The U.S. Producer Price Index for Refrigerated Warehousing and Storage (NAICS 493120)

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A. Introduction

The U.S. Producer Price Index for Refrigerated warehousing and storage (NAICS 493120, formally SIC 4222) has been in calculation since January of 1992. Refrigerated warehousing and storage is of special interest because of the bundling of services that is inherent to the industry. The primary service in this industry is the storage of goods; the bundled services include such things as sorting, inspection and handling.

Different refrigerated warehousing establishments offer different bundled services at unique rates in order to differentiate their services and attract customers. Customers may also decide to streamline their production facilities by having the warehouse provide some of the supplemental services like stenciling and labeling along with sorting instead of having their own employees do these tasks. Samuelson and Nordhaus explain that differentiated goods may lead to monopolistic competition in the marketplace. While their example refers to gasoline retailers and the extra services available at these services stations (convenience stores, pay at the pump, etc.), it is easy to extend their example to refrigerated warehouses. (Samuelson, P. and W. Nordhaus, "Economics", McGraw Hill, 14th edition (1992), 178-187)

The widespread service bundling poses a unique challenge in terms of a pricing methodology. The supplemental services must be included in the net price so that the actual transaction is represented. Units of measure must consistently agree and supplemental services must be prorated over the storage period. Further details are provided in the Index methodology section.

B. Industry output definition and service delivery process

The 2002 North American Industry Classification System defines NAICS 493120 as establishments primarily engaged in operating refrigerated warehousing and storage facilities. The services provided by these establishments include blast freezing, tempering, and modified atmosphere storage services. It is important to note that only public warehouses are in-scope, meaning that warehouses that are used exclusively by a parent establishment (for example, an ice cream manufacturer who owns a refrigerated warehouse and stores their product at the facility) are out-of-scope.

The industry output of refrigerated warehousing is the storage of goods or merchandise in a temperature controlled facility. The goods being stored are perishable and need to be kept under refrigeration or frozen. This industry also includes the rental of locker space for households to store food products. Generally, establishments in this industry include refrigerated warehouses, cold storage warehouses, frozen food locker rentals, and cheese warehouses.

The first step of the service delivery process is the completion of a contract between the warehouse and the customer which outlines the type of service being provided. The contract will detail what type of product is being stored, how much of the product is being stored, the density of the product, the temperature of said product (on arrival and its necessary temperature), how the product will arrive, and what additional services will be required.

Once the customer has arranged delivery to the warehouse, the primary service of refrigerated warehousing and storage begins. The warehouse is most commonly a large industrial building which contains loading docks to receive the product by truck and/ or rail with general offices located adjacent to the actual warehouse. Inside, the warehouse contains cooler and/ or freezer space in a variety of temperatures and humidity levels. The remaining space is used for providing bundled services such as blast freezers and sorting and inspection rooms.

When the product arrives at the warehouse, workers unload it and perform any service that is required prior to storage. This may include inspection, blast freezing, stenciling, labeling and bar coding. The customer then receives a warehouse receipt stating the amount of product stored and the associated charges. The product is then moved to the proper storage area for the specified amount of time. Although the contracts are normally 30 days in length, the product could remain in storage for an indefinite period of time. In fact,

products can be kept anywhere from one day to several years. At the end of the agreed upon storage time the product will be removed from storage and brought to the dock to be received by the customer. Again, additional services may be performed. This completes the warehousing service.

As the economy as a whole continues to rely more and more on the internet and computer-oriented technologies, the refrigerated warehousing industry is following suit. As inventory levels decline many establishments are now concentrating on intensive product handling as much as simple storage. They are using such things as bar codes and other electronic supply chain technologies to facilitate loading and unloading, sorting and other bundled services. Imbedded in the bar codes are such details as the location of the product, the type of product, its arrival date and the storage temperature. The PPI's pricing methodology must accurately reflect this industry trend.

C. Item selection methods

Refrigerated warehousing and storage establishments were selected for this index by using probability proportionate to size sampling techniques. In other words, different units have different probabilities of selection relative to a particular size measure. For this industry the size measure was employment: those establishments with higher employee counts had a greater chance of being selected in the sample. A total of 100 units were chosen from the entire universe for this sample.

The item selection process used an industry specific disaggregation worksheet (ISDWS) so that the following publication structure could be implemented and consistently published:

493120	Refrigerated warehousing and storage
493120P	Primary services
4931202	Commodities in cold storage
493120201	Fruits, including frozen juices
493120202	Vegetables, including potatoes
493120203	Meat, poultry, and fish
493120206	Prepared foods
493120209	Other commodities in cold storage
4931203	Storage related services
493120SM	Other receipts

By using the ISDWS, the field economist can ensure that each sample unit will report on each product category under which they provide service. For example, if a sample unit is assigned six quotes and they provide merchandise storage for each of the six publication cells, then that sample unit would have one item assigned from each product category, regardless of that establishment's actual percentage of value of services. However, each of these items would be weighted by using the establishment's shipments and receipts. For example, if an establishment did 50% of their storage in Fruits, including frozen juices, then their fruit(s) item would constitute 50% of their weight in the index. For sample units that do not provide storage for all service lines the value of services would be used to select the remaining quotes, after disaggregation by ISDWS is complete.

D. Weighting issues

The current PPI structure is shown in the previous section. This structure was decided upon by analyzing the industry weights provided by both the U.S. Census and the U.S. Department of Agriculture (USDA). The USDA's publication *Cold Storage* lists the current commodity amounts in 1,000 lb increments. These amounts were used to distribute the weights obtained from the U.S. Census across the commodity groups. Two other publication goals were critiqued but ultimately discarded: one based upon the type of refrigerated space and the other based upon geographic region. The former is important to the industry but meaningless in terms of pricing trends while the latter is of interest but would require too large of a sample, especially if the geographic region were to be further broken down into commodity groups.

E. Index (pricing) methodology

As mentioned above, refrigerated warehousing and storage establishments provide a large array of other services beyond the storage of refrigerated products. The most common type of additional service is the

handling of merchandise from the warehouse dock to the storage warehouse, and vice versa. For the customer, this handling charge will be billed separately from the storage charge. Another routine service is getting the merchandise to the proper temperature which can be accomplished by blast freezing or by simply placing the item in the refrigerated area. Many other services are also offered in conjunction with refrigerated warehousing including:

- Labeling and stenciling
- Office rentals within the warehouse
- Inspection
- Freight consolidation
- Sorting
- Weighing
- Import/ export services
- Bill of lading

The challenge in pricing this industry is to incorporate all the services that takes place into the pricing methodology. The two main points to address in terms of adjustments to price are fixing different units of measure and prorating the extra service charges over the storage period. When a storage rate is given in hundredweight (100 pounds) and the handling fee is given by pallet, the units of measure must be identical. Ideally, in this case the handling fee would need to be converted to hundredweight. The prorating of additional services to the primary service of warehousing is crucial. If an item is selected which has a storage period of three months and includes extra charges such as handling and inspection, these extra charges must be prorated over the storage period.

Product bundling is of special interest in this industry because many times the supplemental services make up a larger proportion of an actual transaction price than the storage rate. This provides an opportunity for some interesting contract negotiations. Due to the fact that many customers pay the most attention to the storage rate, a refrigerated warehouse may quote a very low storage rate to entice the customer to store their product with them while offsetting their lower storage revenues with inflated supplemental service charges.

F. Issues in maintaining constant quality

There should not be many major service or transaction terms changes when a substitute item needs to be selected. However, item substitution does occur frequently as refrigerated warehousing customers choose not to renew contracts due to competition, seasonal factors and merchandise stockpiles. When substitution occurs, the respondent is asked to find a comparable contract that takes up a similar amount of space and weight as those are the price determining characteristics for the handling and storage in refrigerated warehouses. Additionally, the respondent is as ked to provide a similar product because the publication structure is based upon the commodity being stored.

Distinct problems may occur due to the product bundling because storage periods may continue after the contract's ending date. For example, a customer may plan to have their produce stored for 2 months, thereby causing the PPI to prorate the bundled services over the two months. Supply and demand shocks may then cause this customer to decide to keep the produce in refrigerated storage for an addit ional month. If the reporter does not let the PPI know of this change, then the transaction price has been incorrectly adjusted.

As mentioned in section B, refrigerated warehousing and storage establishments are concentrating on service efficiencies related to loading and unloading as much as on storage. Customers want on-demand access to their stored goods and total flexibility. For example, a customer may decide to enter into a contract where 60 pallets of pears are stored for three months, including a handling charge per pallet for loading and unloading. After one month the customer decides to rotate his inventory by sending 30 of the pallets to market and replacing those with 30 pallets of fresh pears from his farm. The refrigerated warehouse would unload the 30 pallets of fresh pears from the customer's truck, put them in storage and then load the 30 pallets headed to market onto the customer's truck. This service would not bear any additional cost to the customer- the contract is based upon how many pallets are stored, not upon how many

times a pallet is loaded or unloaded. The pricing methodology developed by the PPI is able to handle these situations by combining the storage rate and the handling charge into a single net price per unit of measure.

Explicit quality adjustment is beyond the scope of the PPI at this point. While better, more efficient refrigerated warehousing equipment is being developed and implemented, it is very difficult to get accurate and up-to-date information from individual warehouses.

Below is a table with the current PPI for 493120 and a graph depicting the price movement since the inception of the series. The upward trending index indicates a 10% inflation rate over the past 12+ years. Inflation had been steady until a slow down in 2001.

Series Id: PCU493120493120
Industry: Refrigerated warehousing and storage
Product: Refrigerated warehousing and storage
Base Date: 9112

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1991												100	
1992	100.9	100.9	100.9	100.9	101.1	101.1	101.2	101.2	101.2	101.2	100.9	101.0	101.0
1993	101.2	101.2	101.6	101.8	101.9	101.9	101.9	101.9	101.9	102.3	102.3	102.3	101.8
1994	102.6	102.6	102.6	102.6	102.6	102.7	102.7	102.7	102.8	102.8	102.9	102.9	102.7
1995	103.1	103.5	103.5	103.8	104.5	104.5	104.6	104.6	104.6	104.6	104.6	104.6	104.2
1996	104.7	104.7	104.7	104.6	104.6	104.4	104.4	104.3	104.3	104.6	105.1	105.1	104.6
1997	105.1	105.1	105.1	105.1	105.1	105.2	105.1	105.1	105.2	105.3	105.1	105.2	105.1
1998	105.2	105.2	105.2	105.4	105.4	105.4	105.0	105.5	105.5	105.7	105.7	105.7	105.4
1999	105.7	105.7	105.8	105.8	105.9	106.7	105.8	106.9	107.0	107.0	107.0	107.0	106.4
2000	107.1	107.1	107.1	107.7	107.7	108.6	108.7	108.6	108.6	108.8	108.8	108.8	108.1
2001	108.8	109.4	109.2	110.2	110.0	110.0	110.0	110.1	110.2	110.1	110.1	110.1	109.8
2002	109.7	109.8	109.9	109.8	109.9	109.9	109.9	109.9	109.9	109.4	109.4	109.6	109.8
2003	109.7	109.6	109.7	109.7	109.7	109.7	109.8	109.8	109.9	109.9	109.9	109.9	109.8
2004	109.9	109.9	109.9 (P)	109.9 (P)	110.0 (P)	110.0 (P)