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AN EVALUATION OF THE PIERS DATA FOR USE IN ECONOMIC ANALYSIS OF U.S. AGRICULTURAL AND FOOD PRODUCT TRADE

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An Evaluation of the PIERS Data for Use in Economic Analysis of U.S. Agricultural and Food Product Trade

Trade and industrial organization economists are seeking alternative data sources for more micro-level data for use in their research activities. It is felt that the nature of competition among firms and how firm characteristics affect established trade institutions needs to be better understood in order to better explain trade patterns and flows. This is especially true for processed products where product differentiation, market power, and aspects of imperfect competition are most likely to be important.

Among agricultural economists, there has been a particular interest in obtaining firm-level data on trade of agricultural and food products. It has been observed that the U.S. lags behind the European Community and some other traders in the exportation of value-added agricultural goods, thereby forgoing the opportunity to increase the value of exports within U.S. boundaries (Lee). Expanding value-added agricultural exports for the U.S. has come to the forefront as a research problem and extension activity for agricultural economists. Commodity analysts have also become concerned about the market share of U.S. products in foreign markets.

One source for firm-level trade data is the PIERS (Port Import/Export Reporting Service) data set. This data set, available from the *Journal of Commerce*, provides data on U.S. exports and imports shipped by ocean freight for food and agricultural products (foodstuffs) and nine other broad product areas.[1] The purpose of this paper is to describe this data set and assess its usefulness for economic analysis of U.S. trade in agricultural and food products.

Two facets of the data set should be identified at the outset. One, the data are relatively expensive. Therefore, a thorough understanding of its potential for trade research is necessary before substantial sums of money are committed to its purchase. Two, it is a raw data set. That is, it has not been categorized and aggregated into groups of commodities or products. Also, the data appear nearly as they were recorded by the *Journal of Commerce* field agents. Therefore, the data have not been

thoroughly checked for input errors. The data might be best described as a record of export (or import) transactions or shipments. While this form of data provides researchers with more detailed information, it also entails additional work for the researcher handling the data. With these two facets in mind, researchers who have an interest in this data source should find this paper helpful in assessing whether the PIERS data will be useful in accomplishing their research objectives.

This review will first offer a general description of the PIERS data set and present some of the information that can be garnered from this data set. Next, some specific problems in handling the data are discussed. Then, an assessment of the quality and usefulness of the data is performed by comparing it to official U.S. Census Bureau data. Some illustrations of the firm-level data available are offered. Finally, potential uses of the data in trade research are discussed.

General Description of the PIERS Data Set

Agents for the *Journal of Commerce* collect, organize and distribute data from the freight manifests which exporters and importers are required to file with the U.S. Customs Service. However, the *Journal of Commerce* only collects data on shipments transported by ocean-going vessels through U.S. ports. Therefore, shipments moving by air, rail, or truck are excluded from this data source.

Three months of export data, October through December, 1990, falling into the "foodstuffs" export category were purchased from the *Journal of Commerce* for $2,025 to enable an evaluation of this data set. The *Journal of Commerce* requires a minimum purchase of three months for each order. A discount rate of $675 per month was negotiated for this purchase. When buying historical data, a cumulative 40 percent discount is applied to each year's worth of data after the purchase of one complete year. For instance, the first year of data would cost $8,100. A second and third year of data would cost $4,860 and $2,916, respectively. This discounting system is offered as an incentive to purchasers of historic data and it reflects the time value of the data to commercial users, who are more interested in

very current export data. More information on the cost and purchase terms for this data are available from the *Journal of Commerce*.[2]

This subset of data, the fourth quarter of 1990, was used in the evaluation presented below. The data for the entire quarter were delivered on magnetic tape in one file. The file had 99,941 records and each record was 250 columns wide.[3] Transactions were dated by the departure date of the vessel transporting the cargo. These dates can be used to create files on transactions for a particular month, week, or day.

Figure 1 presents a listing of the data fields and an example record of data. The key fields which define a unique record are the commodity, firm name, U.S. port, vessel, and ultimate destination. For example, a trading firm may ship several different commodities to the same destination on the same vessel. If the commodities are distinctly different, falling into different commodity codes, then an individual record will generally appear for each commodity. Alternatively, the same firm may ship a particular product to different destinations. In this case, the different destinations would define the individual records.

As Figure 1 illustrates, for many of the pieces of information there are both descriptive data fields and numeric codes (e.g., U.S. Port and U.S. Port Code). The *Journal of Commerce* does not provide a list of codes and their description. However, the definitions of the numeric codes can be easily ascertained from the corresponding descriptive data fields[4]. These numeric codes are useful in sorting and aggregating the data. The commodity codes are more fully discussed below.

The category described as foodstuffs by the *Journal of Commerce* contains a large variety of commodities and food products, ranging from unprocessed, bulk commodities like wheat to grocery products like canned baby food. This group of commodities corresponds to those described under the U.S Census Bureau Standard Industrial Classification (SIC) major groups 20, food and kindred products, and 21, tobacco products. When compared to the U.S. Census Bureau Schedule B codes it was found

that the PIERS foodstuff data included the commodities described under the subheadings 0101 (live horses) through 2403 (manufactured tobacco) and 4101 through 4111 (raw hides and skins).

The PIERS data are classified by its own system of product codes. Table 1 presents a listing of the 132 PIERS commodity codes found present in the data sample and a description of each of these commodity categories. The codes available in the PIERS data are seven digit codes which roughly resemble the former (pre-1988) seven digit U.S. Census Bureau Schedule B codes. However, a strict concordance between the seven digit Schedule B codes and the PIERS codes was not found. The seven digit PIERS codes were truncated to a six digits for use in this evaluation, due to some data coding errors. This modification is further discussed in the following section.

The specificity with which the PIERS codes define the goods varies by commodity. For instance, some codes cover a broad range of goods, like those described as "Beef and Pork" and "Assorted Grocery Products." Other codes are quite precise, such as "Walnut Oil." To the extent that the codes are used to define industries, those codes encompassing more than one commodity must be considered as broadly defined industries.

In addition to describing the commodities and commodity codes in the PIERS data set, Table 1 was also prepared to give researchers an idea of how much information is available for particular commodities and to give researchers a glimpse at the structure of the industries defined by the commodity codes. For example, researchers interested in addressing a dynamic issue associated with the shipment of a particular commodity would like to see if there is an ample number of records over a particular time period. In examining this information, it is seen that the top five commodity categories in terms of the number of records available are (1) Assorted Grocery Products, (2) Beef and Pork, (3) Vegetables, (4) Fruits, and (5) Animal and Pet Foods.

The volume of exports, measured in tons, associated with a particular commodity category is presented, as well. This will give researchers an idea of the importance of particular commodities

relative to other water-borne export foodstuff categories. Here it is observed that the five leading categories in terms of export volume are (1) Cereals and Cereal Preparations, (2) Soybeans and Soybean Meal, (3) Animal and Pet Feeds, (4) Rice, and (5) Vegetables.

Generally, a strong positive correlation between the number of records, which could be interpreted as the number of shipments, and the volume of shipments was observed. Only for the major bulk commodities and more broadly defined product categories was this relationship not observed[5].

The last three columns of Table 1 indicate the number of exporting firms, the four-firm concentration ratio, and the Herfindahl-Hirschman Index calculated for product shipments during the fourth quarter of 1990. This information was included to give researchers information on the structure of these industries (broadly defined in some instances). It should be noted that these figures were calculated by simply aggregating over unique character strings[6] in the company name data field. This is a rather crude approach with inherent problems, which will be discussed in the next section. Never-the-less, the relatively high concentration ratios observed across many commodities is striking. It is particularly striking because the approach adopted here would tend to understate the degree of concentration.

Problems with the PIERS Data

In this section problems encountered in handling the PIERS data are more fully discussed, along with approaches and suggestions for solving these problems. While reviewing these problems, it should be remembered that this data set is a raw data set. The issues to be discussed are related to the commodity coding system, commodity descriptions, firm names, and price data.

As mentioned above, some problems with the commodity codes were encountered in the sample data set. Although the commodity code data field is designated as a numeric field, some records contained an alphabetic character in the last position (seventh digit) of the code. For instance, the seven

digit code for cereal and cereal preparations is 1301000. However, in a few cases a commodity falling into this classification was coded as 130100B. The software used to handle the data in this analysis, SAS, requires fields to be designated as either alphabetic or numeric. To avoid any errors in reading the data, this seventh character was truncated. This was a convenient solution to adopt since the value in the seventh position is generally zero and no seven digit commodity codes differed by only the value in this last position. Therefore, the potential problem of creating a single code overlapping formerly separate commodity categories did not arise as a result of this procedure. In short, the six digit commodity codes used here uniquely describe each product group in the foodstuffs category.

Cases where commodities were assigned the improper commodity code were encountered. It was found that products which are closely related in either name, origin, or use may be assigned an incorrect code. For instance, frozen orange juice concentrate might be assigned the code for fresh oranges. In describing this problem and characterizing the value of the commodity codes, it might be said that the commodity codes may err in delineating orange juice and oranges, but the codes are still useful in separating oranges from apples. Therefore, in addition to performing data extractions on the basis of commodity codes, researchers should also use searches for commodity names or descriptions across all the commodity codes to account for the possibility of an improperly assigned commodity code. Researchers should also examine the commodity descriptions in their data in order to purge the commodity data sets (subgroups) of related products.

Another issue related to the commodity coding system is the broad definition applied to some codes. The example of the category described as "Beef and Pork" was mentioned earlier. In cases where these broad codes encompass several commodities that a researcher may wish to analyze individually, the researcher can form subgroups by searching for key words in the commodity description data field. This approach proved to be fairly successful in some of the analysis presented in the subsequent section.

The lack of a strict concordance with the U.S. Schedule B codes complicates efforts to compare these data to the Census Bureau data. Again, this type of problem should be expected when working with a raw data set. However, careful review of the commodity descriptions of both the PIERS data codes and the current ten digit Schedule B codes has led to the creation of a concordance between these codes, presented in Appendix Table 1. This concordance is offered as a guide and should not be viewed as a strict definition. It should also be noted, that in establishing this concordance, a certain level of judgement was required. Therefore, discrepancies in comparing the two data sources may reflect judgement errors.

Given the varying degree of specificity in the PIERS codes and the possibility of misspecified codes, a fundamental problem facing a researcher using the PIERS data set is the development of meaningful product market definitions. In pursuing this objective, researchers will need to examine both the commodity codes and product descriptions. The concordance provided in Appendix Table 1 may be helpful in this effort.

Related to improperly specified commodity codes are cases where the shipment was described as a mixed lot of goods. For example one shipment was described as "FROZEN BEEF VEGETABLES AND SUPPLIES." Another was described as "BEER & MILK." In these cases, researchers must exercise some discretion in determining how to handle the data.

Just as commodities may be described in different manners, firm names may be listed differently, as well. In calculating the industry market shares and four-firm concentration ratios presented in Table 1, the records within commodity categories were aggregated over unique character strings in the company name data field. Yet, a company name recorded in slightly different forms in different records would be identified as separate firms. For instance, the same firm may be recorded as "A & P" and "A & P Food Stores." Researchers using these data should check firm names for minor variations in the manner

in which they are recorded. This check was not employed in calculating the statistics in Table 1 because of the large number of firms and observations present in this data sample.

Upon reviewing Figure 1, an important shortcoming in this data set is the lack of information on price or value of shipments. While this information is included on the firm's customs documents, the *Journal of Commerce* is forbidden to publish this information. Although, price (or unit value) information is necessary for many research methods, its absence does not render a data source entirely useless. The USDA production, supply, and distribution data, which contains historical and projected figures, is used by many economists, yet it does not contain price or value data. (Indeed, the USDA is forbidden to publish forecast prices for some commodities, such as cotton). Trade economists have long struggled with the problem of inadequate price data. Proxy variables for price or the use of other traditional performance variables may resolve this problem in some analyses. In some applications, the average export unit value obtained from U.S. Census Bureau data or the average, landed import price from foreign data sources might be used. As noted in the next section, the Census Bureau data and PIERS data originate from the same basic source. Therefore, these data sources may be used together without introducing problems associated with sampling and measurement error.

Firm-level performance measures may be obtained from a variety of sources. To the extent that trade in some sectors is carried out by public firms, corporate records may also prove to be a useful data complement to the PIERS data. Trade publications may provide more information on the firms identified as exporters of certain commodities. Finally, survey data or personal interviews with managers of firms may prove to be informative. In summary, the absence of a price variable does not appear to be a fatal flaw, it simply requires researchers to work a little harder.

Comparison with Official U.S. Census Bureau Data

In telephone conversations with the U.S. Census Bureau it was determined that the Census Bureau and the *Journal of Commerce* obtain their information from the same documents shippers file with the U.S. Customs Service for water-borne cargoes.[7] Therefore, the starting point of the paper trails for the PIERS data and the official U.S. Census data is the same. Given this same origin, total shipment quantities should be nearly the same for these two data sources, barring no serious data transcription or unit conversion errors on the part of the *Journal of Commerce* or the Census Bureau.

Table 2 presents a comparison of the total water-borne shipments for a sample of commodities from the two data sources.[8] These commodities were selected so as to represent a spectrum of magnitudes of total shipment volume. This approach was adopted so that an assessment could be made with respect to potential biases associated with shipment sizes.

Some of the commodities presented in Table 2, such as beef, corn, wheat, and soybeans, were part of larger aggregations in the PIERS data set, based on the PIERS product codes. To form these subgroups, the data was extracted on the basis of key words in the commodity description data field. In working with these subgroups and the PIERS categories it was necessary to carefully review the commodity descriptions in order to eliminate the closely related products from the subgroup or group. For instance, corn flakes had to be removed from the corn subgroup.

In Table 2 it is seen that the difference between the official U.S. Census and PIERS export volumes for the thirteen commodities examined is less than five percent for six products and less than ten percent for ten products. This discrepancy was less than one percent for four narrowly defined commodities. Specifically, for beef, rice, coffee preparations, and soybeans, it can be concluded that the appropriate concordance between the PIERS and Census data was established and that each organization recorded and reported the data with negligible transcription errors. With regard to the magnitude of discrepancies, no pattern was observable in relation to the shipment size.

For the commodities with a larger margin of difference there are four possible explanations. For the commodity groups where it was necessary to search over keywords in the PIERS commodity descriptions, the discrepancy may be due to having a set of key words which was either too large or too small. This may have been the case for wheat. Although the number of Schedule B codes is fairly small, the number of possible key words to be used in searching over the commodity descriptions is very large (e.g. HRW, HAD, WHEAT, WINTER, BETTER DARK NORTHERN SPRING, etc.). Some of the wheat records did not even have the word wheat in the commodity description data field.

This first explanation is a specific case of a second possible explanation, that of failing to establish an accurate concordance between the PIERS and Census data. This is suspected to have been the case for cheese.

A third explanation is that the Census Bureau and the *Journal of Commerce* agents recorded the commodity descriptions in a different manner. For instance, the *Journal of Commerce* agent may have recorded peanut oil shipments as vegetable oil. This would explain cases where the PIERS volume falls short of the Census volume.

A more general and fourth explanation is that there were data transcription or reporting errors on the part of the *Journal of Commerce* or the Census Bureau.

Table 2 also indicates the volume of U.S. exports moving by vessel relative to all U.S. exports. This should gives researchers an idea of how representative the PIERS data (water-borne cargoes) are of total exports for particular commodities. For several of the bulk commodities listed in the table it is seen that the majority of U.S. exports are moved by vessel. In reviewing these figures, one should bear in mind that a certain level of trade occurs by rail and truck with Canada and Mexico.

Finally, Table 2 presents the unit value of U.S. exports moving by air and water. The information on the value of shipments indicates, to an extent, the segment of the market (high-value or low-value) served by each mode of transportation. This type of information should be useful to

researchers for assessing which market segment the PIERS data represents for shipments to destinations beyond North America. It should be noted that the U.S. Census Bureau only reveals data on total shipment values. It does not disclose firm-level shipment values.

To summarize, it was found that the PIERS data can be viewed as a reliable data source when compared to the official Census data provided that the appropriate concordance is established between these data sources. In establishing this concordance, it is crucial for the researcher to carefully review the commodity descriptions available in the PIERS data.

Firm-Level Data

Most of the discussion to this point has been with regard to data aggregated over commodity categories. Yet a unique advantage of the PIERS data set is the information it conveys on the firms involved in trade. As an illustration, Tables 3 presents the market share position of firms involved in soybean exports defined over some broadly specified trade routes.

In reviewing Table 3, two points should be noted with regard to the trade routes. One, the firm shipments listed under the Gulf - Netherlands trade route illustrate the problem associated with creating statistics based on unique character strings. Specifically note here, the firm names "CEREOL VDO" and "CEROL VDO." Two, a large number of trade routes are exclusively served by a single firm. Since the U.S. Census data gives U.S. export value and volume data by customs districts and destination, the transaction price for these single firm routes can be ascertained.

Given the data fields and codes available in the PIERS data set, other market information besides that presented in Table 3 can be easily extracted. For example, the market share of exporting firms in a particular foreign market could be easily determined. Earlier, the four firm concentration ratio and Herfindahl-Hirschman Index for the different export categories were presented in Table 1. Table 3 is

presented for illustrative purposes only. Use of the PIERS data in trade research is further discussed in the next section.

PIERS Data and Empirical Trade Research

The greatest advantage of the PIERS data is that they provide data at a level of disaggregation not available in other data sources. This level of disaggregation provides more detailed and precise information. Trade routes can be more precisely defined. Shipments from one U.S. port can be mapped to a single foreign port. Further, shipments can be analyzed on a daily, weekly, monthly, quarterly, or annual basis. Products can be more precisely defined. In some instances, brand names can be identified. Finally, and perhaps most importantly, the firms involved in trade can be identified. This brings a new dimension to trade research generally overlooked in the past.

In using the PIERS data in trade research, one useful and fundamental application would be the examination of levels and trends in firm-level market shares in international markets and the stability of these market shares over time. This type of analysis could be likened to the descriptive industrial organization analyses (case studies) performed in the 1930's. This approach has fallen into disfavor as a method to analyze domestic markets because of the subjective nature of the approach and because it was found that repeated studies produced contradictory results. However, the approach was a useful first-step toward identifying characteristics about market structure and conduct in some industries. To date, little is known about the structure of international trade at the firm-level. It is felt that a better understanding of this issue would enable economists to better explain trade patterns and flows.

Caves and Pugel conducted an analysis of the firms involved in U.S. wheat, corn, and soybean exports. In their study they discussed differences in firm-level domestic and export market shares and concentration and evaluated market share stability. Their analysis was conducted using survey data obtained from the members of the North American Grain Export Association. Little additional work on

the firm-level structure of export markets has been conducted since the Caves and Pugel study. Further, their analysis was based on a limited number of survey respondents.

The trade patterns and flows observed in aggregate data are often observed to appear quite rigid, in that the flows are not responsive to marginal price changes. It is hypothesized that these rigidities may reflect firm-level competition and institutional factors peculiar to a single firm or group of firms. The classical trade assumption that nations sanction trade, and are thus responsible for shifts in trade patterns, no longer seems entirely appropriate. Therefore, it is important to take a closer look at the nature of competition among firms and the characteristics of firms involved in trade.

In examining firm-level trade issues, numerous issues related to firm competitiveness come to mind. For instance, why are some firms able to rapidly obtain and maintain a large market share in international markets? The first-mover advantage model proposed by Schmalensee(1982) may offer some guidance on this question. Other factors like learning-by-doing and buyer loyalty may also be important. Another firm-level competition issue which may be examined is the relationship between the intensity of firm rivalry in foreign and domestic markets. The recent liberalization of trade restrictions and restraints in some foreign markets presents the opportunity to perform a nearly controlled experiment in investigating some of these issues.

Although not examined here, the PIERS data are available for imports, as well. If the import data are bought in conjunction with the export data, this would provide researchers with a new level of data to analyze issues related to reciprocal trade. Most explanations of reciprocal or two-way trade have been based on differentiated product models. Since the PIERS data identifies the firms involved in trade and describes the product in more detail than most aggregate data, the influence of product differentiation can be more precisely examined. Also, the PIERS data provide another level of data with which to investigate the affect of imports on domestic market power.

Another traditional industrial organization approach, to which the PIERS data would be amenable, is the traditional cross-sectional, inter-industry studies. In this approach a measure of some aspect of industry performance is regressed against industry structure and control variables. The classic testable hypothesis in this model is that economic profits realized by firms in highly concentrated industries tend to be significantly higher than those of firms in less concentrated industries. Schmalensee (1989) provides a careful review of this methodology.

The information on firm market shares in the export sector of different industries could prove to be an interesting structural variable for researchers adopting the cross-sectional, inter-industry approach. It would, however, require researchers to use some performance measure and control variables from other data sources. As discussed above, this information could be obtained from government statistics, corporate records, or trade publications.

Other industrial organization models that might be pursued using the PIERS data are those called the new empirical industrial organization models. In these models, demand and cost information at either the firm-level or industry-level are used to estimate a structural econometric model of the market under analysis. The estimated parameter of interest, in terms of testing for oligopoly behavior, is the one that indicates the magnitude of the gap between marginal cost and price. A parallel construct exists for testing for oligopsony power. Just and Chern prepared one of the early studies that tested for oligopsony power. Breshnahan provides a survey on studies falling into this family of industrial organization models.

The information on the firms involved in export trade and their respective market shares provides researchers with a starting point for proceeding with a this type of analysis on market power. The study by Buschena and Perloff provides an example of how firm-level data are used in combination with aggregate data to test for market power.

It should also be noted that export concentration ratios are important parameters in some industrial and trade policy simulation models. This is particularly true for calibration models. For example, in the

study by Thursby and Thursby on the Japanese wheat import market, it was necessary to have an estimate of the Herfindahl index for U.S. wheat exports in order to calculate the parameter representing the conjecture U.S. exporters form about their competitors response. Sheldon provides a careful review of some important studies employing calibration models.

As mentioned earlier, the PIERS data records shipments by the date of departure. The possibility of working with daily export data may tempt some researchers to adopt some form of a modern, dynamic model, like a trigger price model (Friedman). In this framework firms are believed to jointly follow some pricing strategy which will insure supra-competitive profits. However, if one firm deviates from this strategy, by cutting price to capture a higher market share, then all firms revert to pricing at the competitive level for some period of time, during which only normal rates of return are earned.

If price data were available in the PIERS data set, the trigger price model might appear particularly intriguing. However, price comparisons across firms at the export departure time may not be appropriate. In all likelihood, price competition between export firms occurs (if at all) at the time contracts for exports are negotiated. Differences in the time lags between export departure and contract formation cloud the ability to make comparisons across firms.

However, shifts in market share over time may reflect changes in medium-term price measures, such as monthly or quarterly average prices. This brings to mind issues on firm entry and exit into different markets. Here, markets might be defined in terms of a trade route or foreign port. Again, this type of analysis is similar to an analysis on trends in firm market shares in international markets.

In summary, the PIERS data set provides a new level of detail in trade data that can be used to address numerous trade and industrial organization research issues. It readily provides information with which to analyze the firm-level structure and trends in the structure of U.S. import and export trade. Further, this information can be used in conjunction with other data to explore issues related to firm-level behavior and the determination of market shares in international markets.

Summary

This paper has described the PIERS data set, evaluated its quality, and assessed it usefulness in empirical trade and industrial organization research. The greatest advantages of this data set are that it identifies the firms involved in international trade and it provides more detail in terms of the product, time, and space dimensions. One unavoidable shortcoming of the data set is the absence of price or value data. Despite this shortcoming, researchers can seek out complementary data sources with a knowledge of the underlying firm-level market structure. When compared to the official U.S. Census Bureau statistics, it was found that the PIERS data could be viewed as a highly accurate data source, provided the proper concordance was established with the Census data. Finally, numerous relevant research issues can be addressed using these data. However, for the application of some methodologies, additional data from alternative sources will be necessary.

Data Field	Field Width	Example Record
Commodity Code	7	1684500
Commodity Description	35	JACK DANIEL BLACK LABEL WHISKEY
Name of Company (Either Manufacturer or Shipper)	35	BROWN FORMAN DISTILLERS
Company City	13	LOUISVILLE
Company State	2	KY
Vessel Name	17	ACT 3
Shipping Line	4	COLL
Unit of Measure or Packaging Form	3	CTN
Quantity of Packages	8	880
Net Shipping Weight (Pounds)	10	35680
U.S. Export Port	13	CHARLESTON
U.S. Export Port Code	4	1601
Departure Date	6	901004
Country of Destination	7	AUSTRALIA
Destination Country Code	5	602
Foreign Port	13	SYDNEY
Foreign Port Code	5	60267
Ultimate Port or Destination	13	SYDNEY
Ultimate Destination Code	5	60267
Container Flag	1	C
Container Quantity	3	1
Container Size	2	20
Container Volume	10	924

Figure 1. PIERS Data Fields and an Example Data Record

Table 1. PIERS Data Commodity Codes and Descriptions, Number and Volume of Shipments, Number of Firms and Four Firm Concentration Ratios and Herfindahl-Hirschman Index, October - December 1990.

PIERS Code	Description	Number of Records	Shipments (Tons)	Average Shipment Size	Number of Firms Recorded	CR4	HHI[1]
.	ALL FOODSTUFFS	99,941	29,060,850.3	290.8	14,391	.	.
100010	LIVE ANIMALS	26	937.3	36.1	14	0.9818	0.4961
105100	BEEF AND PORK (AND OTHER MEATS)	10,324	130,511.1	12.6	541	0.3310	0.0450
105700	POULTRY MEAT	3,966	139,827.7	35.3	300	0.4167	0.0590
106600	FROZEN WHELK, FROZEN SNAILS	11	61.6	5.6	7	0.9766	0.4259
107100	PROCESSED, CURED, AND SPECIALTY MEATS	898	9,528.7	10.6	137	0.4716	0.0702
107800	PROCESSED MEAT BYPRODUCTS	14	127.2	9.1	7	0.9843	0.3040
110101	TUNA	39	1,567.7	40.2	21	0.7054	0.1900
110706	OCTOPUS	7	57.8	8.3	6	1.0000	0.3146
112010	FISH AND SHELLFISH	660	8,646.2	13.1	263	0.2333	0.0234
112200	SARDINES	56	652.8	11.7	30	0.4315	0.0756
112940	OYSTERS	7	2.1	0.3	6	1.0000	0.7867
114000	FROZEN FISH	1,800	34,411.8	19.1	404	0.1278	0.0105
114451	LOBSTER AND CRAWFISH	134	1,529.5	11.4	66	0.4470	0.0694
114453	SCALLOPS	29	303.4	10.5	18	0.7305	0.2199
114454	FROZEN SHRIMP	161	2,300.3	14.3	89	0.3719	0.0689
118000	CHEESE	339	2,965.5	8.7	123	0.5128	0.1046
118300	DAIRY PRODUCTS, EGGS, AND EGG PRODUCTS	2,467	41,791.3	16.9	418	0.1973	0.0207
121400	HIDES AND SKINS	3,536	157,744.6	44.6	382	0.3308	0.0373
125010	LIVE PLANTS	835	7,969.5	9.5	247	0.1454	0.0147
126410	SEEDS	1,965	81,976.9	41.7	314	0.4268	0.0576
126570	MILLET	46	1,849.6	40.2	5	1.0000	0.3658
127100	PUMPKIN SEEDS	3	17.6	5.9	3	1.0000	0.7567
130100	CEREALS AND CEREAL PREPARATIONS	3,833	17,996,027.7	4,695.0	626	0.3793	0.0538
130500	RICE	1,461	777,595.4	532.2	279	0.4552	0.0723
132352	TAPIOCA (CASSAVA)	20	77.9	3.9	6	0.9606	0.2333
132500	POTATO STARCH	4	305.7	76.4	4	1.0000	0.5042
132550	CORN STARCH	236	5,258.5	22.3	43	0.7674	0.2344
140750	CORN AND OTHER VEGETABLE POWDER	24	205.4	8.6	16	0.8010	0.2128
140900	VEGETABLES	7,743	319,554.8	41.3	775	0.2734	0.0264
145040	COCONUTS AND COCONUT PRODUCTS	128	2,625.7	20.5	42	0.4091	0.0689
145100	NUTS (PEANUTS, ALMONDS, WALNUTS, ETC)	5,060	164,659.3	32.5	325	0.2597	0.0317
146100	FRUIT AND MELONS	8,389	273,041.5	32.5	614	0.1941	0.0190
146400	BANANAS	141	2,427.4	17.2	30	0.7332	0.1488
146750	BERRIES	168	3,483.3	20.7	54	0.5689	0.1175
146900	CHERRIES	77	1,347.8	17.5	38	0.4294	0.0649
147100	GRAPEFRUIT	1,973	82,653.4	41.9	115	0.4832	0.0843

Table 1 (continued)

PIERS Code	Description	Number of Records	Shipments (Tons)	Average Shipment Size	Number of Firms Recorded	CR4	HHI
147190	LEMONS	500	30,506.0	61.0	54	0.8005	0.4424
147290	OTHER CITRUS	7	3.5	0.5	4	1.0000	0.5550
147310	ORANGES	1,120	38,057.6	34.0	92	0.4144	0.0648
148900	PINEAPPLES	161	1,670.6	10.4	23	0.8476	0.2900
149100	PRUNES	823	17,353.4	21.1	71	0.5300	0.1078
152140	ORANGE PEELS	19	342.2	18.0	9	0.7816	0.2008
152180	LEMON PEELS	19	1,722.4	90.7	5	1.0000	0.8004
152220	OTHER FRUIT PEELS	21	505.8	24.1	7	0.9284	0.2619
155200	MOLASSES	19	58,935.0	3,101.8	10	0.9998	0.8288
155700	HONEY	76	1,255.4	16.5	40	0.4590	0.0786
155750	SWEET SYRUPS	120	975.1	8.1	59	0.5605	0.1051
156100	SUGAR	418	40,129.1	96.0	87	0.6776	0.1378
156200	CONFECTIONERIES, JELLIES, PASTRIES	1,324	14,358.8	10.8	454	0.3172	0.0390
156500	COCOA AND COCOA PREPARATIONS	157	4,200.1	26.8	62	0.5776	0.1078
160102	COFFEE	579	26,723.8	46.2	206	0.2269	0.0228
160200	COFFEE PREPARATIONS	116	2,069.2	17.8	39	0.6471	0.2396
160300	CHICORY	1	4.8	4.8	1	1.0000	1.0000
160500	TEA	139	546.8	3.9	80	0.2598	0.0390
160600	MACE	2	1.3	0.7	1	1.0000	1.0000
161010	ANISE SEEDS	10	19.6	2.0	9	0.9900	0.3744
161070	CAPERS	7	1.7	0.2	4	1.0000	0.9578
161350	GINGER	3	0.0	0.0	3	0.0000	0.0000
161710	PAPRIKA	11	125.7	11.4	7	0.8632	0.2591
161770	PEPPER	29	145.7	5.0	24	0.7370	0.2146
161800	CHILI PEPPERS AND POWDER	50	398.5	8.0	21	0.7146	0.1606
161940	SAGE	3	10.6	3.5	3	1.0000	0.4439
162100	SPICES AND FLAVORINGS	1,403	13,311.6	9.5	324	0.3006	0.0347
165300	ORANGE AND GRAPEFRUIT JUICE, CONC	487	18,733.7	38.5	108	0.5443	0.1137
166100	JUICES AND SOFT DRINKS	2,713	51,194.7	18.9	635	0.1750	0.0164
167050	BEER	1,387	64,637.3	46.6	191	0.6705	0.1693
167100	CHAMPAGNE	51	218.9	4.3	37	0.3967	0.0626
167250	SAKE KASU	7	53.9	7.7	6	1.0000	0.5166
167300	WINE	1,281	18,998.9	14.8	339	0.4472	0.1005
167400	VERMOUTH	4	0.5	0.1	3	1.0000	1.0000
167900	NONALCOHOLIC WINE	2	10.5	5.2	1	1.0000	1.0000
168250	LIQUEURS	77	728.9	9.5	40	0.6665	0.1939
168352	GIN	34	293.4	8.6	16	0.8313	0.2040
168400	RUM	126	1,532.7	12.2	33	0.6371	0.1459

Table 1 (continued)

PIERS Code	Description	Number of Records	Shipments (Tons)	Average Shipment Size	Number of Firms Recorded	CR4	HHI
168450	WHISKIES	781	15,509.6	19.9	106	0.6454	0.1176
168500	OTHER ALCOHOLIC BEVERAGES	763	8,344.4	10.9	235	0.2083	0.0206
168800	VODKA	178	3,214.3	18.1	29	0.9011	0.3966
170100	TOBACCO, MANUFACTURED AND UNMANUFACTURED	842	95,686.6	113.6	125	0.5385	0.1106
170650	CIGARETTES, CIGARS, AND CIGARILLOS	1,660	82,756.2	49.9	107	0.9685	0.4161
171480	SOYBEANS AND SOYBEAN MEAL	1,128	4,994,567.5	4,427.8	140	0.5140	0.0916
175030	ANIMAL FATS AND OILS	41	2,023.2	49.3	23	0.7787	0.4010
175390	RAPESEED (CANOLA)	4	238.9	59.7	3	1.0000	0.6193
175510	SUNFLOWER SEEDS	125	3,525.4	28.2	35	0.4601	0.0770
176020	CASTOR OIL	25	101.2	4.0	16	0.7711	0.2660
176030	CORN OIL	104	50,762.5	488.1	39	0.6894	0.1622
176070	COCONUT OIL	15	2,919.7	194.6	9	0.9806	0.3806
176180	COTTONSEED OIL	40	117,837.2	2,945.9	17	0.9528	0.6480
176260	LINSEED OIL	4	4.9	1.2	4	1.0000	0.8260
176300	OLIVE OIL	13	91.8	7.1	10	0.9258	0.4188
176340	PALM OIL	1	0.4	0.4	1	1.0000	1.0000
176380	PEANUT OIL	12	240.0	20.0	4	1.0000	0.9992
176470	RAPESEED (CANOLA) OIL	2	438.0	219.0	1	1.0000	1.0000
176500	SESAME OIL	13	17.7	1.4	10	1.0000	0.8058
176520	SOYBEAN OIL	32	52,280.2	1,633.8	19	0.9128	0.3231
176550	SUNFLOWER OIL	15	24,558.8	1,637.3	9	0.8416	0.1915
176580	ALMOND OIL	14	192.8	13.8	5	0.9882	0.7497
176600	TUNG OIL	1	2.2	2.2	1	1.0000	1.0000
176640	WALNUT OIL	20	320.0	16.0	7	0.9822	0.6225
176700	VEGETABLE OILS, OTHER	520	22,476.7	43.2	209	0.4620	0.0748
177020	COD LIVER OIL	7	16.7	2.4	4	1.0000	0.3724
177140	PANAMANIAN FISH OIL	14	15,499.8	1,107.1	11	0.9658	0.3146
177240	MENHADEN FISH OIL	8	11,060.8	1,382.6	4	1.0000	0.4968
177500	LARD	27	2,017.1	74.7	19	0.9145	0.3210
177560	TALLOW	235	227,223.9	966.9	47	0.4409	0.0777
177580	LANOLIN	11	20.9	1.9	9	0.8469	0.2318
177620	WOOL GREASE	8	105.0	13.1	3	1.0000	0.9472
177670	BUTTER OIL	4	253.4	63.4	3	1.0000	0.7532
182000	ASSORTED GROCERY PRODUCTS	13,358	157,866.5	11.8	2,200	0.2004	0.0150
182320	CHEWING AND BUBBLE GUM	178	2,969.0	16.7	34	0.7924	0.3576
182950	ASSORTED CANNED GROCERY PRODUCTS	2,932	64,074.5	21.9	498	0.2482	0.0269
182952	CORN AND WHEAT GLUTEN	8	532.4	66.5	5	0.9962	0.6408
184100	ANIMAL AND PET FEEDS	5,231	2,406,803.1	460.1	489	0.7453	0.2338

Table 1 (continued)

PIERS Code	Description	Number of Records	Shipments (Tons)	Average Shipment Size	Number of Firms Recorded	CR4	HHI
184500	FEATHERS AND ANIMAL HAIR	91	505.8	5.6	31	0.5695	0.1055
186300	BRISTLES	4	7.6	1.9	4	1.0000	0.5719
188200	GUM STYRAX	1	0.3	0.3	1	1.0000	1.0000
188240	BALSAM	6	3.9	0.6	5	0.9965	0.3130
188300	AMBER WAX	3	2.1	0.7	2	1.0000	0.9124
188340	BELIZE CHICLE	5	67.7	13.5	3	1.0000	0.4017
188360	GUM ARABIC	23	105.6	4.6	14	0.9165	0.3221
188381	GUAR GUM	11	154.4	14.0	7	0.9661	0.4095
188382	LOCUST BEAN GUM	3	26.8	8.9	3	1.0000	0.9258
188384	POWDERED GUM	2	0.5	0.3	1	1.0000	1.0000
188385	KARAYA GUM	5	21.7	4.3	4	1.0000	0.6557
188387	GUMS AND RESINS	118	792.2	6.7	33	0.6843	0.1609
188453	FISH MEAL	65	7,633.3	117.4	32	0.4868	0.1049
188504	WOOD ROSINS	174	3,458.0	19.9	24	0.8402	0.2411
188506	TURPENTINE	38	3,835.4	100.9	13	0.9924	0.4751
190100	SHELLS, ANTLERS, AND SPONGES	147	2,361.5	16.1	60	0.6136	0.1222
190150	SOLUBLE LACTALBUMIN	4	11.1	2.8	3	1.0000	0.8145
190580	SAUSAGE CASINGS, NATURAL AND SYNTHETIC	620	5,189.6	8.4	68	0.5941	0.1285
192050	ALGAES AND FUNGUS	58	653.6	11.3	34	0.6766	0.2479
192070	MOSS AND SEAWEED EXTRACTS	69	227.1	3.3	8	0.9761	0.5635
192450	LICORICE EXTRACT	81	1,274.7	15.7	6	0.9979	0.9229
193100	VANILLA BEANS	2	0.8	0.4	2	1.0000	0.5762
193250	OTHER VEGETABLE AND PLANT MATTER	151	4,142.6	27.4	67	0.7410	0.1636

[1] The Herfindahl-Hirschman Index was calculated based on the market shares of the 50 largest firms in the market (or product category).

Table 2. Comparison of PIERS Export Volums to Official U.S. Census Bureau Volumes and Unit Values of Shipments by Air and Water, October - December 1990.

PIERS Code	Description	PIERS Volume (tons)	Census Vessel Volume (tons)	Percentage Difference from Census Volume	Vessel Shipments as a Percent of Total Export Shipments	Unit Value (dollars / ton) of Shipments by Vessel & Air		Census Code
105100	BEEF*[1]	103,959	104,185	-0.22	74.19	3,553.30	6,657.98	0201.10.0010-0202.30.6000 0206.10.0000-0206.29.0000 0210.20.0000
105700	POULTRY	137,205	130,493	5.14	86.13	966.10	6,293.97	0207.10.2000-0207.50.0000
118000	CHEESE	2,220	1,780	24.70	50.88	3,016.12	2,424.77	0406.10.0000-0406.90.1000
130100	CORN*	10,604,147	10,413,073	1.83	97.79	106.98	1,148.77	1005.90.2000-1005.90.4060
130100	WHEAT*	5,361,536	5,904,220	-9.19	99.70	115.76	n/a	1001.10.0000-1001.90.2000
130500	RICE	777,595	784,243	-0.85	93.26	277.99	519.46	1006.10.0000-1006.40.0000
147100	GRAPEFRUIT	82,651	87,525	-5.57	82.00	538.10	1,116.64	0805.90.0000
147190	LEMONS	30,363	31,179	-2.62	81.01	719.96	815.82	0805.30.2000
147310	ORANGES	37,758	40,701	-7.23	47.75	539.83	834.50	0805.10.0020 0805.10.0040
155700	HONEY	1,271	1,690	-24.79	77.10	1,136.14	7,195.65	0409.00.0020 0409.00.0050
160200	COFFEE PREPARATIONS	1,928	1,912	0.84	87.60	3,499.65	5,232.54	2101.10.2025-2101.10.5000
171480	SOYBEANS*	3,964,541	3,995,150	-0.77	99.39	232.59	n/a	1201.00.0020
176380	PEANUT OIL	240	342	-29.82	32.39	763.83	n/a	1508.10.0000 1508.90.0000

[1] The asterisk denotes that the product is a subgroup within the PIERS code product group.

Table 3. Soybeans[1] - Firm Level Exports and Market Shares Defined by Trade Routes, U.S. Soybean Exports, October - December 1990.

Trade Route and Firm Name	Number of Shipments	Market Share	Total Shipments (Tons)
TOTAL SOYBEAN EXPORTS	465	100.00	3,964,557.6
ATLANTIC - AUSTRALIA	1	100.00	16.6
CENTRAL SOYA	1	100.00	16.6
ATLANTIC - DOMINICAN REPUBLIC	1	100.00	0.9
A E STALEY MFG	1	100.00	0.9
ATLANTIC - GERMANY	1	100.00	0.3
CARGO MANAGEMENT	1	100.00	0.3
ATLANTIC - HAITI	1	100.00	1,020.6
MID SOUTH FEEDS	1	100.00	1,020.6
ATLANTIC - HONG KONG	4	100.00	156.2
HAZZARDS FARM SERVICE	3	83.14	129.8
W G THOMPSON & SONS	1	16.86	26.3
ATLANTIC - JAPAN	69	100.00	217,190.1
CARGILL CORP	15	45.46	98,739.3
ALFRED C TOEPFER INTL	41	40.85	88,713.4
MITSUI GRAIN	5	12.90	28,020.6
CANADA PACKERS	7	0.69	1,494.2
MONTAGUE FARMS	1	0.10	222.6
ATLANTIC - LEEWARD ISLANDS	1	100.00	1.0
CARIBBEAN EXPRESS	1	100.00	1.0
ATLANTIC - SAUDIA ARABIA	2	100.00	18.1
AMERICAN ENTERPRISES	1	100.00	18.1
INTL MARKET DEVELOPMENT	1	0.00	0.0
ATLANTIC - SINGAPORE	1	100.00	26.1
CHATHAM BEANS	1	100.00	26.1
ATLANTIC - SPAIN	10	100.00	92,417.4
FERRUZZI	10	100.00	92,417.4
GREAT LAKES - CANADA	1	100.00	7,789.0
MID STATES TERMINAL	1	100.00	7,789.0
GREAT LAKES - JAPAN	1	100.00	16,197.9
MITSUBISHI INTL	1	100.00	16,197.9
GREAT LAKES - SPAIN	2	100.00	35,648.5
AGRO	1	50.01	17,826.6
CONTINENTAL GRAIN EXPORTS	1	49.99	17,821.8
GULF - AUSTRALIA	1	100.00	14,870.2
CARGILL CORP	1	100.00	14,870.2
GULF - BELGIUM	5	100.00	206,692.4
GARNAC GRAIN	3	73.57	152,069.6
RICHCO GRAIN	1	26.42	54,602.6
PROTEIN TECHNOLOGIES INTL	1	0.01	20.2

Table 3 (continued).

Trade Route and Firm Name	Number of Shipments	Market Share	Total Shipments (Tons)
GULF - COSTA RICA	3	100.00	14,433.1
CTC NORTH AMERICA	2	77.33	11,161.6
CARGILL CORP	1	22.67	3,271.6
GULF - TAIWAN	9	100.00	232,539.2
CONTINENTAL GRAIN EXPORTS	2	36.70	85,331.1
TRADIGRAIN	1	24.38	56,700.0
ZEN NOH GRAIN	2	23.83	55,411.7
CARGILL CORP	3	10.66	24,775.9
BUNGE CORP	1	4.44	10,320.5
GULF - DOMINICAN REPUBLIC	3	100.00	9,372.9
GARNAC GRAIN	2	98.08	9,192.9
FERRUZZI	1	1.92	180.0
GULF - ECUADOR	1	100.00	20.1
SAYAGO INTL	1	100.00	20.1
GULF - GERMANY	9	100.00	330,614.7
CONTINENTAL GRAIN EXPORTS	3	32.05	105,953.1
ARCHER DANIELS MIDLAND	2	30.64	101,289.4
CARGILL CORP	1	16.52	54,615.1
ALFRED C TOEPFER INTL	2	16.41	54,249.1
GARNAC GRAIN	1	4.39	14,508.0
GULF - FRANCE	1	100.00	5,000.0
KROHN	1	100.00	5,000.0
GULF - GREECE	4	100.00	72,014.1
CONTINENTAL GRAIN EXPORTS	2	52.24	37,620.6
PEAVEY GRAIN	1	26.11	18,805.3
LOUIS DREYFUS	1	21.65	15,588.2
GULF - HONDURAS	1	100.00	2,466.7
SCHOUTEN INTL	1	100.00	2,466.7
GULF - ISRAEL	6	100.00	91,319.8
RED ROCK COMMODITIES	2	51.96	47,449.0
CONTINENTAL GRAIN EXPORTS	3	39.46	36,033.8
CARGILL CORP	1	8.58	7,837.0
GULF - ITALY	1	100.00	26,805.6
CONTINENTAL GRAIN EXPORTS	1	100.00	26,805.6
GULF - JAMAICA	3	100.00	15,574.0
CARGILL CORP	2	64.69	10,074.1
MAPLE LEAF MILLS	1	35.32	5,499.9
GULF - JAPAN	33	100.00	721,494.8
ZEN NOH GRAIN	17	29.45	212,488.1
MITSUBISHI INTL	3	22.06	159,140.4
ARCHER DANIELS MIDLAND	3	16.72	120,650.0
CARGILL CORP	2	10.42	75,204.9
MITSUI GRAIN	3	8.55	61,693.9
KURT A BECHER	1	7.58	54,686.6
GARNAC GRAIN	1	2.33	16,792.5
CONTINENTAL GRAIN EXPORTS	2	1.73	12,502.2
TOMEN	1	1.16	8,336.3

Table 3 (continued).

Trade Route and Firm Name	Number of Shipments	Market Share	Total Shipments (Tons)
GULF - KOREA	8	100.00	187,790.6
CENTRAL STATES ENTERPRISES	2	30.60	57,455.1
LOUIS DREYFUS	2	22.83	42,872.2
CONTINENTAL GRAIN EXPORTS	1	21.09	39,599.1
TOMEN	2	15.07	28,304.6
MITSUBISHI INTL	1	10.42	19,559.6
GULF - MEXICO	1	100.00	14,700.3
CARGILL CORP	1	100.00	14,700.3
GULF - NETHERLANDS	31	100.00	830,693.0
CARGILL CORP	8	37.53	311,743.8
GARNAC GRAIN	6	19.44	161,480.1
ARCHER DANIELS MIDLAND	6	16.04	133,199.5
ALFRED C TOEPFER INTL	3	11.68	97,003.5
CEREOL VDO	4	8.94	74,269.6
CEROL VDO	2	3.62	30,034.0
ORDER	2	2.76	22,962.5
GULF - NORWAY	2	100.00	50,969.5
LOUIS DREYFUS	2	100.00	50,969.5
GULF - PORTUGAL	5	100.00	94,910.7
UNIFAC	3	35.48	33,673.5
CARGILL CORP	1	33.19	31,501.4
PEAVEY GRAIN	1	31.33	29,735.8
GULF - ROMANIA	1	100.00	26,786.8
RICHCO GRAIN	1	100.00	26,786.8
GULF - SPAIN	3	100.00	164,688.1
CARGILL CORP	2	66.67	109,792.2
FERRUZZI	1	33.33	54,895.9
GULF - SURINAME	1	100.00	17.7
NORTH PACIFIC INTL	1	100.00	17.7
GULF - TRINIDAD	4	100.00	28,313.7
CONTINENTAL GRAIN EXPORTS	4	100.00	28,313.7
GULF - UNITED KINGDOM	4	100.00	156,539.7
CARGILL CORP	3	97.43	152,517.5
CONTINENTAL GRAIN EXPORTS	1	2.57	4,022.2
GULF - VENEZUELA	4	100.00	43,155.4
GARNAC GRAIN	1	45.93	19,820.5
CARGILL CORP	1	31.86	13,750.5
INTL MULTIFOODS	1	11.59	5,000.1
CONTINENTAL GRAIN EXPORTS	1	10.62	4,584.4
PACIFIC - TAIWAN	12	100.00	206,396.2
CONTINENTAL GRAIN EXPORTS	6	45.28	93,448.0
TRADIGRAIN	3	41.32	85,280.8
MITSUI GRAIN	1	5.09	10,500.1
LOUIS DREYFUS	1	4.29	8,852.3
CARGILL CORP	1	4.03	8,314.9
PACIFIC - GERMANY	1	100.00	0.2
J & R IND	1	100.00	0.2

Table 3 (continued).

Trade Route and Firm Name	Number of Shipments	Market Share	Total Shipments (Tons)
PACIFIC - FRENCH POLYNESIA	1	100.00	1.8
GRAND EXPORTS	1	100.00	1.8
PACIFIC - HONG KONG	42	100.00	2,264.7
W G THOMPSON & SONS	7	30.22	684.5
B C HARVEST TRDG	12	19.87	450.0
ADM	4	17.68	400.3
KNIGHT SEED	4	11.13	252.1
KING GRAIN	2	6.92	156.6
PACIFIC SOYBEAN	6	6.12	138.5
DENNIS JACKSON SEED SERVICE	5	5.76	130.5
HAZZARDS FARM SERVICE	2	2.31	52.2
PACIFIC - JAPAN	134	100.00	15,723.8
KANEMATSU GOSHO	18	43.77	6,882.7
ORDER	27	8.27	1,300.3
MITSUI GRAIN	11	7.21	1,133.6
ADM MILLING	8	5.24	824.3
MARUBENI AMERICA	9	4.03	634.2
TOMEN	10	3.82	600.8
BLUE HORIZON	5	3.39	533.6
MITSUI & CO	4	3.32	522.0
ZEN NOH UNICO	3	3.02	475.4
CONTINENTAL GRAIN EXPORTS	1	2.88	453.5
HONDA INTL TRDG	4	2.47	388.4
DUNN INTL	2	2.43	382.0
CANADA PACKERS	3	2.08	327.1
ACE POOL CAR	3	1.92	302.2
SUN BELT EXPORTS	2	1.64	258.0
FAIRVIEW FARMS	7	1.03	161.8
PIONEER HI BRED INTL	1	0.77	120.9
OKURA	2	0.46	72.0
TOSHOKU AMERICA	2	0.46	71.5
LITTLE BEAR TRDG	1	0.31	49.0
NITTO DENKO AMERICA	1	0.31	49.0
EDEN FOODS	1	0.23	35.7
D & K FROZEN FOODS	2	0.15	23.4
PURITY FOODS	1	0.12	18.4
GRANPLEX	1	0.12	18.1
E BOYD & ASSOC	1	0.11	18.0
LIVING FARMS	1	0.11	18.0
PEARCY GRAIN SERVICE	1	0.11	17.9
NICHII OF AMERICA	1	0.10	16.3
ORGANIC MARKETING	1	0.10	15.9
PACIFIC - KOREA	3	100.00	26,596.8
MARUBENI AMERICA	1	82.72	22,000.0
MITSUBISHI INTL	1	17.22	4,580.8
OSCAR FREIGHT LINE	1	0.06	16.0
PACIFIC - MALAYSIA	9	100.00	617.5
W G THOMPSON & SONS	6	82.74	511.0
CHATHAM BEANS	3	17.26	106.6
PACIFIC - NEW ZEALAND	1	100.00	86.2
COLYER WATSON	1	100.00	86.2
PACIFIC - PHILIPPINES	1	100.00	20.4
CARGILL CORP	1	100.00	20.4

Table 3 (continued).

Trade Route and Firm Name	Number of Shipments	Market Share	Total Shipments (Tons)
PACIFIC - SINGAPORE	10	100.00	545.0
W G THOMPSON & SONS	6	75.97	414.0
MIRATRADE INTL	2	14.53	79.2
HAZZARDS FARM SERVICE	2	9.50	51.8
PACIFIC - THAILAND	2	100.00	39.3
PROTEIN TECHNOLOGIES INTL	1	52.45	20.6
CENTRAL SOYA	1	47.55	18.7

[1] Soybeans are defined here as a subgroup of the PIERS commodity category, Soybeans and Soybean Preparations (171480). This PIERS data subcategory corresponds with the U.S. Census Bureau Schedule B code number 1201.00.0040.

Endnotes

[1] The product categories available in the PIERS data are: (1) Foodstuffs; (2) Forest Products; (3) Textiles, Apparels, Yarn, etc.; (3) Chemical and Plastics; (5) Non-metallic Minerals, Ceramics, Glass etc.; (6) Ores and Metals; (7) Manufactured Metal Products and Mechanical Machinery; (8) Electronics and Instruments; (9) Furnishings, Personal and Household; and (10) Miscellaneous and All Other.

[2] Address: PIERS, *Journal of Commerce*, Inc., 120 Wall Street, New York, N.Y. 10005. Telephone: 212-425-1616.

[3] As an example of computer storage space requirements, the fourth quarter 1990 data file had 99,941 records and required 6,100 blocks of storage space on an IBM 3090B mainframe computer with a CMS operating system. This is equivalent to about 24 megabytes.

[4] A listing and description of all the U.S. export port codes, destination country codes, foreign port codes, and ultimate destination codes encountered in using the foodstuff data for the fourth quarter data of 1990 was created and is available from the authors on request.

[5] The absolute value of the difference between the percentage of records and percentage of shipments was calculated and the commodity categories were ranked according to this value. The six largest differences, in descending order, corresponded to the following categories: Cereals and Cereal Preparations, Soybeans, Assorted Grocery Products, and Beef and Pork. These categories had values for the absolute difference greater than 5 percent. When these categories were excluded from the sample, a simple correlation coefficient of 0.56 was obtained for the correlation between the number of records and volume of shipments. When the top 12 categories were excluded from the sample of 131 categories, a correlation coefficient of 0.76 was obtained.

[6] A unique character string is defined as a combination of alphabetic or numeric characters to form a description or label unlike any other combination of characters.

[7] Telephone conversation with Foreign Trade Division, Bureau of Census, Department of Commerce, August 16, 1991.

[8] The Census Bureau data was obtained from "U.S. Exports of Merchandise," U.S. Department of Commerce, Bureau of the Census, September and December 1990, CD-ROM version.

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Appendix Table 1. Concordance for the PIERS Commodity Codes and the U.S. Census Bureau Schedule B Codes

PIERS Commodity Code	PIERS Commodity Description	Schedule B Codes [1]	Schedule B Descriptions
100010	LIVE ANIMALS	0101.11.0000 - 0106.00.0000	LIVE ANIMALS
105100	BEEF & PORK (AND OTHER MEATS)	0201.10.0000 - 0202.30.6000	BEEF, FRESH, CHILLED, OR FROZEN
		0203.11.0000 - 0203.29.4000	PORK, FRESH, CHILLED, OR FROZEN
		0204.10.0000 - 0206.90.0040	SHEEP, GOATS, HORSE, AND EDIBLE OFFAL THEREOF
		0208.10.0000 - 0210.90.0000	OTHER EDIBLE MEAT, EXCLUDING POULTRY
105700	POULTRY MEAT	0207.10.2000 - 0207.50.0000	POULTRY, FRESH, CHILLED OR FROZEN
106600	FROZEN WHELK, FROZEN SNAILS	0307.60.0000	SNAILS
107100	PROCESSED, CURED, AND SPECIALTY MEATS	1601.00.0000 - 1602.90.0000	SAUSAGES AND OTHER PREPARED OR PRESERVED MEATS
107800	PROCESSED MEAT BYPRODUCTS	1603.00.9010 - 1603.00.9500	EXTRACTS OF MEAT AND FISH
110101	TUNA	0302.31.0000 - 0302.39.0040	TUNAS, SKIPJACK, AND ATLANTIC BONITO
		1604.14.000	
110706	OCTOPUS	0307.51.0000 - 0307.59.0000	OCTOPUS

PIERS Commodity Code	PIERS Commodity Description	Schedule B Codes	Schedule B Descriptions
112010	FISH AND SHELLFISH	0302.11.0000 - 0302.29.0000	FISH, FRESH OR CHILLED
		0302.40.0000 - 0302.70.0000	
		0304.10.0000 - 0304.90.0000	FISH FILLETS
		0305.10.0000 - 0305.69.0000	FISH, DRIED, SALTED IN BRINE
		0306.14.0000	CRABS
		0306.24.2000	CRABMEAT
		0307.31.0000 - 0307.49.0060	MOLLUSKS (NOT SPECIFIED ELSEWHERE)
		0307.91.0020 - 0307.99.0080	
		1604.11.2000 - 1604.12.0000	PREPARED AND PRESERVED FISH
		1604.15.0000 - 1605.90.7000	
112200	SARDINES	1604.13.0000	SARDINES
112940	OYSTERS	0307.10.0020 - 0307.10.0040	OYSTERS
114000	FROZEN FISH	0303.10.0010 - 0303.80.4080	FROZEN FISH
114451	LOBSTER AND CRAWFISH	0306.11.0000	LOBSTER AND CRAWFISH
		0306.12.0000	
		0306.19.0010	
		0306.21.0000	
		0306.22.0000	
114453	SCALLOPS	0307.21.0000 - 0307.29.0000	SCALLOPS

Appendix Table 1 (continued).

PIERS Commodity Code	PIERS Commodity Description	Schedule B Codes	Schedule B Descriptions
114454	FROZEN SHRIMP	0306.13.0000 0306.23.0000	SHRIMP
118000	CHEESE	0406.10.0000 - 0406.90.9000	CHEESE
118300	DAIRY PRODUCTS, EGGS, AND EGG PRODUCTS	0401.10.0000 - 0405.00.8040 0407.00.0020 - 0408.99.0000	DAIRY PRODUCTS BIRDS' EGGS
121400	HIDES AND SKINS	4101.10.0000 - 4111.00.0000	RAW HIDES AND SKINS AND LEATHER
125010	LIVE PLANTS	0601.10.0000 - 0604.99.0000	LIVE TREES AND OTHER PLANTS; BULBS, ROOTS AND THE LIKE; CUT FLOWERS AND ORNAMENTAL FOLIAGE
126410	SEEDS	1209.11.0000 - 1209.99.4060 1201.00.0020 1005.10.0000 1001.90.1000	SEEDS, OF A KIND USED FOR SOWING SOYBEAN SEED CORN SEED WHEAT SEED
127100[2]	PUMPKIN SEEDS		
126570	MILLET	1008.20.0000	MILLET

Appendix Table 1 (continued).

PIERS Commodity Code	PIERS Commodity Description	Schedule B Codes	Schedule B Descriptions
130100	CEREALS AND CEREAL PREPARATIONS	1001.10.0000	WHEAT, RYE, BARLEY, OATS, CORN
		1001.90.2000 - 1004.00.000	
		1005.90.2000 - 1005.90.4060	
		1007.00.0020 - 1007.00.0040	GRAIN SORGHUM
		1008.10.0000	BUCKWHEAT
		1008.30.0000	OTHER CEREALS
		1008.90.0040	
		1101.00.0000 - 1107.20.0000	PRODUCTS OF MILLING INDUSTRY
		1901.10.0000 - 1902.40.0000	PREPARATIONS OF CEREALS (FLOUR PREPARATIONS, PASTA, BREADS)
		1904.10.0000 - 1905.90.9090	
130500	RICE	1006.10.0000 - 1006.40.0000	RICE
		1008.90.0020	WILD RICE
132352	TAPIOCA (CASSAVA)	1903.00.0000	TAPIOCA
132500	POTATO STARCH	1108.13.0000	POTATO STARCH
132550	CORN STARCH	1108.12.0000	CORN STARCH
140750	CORN AND OTHER VEGETABLE POWDER	NO CONCORDANCE ESTABLISHED	

Appendix Table 1 (continued).

PIERS Commodity Code	PIERS Commodity Description	Schedule B Codes	Schedule B Descriptions
140900	VEGETABLES	0701.10.0000 - 0710.00.0000 0712.30.000 0712.90.8050 - 0714.90.0000 2001.10.0000 - 2005.90.0000	EDIBLE VEGETABLES AND CERTAIN ROOTS AND TUBERS VEGETABLE PREPARATIONS
145040	COCONUTS AND COCONUT PRODUCTS	0801.10.0000	COCONUTS
145100	NUTS (PEANUTS, ALMONDS, WALNUTS, ETC.)	0801.20.000 - 0802.90.9500 1202.10.0000 - 1202.20.0040 2008.11.0020 - 2008.19.9500	EDIBLE NUTS PEANUTS NUTS, PEANUTS, AND OTHER SEEDS

Appendix Table 1 (continued).

PIERS Commodity Code	PIERS Commodity Description	Schedule B Codes	Schedule B Descriptions
146100	FRUITS AND MELONS	0804.10.0000	DATES
		0804.20.0000	FIGS
		0804.40.0000	AVOCADOS
		0804.50.0000	GUAVAS, MANGOES
		0806.10.0000 - 0809.10.0000	GRAPES, RAISINS, MELONS, APPLES, PEARS, AND APRICOTS
		0809.30.0000	PEACHES
		0809.40.0000	PLUMS
		0810.90.2060 - 0810.90.5000	KIWI
		0813.10.0000	FRUITS, PRESERVED AND DRIED
		0813.30.0000 - 0813.50.0060	
		2008.40.0000	PEARS, PREPARED
		2008.50.0000	APRICOTS, PREPARED
		2008.70.0000	PEACHES, PREPARED
146400	BANANAS	0803.00.0000	BANANAS
146750	BERRIES	0811.10.0000 - 0810.40.0050	STRAWBERRIES, RASPBERRIES, CRANBERRIES, BLUEBERRIES
		0811.10.0000 - 0811.90.2000	
		0812.20.0000	
		2008.99.1900 - 2008.99.7000	BERRIES, PREPARED

Appendix Table 1 (continued).

PIERS Commodity Code	PIERS Commodity Description	Schedule B Codes	Schedule B Descriptions
146900	CHERRIES	0809.20.0020 - 0809.20.0040 0811.90.6040 - 0811.90.6060 0812.10.0000 2008.60.0020 - 2008.60.0060	CHERRIES
147100	GRAPEFRUIT	0805.90.0000	GRAPEFRUIT
147190	LEMONS	0805.30.2000	LEMONS
147290	OTHER CITRUS	0805.90.0000	OTHER CITRUS
147310	ORANGES	0805.10.0020 - 0805.20.0040	ORANGES AND MANDARINS
148900	PINEAPPLES	0804.30.0000 2008.20.0000	PINEAPPLES
149100	PRUNES	0813.20.0000	PRUNES
152140 152180 152220	ORANGE PEELS DRIED LEMON PEELS OTHER FRUIT PEELS	0814.00.0000	PEEL OF CITRUS FRUIT OR MELONS
155200	MOLASSES	1703.10.0000 1703.90.0000	MOLASSES
155700	HONEY	0409.00.0020 - 0409.00.0050	NATURAL HONEY

Appendix Table 1 (continued).

PIERS Commodity Code	PIERS Commodity Description	Schedule B Codes	Schedule B Descriptions
155750	SWEET SYRUPS	1702.10.0000 - 1702.90.5000	OTHER SUGARS
156100	SUGAR	1701.11.0000 - 1701.99.0000	CANE OR BEET SUGAR
156200	CONFECTIONERIES, JELLIES, PASTRIES	1704.90.3000 - 1704.90.7000 1806.10.0000 - 1806.90.0000	SUGAR CONFECTIONERY CHOCOLATE
156500	COCOA AND COCOA PREPARATIONS	1801.00.0000 - 1805.00.0000	COCOA AND COCOA PREPARATIONS
160102	COFFEE	0901.11.0000 - 0901.40.0000	COFFEE
160200	COFFEE PREPARATIONS	2101.10.2025 - 2101.10.2030	COFFEE PREPARATIONS
160300	CHICORY	2101.30.0000	CHICORY
160500	TEA	0902.10.0000 - 0902.40.0000 2101.20.0000	TEA TEA PREPARATIONS
161010	ANISE SEEDS	0909.10.0000	ANISE SEEDS
161350	GINGER	0910.10.0000	GINGER
161770 161800	PEPPER CHILI PEPPERS AND POWDER	0904.11.0000 - 0904.20.0000	PEPPER

PIERS Commodity Code	PIERS Commodity Description	Schedule B Codes	Schedule B Descriptions
161070[2]	CAPERS		
161710	PAPRIKA		
161940	SAGE		
162100	SPICES AND FLAVORINGS	0712.20.2000 - 0712.20.4000	ONION POWDER
		0712.90.4020 - 0712.90.4040	GARLIC POWDER
		0906.10.0000 - 0908.30.0000	SPICES AND FLAVORINGS
		0909.20.0000 - 0909.50.0000	
		0910.20.0000 - 0910.99.0000	
165300	ORANGE, GRAPEFRUIT, AND OTHER CITRUS JUICE, CONC	2009.11.0020 - 2009.30.8000	ORANGES, GRAPEFRUIT AND OTHER CITRUS JUICE, CONC
166100	JUICES AND SOFT DRINKS	2009.40.2000 - 2009.90.4000	FRUIT JUICES (NOT CITRUS)
		2201.10.0000 - 2202.90.9090	WATERS & FLAVORED WATERS
167050	BEER	2203.00.0000	BEER
167100	CHAMPAGNE	2204.21.2000	EFFERVESCENT WINE
167250	SAKE	2206.00.7000	OTHER WINE
167300	WINE	2204.10.0000 - 2204.30.0000	WINE OF FRESH GRAPES
167400	VERMOUTH	2205.10.0000	VERMOUTH
167900	NONALCOHOLIC WINE		
168250	LIQUEURS	2208.90.4500	CORDIALS, LIQUEURS
168352	GIN	2208.50.0000	GIN
168400	RUM	2208.40.0030 - 2208.40.0050	RUM

Appendix Table 1 (continued).

PIERS Commodity Code	PIERS Commodity Description	Schedule B Codes	Schedule B Descriptions
168450	WHISKIES	2208.30.6020 - 2208.30.9040	WHISKEYS
168500	OTHER ALCOHOLIC BEVERAGES	2208.20.0000 2208.90.9000	GRAPE BRANDY OTHER ALCOHOLIC BEVERAGES
168800	VODKA	2208.90.6300	VODKA
170100	TOBACCO, MANUFACTURED AND UNMANUFACTURED	2401.10.2020 - 2401.30.9000 2403.10.0030 - 2403.99.0070	UNMANUFACTURED TOBACCO MANUFACTURED TOBACCO
170650	CIGARETTES, CIGARS, AND CIGARILLOS	2402.10.3030 - 2402.90.0000	CIGARS, CHEROOTS, CIGARILLOS, AND CIGARETTES
171480	SOYBEANS AND SOYBEAN MEAL	1201.00.0040 1208.10.0000	SOYBEANS SOYBEAN MEAL
175030	ANIMAL FATS AND OILS	1506.00.0000	OTHER ANIMAL FATS AND OILS
175390	RAPESEED (CANOLA)	1205.00.0000	RAPESEED
175510	SUNFLOWER SEEDS	1206.00.0020 - 1206.00.0050	SUNFLOWER SEEDS
176020	CASTOR OIL	1515.30.0000	CASTOR OIL
176030	CORN OIL	1515.21.0000 - 1515.29.0040	CORN OIL
176070	COCONUT OIL	1513.11.0000 - 1513.19.0000	COCONUT OIL
176180	COTTONSEED OIL	1512.21.0000 - 1512.29.0040 1517.90.4055	COTTONSEED OIL
176260	LINSEED OIL	1515.11.0000 - 1515.19.0000	LINSEED OIL
176300	OLIVE OIL	1509.10.0000 - 1509.90.0000	OLIVE OIL
176340	PALM OIL	1511.10.0000 - 1511.90.0000	PALM OIL
176380	PEANUT OIL	1508.10.0000 - 1508.90.0000	PEANUT OIL

Appendix Table 1 (continued).

PIERS Commodity Code	PIERS Commodity Description	Schedule B Codes	Schedule B Descriptions
176470	RAPESEED (CANOLA) OIL	1514.10.0000 - 1514.90.0000	RAPESEED OIL
176500	SESAME OIL	1515.50.0000	SESAME OIL
176520	SOYBEAN OIL	1507.10.0000 - 1507.90.3030 1517.90.4035	SOYBEAN OIL
176550	SUNFLOWER OIL	1512.11.0020 - 1512.19.0040	SUNFLOWER SEED OIL
176600	TUNG OIL	1515.40.0000	TUNG OIL
176580	ALMOND OIL	1510.00.0000	OTHER OILS
176640	WALNUT OIL	1517.10.0000 - 1517.90.4015	MARGARINE; OTHER EDIBLE MIXTURES
176700	VEGETABLE OILS, OTHER		
177020	COD LIVER OIL	1504.10.0000	FISH-LIVER OILS
177140	PANAMANIAN FISH OIL	1504.20.7000	OTHER FISH FATS AND OILS
177240	MENHADEN FISH OIL	1504.20.6020	MENHADEN FISH OIL
177500	LARD	1501.00.0020	LARD
177560	TALLOW, WHITE AND YELLOW GREASE	1501.00.0040 - 1502.00.0060	WHITE & YELLOW GREASE, TALLOW, AND OTHER ANIMAL FATS
177580	LANOLIN	1505.10.0000 - 1505.90.0000	WOOL GREASE AND LANOLIN
177620	WOOL GREASE		
177670	BUTTER OIL	0405.00.8040	OTHER FATS AND OILS DERIVED FROM MILK
182000	ASSORTED GROCERY PRODUCTS	*NO CONCORDANCE ESTABLISHED*	
182320	CHEWING AND BUBBLE GUM	1704.10.0000	CHEWING GUM
182950	ASSORTED CANNED GROCERY PRODUCTS	*NO CONCORDANCE ESTABLISHED*	

Appendix Table 1 (continued).

PIERS Commodity Code	PIERS Commodity Description	Schedule B Codes	Schedule B Descriptions
182952	CORN AND WHEAT GLUTEN	2301.10.0000	RESIDUES FROM FOOD INDUSTRIES AND PREPARED ANIMAL FOOD
184100	ANIMAL AND PET FEEDS	2302.10.0000 - 2309.90.8000	
		1214.10.0020 - 1214.90.0040	ALFALFA MEAL AND PELLETS, OTHER HAY
184500	FEATHERS AND ANIMAL HAIR	0505.10.0000	FEATHERS AND DOWN
		0503.00.0000	HAIR OF EQUINE OR BOVINE ANIMALS
186300	BRISTLES	0502.10.0000 - 0502.90.0000	PIGS', HOGS' OR BOARS' BRISTLES
188360	GUM ARABIC	1301.20.0000	GUM ARABIC
188200	GUM STYRAX	1301.10.0000	LAC, GUMS, RESINS
188240	BALSAM	1301.90.0000 - 1302.11.0000	
188300	AMBER WAX	1302.13.0000 - 1302.39.0000	
188340	BELIZE CHICLE		
188381	GUAR GUM		
188382	LOCUST BEAN GUM		
188384	POWDERED GUM		
188385	KARAYA GUM		
188387	GUMS AND RESINS		
188453	FISH MEAL	2301.20.0000	FISH MEAL
188504	WOOD ROSINS	*NO CONCORDANCE ESTABLISHED*	
188506	TURPENTINE	*NO CONCORDANCE ESTABLISHED*	

Appendix Table 1 (continued).

PIERS Commodity Code	PIERS Commodity Description	Schedule B Codes	Schedule B Descriptions
190100	SHELLS, ANTLERS, AND SPONGES	0506.10.0000 - 0509.00.0000	BONES, SHELLS, CORAL AND SPONGES
190150	SOLUBLE LACTALBUMIN	*NO CONCORDANCE ESTABLISHED*	
190580	SAUSAGE CASINGS, NATURAL AND SYNTHETIC	0504.00.0020 - 0504.00.0060	GUTS, BLADDERS & STOMACHS OF ANIMALS PREPARED FOR SAUSAGE CASINGS
192050	ALGAE AND FUNGUS	*NO CONCORDANCE ESTABLISHED*	
192070	MOSS AND SEAWEED EXTRACTS	*NO CONCORDANCE ESTABLISHED*	
192450	LICORICE EXTRACT	1302.12.0000	LICORICE EXTRACT
193100	VANILLA BEANS	0905.00.0000	VANILLA BEANS
193250	OTHER VEGETABLE PLANT MATTER	*NO CONCORDANCE ESTABLISHED*	

[1] The concordance was generally established between individual PIERS data codes and groups of Schedule B codes. An expression such as 0201.10.0000 - 0202.30.6000 means that the codes beginning with 0201.10.0000 and ending with 0202.30.6000 and all intervening codes are to be considered as part of a group. When a group of codes for a related product identified by a single PIERS code were not part of a contiguous series, then the codes were listed individually. In some instances, the concordance was established between several PIERS data codes and a single or few Schedule B codes.

[2] The PIERS codes have been taken out of numerical order so that a group of PIERS codes can be related to the Schedule B code(s).

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