Paper presented at the Meetings of the Association of American Geographers, Columbus, Ohio, April 20, 1965

INTERINDUSTRY RELATIONSHIPS IN THE PHILADELPHIA ECONOMY *

Gerald J. Karaska
The Wharton School
University of Pennsylvania

The intent of this paper is to introduce some of the research being done at the University of Pennsylvania. This research is designed as regional impact analysis and largely involves the use of input-output relations with special consideration given to the regional flow of goods. This paper will discuss some impact models, relate some of the methodology and statistical procedures being employed in a model of Philadelphia, and will present some of the results of this model. The major purpose of this presentation is to suggest the pertinence of this avenue of research.

The current study has as its focus the Standard Metropolitan Statistical Area of Philadelphia, which includes five counties in Pennsylvania and three counties in New Jersey. All data and empirical information are relevant for 1959.

The expressed intent of the Philadelphia Study is to measure the impacts of changes in federal research and development expenditures upon the regional economy. Recent national concern with an undesirably high level of defense expenditures, the uneven geographic distribution of federal R & D awards, and the outcries by communities when defense cutbacks threaten their economic stability have motivated the Federal government to encourage and sponsor research on the nature and extent of its procurement programs.

This regional impact problem can find some focus in simply viewing the industrial and geographic distribution of the government's prime defense

* Support of the National Aeronautics and Space Administration is gratefully acknowledged.

contract awards, but its perspective is clouded when the industries receiving the prime awards let subcontracts and redistribute the federal dollars throughout the United States.

As an economic problem, the regional effects of changes in levels of federal expenditures can be viewed as the repercussions of changes in levels of final demand, the so-called multiplier effect.

Several techniques are commonly used to generate a multiplier. The basic-nonbasic approach, certain econometric models, and input-output analysis have all found favor in regional impact studies, and all have been debated for their advantages and disadvantages. Like all models of a complex phenomenon, however, none have found widespread acceptance. One desirable attribute of the input-output approach is its detailed description of the linkages between all sectors of the economy. Put another way, input-output has great utility in outlining the specific repercussions of changes in consumption. The matrix format also provides a double accounting system which is especially useful in assessing the reliability of existing data and in denoting the absence of pertinent data. When supplemented with information on the interregional flows of goods the input-output matrix can be a valuable source of information to evaluate the spatial interactions of regions and industries.

There are, of course, many problems to which an impact analysis can be directed. Previous studies have analyzed the impacts of new bridges, new industries, and economic development programs. An expressed concern of the present Philadelphia Impact Study is to analyze the impacts of cutbacks in defense expenditures on the one hand, and, on the other, to help evaluate the effects of concomitant governmental offset policies. One implicit goal of the Study is to provide basic data which would help to orient local industrial development plans. Together with other analytical techniques,

input-output analysis will furnish valuable information on those industrial linkages, identified by their internal and external flows of goods, which serve as the principle source of income generation for the region.

In addition to the well known difficulties with input-output analyses --- these largely reflect several restrictive assumptions --- regional models have been hampered by a lack of extensive and reliable data. Previous regional input-output studies have been forced to either use national information, or adopt highly generalized measurement techniques, or make educated guesses of the regional attributes to be employed in a national model. Although numerous nations have compiled input-output tables, and many with great detail, only a few attempts have been made to construct a table at the regional or metropolitan level. Where attempted, these nonetheless have sacrificed detail for the facility or ease in manipulating the final matrix in order to trace some impacts of change. Indeed, frequent reference in the literature is made to the marginal gain of detail for the expensive data gathering and compilation procedures.

The term input-output really designates two separate concepts: one, the descriptive model or matrix, and second, the manipulation of this matrix or the impact analysis. The matrix is a table in which industries or economic sectors appear as both rows and columns in identical sequence. An entry in each cell of the table indicates the numerical relationship between the respective row and column. This relationship can be measured in monetary values or weight units, or can be expressed as a coefficient. For manufacturing industries this coefficient is usually referred to as the technological coefficient and expresses the amount of each input or purchase per total output of the industry, hence the term input-output coefficient. A very basic assumption of impact analysis is that this input-output coefficient

is comparable for all firms in any industrial category, and is stable for these industries for any scale of operation and for short periods of time.

The most frequent matrix appearing in the literature is the balanced regional model which designates the total array of industrial relationships irrespective of the geographic source of supply and destination of demand. The utility of this nationally balanced model for metropolitan areas is obviously restricted. A better model for such a sub-region is an inter-regional model which would distinguish the local from the non-local sources of supply and destinations of demand. Figure 1 illustrates one inter-regional model as a set of matrices: the local matrix, the import matrix, and the export matrix. For any industry, inputs would be designated as being supplied from local industries A, B, C, ..., and from non-local industries A', B', C', ... The outputs of any industry would also be represented as flowing to local industries A, B, C, ..., and to non-local industries A_1, B_1, C_1, ... A common variation of this model is one which collapses the import matrix into a single row and the export matrix into a single column. The Philadelphia Study will attempt still another variation by considering an additional matrix which would describe certain intra-regional flows, namely the intra-industrial relationships between one suburban county and the metropolitan area. Figure 2 illustrates this sub-matrix as industries $\hat{A}$,$\hat{B}$,$\hat{C}$, ...

The pertinent qualities of the Philadelphia Study will be: (1) extensive detail in a single, nationally-balanced matrix, and (2) a set of matrices describing the regional and intra-regional flows of goods and services. The manufacturing portion of the Philadelphia economy will be represented by 370 sectors at the four-digit level of the Standard Industrial Classification. The technological coefficients and direct dollar flows of these manufacturing sectors are now completed for the nationally-balanced model,

and it is anticipated that the regional flows will be completed shortly. It is intended that the remaining sectors of the Philadelphia economy will be treated in similar detail. Basic data has been gathered to represent wholesale trade by 20 to 25 sectors, retail trade by approximately 25 sectors, and the construction industry by six sectors. For the remainder of the economy, information is currently being collected for similar detail in order to sufficiently complement the more basic sectors.

Data and information for the Philadelphia Study were obtained from three principle sources: interviews with local businesses; published and unpublished reports from state and federal agencies; and from local governmental sources, chiefly the Penn-Jersey Transportation Study. The local interviews were, by far, the most important source of data. For the manufacturing sectors, the interviews contacted approximately 3000 firms over a period of fifteen months. Of these, returns from 912 firms with detailed information were used to compute the technological coefficients. In addition, less detailed information was utilized from 255 firms. The Penn-Jersey Transportation Study earlier conducted a survey of industrial firms and gathered detailed information which facilitated incorporation into the present study. Table 1 shows the extent of survey coverage for the manufacturing sectors and permits some estimate of the reliability of the final results.

The goal of the survey was to provide information from firms which totalled at least twenty-five percent of the employment in each four-digit SIC category. The sampling procedure was to rank by employment-size all firms in each four-digit category. The next step was to select for interview all those firms with greater than 200 employees. In situations where this first selection did not cover at least twenty-five percent of the

employment in each category, the largest firms were then selected to total the twenty-five percent criterion. The response rate in terms of completed, returned questionnaires averaged about thirty-five percent of the initial selection. One the basis of the responses, the next step was to select the largest firms from the remaining list of firms under 200 employees, until the twenty-five percent criterion was again reached. Depending upon the subsequent responses, this last procedure was repeated several times.

The final stage was the selection of a large number of the remaining small firms in most SIC categories. These were interviewed with a much shortened questionnaire. Since the original sample was biased with large firms, the intent here was to procure information from the vast number of smaller firms in the region. The new questionnaire was shortened so as to ask only selected, strategic questions which were suggested by the earlier responses.

In summary, the sampling procedure might be described as almost a complete inquiry of firms with greater than 50 employees; of course not all of these responded with data for use in the study.

Both questionnaires were designed to be completed by responsible management after being delivered by University personnel. The earlier, longer questionnaire asked for accurate figures from company records, while the shorter questionnaire largely facilitated estimates by management.

This sampling procedure was greatly expedited by the availability of detailed industrial directories compiled by the Pennsylvania Department of Internal Affairs. The directories listed firms by the four-digit SIC and included the employment-size of each firm. In addition, the same State agency provided both published and unpublished data on wages, value of

of production, and value-added for all four-digit SIC categories.

When the interview stage was completed or closed, the next step involved the computation of technological coefficients and total dollar flows or control totals. The principle sources for establishing control totals were: the Pennsylvania Department of Internal Affairs, the local Bureau of Employment Security, and the federal Census of Manufacturers. While the basic survey provided most of the information for the technological coefficients, frequent reference was made to the 1958 national input-output table compiled by the Office of Business Economics. In instances where responses to the local survey were limited, these national values were used as "dummy" entries, particularly so as to comply with the disclosure rule.

There were, as always, many problems encountered in the computation process. A more detailed description of these will be given in a published report. Perhaps the most serious problems were those resulting from the reconciliation of sources, especially when different years were reported, and where different state sources were utilized.

The validity of an input-output table can be discerned in part if a measure of the variance of the technological coefficients is given. For if the table is to be used in an impact analysis, the obvious question of representativeness of the coefficients becomes of paramount importance. To this end, it is desirable to illustrate some of the variations in the coefficients among Philadelphia industries and firms. Table 2 shows technological coefficients for eleven firms representing the fluid milk industry in Philadelphia. Seven of these firms provided detailed information on their manufacturing operations and four firms provided only limited data. These eleven firms of varying size of operation served as the basis

for the Philadelphia technological coefficients. In Table 2 the columns report the ratio of dollar purchases from each industry listed on the left to the total value of production of each firm listed at the top. The last two columns show the aggregated Philadelphia coefficients and the respective coefficients for the entire United States as reported by the 1958 Census of Manufacturers. The relative comparability of production technology for these firms and the industry can be observed, especially for the Dairy Farms row, the total material purchases row, the wages row, and the power row. The most apparent variations among these firms involve the minor purchases, and reflect variations in purchases from similar or related industries. That is, variations in the degree to which some firms purchase materials to be further processed and sold as secondary products, for example, eggs, butter, cheese, etc. It is important to note in Table 2 the limited detail offered by published government sources.

The question of reliability of the regional, Philadelphia coefficients can be further evaluated, in a limited sense, by their comparison with other coefficients. Unfortunately, only the national U.S. coefficients offer a reasonable basis for comparison. Table 3 shows the input-output coefficients for the four Philadelphia industries in the Dairy Products Industrial Group and the respective national coefficients. This table reveals the regional technology of the dairy products industries, and also indicates that in some cases the regional variation can be quite significant, see the butter and ice cream industries.

Table 4, like Table 3, compares the production coefficients for the Meat Products Industry in Philadelphia and the national coefficients. In this industrial group the regional and national characteristics are more alike.

As indicated earlier, the more important characteristics of a regional table are the relationships between the local industries and the non-local industries. Regional impact analysis must obviously identify and assess the local repercussions of economic changes. As an example of the nature of the regional and extra-regional relationships, Table 5 shows two sets of input-output coefficients for the Meat Products Industries: one denoting the local purchases and another denoting the non-local purchases or imports. This table reveals the relatively small volume of local purchases and the great dependence on outside industries. Perhaps this is to be expected for a metropolitan area in the case of the agricultural purchases, but Table 5 suggests that there is importation of products which might be available from local sources. All of the industries listed to the left in Table 5 have representative firms in the metropolitan region.

These differences between the intra-regional and inter-regional purchases are important considerations in industrial development and of great pertinence to location theory. American industry can be characterized by its high degree of specialization and product differentiation. Most manufactured items are available in many different grades and varieties, and each of these different items are manufactured by separate firms to gain certain economic advantages in terms of agglomeration or scale economies. These advantages have been noted in the literature as cheapness, variety, and flexibility of supply.[1] American industry has developed to the point where it has become economically imperative for most firms to have access to an

---

[1] Edgar M. Hoover, Spatial Economics: The Partial-Equilibrium Approach, Center for Regional Economic Studies, Occasional Paper, No. 2, May 29, 1964.

assured and wide range of cheap products. It is suggested that the distance input of traditional location theory now finds expression in terms of communication, and its parameters are measured by speed, efficiency, and convenience.

The large metropolitan agglomerations of people have become synonymous with large, diversified, industrial bases in which the juxtaposition of a large pool of resources becomes an important locational factor. The location of industry thus can be partly explained by the economic advantages accrued through external, agglomeration economies, or Hoover's urbanization economies.[2] This interdependence of industry can be neatly portrayed by the input-output matrix, and together with other techniques could also permit a better understanding of the urbanization, agglomeration economies.

The most detailed input-output table readily available to the researcher is the 192 industry matrix of the U.S. economy for 1947. Inspection of a table at this level of detail reveals a clustering or clumping of entries in the cells of the matrix, evidence of the industrial complex whereby products move in several stages from raw material to final consumption. While industrial linkages are quite apparent at the national level, the nature and extent of the local linkages are not at all clear. To this end it would be instructive to investigate the characteristics of the linkages in the Philadelphia Region.

The following discussion will describe the interindustry relationships of one industrial complex. The intent here is to show the degree to which one industry is dependent upon both local and non-local industries, and, in

---

[2] Edgar M. Hoover, Location Theory and the Shoe and Leather Industries (Cambridge: Harvard University Press, 1937) p. 91.

an overly simplified approach, suggest the pertinence of the role of urbanization economies. The data to be subsequently presented show that industries in the Philadelphia Region purchase a large number and variety of products from local sources; however, these local purchases do not constitute a large proportion of the total inputs. The industries discussed are shown to be dependent upon a single, outside source of supply which constitutes the largest dollar purchase --- the basic raw material --- but also dependent upon the procurement of numerous, small purchases from local sources. The thesis offered is that a large, metropolitan area provides the diversified industrial base to furnish industries a quick and efficient source of supply.

The following analysis is in no way a test for the urbanization economies, but is rather an indication of a direction which research pertinent to this problem might be pursued. Further, the following results, of course, are only significant as indicated by the size of the sample. An articulate test for the urbanization economies must await more extensive research.

The Paper and Paper Products industrial complex is common to many industrial regions, and it is sufficiently specialized in product differentiation to offer a meaningful example. The linkages in the Paper Industry are from raw material to pulp production, to paper and paperboard manufacture, to converted paper and converted paperboard products, to consuming industry, to final consumption. The 1947 interindustry matrix for the U.S. reports the following relationships: the largest material input to the pulp industry was from logging, 29¢ for each dollar of pulp output; the largest material input to paper and board mills was from the pulp industry, 35¢ of pulp for each dollar of ouput of paper and paperboard; and, the largest

material input to the converted paper and paperboard industry was from the paper and board mills, 43¢ of paper and board for each dollar of converted products output. The same relationships are similar for the U.S. for 1958.

In the Philadelphia Region there are numerous firms representing all stages in the Paper Industry Complex, except pulp manufacture. The question of existing linkages then focuses upon the flows of paper from local paper mills to the local converted-paper industries, and the flows of board from the local paperboard mills to the local, converted-paperboard industries.

Table 6 shows the technological coefficients for local and non-local purchases of the Philadelphia paper mills. With pulp being the chief input, and since there are no pulp mills in the Region, the local purchases of Philadelphia's paper mills are seen to be insignificant.

Looking next at the purchases of the converted paper industries, see Table 7, the local purchases are again seen to be insignificant. Although there is considerable production of local paper (as seen in the previous table), local paper converters purchase most of their paper from mills outside the region. On the basis of the Philadelphia Study and sample, while Philadelphia paper mills produce $136 million of paper, Philadelphia paper converting firms purchase $68 million of paper, only $5 million of which are local paper purchases. The comparison of the local and import coefficients in Table 7 illustrate the importance of this extra-local dependence, see for example the comparison of paper purchases (SIC 2621) and total material purchases.

Table 7 also describes the variability among the different industries in the paper-converting category. Through symbols, Table 7 shows that:

(1) most industries purchase little or no local paper,

(2) most industries purchase many products from local sources,

(3) all industries purchase local ink.

(4) most industries purchase local glue, and,

(5) that most industries purchase converted paper products from local sources.

Turning to the linkages in another part of the Paper Industry --- that is the flow of goods from paperboard mills to paperboard converters --- Table 8 compares the local and import coefficients for the paperboard mills. It can be seen in Table 8 that the board mills are much more dependent upon local sources of supply. Thirty-seven percent of the value of all material purchases come from local industries. The principle input to the paperboard mills is seen to be waste paper, the largest portion of which is supplied from local sources. The second most important material input is imported pulp, while other inputs represent both local and imported purchases.

Table 9 describes the interindustry relations for the industries in the Converted Paperboard category, that is, the paperboard containers and boxes. As in the preceding tables, the largest volume of material purchases is imported to these Philadelphia industries. Table 9 shows that the major inputs to the Region's paperboard converters are paper and paperboard, and that the bulk of both of these commodities is imported. This is in spite of significant local production of paper and paperboard. On another point, Table 9 shows that these converters also make many small purchases from a variety of local industries. Many of the individual converted paperboard industries purchase their supply of some commodities completely from local sources, see for example the total local purchases of converted paper and converted paperboard, engraving, plastics, glue, and ink.

As a summary of the preceding discussion, Table 10 is presented. This table is essentially a set of matrices describing the relationships between the paper industries, namely between Philadelphia paper industries and the rest of the U.S. In Table 10 one can compare the magnitudes of the local and import coefficients and observe the volume of local and export sales. This table also reveals several pertinent properties of the linkages of the Paper Industry in Philadelphia.

(1) Most of the purchases of Philadelphia's converted paper industries are paper and paperboard which are imported from outside mills. For example, the converters purchase $10 million of local paper and $59 million of non-local paper, notwithstanding local paper production of $136 million. Further, the converters purchase $5 million of local paperboard and $53 million of non-local paperboard, in spite of local paperboard production of $75 million.

(2) Although most of the converted paper and paperboard products are destined for a whole host of other industries, some production goes to the Paper Industry in general. Table 10 shows that even in these instances the Philadelphia paper firms purchase a substantial proportion of their converted paper and converted paperboard from outside sources. Only in those industries shown with a star does local converted paper and converted paperboard appear as a credit balance.

The preceding tables reveal some interesting information on the locational pulls of the Paper Industry. The paper mills are not raw material-oriented, since the major raw material --- pulp --- is imported; nor are the paper mills market-oriented, since the local paper converters purchase only a small proportion of the total local paper supply.

The same note may be made for the paper and paperboard converters. These firms were seen as not raw material-oriented since the major raw

materials --- paper and paperboard --- were imported; and, Table 10 suggests that the paper and board converters are not strictly market-oriented since the survey reveals that their sales are not completely local. Only two of the nine converted paper and board industries sell more than 50 percent of their products to local industries. The Paper Industry requires many different sources of supply, and, in turn, supplies many different paper converters, who supply many different industries. The great degree of specialization in manufacturing and the highly differentiated flows of commodities require a more refined articulation of location theory.

TABLE 1

Number of Firms and Employees for Philadelphia S.M.S.A.

Manufacturing, Survey Sample and Regional Estimates

SIC	Survey Data Used: Incomplete Questionnaire		Survey Data Used: Complete Questionnaire		Survey Data Used: Total Questionnaire		Other Sources	Total Estab. Used	1959 Regional Estimates		Coverage (Survey)	
	Empl	Estab	Empl	Estab	Empl	Estab	Estab	Estab	Empl	Estab	Empl	Estab
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
20	2,777	21	20,544	59	23,321	80	15	95	52,664	771	44.28	10.38
21	-	-	7	1	7	1	3	4	4,408	20	.16	5.00
22	1,603	25	8,086	71	9,689	96	9	105	37,125	490	26.10	19.59
23	3,181	34	15,502	90	18,683	124	5	129	58,310	1,008	32.04	12.30
24	260	6	813	16	1,073	22	3	25	3,178	199	33.76	11.06
25	254	5	2,552	34	2,806	39	3	42	7,159	267	39.20	14.61
26	1,727	11	8,813	33	10,540	44	1	45	21,892	233	48.14	18.88
27	952	13	17,494	57	18,446	75	2	77	41,104	997	44.88	7.52
28	12,724	19	7,424	45	20,148	64	11	75	33,955	422	59.34	15.17
29	-	-	11,477	12	11,477	12	1	13	15,802	51	72.63	23.53
30	3,348	5	4,415	17	7,763	22	3	25	12,773	151	60.78	14.57
31	52	2	2,238	22	2,290	24	1	25	6,352	108	36.05	22.22
32	2,475	13	5,717	51	8,192	64	10	74	14,507	326	56.47	19.63
33	8,884	10	14,297	40	23,181	50	8	58	37,032	203	62.60	24.63
34	1,826	27	14,325	92	16,151	114	4	123	43,807	932	36.87	12.77
35	1,125	21	29,910	118	31,035	139	7	146	47,927	790	64.75	17.59
36	7,360	18	31,103	47	38,463	65	13	78	56,434	329	68.15	19.73
37	1,987	6	35,264	19	37,251	25	6	31	42,113	108	88.45	23.15
38	2,073	10	5,652	29	7,725	39	1	40	13,692	156	56.42	25.00
39	590	4	2,535	59	3,125	63	7	70	10,369	436	30.14	14.45
Tot	53,198	255	238,168	912	291,366	1167	113	1280	560,603	7997	51.97	14.59

Karaska - Univ. of Pa.

Source: Regional Impact Study

TABLE 2

INPUT-OUTPUT COEFFICIENTS FOR ELEVEN
PHILADELPHIA FLUID MILK FIRMS

Industry Producing		Firm A	Firm B	Firm C	Firm D	Firm E	Firm F	Firm G	Firm H	Firm I	Firm J	Firm K	Phila.	Nat'l.
SIC	Name													
0132	Dairy Farms	.5532	.4708	.4599	.5022	.3531	.4637	.5910					.5047	.4634
0133	Poultry Farms	.0179			.0144	.0129							.0081	
2021	Butter	.0174			.0311	.0160							.0082	
2022	Cheese	.0133											.0057	.0044
2026	Milk		.0309	.1074									.0162	
2033	Fruit	.0227		.0132	.0143								.0105	
2087	Flavoring	.0256		.0382									.0014	
2654	Sanit. Cont'rs.			.0677			.0254	.0274					.0164	.0835
Misc.						.1360	.1349						.0153	.0631
Σ MI		.6501	.5018	.6864	.5620	.5181	.6239	.6184	.5076	.5917	.6093	.5732	.5866	.6164
Wages		.2103	.1603	.1647	.2775	.2489	.2795	.2679					.2005	.1568
Power		.0043	.0072	.0061	.0087	.0156	.0066	.0195					.0063	.0094

Karaska - U. of Pa.

TABLE 3

COMPARISON OF PHILADELPHIA AND NATIONAL
INPUT-OUTPUT COEFFICIENTS FOR THE
DAIRY PRODUCTS INDUSTRIES

Industry Producing		Butter SIC 2021		Cheese SIC 2022		Ice Cream SIC 2024		Fluid Milk SIC 2026	
SIC	Name	Phila	US	Phila	US	Phila	US	Phila	US
0132	Dairy Farms							.5047	.4634
0133	Poulty Farms	.1588						.0081	
2021	Butter	.6649						.0082	
2022	Cheese	.0280			.1294			.0057	.0044
2026	Fluid Milk		.6242	.5519	.5277	.2782	.1457	.0162	
2033	Fruit							.0105	
2062	Sugar Refining					.0423	.0265		
2087	Flavoring					.0823	.0662	.0014	
2499	Wood Prods.					.0001			
2649	Boxes					.0005			
2654	Sanit.Cont'rs.					.0716		.0164	.0835
2819	Ind.Inorg.Chem.					.0004			
Misc.		.0496	.1328		.1151	.0011	.2604	.0153	.0651
Σ MI		.9012	.7570	.5519	.7722	.4767	.4988	.5866	.6164
Wages		.0327	.0413	.1410	.0722	.1521	.1617	.2005	.1568
Power		.0012	.0014	.0209	.0115	.0120	.0115	.0063	.0094

Karaska - U. of Pa.

TABLE 4

COMPARISON OF PHILADELPHIA AND NATIONAL
INPUT-OUTPUT COEFFICIENTS FOR THE
MEAT PRODUCTS INDUSTRIES

Industry Producing		Meat Packing SIC 2011		Sausage & other prepared meat SIC 2013		Poultry SIC 2015	
		Phila	US	Phila	US	Phila	US
SIC	Name						
0133	Poultry Farms					.7987	.6195
0143	General Farms	.7074	.6949				
2011	Meat Packing	.0897	.0612	.4514	.5302		
2013	Sausage & Meats			.3311			
2211	Cotton Fabrics			.0015			
2643	Bags					.0112	
2649	Convert. Paper					.0047	
2651	Boxes	.0077		.0082			
2819	Ind.Inorg.Chem.	.0018					
2899	Chemicals n.e.c.			.0020			
Σ MI		.8067	.8216	.7941	.6865	.8146	.7963
Wages		.0820	.0893	.1206	.1147	.1002	.0852
Power		.0038	.0040	.0058	.0053	.0050	

Karaska - U. of Pa.

TABLE 5

COMPARISON OF LOCAL AND IMPORT COEFFICIENTS
FOR PHILADELPHIA MEAT PRODUCTS INDUSTRIES

Industry Producing		Meat Packing SIC 2011		Sausage & other prepared meat SIC 2013		Poultry SIC 2015	
SIC	Name	Local	Import	Local	Import	Local	Import
0133	Poultry Farms					.0565	.7422
0143	General Farms	.0174	.6900				
2011	Meat Packing	.0089	.0808	.0125	.4389		
2013	Sausage & Meats			.0661	.2650		
2211	Cotton Fabrics			.0000	.0015		
2643	Bags					.0056	.0056
2649	Convert.Paper					.0023	.0024
2651	Boxes	.0036	.0041	.0077	.0005		
2819	Ind.Inorg.Chem.	.0001	.0017				
2899	Chemicals n.e.c.			.0010	.0010		
Σ MI		.0300	.7766	.0874	.7067	.0644	.7502
		3.7 Percent Local		11.0 Percent Local		7.9 Percent Local	

Karaska - U. of Pa.

TABLE 6

COMPARISON OF LOCAL AND IMPORT
COEFFICIENTS FOR PHILADELPHIA PAPER MILLS

SIC 2621

Industry Producing SIC	Name	Local	Import
2611	Pulp	-	.2542
2621	Paper	.0018	.0056
2643	Bags	-	.0331
2651	Folding Boxes	.0099	.0149
2655	Fiber Cans	-	.0051
2753	Engraving	-	.0009
2812	Alkalies	.0017	.0018
2816	Inorg. Pigments	.0008	.0015
2899	Chemicals n.e.c.	-	.0026
Misc.		.0008	.0060
Σ MI		.0151	.3257
Percent Local Purchases of Total Purchases		4.4 Percent	
Sample Firms		2	
Sample $		109,345	
Total $ Phila		136,099	

Karaska - U. of Pa.

TABLE 7

COMPARISON OF LOCAL AND IMPORT COEFFICIENTS FOR PHILADELPHIA CONVERTED PAPER AND PAPERBOARD INDUSTRIES

Industry Producing		SIC 264		SIC	SIC	SIC	SIC	SIC
		Local	Import	2641	2642	2643	2645	2649
SIC	Name							
2211	Cotton Cloth	.0001	.0031				0	
2281	Yarn and Thread	-	.0011					-
2298	Twine	-	.0012					-
2499	Wood Prods. n.e.c.	-	.0008				-	
2621	Paper	.0490	.3291	0	0	0	-	0
2631	Paperboard	.0086	.0001		X	X	0	
2641	Coated Paper	-	.0053				-	-
2651	Folding Boxes	.0035	-		X	X		
2652	Set-Up Boxes	.0026	-				X	X
2653	Corrugated Boxes	.0012	-				X	X
2655	Fiber Cans	.0001	-	X				
2753	Engraving	.0012	-	X	X			
2793	Photoengraving	.0002	-				X	
2815	Dyes and Pigments	.0006	.0012	0				
2819	Ind.Inorg.Chems.	.0006	.0054	0				
2821	Plastics	.0096	.0002			X		-
2891	Glue	.0044	.0028		-	X	X	X
2893	Ink	.0118	-	X	X	X	X	X
3069	Fab.Rubber Prods.	-	.0356	-				
3079	Misc. Plastics	.0001	-				X	
3315	Steel Wire	-	.0008					-
3461	Metal Stampings	-	.0002					-
3554	Paper Machinery	-	.0002				-	
3955	Carbon Paper	-	.0004					-
3964	Needles, Pins, etc.	-	.0002		-			
Misc.		.0084	.0072	0	0	X	X	0
Σ MI		.0997	.4086					
Sample Firms				3	3	2	3	2
Sample $				6,623	8,492	5,371	1,586	3,168
Total $ Phila				42,944	9,841	23,012	6,045	52,071

X = Completely Local Purchases
0 = Some Local Purchases
- = No Local Purchases

Karaska - U. of Pa.

TABLE 8

COMPARISON OF LOCAL AND IMPORT COEFFICIENTS
FOR PHILADELPHIA PAPERBOARD MILLS

Industry Producing SIC	Name	Local	Import
		SIC 2631	
2611	Pulp	-	.1073
2631	Paperboard	-	.0616
2819	Ind. Inorg. Chem.	.0033	.0300
2891	Glue	.0003	.0045
2893	Ink	.0050	.0076
4941	Water	.0041	-
9926	Waste Paper	.1535	.0889
Misc.		.0035	-
Σ MI		.1699	.2948
Percent Local Purchases of Total Purchases		36.56 Percent	
Sample Firms		3	
Sample $		39,372	
Total $ Phila		74,835	

Karaska - U. of Pa.

TABLE 9

COMPARISON OF LOCAL AND IMPORT COEFFICIENTS FOR PHILADELPHIA PAPERBOARD CONTAINERS AND BOXES INDUSTRIES

Industry Producing		SIC 265		SIC	SIC	SIC	SIC	SIC
		Local	Import	2651	2652	2653	2654	2655
SIC	Name							
2046	Starch	-	.0039			-		
2298	Twine	.0001	.0003			0		
2621	Paper	.0055	.1643	0	0	-	-	
2631	Paperboard	.0138	.2870	0	0	0	-	-
2641	Coated Paper	-	.0078			-		-
2645	Die Cut Pap.& Board	.0010	.0002	0				
2649	Paper & Board nec	.0007	-					X
2653	Corrugated Boxes	.0072	.0037	X			0	
2654	Sanit. Contrs.	-	.0001				-	
2753	Engraving	.0027	-	X		X		
2819	Ind.Inorg.Chems.	-	.0013			-		
2821	Plastics	.0003	-	X				
2891	Glue	.0089	.0033	0	X	0	0	-
2893	Ink	.0064	.0054	0		0	X	
2911	Petrol.Refining	.0002	.0004				0	
3351	Copper Wire	.0001	.0004			0		
3352	Aluminum Wire	-	.0002					-
Misc.		.0581	.0006		X	0		
Σ MI		.1042	.4797					
Sample Firms				3	2	5	2	2
Sample $				7,198	2,543	37,813	7,768	983
Total $ Phila				41,742	13,861	98,406	15,092	7,861

X = Complete Local Purchases
0 = Some Local Purchases
- = No Local Purchases

Karaska - U. of Pa.

TABLE 10

LOCAL AND IMPORT COEFFICIENTS AND DOLLAR FLOWS FOR PHILADELPHIA PAPER INDUSTRIES

Industry Producing	Industry Purchasing SIC 2621	SIC 2631	SIC 2641	SIC 2642	SIC 2643	SIC 2645	SIC 2649	SIC 2651	SIC 2652	SIC 2653	SIC 2654	SIC 2655	Total Local Sales to Paper Inds. $000 a/	Exports of Phila. Paper Ind. to Rest of Phila. & Rest of World $000	Total Sales $000	Percent Sales Local
SIC LOCAL																
2621	.00185		.11370	.05514	.00112	-	.03613	.00779	.09899	-	-		9,847	126,252	136,099	
2631		-		.00294	.01109	.08098		.02338	.17607	.00418	-	-	4,598	70,237	74,835	
2641						-	-			-		-		47,944	47,944	19%
2642														9,841	9,841	76%
2643	-													23,012	23,012	19%
2645								.00820					342 *	5,703	6,045	41%
2649			-									.03822	300 *	51,771	52,071	49%
2651	.00990			.00359	.00876								1,583	40,159	41,742	21%
2652						.01370	.01602						916 *	12,945	13,861	34%
2653						.00478	.00566	.04168				.01360	2,269 *	96,137	98,406	74%
2654												-			15,092	
2655	-		.00020										10	7,851	7,861	30%
IMPORT													Total Import a/ Purchases $000			
2621	.0056		.21397	.42174	.46199	.02427	.14741	.03118	.08327	.22784	.02599		58,873			
2631		.0616		-	-	.00193		.31248	.06277	.24434	.55572	.20067	52,545			
2641						.08551	.00467			.00660		.19112	2,907			
2642													0			
2643	.0331												4,505			
2645								.00180					75			
2649												-	0			
2651	.0149			-	-								2,028			
2652						-	-						0			
2653						-	-	.00231			.02482		471			
2654											.00037		6			
2655	.0051		-										694			

a/ Sum of respective row.

Karaska - U. of Pa.