, Hong Kong Financial Secretary's Office for the value added to consumer spending ratio for Hong Kong. Induced Employment was estimated by multiplying estimated Induced Value Added by the ratio of retail trade Employment to Value Added calculated from HKCSD data. Implicit in this is the assumption that employment in the retail sector per dollar of value added is broadly comparable to employment in the other spending categories per dollar of value added.

AA provided estimated maintenance expenditure for each scenario from years 2012 to 2046. Maintenance expenditure will have a different mix to construction with lower expenditure on plant and material but higher expenditure on labour. No data is available on this expenditure mix and so we have assumed the same mix as used for construction.

A.3. Future projections

The economic impact analysis for the present provides a basis for estimates of future economic impacts. However, a number of additional assumptions and methods are necessary to project these impacts. We separate these into assumptions and methods that affect base economic impact projections and those specific to the projection of the economic impact of each scenario at HKIA.

A.3.1. Base projections

To generate future economic impact projections, it was necessary to obtain throughput or traffic forecasts for HKIA, and to generate scale factors that link future economic impact to the number of passengers and the amount of cargo handled by HKIA. The traffic projections were generated by AA's Consultants for the Status Quo Situation, Scenario 1, and Scenario 2. These projections indicated that Hong Kong residents would be served even if capacity were constrained at HKIA, with transit passenger then foreign visitor traffic bearing the brunt of the capacity limitations. Thus we project all Hong Kong resident demand is served through 2030 and that the ratio of Hong Kong resident to foreign visitor to transit and transfer passengers remains constant thereafter.

Scale factors for each major line of business were generated based on year 2012 data, and the relevant passenger and cargo throughput information. For businesses that are likely to scale with passenger numbers (retail, and food and beverage, for example), the most recent revenue per passenger was calculated and applied to projected passenger numbers. For businesses most likely to scale with cargo (cargo related services, for example), revenue per tonne of cargo throughput was calculated for the most recent year for which data was available and then applied to the projected cargo throughput numbers. For businesses where it was not possible to separate passengers and cargo (for example, the HKCSD "Air Transport and Incidental Services" category), the future projections were scaled by work load unit (WLU) as defined in Exhibit A3.1.

Exhibit A3.1 identifies each of the major line items in the analysis and whether the future projections are based on projected passenger numbers, cargo throughput, or workload unit.

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Exhibit A3.1. Economic Model Industry Line Items Scale Factors

Industry	Scale Factor
Aviation-related Business in Hong Kong	
Air Transport and Incidental Services - (i) Air Transport & Cargo	Work Load Unit (WLU)
Non-aviation Business at the HKIA	
Total Retail, Food, and Beverage	Visitors arriving by air and Transit passengers
Hotel	Fixed at 2012 occupancy rate
Exhibitions and Conventions	Cargo weight
Tourism	
Tourism Exports	Visitors arriving by air
Tourism Imports	Hong Kong residents departing by air
Trade	
Hong Kong Trade Services	Cargo weight

Note: One WLU equals one passenger or 100 kg of cargo

Source: Enright, Scott & Associates, Ltd. research.

A.3.2. The economic impact of Scenario 1 and Scenario 2 at HKIA

The initial estimates of the economic impact of the investment programs associated with Scenario 1 and Scenario 2 at HKIA on Hong Kong's economy were generated by taking the economic contribution of HKIA projected in Scenario 1 or Scenario 2 and subtracting from this the economic contribution of HKIA projected in the Status Quo Situation with the net difference being the economic impact of Scenario 1 or Scenario 2. We have performed this calculation and the results are described in this Report as a separate analysis for construction and maintenance and airport operations.

A.4. Economic cost benefit analysis

Beyond estimating and projecting the net economic impacts of each investment scenario in nominal dollars, it is useful to assess the size of the economic return on investment to Hong Kong from each investment scenario in turn.

This can be expressed in the form of an Economic Internal Rate of Return (EIRR) and also as an Economic Net Present Value (ENPV). The EIRR and ENPV calculations are similar to the more commonly performed Internal Rate of Return (IRR) and Net Present Value (NPV) calculations, the main difference being that the "returns" or "inflows" used in doing an EIRR / ENPV are typically larger than the projected cash inflows that are used in doing a traditional IRR / NPV analysis because they may include broader economic benefits such as indirect impacts stemming from the suppliers providing goods and services to the direct activities in the project, and induced impacts from the spending of income generated by the direct and indirect activities. The capital costs or "outlay" expenditures are the same as those that would be used in a regular IRR / NPV calculation and represent the actual cost of the project.

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For the present project, the ENPVs were calculated assuming a discount rate of 4 percent provided by the Economic Analysis and Business Facilitation Unit of the Hong Kong Financial Secretary's Office, understood to be the rate that is commonly taken as the imputed discount rate used for capital budgeting purposes for projects that are government funded in Hong Kong.

The AA have provided cash flow estimates for construction and maintenance out to the first quarter of 2047. As some of the cash flow components were in financial year periods (April to March) these were converted to calendar year periods (January to December). By 2024 all expenditures are projected to be maintenance expenditure at the airport, we have assumed that maintenance expenditure for 2047 to 2061 remain at the 2046 levels.

For the various scenarios and cases investigated, we report the EIRRs and ENPVs for the direct benefits, direct plus indirect benefits, and direct plus indirect plus induced benefits. We also report results that include only the direct catalytic benefits, as well as the direct plus indirect plus induced catalytic benefits.

For each of the cases estimated, a 50 year period from 2012 to 2061 was taken as the relevant project timeline for the purpose of estimating EIRR and ENPV. The 50 year period was taken with reference to the time periods used in estimating the economic benefits of other major infrastructure projects, such as the Hong Kong-Shenzhen Western Express Line (WEL), which use 50 years as the projected period of time over which economic benefits may reasonably be estimated. The analysis assumes a zero terminal value for the investments of both Scenario 1 and Scenario 2. This is likely to be conservative.

For each of the cases estimated, the projected costs of each scenario were taken as being equal to the construction and maintenance costs from 2012 to 2046 as described in Section A.2. The annual cost flows for each scenario up to 2046 are given in Exhibits A4.1 and A4.2.

The projected economic benefits of airport expansion were taken as being equal to the incremental value added for each scenario. This was calculated by subtracting the projected value added for the Status Quo Situation from the projected value added in the Scenario 1 or Scenario 2. For each scenario, after 2030 the annual value added from operations in each year is assumed to remain constant at the 2030 level. The annual value added flows for each scenario up to 2046 are given in Exhibits A4.1 and A4.2.

The projected economic cost was subtracted from the projected economic benefit in each year to determine a net economic benefit for each year which was then discounted to present value terms using the 4 percent discount rate giving the estimated ENPV for each scenario. The discount rate that would give an estimated ENPV for each scenario that is equal to zero was then calculated for each of the estimated cases, this rate being the estimated EIRR for each scenario.

The EIRR and ENPV values can be found in Exhibit A4.3. In each case, the first three rows of results only take into account aviation-related businesses in Hong Kong and non-aviation businesses at HKIA, the fourth row includes the direct impact of aviation-facilitated tourism and trade, and the fifth includes the direct, indirect, and induced impacts of aviation-facilitated tourism and trade. Note that only results for the "Net Tourism" cases are shown.

We note that the high EIRRs are due in part to the fact that significant leverage can be achieved with the existing asset and benefits can be readily realized from the second year of investment. In addition, IRR (EIRR) assumes that all the benefits from the project under review are re-invested at the internally generated rate of return, yielding further returns at

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this same rate in the following period(s). However, if the magnitude of the returns exceeds the amount that can be re-invested in the project and the IRR is high by comparison to rates of return available in the market, then the assumption that all the returns can be re-invested at the same rate as the IRR is false and the estimated IRR may not be a good measure for project evaluation. In any case, if the IRR (EIRR) and the NPV (ENPV) give different answers in the evaluation of mutually exclusive projects, the correct answer is by NPV (ENPV).

We note that for the EIRR calculation we assumed that all capital expenditures (cash outflows) occurred at the beginning of a year and all benefits were obtained at the end of a year. If we assumed both expenditures and benefits were made evenly through the year, then the net of expenditure and benefits was positive, even in the first year, yielding infinite EIRR estimates. The time shift will yield conservative EIRR estimates.

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Exhibit A4.1. Costs and Economic Benefits Cash Flows for Scenario 1, HK\$ mn

Year	Costs	Direct		Direct + Indirect		Direct + Indirect + Induced		Direct + Indirect + Induced + Catalytic Direct Only		Direct + Indirect + Induced + Total Catalytic	
		VA	Net	VA	Net	VA	Net	VA	Net	VA	Net
2012	(2,288)	5,726	3,437	8,511	6,223	10,284	7,995	18,507	16,219	31,087	28,799
2013	(3,864)	5,502	1,638	8,226	4,362	9,937	6,073	15,747	11,883	23,318	19,454
2014	(3,712)	5,639	1,927	8,430	4,718	10,184	6,472	16,137	12,424	23,898	20,186
2015	(2,352)	6,768	4,416	10,076	7,724	12,174	9,822	21,174	18,822	34,525	32,173
2016	(3,514)	10,080	6,566	14,952	11,438	18,066	14,552	34,002	30,488	59,338	55,824
2017	(5,245)	12,140	6,895	17,974	12,729	21,719	16,474	42,389	37,144	76,099	70,854
2018	(3,698)	12,995	9,297	19,232	15,534	23,239	19,541	45,698	42,000	82,547	78,849
2019	(1,674)	14,633	12,959	21,635	19,961	26,143	24,469	52,438	50,765	96,028	94,354
2020	(1,003)	15,402	14,399	22,765	21,762	27,509	26,506	55,480	54,477	102,032	101,029
2021	(742)	16,840	16,098	24,868	24,126	30,051	29,309	61,648	60,906	114,705	113,962
2022	(515)	17,483	16,968	25,823	25,308	31,205	30,690	63,761	63,245	118,317	117,801
2023	(284)	17,922	17,638	26,478	26,194	31,996	31,712	65,017	64,733	120,248	119,964
2024	(132)	18,417	18,285	27,210	27,078	32,880	32,748	66,806	66,674	123,552	123,420
2025	(207)	18,832	18,625	27,821	27,614	33,619	33,412	68,370	68,163	126,523	126,316
2026	(288)	19,027	18,739	28,121	27,833	33,981	33,694	68,498	68,210	126,041	125,753
2027	(314)	19,529	19,216	28,862	28,549	34,877	34,563	70,375	70,061	129,618	129,304
2028	(314)	19,871	19,557	29,377	29,063	35,498	35,184	71,174	70,860	130,539	130,225
2029	(295)	20,411	20,116	30,164	29,869	36,450	36,155	73,581	73,285	135,623	135,327
2030	(291)	20,794	20,503	30,734	30,443	37,138	36,847	74,788	74,497	137,621	137,329
2031	(321)	20,794	20,474	30,734	30,413	37,138	36,818	74,788	74,467	137,621	137,300
2032	(547)	20,794	20,247	30,734	30,187	37,138	36,592	74,788	74,241	137,621	137,074
2033	(800)	20,794	19,995	30,734	29,934	37,138	36,339	74,788	73,988	137,621	136,821
2034	(1,008)	20,794	19,786	30,734	29,726	37,138	36,131	74,788	73,780	137,621	136,613
2035	(1,191)	20,794	19,603	30,734	29,543	37,138	35,947	74,788	73,597	137,621	136,430
2036	(1,252)	20,794	19,542	30,734	29,482	37,138	35,886	74,788	73,536	137,621	136,369
2037	(1,172)	20,794	19,622	30,734	29,562	37,138	35,966	74,788	73,616	137,621	136,448
2038	(1,089)	20,794	19,705	30,734	29,645	37,138	36,049	74,788	73,699	137,621	136,531
2039	(1,001)	20,794	19,793	30,734	29,732	37,138	36,137	74,788	73,786	137,621	136,619
2040	(956)	20,794	19,838	30,734	29,778	37,138	36,182	74,788	73,832	137,621	136,665
2041	(1,030)	20,794	19,764	30,734	29,703	37,138	36,108	74,788	73,758	137,621	136,590
2042	(1,216)	20,794	19,578	30,734	29,517	37,138	35,922	74,788	73,571	137,621	136,404
2043	(1,450)	20,794	19,345	30,734	29,284	37,138	35,689	74,788	73,338	137,621	136,171
2044	(1,675)	20,794	19,119	30,734	29,059	37,138	35,463	74,788	73,113	137,621	135,945
2045	(1,893)	20,794	18,901	30,734	28,841	37,138	35,246	74,788	72,895	137,621	135,728
2046	(1,993)	20,794	18,801	30,734	28,741	37,138	35,146	74,788	72,795	137,621	135,628
2047-2061	(1,993)	20,794	18,801	30,734	28,741	37,138	35,146	74,788	72,795	137,621	135,628

Note: VA = value added, Net = VA – Costs. Dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Exhibit A4.2. Costs and Economic Benefits Cash Flows for Scenario 2, HK\$ mn

Year	Costs	Direct		Direct + Indirect		Direct + Indirect + Induced		Direct + Indirect + Induced + Catalytic Direct Only		Direct + Indirect + Induced + Total Catalytic	
		VA	Net	VA	Net	VA	Net	VA	Net	VA	Net
2012	(2,288)	5,726	3,437	8,511	6,223	10,284	7,995	18,507	16,219	31,087	28,799
2013	(3,864)	5,502	1,638	8,226	4,362	9,937	6,073	15,747	11,883	23,318	19,454
2014	(3,805)	5,639	1,834	8,430	4,625	10,184	6,379	16,137	12,331	23,898	20,093
2015	(3,318)	6,768	3,450	10,076	6,758	12,174	8,856	21,174	17,856	34,525	31,207
2016	(19,145)	10,080	(9,065)	14,952	(4,193)	18,066	(1,079)	34,002	14,857	59,338	40,193
2017	(20,708)	12,140	(8,567)	17,974	(2,733)	21,719	1,011	42,389	21,681	76,099	55,392
2018	(18,606)	12,995	(5,611)	19,232	627	23,239	4,634	45,698	27,092	82,547	63,941
2019	(16,705)	14,633	(2,072)	21,635	4,930	26,143	9,438	52,438	35,734	96,028	79,323
2020	(16,369)	15,702	(666)	23,173	6,804	28,003	11,634	58,128	41,759	109,033	92,664
2021	(16,493)	16,430	(63)	24,220	7,727	29,269	12,776	62,026	45,533	117,923	101,430
2022	(16,651)	17,130	480	25,264	8,614	30,531	13,880	64,131	47,480	121,230	104,579
2023	(16,758)	22,332	5,573	32,941	16,183	39,808	23,049	83,313	66,555	157,184	140,426
2024	(132)	27,020	26,889	39,864	39,732	48,173	48,041	100,530	100,398	189,310	189,178
2025	(207)	31,633	31,426	46,678	46,471	56,408	56,201	117,280	117,073	220,306	220,099
2026	(288)	35,708	35,421	52,698	52,411	63,683	63,395	132,024	131,736	247,630	247,342
2027	(314)	39,395	39,081	58,134	57,821	70,252	69,938	145,824	145,511	273,804	273,491
2028	(323)	42,950	42,627	63,375	63,052	76,585	76,262	159,185	158,862	299,225	298,902
2029	(327)	46,211	45,884	68,173	67,846	82,383	82,056	171,836	171,509	323,806	323,479
2030	(352)	49,444	49,091	72,932	72,579	88,134	87,782	184,312	183,960	347,924	347,571
2031	(428)	49,444	49,016	72,932	72,504	88,134	87,706	184,312	183,884	347,924	347,496
2032	(678)	49,444	48,766	72,932	72,254	88,134	87,457	184,312	183,634	347,924	347,246
2033	(970)	49,444	48,473	72,932	71,961	88,134	87,164	184,312	183,342	347,924	346,954
2034	(1,204)	49,444	48,240	72,932	71,728	88,134	86,931	184,312	183,108	347,924	346,720
2035	(1,434)	49,444	48,009	72,932	71,497	88,134	86,700	184,312	182,878	347,924	346,490
2036	(1,597)	49,444	47,847	72,932	71,335	88,134	86,538	184,312	182,715	347,924	346,327
2037	(1,769)	49,444	47,675	72,932	71,163	88,134	86,366	184,312	182,543	347,924	346,155
2038	(1,942)	49,444	47,502	72,932	70,990	88,134	86,192	184,312	182,370	347,924	345,982
2039	(2,092)	49,444	47,352	72,932	70,840	88,134	86,043	184,312	182,220	347,924	345,832
2040	(2,754)	49,444	46,689	72,932	70,178	88,134	85,380	184,312	181,558	347,924	345,170
2041	(3,397)	49,444	46,046	72,932	69,534	88,134	84,737	184,312	180,915	347,924	344,527
2042	(3,796)	49,444	45,648	72,932	69,136	88,134	84,338	184,312	180,516	347,924	344,128
2043	(3,956)	49,444	45,488	72,932	68,976	88,134	84,179	184,312	180,356	347,924	343,968
2044	(3,935)	49,444	45,509	72,932	68,997	88,134	84,200	184,312	180,377	347,924	343,989
2045	(3,836)	49,444	45,608	72,932	69,096	88,134	84,298	184,312	180,476	347,924	344,088
2046	(3,764)	49,444	45,679	72,932	69,167	88,134	84,370	184,312	180,548	347,924	344,159
2047-2061	(3,764)	49,444	45,679	72,932	69,167	88,134	84,370	184,312	180,548	347,924	344,159

Note: VA = value added, Net = VA – Costs. Dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

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Exhibit A4.3. Economic Internal Rate of Return and Economic Net Present Value for a 50 Year Return, Scenario 1 and 2

Impact	EIRR (percent)	ENPV (HK\$ mn)
Scenario 1		
Direct	106%	314,739
Direct + Indirect	211%	482,969
Direct + Indirect + Induced	285%	591,214
Direct + Indirect + Induced + Catalytic Direct Only	626%	1,213,343
Direct + Indirect + Induced + Catalytic Total	1,164%	2,243,271
Scenario 2		
Direct	27%	525,722
Direct + Indirect	179%	841,521
Direct + Indirect + Induced	269%	1,045,637
Direct + Indirect + Induced + Catalytic Direct Only	623%	2,309,927
Direct + Indirect + Induced + Catalytic Total	1,163%	4,447,187

Note: The “Direct,” “Direct + Indirect,” and “Direct + Indirect + Induced” lines include only aviation-related businesses in Hong Kong and non-aviation businesses at HKIA. The “Direct + Indirect + Induced + Catalytic Direct Only” line adds in the direct benefits of aviation-facilitated tourism and trade. The “Direct + Indirect + Induced + Catalytic Total” line adds in the direct, indirect, and induced benefits of aviation-facilitated tourism and trade. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

On economic grounds, the results suggest that Scenario 2 would be far more beneficial to Hong Kong than Scenario 1.

A.5. Cost of delay

The present report has assumed that there will be no delay in the start to construction and the final opening date for the third runway under Scenario 2. To estimate the cost of delaying the opening of a third runway, ESA calculated the ENPV for Scenario 2 assuming that the costs and benefits of the third runway construction would be delayed by one year, two years, three years, four years, and five years. To provide an “apples to apples” comparison, ESA allowed for an extension of the cash flows beyond 2061 for each year of delay. The cost of delay was then estimated by taking the difference between the ENPV in the no delay case and that for the delay cases. The results of this analysis are reported in Appendix G.

Appendix B. Features not included in the present Study

Airport expansion projects are often justified on the basis of a reduction in congestion costs. The idea is that as an airport reaches full capacity, delays inevitably set in. These delays create costs to aviation operators, the travelling public, and those that rely on air cargo. Capacity constrained airports also find it particularly difficult to recover from bad weather or operational issues. In such circumstances, airport expansion can be a means of reducing the costs of congestion.⁷¹ Reduced congestion costs represent one of the principal benefits claimed for construction of a third runway at Heathrow Airport.⁷² As forecasts for congestion-related delays in the various scenarios addressed in this Study are not available, reduced congestion costs were not factored into the present analysis. Including them would increase the economic value of expanding HKIA capacity.

Capacity constraints can also result in higher prices for air travel as carriers use the capacity constraints (demand in excess of supply) to extract money from passengers and shippers. This has been considered in analyses of capacity constrained airports. Such considerations were not factored into the present analysis. Including them would increase the economic value of expanding HKIA capacity.

The present Study did not attempt to address environmental issues associated with airport expansion. These have been subject to a separate environmental impact assessment.

The future traffic forecasts were generated by AA's Consultants. We have assumed that the only binding physical constraint that is relevant to the economic impact of the third runway is that involving runway capacity. That means that we have not independently assessed whether there are other physical constraints (such as road or rail access or terminal capacity) that would limit traffic even should HKIA be expanded.

⁷¹ J.P. Cohen and C.C. Coughlin, "Congestion at Airports: The Economics of Airport Expansions," *Federal Reserve Bank of St. Louis Review*, 2003.

⁷² UK Department for Transport, *The Future of Air Transport*, 2003; UK Department for Transport, *Air Transport White Paper Progress Report 2006*, 2006; UK Department for Transport, *Adding Capacity at Heathrow Airport*, 2008; Oxford Economic Forecasting, *The Economic Contribution of the Aviation Industry to the UK*, 2006.

Appendix C. Caveats

This Section describes the appropriate caveats associated with the present work and the interpretation of the analysis. The work reported relies heavily on assumptions. We have tried to make the assumptions that were the most reasonable and have tried to make the major assumptions clear to the reader. In addition, there are some well-known features of economic impact analyses that the reader should keep in mind in assessing the analyses presented in this Report.

While economic impact analysis typically projects the direct, indirect, induced, and sometimes catalytic impact on revenue, value added (GDP contribution), and employment associated with a major investment, the typical way of reporting the results can be misleading to the non-specialist. In particular, if an investment is projected to have a HK\$100 million GDP impact and 10,000 employee impact, it generally does not mean that GDP will be HK\$100 million less and total employment will be 10,000 less if the investment is not made, because some of the resources will be used for other businesses and some of the people will find employment in other activities. What it implies is that if the investment is not made, that GDP will be lower by an amount determined by the next best use of resources and employment will be lower to the extent that the people involved cannot obtain more desirable or more remunerative employment. So the correct interpretation of the economic impact results is that the aviation sector is “associated with” a certain portion of GDP and employment, and it is not clear, in the absence of a full macroeconomic model that contains all the alternative sectors and employment opportunities and the relevant prices, exactly what the impact on GDP and employment would be if the investment were not made and the financial and human resources diverted to other uses.

In order to project economic impacts going forward, we needed to develop some scale factors that would allow for projections based on forecasts of throughput for passenger and cargo into the future. These scale factors were estimated from the latest relevant data and then assumed to be constant over the period of the projections. To the extent that these scale factors may change over time, the resulting projections could be overestimates or underestimates.

There are also caveats associated with the use of multipliers. One caveat is that the multipliers generated from input-output tables or similar means are best used for marginal analysis. That is, they are best suited for relatively small variations from the current situation. When used for very large investments, or for very long periods of time, these multipliers can result in overestimates since the use of linear multipliers means that diminishing returns are not taken into account.

Appendix D. Hong Kong GDP Forecasts

Exhibit D1. Hong Kong GDP Forecasts

Year	HK\$ Billion
2012	2,037
2013	2,097
2014	2,173
2015	2,263
2016	2,363
2017	2,457
2018	2,544
2019	2,633
2020	2,723
2021	2,815
2022	2,909
2023	3,006
2024	3,105
2025	3,209
2026	3,312
2027	3,418
2028	3,525
2029	3,634
2030	3,744

Note: All values are in 2012 dollars.

Source: IHS, May 2014

Appendix E. Scenario 2 versus Scenario 1

In this section, we calculate the differences in net economic benefits (including the benefits from operations and capital costs for construction and maintenance) between Scenarios 1 and 2 (see Exhibit E1).

Since the benefits calculated for Scenario 2, which includes a third runway, are larger than those for Scenario 1, which does not, this calculation provides an estimate of the economic benefits that will be foregone if Scenario 1 is put in place rather than Scenario 2. We provide the year-by-year differences in net benefits, the year-by-year cumulative difference in net benefits, and the ENPV of the differences in net benefits using the same 4 percent discount rate as used elsewhere in this Report.

Here we only include the Direct, Indirect, and Induced Benefits for aviation businesses and non-aviation businesses at HKIA. The catalytic impacts on tourism and trade are ignored.

In the early years, the foregone benefit is negative as the third runway expenditures tip the balance. However, over the 50 year period under investigation, the cumulative balance tips in favour of Scenario 2 by 2027. The Economic Net Present Values of the foregone benefits are given for the various cases in Exhibits E2 and E3.

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Exhibit E1. Foregone Benefits of not choosing Scenario 2 over Scenario 1 (HK\$ million)

Year	Total Net Economic Impact (Direct + Indirect + Induced)		Foregone Benefit (Scenario 2 – Scenario 1)	Foregone Benefit Cumulative
	Scenario 2	Scenario 1		
2012	7,995	7,995	-	-
2013	6,073	6,073	-	-
2014	6,379	6,472	(93)	(93)
2015	8,856	9,822	(966)	(1,059)
2016	(1,079)	14,552	(15,631)	(16,690)
2017	1,011	16,474	(15,463)	(32,152)
2018	4,634	19,541	(14,908)	(47,060)
2019	9,438	24,469	(15,031)	(62,091)
2020	11,634	26,506	(14,872)	(76,963)
2021	12,776	29,309	(16,533)	(93,496)
2022	13,880	30,690	(16,810)	(110,306)
2023	23,049	31,712	(8,663)	(118,969)
2024	48,041	32,748	15,293	(103,676)
2025	56,201	33,412	22,789	(80,887)
2026	63,395	33,694	29,701	(51,186)
2027	69,938	34,563	35,375	(15,811)
2028	76,262	35,184	41,078	25,267
2029	82,056	36,155	45,902	71,169
2030	87,782	36,847	50,935	122,103
2031	87,706	36,818	50,888	172,992
2032	87,457	36,592	50,865	223,857
2033	87,164	36,339	50,825	274,682
2034	86,931	36,131	50,800	325,482
2035	86,700	35,947	50,753	376,235
2036	86,538	35,886	50,652	426,886
2037	86,366	35,966	50,399	477,286
2038	86,192	36,049	50,143	527,429
2039	86,043	36,137	49,906	577,335
2040	85,380	36,182	49,198	626,533
2041	84,737	36,108	48,629	675,162
2042	84,338	35,922	48,416	723,578
2043	84,179	35,689	48,490	772,068
2044	84,200	35,463	48,736	820,804
2045	84,298	35,246	49,053	869,857
2046	84,370	35,146	49,224	919,082
2047	84,370	35,146	49,224	968,306
2048	84,370	35,146	49,224	1,017,530
2049	84,370	35,146	49,224	1,066,755
2050	84,370	35,146	49,224	1,115,979
2051	84,370	35,146	49,224	1,165,203
2052	84,370	35,146	49,224	1,214,428
2053	84,370	35,146	49,224	1,263,652
2054	84,370	35,146	49,224	1,312,876
2055	84,370	35,146	49,224	1,362,101
2056	84,370	35,146	49,224	1,411,325
2057	84,370	35,146	49,224	1,460,549

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Year	Total Net Economic Impact (Direct + Indirect + Induced)		Foregone Benefit (Scenario 2 – Scenario 1)	Foregone Benefit Cumulative
	Scenario 2	Scenario 1		
2058	84,370	35,146	49,224	1,509,774
2059	84,370	35,146	49,224	1,558,998
2060	84,370	35,146	49,224	1,608,222
2061	84,370	35,146	49,224	1,657,447

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Exhibit E2. Foregone ENPV (Direct + Indirect + Induced) of not choosing Scenario 2 over Scenario 1 (i.e. Scenario 2 – Scenario 1)

	ENPV (HK\$ million)
Scenario 1	591,214
Scenario 2	1,045,637
Foregone ENPV	454,423

Note: All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Exhibit E3. Foregone ENPV (All Cases) of not choosing Scenario 2 over Scenario 1 (i.e. Scenario 2 – Scenario 1)

Impact	ENPV (HK\$ mn)
Scenario 2 – Scenario 1	
Direct	210,983
Direct + Indirect	358,552
Direct + Indirect + Induced	454,423
Direct + Indirect + Induced + Catalytic Direct Only	1,096,584
Direct + Indirect + Induced + Catalytic Total	2,203,916

Note: The “Direct,” “Direct + Indirect,” and “Direct + Indirect + Induced” lines include only aviation-related businesses in Hong Kong and non-aviation businesses at HKIA. The “Direct + Indirect + Induced + Catalytic Direct Only” line adds in the direct benefits of aviation-facilitated tourism and trade. The “Direct + Indirect + Induced + Catalytic Total” line adds in the direct, indirect, and induced benefits of aviation-facilitated tourism and trade. All dollar values are in 2012 dollars.

Source: Enright, Scott & Associates, Ltd. analysis.

Appendix F. EIRRs and ENPVs, 2011 and 2014 Analyses

As indicated at the beginning of this report, ESA carried out an economic impact analysis for Scenario 1, in which two runway capacity of HKIA is optimised, and Scenario 2, in which a third runway was also constructed in 2011 as well as the analysis included in this report carried out in 2014. The EIRR and ENPV results from the 2011 report and the present report are shown in Exhibit F1. The ENPVs for Scenario 1 and Scenario 2 are higher in the 2014 analysis than the 2011 analysis. The main reason was that the throughput estimates for passengers and cargo are higher in the 2014 analysis than in the 2011. The 2011 analysis relied on forecasts made during a particularly bad period for the aviation industry. In reality, the industry in Hong Kong bounced back much faster than was projected in the earlier forecasts to the point where the actual throughputs in 2011, 2012, and 2013 were significantly higher than the forecasts used in the 2011 report. The impact of higher throughput more than offset higher projections for construction and maintenance costs, slightly lower estimates for economic multipliers, and lower per passenger spending estimates. In addition, the 2014 analysis used year 2012 Hong Kong dollars while the 2011 analysis used 2009 Hong Kong dollars. The EIRRs for Scenario 2 are higher in the 2014 analysis than in the 2011 analysis for similar reasons. The EIRRs for Scenario 1 showing lower in the 2014 analysis is deceiving in that for the 2014 analysis we had to have all capital and maintenance spending placed at the beginning of a year and all results benefits obtained at the end of the year (or at the start of the next year) in order to obtain finite EIRRs. Otherwise they were infinite.

Exhibit F1. Comparison of 2011 and 2014 EIRR and ENPV Results

Impact	2011 Analysis		2014 Analysis	
	EIRR (Percent)	ENPV (HK\$ Millions)	EIRR (Percent)	ENPV (HK\$ Millions)
Scenario 1				
Direct	354%	233,646	106%	314,739
Direct + Indirect	511%	347,744	211%	482,969
Direct + Indirect + Induced	623%	431,673	285%	591,214
Direct + Indirect + Induced + Catalytic Direct Only	1221%	861,406	626%	1,213,343
Direct + Indirect + Induced + Catalytic Total	2144%	1,532,911	1,164%	2,243,271
Scenario 2				
Direct	23%	481,862	27%	525,722
Direct + Indirect	29%	729,071	179%	841,521
Direct + Indirect + Induced	32%	912,009	269%	1,045,637
Direct + Indirect + Induced + Catalytic Direct Only	47%	1,930,652	623%	2,309,927
Direct + Indirect + Induced + Catalytic Total	63%	3,532,127	1,163%	4,447,187

Note: The 2011 analysis showed currency values in 2009 HK\$. The 2014 analysis showed currency values in 2012 HK\$.

Source: Enright, Scott & Associates, Ltd. analysis.

Appendix G. Cost of delay

Given the greater positive ENPV of Scenario 2 compared to Scenario 1, it stands to reason that any delay in completing and opening the capacity projected for the third runway in Scenario 2 would impose a cost on the Hong Kong economy. The cost of this delay in ENPV terms for aviation-related businesses in Hong Kong and non-aviation businesses at HKIA only (i.e. excluding catalytic impacts) is given in Exhibit G1, see Appendix A.5 for methodology details.

Exhibit G1. Cost of Delay in Opening the Third Runway for Aviation-related Businesses in Hong Kong and Non-Aviation Businesses at HKIA

Delay	Scenario 2 ENPV (HK\$ mn)	Cost of Delay in ENPV (HK\$ mn)	Percentage Difference
No Delay	1,045,637		
1 year	1,030,320	15,316	1.5%
2 Years	1,015,789	29,848	2.9%
3 Years	1,002,102	43,535	4.2%
4 Years	989,204	56,433	5.4%
5 Years	976,989	68,648	6.6%

Note: Cost of delay = ENPV with delay – ENPV with no delay. ENPV for Direct + Indirect + Induced impacts (i.e. catalytic impacts excluded)

Source: Enright, Scott & Associates, Ltd. analysis.