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SPPI for Mainline Freight Rail Transportation Services in Canada

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Introduction

The purpose of this paper is to provide a brief overview of the Services Producer Price Index (SPPI) program for the railway services industry in Canada. This paper will describe on going work with respect to an index for mainline freight transportation. The development of an SPPI for rail passenger service will start soon. The structure of this paper follows the Content Development Framework set out by the Voorburg Group on Service Statistics. The SPPI is being developed by the Producer Prices Division of Statistics Canada.

1. Definition of the Service

According to the North American Industry Classification (NAICS 2007) NAICS 482113, Mainline Freight Rail Transportation is comprised of establishments primarily engaged in operating railways for the transport of goods over a mainline rail network. A mainline rail network is a system that usually comprises one or more trunk lines, into which a network of branch lines feed. The branch lines may be part of the mainline establishment or may be separate establishments of short-haul freight railways.

Establishments primarily engaged in the following are excluded from this industry:

- Operating railways for the transport of goods on a rail line that does not comprise a rail network, NAICS 482112 Short-Haul Freight Rail Transportation
- Providing the railway transport of passengers, NAICS 482114 Passenger Rail Transportation CAN
- Operating street railways and urban rapid transit, NAICS 48511 Urban Transit Systems
- Operating tourist and scenic trains, NAICS 48711 Scenic and Sightseeing Transportation, Land
- Operating switching and terminal railways, NAICS 48821 Support Activities for Rail Transportation

Rail companies in Canada are also classified into three different classes by revenue (see *Appendix1), Table 4 - Uniform Classification of Accounts (U.C.A.)).*

The notable relationship between mainline carriers defined by NAICS 482113 and short-haul carriers defined by NAICS 482112 requires some clarification. Short-haul carriers regularly receive contracts to transport goods along smaller regional lines connected to mainline networks serviced by rail carriers in NAICS 482113. This occurs as part of a larger shipment route but because mainline carriers usually do not provide rail services to smaller markets, sub-contracting these services to smaller regional carriers is common practice. For example, a particular good may have an origin-destination of St. Catharines-Halifax but since St. Catharines is a smaller market, a smaller regional carrier may be sub-contracted to transport the good to Toronto. From Toronto, a hub along the mainline network the good is then transported along the mainline

network to Halifax by a mainline carrier. It should be considered that contract prices provided to regional carriers are included within contract prices quoted to customers of mainline rail carriers.

2. Pricing Unit of Measure

The pricing unit of measure typically represents a shipment. The characteristics of the shipment (or service) are monitored and, where possible, held fixed in order to maintain comparability and ensure constant quality. The price-determining variables or characteristics are:

a) Type of Service
- Carload
- Intermodal

b)Type of Equipment
- Box car
- Container
- Flat car
- Gondola
- Hopper
- Refrigerated car
- Tank car
- Trailer
- Other freight car (as specified)

c) Service Identification
- Commodity by carload (i.e. assumed to be single carloads unless otherwise stated; differs for contract transactions)
- Shipment weight and dimensions
- Origin and destination of shipment
- Route (direct or indirect)

Information on each of these characteristics is available from the respondents.

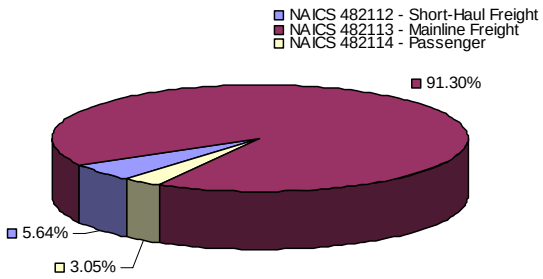
3. Market conditions and constraints

3.1 Size of industry

In Canada, the mainline freight rail transportation industry, NAICS 482113 has 2 main carriers; Canadian National (CN) and Canadian Pacific (CP). In 2006, the revenue share of the rail freight

carrier market held by CN was 53.92% and the share held by CP was 40.26%, while all other carriers contributed only 5.82%.

The following chart illustrates the breakdown of the Rail Transportation industry (NAICS 482):

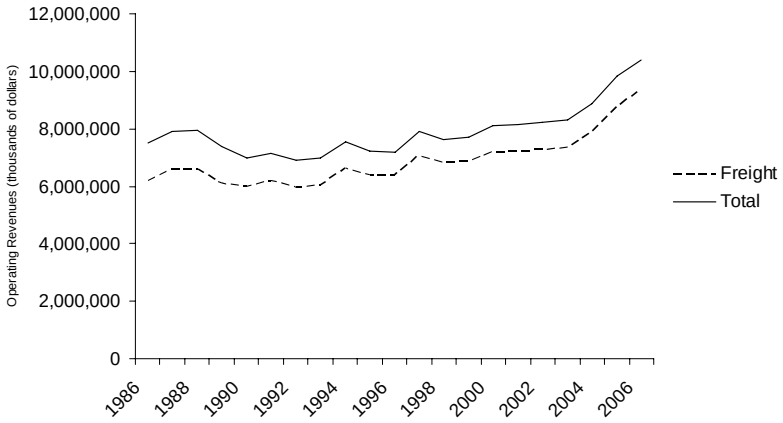


Source: Statistics Canada, Railway transport survey(annual).

Within the rail industry, freight transportation continuously represents the single largest revenue source. 2007 proved to be no exception to this as the $9.4 billion in freight revenues, which grew 1.0% over 2006 levels, accounted for 90.0% of the industry's total operating revenues.

Total operating revenues for the Canadian railway industry rose 0.8% to $10.5 billion in 2007, the 9th consecutive year an increase has occurred. The increase was due primarily to a rise in freight revenue, which rose 1.0% to $9.4 billion. Over the 5 year period from 2003 to 2007, total operating revenues grew from $8.3 billion to $10.5 billion. In 2007 however, significant increases in operating expenses resulted in net operating income decreasing 4.5% over 2006 levels to $2.5 billion. Net income, after adjusting for taxes and extraordinary items, increased 9.2% to $2.0 billion. According to the *Rail in Canada 2007* publication, employment in the Canadian rail industry increased to 34,281 employees in 2007, an increase of 0.6% over the previous year.

The following chart shows the operating revenues for both the rail freight and total rail industry from 1986 to 2007:



Source: Statistics Canada, Railway transport survey(annual).

3.2 Special conditions or restrictions

The regulatory environment for this industry is primarily concerned with maintaining a competitive and safe atmosphere. Canadian rail freight carriers operate in Canada and the United States and are subject to economic, environmental, safety, health, labour and security regulations which are set by ruling bodies in each of the respective countries (see *Appendix 2*, *Table 5*, for a list of the different regulatory associations and their corresponding areas of legislation).

The transportation sector was deregulated substantially by a series of legislative changes in 1987 and 1996. These changes simplified many aspects of railway operations. For example, carriers no longer needed economic justification for the discontinuation of rail lines and enjoyed the freedom to negotiate prices in alignment with market conditions.[1]

Rail carriers are exposed to the volatility of fuel price fluctuations which can adversely affect their financial performance by increasing expenses relative to its income. Fuel comprises a sizeable portion of operating expenses and therefore changes in the price of fuel are significant. This concern has been addressed with the introduction of new fuel surcharge schedules and fuel hedging techniques. These surcharge programs are designed to offset the impact of rising fuel prices and to implement cost-recovery from consumers of this industry.

Currency fluctuations are another factor that wield influence on the financial operations of rail carriers and the demand for rail services. Both CN rail and CP rail operate in both Canada and the U.S. As such, they are invariably affected by currency rate fluctuations because a considerable portion of their revenues, expenses and debts are denominated in U.S. dollars. CN, which has a considerable presence in the U.S., sees as much as 55% of its revenue, 60% of its expenses and 90% of its debt based in U.S. currency. On average, a one-cent appreciation of the Canadian dollar against the U.S. dollar (i.e. $0.84 to $0.85 USD per CDN) over the course of one year can reduce net income by about $10 million annually. The demand for Canadian exports is also affected by currency fluctuations. As the Canadian dollar appreciates against other currencies, it becomes increasingly expensive to purchase Canadian goods/exports and rail carriers suffer due to decreased demand for Canadian goods and ultimately freight transportation.

3.3 Record keeping practices

CN and CP rail both have an online public tariff publishing system. This system is updated on a regular basis, and provides detailed descriptions and pricing information for all commodities transported by the carriers. The systems also provide information on fuel and other surcharges. Tariff prices and surcharges are collected monthly.

[1] The Canada Transportation Act (CTA) protects shippers/customers against potential monopolistic price-setting behaviour or excessive surcharges.

4. Standard classification structure and details

The Mainline Freight Rail Transportation Price Survey is based on the 2007 North American Industrial Classification System (NAICS) definition. For a complete standard classification structure of the rail transportation industry, see. *Appendix 3, Table 6: North American Industry Classification System (NAICS) 2007.*

The main price-determining variables used to characterize a price for a shipment are:

Commodity
- Identifies the product transported (i.e. one of the top commodities listed above)

Shipment/STCC code
- Identifies the item shipped under the specified commodity, which can be used to uniquely identify and track the product over different time periods

Route
- Specifies the route used, which can be used to uniquely identify and track the product over different time periods

Origin/destination
- Specifies the origin and destination, which can be used to identify a similar shipment in the case of a cancellation of an item

Type of equipment
- Refers to the type of train equipment used to transport the commodity

Description of car
- Refers to any specific characteristics of the car shipped (ex. weight and length of car)

Information on each of these variables is collected along with the price, where the type of price collected may be contract, list/tariff, private quote, public/open quote, or other (as specified).

5. Evaluation of standard vs. definition and market conditions

The implementation of the North American Product Classification System (NAPCS) and the North American Industry Classification System (NAICS) are intended to match the market conditions in the area of freight transportation by rail. In Canada, the Standard Classification of Transported Goods (SCTG) is employed and represents a good classification measure for the types of commodities transported and associates well with how the data are used by the System of National Accounts (SNA). As the Canadian statistical system (both the SNA and business survey fields) moves toward the implementation of NAPCS and NAICS, a historical linkage will be carried out. The NAICS has also evolved to provide a fairly accurate depiction of how the

industry should be organized. In practice, data will be available for local and long distance rail freight transportation, general freight and specialized freight, normal container and inter-modal containers as well as the commodities being transported. Application of the proposed NAPCS based products will act to complement the existing industry structure of NAICS.

6. National Account Concepts and Measurement Issues

Although the measurement of turnover data in the economy is relatively easy for the System of National Accounts, constant dollar estimates are conceptually more complex to derive. This is due to the fact that there does not currently exist *current direct* price indices for rail freight transportation services (until the SPPI initiative). Rather, real output must be estimated indirectly. Using monthly GDP data, changes in constant price output are used as indicators of the growth rates in constant price value added. The movement in constant price output is assumed to be represented by the month-over-month growth rates in constant price gross revenue arising from the transportation of goods and freight.

Regarding the deflation of output for rail freight transportation, constant price revenue is computed by using the base year revenues of one ton of freight through a distance of one kilometre, by commodity (note: this method differs from that used for rail passenger transportation).

The system of national accounts measures rail freight transportation output in millions of 1997 current dollars. The quantities of freight car loading (measured in metric tons) are multiplied by the average haul (measured in kilometres), by commodity.

Some of the expenditures on rail transportation are direct purchases by consumers, but most of rail transportation is purchased indirectly when consumers buy goods and pay for the cost of transporting the goods from producer to purchaser. This cost of transportation is included in the purchasers' price of products, together with the cost of storage, mark ups by wholesalers and retailers, and commodity taxes. In the input–output tables these additional costs which are incurred by purchasers over and above the producers' price are called margins.

7. Pricing Methods and Criteria

For the purposes of developing the SPPI, industry composition and activity were taken into account. The mainline freight rail transportation industry in Canada has only 2 main carriers; Canadian National (CN) and Canadian Pacific (CP). Together, they account for just over 94% of the rail freight revenue. The top seven commodities transported by CN and CP are presented in Table 1, while Charts 1 and 2 show the revenue generated for each type of shipment during 2007.[2]

[2] Intermodal typically covers basic or general freight.

Table 1: Top 7 Commodities by Company

CN	CP
▪ Forest Products ▪ Intermodal ▪ Grains and Fertilizers ▪ Petroleum and Chemicals ▪ Metals and Minerals ▪ Automotive ▪ Coal	▪ Forest Products ▪ Intermodal ▪ Grains ▪ Industrial and Consumer Products ▪ Sulphur and Fertilizers ▪ Automotive ▪ Coal

Chart 1: CN Revenue 2007 (millions of $CDN)

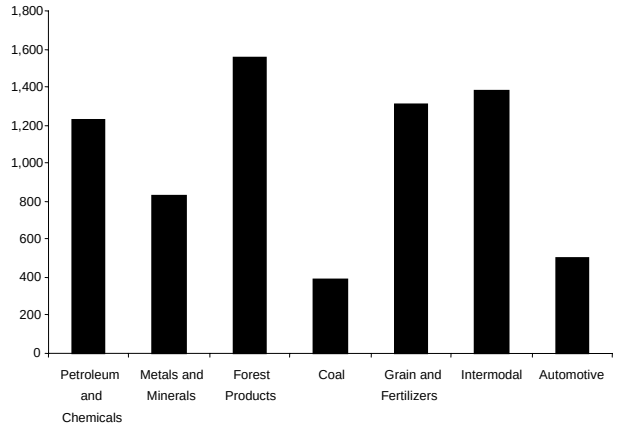
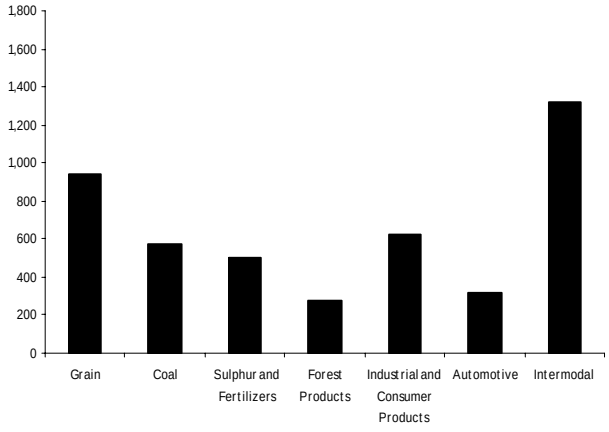


Chart 2: CP Revenue 2007 (millions of $CDN)



Source: Canadian National Railway Company. *CN: 2007 Annual Report.*
Canadian Pacific Railway Limited. *2007 Annual Information Form.*

Given the proprietary nature of the industry, the heavy regulation it already faces, and the fact that CN and CP account for nealry all of mainline freight activity (94%) it was decided early in the development phase to visit these companies and test several options for collecting representative price data. These visits were very beneficial and revealed a significant aversion to increased response burden from both carriers. To address this issue an option where list or tariff prices are collected using each company's website was pursued. The companies pointed out that while these price were not actual contract prices, they did represent a good proxy for their company's price change regime, reflecting the impact of underlying elements of supply/demand, fuel charges, etc.. As a second-best option to directly collect prices via surveys, this price collection method provides for respondent-friendly data collection that minimized unnecessary response burden.

For this industry price quotes are collected every month for a fixed basket of commodities and shipments. The process of selecting the basket of shipment types to price is described below:

1. A concordance was created between each company's own commodity groupings (refer to Table1) and the SCTG classification.

2. A set of origins and destinations was constructed according to the amount of tonnage (i.e. the busiest corridors) for a particular calendar year for each commodity (i.e. by SCTG). These routes were identified at the provincial level initially, since this is the lowest level of detail for which data are available.

3. For each origin/destination route, well-known, larger cities which offered the specified commodity were then chosen.[3]

This process results in the selection of the origin-destination combinations of the most commonly shipped goods which carry the highest tonnage and generate the largest revenue, thereby maximizing coverage of the prices collected. Table 2 provides an outline of the commodities covered by this index and their contributions to total tonnage (i.e. signifies their importance of price movements regarding rail freight services):

Table 2: Commodities in Scope for SPPI

Commodity Group	**Commodity Percentage of Total Tonnage**		**Percentage of Commodity Covered**		**Percentage of Commodity Covered to Total Tonnage**	
Wheat		7.7		72.7		5.6
Other Cereal grains		2.3		49.7		1.1
Other non-metallic minerals		2.1		117.7		2.5
Coal coke and petroleum coke		0.5		6.7		0.0
Other basic chemicals		3.8		49.0		1.9
Potash		4.8		88.9		4.3
Fertilizers (excluding potash)		2.0		46.4		0.9
Plastic and rubber		2.1		29.1		0.6
Lumber		5.3		130.6		6.9
Other wood products		2.7		17.6		0.5
Wood pulp		3.3		51.7		1.7
Iron and steel, primary or semi-finished		2.3		58.4		1.3
Articles of base metal		0.6		37.2		0.2
Automobiles and mini-vans		0.8		138.1		1.1
Metallic waste and scrap		1.4		105.1		1.4
Mixed loads or unidentified freight		8.6		43.8		3.8
	Total	50.3	Average	65.2	Total	33.8

Note: Numbers may not add to total due to rounding.

[3] Note: If an origin-destination combination was unavailable by either company, the next largest origin-destination combination by tonnage was chosen

The Voorburg Group *Quality Assurance Framework* is used as a guide for the evaluation of the rail freight SPPI. From the results, the survey design can be rated as *"Best"," Good"*, or *"Poor"* (see Table 3).

Table 3: Point Ranges

Category A ("Best")	▪ True transaction price ▪ 100% quality change accounted for ▪ Frequency correlates directly with price change ▪ Robust sample (excellent size and representation)
Category B ("Good")	▪ Good proxy for transaction price ▪ Significant quality change accounted for ▪ Frequency correlates closely with price change ▪ Semi-robust sample (fair size and representation)
Category C ("Poor")	▪ No relation to transaction price ▪ No significant quality change accounted for ▪ Frequency does not correlate with price change ▪ Weak sample (poor size and representation)

After assessing the rail freight SPPI, it was determined that it ranked as a *Category B* which is quite satisfactory given the fact that list prices from an online price schedule are being used. *See Appendix 4), Table 7: PPI Quality Assessment Framework* for the complete assessment.

8. Quality Adjustment and Methodology

As much detailed information as possible is collected for all transactions (i.e. shipments) that are priced in an effort to maintain constant quality. This includes information about:

- the type of shipments (intermodal, commodity)
- the origin/destination of the shipment
- the terms of the shipment
- the type of price (contract, list/tariff, private quote, public/open quote, or other)

All efforts are made to keep these price-determining characteristics constant through time, thereby ensuring comparability of re-pricing. When necessary, changes to the service quality or terms are evaluated and treated appropriately (e.g. adjustment for service quality if possible, linking to show no change when a non-comparable substitution arises).

9. Evaluation of Comparability Regarding Output Measures

The level of comparability between the SPPI and turnover data is high. Firstly, both survey programs use the same industry classification system, NAICS. Secondly, the SPPI sample set is

identical to the sample set of the Railway Transport Survey (RTS) frame (i.e. all mainline rail freight carriers; CN and CP, NAICS 482113) where the same units are defined and covered. This frame is ultimately derived from the Business Register. One difference in comparability, however, is that rail freight financial, turnover and employment data are collected annually, while price data will be available on a quarterly basis.

10. Summary

In Canada, mainline rail freight carriers play a key role in the transportation sector as well as the economy. The impact of the industry is extensive as it facilitates the transportation of commodities and goods across Canada. Most long distance haulage of large quantities of commodities is transported by mainline rail freight carriers, which highlights its significance to the Canadian economy and its growth. The development of an SPPI for mainline freight transportation services will result in a comprehensive set of industry indicators and better estimates of real output and productivity for this sector.

Appendix:

1.) Table 4: Uniform Classification of Accounts (U.C.A.)

Uniform Classification of Accounts and Related Railway Records as prescribed by the National Transportation of Canada (now called the Canadian Transportation Agency), for use by all railways under federal jurisdiction. These accounts are also used for railway carriers whose data are collected under the authority of the Statistics Act.

According to the *Uniform Classification of Accounts*, railway carriers can be categorized as shown in the table below:

Railway Carrier Class	Description
Class I	A railway company that realized gross revenues of at least $250 million for the provision of Canadian rail services in each of the two calendar years before the year in which information is provided pursuant to the *Carriers Information Regulations*.
Class II	A railway company that realized gross revenues of less than $250 million for the provision of Canadian rail services in each of the two calendar years before the year in which information is provided pursuant to the *Carriers Information Regulations*.
Class III	A railway company, other than a class I rail carrier or a class II rail carrier, which is engaged in the operation of bridges, tunnels and stations.

2) Table 5: Regulatory Framework in Canada

Regulatory Association	Country of Jurisdiction	Matter of Regulation
Canadian Transportation Agency (CTA)	Canada	Economic (Canada Transportation Act)
Competition Bureau	Canada	Rail Merger Transactions
Transport Canada	Canada	Safety (Railway Safety Act)
Canada Border Services Agency (CBSA)	Canada	Security/Safety
U.S. Department of Transportation	United States	Economic/Safety
Surface Transportation Board (STB)	United States	Economic
Federal Railroad Administration (FRA)	United States	Safety
Pipeline and Hazardous Materials Security Administration (PHMSA)	United States	Safety
Transportation Security Administration of the Dept. of Homeland Security	United States	Security
U.S. Customs and Border Protection (CBP)	United States	Security/Safety

3) Table 6: North American Industry Classification System (NAICS) 2007

NAICS 2007	Description
NAICS 482 – Rail Transportation	This subsector comprises establishments primarily engaged in operating railways. Establishments primarily engaged in the operation of long-haul or mainline railways, short-haul railways and passenger railways are included.
NAICS 48211 – Rail Transportation	This industry group comprises establishments primarily engaged in operating railways. Establishments primarily engaged in the operation of long-haul or mainline railways, short-haul railways and passenger railways are included.
NAICS 482112 – Short-haul Freight Rail Transporation	This Canadian industry comprises establishments primarily engaged in operating railways for the transport of goods on a rail line that does not comprise a rail network. A short-haul railway line usually takes goods from one or more points to a point on the larger transportation network, which is usually a mainline railway, but may be a trans-shipment point onto another transportation mode.
NAICS 482113 – Mainline Freight Rail Transporation	This Canadian industry comprises establishments primarily engaged in operating railways for the transport of goods over a mainline rail network. A mainline rail network is a system that usually comprises one or more trunk lines, into which a network of branch lines feed. The branch lines may be part of the mainline establishment or may be separate establishments of short-haul freight railways.
NAICS 482114 – Passenger Rail Transportation	This Canadian industry comprises establishments primarily engaged in the railway transport of passengers.

4) Table 7: PPI Quality Assessment Framework (Preliminary) – Rail Freight Services

Base Points	Categories	X	Assessment
	1. Shipment Price (Weight - 10%)		
0	i) Price represents order pricing, actual price at shipments may be different		
100	ii) Price represents the completion of service or a proxy measure for the completed transaction	X	10
	2. Representative of current period production (Weight - 10%)		
	Section A		
0	i) Emergence of new product/service lines or critical new product/service features has occurred since the index reference period or since sample augmentation was last done		
50	ii) Emergence of new product/service lines or critical new product/service features has not occurred since the index reference period or since sample augmentation was last done	X	5
	Section B		
50	i) Product substitution usually occurs when an item becomes obsolete or, if model pricing applies, the models are regularly updated to reflect changes	X	5
0	ii) Product substitution usually does not occur when an item becomes obsolete or, if model pricing applies, the models are not regularly updated to reflect changes		
	3. Transaction Price (Weight - 25%)		
	Select the option which is most prevalent in the industry		
100	i) The price is the real transaction price or a list price that can always be assumed to be equal to the transaction price		
50	ii) The price is a list price not equal to the transaction price	X	12.5
100	iii) The price is a unit value for a homogeneous group of products/services		
50	iv) The price is a unit value for a non-homogeneous group of products/services		
75	v) The price is a model price	X	
50	vi) The price is constructed from input costs plus profit and overhead mark-ups.		

	4. Output price (Weight - 25%)		
	Select the option which is most prevalent in the industry		
100	i) Recorded price reflects an actual transaction or average of actual transactions		
75	ii) Recorded price reflects a model transaction incorporating the pricing of all of the features found in an actual transaction		
50	iii) Recorded price reflects a model transaction incorporating the pricing of only some of the features found in an actual transaction	X	12.5
50	iv) Recorded price reflects some components of a transaction		
50	v) Recorded price reflects input costs plus overhead and profit margins incorporating the pricing of all features found in an actual transaction		
25	vi) Recorded price reflects input costs plus overhead and profit margins incorporating the pricing of some of the features found in an actual transaction		
0	vii) Recorded price reflects charge out rates for fixed labour inputs not directly tied to a specific quantity of output		
	5. Timely Measure (Weight - 10%)		
	Section A		
50	i) Pricing data reflect the service provision in the current period and are not lagged	X	5
0	ii) Pricing data are lagged		
	Section B		
50	i) Pricing data reflect an average over the entire period	X	5
40	ii) Pricing data reflect an average of multiple measurements over a portion of the period		
25	iii) Pricing data reflect a single point in time		
	6. Constant Quality Maintained (Weight - 20%)		
100	i) Rapid changes to product specification are not expected, otherwise an appropriate method to explicitly quality adjust is in use	X	20
0	ii) Rapid changes to product specification are expected and there does not exist an appropriate method to use explicit quality adjustment		
	Total =		75.0
	Type A Point Range (over 90 base points)		
	Type B Point Range (70 - 90 base points inclusive)		
	Type C Point Range (less then 70 base points)		