

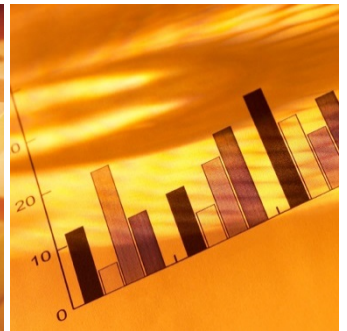
# A Discussion of the Economics of Preclearance with Proposed Measurement Methodologies

by Jean-François Arsenault  
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# **A Discussion of the Economics of Preclearance with Proposed Measurement Methodologies**

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*The views expressed herein are those of the authors and do not necessarily  
reflect those of the Department of Public Safety Canada.*

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## Acronyms / Abbreviations

ACI	Advance Commercial Information
ACROSS	Accelerated Commercial Release Operations Support System
ASPM	Aviation System Performance Metrics
BCA	Benefit-Cost Analysis
CBA	Cost-Benefit Analysis
CBP	US Customs and Border Protection
CBSA	Canada Border Services Agency
CGE	Computable General Equilibrium
CSA	Customs Self-Assessment
C-TPAT	Customs-Trade Partnership Against Terrorism
DHS	Department of Homeland Security
EBTC	Eastern Border Transportation Coalition
EIA	Economic Impact Analysis
ESIA	Economic and Social Impact Assessment
EU	European Union
FAA	Federal Aviation Administration
FAST	Free and Secure Trade
Frontex	European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union
GAO	US Government Accountability Office
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GPS	Global Positioning System
HEATCO	Developing Harmonised European Approaches for Transport Costing and Project Assessment
ICSS	Integrated Cargo Security Strategy
INNAV	National Information System on Marine Navigation
IO	Input-Output
Mag.	Magnitude of the estimated benefit
PARS	Pre-arrival Review System
PIP	Partners in Protection
QALY	Quality Adjusted Life Years
RFP	Request for Proposal
Rob.	Robustness of potential benefit estimates
SAFE	Framework of Standards to Secure and Facilitate Global Trade
SIS	Schengen Information System
TBS	Treasury Board Secretariat
UK	United Kingdom
US	United States
WA	Washington State
WCO	World Customs Organization

## Abstract

This report has three objectives: summarize the international literature on the economic and social impact of preclearance operations; identify additional benefits of preclearance not well covered in the literature; and propose feasible methodologies to quantitatively measure the benefits to Canada of establishing preclearance processes and facilities in different environments.

Preclearance benefits have not generally been the subject of much measurement. Based on an analysis and literature review, benefits were classified in five categories: optimizing border resources; improving security; improving the experience of crossing the border for passengers; improving the experience of crossing the border for carriers; and generating ‘spin-off’ benefits. In general, benefits in the first four categories are additive, while the last category spans a wide range of beneficial impacts of preclearance which generally can only be assessed using input-output or computable general equilibrium models.

The report describes each benefit, identifies the main recipient of the benefit, and proposes specific methodologies to measure these benefits. For some benefits, in particular those related to security, the inherent difficulties in measuring the impact of preclearance leads the authors to suggest a qualitative treatment. Some preliminary estimates, based on heavy assumptions, are provided as a first step towards an accurate measurement of benefits.

## Executive Summary

Preclearance refers to a process in which customs, immigration and other border functions of a foreign country (e.g. United States) are undertaken within a host country (e.g. Canada). Such operations can potentially generate significant benefits for governments, users and carriers. Preclearance benefits, however, have not generally been the subject of much measurement.

This report has three objectives: summarize the international literature on the economic and social impact of preclearance operations; identify additional benefits of preclearance not well covered in the literature; and propose feasible methodologies to quantitatively measure the benefits to Canada of establishing preclearance processes and facilities in various contexts.

## Global Preclearance Operations

At the moment, air passengers can be precleared for US travel at eight Canadian airports. For marine passengers, preclearance facilities are in place in Vancouver (cruise terminal) and Prince Rupert, while US immigration pre-inspections are provided in Victoria and Sidney. For rail passengers, pre-inspection facilities are in place only at Pacific Central Station in Vancouver. Air preclearance is formalized, while all other initiatives do not have a legal framework. Finally, a pilot project for freight pre-inspection is in operation, with Phase II currently taking place at the Peace Bridge, in Fort Erie.

In general, the policy objectives of preclearance are centered on issues of security, service and cost optimization, and international cooperation. Internationally, the US operates preclearance facilities in a number of countries, including Ireland and the United Arab Emirates. Mexican authorities also operate an air cargo preclearance facility in Texas. Otherwise, the only other preclearance operations known to the research team - the juxtaposed controls between the UK, France and Belgium - are centered on reducing the number of asylum seekers and illegal immigrants.

## Identifying Benefits

In this study, benefits are defined to include the whole spectrum of positive consequences flowing from preclearance operations. Using this wide definition allows for a more complete understanding of the implications of preclearance and can better inform discussions of the policy. Casting such a wide net does mean, however, that these benefits must be reported with care as they are not necessarily additive. The report provides guidance on this issue.

Based on the analysis and literature review, benefits were classified in five categories.

- **Optimizing border resources:** Preclearance can lead to better utilization of resources which are a direct benefit for border agencies and provide direct budget relief.
- **Improving security:** Preclearance, by moving clearance to the perimeter, can lead to reduced threats and improved security.
- **Improving the Border Crossing Experience for Passengers:** Through more efficient border operations (faster, more reliable) and thanks to its unique characteristics (e.g. location of border



clearance which can lead to reduced costs, more choices), preclearance provides clear advantages to passengers.

- **Improving the Border Crossing Experience for Commercial Entities:** Through more efficient border operations (faster, more reliable) and thanks to its unique characteristics (e.g. location of border clearance which can lead to reduced costs, more operational flexibility), preclearance provides clear advantages to carriers and airports.
- **Spin-Off Benefits:** These are benefits which flow directly or indirectly from the previous four categories. For example, reduced border costs for commercial operations can lead to increased trade or increased foreign investment. Reduced wait time for passengers can lead to increased tourism.

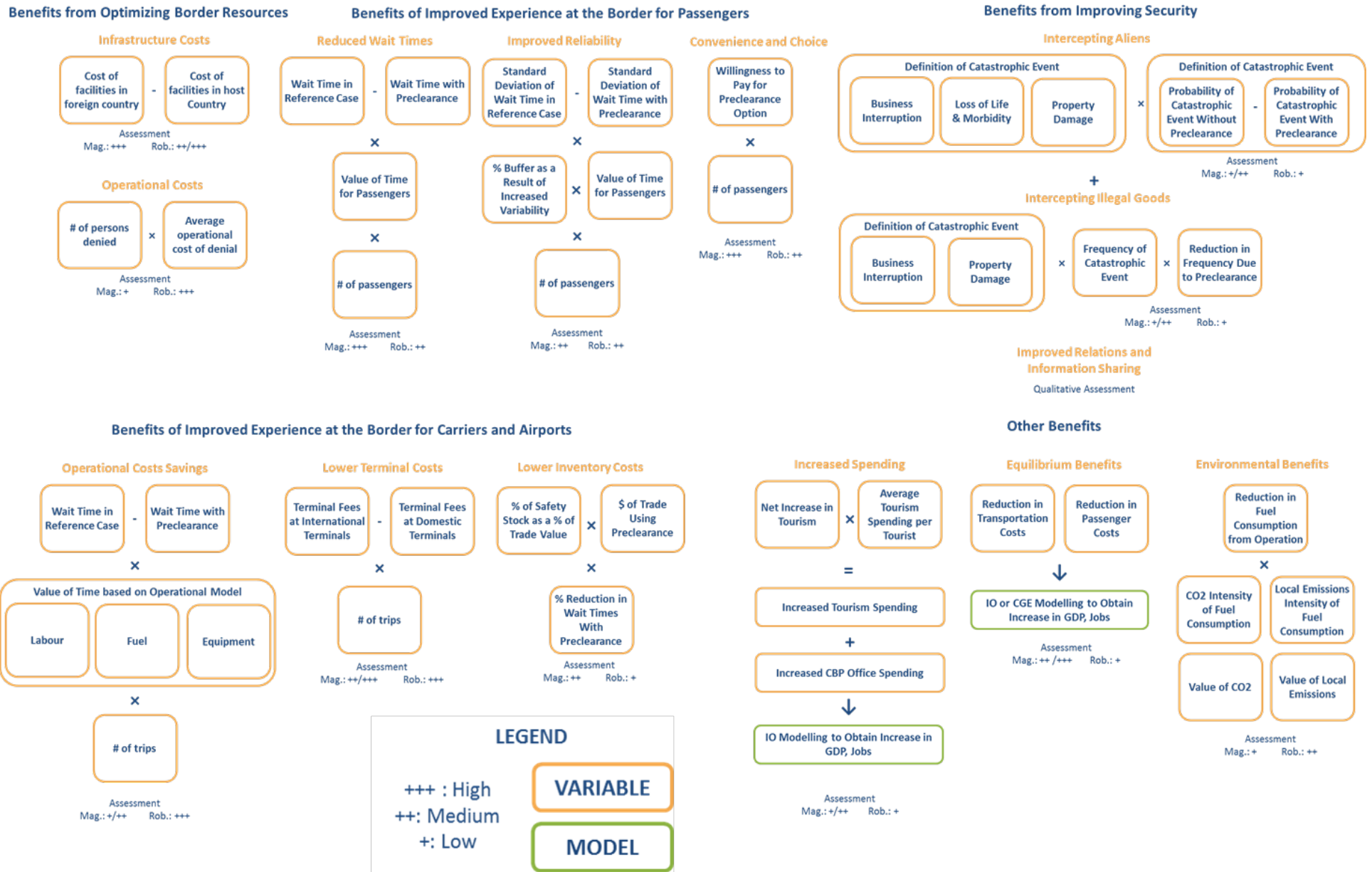
In general, benefits in the first four categories are additive, while the last category spans a wide range of beneficial impacts of preclearance which generally can only be assessed using input-output or computable general equilibrium models.

## Measuring Benefits

For each category of benefits, a set of detailed benefits were identified through consultations and a literature review. They were documented, methodologies were proposed and potential data sources were identified. The following graphic summarizes the proposed methodologies to measure the main quantitative benefits. Of note, accurately measuring security benefits associated with preclearance requires strong assumptions about the role played by preclearance in preventing catastrophic events, assumptions which have no strong basis on which to be developed. For this reason, the research team recommends that these benefits not be quantitatively evaluated, although they could, but instead be assessed qualitatively.

In order to aggregate benefits, some of the benefits must be ‘monetized,’ i.e. transformed from qualitative units (e.g. minutes saved) to monetary benefits, and benefits over time must be brought within a common temporal unit, i.e. future streams of benefits must be expressed into a ‘present value’ amount (i.e. discounted). For monetization, the significant amount of research on the appropriate values to use for different types of benefits, as well as guidelines by the Treasury Board Secretariat (TBS), were leveraged. For discounting, the research team adopted the TBS guidelines which suggest using a rate of 8%. More details on the exact nature of the benefits, the nuance of the measurement methodologies and examples from the literature are provided in the report.

**Figure E-1: Summary of Quantifiable Preclearance Benefits and Overview of Measurement Methodologies**



## Guidance on Application of Methods

Proposing specific methods to measure the benefits of preclearance requires establishing clarity and trading-off between a number of factors.

- **Robustness and Availability:** Is the focus on obtaining robust estimates, or should less robust estimates be produced based on available data? At what point should an estimate be excluded / included based on its level of reliability? What level of assumption is acceptable versus a requirement to use observed data?
- **Scope:** Are benefits measured only for Canada? For both the host and foreign country? Are benefits to international passengers counted?
- **Focus:** Is the measurement for benefits of existing activities or of proposed activities? Are benefits being measured for a single preclearance location or for all preclearance activities? Are they measured before implementation (i.e. potential benefits) or after implementation?

The report provides guidance and information on how each of these issues would impact the methodology proposed. One thing of particular importance is that it is almost impossible to accurately assess division between whether benefits accrue mostly to the host or the foreign country. As such, the research team strongly recommends that any framework adopted does not limit the scope of benefits (i.e. that it include benefits flowing outside Canada), leaving discussions of the distribution of benefits as a qualitative component of the assessment.

The report also identifies which benefits could be summed up, and which would better be the subject of a separate analysis. In a nutshell, benefits requiring input-output or computable general equilibrium modelling should be treated separately to avoid double-counting.

## Conclusion

Potential benefits offered by preclearance operations are significant. Indeed, a very preliminary assessment of the preclearance facility in Toronto's Pearson Airport finds, based on a heavy set of assumptions which would be verified in any serious measurement endeavour, that measurable preclearance benefits for these operations could be of the order of \$47.3 million per year, or nearly \$570 million dollars over a thirty year period (discounted at 8% per year). Most of the significant government-related savings (infrastructure, operational, administrative savings), which accrue solely to the US, are not included in this total. All benefits measured are shared between Canadian and US carriers and passengers, as well as with some international passengers.

Of course, benefits can differ widely, both in their nature and their magnitude, based on the mode and the port of entry. In most cases, benefits to passengers and carriers are driven by the potential for faster customs clearance and the associated time saved. In the air sector, however, the additional operational flexibility leads to much larger benefits, both to passengers (increased choices) and airlines (terminal fees). The extent to which airlines are able to collect these benefits through higher fares (i.e. how the benefit is divided between passengers and airlines) is hard to establish.

In the trucking sector, the benefits associated with lower inventory carrying costs accruing to shippers are potentially significant. This benefit is contingent on saving time at the border.

In some cases, the benefits from lower infrastructure or operational costs could be particularly interesting for border agencies. Similarly, while too hard to accurately value, security benefits are potentially very significant.

Finally, it can be noted that other benefits, largely driven by the primary benefits noted above, can be measured using economic modelling. These models rely on a heavy set of assumptions and can be perceived as not being particularly transparent. On the upside, they do capture a number of impacts which are otherwise practically impossible to capture directly, including potential for improved productivity, improved competitiveness and increased tourism. Unfortunately, because of the methodologies used to measure these benefits, they cannot be meaningfully compared with or added to other measurable benefits, nor can they be compared to the costs of the project/facility. They could, however, be reported separately to inform the discussion about the value of preclearance initiatives to specific stakeholders and the wider economic competitiveness of the country.

# Introduction

## Background

### What is Preclearance?

It is in the economic interests of governments worldwide to facilitate the fluid trade of goods and services and the freer movement of people by reducing the costs associated with international border crossings. This interest is explicit in the 2011 Canada-US *Beyond the Border: A Shared Vision for Perimeter Security and Economic Competitiveness*. Specifically, “Part 2 – Trade Facilitation, Economic Growth and Jobs” of the *Beyond the Border* Action Plan commits both countries to “develop additional initiatives for expediting legitimate travellers and cargo,” including developing a comprehensive approach to preclearance and pre-inspection, covering all modes of cross-border trade and travel.<sup>1</sup>

Canada and the US already have a number of joint or complimentary programs designed to reduce delays at border crossings through various levels of partial pre-approval prior to entry in each other’s country.<sup>2</sup> These programs facilitate – or are designed to facilitate – cross-border movements. In this respect, they can be thought of as “pre-processing” arrangements, but are not true border preclearance operations, as defined in the Statement of Work (page 9 of 34, RFP) for this study:

Preclearance refers to a process in which customs, immigration and other border functions of a foreign country (such as the United States) are undertaken within a host country (such as Canada).

At the moment, the only full and formal preclearance operations as defined above between Canada and US consist of US Customs and Border Protection (CBP) officials working in Canada making admissibility determinations prior to onward travel to the US in eight Canadian airports. A number of

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<sup>1</sup> Government of Canada, “Perimeter Security and Economic Competitiveness Action Plan”, 2011, p.16.

<sup>2</sup> These programs are numerous. Some examples are provided below:

- Free and Secure Trade (FAST): A bilateral initiative which offers expedited clearance to carriers and importers enrolled in the Customs-Trade Partnership Against Terrorism (C-TPAT) or the Partners in Protection (PIP) program.
- NEXUS: A bilateral voluntary program to expedite the border clearance process for low-risk, pre-approved travelers into Canada and the US.
- Partners in Protection (PIP): A Canada Border Services Agency (CBSA) program that enlists the cooperation of private industry to enhance border and trade chain security, combat organized crime and terrorism and help detect and prevent contraband smuggling. It is similar to C-TPAT in the US and includes importers, exporters, all modes of carriers, customs brokers, couriers, warehouse operators, freight forwarders and shipping agents.
- Pre-arrival Review System (PARS): A voluntary carrier based program that utilizes a bar-code system to facilitate the flow of information at the border and allows CBSA to release shipments more quickly (unless an examination is required).
- Accelerated Commercial Release Operations Support System (ACROSS): Uses electronic technology to simplify the process of importing goods into Canada. Brokers and importers communicate electronically with CBSA and are not required to submit paper release packages.

other Canadian locations are also conducting pre-inspection and informal preclearance/pre-inspection operations, including four ferry or cruise ship terminals, one rail station and road border crossings.

International examples of preclearance notably include US operations in airports in Ireland and the United Arab Emirates, Mexican operations for air cargo at Laredo, Texas, and British and French preclearance operations under their Channel Tunnel agreements.

## Terminology for Preclearance Operations

From a legal perspective, the only preclearance operations in Canada are the ones conducted at airports. These operations cover the whole clearance process (immigration, customs, agriculture) and have a clear legal framework. They represent what can be called *full preclearance operations*.

All other cases mentioned in the report are either partial or informal preclearance operations. When they represent full preclearance operation, but do not have a legal framework, they are referred to as *informal preclearance operations*. When they represent partial preclearance, i.e. only immigration services are provided, they are referred to as *pre-inspection operations*. In some cases, they are both informal and partial. In these cases, they are also called pre-inspection operations, since these do not necessarily require a legal framework.

Terminology	Application
Full Preclearance	Eight Canadian airports
Informal Preclearance	Port Metro Vancouver (Ferry), Prince Rupert (Ferry)
Pre-inspection	Trucking pilot project, Victoria Inner Harbour (Ferry), Port of Sidney (Ferry), Pacific Central Station (Rail)

All other programs noted in the report fall outside the scope of preclearance, and are only noted to provide some context on the benefits that could accrue from similar operations. The table below summarizes the semantic applied to all Canadian preclearance operations.

Also worth of mention, throughout the report there are references to *host country* and *foreign country*. In the context of preclearance, the host country is the one where the preclearance facility or preclearance operations are located. The foreign country is the one whose officers are located in the host country. Canada, for example, is the host country for all Canada-US preclearance and pre-inspection operations, while the US is the foreign country.

## Terminology and Stakeholders

Stakeholders consulted often understood the term “preclearance” to mean inspection and border activities occurring away from the physical border. In their mind, this included activities covered by the Integrated Cargo Security Strategy (ICSS) and other programmes requiring enrollment, but allowing for expedited processing (e.g. the Free and Secure Trade (FAST) programme). For some, it even included preprocessing and electronic data initiatives such as Advance Commercial Information (ACI) which lower transaction times at the border.

The term “reverse inspection” was most often used when discussing activities considered as preclearance, especially in the context of freight-focused preclearance initiatives. While this does not represent a challenge for the research, it is useful to note as it may be relevant to how authorities wish to communicate their findings to industry stakeholders.

## Objectives

This study will help inform the Government of Canada on the benefit-measurement methodologies for preclearance operations. This information could contribute to the decision-making process for the establishment of new or more preclearance operations on either side of the border, support the evaluation of existing and future preclearance operations, help communicate the benefits of preclearance, and foster meaningful discussions among stakeholders, within and outside government, about the benefits of such operations.

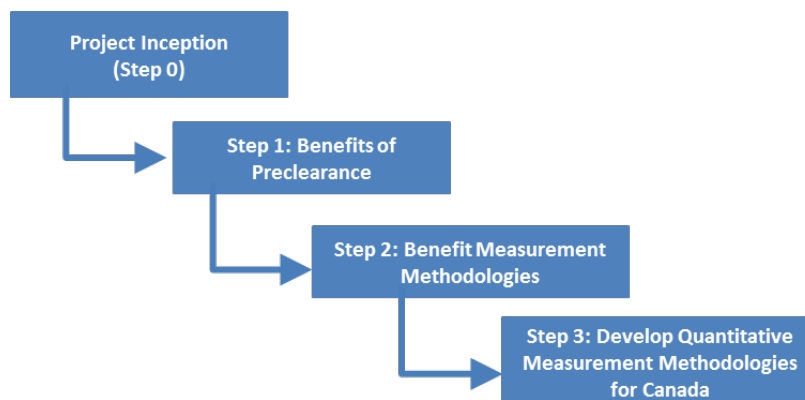
As stated in the RFP Statement of Work (p. 10), the objectives for the project are thus as follows:

- 1) To summarize the international literature on the economic and social impacts of preclearance and pre-inspection operations that could apply to the Canadian economy and to Canadians, which shall include a comparison of similar preclearance operations and arrangements in other countries;
- 2) To identify and discuss other possible economic and social benefits of preclearance and pre-inspection operations not well-covered in the literature; and
- 3) To propose feasible methodologies to quantitatively measure the economic and other benefits to Canada of establishing preclearance processes and facilities in different environments on either side of the border (i.e., Canadian preclearance located in the United States and US preclearance located in Canada, in all types of border crossing situations).

## Project Structure

The project is to be developed in three broad steps, as set out in Figure 1. This Final Report reflects the output of all project steps.

**Figure 1: Project Structure**



## Key Methodological Approaches

The methodology used in informing this report relied primarily on a review of literature as well as some consultations with key experts and stakeholders. Given the limited literature on the particular subject of preclearance benefit valuation, the research team extended the review to include benefits of other initiatives aimed at “thinning” the border, where appropriate.

To ensure that all the key literature was covered, border experts in Canada, the US and internationally were consulted. A list of the literature identified is included in Appendix A. A list of the stakeholders consulted is included in Appendix B.

## Limitations

Given the nature of this project, most of the information herein represents findings from third parties which cannot be verified. While the research team do not warrant accuracy of third party data and findings, the team tried to the extent possible to validate it.

Another key limitation is the possibility that some portions of the literature may not have been fully covered. This is particularly likely for the literature outside the public domain, including but not limited to: private negotiations; limited distribution meetings and conference proceedings; and unpublished research. Moreover, some literature addressing these issues, but using alternative terminology or outside the scope of the team’s search, may have been omitted.

Unless otherwise stated, the opinions herein are those of the authors, and do not necessarily represent the views of Public Safety Canada or the Government of Canada.

## Organization of this Report

The remainder of this report is organized as follows:

- Chapter 2: Global Preclearance Operations
- Chapter 3: Defining Benefits
- Chapter 4: Benefits and Impacts of Preclearance Operations
- Chapter 5: Measurement Approaches
- Chapter 6: Measurement Methodologies Identified in the Literature
- Chapter 7: Proposed Methodologies for Measuring Individual Benefits from Preclearance
- Chapter 8: Towards a Framework
- Chapter 9: Conclusion and Next Steps

The appendices follow.



# Global Preclearance Operations

## Canada-US Preclearance Operations

### Brief History of the Program

Preclearance at Canadian airports for travellers bound for the US has a long history. Informal arrangements between the US and Canada were in place as early as 1952. That year, a pilot preclearance program was initiated at Toronto airport at the request of American Airlines. The airline believed that such a system would lead to better resource utilization.<sup>3</sup> This arrangement was extended and formalized through the *Canada-US Air Transport Preclearance Agreement* in 1974, with implementing legislation under the *Preclearance Act* of 1999. Since then, the two countries continued to cooperate with the signature of a new agreement in 2001, the *Canada-US Agreement on Air Transport Preclearance*.<sup>4</sup>

In recent years, however, preclearance operations for passengers and goods travelling with them have been extended to some ferry and rail operations across the country. At this time, no comprehensive agreement similar to the one for air transport is in place for these initiatives. The truck *cargo pre-inspection* pilot project, which is essentially a partial form of preclearance for freight, is governed by the framework provided by the *Preclearance Act*.

### Program Application

While conceptually similar, the program for passengers<sup>5</sup> and commercial freight are fairly different in terms of their history, their implementation and, to a large extent, the benefits they generate. As a result, they are treated separately throughout the report, but similarities are noted.

#### Passenger Preclearance Operations

As noted earlier, preclearance is essentially the process by which all necessary border functions of a foreign country are undertaken within a host country. In the case of Canada and the US, preclearance has been primarily implemented in Canadian airports, with US Customs and Border Protection (CBP) agents, including immigration, customs and agriculture specialists, conducting preclearance operations. Canadian airports with preclearance facilities are Calgary International Airport, Edmonton International Airport, Halifax Stanfield International Airport, Montréal-Pierre Elliott Trudeau International Airport, Ottawa Macdonald-Cartier International Airport, Toronto Pearson International Airport, Vancouver International Airport and Winnipeg James Armstrong Richardson International Airport.

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<sup>3</sup> General Accounting Office, *Decisions of the Comptroller General of the United States: Volume 59*, Article “Matter of: Customs Service Recovery of Preclearance (Including TECS) Cost Under User Charge Statute, 31 USC. 433a, April 15, 1980”, p. 390-395.

<sup>4</sup> See the 2001 Treaty at <http://www.treaty-accord.gc.ca/text-texte.aspx?id=103842> (accessed on February 1<sup>st</sup>, 2014).

<sup>5</sup> Of note, passenger preclearance is meant to include both passengers and their luggage.

A key requirement of preclearance operations is the capacity to operate a “sterile” unit of transport, thus ruling out transportation with multiple stops before crossing the border. This limitation notably rules out a large number of train routes (e.g. the train from Toronto to New York stops at Oakville and Aldershot). In Canada, key rail services meeting that requirement originate out of Pacific Central Station in Vancouver and Central Station in Montreal. In Vancouver, partial preclearance (i.e. pre-inspection) services have been in place for a number of years for the Cascades service to Portland, with immigration and baggage inspection completed at the station, and customs’ inspections conducted on-board after the train crosses the border at Blaine, WA. A pilot initiative to conduct full preclearance of travelers and their baggage is being negotiated (EBTC (2011), p. 4). Montreal, on the other hand, has no preclearance program in place, although there is interest and it could potentially be implemented at a future date.

In the marine ferry and cruise sectors, informal preclearance is in place at Port Metro Vancouver and Prince Rupert. Preclearance from Vancouver serves a variety of lines, including those travelling to Alaska or those who have a first stop at a US west coast city (e.g. Seattle, San Francisco). The Prince Rupert preclearance is used for onward travel to Alaska.

Immigration pre-inspections are also provided at Victoria Inner Harbour for the service to Port Angeles, WA and at the port of Sidney for the service to Anacortes, WA. Customs and agriculture formalities are completed upon arrival.

In terms of land crossing, no preclearance facilities are in place for passengers.

### **Freight Preclearance Operations**

Freight preclearance operations do not have the long history of passenger air transport preclearance. In fact, the CBP notes clearly on its website that its preclearance process is “...focused solely on passenger processing (no cargo)”.<sup>6</sup> In recent years, however, the focus on perimeter security and economic competitiveness has brought the question of freight preclearance forward.

While negotiations have been ongoing since the early 2000s, it is only very recently that a pilot project has been implemented for freight pre-inspection. In particular, a pilot project in two phases for truck freight pre-inspection is currently in operations. Phase I ran at the Pacific Highway near Surrey (BC) from June 2013 to January 2014 (official end on January 2), and Phase II has been in operations since February 2014 at the Peace Bridge, in Fort Erie. In both locations truck pre-inspection is possible since travel between the Canadian crossing and the US border is ‘sterile’ (and very short). Of particular note, these operations do not involve only cargo clearance, but also the pre-clearance of drivers and passengers. The pilot is not considered full preclearance since an accelerated inspection and all secondary inspections are still done in the US.

It can also be noted that other operations of a very similar nature have been put in place at other locations in Canada for cargo between Canada and the United States. Indeed, as part of the 2011 *Beyond the Border Action Plan*, Canada and the US committed to developing a joint strategy under the principle of “cleared once, accepted twice.” The *Integrated Cargo Security Strategy* (ICSS) is “aimed at identifying and resolving security concerns as early as possible in the supply chain or at the

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<sup>6</sup> See [https://help.cbp.gov/app/answers/detail/a\\_id/1640/~/-/cbp-preclearance](https://help.cbp.gov/app/answers/detail/a_id/1640/~/-/cbp-preclearance), accessed on February 1<sup>st</sup>, 2014.

perimeter, with the expectation that this will allow us to reduce the level of these activities at the Canada-US border.”<sup>7</sup> Clearly, the ICSS implementation is conceptually very similar to preclearance operations, with inspections occurring away from the border on host country soil. In fact, many stakeholders refer to these pilot projects as “cargo preclearance”.

At the moment, the two pilot projects under the ICSS are in Montreal and Prince Rupert. Unlike preclearance operations, which involve US officials operating on foreign soil, pre-inspections for ICSS are done by CBSA officers *on behalf* of CBP. Containers moving by truck from the Port of Montreal to the US are inspected and secured with high security bolt seals for transit through Canada to the border, eliminating the need for a duplicate inspection at the border. The same process is used in Prince Rupert for container trains bound for the US. It is important to note, however, that these pilot projects are not preclearance operations. Not only does the absence of CBP officers on Canadian soil makes it fundamentally different from a legal perspective, it also does not involve any immigration clearance. These activities are thus excluded in the analysis.

### **Future Preclearance Applications**

At the moment, Canada-US preclearance operations are all located in Canada (i.e. only US-bound passengers and goods). Hence, it generally involves the construction of infrastructure in Canada instead of the US. It also generally involves an increase in the overall infrastructure capacity of the system which would not otherwise be possible. For example, preclearance facilities for the Peace Bridge in Fort Erie are meant mainly as a means to improve US CBP facilities, which are severely land-constrained in Buffalo leading to issues with border congestion and a bottleneck at the border. Similarly, preclearance facilities in Canadian airports reduce the need for processing capacity in US airports. As a result, preclearance facilities are generally considered only for high-volume border crossings.

In the future, one could imagine setting up preclearance facilities for entirely different reasons. For example, facilities could in fact represent the combination of CBSA and US CBP services on one side of the border, with one officer providing immigration and border services for travellers in either direction. This could effectively halve infrastructure and operational costs, potentially improving the viability (or extend the service hours) of smaller border crossings.

### **Stated Policy Objectives**

In both Canada and the US, the stated objectives are centered on issues of security, service optimization and international cooperation. More specifically, the US CBP notes six key objectives for its preclearance operations.

- “Prevent terrorists, terrorist instruments and other national security threats from gaining access to the US.
- Intercept inadmissible persons and goods before boarding US-bound conveyances.

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<sup>7</sup> See CBSA, “Integrated Cargo Security Strategy (ICSS) Overview”, <http://www.cbsa-asfc.gc.ca/trade-commerce/icss-sisf/icss-sisf-menu-eng.html>, accessed on February 1<sup>st</sup>, 2014.

- Protect US agricultural infrastructure from foreign pests, disease and global outbreaks.
- Facilitate entry of legitimate trade and travelers across our US borders.
- Reduce congestion at US “gateway” airports and support domestic connections.
- Foster cooperation with foreign (host) authorities in trade, diplomacy, law enforcement and security.”<sup>8</sup>

In Canada, the main stated purpose of these operations, as per the *Preclearance Act* of 1999, is “to facilitate the movement of travellers and goods between Canada and the United States” (p. 3).<sup>9</sup> While the statement remains fairly general, it is well-aligned with the objectives mentioned by the US CBP, which suggests that these same objectives likely reflect the considerations of Canada.

## Global Preclearance Operations

When preclearance is taken strictly as *a process in which customs, immigration and other border functions of a foreign country are undertaken within a host country*, there are very few comparable operations across the globe. In addition to US CBP preclearance operations outside Canada, the only other known example is the juxtaposed controls between France (Calais) and the United Kingdom (Folkestone) for travel on the Eurotunnel route.

Otherwise, a number of programs with similar policy objectives, but different reach and implementation strategies, also exist. For example, the UK did set up immigration preclearance with the Czech Republic in Prague in July 2001, but the program was stopped in February 2003. Other programs include immigration preclearance on the Eurostar routes (as part of juxtaposed controls), efforts to ‘thin the border’ between Canada and the United States, the Schengen area in the European Union (EU), international standards to promote secure and seamless supply chains (the SAFE program), etc. The following sections provide a brief overview of these programs and their similarities to preclearance operations between Canada and the US. This review contextualizes the Canadian experience, and will help identify literature on the measurement of benefits of a similar nature to those generated by preclearance operations in Canada.

## Other US Preclearance Facilities

### Overview

The US CBP operates seven other preclearance facilities throughout the world, with very similar policy objectives to those operated in Canada.

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<sup>8</sup> US CBP, “Preclearance Operations Factsheet”, <http://www.cbp.gov/xp/cgov/toolbox/contacts/preclearance/> (accessed on February 2<sup>nd</sup>, 2014).

<sup>9</sup> Justice Laws Website, Preclearance Act, S.C. 1999, c. 20, assented to 1999-06-17. Available at <http://laws-lois.justice.gc.ca/PDF/P-19.3.pdf> (accessed on February 2<sup>nd</sup>, 2014).

Outside Canada, the US CBP operates preclearance facilities at Dublin and Shannon airports in Ireland, at Nassau and Freeport in the Bahamas, at Aruba and at L.F. Wade International Airport in the Bermuda and, most recently, in Abu Dhabi airport.<sup>10</sup>

## Policy Objectives

These preclearance facilities and operations are essentially identical to those operated in Canadian airports. From the US perspective, the public benefits sought are identical,<sup>11</sup> and the decision-making process follows a similar logic to the one used to establish operations in Canadian airports.

It is worth noting that the implementation of a preclearance facility in Abu Dhabi raised a number of concerns in the US since no US carriers serve that airport. While the benefits of the policy in terms of security, fluidity and cooperation are significant, potential commercial benefits would accrue to a foreign carrier, with potentially negative impacts on domestic carriers. These concerns, however, have not to-date proved sufficient to prevent the implementation of the facility.

## US-Mexico Freight Preclearance Facilities

### Overview

In 2012, the Mexican government introduced new legislation authorizing Mexican Customs preclearance at the Laredo International Airport in Texas. The airport, which is located at the border of Texas and Mexico, now has a Mexican Customs facility with Mexican agents, allowing it to effectively clear air cargo bound for Mexico at the US airport. Because of its location at the border with Mexico, the facility also allows the airport to receive cargo from anywhere in the world, have it cleared by Mexican Customs, and then flown or trucked to Mexico. The first shipment under the Mexican Customs program departed the Laredo International Airport to Guanajuato, Mexico, on December 20, 2012 (Flores, 2012).

In 2013, two other pre-inspection initiatives between Mexico and the United States were also put forward but are still to be fully implemented.<sup>12</sup> In both cases, the initiatives are CBP pre-inspection activities in Mexico.<sup>13</sup> In particular, a pilot at the Otay Mesa road border crossing in Mexico will house CBP officers who will provide screening for selected goods trucked over the border (i.e. perishable goods that are time sensitive, such as strawberries, tomatoes, etc.). The other initiative would have CBP officers working on the campus of the company Foxconn to clear goods for entry at Santa Teresa in New Mexico.

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<sup>10</sup> See *CBP Preclearance Locations* website, accessed on February 3<sup>rd</sup>, 2014

([http://www.cbp.gov/xp/cgov/toolbox/contacts/preclearance/preclear\\_locations.xml](http://www.cbp.gov/xp/cgov/toolbox/contacts/preclearance/preclear_locations.xml))

<sup>11</sup> The relative importance of different objectives may shift. For example, agricultural or security threats may be of more importance for the Abu Dhabi preclearance facilities, with less emphasis on the fluidity benefits.

<sup>12</sup> According to multiple non-official sources, the implementation of these initiatives is held up over CBP's reluctance to allow its agents to work across the border without firearms, as required by Mexican law.

<sup>13</sup> Dibble, Sandra (2013), "Border Station To Ease Inspection Of Goods: Pilot program will let U.S., Mexican officials screen trucks in Mexico", San Diego Union-Tribune, January 2. Accessed on March 31, 2014. (<http://m.utsandiego.com/news/2013/jan/03/tp-border-station-to-ease-inspection-of-goods/>)

## Policy Objectives

From a supply chain perspective, major gains in efficiency are possible as a result of the Laredo preclearance facility since goods can now be flown directly to their destination, without the need to use an international airport in Mexico with inspection capabilities. This reduces costs and increases choice for shippers, who can now use air transportation more efficiently, sometimes even replacing road logistics. From an airport's perspective, the gain in competitiveness is not trivial since cargo previously flown to Mexican international airports can now be rerouted to the Laredo airport for clearance and further shipping.

The other two initiatives, at Otay Mesa and near Santa Teresa, share the main common objective of expediting clearance and reducing delays for northbound shipments for selected goods.

## Juxtaposed Controls

### Overview

Juxtaposed controls refer to an arrangement between the UK, France and Belgium for foreign officers to provide immigration preclearance on certain cross-Channel routes before boarding the train or ferry, rather than upon arrival after disembarkation. These controls were first set up between the UK and France, following the 1991 Sangatte Protocol which provided for a French border checkpoint in Folkestone, UK and a British border checkpoint in Calais, France. This was in preparation of the opening of the Eurotunnel in 1994, which facilitated the illegal entry of people from the continent to the UK given little to no immigration controls are done before boarding trains.

On that route, namely the Eurotunnel rail route between Folkestone, UK and Calais, France, full preclearance is provided, with both immigration and customs checks completed before boarding the train. This is the only example of preclearance fully analogous to US CBP operations throughout the world that was found. Juxtaposed controls do, however, encompass other *immigration preclearance* operations between the three countries, with foreign officers on the ground. The following operations are notably covered:

- Eurostar services (rail) between French and UK stations, following an agreement in 2000 (*Additional Protocol to the Sangatte Protocol*)
- Cross-channel ferry service between Dover, Calais and Dunkirk following a treaty signed in 2003 (known as *Le Touquet Treaty*).
- Rail service between the UK and Brussels Midi station, following a tripartite agreement in 2004. Of note, Belgian immigration checks (for the Schengen area) are done by French officers.

In all cases, customs checks remain unaffected, and as such this does not represent 'full preclearance.' These operations do not generate the same benefits in terms of fluidity as full preclearance would, since travellers must still proceed to a sterile area for customs clearance on arrival.

### Policy Objectives

In fact, it is important to note that the relative importance of the different policy objectives of juxtaposed controls arrangements is different than those put forward by Canada and the US for similar operations. While security and cooperation remained key objectives for the UK, France and Belgium,

the central objective was to better control the flow of illegal immigrants and asylum seekers to the UK. Moreover, fluidity was not a particular concern.

Indeed, these efforts followed on the heels of an experiment conducted in Prague in the Czech Republic. In July 2001, the UK government set up immigration preclearance facilities at Prague airport. The objective was to diminish the number of Roma asylum seekers, as noted in an official Home Office Statement:<sup>14</sup>

The scheme was implemented from 18th July as a flexible and short term response to the high levels of passengers travelling from Prague who are subsequently found to be ineligible for entry to the UK... In the three weeks before preclearance was introduced there were over 200 asylum claims (including dependants) at UK ports from the Czech Republic. In the subsequent period (during preclearance controls) our provisional figures show that there have been in the region of only 20 claims. More than 110 people were refused leave to enter the UK in Prague during the period preclearance has been in operation.

When asylum seekers are refused entry from a location outside the foreign country (the UK in this case) the obligations of *non-refoulement* do not apply.<sup>15</sup> In this case, preclearance is one way in which to quell the number of asylum seekers and illegal immigrants.<sup>16</sup> In this specific case, the scheme was deemed to be discriminatory on racial grounds by the England and Wales Court of Appeal, and was discontinued in February 2003.<sup>17</sup> Nonetheless, it appears clearly that in the case of juxtaposed controls, and unlike what is stated for Canada-US preclearance where objectives are multiple, the main and sometimes sole objective remains focused on controlling the flow of illegal immigration.

## Other Relevant Programs

A number of other programs have been put in place in North America and around the world to achieve some of the same benefits that preclearance provides. Most of these programs focus on security and fluidity issues, with a few bilateral programs also requiring significant cooperation across nations. In the large majority of cases, the programs focus on one of these three processes:

- Processing documents upstream on the border crossing process (pre-processing)

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<sup>14</sup> See [http://www.gov-news.org/gov/uk/news/home\\_office\\_statement\\_pre\\_clearance\\_controls/7842.html](http://www.gov-news.org/gov/uk/news/home_office_statement_pre_clearance_controls/7842.html), accessed on February 2<sup>nd</sup> 2014.

<sup>15</sup> The Convention Relating to the Status of Refugees 189 UNTS 137 (entered into force 22 April 1954) and Protocol Relating to the Status of Refugees 606 UNTS 267 (entered into force 4 October 1967) ("the Refugees Convention") provides that "No Contracting State shall expel or return (refouler) a refugee in any manner whatsoever to the frontier of territories where his life or freedom would be threatened on account of his race, religion, nationality, membership of a particular social group or political opinion."

<sup>16</sup> Other countries have used, for example, interception on the high seas, after which vessels are sent to third party countries where asylum seekers are, effectively, precleared. For example, the US made agreements with Jamaica and the UK (in respect of its Caribbean territory, Grand Turk Island) which permitted the US to process asylum seekers in those places. Australia passed similar legislation and agreements with Papua New Guinea and Nauru. See Justice A. M North (2011), Extraterritorial Effect of Non-refoulement, International Association of Refugee Law Judges World Conference, Bled, Slovenia. September 2011. Accessed on February 3<sup>rd</sup>, 2014. ([http://www.fedcourt.gov.au/publications/judges-speeches/justice-north/north-j-20110907#\\_ftn3](http://www.fedcourt.gov.au/publications/judges-speeches/justice-north/north-j-20110907#_ftn3))

<sup>17</sup> Clayton, Gina (2012), "Textbook on Immigration and Asylum Law", Oxford University Press, Chapter 7, Section 7.4.5 Preclearance, p. 220-221.

- Developing ‘trusted participants’ who benefit from lower border crossing scrutiny and lower associated costs; or
- Recognition by one country of another’s border control programmes or process,<sup>18</sup> as is the case for the ICSS pilots at Prince Rupert (rail) and the Port of Montreal (trucks).

Freight-focused programs generally facilitate customs’ procedures, while passenger-focused programs generally facilitate immigration procedures, leaving the other largely untouched.

Table 1 provides a brief description of a selection of these programs, and their similarities to preclearance. This review on border programs with similar objectives will help identify literature on the measurement of benefits of a similar nature to those generated by preclearance operations in Canada.

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<sup>18</sup> For example, the World Customs Organization (WCO) provides guidelines for developing mutual recognition agreements for Authorized Economic Operator (AEO) programs such as PIP in Canada (see WCO (2011), “Guidelines for developing a mutual recognition arrangement/agreement,” retrieved on March 13, 2014 at [http://www.wcoomd.org/en/topics/facilitation/instrument-and-tools/tools/safe\\_package.aspx](http://www.wcoomd.org/en/topics/facilitation/instrument-and-tools/tools/safe_package.aspx)). In these guidelines, the WCO defines mutual recognition as (p. 1) a “broad concept embodied within the WCO SAFE Framework whereby an action or decision taken or an authorization that has been properly granted by one Customs administration, is recognized and accepted by another Customs administration. The document that formalizes this action or decision has generally been termed a “Mutual Recognition Agreement” or a “Mutual Recognition Arrangement. The objective of Mutual Recognition of AEOs is that one Customs administration recognizes the validation findings and AEO authorizations by the other Customs administration issued under the other programme and agrees to provide substantial, comparable and - where possible - reciprocal benefits/facilitation to the mutually recognized AEOs. This recognition is generally premised on the existence (or creation) of both relevant legislation (where applicable) and operational compatibility of both or more programmes.” In this case, the mutual recognition involves recognizing the quality and standards of the partner’s program and the processes put in place to qualify AEO. Other types of agreement, such as data exchange agreements, involve recognizing the validity of the data provided by the partner.



**Table 1: Similar Programs with Policy Objectives**

Name	Description (similarities, differences)	Key Objectives
European Union Schengen Area <sup>1</sup>	During the 1980s five states (Belgium, France, Germany, Luxembourg and the Netherlands) decided to create a territory without internal borders. The 1985 <i>Schengen Agreement</i> , complemented by a convention in 1990, entered into force in 1995. It effectively abolished checks at the internal borders and created a single external border, with checks performed using identical procedures across countries. Information is exchanged using the Schengen Information System (SIS). In general, immigration and customs checks are done at the external border, with other members automatically recognizing the control. In 2004, Frontex, an EU agency tasked with promoting, coordinating and developing European border management was created. This agency includes <i>European Border Guard Teams</i> , which participate in joint operations and rapid border interventions, effectively deploying agents from member states outside their country. Given the highly integrated nature of the EU, and the EU status of Frontex, the legal challenges of such operations are much lower than those associated with preclearance.	<ul style="list-style-type: none"> <li>• Significantly reduce infrastructure and operational costs (internal border posts entirely eliminated)</li> <li>• Greatly facilitate the flow of goods and people</li> <li>• Enhance cooperation across participating nations</li> <li>• Pool resources, allocate resources where impact is higher</li> </ul>
NEXUS <sup>2</sup>	The NEXUS program is a bilateral voluntary program to expedite the border clearance process for low-risk, pre-approved travelers into Canada and the US. This process is from travel to the US and Canada from any destination, not only for travel between the two countries. It “allows low-risk pre-approved travellers to use designated NEXUS border crossings without being subject to regular questioning by customs and immigration officers. The program issues NEXUS identification cards for entry into both Canada and the United States to Canadian and American participants.” In Canada, the NEXUS kiosks are located at the same 8 airports as preclearance facilities, and also at Toronto’s Billy Bishop airport for incoming flights. It includes both immigration and customs’ procedures for non-commercial goods. The program has little in common with preclearance operations, other than it increases the processing capacity of limited infrastructure and seeks to achieve similar policy objectives.	<ul style="list-style-type: none"> <li>• Automated process for low-risk travellers to: <ul style="list-style-type: none"> <li>- reduce processing costs;</li> <li>- minimize wait time at the border; and</li> <li>- increase wait time certainty.</li> </ul> </li> <li>• Increased security given additional focus is spent on ‘higher-risk’ travellers</li> <li>• Increased security through biometrics</li> <li>• Bilateral program leading to increased cooperation</li> </ul>
Free and Secure Trade (FAST) <sup>3</sup>	FAST is a bilateral initiative which offers expedited clearance to carriers and importers enrolled in the US Customs-Trade Partnership Against Terrorism (C-TPAT) or the Canadian Partners in Protection (PIP) programs. These two programs are voluntary programs for a variety of supply chain stakeholders (e.g. importers, highway carriers, rail and sea carriers, customs brokers, terminal operators, manufacturers, etc.). Canada and the US are working on harmonizing PIP and C-TPAT applications so that a single application process would be necessary to apply to both programs. The program moves the verification of all trade data declarations and verification away from the border. It also streamlines the process for drivers to cross the border.	<ul style="list-style-type: none"> <li>• Expedited clearance for low-risk participants to: <ul style="list-style-type: none"> <li>- reduce processing costs</li> <li>- minimize wait time at the border</li> <li>- Increases wait time certainty</li> </ul> </li> <li>• Increased security given additional focus is spent on ‘higher-risk’ goods movements</li> <li>• Bilateral program leading to increased cooperation</li> </ul>
Authorized Economic Operators – SAFE <sup>4</sup>	The World Customs Organization (WCO) has established a Framework of Standards to secure and facilitate global trade, called SAFE. SAFE was established in 2005, and has since then been updated a number of times. The SAFE Framework notably sets out the conditions and requirements for Customs and Authorized Economic Operators (‘trusted agents’ or AEOs) to participate in programs to establish expedited clearance. The establishment of a framework notably facilitates the mutual recognition of programs across nations. For example, Canada’s PIP program is now recognized in other countries, through mutual recognition arrangements with similar programs in Japan, Korea and	<ul style="list-style-type: none"> <li>• Established standards to facilitate border programs across the world of a similar nature to PIP and C-TPAT</li> <li>• Encourages the mutual recognition of programs across the world, multiplying associated benefits</li> </ul>

	Singapore. As of June 2012, the WCO Compendium of Authorized Economic Operator Programmes documented 41 different programmes across the world, including the PIP and the Customs Self-Assessment (CSA) in Canada.	
Mutual Recognition Agreements	The WCO also sets guidelines to facilitate and guide the process of mutual recognition for AEO programs. As of June 2012, the WCO Compendium of Authorized Economic Operator Programmes documented 19 mutual recognition agreements of AEO programs internationally, including agreements between Canada and three countries (US, Japan, South Korea and Singapore). Other examples include agreements between New Zealand and the US (the earliest of all 19, concluded in June 2007), between the EU and the US and between China and Singapore. Of the 19 agreements, all of them included at least one of the following countries: Canada, the US, the EU, South Korea, Japan or Singapore. Another 10 agreements were being negotiated, all of which involved at least one of the aforementioned countries, with the exception of an agreement between Norway and Switzerland.	<ul style="list-style-type: none"> <li>• Extend benefits of AEO (improved efficiency, reduce costs and delays, improved reliability) across borders and to additional cargo without incurring significant costs</li> <li>• Reduce cargo theft and pilferage by improving the security of the bilateral supply chain.</li> <li>• Reciprocal or comparable compliance benefits to stakeholders in each country</li> </ul>
Other Canadian and US programs	<p>A large number of other programs, especially for cargo, exist in Canada. Most of the Canadian programs have US equivalent. In Canada, examples include:</p> <ul style="list-style-type: none"> <li>• Customs Self-Assessment (CSA): A CBSA program for low-risk, pre-approved importers, carriers and registered drivers which leads to simplified import border requirements;</li> <li>• Pre-arrival Review System (PARS): A voluntary carrier based program that utilizes a bar-code system to facilitate the flow of information at the border and allows CBSA to release shipments more quickly (unless an examination is required);</li> <li>• Accelerated Commercial Release Operations Support System (ACROSS): Uses electronic technology to simplify the process of importing goods into Canada. Brokers and importers communicate electronically with CBSA and are not required to submit paper release packages; and</li> <li>• Advance Commercial Information (ACI): This program provides CBSA officers with electronic pre-arrival cargo information for all modes of transportation so they are equipped with the right information at the right time to identify health, safety and security threats related to commercial goods before the goods arrive in Canada.</li> </ul>	<ul style="list-style-type: none"> <li>• Objectives vary across programs, but in general lower compliance costs for participants, improved security and a minimization of delays are amongst the most common objectives.</li> </ul>

<sup>1</sup> For more information on the Schengen Area, see [http://europa.eu/legislation\\_summaries/justice\\_freedom\\_security/free\\_movement\\_of\\_persons\\_asylum\\_immigration/index\\_en.htm](http://europa.eu/legislation_summaries/justice_freedom_security/free_movement_of_persons_asylum_immigration/index_en.htm) (accessed on February 5th). For more information on Frontex, see <http://frontex.europa.eu/> (accessed on February 5th).

<sup>2</sup> For more information on the NEXUS program, see <http://cbsa-asfc.gc.ca/prog/nexus/menu-eng.html> (accessed on February 5th).

<sup>3</sup> For more information on the FAST program, see <http://www.cbsa-asfc.gc.ca/prog/fast-expres/menu-eng.html> (accessed on February 5th).

<sup>4</sup> For more information on SAFE, see [http://www.wcopscg.org/wco\\_safe\\_package.html](http://www.wcopscg.org/wco_safe_package.html) (accessed on February 5th).

## Defining Benefits

This chapter provides the reader with a clear understanding of what is, and what is not, a benefit. To this end, a high-level review of the different conceptual approaches used to measure economic consequences is first provided. It is followed by a more in-depth discussion of some of the key issues which can have significant impact on the measurement of these benefits.

## Conceptual Approaches

In general, businesses assess investment opportunities based on a financial analysis. A financial analysis takes into account only the costs and revenues of a project accruing to its proponent (also called ‘internal’ costs and benefits, as they are internal to the project). While a financial analysis is essential to establish the commercial viability of a project, it fails to take into account the non-market (also called ‘external’) effects of the project (e.g. pollution, accidents, etc.). As such, from a public policy perspective the financial analysis is a very restrictive indicator of whether a project should or should not go ahead.

## Key Concepts and Tools

Broader concepts and tools are typically used by governments to assess projects when these are intended to deliver benefits to the public and the economy more broadly. The three approaches most commonly used are the Cost-Benefit Analysis (CBA), the Economic Impact Analysis (EIA) and the Economic and Social Impact Assessment (ESIA).

The key difference between a CBA and an EIA is that the former attempts to capture all benefits and costs accruing to society from a project without double counting (see Section 0), while the latter attempts to assess the impact that the flow of money will have on the local, regional, or national economy (e.g. input-output models). In many occasions, the scope of an EIA is widened further to include a variety of economic and social impacts which go beyond the simple ‘flow of money.’ These wider assessments, called “Economic and Social Impact Assessment” (ESIA), often include many components of a CBA, but with no concerns for double-counting. It also generally focuses on some of the distributive impacts of projects, and the impacts it may have on markets (e.g. real estate, competition, etc.) and society. Figure 2 summarizes some of the components generally covered under a financial analysis, a CBA, an EIA and an ESIA.

**Figure 2: Typical Inclusions and Exclusions from Financial, CBA, EIA and ESIA analyses**

Data Element	Financial Analysis	Cost-Benefit Analysis	Economic Impact Analysis	Economic and Social Impact Assessment
Life-Cycle Project Costs (e.g. capital, operational, maintenance, etc.)	✓	✓	✓	✓
Life-Cycle Project Revenues (e.g. fares, tolls, residual value of assets, etc.)	✓	✓	✗	✓
Direct Employment, Income, Taxation Impacts (closely related to Project Costs and generated spending (e.g. tourism))	✗	✗	✓	✓
Indirect and Induced Impacts (e.g. multiplier effect)	✗	✗	✓	✓
Productivity Enhancements (e.g. transportation cost savings, time-savings/delay)	✗	✓	✗	✓
GHG Emissions	✗	✓	✗	✓
Pollution (e.g. air, noise, water)	✗	✓	✗	✓
Accidents / Safety	✗	✓	✗	✓
Road Damage	✗	✓	✗	✓
Other External Costs / Benefits	✗	✓	✗	✓
Impact on House Prices	✗	✗	✗	✓
Impact of Income Distribution	✗	✗	✗	✓
Impact on Labour Markets, Wages	✗	✗ <sup>*</sup>	✗	✓

Source: CPCS Analysis. \* In cases where labour markets are significantly distorted, the difference between actual and shadow wages is taken into account in CBAs.

## Avoiding Double-Counting in Cost-Benefit Analysis

When conducting a CBA, the main concern is to avoid double-counting. For example, a new road provides benefits for users in terms of time and transportation cost savings. If a toll, or another user charge, were to be implemented, revenues from the toll should not be counted as an additional benefit. Indeed, a toll will simply transfer a portion of the benefits of the new users to the operator. The negative effect of a toll on traffic, however, should be taken into account as to reflect the actual benefits that will be derived from the new facility (less users will benefit).

While the capacity of the operator to raise revenues through user fees has no impact (other than through traffic projections) on the CBA, it may have significant implications on the financial feasibility of the project. It can be important to determine whether the project can generate enough revenues to sustain its operation or whether sustained government intervention will be required.

## Purposes and Uses

It is particularly important to understand the purpose of these different types of analyses. A CBA is a formal tool used to identify the most economically efficient alternative. An EIA follows a ‘flow of money’ logic, establishing the impact of spending on the local economy. An ESIA informs policy-maker about the effects of their policy choice on a wide spectrum of issues.

CBA is in nature comparative, and its goal is to identify the most economically efficient investment alternative, i.e., the one that maximizes the net benefits to the public. It aims to inform decision-making by establishing whether a project should be undertaken, or which project should be undertaken from a set of options. The benefit-cost ratio is the summary statistic which establishes whether the benefits of a project outweigh its costs (i.e. if it is larger than 1.0). It also allows projects to be evaluated on a comparable basis. A CBA is built around a formal framework which ensures the consistency and validity of the results. This reduces the flexibility of the analyst, but it allows CBA to be used as a reliable decision-making tool.

An EIA is different from a CBA. It is not a decision-making or comparative tool. Indeed, it is rather generally used as a regional advocacy analysis, showing how much a specific region will benefit or is benefiting from a given project/spending/activity. It is particularly popular in communication material for public and private projects and companies. This type of analysis is narrowly focused on the “*flow of money*” resulting from direct (capital and operational costs) and indirect (e.g. tourism generation, spending by individuals working on the project) project spending. In these cases, economic models, most often input-output models, are used to measure how this spending will be distributed (imports, export and local spending by industry), and what will be the likely impact in terms of employment, gross domestic product (GDP), income and tax revenues for a given geography. Since economic impacts are not an additive concept, there is no concern about double-counting. In the same vein, the economic impacts should not be compared to costs as there is no theoretical relationship between the two concepts.<sup>19</sup>

ESIAs, on the other hand, attempts to assess the economic consequences that a project will have in a given area. Like the EIA, it does not provide information as to whether a project is economically efficient or not, but rather informs policy-maker about some key effects of their policy choice. An ESIA is not based on a formal framework and there are no formal limits as to what can/should be considered. While this provides flexibility to the analyst, it also weakens the conclusions that can be

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<sup>19</sup> There are two major reasons why the impacts of an EIA cannot be compared to costs. First, unlike a CBA, an EIA addresses the direct impacts of project spending on the economy. These impacts will, by definition, always be at least as large as the spending itself, thus always providing a so-called ‘benefit-cost ratio’ well above unity (if, of course, the spending is not directed to exports). A CBA ignores these impacts as they represent a ‘transfer,’ i.e., the spending associated with the project (e.g. government spending) will occur elsewhere in the economy if the project does not go ahead (or translate into lower taxes). Second, many of the impacts discussed in an EIA are simply a restatement of other benefits of the project and adding them up for a comparison with costs would overstate benefits. For example, if a new road reduces the transit time between a neighbourhood and a common workplace, property values will increase in the neighbourhood. This increase in land value is simply a transfer of the transit time benefits into higher property values – i.e. new purchasers will need to pay to enjoy the benefit of shorter transit times. Adding-up shorter transit times benefits and higher property prices would be double-counting. This is not an issue for an EIA where as many impacts as possible are to be discussed, but it means that impacts cannot be meaningfully added-up and compared to costs.

drawn from an ESIA. Indeed, the absence of a firm, recognized and accepted framework may limit the comparability of findings across projects, increase the likelihood that assumptions and approaches are inconsistent across time or subject, and open the door to analytical biases favouring a preferred outcome.

## What is a Benefit?

### **Academic Definition of Benefits**

In general, an economic benefit is taken to be the set of ‘benefits’ computed as part of a CBA. It thus excludes the economic impact on a given region, since these impacts are the result of increased spending by entities that would otherwise be spent elsewhere (‘a transfer’). It also avoids counting ‘benefits’ twice, thus not providing the full spectrum of economic consequences included in an ESIA. Indeed, as noted as an example before, if the travel time savings are computed, the impact on real estate prices of a shorter drive cannot be included as an additional benefit.<sup>20</sup>

### **Study Definition of Benefits**

For this study, benefits are defined much more broadly to include the whole spectrum of positive consequences flowing from preclearance operations. In other words, the initial identification of benefits will be more in line with an ESIA process. The definition excludes, however, negative consequences as well as project costs, as they are on the other side of the equation and fall outside the scope of the study. Using this wide definition will allow for a more complete understanding of the implications of preclearance and will better inform discussions of the policy.

It is important to note, however, that when developing a methodology to assess the benefits of preclearance operations, the team will root its approach in more formal processes observed in the literature, in particular the CBA and EIA processes. This will ensure that the methodology proposed is credible and can sustain the scrutiny of academics and the public.

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<sup>20</sup> In some CBA, the impact on real estate is used as a proxy to quantify the benefits of a project with very local impacts, e.g. a school or a metro line extension. Indeed, real estate prices before and after the project (or project announcement) provide a good estimation of people’s willingness to pay for the benefits accruing from those projects.

## Benefits and Impacts of Preclearance Operations

As noted in Section 0, the potential applications of preclearance are varied. The range of options for new preclearance operations encompasses facilities and services to preclear passengers or cargo, located in Canada or the US, and operations which increase or reduce the level of service. As such, preclearance operations cannot be evaluated in a single way.

Similarly, knowing the nature of the preclearance operation is essential to better understand which benefits are more or less likely to be realized. While this issue is of high relevance when it comes to measuring benefits, it is less problematic for identifying benefits. The next section identifies five key categories of benefits of preclearance. It is followed by an inventory of benefits, by category. For each benefit, the mechanism through which preclearance is believed to produce the benefit is explained, references to the literature are provided, and the major recipients of the benefit are identified.

### Categorizing Benefits

The potential benefits of preclearance can be categorized in many ways. For example, categorization can be structured around the policy objectives or around the main recipient of the benefit. For the purposes of this study, a hybrid approach was developed.

First, a long list of benefits was identified based on the literature. Then, based on this list, the different channels through which benefits are generated were identified. Four primary channels were identified.

1. **Optimizing border resources:** Preclearance can lead to better utilization of resources which are a direct benefit for border agencies and provide direct budget relief.
2. **Improving security:** Preclearance, by moving clearance to the perimeter, can lead to reduced threats and improved security.
3. **Improving the Border Crossing Experience for Passengers:** Through more efficient border operations (faster, more reliable) and thanks to its unique characteristics (e.g. location of border clearance which can lead to reduced costs, more choices), preclearance provides clear advantages to passengers.
4. **Improving the Border Crossing Experience for Commercial Entities:** Through more efficient border operations (faster, more reliable) and thanks to its unique characteristics (e.g. location of border clearance which can lead to reduced costs, more operational flexibility), preclearance provides clear advantages to carriers and airports.

These channels are, in effect, direct categories of benefits. From these benefits, a number of ‘second-order’ benefits can be generated. For example, reduced border costs for commercial operations can lead to increased trade or increased foreign investment. Reduced wait time for passengers can lead to increased tourism.

5. **‘Spin-off’ benefits:** Third and fourth-order benefits are also possible. For example, reduced operational costs (first-order) may make a particular transportation service viable (second-order), which in turn can increase tourism (third-order). The new service and increase in tourism will in turn generate jobs and economic activity (fourth-order).

# Inventory of Benefits

## Optimizing Border Resources

From a budgetary perspective, the actual costs of managing the border are not insignificant. They include infrastructure as well as operational costs. These costs can be dramatically affected by the decision to proceed with preclearance, particularly in locations where space constraints and land costs differ in the home and host countries.

Conceptually, preclearance opens a new set of options as to where clearance can occur. Indeed, the US CBP or CBSA can now decide to conduct clearance at any point in the supply chain (or travel chain for passengers), as long as there is a way to maintain the sterility of travel<sup>21</sup> between the preclearance area and the usual clearance area. In short, new preclearance options mean that lower-cost options can be implemented.

The documentation reviewed identifies three sets of potential benefits for border agencies: (1) lower infrastructure costs; (2) lower operational costs; and (3) partial reimbursement of costs. Table 2 documents such benefits.

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<sup>21</sup> In general, a sterile area is an area where access is controlled and cargo or passenger cannot be 'corrupted', i.e. a threat cannot be introduced without going through a control. For example, in an airport context, it is the area between the security screening area and the aircraft door. The aircraft itself is also considered a sterile area, since it can only be accessed through the airport sterile area. Hence, in an air transportation context, the sterility of travel is preserved between the screening area and the exit of the passenger at the other airport. For cargo, if the cargo is sealed, the travel can be considered sterile as long as the seal is intact.



**Table 2: Benefits Related to Optimizing Border Resources**

<b>Benefit</b>	<b>Description</b>	<b>Literature &amp; Examples</b>	<b>Recipient of benefit</b>
Lower infrastructure costs	For the agency setting up a preclearance facility, the cost of the facility may be significantly less in the host country than it would be at the usual border crossing location within the foreign country. Moreover, by co-locating host and foreign country operations, significant infrastructures savings may be possible.	The US GAO (2008, p.9) notes that a “benefit of shared border management was that constructing a new US inspection facility in Fort Erie would cost approximately \$100 million less and take less time than expanding the inspection facility in Buffalo.” Similarly, US GAO (1980, p. 393) notes that as a result of preclearance, “Customs is relieved of 20 percent of passenger clearance at US gateway airports,” thus “providing relief from the need to expand US airports,”	Government / taxpayers of the foreign country
Lower operational costs	For the agency setting up a preclearance facility, the cost of operations may be significantly less in the foreign country than it would be at the border crossing at the domestic location.	McAleenan (2013) notes that “Denying admission to the United States at a preclearance location precludes costs, such as enforcement processing, detention, monitoring, transportation, and repatriation costs, that are normally borne by DHS and CBP at the US port of arrival.”	Government / taxpayers of the foreign country
Reimbursement of costs (User fee)	In some cases, the agency or other stakeholders (e.g. the airport) may be able to recoup some of its normal operational or infrastructure costs by charging fees to the company (e.g. an airline) benefiting from it. In effect, the agency is capturing a portion of the benefits that accrue to industry. As a result, this is considered more a transfer than a pure benefit, but is included for completeness.	McAleenan (2013) notes that “savings realized through partial reimbursement of CBP officers posted in Abu Dhabi would allow up to 15 domestic officers to be redirected to process traffic arriving from other international airports.”	It depends. The fee could be collected by foreign or host country government, depending on agreement.

## Improving Security

Security is at the centre of border management policies in the US, Canada and across the world. Increased security can be achieved through an improvement in information sharing and international relations, or through the early interception of threats.

The US CBP notes in its preclearance factsheet<sup>22</sup> three security-related objectives:

1. “Prevent terrorists, terrorist instruments and other national security threats from gaining access to the United States;
2. Intercept inadmissible persons and goods before boarding US-bound conveyances; and
3. Protect US agricultural infrastructure from foreign pests, disease and global outbreaks.”

These benefits are mentioned at numerous occasions in the literature. For example, US GAO (1980) mentions improvement in international relations as a motive for preclearance operations. The US GAO (2008, p.9), when discussing the potential for a US CBP facility in Fort Erie, noted that “shared border management would have also enabled informal information sharing between US and Canadian border inspection officials because the inspection facilities would be located adjacent to each other.” The capacity to “interdict illegal products before they enter the US” and “to interdict inadmissible aliens before their departure for the US” are also noted by US GAO (1980, p.393). The reduction in the risk of immigration fraud is a similar benefit which is noted as one of the key objectives of preclearance operations in the UK.

It is important to note that these benefits are, for the most part, only primary consequences. The control of terrorism, pest and illicit goods, and illegal immigration in the host country translates into benefits largely because they minimize the incidence of catastrophic events: terrorist attacks, spread of foreign pests and disease outbreaks. The actual benefits are thus focused on the reduction in the incidence of loss of life, morbidity, business interruption, property damages and other economic harm.

Table 3 documents these benefits.

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<sup>22</sup> US CBP, “Preclearance Operations Factsheet”, <http://www.cbp.gov/xp/cgov/toolbox/contacts/preclearance/> (accessed on February 2<sup>nd</sup>, 2014).

**Table 3: Benefits Related to Improving Security**

Benefit	Description	Literature & Examples	Recipient of benefit
Improved relations and information sharing	Preclearance requires significant cooperation between foreign and host country. This level of cooperation leads to improved relations and, often, increased coordination on other security programs/issues. The co-location of border facilities in the host country can also facilitate information sharing.	Improved relations mentioned as a motive by US GAO (1980), while improved data sharing noted as a direct benefit by GAO (2008). More specifically, US GAO (2008, p.9) notes that “shared border management would have also enabled informal information sharing between US and Canadian border inspection officials because the inspection facilities would be located adjacent to each other.” This effectively translates into improved security overall.	Authorities in both host and foreign country
Intercept aliens in foreign country	Preclearance allows border authorities to intercept individuals in the host country. This is a benefit as it reduces the number of asylum seekers and illegal immigrants, but also reduces the potential threat of terrorist attacks with an origin in the host country. It also reduces the risk of a global spread of contagious human diseases as individual never reach the foreign country.	The note from the UK Home Office (2001) preclearance experiment in Prague shows clear results: “In the three weeks before preclearance was introduced there were over 200 asylum claims (including dependants) at UK ports from the Czech Republic. In the subsequent period (during preclearance controls) our provisional figures show that there have been in the region of only 20 claims. More than 110 people were refused leave to enter the UK in Prague during the period preclearance has been in operation.”	Authorities in foreign country, population in foreign country.
Intercept illegal goods in foreign country	Preclearance allows border authorities to intercept illegal goods in the host country. This is a benefit as it reduces the risk of pests being introduced into the foreign country’s food chain during transit to zero. It does not, however, reduce the number of illicit goods entering the foreign country since the processes are identical with and without preclearance.	As noted by McAleenan (2013) “preclearance also protects the security of US agricultural infrastructure and public health from the spread of foreign pests, disease, and global outbreaks. For example, in the last two years, CBP has seen a 400 percent increase in interceptions of the destructive <i>Trogoderma granarium</i> (Khapra beetle), one of the most devastating agricultural pests from that region, mostly in luggage of passengers originating from or transiting the Middle East. The Khapra Beetle is frequently found in rice and other commodities from India, Pakistan, and the Arabian Peninsula.”	Population, businesses and authorities in foreign country.
Reduction in loss of life and morbidity	By improving security through the aforementioned mechanism, the risk of catastrophic event is reduced. This reduces the risk of loss of life due to terrorist attacks or disease outbreaks.	Noted as a benefit of counter-terrorism measures by Rose & Chatterjee (2011).	Citizens of foreign country.
Reduction in business interruption	By improving security through the aforementioned mechanism, the risk of catastrophic event is reduced. This reduces the risk of business interruptions due to terrorist attacks, disease outbreaks or the introduction of pest.		Businesses in foreign country. May have a secondary impact on host country.
Reduction in property damage	By improving security through the aforementioned mechanism, the risk of catastrophic event is reduced. This reduces the risk of loss of life due to terrorist attacks or disease outbreaks.		Owners of property in foreign country

## Improving the Border Crossing Experience for Passengers

For passengers, the value proposition of crossing the border depends on a number of factors. Time, cost and reliability come high on the list of these factors. Otherwise, convenience and flexibility are also important. Table 4 documents these benefits in details, and they are summarized here.

Preclearance operations provide potential benefits on all aspects of the value proposition. Indeed, costs for customers (passengers, shippers) can be reduced if carriers' savings (see next section) are transferred through lower prices.<sup>23</sup> For passengers, the capacity to clear the border at the beginning of the trip is also a significant benefit since it allows them to better control their fate – in the air sector, if clearance delays are instead incurred at an in-transit airport, issues with connecting flights can be significant, leading to significant frustrations and additional costs.<sup>24</sup> Finally, preclearance provides more flexibility and choice to many passengers, who see their option for direct flights from Canadian airports expanded significantly.

In addition to these benefits for passengers using preclearance, it is important to note that passengers not using preclearance may also benefit. Indeed, by reducing lineups at major hubs, preclearance also has the potential to reduce wait times for other passengers using these hubs.

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<sup>23</sup> This, of course, assumes that carriers' savings are significant. For some modes, in particular trucking, carriers' savings are contingent on a reduction in wait times and/or improved reliability at the border.

<sup>24</sup> If preclearance occurs at an in-transit airport, in particular Toronto, these particular gains are eliminated. Indeed, passengers in transit from other Canadian airports may potentially miss their connecting flight to the US because of preclearance.

**Table 4: Benefits Related to Improving the Value Proposition of Crossing the Border for Passengers**

<b>Benefit</b>	<b>Description</b>	<b>Literature &amp; Examples</b>	<b>Recipient of benefit</b>
Reduced wait time for preclearance passengers	Preclearance operations are generally set up at locations which are less congested or constrained than the usual clearance area. As a result, operations can be faster and wait time can potentially be reduced.	According to McCartney (2013), “the busiest time [for Toronto’s preclearance] facility is morning rush, but wait times are tame compared with busy US airports. They average about 10 to 14 minutes, but can stretch to 30 to 40 minutes, CBP says.” For rail preclearance, the Woodrow Wilson International Center for Scholars (2010) notes that “wait times for a trip by rail from New York to Montreal would be reduced by 1.5 to 2 hours if preclearance programs were implemented.”	Preclearance passengers (includes host country, foreign country and international in-transit passengers)
Improved reliability	Improved reliability is realized in two ways. First, as for wait times, preclearance tends to occur at locations which are less congested or constrained than the usual clearance area, thus minimizing the risk of delay. In addition, preclearance usually occurs at the beginning of the trip, and thus does not affect the arrival time. This significantly increases arrival time reliability, which is most significant for passengers. This means that passengers can plan to have fewer buffers before travelling and at destination. Another benefit is the lower chance of baggage delays for air travellers with further connections, who can have their baggage checked through to their destination. Without preclearance the baggage would have to be collected prior to customs inspection and then checked in for the subsequent flight	The team was not able to identify significant literature directly mentioning the gain in reliability for passengers. However, it was noted in discussions with stakeholders. The reliability benefits are more prevalent in the freight-focused literature. For example, they are mentioned in Chow (2007) and Taylor (2010).	Preclearance passengers (includes host country, foreign country and international in-transit passengers)
Increased convenience	Passengers value the capacity to be in control when it comes to travel arrangements. The risks of preclearance delays, because it is at the beginning of the trip, can be minimized by travellers through arriving early. When clearance occurs in the middle of a trip, at a transit point, passengers lose the capacity to mitigate the risk.	The US GAO (1980, p.393) notes that “passengers benefit from the greater convenience, especially those traveling on the same airline bound to an airport beyond the initial US gateway airport.”	Preclearance passengers (includes host country, foreign country and international in-transit passengers)

Benefit	Description	Literature & Examples	Recipient of benefit
Increased choices	This benefit primarily applies to air preclearance facilities. Indeed, with preclearance, carriers have the choice to land at airports that do not have clearance facilities on-site, increasing the number of direct flight connections.	Pearson’s airport website notes that “... dozens of US cities do not have their own US CBP facilities and, without preclearance made possible by CBP’s presence at Toronto Pearson, would lose non-stop air service from Canada’s largest city and financial capital. Annually, CBP processes ... more than one million passengers travelling to US airports with limited or no CBP facilities. Cities like Columbus, Milwaukee, Nashville and Richmond rely on direct flights to Toronto to protect their international business relationships and tourism industries.”	Preclearance passengers using direct flights (includes host country, foreign country and international in-transit passengers)
Reduced costs	Preclearance operations are believed to generate significant savings for carriers. It is thus reasonable to believe that some of these savings would be transferred to customers through lower prices.	The team was not able to identify significant literature mentioning a reduction in price related to preclearance operations. However, it is clear that if carriers generate savings, and the market is competitive, some of these savings will be transferred to consumers through lower prices. Nonetheless, Pearson’s airport website also notes that “Without preclearance, business and other travellers would be forced to connect through US hub airports that have a CBP presence... making travel to the US more time-consuming and expensive.”	Preclearance passengers (includes host country, foreign country and international in-transit passengers)
Reduced wait time for non-preclearance passengers	Since preclearance generally occurs at less congested clearance locations, it reduces congestion at already congested clearance locations. This translates into wait time savings for non-preclearance passengers.	McAleenan (2013) notes that “passenger traffic from Abu Dhabi contributes to significant wait times that inconvenience all international travelers, including those arriving on US carriers from other locations. Preclearing [Etihad flight 151] flight would remove almost 20 percent of the arriving travelers from processing queues at [Chicago’s airport] during [the PM] peak hour and provide a significant, positive impact on primary and secondary examination wait times.” Pearson’s airport website also notes that “Without preclearance, business and other travellers would be forced to connect through US hub airports that have a CBP presence, adding pressure to already over-burdened airports.”	Passengers using major international hubs likely relieved by preclearance operations (mostly foreign country and international passengers, some host country in-transit passengers)

## Improving the Border Crossing Experience for Commercial Entities

Carriers and airports can generate significant benefits from preclearance operations. Indeed, the first preclearance operation in Canada was born out of a request by a US air carrier to improve the efficiency of their operations. To this day, preclearance operations in the air mode are generally the result of carriers' requests. For example, the most recent preclearance US CBP facility in Abu Dhabi was in no small part the result of Eithad's request and willingness to cover a significant portion of the costs.

The business case for preclearance operations is based on the capacity to generate significant commercial savings. These operational savings are generally related to the capacity for carriers to better use their assets by reducing cycle times, or to generate additional revenues by developing more appealing routings. For airports, the capacity to offer such savings to carriers is definitely a competitive advantage which makes it easier to attract new carrier services.

In the air industry, reduced operational cost savings are related to the fact that preclearance terminals and domestic terminals tend to be less congested than international terminals at major hubs, hence reducing delays and improving equipment utilization rates. Direct savings are also generated by using less expensive domestic terminals, instead of busier international terminals. Operational savings may also be produced when direct routings replace indirect hub-and-spoke routings. Of note, these savings do not require a reduction in the processing time at the border.

In the trucking industry, however, savings are directly related to the efficiency of clearance activities. Indeed, saving depends on the capacity of the preclearance facility to reduce and increase the reliability of wait times. If wait times cannot be reduced, commercial benefits are generally eliminated.

In the rail industry, a reduction in border delays is not necessary to generate carrier benefits. Indeed, because clearance occurs at the terminal for passengers, equipment is not necessarily tied up during preclearance, while it necessarily is if clearance occurs at the border crossing. For freight, with preclearance occurring at the perimeter, even if the process is not faster, the early warning of delays means that operations may be able to make up time and still meet their arrival times. If they can't, the downstream supply chain can be informed earlier, and thus consequences can be mitigated.

Finally, in the marine industry, as with other industries where clearance does not occur on-board, operational savings are not dependent on a more efficient clearance process.

Table 5 documents these benefits.

**Table 5: Benefits Related to Improving the Value Proposition of Crossing the Border for Carriers**

Benefit	Description	Literature & Examples	Recipient of benefit
Better asset utilization, lower fuel and other operational costs	By reducing cycle times, carriers are able to use less equipment to service a route with a given passenger or freight volume.	<p>US GAO (1980, p.394), on the subject of airlines and preclearance, notes that “preclearance allows them to save on ground time and this in turn decreases the numbers of aircraft required to service their routes. There are savings accruing to the airlines due to quick turn-around capabilities for planes used on preclearance routes. Planes continuing on to other destinations also save time. In addition, aircraft do not have to be ready or available at the preclearance site until flight departure time. Upon arrival in the US, the air craft is free to proceed directly to that carrier's regular terminal. Contrast this with a carrier that first stops off at an international, arrival area, deplanes its passengers, and then has the aircraft towed to its regular terminal for further use. In theory, operational costs associated with manpower and equipment tend to increase proportionately with the increase in time required to remain on the ground.” As a result, airlines generate significant savings “using preclearance because: (1) preclearance operations are more efficient; airlines need fewer aircraft, crews, less fuel, etc., to accomplish the same task; (2) the planes spend less time on the ground, therefore, the airlines ground costs are decreased (FAA estimates that ground time costs the airlines an average of \$4.07 per minute)” (p. 394).</p> <p>Similar, EBTC (2012, p. 7) notes that “the railroad lost an additional \$10,000 in annual operating cost for each minute the service is delayed and idling at the border.”</p> <p>Taylor (2010) and Transport Canada (2013) documents the costs related to border wait times and uncertainty for the trucking industry. Inversely, reduction in border wait times and improved reliability would hence reduce these costs. Of note, research from the Border Policy Research Institute (2013) did not find wait time savings at Blaine in the Phase I pilot, but this was mainly due to the way the site was organized with fewer staging lanes and inspection booths available for southbound non-FAST traffic. The second pilot at Fort Erie is specifically meant to assess the possibility of reducing wait times.</p>	All Carriers
Lower terminal cost for airlines	Airlines can make better use of cheaper domestic terminals since passengers are already cleared.	US GAO (1980, p.394) notes that as a result of preclearance “airlines can use domestic terminals instead of international terminals where user fees are higher; for example, the Port Authority of New York charges arriving user airlines \$5.35 per passenger and \$78 per aircraft for the use of the International Arrival Building at JFK.”	Airlines using preclearance facilities



<b>Benefit</b>	<b>Description</b>	<b>Literature &amp; Examples</b>	<b>Recipient of benefit</b>
Increased revenues through improved service and ridership or added service offering	If wait times are reduced and reliability is increased, carriers should be able to offer more appealing services, thus increasing potential fare revenues.	<p>EBTC (2012, p.8) notes that preclearance on the Montreal-New York line could lead to “increased ridership and revenue for Amtrak due to faster trip times, improved reliability and on-time performance, and potential changes for arrival and departure times.”</p> <p>Similarly, the US GAO (1980, p. 394) notes that “additional business the airlines receive as a result of “passenger facilitation” and “competitive advantages” should provide the airlines with additional revenue.”</p>	All carriers
Lower inventory costs for freight	If reliability and wait times are reduced for freight shipments, inventories could be reduced. As a result inventory carrying costs would also be reduced.	Inventory costs is well-documented on most of the literature estimating truck border delays, notably Chow (2007), Taylor (2010) and Transport Canada (2013).	Freight carriers and/or manufacturer in both host and foreign countries

## Generating 'Spin-Off' Benefits

As noted earlier in the chapter, a number of 'second-order' benefits can be generated if preclearance does indeed reduce wait times and improve commercial operations.

This section documents some of the most common form of impacts that can result from primary benefits. These include economic benefits, environmental benefits, benefits flowing to governments in the form of increased taxes, tourism impacts, etc. In many cases, the literature provides limited examples of these benefits, since they are of the second-order. They are, however, essential to better understand the wide range of impacts that preclearance can have on communities and on the economy as a whole.

Table 6 documents these benefits.

**Table 6: Spin-Off Benefits Generated from Primary Benefits**

<b>Benefit</b>	<b>Description</b>	<b>Literature &amp; Examples</b>	<b>Recipient of benefit</b>
Increased spending in host country	Because preclearance operations occur in the host country rather than the usual country, spending on infrastructure and operations at the new geographical location represents new spending in that geography. This additional spending generates economics impacts as it flow through the local economy.	No example was found in the literature, but the literature on the economic impact of increased spending, either for projects (infrastructure) or ongoing operations, is well established.	Economy near the preclearance facility
Environmental benefits	Reduced wait times at the border for vehicles and better operational efficiency reduces fuel consumption. This is valid for all modes of transportation. Reduced fuel emissions can lead to air quality benefits for local residents and lower CO2 emissions.	The literature does mention emissions' benefits/costs of reduced/increased border wait times. Most notably, EBTC (2012) mentions the benefits related to rail transportation, while Transport Canada (2013) notes the benefits as related to trucking operations.	Local residents near the preclearance facility (host country) and at usual border crossing (foreign country) Worldwide benefits for CO2 reduction
Increased foreign investment	If the border is inefficient and introduces significant supply chain uncertainty, foreign investors who would produce heavily-traded goods may decide to locate in the country requiring less border crossing. This can also affect how businesses source inputs. In some industries, such as the automotive industry, it can have significant impacts on business investment decisions.	Transport Canada (2013) and Anderson (2012) mentions the potential impact on foreign investment. More generally, Anderson (2012, p.20) also notes that "If trade yields benefits, then anything that retards trade must impose costs."	Industries in the host and foreign countries heavily dependent on trade in goods and/or movements of people using the preclearance facility.
Increased productivity	If supply chains must have additional inventory to cope with border delays, or if they decide not to hold inventory but instead face intermittent down-time, their productivity level will be affected.	Anderson (2012) mentions the possibility that border delays lead to down-time in the automotive industry, which operates heavily based on just-in-time supply chains. Down-time imposes significant economic costs and reduces the industry's productivity.	Businesses in host and foreign countries heavily dependent on trade in goods and/or movements of people using the preclearance facility. potentially.

Benefit	Description	Literature & Examples	Recipient of benefit
Increased tourism	Improved service levels, reliability and/or lower prices and wait times will increase ridership for passenger services. Similarly, lower costs may make new service viable, increasing tourism.	The potential impact on tourism is noted in EBTC (2012), which notes the possibility of increased ridership on rail services and of new cross-border rail services. Lee, L., Martin, P., Ouellet, E., & Vaillancourt, F. (2005) also evaluates the impact of border programs on tourism.	Economy in the host and foreign countries of regions where tourism is heavily dependent on border crossings served by preclearance.
Employment, GDP & government revenues	New spending directed related to preclearance, or generated by savings associated to preclearance, can be traced through the economy. This can be expressed as new jobs, increased GDP and increased government revenues.	Economic impact assessments are widespread in the economic literature. Lee, L., Martin, P., Ouellet, E., & Vaillancourt, F. (2005) provides an example of such an analysis related to border issues using an input-output model. Computable general equilibrium can also be used to follow a wider array of variables.	Economy in the host and foreign country of location(s) where additional spending occurs, government, taxpayers.

# Measurement Approaches

## Review of Benefits Typology

It has been noted that only benefits measured in a cost-benefit analysis (BCA) are generally considered primary benefits. In some cases, the decision as to which benefit is primary and which is secondary is arbitrary, since these benefits are often related or in fact the same.

A good example is the benefit of a shorter commute time related to a transit station in proximity of a neighbourhood. The primary benefit is generally reduced transit time (i.e. time saved). A secondary benefit is increased property values, which are the direct result of the time saved. Because measuring changes in property values is sometimes easier than measuring and valuing time saved, the latter can be used as a proxy to measure the primary benefit. As long as both benefits are not considered cumulative, choosing one over the other is more a methodological choice.

In the case of preclearance, user fees are a prime example of this process. Indeed, if airlines are paying user fees for preclearance facilities, one can assume that commercial benefits are at least sufficient to cover these fees (otherwise airlines would not have requested these facilities). In the absence of a firm estimate of commercial benefits, user fees thus provide a lower-bound estimate of the associated commercial benefits. In other words, while user fees can be used as a way to measure commercial benefits, user fees and commercial benefits cannot be considered jointly.

Once primary benefits are identified, the analyst is generally left with a number of secondary benefits which can be used to promote an initiative. These secondary benefits are alternatively called direct, indirect or induced impacts (i.e. results of spending), or ‘spin-off’ benefits.

These other benefits can be identified as such for one of two reasons:

- They are a consequence of a primary benefit, and as such are often already captured by the measurement of that benefit. For example, increased reliability at the border may allow business people to lower the number of meetings they miss due to border delays. The value attributable to reliability is a function of the value people put on such things as not missing a meeting. Measuring the value of increased reliability and that of not missing meetings would count benefits twice.
- They reflect a displacement of, rather than an actual increase in, economic activity. For example, if infrastructure spending for clearance facilities is done in the host country instead of the foreign country, economic activity increases in the host country, but is reduced in the foreign country. It is, in effect, a transfer.

The list of these types of secondary benefits is large and providing a comprehensive list of such benefits is not possible here. The research team nonetheless report on the some of the most-oft quoted benefits in the literature reviewed, and propose methodologies to value them.

## Measuring Individual Benefits

Benefit measurement involves two key steps: (1) identifying the process generating the benefit and (2) assessing the benefit’s magnitude using a quantifiable metric. While the process is generally fairly straightforward for primary benefits, it can be more complex for secondary or ‘spin-off’ benefits.

## Primary Benefits

The first step is to clearly identify the benefit and the process which generates it. In most cases, it involves comparing a ‘reference case’ (i.e. without the project, facility or process) to a ‘with project’ case. In the case of preclearance, since the clearance process is essentially identical to normal clearance, benefits are generally related to the location of clearance. The ‘reference case’ is thus clearance at existing locations, while the ‘with project case’ is clearance at the new preclearance location. Information about both cases is essential to be able to assess benefits.

For example, in the literature on border issues, the impact of different processes or policies on time spent at the border crossing is one of the most-oft measured benefits (or costs). As noted, since the clearance process is essentially identical to normal clearance, time savings are related to the characteristics of the different locations where clearance can occur under the ‘reference’ and the ‘with project’ case. In other words, time savings are realized if preclearance occurs at a location in the host country which is either less congested and/or more efficient than the alternate facility in the foreign country where clearance would normally occur.

Understanding the benefit and delineating the process through which the benefits are produced allows one to identify ways to measure the magnitude of the benefits. In the example provided above, it is clear that a measure of processing times at the preclearance location in the host country, but also at alternate clearance locations in the foreign country, will be necessary to assess the magnitude of comparative time-savings benefits. The benefit will most likely be measured in minutes. The benefit per passenger will likely be expressed in minutes per passenger, while the benefit for time saved by carriers, in instances where the clearance process affects equipment and staff, will likely be expressed in minutes per trip.

## Spin-Off Benefits

The measurement approach for spin-off benefits is essentially the same. In general, however, the channels through which benefits are generated are much more complex. This, in turn, makes their measurement more sensitive to the assumptions used.

In the preclearance literature, time saved by passengers and carriers through preclearance is shown to translate into a much more attractive transportation option for passengers. It is, for example, one of the key arguments put forward to support rail preclearance operations between Montreal and New York. As a separate benefit, supporters of preclearance on that corridor note the beneficial impacts on tourism. Increased tourism, however, is contingent on an improvement in the value of the transportation option to passengers, either through time saved, increased reliability, improved convenience or lower prices, which are necessary to increase tourism. This makes increased tourism a ‘spin-off benefit’.

Obtaining an estimate of the impact of preclearance for tourism on that corridor requires the following:

- an estimate of the improvement in the transportation option;
- an estimate of the increase in passengers resulting from the improvement;

- an estimate of the actual increase in tourists from the increase in passengers. Indeed, some may now choose to travel by rail *instead* of air, and thus not represent an increase in tourism;<sup>25</sup> and,
- an estimate of spending by an average tourist to estimate an overall increase in spending. This generally relies on estimates of the number of days and nights spent at the destination, along with average spending per day.

The estimate of increased spending by tourists (called ‘direct impacts’) would then be inputted in a model to estimate the direct, indirect and induced tourism impacts of preclearance in terms of jobs and economic activity (e.g. GDP). Clearly, the number of steps involved, and in particular the high number of steps where observed estimates are unlikely to be available (thus requiring an assumption), make such estimates less robust than a relatively simple estimate of time saved by passengers.

In this specific case, it is also useful to note that tourism impacts represent a displacement of benefits. Indeed, since tourism money spent in one location will go unspent elsewhere, it is generally considered a transfer in a cost-benefit analysis. If the scope of the analysis is geographically restricted (i.e. benefits for Quebec), a transfer can be measured as a benefit. It, however, means that the benefit is very susceptible to the geographical scope of the analysis.

This is particularly problematic for transportation services where benefits (and associated costs) can flow in both directions. In this example, the improved rail service would without doubt increase US tourism in Montreal, but also likely decrease local tourism in Montreal as Quebec resident now decide in greater number to spend their tourism dollars at US destinations. Obtaining accurate estimates of such transfers is difficult and, often, unreliable. Also, promoting benefits essentially based on ‘transfers’ is not always an efficient way to advocate for projects since positive benefits necessarily implies negative benefits for another stakeholder.

## Aggregating Benefits

The aggregation of different types of benefits is appropriate only where the rules of a benefit-cost analysis are followed. This ensures that no benefits are double-counted.

The aggregation of benefits requires the transformation of benefits into a common unit of measure, i.e. in dollars. This process is called monetization. Aggregation is also necessary to sum benefits accruing over time. This requires not only an assessment of the durability of the new process/policy/infrastructure, but also a discount rate which reflects the diminishing value of benefits farther into the future. Each of these features is discussed below.<sup>26</sup>

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<sup>25</sup> In general, especially for rail and marine modes, the transportation experience is of value itself, and thus modal displacement is minimal. Preclearance can facilitate the development of new services (niche tourism options) and/or strengthen existing niches. In these cases, there may be ‘tourism displacement’, i.e. from other tourism experiences (e.g. Europe, Alaska). Establishing the level of and nature of such displacement is key to identify where the economic impact accrues (e.g. within or outside the host and foreign country).

<sup>26</sup> For more details on all the necessary steps to produce a comprehensive cost-benefit analysis, please see Treasury Board Secretariat (2007), “Canadian Cost-Benefit Analysis Guide: Regulatory Proposals”, 47 pages. Available online at <https://www.tbs-sct.gc.ca/rtrap-parfa/analys/analys-eng.pdf>. Accessed March 17<sup>th</sup>, 2014.

## Monetization

In some cases, benefits can easily be expressed in dollar terms, because they are realized in dollar terms. This is, for example, the case for carriers' cost savings. In other cases, the monetary value of benefits is less clear. For example, what is the monetary value of a minute of time? What is the monetary value of a life or of decreased morbidity?

A significant amount of research exists on the appropriate values to monetize different types of benefits. Academic debates abound on the appropriate approach to measure individual benefits, and a number of methodologies often co-exist. Some are based on observed behaviour, while others are based on surveys.<sup>27</sup> For the most common benefits such as the value of time and the statistical value of a life, regulators conducting frequent benefit-cost analyses (e.g. Treasury Board) provide guidance as to what they consider the most appropriate estimates. It is important to note that this report does not spend a significant amount of time discussing the valuation methodologies and rationale.<sup>28</sup> Instead, it provides guidance as to the most commonly used values in Canada. It is also important to note that the commonly used "statistical value of a life" is not a valuation of what one individual person is intrinsically worth, but is a simplified unit of measure for the willingness to reduce the chance of death in an entire population of people.

## Discount Rate

In order to put all relevant benefits on a common temporal unit, one needs to convert future streams of benefits into a 'present value' amount, i.e. the value of these benefits in today's dollars. Future benefits are discounted using a discount rate, i.e. the rate at which future benefits are deflated to express them in today's dollars.<sup>29</sup> There are a number of strong empirical rationales for discounting, most notably the cost of capital (i.e. \$100 invested today will be worth more in the future, so \$100 in the future is worth less in today's dollars) and the time-preference of individuals, which intrinsically value money received today more than money they get in the future.

Using one rationale or the other to establish a discount rate can lead to widely differing rates. Indeed, the choice of the discount rate can be quite controversial, and rightly so since it can have a significant impact on the valuation of the results. Unlike a financial discount rate, which reflects the opportunity cost of capital, the economic discount rate (or social discount rate) should reflect how society values current costs and benefits versus future ones.

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<sup>27</sup> For example, to evaluate the value someone places on their own life, one could directly ask individuals how they value their life (stated preferences), or one could observe their decisions towards risk (revealed preferences) to assess how they value their life (e.g. pay-differential between high-risk and low-risk jobs requiring similar skills).

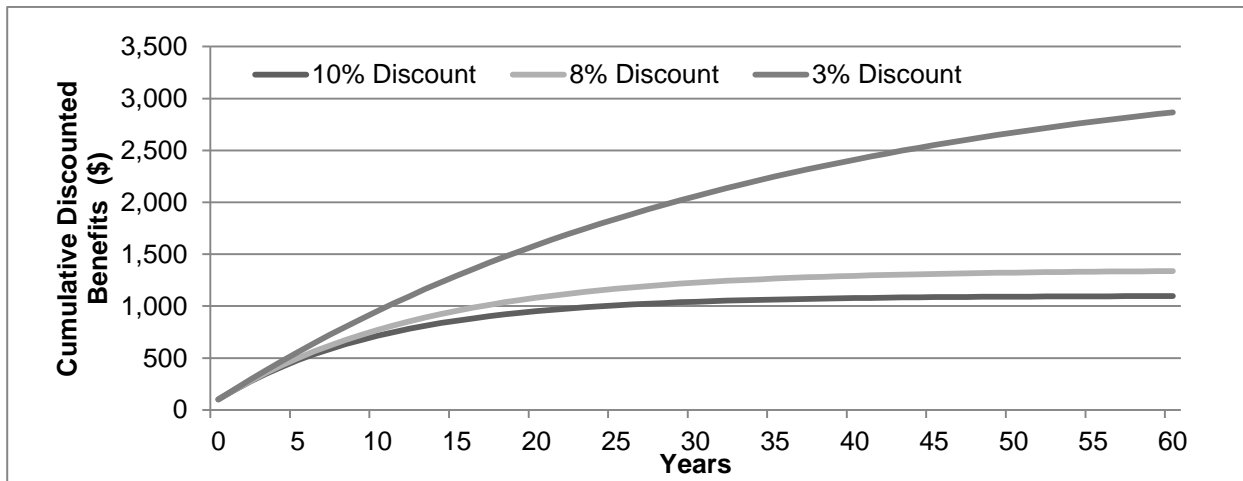
<sup>28</sup> For example, non-economists often debate whether it is appropriate to associate a monetary value with a human life. These ethical issues, along with more arcane methodological issues on valuation, are the subject of an ample literature and will not be discussed in the context of this report.

<sup>29</sup> Discounting is not done to deal with inflation. Inflation is generally dealt with by expressing undiscounted benefits in dollars of the base year, for simplicity. For example, if benefits are \$10 per passenger in 2014, there are assuming to remain at \$10 per passenger for the whole period of analysis, even though inflation is likely to increase the benefit over time. These future values still need to be discounted.



Guidelines by the Treasury Board Secretariat (TBS) recommend using a discount rate of 8%, with proposed sensitivity at 10% and 3% (p. 37).<sup>30</sup> Figure 3 shows the impact of using these discount rates on a stream of benefits of \$100 per year.

**Figure 3: Cumulative Discounted Benefits of \$100 per Year**



Two particularly salient points should be made. First, when using the 8% or 10% discount rate, benefits accruing after the 30<sup>th</sup> year are largely insignificant. Indeed, discounted benefits for Year 31 to 60 represent 4.7% of benefits for Year 1 to 30 with a 10% discount rate, and 8.3% for an 8% discount rate. This means that for most long-term policies, choosing a length of application beyond 30 years has little impact on the measurement of benefits.

Second, the impact of the discount rate can be very significant. Indeed, after 60 years, the difference between a 3% and 8% discount rate is a ratio of 2.14, i.e. benefits are estimated to be 2.14 times larger when a 3% discount rate is used. This underlies the significance of the discount rate and, hence, the controversy surrounding it. In a Canadian context, and to ensure consistency with other evaluations, adopting the TBS’s recommendation (8%) is most appropriate.

Using this discount rate, over a 30-year period, means that an annual benefit of \$100 would represent a total cumulative benefit of about \$1,200. This 1 to 12 ratio is used to provide high-level estimates of benefits where relevant.

## Key Challenges

Of course, a number of technical challenges may arise, including ways to treat risk and uncertainty, as well as data limitations. In some cases, benefits may simply be impossible to accurately monetize, and as such may need to remain qualitative. This, however, does not mean they are trivial, and in some cases may be too important to ignore.

In the case of preclearance, it is particularly the case of benefits associated with security. As noted by Anderson (2012) (p.26):

<sup>30</sup> Treasury Board Secretariat (2007), “Canadian Cost-Benefit Analysis Guide: Regulatory Proposals”, 47 pages. Available online at <https://www.tbs-sct.gc.ca/rtrap-parfa/analys/analys-eng.pdf>. Accessed March 17<sup>th</sup>, 2014.

Assessing the costs of extreme events on non-resilient systems is difficult. The cost of losing a bridge for a long time would be huge, probably in the billions, but this must be balanced against the fact that such an event is quite improbable. In theory, an expected cost can be estimated by multiplying the event cost by the probability of the event. But what is the probability of terrorist attack on a particular bridge? We don't know because we don't have a history of terrorist attacks on which to base an estimate. In the absence of hard analysis that can be used to weigh costs against benefits, the costs associated with the vulnerabilities of the cross-border infrastructure probably don't get the emphasis they deserve in policy formulation.

In such cases, these benefits related to preclearance may need to be treated qualitatively. They should not be simply ignored, however, since they likely represent a significant benefit of preclearance.

# Measurement Methodologies Identified in the Literature

## Key Trends Observed in the Literature

The literature reviewed did provide a number of different approaches to value the benefits of preclearance. A few trends observed in the literature reviewed are worth mentioning.

- First, it is important to note that none of the literature reviewed on the methodologies to measure benefits referred to preclearance directly. Some focused on the truck pre-inspection pilot currently underway.
- Second, of the literature focusing on measurement, the large majority focused on measuring the ‘cost’ of border issues rather than the benefits of particular programs or processes. Of course, while a delay is measured as a cost, the same methodology can be used to measure the benefits of a reduction in delays.
- Third, most of the literature focused on measurement for freight, which is a relatively minor area of focus for current preclearance activities. As a result, literature focusing on passenger benefits was specifically sought.
- Fourth, while some of the literature focused on measuring individual components or benefits, related frameworks generally provided only ‘headline estimates’ of benefits in the form of a single number. These approaches, while of interest, are less conducive to a discussion about the various benefits of preclearance.

## Summary of Literature

Table 7 summarizes the methodologies used in the literature deemed of most relevance to the development of a measurement methodology. The papers reviewed are ordered by date and primary authors. These findings are used to develop the methodologies for individual benefits in the following section, as well as to shape the overall framework in the next chapter.

**Table 7: Summary of Literature on Measurement Methodologies**

Reference	Overall Description of Methodology	Components Measured of Relevance to Preclearance
Roberts et al. (2013)	This paper is probably the most comprehensive approach to measuring the impact of reduced wait time at border crossings. It first estimates the reduction in wait times resulting from the addition of one CBP officer at 33 points of entry, and then estimates the impact of this incremental change in wait times on a number of variables. For truck freight transportation, it measures the operational savings from reduced wait times, and then models their impact on the overall economy using a Computable General Equilibrium (CGE) model. For passengers at land border crossing, it measures the value of time saved, but also the likely increase in tourism associated with lower border wait times. The overall impact of the increase in tourism spending in the US is then measured using an input-output model. Finally, for air passengers, only the value of time saved is computed. This approach represents a good basis for a framework as it includes both primary and spin-off benefits.	<ul style="list-style-type: none"> <li>• Value of time saved for passengers</li> <li>• Impact of increased tourism spending</li> <li>• Operational cost savings for truckers associated with decreased wait times</li> <li>• Impact on the US economy of reduced trucking costs</li> </ul>
Transport Canada (2013)	This report provides an analysis of border wait-times for southbound truck movements at the Peace Bridge, of particular relevance since it provides a baseline before the pre-inspection pilot was conducted. Additional operating costs incurred by the trucking industry and a high-level estimate of higher inventory carrying costs incurred by manufacturers down the supply chain as a result of these wait times are also provided. The estimate of wait times and operational costs were largely based on observed data, but the estimate of inventory carrying costs was largely based on assumptions.	<ul style="list-style-type: none"> <li>• Wait times for truck crossing the border</li> <li>• Operational cost increases for truckers associated with increased wait times</li> <li>• Inventory carrying costs</li> </ul>
Anderson (2012)	Anderson divides border costs into three categories: border-specific costs, trade costs, and general equilibrium costs. Border specific costs include delays, fees, etc. These can be affected by preclearance operations. Trade costs reflect costs which are incurred because trade across countries occur, and include costs related to inconsistencies in regulation, cabotage rules, etc. These are unaffected by preclearance operation. Finally, general equilibrium costs, which capture the costs of lower trade due to the aforementioned categories of costs. These can be affected by preclearance in as much as the first two are affected by preclearance. The paper does not put forward any methodology of its own to measure these different costs.	<ul style="list-style-type: none"> <li>• N/A</li> </ul>
Davidson & Conroy (2013)	This report provides a detailed approach to measure truck delays at the border, and hence measure time saved after pre-inspection operations are put in place. It is based on data obtained by a survey crew and their observations. It provides results for the Phase I of the pilot at Blaine.	<ul style="list-style-type: none"> <li>• Estimates time saved by trucks associated to pre-inspection</li> </ul>
EBTC (2012)	This paper reports on methods and findings from various other research efforts in the gray literature. It identifies potential operational cost savings from rail preclearance as having been directly obtained from the operator (Amtrak). It also provides an estimate of the economic impact of tourism associated with preclearance. It suggests that preclearance, by reducing costs, was directly leading to the retention of a second daily round trip between Seattle and Vancouver. The economic impact of the spending by individuals (tourists) using the service is modelled using an IO model.	<ul style="list-style-type: none"> <li>• Operational savings from reduced delays for train at the border</li> <li>• Impact of tourism on increased service relate to reduced costs</li> </ul>
Transport Canada (2012)	In this presentation, Transport Canada outlines its approach to measuring the supply chain performance of Canadian routings. It outlines methodologies to measure delays for multiple freight modes (rail, trucking, ocean transportation). The trucking methodology, based on GPS data, is particularly relevant for preclearance operations.	<ul style="list-style-type: none"> <li>• Methodology to measure truck delays at the border</li> </ul>

Reference	Overall Description of Methodology	Components Measured of Relevance to Preclearance
Nguyen and Wiggle (2011)	This paper is an update on Nguyen and Wiggle (2007) which simulates the impact of border delays on the Canadian economy using a CGE model of Canada regional trade. It refines assumptions about increased transportation costs associated with border delays. It also provides some limited insights as to the source of these consequences, which come mostly from resources wasted on delays and ensuing increase in landed costs for Canadian producers, as opposed to the result of more limited capacity at the border limiting trade volumes. These insights also point out the high level of sensitivity of CGE models to the assumptions used.	<ul style="list-style-type: none"> <li>• Estimates of the overall impact of border delay on the Canadian economy, by region and sector</li> </ul>
Rose and Blomberg (2011)	Application of the framework developed in Rose and Chatterjee (2011a) to measure the consequences of the 9/11 terrorist attacks. Most importantly, it confirms high level of resilience which minimizes business interruption costs. It also identifies fear and behavioural factors as particularly important, accounting for over 80% of costs.	<ul style="list-style-type: none"> <li>• Estimates of business interruptions for disaster events</li> </ul>
Rose and Chatterjee (2011)	This report shows how cost-benefit analysis can be combined with CGE analysis to estimate the consequences of disaster events such as terrorist attacks or epidemics. It also highlights the importance of behavioural linkages for measuring the impact of disasters and/or the benefits of security measures.	<ul style="list-style-type: none"> <li>• Methodology to measure security benefits</li> </ul>
Dixon et al. (2010)	This paper estimates the effect of a hypothetical H1N1 epidemic in the US using a CGE model. As with most CGE modelling, the shocks are developed based on high-level data. For example, in this case reductions in tourism are based on tourism data observed in Asia and Mexico during similar H1N1 episodes. Similarly, based on a variety of sources, reduction in labour productivity, increased medical spending and decreased spending on public leisure activity were assumed.	<ul style="list-style-type: none"> <li>• Overall impact of disaster medical event on the US economy</li> </ul>
CBOC (2007)	This report attempts to identify the impact of the thickening border on trade between Canada and the US. It used regression analysis to identify changes in trade that could be attributable to border delays and increased compliance costs. The analysis could not identify any impact on imports or exports.	<ul style="list-style-type: none"> <li>• Overall impact on trade of thickening border</li> </ul>
Chow (2007)	This paper puts forward the “Total Logistics Cost Approach” to measure the benefits and costs of security measures to a freight supply chain. The model requires very detailed information on the characteristics of the commodity and the shipments and the shipper. It also requires detailed information on the transportation performance characteristics, including transit time, variability, rates, damage rates, etc. The methodology is primarily a way to aggregate all logistical costs and benefits from the perspective of a shipper faced with different supply alternatives. It does, however, propose some simple formula to measure specific costs to shippers, such as the cost of variability. In most cases, it does not develop ways to measure costs and benefits, but instead uses unsupported assumptions (e.g. damage rates) to show their incidence on the aggregation process.	<ul style="list-style-type: none"> <li>• Value of variability / reliability for shippers (based on safety stock)</li> </ul>
Nguyen and Wiggle (2007)	This paper simulates the impact of border delays on the Canadian economy using a CGE model of Canada regional trade.	<ul style="list-style-type: none"> <li>• Estimates of the overall impact of border delay on the Canadian economy, by region and sector</li> </ul>

Reference	Overall Description of Methodology	Components Measured of Relevance to Preclearance
Lee et al (2005)	This report attempts to estimate the economic impact of border security measures on Quebec. It uses primarily secondary sources. For example, it measures the costs incurred by the transportation sector in the province by assuming an average delay, which it multiplies by an evaluation of the cost per minute to truckers based on DAMF and Tardif (2005) and by the number of annual trucks crossings at Quebec's border crossings. Then, assuming that the increase in cost is borne entirely by Quebec's producers, it uses IO modelling to measure the impact on the overall economy in terms of wages and GDP.	<ul style="list-style-type: none"> <li>• Operational cost increases for truckers associated with increased wait times</li> <li>• Impact on the Quebec economy of increased trucking costs</li> </ul>
DAMF and Tardif (2005)	The study aimed to provide an assessment of the cumulative impact of US import compliance programs on the Canadian trucking industry. It was based on a survey of truckers, and results were applied to the industry as a whole to derive estimates of overall costs. Estimates of the operational costs associated with delays were obtained through the literature, i.e. not independently measured. They were multiplied by an average delay estimated through the survey, and by the number of trucks crossing the border. All other costs measured related to items which are not relevant to preclearance.	<ul style="list-style-type: none"> <li>• Operational cost increases for truckers associated with increased wait times</li> </ul>
Taylor et al. (2003)	This paper estimates the costs imposed by border and trade policies between Canada and the US. Two categories of costs were identified: (1) costs related to delays/uncertainties; and (2) costs related to general transportation and customs policies. Only the first set of costs is of relevance to preclearance. Insufficient infrastructure was deemed as a significant factor in some cases (e.g. insufficient size of secondary inspection yards and parking was deemed as one of the most severe factors, while the number of booths for primary inspection was deemed of moderate severity). The methodology used to measure the different cost categories relied on secondary sources and on primary interviews.	<ul style="list-style-type: none"> <li>• Operational cost increases for truckers associated with increased wait times</li> <li>• Impact of lost productivity to manufacturers from delays</li> <li>• Increased safety inventories and associated inventory carrying costs</li> </ul>
Hobjin (2002)	This paper reviews the possible costs of security in the US. Most notably, it discusses the effect of security on the aviation sector, and more precisely the effect of additional delays on passengers. It provides data sources for delays at airports, as well as estimates of the value of time for different types of passengers.	<ul style="list-style-type: none"> <li>• Estimates of delays for air passengers</li> <li>• Value of time spent at airport by passengers due to security measures</li> </ul>

# Proposed Methodologies for Measuring Individual Benefits from Preclearance

Before developing a comprehensive framework for measuring preclearance benefits, it is first essential to better understand how individual benefits can be measured. The relationships between these benefits, and the way they can be estimated, will define how they can be integrated within a more comprehensive framework.

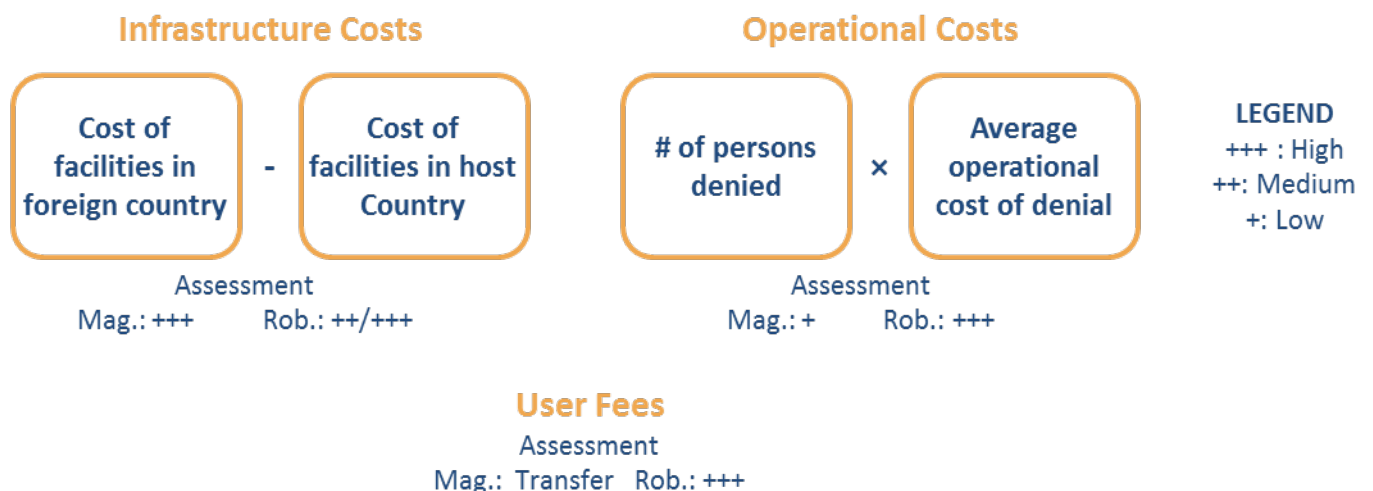
A number of benefits of preclearance were identified. They were divided into five major categories. In this section, for each of these categories, a methodology to measure related benefits is put forward. This will form the basis of the measurement framework, which will integrate all categories of benefits.

For each individual benefit, a methodology is proposed based on the literature review, discussions with stakeholders and an analysis. Potential data sources are identified and a high-level assessment of the magnitude of the benefit is provided. Finally, a brief assessment of the robustness of the analysis is provided.

## Optimizing Border Resources

The figure below summarizes the methodology proposed to measure the benefits of preclearance stemming from the optimization of border resources. It also provides a high level assessment of the magnitude of the benefit (Mag.), as well as of the robustness of potential estimates (Rob.). It is important to note that these are purely indicative. Indeed, the magnitude of benefits depends heavily on the particular preclearance operation being analyzed, as well as the scope of the analysis. For each of the individual benefits, a more detailed analysis is provided in the following subsections.

### Benefits from Optimizing Border Resources



## Lower Infrastructure Costs

<b>Methodology</b>	<p>The literature provides no methodological guidance. It notes, however, that savings should include not only savings for new facility, but also savings related to the lower need for investment in existing facilities.</p> <p>The estimate would require a comparison of investment needed to provide the same service in the host country and in the foreign country.</p>
<b>Potential Data Source</b>	In general, it is safe to assume that these estimates would be provided by the border agencies in charge of infrastructure investment at clearance facilities. Particular challenges in calculating reliable estimates related to the investment savings for existing facilities are to be expected.
<b>Magnitude of Benefit (High)</b>	These benefits are believed to be significant. For example, the US GAO (2008, p.9) notes that a “a new US inspection facility in Fort Erie would cost approximately <b>\$100 million less</b> and take less time than expanding the inspection facility in Buffalo.” This is a very significant benefit. Of course, savings are highly dependent on the specifics of particular points of entry.
<b>Robustness of estimate (High to Medium)</b>	The robustness is contingent on the quality of information obtained from border agencies. For new facilities, information is likely to be robust, while for existing facilities, it may be harder to obtain a comparator for savings in the foreign country.

## Lower Operational Costs

<b>Methodology</b>	The literature provides no methodological guidance. A simple estimate could be computed by multiplying the number of admissions denied by the average costs of denial in the foreign country (including enforcement processing, detention, monitoring, transportation, and repatriation costs). Of course, only costs that would not be faced if denial of entry occurs at the preclearance location instead of the usual port of entry should be counted.
<b>Source</b>	These estimates would need to be produced by the border agencies implementing preclearance. Alternatively, it could be produced based on high-level administrative costs and a set of assumptions, but the results would be much less reliable and open to criticism.
<b>Magnitude (Low)</b>	On a typical day, CBP refuses entry to 931 individuals at a US port of entry. <sup>31</sup> Given that CBP oversees 327 ports of entry and 15 preclearance offices, the average number of individuals refused entry per year per port is 993. No data on the number of individuals denied entry from Canada were found. It is natural to believe that cases from a Canadian origin are low enough that the benefits would not be overly large. Benefits would likely be larger for some operations (air, ferries) than others (trucks) given the costs to repatriate are larger for the former. For a single point of entry, assuming 1,000 individuals are denied every year at a cost of \$1,000 per individual, total annual benefits would be \$1 million or about \$12 million over 30 years.
<b>Robustness of estimate (High)</b>	Assumes border agencies possess data on the number of denial of entry and the average cost associated with these events.

<sup>31</sup> See CBP’s brochure “On a typical in Fiscal Year 2012, CBP”, accessed on March 22<sup>nd</sup>, 2014. [http://www.cbp.gov/sites/default/files/documents/typical\\_day\\_fy12\\_2.pdf](http://www.cbp.gov/sites/default/files/documents/typical_day_fy12_2.pdf).



## Reimbursement of Costs (User Fee)

<b>Methodology</b>	The literature provides no methodological guidance. This is not surprising given that it is essentially administrative data that depends on the specifics of the implementation of preclearance at different locations. These fees are often used to cover a portion of the infrastructure costs of the facility.
<b>Source</b>	Organization collecting the fee. This could be, for example, a border agency or an airport authority. Alternatively, the fee level could be obtained and multiply by the number of passengers (if fees are paid per passenger) or any other relevant unit (e.g. per plane if the fee is assessed on that basis).
<b>Magnitude (N/A)</b>	This benefit is, in effect, a transfer from the primary beneficiaries of preclearance (e.g. carriers or passengers) to government authorities. As such, it should not be computed as a benefit on its own. It may be used to approximate a lower-bound of benefits for carriers where they are the instigator of the preclearance process, as is generally the case for US air preclearance facilities. To get an order of magnitude of these fees, it can be noted that McAleenan (2013) mentions that “savings realized through partial reimbursement of CBP officers posted in Abu Dhabi would allow up to 15 domestic officers to be redirected to process traffic arriving from other international airports.” Assuming a per-officer cost of about \$140,000 per year, <sup>32</sup> this represents fees of \$2.1 million per year, or \$25.2 million over 30 years,
<b>Robustness of estimate (High)</b>	Administrative data has a very high level of reliability. If used to approximate commercial benefits, however, it would have to be treated as a lower-bound.

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<sup>32</sup> See US CBP website, “Ports of Entry and User Fee Airports”, at <http://www.cbp.gov/trade/trade-community/programs-outreach/ports>. Accessed on April 20<sup>th</sup>, 2014.

## Improving Security

The figure below summarizes a methodology that could measure the benefits of preclearance stemming from improved security. It also provides a high level assessment of the magnitude of the benefit, as well as of the robustness of potential estimates.

### Benefits from Improving Security

#### Intercepting Aliens



#### Intercepting Illegal Goods



#### Improved Relations and Information Sharing

Qualitative Assessment

It does not appear that accurately measuring security benefits associated with preclearance is possible. It requires strong assumptions about the role played by preclearance in preventing catastrophic events, assumptions which have no strong basis on which to be developed. Moreover, these assumptions drive, to a large extent, the final valuation of benefits.

Other significant challenges are related to the development of catastrophic event scenarios, along with the probability for such events. These challenges mean that accurate measurement is nearly impossible. As an order of magnitude, for example, if it were to be assumed that preclearance

diminished the potential of one major terrorist attack and one major epidemic in the US by 1/1,000, and that these events were to occur once every 15 years (for discounting purposes), benefits to the US could be roughly be estimated at \$100 million.

For each of the individual benefits identified in section 0, a more detailed analysis is provided in the following subsections.

## Intercept Aliens in Host Country

<b>Methodology</b>	<p>The benefits of intercepting aliens are threefold. It minimizes operational costs in the foreign country, as noted earlier in section 0, it reduces the threat of a terrorist incident in-transit between both countries, and it reduces the threat of spreading a dangerous disease.</p> <p>No methodology has been put forward in the literature reviewed to assess the number of catastrophic events potentially averted because of preclearance operations. The scenarios about the number and the types of catastrophic events averted would need to rely on expert judgment. An analysis of past threat, both realized and not realized, could be done to identify realistic scenarios.</p>
<b>Source</b>	<p>The literature on catastrophic events could provide some guidance as to the probability of such an event. The team could not identify any data that could help identify the relative importance that preclearance could have in preventing such events.</p>
<b>Magnitude (Medium to Low)</b>	<p>Some stakeholders noted that in the case of pre-inspection for trucks, they considered the likelihood of a “bridge bomber” to be very low. Moreover, in such an instance, the attack could simply be redirected to a crossing without preclearance. A similar argument was put forward by some air stakeholders, who argued that if preclearance was indeed a deterrent, it could simply lead terrorists to choose alternate routes, rather than prevent the event.</p> <p>In terms of magnitude, Rose and Blomberg (2011) point out that the various academic estimates of the economic impact of the terrorist attacks of September 11, 2001 have a median of between \$50 and \$100 billion. If preclearance diminished the risk of such a massive event by 1/1,000, the benefit would be valued at \$100 million. Depending on where in time that benefit is located (e.g. now or late in the future), its discounted value could be significantly reduced.</p> <p>In terms of the spread of epidemics, the integration of the Canadian and US economy was seen as a key obstacle to the successful containment of human disease across borders, and as such the role that preclearance could play to diminish a spread was deemed minimal. For context, one can note that in Dixon et al. (2010), the economic impact of a hypothetical H1N1 epidemic was estimated at \$220 billion (1.4% of US GDP). Of note, this hypothetical epidemic (59.8 million experiencing symptoms) is about 20 times larger than what was experienced in the US during the actual H1N1 scare in 2009.</p>
<b>Robustness of estimate (Low)</b>	<p>Because both the definition of realistic scenarios, and the impact preclearance could have on averting them are unknown, any estimate associating such benefits to preclearance would be highly hypothetical.</p>

## Intercept Illegal Goods in Host Country

<b>Methodology</b>	<p>As is the case for the interception of aliens, the literature provides no guidance as to the probability and nature of the events that could potentially be averted because of preclearance operations between Canada and the US. It is also important to note that nothing in the literature or in the interviews suggest that preclearance would significantly diminish the quantity of illicit or counterfeit goods crossing the border.</p> <p>Hence, the primary benefit may be for the foreign country through a reduction of administrative costs associated with dealing (storing, eliminating, etc.) with illicit and counterfeit goods, in most cases transferring them to the host country. This benefit is captured in section 0.</p>
<b>Source</b>	<p>The literature on pests and other goods contamination issues between Canada and the US could be leveraged to develop realistic scenarios (e.g. Mad Cow disease). Since the inspection processes are identical before and after preclearance, however, and unless preclearance allows for additional inspecting resources to be spent, nothing suggests that preclearance between these two countries would have an impact in term of reducing the incidence of catastrophic events.</p>
<b>Magnitude (Low)</b>	<p>Given the integration of the Canadian and US economy, that the number of incidents leading to the spreading of pests that could be averted through preclearance is assumed to be minimal. In fact, the research team was unable to find a single instance where preclearance would have had a significant impact in terms of illegal goods.</p> <p>Estimates of the impact of loss trade due to the catastrophic spreads of disease (e.g. mad cow) were found, but nothing suggests that they could be averted through preclearance. For context, one can nonetheless mention that Park, Park and Gordon (2006) estimated the impact of the closure of US beef exports following a positive test for Mad Cow disease in a dairy cow in the state of Washington at \$4.6 billion dollars in the following two years.</p>
<b>Robustness of estimate (Low)</b>	<p>Because both the definition of realistic scenarios, and, most importantly, the impact preclearance could have on averting them, are unknown, any estimate associating such benefits to preclearance would be highly hypothetical.</p>

## Reduction in Loss of Life and Morbidity

<b>Methodology</b>	<p>Any estimate of the reduction in loss of life or morbidity would have to be derived from scenarios of catastrophic events, weighted to reflect the role preclearance plays in reducing the likelihood of these events.</p> <p>If that were to be established, the value of decreased morbidity and death could be estimated, and valuation would be fairly straightforward. In TBS (2007), a statistical life is valued at \$6.11 million in 2004. Adjusted for inflation (as recommended) would add 20% to that estimate, reaching \$7.33 million in 2014. Morbidity estimates would depend on the number of quality adjusted life years (QALY) loss as a result of a particular disease.</p>
<b>Source</b>	<p>Monetization should be based on the values noted in the previous box. The key challenge remains identifying with a reasonable degree of certainty the role played by preclearance in diminishing the likelihood of loss of life or morbidity. No source known to the team could provide an accurate assessment for that component.</p>
<b>Magnitude (Low)</b>	<p>This is a subset of the benefits identified in categories above, and as such is also considered relatively low. For example, September 11, 2001 attacks killed nearly 3,000 individuals. Assuming preclearance would reduce the potential of such an attack succeeding by 1/1,000, benefits would be a one-time \$22 million (three statistical lives).</p>

<b>Robustness of estimate (Low)</b>	Since this estimate itself relies on estimates with low robustness, it is itself assessed at a low level of robustness.
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## Reduction in Business Interruption

<b>Methodology</b>	<p>Any estimate in the reduction in business interruption loss would have to be derived from scenarios of catastrophic events, weighted to reflect the role preclearance plays in reducing the likelihood of these events.</p> <p>If that were to be established, the value of decreased business interruption could be estimated. To fully capture the value of business interruption, it would need to include both direct business interruption and business interruption related to the fear of travel which manifests itself in a reduction of business and tourism travel for a certain time. Rose and Blomberg (2011) have suggested metrics to measure the impact of fear, mainly based on observed reduction in air travel versus what can reasonably be thought would have occurred without the catastrophic event (in this case, 9/11). These estimates could be used as proxies in building the scenarios of catastrophic events.</p>
<b>Source</b>	CGE modelling with behavioural linkage could provide an estimate of business interruption based on scenarios of catastrophic events.
<b>Magnitude (Low)</b>	<p>This is a subset of the benefits identified in, for example, the component on intercepting illegal aliens. As such is also considered relatively low. Business interruption is still generally the largest of all factors in the total security component. It is the largest issue for both terror- and disease-related events.</p> <p>For example, Rose and Blomberg (2011) point out that business interruption represented the large majority of the economic costs of 9/11. Assuming they represented about 80%, the cost of business interruption would represent approximately \$800 million for an event such as 9/11. If preclearance diminished the risk of such a massive event by 1/1,000, the benefit would be valued at \$80 million. Depending on where in time that benefit is located (e.g. now or late in the future), its discounted value could be significantly reduced.</p>
<b>Robustness of estimate (Low)</b>	Since this estimate itself relies on estimates with low robustness, it is itself assessed a low level of robustness.

## Reduction in Property Damage

<b>Methodology</b>	Any estimate in the reduction of property damage would have to be derived from scenarios of catastrophic events, weighted to reflect the role preclearance plays in reducing the likelihood of these events.
<b>Source</b>	These would be an integral part of the catastrophic event scenarios to be developed. They could be sourced from the literature on catastrophic events, or if specific event want to be modelled, property values in the affected area could be estimated using different sources (e.g. MPAC assessment in Ontario).
<b>Magnitude (Low)</b>	<p>This is a subset of the benefits identified in, for example, the component on intercepting illegal aliens. Property damage is of particular relevance for terrorist attacks. As an order of magnitude, the attacks of September 11, 2001, produced a bit over \$20 billion in property damage (Rose and Blomberg (2011)). Assuming preclearance would reduce the potential of such an attack succeeding by 1/1,000, benefits would be a one-time \$20 million. As for other one-time benefits, depending on where in time that benefit is located (e.g. now or late in the future), its discounted value could be significantly reduced.</p>

<b>Robustness of estimate (Low)</b>	Since this estimate itself relies on estimates with low robustness, it is itself assessed a low level of robustness.
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## Improved Relations and Information Sharing

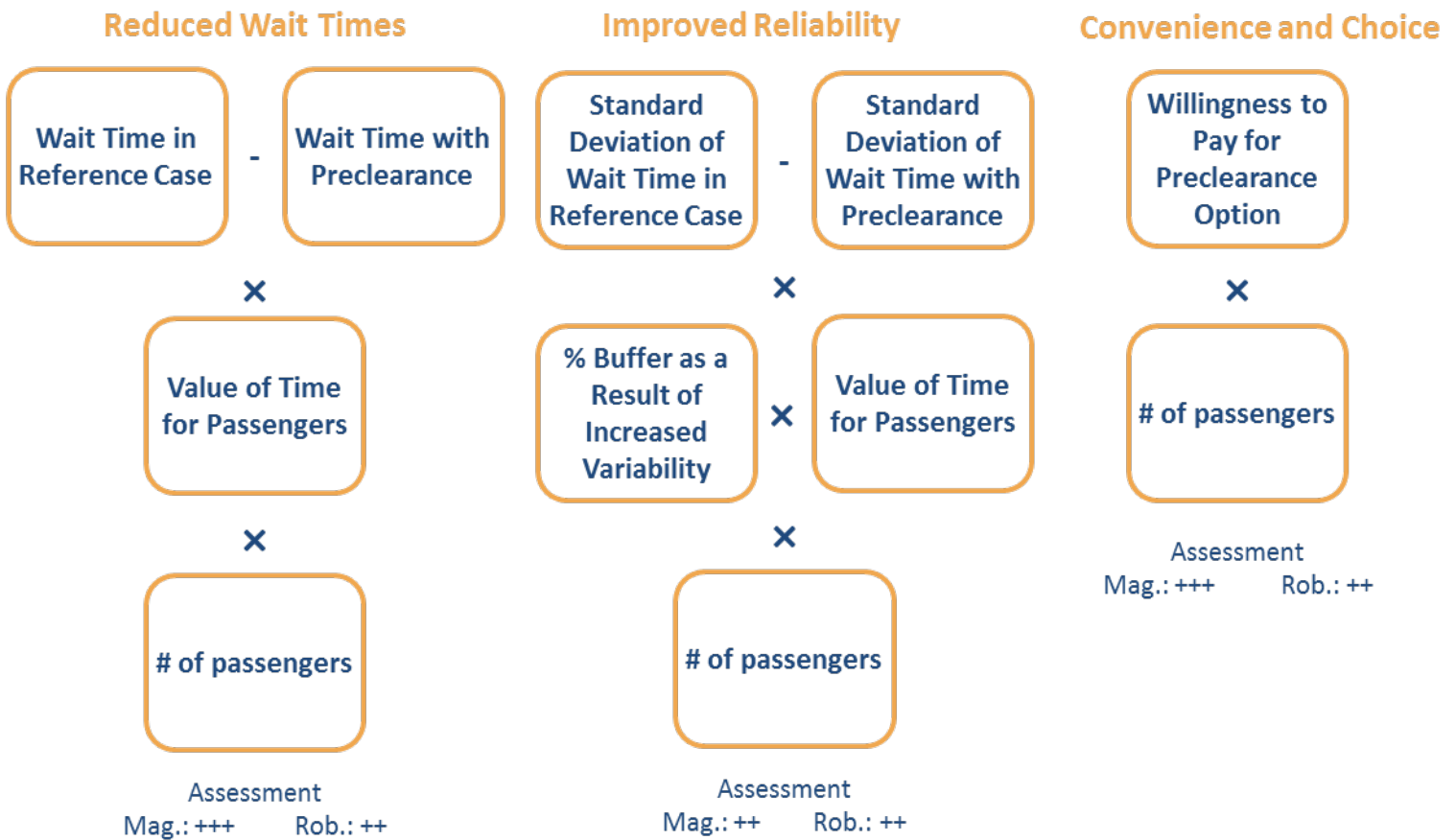
<b>Methodology</b>	The literature provides no methodological guidance. These benefits are very intangible, and would basically affect the assessment of the reduced risk of an incident. Indeed, with improved relations and better information sharing, one should expect the incidence of catastrophic event to be reduced. Overall, however, the research team does not feel this benefit is sufficiently tangible to warrant the development of a methodological approach.
<b>Source</b>	No data available.
<b>Magnitude (Low)</b>	The magnitude of this benefit is largely unknown.
<b>Robustness of estimate (Low)</b>	The assessment should remain qualitative.

# Improving the Experience of Crossing the Border for Passengers

The figure below summarizes the methodology proposed to measure the benefits of preclearance for passengers crossing the border. It also provides a high level assessment of the magnitude of the benefit, as well as of the robustness of potential estimates.

It is important to note that these are purely indicative. Indeed, the magnitude of benefits depends heavily on the particular preclearance operation under analysis, as well as the scope of the analysis. For each of the individual benefits, a more detailed analysis is provided in following subsections.

## Benefits of Improved Experience at the Border for Passengers



## Reduced Wait Time for Preclearance Passengers

<b>Methodology</b>	The methodology applied in the literature is to simply multiply an estimate of time saved per passenger by a value of time saved and by the number of passengers per year to obtain an estimate of annual benefits.
<b>Source</b>	In the US, average wait times are available from <a href="http://awt.cbp.gov">awt.cbp.gov</a> for major airports. Data on preclearance facilities may be obtained from Canadian airports. Value of time is generally based on a proportion of median wage. Number of passengers would be from airports. For rail and marine applications, border agencies would be the most accurate source of the data. If data are unavailable from that source, railways, in particular Amtrak, should be able to provide data. For ferries and cruises, border agencies are also a likely source of data. An alternative would be using GPS-based navigation data. For land border crossings, since no passenger vehicle preclearance is currently planned, no clear data source was identified.
<b>Magnitude (High)</b>	Of course, the magnitude depends on the port of entry under analysis. In Toronto, CBP processes about 4.5 million passengers per year. If, for example, each passenger saved 5 minutes, and time was valued at half the median hourly wage in Canada (about \$12.50 per hour, an appropriate measure for leisure travellers), an estimate for time saved of about \$4.7 million per year would be measured. Over 30 years, this represents \$56 million for Toronto alone. It is important to note that these estimates are only given as an example, and that the estimate of 5 minutes saved per passenger <u>is not</u> based on any detailed analysis.
<b>Robustness of estimate (Medium)</b>	The robustness of this estimate is deemed to be medium, especially in the air mode. Indeed, since a full breakdown of airports that would be used by passengers which are using preclearance facilities would be difficult to obtain, using estimates of average delays at major US hubs may be the only way to obtain a reliable estimate. Issues related to passengers using Nexus facilities, which may realize a lower time saving, would also complicate the estimate. The value of time also embodies uncertainty, especially since the breakdown of business and leisure passengers may be hard to obtain. There is little uncertainty on the number of passengers.

## Improved Reliability

<b>Methodology</b>	The literature reviewed provided no guidance as to an appropriate method to estimate the effect of variance in wait times on passengers. As a result, the research team proposes to use the standard deviation in wait times in the reference and preclearance case as an index of the improvement, to which a factor (buffer) reflecting how responsive passengers are to this variability would be applied. The decrease in buffer time would reflect time saved. The buffer estimate could be estimated through a stated preference survey or using previous stated preference surveys in the literature.
<b>Source</b>	Same sources noted in section 0.  For the responsiveness of passenger, metrics in the literature reported by Cohen and Southworth (1999) could be used. They report that stated preference surveys measured the impact of an increase in one minute of reliability (e.g. one minute decrease in standard deviation of delay) was valued at between 0.35 and 1.31 minutes of travel time. The wide variation for that metrics is mostly attributable to the purpose of trips by travellers. Time-sensitive business travellers tend to have a strong preference for reliability, while time-insensitive leisure travellers have a weaker preference. Differences across modes could also be expected.



<b>Magnitude (Medium)</b>	<p>The magnitude is unknown for many reasons. First, the level to which preclearance could reduce variability in delays is not known. Second, infrequent passengers likely do not necessarily have good information on the variability of processing times, and as such are most likely to plan accordingly to average time than to any estimate of variability. This could affect the level of reactivity of passengers to an improvement in reliability.</p> <p>To provide some context, benefits can be estimated by assuming that preclearance reduces delay's standard deviation by 3 minutes for passengers using Toronto airport. Since CBP processes about 4.5 million passengers per year at that airport, and assuming that for air passenger value reliability gains equally to travel time gains, benefits would be approximately \$2.8 million per year (using half the median hourly wage, i.e. \$12.50 per hour). Over 30 years, this represents \$33.6 million for Toronto alone. It is important to note that these estimates are only given as an example, and that the estimate a reduction of 3 minutes in the standard deviation is <u>not</u> based on any detailed analysis.</p>
<b>Robustness of estimate (Medium)</b>	<p>In the absence of a solid model to predict the reaction of passengers to increased variability, these estimates cannot be considered particularly robust. Estimates of variability itself, however, are fairly robust.</p>

## Increased Convenience

<b>Methodology</b>	<p>The literature provides no guidance on the measurement of this benefit of preclearance. A survey on the willingness of passengers to pay for the increased convenience and additional choice would be the most likely avenue to produce estimates for these categories.</p>
<b>Source</b>	<p>Conducting a willingness-to-pay survey would be one way to value this component. It would require a clear delineation of the benefits for which passenger are requested information to clearly exclude decrease wait times. Such surveys can be relatively expensive to run.</p>
<b>Magnitude (N/A)</b>	<p>The value of convenience is likely to be fairly low since many customers will only benefit marginally from preclearance, in particular those not transiting for further travel.</p> <p>No clear estimates, however, can be provided without a survey. No literature on this specific issue was found by the team, and as such no real assessment can be provided at this stage.</p>
<b>Robustness of estimate (Medium)</b>	<p>Willingness-to-pay surveys are not always perfectly reliable because people are often asked to value elements for which a value is hard to assess.</p>

## Increased Choice

<b>Methodology</b>	<p>The literature provides no guidance on the measurement of this benefit of preclearance. As noted earlier, a survey on the willingness to pay of passengers could help produce estimates.</p> <p>The value of increased choice could also be estimated by comparing prices for direct flights to destinations versus other options, and thus assess how much additional money people are ready to pay to have that choice (which is only available because of preclearance).</p>
<b>Source</b>	<p>An alternative to a survey approach would be, as mentioned, to use airfare information to compare direct flight options to other flight options. Such comparison could be made using public rates on travel websites.</p>

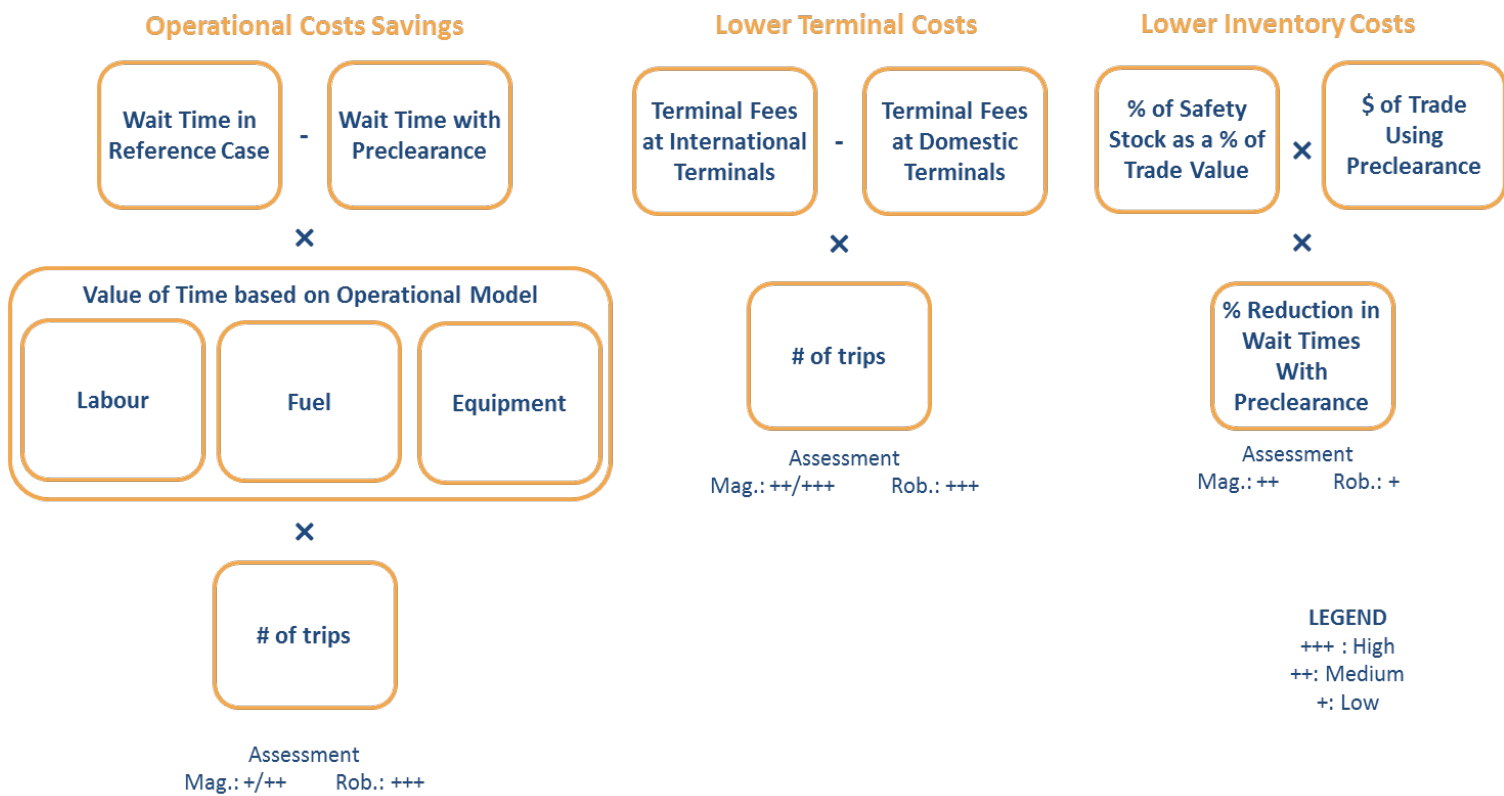
<p><b>Magnitude (High)</b></p>	<p>Increased choice is only a benefit for a portion of passengers. In Toronto, 1 million of the 4.5 million passengers are flying to destinations they would otherwise not be able to fly to (directly). It would not be surprising, however, if the average benefit per passenger was relatively high. Indeed, direct flights have the potential to save each traveller numerous hours. Using the value of time noted earlier (\$12.50 per hour) it wouldn't be surprising if passengers valued direct flights significantly more than non-direct flights. Assuming passengers saved on average 2 hours when using direct flights, savings of the order of \$25 per passengers would be realistic. With 1 million passengers benefiting from this at Toronto's airport, savings of \$25 million per year, or \$300 million over 30 years, are in the range of the possible.</p>
<p><b>Robustness of estimate (Medium)</b></p>	<p>Willingness-to-pay surveys are not always perfectly reliable because people are often asked to value elements for which a value is hard to assess.</p> <p>The alternative valuation also has drawbacks, notably as rates may reflect differences in operational costs and thus underestimate value to passengers.</p>

# Improving the Value Proposition of Crossing the Border for Freight Carriers

The figure below summarizes the methodology proposed to measure the benefits of preclearance stemming from the optimization of border resources. It also provides a high level assessment of the magnitude of the benefit, as well as of the robustness of potential estimates.

It is important to note that these are purely indicative. Indeed, the magnitude of benefits depends heavily on the particular preclearance operation under analysis, as well as the scope of the analysis. For each of the individual benefits, a more detailed analysis is provided in the following subsections.

## Benefits of Improved Experience at the Border for Carriers and Airports



## Operational Costs Savings

<b>Methodology</b>	The estimate of the benefits of wait time reduction for carriers is very similar to that for passengers. In a nutshell, wait times must be measured before and after preclearance, and then valued using an operational model appropriate for the mode under analysis. It is then multiplied by the number of trips per year to obtain an annual measure of benefits.
<b>Source</b>	<p>The source of wait times would differ for different modes. For trucking, GPS data is already in use in Canada to obtain estimates before and after pre-inspection is in place. Otherwise, on-site surveys could be use (which is more expensive). For the air mode, sources in the US include the Federal Aviation Administration (FAA) Aviation System Performance Metrics (ASPM) database which measures, among other metrics, plane delays. Data in Canada would most probably have to come from airports or air carriers directly. In the rail mode, carrier estimates are the only source currently known, unless border agencies are able to provide data. For ferries, data could potentially be obtained through ports or, alternatively, through GIS database such as the National Information System on Marine Navigation (INNAV).</p> <p>Operational models are generally available in the literature. For example, in Canada Transport Canada has published the “Operating Costs of Trucks In Canada” a few times over the last few years. For the air mode, data from air carrier financial filings with the Department of Transportation (Form 41 Financial Data) provide the necessary input to produce an operational model. For the rail mode, the most likely source is once again financial filings in the US. In the ferry industry, direct consultations with operators would likely be the best way to obtain robust estimates.</p>
<b>Magnitude (Low to Medium)</b>	<p>The benefits are driven by wait time reduction for carriers. The magnitude of these wait times savings critically depends on the facilities under study and the nature of the operations. No indication is provided in the literature as to the magnitude of such time savings with preclearance operations, although they seem to be in the order of minutes per trip for trucking (at best), with a higher potential for rail and air operations (although the number of annual trips is generally lower for those).</p> <p>Cost of delays per minute are estimated at about \$78 for airplanes,<sup>33</sup> about \$30 for passenger trains (EBTC, 2012, p.7) and between \$1.20 and \$1.50 for trucks (Transport Canada, 2013, p. 18). Using Toronto as an example, and assuming that the 4.5 million passengers represent roughly 18,000 trips (250 passengers per trip), and assuming savings of 30 minutes because of reduced airport congestion, annual savings would be of the order of \$700,000 per year, or \$8.4 million over 30 years. Similarly, in 2012, delays at the Peace bridge were estimated to cost \$1.69 million per year to the trucking industry (Transport Canada, 2013, p. 18). If preclearance (or pre-inspection in this case) leads to a 50% reduction in wait time, the benefits would be \$850,000 per year, or \$10.2 million over 30 years.</p>
<b>Robustness of estimate (High)</b>	The measurement of these benefits would be entirely derived from actual data, making them particularly robust. They could also be validated with industry to improve their accuracy.

<sup>33</sup> See Airlines for America website, “Annual and Per-Minute Cost of Delays to U.S. Airlines”, <http://www.airlines.org/Pages/Annual-and-Per-Minute-Cost-of-Delays-to-U.S.-Airlines.aspx>, accessed on March 23<sup>rd</sup>, 2014).

## Lower Terminal Costs for Airlines

<b>Methodology</b>	The literature provides little guidance on ways to measure this benefit. A straightforward way would be to compare posted terminal fees between domestic and international terminals at major airports. It could also include comparison of terminal fees between domestic terminals at secondary airports (not served by CBP) compared to major international terminals. The fee difference would then be multiplied by the number of trips per year.
<b>Source</b>	Airports have published rates for services and gate usage at their different terminals. These fee structures can be quite complex, so some modelling would be required to develop estimates of total fees for typical planes. Number of trips should be available from public data sources in the US, and from airports in Canada. Transport Canada also maintains an aviation database which, in its confidential form, may be used to inform the number of trips by origin and destination.
<b>Magnitude (Medium to High)</b>	To provide an order of magnitude, one can point to terminal fees at Miami-Dade, where international arrival aviation charges for an A300 (266 passengers' capacity) are \$1,573.66 and domestic arrival aviation charges for the same aircraft is \$1,464.87. The difference is about \$109 per arrival. Using Toronto as an example, and assuming that the 4.5 million passengers represent roughly 18,000 trips (250 passengers per trips), annual savings are about \$2 million per year, or \$24 million over 30 years. This is only indicative since the differential at other airports may be much more significant. Indeed, in Vancouver, the terminal fee for domestic flights for the same plane is \$1,145.08, while it is \$2,537.50 for the international terminal. Using that differential, the benefits would be nearly 13 times larger, i.e. about \$26 million per year and \$312 million over 30 years. A much finer analysis would be necessary to obtain robust estimates.
<b>Robustness of estimate (Low)</b>	These estimates should be fairly robust, although assumptions about the airports that would be served without preclearance (i.e. reference case) could introduce errors.

## Lower Inventory Costs for Freight

<b>Methodology</b>	<p>The literature on freight border delays provides both complex and simple ways to estimate benefits associated with lower inventory costs. The more complex approach is very data intensive, and the research team does not believe it would provide significantly different estimates. Hence, the simpler, but less robust approach was adopted.</p> <p>It essentially consists of measuring total inventory costs based on assumptions taken directly from the literature (inventory costs as a % of trade), and apply them to the volume of trade at the preclearance facility. This provides an estimate of total inventory costs for goods crossing the preclearance facility. Then, using the percentage reduction in delays measured due to the preclearance, one could assume a similar percentage reduction in total inventory costs.</p>
<b>Source</b>	Wait times would be available from a GPS analysis of data provided by Transport Canada. Estimates of the proportion of trade that represents inventory carrying trade would be taken from the literature (Transport Canada, 2013 or Taylor, 2003). Trade volumes are available from Statistics Canada, International Trade Database.
<b>Magnitude (High)</b>	The benefits of preclearance are driven by wait time reduction for carriers. The magnitude of these wait times savings critically depends on the facilities under study and the nature of the operations. Transport Canada (2013) estimates inventory carrying costs for trucks crossing the Peace Bridge at between \$17 and \$52 million per year (between 1 and 3% of trade). Assuming preclearance diminished wait times by half, and using the mid-range (\$35 millions) estimate of inventory costs, annual savings would potentially be about \$17.5 million per year, or \$210 million over 30 years.

<b>Robustness of estimate (Low)</b>	Because the estimate relies on a high-level analysis of inventory carrying costs it is considered not very robust. In fact, the literature suggests a range of 1% to 3% of trade (Taylor, 2010 and Transport Canada, 2013), which means the range of values can be quite large.
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## Improved Airport Competitiveness

<b>Methodology</b>	These benefits are not considered in this section, since they essentially represent a transfer from airports in the foreign country to airport in the host country. They would be captured in any CGE analysis based on lower transportation costs completed as part of the 'spin-off' section and focusing on only one of the two countries.
<b>Source</b>	CGE modelling
<b>Magnitude (N/A)</b>	The magnitude of the benefit cannot be identified with precision, and would likely represent double-counting as it captures the impact of lower costs measured in other benefits. Moreover, CGE modelling would not identify this benefit separately (and it does not in the literature reviewed), but it would be capture by the overall impact measured for the economy as a whole.  As such, the team was not able to provide an assessment of the magnitude for this benefit.
<b>Robustness of estimate (Medium)</b>	CGE modelling is highly sensitive to embedded assumptions.

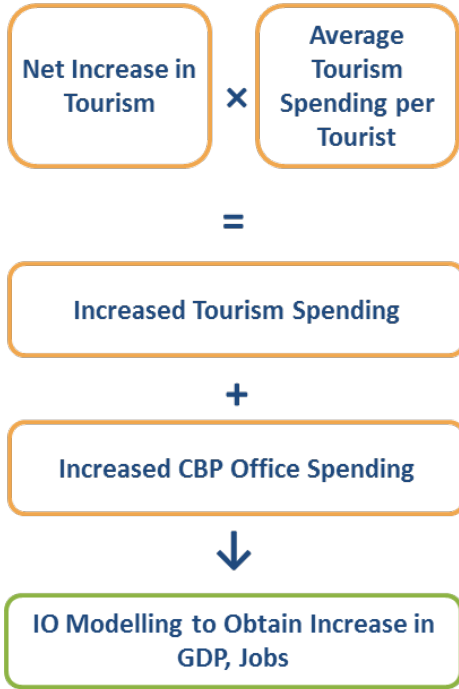
## Increased Revenues Through Improved Service and Increased Ridership

<b>Methodology</b>	These benefits are not considered, since they represent a capture by carriers of the benefits of passengers noted in section 0. Indeed, with passenger facing better choices and better service (faster, more reliable or more convenient), they are now ready to increase spending on the same line, either through increases in tariffs or through additional travel. Counting these benefits here would be double-counting.  The economic impact of increased spending could be measured using an IO or CGE model.
<b>Source</b>	IO or CGE modelling.
<b>Magnitude (N/A)</b>	Including increased revenues due to an improvement in service would represent double-counting, since the value of these improvements to customers are measured in other benefits. Increased revenues merely reflect the portion of these benefits captured by carriers.  Moreover, IO or CGE modelling would not identify this benefit separately (and it does not in the literature reviewed), but it would be captured by the overall impact measured for the economy as a whole.  As such, the team was not able to provide an assessment of the magnitude for this benefit.
<b>Robustness of estimate (Medium)</b>	CGE modelling is highly sensitive to embedded assumptions.

# Other Benefits

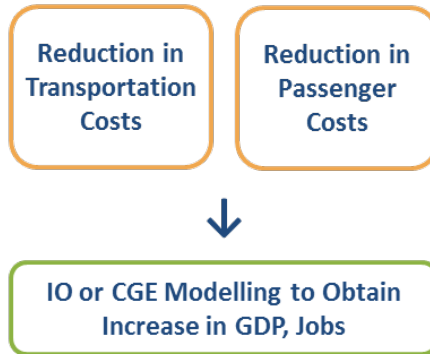
## Other Benefits

### Increased Spending



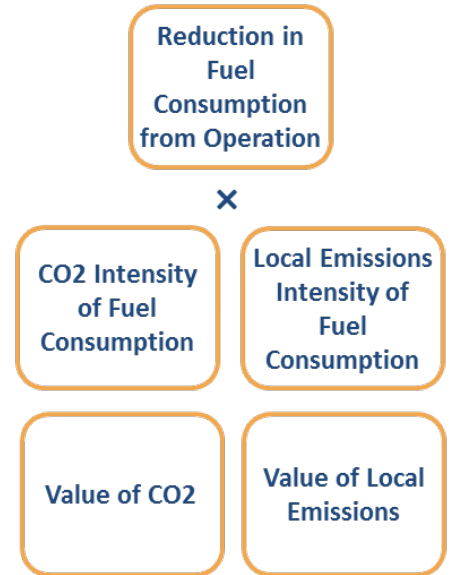
Assessment  
Mag.: +/++ Rob.: +

### Equilibrium Benefits



Assessment  
Mag.: ++ /+++ Rob.: +

### Environmental Benefits



Assessment  
Mag.: + Rob.: ++

## Increased Tourism

<b>Methodology</b>	The computation of net increase in tourism is generally based on assumptions. For a new service made possible by preclearance, the full volume of tourism could be assumed to be associated with preclearance. Otherwise, the price elasticity of passengers applied to a reduction in costs could be used to estimate changes in tourism from both sides of the border. Combined with average spending per traveller (e.g. could include both business and leisure travellers), one could obtain an overall increase in tourism spending.
<b>Source</b>	<p>Generally, assumptions are required for visitors' spending. These assumptions can be derived from Statistics Canada's 2009 Travel Survey of Residents of Canada and the International Travel Survey. It is, however, necessary to have some indication of the origin of tourists (Canada, US, International) and the length of their stay. Indeed, a three-hour cruise tourist does not generate the same spending as a one-week tourist at a ski resort. This information could either be gathered through a passenger survey, or assumed based on the activity under analysis. In some cases, carriers may have some information on their passengers gathered through past client surveys.</p> <p>Modelling could be done using a Statistics Canada IO model or any other model of repute. For example, in Ontario the Ministry of Tourism, Sport, and Culture's TREIM (Tourism Regional Economic Impact Model, see <a href="http://www.mtr-treim.com/webtreim/en/main.aspx">http://www.mtr-treim.com/webtreim/en/main.aspx</a>) can be used to measure impacts of tourism activity on the economy. This model allows for the measurement of impacts at a regional level and helps the user generate accurate spending assumptions when details are lacking.</p>
<b>Magnitude (N/A)</b>	<p>Economic impact estimates tend to be fairly large. For example, in Robert et al. (2013), the economic impact of lower passenger costs due to reduced delays was 3.5 times the value of time saved by passengers, with most benefits accruing close to the port of entry. Using the example for Toronto airport, where time saved was estimated at \$4.7 million per year, suggests that the annual economic impact could be \$16.5 million.</p> <p>The measured economic impact is generally not summed up with other benefits, nor is it discounted over time. It is instead reported as an annual impact on GDP (or employment).</p>
<b>Robustness of estimate (Low)</b>	Given the high level of assumption required (including both input and modelling assumptions), the robustness of the estimate is considered low.

## Increased Spending in Host Country

<b>Methodology</b>	The methodology basically relies on obtaining estimates of spending in the host country from administrative sources, and to then use that as an input in an IO model to measure the direct, indirect and induced impacts on the economy. In general, results would only be available at the provincial level. Detailed description of spending would lead to more accurate evaluation of the economic impact.
<b>Source</b>	<p>Estimates of increased spending by foreign officers in the host country could be either obtained through the border agency, or assumed based on estimated salaries and staffing levels. For infrastructure spending, they could be obtained through the border agency.</p> <p>With this information in hand, modelling could be done using Statistics Canada IO model or any other model of repute. Many provinces maintains their own I-O models based on Statistics' Canada data, of which the better known are the Quebec model from the Institut de la Statistique du Québec and the BC model from BC Stats.</p>



<p><b>Magnitude (Low to Medium)</b></p>	<p>Economic impact estimates are in direct relation to the increase in spending. The exact multiplier depends on the nature of spending. For example, based on a CPCS run of the TREIM model where spending of \$54,000 was assumed across a multitude of goods and services (accommodation, food and beverages, entertainment, etc.), direct (\$26,500), indirect (\$11,500) and induced (\$11,500) impacts on total GDP were estimated at \$49,500.</p> <p>Using this multiplier, it can be estimated that for each CBP officer spending \$60,000 of its wage in Canada annually, the impact on Canadian GDP would be \$55,000. The number of officers at the preclearance location and the amount of infrastructure spending would ultimately drive the magnitude of the measured economic impact.</p> <p>The measured economic impact is generally not summed up with other benefits, nor is it discounted over time. It is instead reported as an annual impact on GDP (and/or employment).</p>
<p><b>Robustness of estimate (Low)</b></p>	<p>Given the high level of assumption required (including both input and modelling assumptions), the robustness of the estimate is considered low.</p>

## Increased Foreign Investment and Productivity

<p><b>Methodology</b></p>	<p>The only way to appropriately capture these benefits is through a simulation using a CGE model. By inputting estimates of transportation costs savings, which mostly rely on a reduction of delays at the border, it is possible to measure the overall impact on the economy, including dynamic impact such as increased foreign investment. The specific component of foreign investment or productivity would, however, likely be impossible to isolate.</p>
<p><b>Source</b></p>	<p>In order to measure the decline in transportation costs related to preclearance, including costs related to delays, one could lean on the metrics developed for other benefits. For example, the average delay (monetized), added to the benefits to the carriers, could be translated into an average saving per passenger, and then expressed in percentage terms.</p> <p>This input could then be introduced in a CGE model to produce estimates of impacts on the economy as a whole.</p>
<p><b>Magnitude (Medium to High)</b></p>	<p>Unfortunately, it is difficult to separate specifically new foreign investment (as opposed to new local investment). The magnitude also critically relies on the magnitude of the reduction in transportation costs. Nguyen and Wiggle (2011) modelled an increase of 1% in transportation costs over the whole range of industry, leading to a 1% decline in GDP, a 3.6% decline in international trade and a 0.4% decline in interprovincial trade. Given that Canada's GDP is about \$1.8 trillion, this would represent an \$18 billion reduction in annual GDP. Assuming linearity, if a preclearance facility reduced transportation costs by 1% for a small portion of the economy, let's say 1/100<sup>th</sup>, benefits could be in the order of \$180 million per year. These benefits would not only cover foreign investment and productivity, but also increased spending, increased trade, etc.</p> <p>The measured economic impact is generally not summed up with other benefits, nor is it discounted over time. It is instead reported as an annual impact on GDP, which is assumed to be sustained over time.</p>
<p><b>Robustness of estimate (Low)</b></p>	<p>Comparisons with other CGE model reveal wide ranges of results. Given the high level of assumption required (including both input and modelling assumptions), the robustness of the estimate is considered low.</p>

## Environmental Benefits

<b>Methodology</b>	This benefit would be directly derived from fuel savings computed in the operational models. Valuation for CO2 emissions and local emissions are well-documented. These benefits flow, for the most part, from time savings in the customs clearance process.
<b>Source</b>	<p>The primary data on fuel savings would need to be derived from operational models, as described in section 0.</p> <p>The reduction in emissions would then be measured using the emissions contents of the different fuels used for that mode of transportation. These estimates are essentially based on the chemical composition, but some adjustment would be necessary in some cases since different exhaust systems may reduce local emissions.</p> <p>Valuation for monetization would be based on values found in the literature, with a range of estimates used to show the sensitivity of the benefits to the assumptions. TBS's cost benefit guidelines could be used, although they do not necessarily prescribe values for specific emissions. The European HEATCO initiative (Developing Harmonised European Approaches for Transport Costing and Project Assessment)<sup>34</sup> could provide further guidance on appropriate monetization estimates.</p>
<b>Magnitude (Low)</b>	<p>Environmental benefits represent a fraction of the value of fuel savings, and as such would represent a fraction of the operational costs savings measured earlier. For example, a litre of diesel produces 2.7 kilograms of CO2. CO2 emissions are valued anywhere between \$10 and \$150 per tonne. Even using the highest estimate of the value of CO2 emissions, the value of CO2 emission per litre of diesel is 40 cents. At the moment, diesel is priced at about \$1.40 per litre, so CO2 benefits represent at best 29% of fuel savings.</p> <p>As noted in section 0, if preclearance (or pre-inspection) leads to a 50% reduction in wait time at the Peace Bridge, operational benefits would \$850,000 per year. Since fuel represents about 40% of operational costs, fuel savings are about \$340,000 per year. In turn, CO2 emissions, which represent at best 29% of fuel savings, could be estimated at \$99,000 per year, or about \$1.2 million over 30 years. Of course, detailed operational models would allow for more accurate estimates.</p> <p>Of note, local emissions are generally valued much lower than CO2 emissions since they impact a much more limited number of individuals.</p>
<b>Robustness of estimate (Low)</b>	Since this estimate itself relies on estimates with low robustness, it is itself assessed a low level of robustness.

<sup>34</sup> See <http://heatco.ier.uni-stuttgart.de/>. Accessed April 23<sup>rd</sup>, 2014)

## Towards a Framework

This report has detailed the proposed methodology to measure the individual benefits that could be attributed to preclearance which were identify. It did not propose, however, a way to aggregate these benefits. This chapter provides some guidance on aggregation, as well as provides some other directions on the application of the measurement methodologies in the different contexts of preclearance and pre-inspection. This guidance is operationalized in an example. Although this example does not provide an accurate or complete measurement of preclearance benefits, as this is clearly outside the scope, more detailed pointers as to how the methodology could be applied is provided.

## Key Challenges

Proposing specific methods to measure the benefits of preclearance requires establishing clarity and trading-offs between a number of factors.

- **Robustness and Availability:** Is the focus on obtaining robust estimates, or should less robust estimates be produced based on available data? At what point should an estimate be excluded / included based on its level of reliability? What level of assumption is acceptable versus a requirement to use observed data?
- **Scope:** Are benefits measured only for Canada? For both the host and foreign country? Are benefits to international passengers counted?
- **Focus:** Is the measurement for benefits of existing activities or of proposed activities? Are benefits being measured for a single preclearance location or for all preclearance activities? Are they measured before implementation (i.e. potential benefits) or after implementation?

This chapter provides guidance which should, at least in theory, provide an analyst with sufficient understanding to adapt the methodologies to each of these challenges. Indeed, since the proposed framework is essentially built on individual measurement methodologies, it is very modular. It is of course impossible to provide a complete level of details for all the possible permutations, but the research team believes that sufficient information on the metrics and models has been provided to easily adapt the methodology to these different realities.

The following section provides guidance as to how to adapt each methodology for measuring preclearance benefits based on issues of data, scope and focus. Then, an example of how it could be applied to a specific situation is shown. This example identifies some of the key drivers of benefits which could be used to assess future preclearance projects in the absence or in the case of limited observed and measurable data.

# Guidance on the Application of the Methodology

## Summary of Benefits and Measurement Recommendations

Table 8 provides a list of the relevant preclearance benefits identified in the report alongside the estimated magnitude and robustness of potential estimates.<sup>35</sup> It also provides some discussion of the impact of scope, data needs, and focus, as well as other relevant notes on the application of the methodology for that benefit.

One thing of particular importance is that it is almost impossible to accurately assess whether benefits accrue mostly to the host or the foreign country. Indeed, while passengers (from either country) may benefit from lower delays or better choices, it is entirely possible that this benefit is then captured by airlines through higher fares. Similarly, while carriers undoubtedly generate significant operational savings, it is unclear to what extent these savings are then transferred to passengers (through lower fares) and authorities (through user fees). Even if it was possible to accurately identify the stakeholder capturing the benefit (e.g. the carrier), questions could be raised since ownership of airlines is not entirely domestic. For example, about 13% of Air Canada is owned by non-Canadians, so benefits flowing to Air Canada could be considered as partially non-domestic.

In the same vein, some of the passengers using preclearance facilities are neither host nor foreign country citizens. These passengers save time, and also benefits from better choices or increased convenience. Given these difficulties, the research team strongly recommend that any framework adopted does not limit the scope of benefits, leaving discussions of the distribution of benefits as a qualitative component of the assessment.

Otherwise, one should also note that while benefits that can be legitimately summed up (i.e. ‘additive’ benefits) should be aggregated, it is recommended that analyses requiring IO or CGE modelling (‘impact analyses’) be conducted separately (and separately from each other) to facilitate the understanding of individual impacts and avoid totals that would include double-counting.

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<sup>35</sup> Of course, the magnitude of the benefit critically depends on the facility and operations under study. This assessment is thus purely indicative, and should be interpreted with care.

**Table 8: Measurement Recommendations and Implications**

Preclearance Benefit	Estimated Magnitude	Estimated Robustness	Additive, Impact or Qualitative	Major Unmet Data Needs	Scope Implications	Focus Implications	Other Notes
Infrastructure cost savings	+++	++/+++	Additive	Long-term infrastructure savings (e.g. less growth at some airport which reduce investment needs)	Savings accrue mostly to foreign country. Depends on agreement.	Easier to measure for single facilities.	Depends heavily on information available from official sources.
Border Operations Savings	+	+++	Additive	None, assuming border agency has data.	Savings accrue mostly to foreign country. Depends on agreement.	Easier to measure for single facilities.	
Reimbursement of costs	N/A	+++	Impact / Qualitative	None, assuming border agency has data.	Relevant in as much as it can represent a shift of benefits from foreign to host or vice-versa, depending on agreement.	Since it is very dependent on agreement and location, it is more relevant to single facilities	
Intercepting Aliens	+/>++		Additive / Qualitative	Assessing impact of preclearance on the incidence of catastrophic events	Savings accrue mostly to foreign country. Incidental benefits to the host country of avoiding a catastrophic event in the foreign country.	No major incidence	Given the lack of data and high level of uncertainty, the recommendation is to treat these benefits qualitatively.
Intercepting Illegal Goods	+/>++		Additive / Qualitative			No major incidence	
Improved Relations and Information Sharing	N/A	N/A	Additive / Qualitative	No clear way to assess and monetize	Shared benefits	No major incidence	
Reduced Delays for Passengers	+++	++	Additive	None	Shared benefits. The more 'local' the facility, the most benefits are likely to be for the host country	Data gathering needs are significant. Much easier for single facilities. Much easier with 'observed' data, otherwise heavily based on assumptions.	-
Improved Reliability for Passengers	++	++	Additive	Stated preference surveys to assess value of variability would increase robustness			Given importance and magnitude, using estimates from the literature instead of a survey would be appropriate.
Increased Choices and Convenience for Passengers	+++	++	Additive / Qualitative	Convenience would require a willingness-to-pay survey.			Should treat convenience qualitatively and assess the value of choice through fare analysis.

Preclearance Benefit	Estimated Magnitude	Estimated Robustness	Additive, Impact or Qualitative	Major Unmet Data Needs	Scope Implications	Focus Implications	Other Notes
Carriers' Operational Costs Savings	+ / ++	+++	Additive	May need consultation with industry to firm up some operational costing and better understand turnaround time savings.	Shared benefits. Depends on the carrier(s) operating from the preclearance facility.	Requires estimates of time saved at the border for some mode (trucks, rail). Easier with observed data, i.e. for existing services.	This is the benefit where close collaboration with industry would be most beneficial to improve robustness of estimate.
Lower Terminal Costs for Airlines	++ / +++	+++	Additive	May need to consult with some airport authorities to obtain tariffs.	Shared benefit. Depends on the carrier(s) operating from the preclearance facility.	Easier for well-defined services with clear origins and destinations.	-
Lower Inventory Costs for Freight	++	+	Additive	None	Shared benefit. Depends on the carrier(s) crossing the border.	No major implication.	-
Improved Airport Competitiveness	N/A	N/A	Impact / Qualitative	This is essentially a transfer from foreign to host country and would be very hard to measure independently	Host country benefit (also for host country carriers). Negative impact for foreign country.	Easier to assess when concrete proposals from carriers are on the table.	Given it is a transfer, and the difficulty to measure, the recommendation is to treat this benefit qualitatively
Increased Carriers' Revenue	N/A	N/A	Impact / Qualitative	This is essentially a transfer from passengers to carriers and would be very hard to measure accurately.	Since the benefits can be transferred from passenger to carriers, the allocation between host and foreign country may be dicey.	No major implication.	Given it is a transfer, and the difficulty to measure, the recommendation is to treat this benefit qualitatively
Increased Tourism	+	+	Impact	None, other than accurate assumptions based on specific case.	Possibility to focus analysis on a specific country. Preclearance generally create benefits in both countries.	Of particular relevance when the facility is focused on creating a new tourism niche.	-
Increased Spending by Border Officers in Host Country	+	+	Impact	None	Benefits accrue mostly to host country. Hard to model the very local nature of benefits since models are often at provincial levels.	No major implication.	Depends heavily on information available from official sources.

Preclearance Benefit	Estimated Magnitude	Estimated Robustness	Additive, Impact or Qualitative	Major Unmet Data Needs	Scope Implications	Focus Implications	Other Notes
Increased Foreign Investment, Productivity	++	+	Impact	None, other than generating accurate assumptions	Shared benefits.	No significant impact of the scope on modelling. Modelling generally at the provincial or national level, so slightly easier for a sector as a whole.	-
Environmental Benefits	+	++	Additive	None	Shared benefits. In some cases, fuel savings occur in both countries (e.g. at airports in both the host and foreign country). In other cases, there is a reduction, but also a shift (e.g. local trucking emissions reduced, but now in host country instead of foreign country)	No major implication.	-

Note: + is low, ++ is medium, +++ is high. The magnitude of a given benefit can vary widely depending on the preclearance facility or operation under study. The assessment provided in the table is purely indicative and should be interpreted with care.

## How to Apply to a Passenger Air Preclearance Facility

The proposed framework is modular and could apply to a variety of cases. This section briefly provides an assessment of benefits for the case of a passenger air preclearance facility. The example of Toronto’s Pearson airport is used. Based on this high-level assessment, some of the key drivers of benefits which could be used to evaluate new facilities are identified.

### Benefits Assessment

First, it is useful to remind the reader that measuring preclearance benefits was not within the scope of this research report. Nonetheless, where possible, examples of benefits valuation were developed. In Table 9, these examples applied to Toronto’s Pearson airport preclearance facility are summarized. Unsurprisingly, some items which could be measured do not have estimates given the lack of information currently available to the team.

As shown in Table 9, based on a heavy set of assumptions which would be verified in any serious measurement endeavour, preclearance benefits at Toronto’s Pearson Airport are estimated to be approximately \$47.3 million per year, or nearly \$570 million dollars over a thirty year period (discounted at 8% per year). Most of the government-related savings (infrastructure, operational, administrative savings), which accrue to the US, are not counted. All other benefits are shared between Canadian and US carriers and passengers, as well as some international passengers. The separation of these benefits was not assessed.

**Table 9: Indicative Summary of Additive Benefits for An Air Preclearance Facility**

Preclearance Benefit	Rough Estimate	Note
Infrastructure cost savings	No estimate available at this moment.	Estimates would need to be provided by authorities.
Border Operations Savings	No estimate available at this moment.	Estimates would need to be provided by authorities. Driven by volumes of passengers.
Reduced Delays for Passengers	About \$4.7 million per year or \$56 million over 30 years.	Based on 4.5 million passengers per year, 5 minutes savings and half median hourly wage in Canada (\$12.50).  Time savings are not based on actual observations.
Improved Reliability for Passengers	About \$2.8 million per year or \$33.6 million over 30 years.	Based on 4.5 million passengers per year, 3 minutes reduction in average delay’s standard deviation, an equal value by passenger for reliability and time savings, and half median hourly wage in Canada (\$12.50).  Reduction in standard deviation and stated preference about reliability are not based on actual observations or surveys.
Increased Choices for Passengers	About \$25 million per year or \$300 million over 30 years.	Based on 1 million passengers benefiting from direct flights otherwise unavailable, an average of 2 hours saved due to direct flying, and half median hourly wage in Canada (\$12.50).  Reduction in travel time not based on actual observations.



Preclearance Benefit	Rough Estimate	Note
Carriers' Operational Costs Savings	About \$700,000 per year or \$8.4 million over 30 years.	Based on cost of delays per minute of \$78 for airplanes, an estimated 18,000 trips (250 passengers per trips), and savings of 30 minutes per trips annual savings  Number of trips estimated rather than observed. No account for different plane types. Savings of 30 minutes not based on actual observations.
Lower Terminal Costs for Airlines	Between \$2 and \$26 million per year or between \$24 and \$312 million over 30 years.  Central estimate of \$14 million per year and 164 million over 30 years.	Based on an estimated 18,000 trips per year and terminal savings between \$109 (Miami-Dade) and \$1,145 (Vancouver) for domestic versus international terminals.  A much finer analysis of the airports services and their terminal fees would be necessary to obtain robust estimates.
Environmental Benefits	About \$105,000 per year or \$1.3 million over 30 years.	Based on fuel representing about 50% of operational cost savings and CO2 value representing about 30% of the cost of fuel.  These assumptions would need to be refined based on actual operational models being developed.
<b>TOTAL</b>	About 47.3 million per year, or nearly 570 million over 30 years.	Very rough estimate. Does not include savings related to infrastructure, border-operations and administrative costs related to preclearance. Also excludes a host of security benefits.

It is worth noting that the two largest benefits, i.e. increased passengers choices and lower terminal costs for airlines, are specific to the air sector. One would thus expect preclearance benefits to be sizeably smaller for facilities serving other modes.

Other benefits of preclearance at Pearson's airport which are of importance but are hard to value with significant accuracy include:

- Improved security as illegal passengers can be intercepted before boarding the plane;
- Improved security as illegal goods or pests can be intercepted before being loaded for the US;
- Improved relations and information sharing between Canadian and US border agents, increasing the probability of avoiding potential threats;
- Increased convenience for passengers catching connections in the US as they can fly directly to domestic terminals and connect rapidly to other domestic flights; and
- The value for passengers at major US hubs who benefit from shorter clearance lines and reduced delays.

In addition to these benefits, it is worth mentioning another number of significant impacts that preclearance has on the Canadian economy. Indeed, by saving time and reducing delays for business passengers, the preclearance facility facilitates business travel and increases productivity. This in turn can lead to significant spin-off benefits in terms of increased cross-border trade (in goods and

services), improved productivity and competitiveness, and higher economic output. The extent of such benefits, while hard to quantify with certainty, is not negligible.

Moreover, by allowing direct flights between Toronto and US destinations that would otherwise not exist, preclearance favours the development of tourist and business-related events (conventions, conferences, etc.) in Toronto. These events generate significant spin-off benefits in the local economy which would otherwise accrue to other cities.

Thirdly, the preclearing facility puts Pearson on a level-ground with US airports when it comes to transiting passengers to US-bound destinations, since passengers can clear US customs directly in Toronto. This means no double-clearance is required, and provides a clear competitive edge to the airport. This facilitates the development of the airport and ensures additional jobs remain in the local economy.

Finally, a significant number of CBP officers are located in Toronto instead of the US, providing a small boost to the local economy as they live and spend a portion of their wage in Toronto instead of the US.

### **Key Drivers of Benefits**

The example of the air preclearance facility points to some clear drivers of benefits for such operations. Unsurprisingly, the volume of passengers being processed through the preclearance facility is the most obvious. It drives all other benefits, maybe to the exception of infrastructure costs savings.

There are, however, some follow-up questions which are worth asking as they also drive benefits, contingent on passenger volumes. In particular, of the passengers and services provided from the preclearance facility, the following questions provide guidance as to the magnitude of benefits:

- What proportion of passengers will benefit from new direct flight options?;
- Is there a large cost-differential for terminals that will be served from the facility?; and
- Will passengers save a significant amount of time or face much improved reliability when clearing at the facility?

Other benefits (carrier's operating costs, environmental benefits, administrative costs savings, etc.) are generally small in proportion.

In terms of unquantified benefits and impacts, some of the key questions that must be asked to assess whether the benefits are likely to be sizeable are:

- Is this airport in the host country the origin for a significant numbers of illegal passengers or illicit cargo with a destination in the foreign country?
- Is preclearance opening new niche markets for businesses and tourism in the host country?

Answering these questions, and especially getting a sense of the magnitude to which each objective would be met, can provide a good assessment of whether the new facility would generate significant benefits or not.

## A Note on Other Modes

Of course, the relative importance of key drivers for different types of facilities will differ. Indeed, non-airport preclearance operations generally do not generate significant (or any) passenger choice or terminal-related benefits. In that context, focusing on time savings, reliability and carriers' operational savings should be most appropriate, alongside tourism impacts. In some cases, infrastructure savings may also be most significant (e.g. Buffalo-Fort Erie truck border crossing).

Similarly, security impacts, outside the air mode, are also likely to be much lower given that history suggests that terrorism incidents involving passenger trains, ferries or freight trucks are less likely to generate as significant damage as airplanes.

In any case, the examples and framework provided in this report should provide significant guidance as to the relative importance of different benefits and impacts, and help policymakers assess the benefits of preclearance before or after implementation.

## Conclusion and Next Steps

### Conclusion

Potential benefits offered by preclearance operations are significant. Of course, they can differ widely based on the mode and the port of entry. In most cases, benefits to passengers and carriers are driven by the potential for faster customs clearance and the associated time saved. In the air sector, however, the additional operational flexibility leads to much larger benefits, both to passengers (increased choices) and airlines (terminal fees). The extent to which airlines are able to collect these benefits through higher fares (i.e. how the benefit is divided between passengers and airlines) is hard to establish.

In the trucking sector, the benefits associated with lower inventory carrying costs accruing to shippers are potentially significant. This benefit is contingent on saving time at the border.

In some cases, the benefits from lower infrastructure or operational costs could be particularly interesting for border agencies. Similarly, while too hard to accurately value, security benefits are potentially significant.

Finally, one can note that other benefits, largely driven by the primary benefits noted above, can be measured using economic modelling. These models rely on a heavy set of assumptions and can be perceived as not being particularly transparent. On the upside, they do capture a number of impacts which are otherwise practically impossible to capture directly, including the potential for improved productivity and improved competitiveness.

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## Appendix B: Stakeholders Consulted

The following stakeholders were successfully consulted for this study. The research team did reach out to a number of other stakeholders, but interviews could not be arranged within an appropriate timeframe.

<b>Organization</b>	<b>Name</b>
American Trucking Associations Cross-Border Committee	Martin Rojas
Border Connect Corporation	Anonymous
Chrysler – International Logistics Staff	Anonymous
Detroit Chamber of Commerce	Ben Eurlkar
Detroit-Windsor Tunnel Corporation	Neal Belitsky
Eastern Border Transportation Council	Kris Wisniewski
Ogdensburg Bridge and Port Authority	Steve Lawrence
Ontario Trucking Association	Jennifer Fox
Original Equipment Suppliers Association	Dave Andrea
Outward Group Transportation	Karl Randolph
Sandler, Travis & Rosenberg Trade Advisory Services	Kevin Smith
Southeast Michigan Council of Governments	Carmine Palombo
Transport Canada	Louis-Paul Tardif
University of Windsor – Cross-Border Institute	Bill Anderson
Wilson International Brokerage	John Christi