TECHNICAL APPENDIX

THE BAHAMAS INPUT-OUTPUT MODEL

CONTEXT AND RATIONALE

According to the most recent Tourism Satellite Account (TSA) for The Bahamas, completed for 2012, visitors represent an integral part of the economy. Direct tourism GDP accounted for $1.6 billion or 15% of Bahamian GDP in 2012.
By monitoring the visitor economy, policymakers can inform decisions regarding the funding and prioritization of the sector's development. They can also carefully monitor its successes and future needs.

The TSA measures the direct effects of tourism. That is, the immediate effects of the additional tourism demand on the production processes and supply of goods and services within an economy—in terms of additional goods and services that are produced, and the additional value added and jobs that are supported.
However, it is also important to consider the impacts of such increased economic activity on the country as a whole. This includes not only the impact of actual spending by tourists but also the downstream effects of this injection of spending into the Bahamian economy. These additional channels of activity can be grouped into two core channels of impact: indirect and induced effects.

- **Indirect effects** stem from supply chain spending, where each directly affected sector also purchases goods and services as inputs (e.g. food wholesalers, utilities) into production.
- **Induced effects** are generated when employees, whose wages are generated either directly or indirectly by travel and tourism, spend those wages in the local economy.

Considering the direct, indirect and induced impacts together equates to the total economic impact of tourism.

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THE BAHAMAS INPUT-OUTPUT MODEL

MODEL OBJECTIVES

Tourism Economics were asked by The Bahamas Ministry of Tourism and Aviation to develop a functioning input-output (I-O) tourism impact model for The Bahamas to calculate the indirect and induced impact of tourism. This appendix presents a summary of the technical steps we worked through in order to develop this model.

The following pages explain these the steps taken in order to transform SUTs and build a functioning I-O model in more detail. To develop the theoretical aspects of these chapters we drew from the following sources:

- Office of National Statistics, Input-output analytical tables: methods and application to UK National Accounts, 2017
- Office of National Statistics, United Kingdom Input-Output Analytical Tables, 2010
- Eurostat, Manual of Supply, Use and Input-Output Tables, 2008
- UNWTO, OECD, Eurostat, the United Nations Statistics Division, Tourism Satellite Account: Recommended Methodological Framework, 2008
- OECD, Understanding National Accounts, 2014

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SUPPLY AND USE TABLES

Supply and use tables (SUTs) provide a detailed picture of the processes of production, the use of goods and services and the income generated from production within an economy. SUTs are presented as two matrices—one for supply and one for use. The supply table shows the supply of goods and services by type of product of an economy for a given period of time. Supply is shown from domestic industries at basic prices plus imports as well as valuation matrices for distributors' trade margins attached to products and taxes less subsidies on products. Summing across these categories gives the total supply of products at purchasers' prices.

Fig. 1 presents the basic framework of a supply table.

Figure 1. Supply Table

<table>
<tr><th rowspan="2">Products</th><th colspan="4">Output of industries</th><th rowspan="2">Imports CIF</th><th rowspan="2">Total supply at basic prices</th><th colspan="2">Valuation</th><th rowspan="2">Total supply at purchasers' prices</th></tr>
<tr><th>Industry 1</th><th>Industry 2</th><th>Etc.</th><th>Total domestic output at basic prices</th><th>Trade and transport margins</th><th>Taxes less subsidies on products</th></tr>
<tr><td>Product 1</td><td colspan="3" rowspan="3">Production matrix</td><td rowspan="3">Domestic output</td><td rowspan="3">Import matrix</td><td rowspan="3">Total supply at basic prices</td><td colspan="2" rowspan="2">Valuation matrix</td><td rowspan="3">Total supply at purchasers' prices</td></tr>
<tr><td>Product 2</td></tr>
<tr><td>Etc.</td></tr>
<tr><td>Total</td><td colspan="4">Total output of industries at basic prices</td><td colspan="2">Total</td></tr>
</table>

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SUPPLY AND USE TABLES

The second matrix within SUTs is the use table which shows the use of goods and services within an economy. Specifically, the table details the input structure of each industry within an economy by showing the use of goods and services by product and type of use for intermediate consumption by industry, i.e. demand for goods and services to be used up or altered in the production processes of businesses. The use table also shows the value of the products and services absorbed by the components of the final demand including consumption expenditure, gross capital formation and exports—details of household consumption and labour costs (mentioned in the below bullet) are essential for estimating the wage-financed consumption (or induced) impact . Also included in the use table are the components of gross value added by industry, including labour costs, taxes less subsidies on production, profits etc—gross value added reflects the factor costs for primary inputs of each industry. Figure 2 below presents the basic framework of the use table.

Figure 2. Use Table

	Input of industries				Final uses								
Products	Industry 1	Industry 2	Etc.	Total	Final consumption expenditure by households	Final consumption expenditure by non-profit organisations	Final consumption expenditure by government	Gross fixed capital formation	Changes in valuables	Changes in inventories	Exports	Total	Total use at purchasers' prices
Product 1	Intermediate consumption at purchasers' prices				Final demand at purchasers prices								
Product 2													
Etc.													
Total													
Compensation of employees	Gross value added at basic prices												
Other net taxes on production													
Consumption of fixed capital													
Operating surplus, net													
Gross value added at basic prices													
Output at basic prices													

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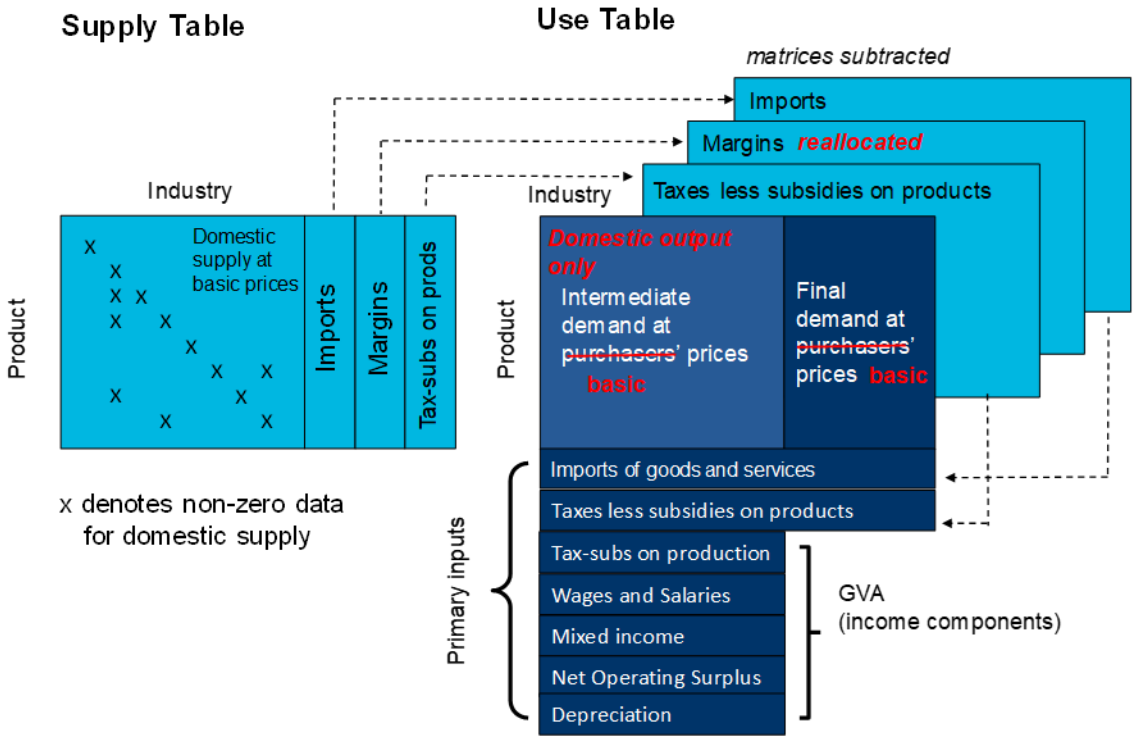
THE BAHAMAS INPUT-OUTPUT MODEL

TRANSFORMATION OF SUTS TO A DOMESTIC IO MODEL

SUTs can be used to develop a symmetric IO table. The first step in developing the IO table is to transform SUTs from purchasers' prices into domestic basic prices by adjusting for imports, taxes and subsidies on products, and distributor trading margins. We use the supply table to remove imports from the use table's product by industry matrix, remove subsidies and taxes from the use table's product by industry matrix, and redistribute trading margins within the use table. Once imports—which account for 23% of supply in The Bahamas—and net taxes are removed from the use table, separate rows for each these components are created in the primary inputs, leaving the industry output totals unchanged. Fig. 3 below demonstrates the process described above.

Figure 3. Transformation



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THE BAHAMAS INPUT-OUTPUT MODEL

INPUT-OUTPUT FRAMEWORK

The above steps result in a functional input-output model for The Bahamas economy. The model allows for the tracing of money through the national economy as a result in a change in final demand driven by a project or event. The model uses inputs as the change in final demand, and estimates the changes in the economy in terms of:

- GDP, or more specifically, tourism's gross value-added contribution to GDP
- employment, measured on a headcount basis
- compensation of employees, which includes the gross wages paid to workers but also includes benefits in kind and employer social security contributions (including pensions).

Adding together direct, indirect and induced impacts across the metrics above provides an estimate of the total economic impact in The Bahamas. In Figure 4 below, reading across horizontally illustrates the distribution of each industry's output, split between intermediate demand from other industries (used as an input to production) and final demand (consumer spending, exports and other government consumption). Therefore, Industry 2 in Fig. 4 purchases an amount, C2,1 from Industry 1 as an input to their production process. Reading down vertically indicates what each industry purchases from other industries in the national economy by way of inputs which, when combined with imports from abroad (leakages), employment costs, operating surplus and any additional taxes or subsidies to production, gives total inputs and will equal total outputs. In the model illustrated in Fig. 4, C8,1 will equal C1,8.

This framework helps to develop an understanding of how an increase in activity and spending in one area filters throughout the rest of the economy. For example, an increase in consumer spending on the output of one industry will require input purchases from other industries as well as new labour inputs (employment and wages). In turn, these additional impacts will further filter through the economy with additional purchases from other industries.

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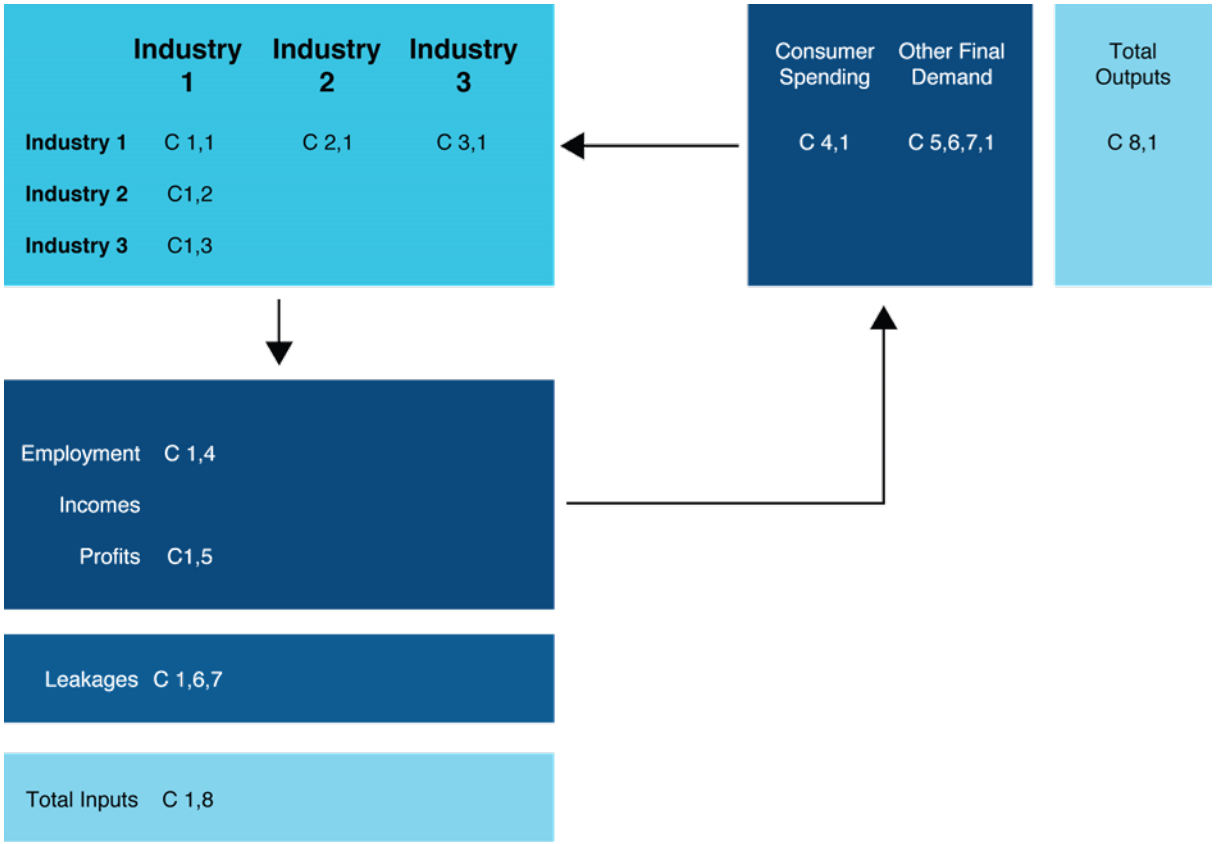
Figure 4. Input-Output Framework



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Tourism Economics is an Oxford Economics company with a singular objective: combine an understanding of the travel sector with proven economic tools to answer the most important questions facing our clients. More than 500 companies, associations, and destination work with Tourism Economics every year as a research partner. We bring decades of experience to every engagement to help our clients make better marketing, investment, and policy decisions. Our team of highly-specialized economists deliver:

- Global travel data-sets with the broadest set of country, city, and state coverage available
- Travel forecasts that are directly linked to the economic and demographic outlook for origins and destinations
- Economic impact analysis that highlights the value of visitors, events, developments, and industry segments
- Policy analysis that informs critical funding, taxation, and travel facilitation decisions
- Market assessments that define market allocation and investment decisions

Tourism Economics operates out of regional headquarters in Philadelphia and Oxford, with offices in Belfast, Buenos Aires, Dubai, Frankfurt, and Ontario.

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