

# THE PRIMARY, SECONDARY, TERTIARY AND QUATERNARY SECTORS OF THE ECONOMY

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The recognition of differences among the major sectors of the economy, such as agriculture, commerce, or manufacturing, has a considerable tradition in economic thinking. Also, there is evidence that important national and international predicaments of our time are closely related to sectoral-structural developments. Yet economists in the developed countries are often disinclined to study the shifts among the megasectors.

This paper suggests that an intensified study of the topic may be profitable. In order to support this proposition it first reflects on the traditions of sectoral emphasis in literature. Second, it considers the evidence for the ascendancy of the quaternary activities. Third, it deals with the input-output relations among the four megasectors of the economy. Thereafter it points to the emergence of potential inefficiencies among quaternary activities and raises the possibility of a megasector misequilibrium. Finally it outlines certain connections to the thoughts of Leontief and Sraffa; considers services in the neoclassical framework; explores the relationships to institutional thought; and ponders the extension of its basic hypothesis to the developing nations, the socialist countries, and to historical analysis.

## INTRODUCTION

The ascendancy of service output for the 20th century and its growing share in total activity is as important an economic development as the industrial revolution and the growing share of manufacturing were for the preceding two centuries. The transition from preponderantly agricultural to industrial economies involved much economic, social and cultural stress within and among nations; it would be naive for our age to expect a smooth transition to the service economies in this and the next century. Many economic problems of our times are apparently related to the sectoral structural shifts in modern economies and therefore this topic deserves intensified study.

In particular we should understand better the input-output relationships of the key sectors; the economic inefficiencies that may be related to sectoral-structural adjustment problems; and the challenges to economic thinking posed by this major transformation of the world economy.

## I. THE TRADITIONS OF SECTORAL EMPHASIS

Unfortunately economists in the developed countries today are often disinclined to research the major sectoral-structural characteristics of production and even to accept the existence of analytically useful industrial distinctions among the main sectors of the economy.<sup>1</sup> Yet, making industrial distinctions among

\*The views expressed in this paper are those of the author and do not necessarily represent those of the Board or the staff of the Federal Reserve System.

<sup>1</sup>In the developing countries, and in the socialist economies, the sectoral structure of their economies is more often analyzed mainly because of the needs felt for industrialization and the often backward state of agriculture.

sectors has a considerable tradition in economic thinking. Such thoughts may have been flawed, but nevertheless may have contained certain kernels of truth. A search for these may be profitable.

The relative characteristics of major economic sectors, such as agriculture, commerce and manufacturing, have been pondered by the mercantilists and the physiocrats and since Sir William Petty's time eminent economists have often devoted effort to evaluating the impact of shifts among major economic sectors. The relative neglect of the subject in the last two decades is almost unprecedented.

The notion that different major economic sectors and activities may be of varying importance for overall economic activity and well-being goes back to preceding millenia. For example in ancient China usually four basic classes or categories of people were recognized, and among these, persons involved in agriculture were ranked higher than agents of commerce.<sup>2</sup>

In ancient Greece one finds similar distinctions in Aristotle, who accepted agriculture and household management as honorable, but frowned upon certain other activities such as trade and deplored moneylending because it involved usury. Scholastic tradition in Medieval Europe followed in the footsteps of Aristotle and canon law outlawed usury and denounced trade as a sinful occupation. "The scholastic Doctors extolled agriculture as an occupation leading to virtue, but shared all the prejudices of Aristotle and of the Church Fathers against trade."<sup>3</sup> In later times Francois Quesnay in the famous *Tableaux Economiques* (about 1756) suggested that the net product of society was produced by the productive class (engaged in agriculture, fishing and mining), while the proprietary class (such as landowners) and the sterile or artisan class could serve public purposes and at best would recover its outlay. In his scheme "the expansion of the economy and the population therefore depended upon expansion of the expenditure of the productive class and the resultant expansion of the net product."<sup>4</sup>

In England, well before Quesnay, already in 1691 Sir William Petty concluded that "There is much more to be gained by *Manufacture* than *Husbandry*; and by *Merchandise* than *Manufacture* . . ."<sup>5</sup> But in 1951, some 260 years later, Colin Clark correctly lamented "that most of the world still remains quite unaware of the significance of Petty's brilliant and entirely correct generalization made from

<sup>2</sup>Among those who performed physical labor, farmers were held to be the most productive and therefore their status came next to that of scholars. Artisans and merchants, whose efforts were considered less productive, had an unfavorable position and were looked down upon by society, especially by the intellectuals." Slaves, prostitutes, entertainers, music players—depending on regional definitions—"were considered non-productive and as making the least contribution to society." T'ung-Tsu Ch'u "Chinese Class Structure and Its Ideology," in John K. Fairbank, *Chinese Thought and Institutions*, the University of Chicago Press, 1973, p. 247 and p. 249. We also know of the Edict of Emperor Wen on the Primacy of Agriculture in 163 B.C. and of other references regarding the encouragement of agriculture. See *Introduction to Oriental Civilizations*, Sources of Chinese Tradition, Vol. I. Chapter IX, The Economic Order, Columbia University Press (New York, 1960).

<sup>3</sup>Raymond de Roover, Ancient and Medieval Thought in *International Encyclopedia of the Social Sciences*, Volume 4, p. 432.

<sup>4</sup>Joseph J. Spengler, Physiocratic Thought in *International Encyclopedia of the Social Sciences*, Volume 4, p. 444.

<sup>5</sup>In Colin Clark, *The Conditions of Economic Progress*, London, MacMillan and Co., Ltd., 1951, p. 395.

the scanty facts at his disposal in 1691; and that many concerned with economic policy still act as if they too were entirely unaware of what might be called, in all fairness, Petty's law."<sup>6</sup>

Differences felt regarding the overall contribution of various types of economic activities (or sectors) one way or another influenced the teachings of the classical 19th century economists. Adam Smith, David Ricardo, Karl Marx, John Stuart Mill, and others essentially accepted the doctrine of "material production" which distinguished productive and non-productive activities on the basis of their proximity (direct involvement) in the creation of physically tangible output. The so-called historical school in Germany, on the other hand, took a broader stance. Friedrich List, for example, "considered education, administration and communication to be historically important productive forces" as well.<sup>7</sup> It is interesting that the work of List intellectually lead to the stages-of-growth thinking of later times. Katouzian suggests that "List's descriptive scheme of Agricultural, Agricultural-and-Manufacturing and Agricultural-Manufacturing-and-Commercial stages of economic development can now be explained in terms of the Primary, Secondary, Tertiary stages associated with the names of Allan G. Fisher, Colin Clark and Simon Kuznets."<sup>8</sup>

The comprehensive concept of production became the prevailing one, especially after Alfred Marshall's *Economics of Industry* was published in 1879. And modern national accounting in the Western world has been based on the comprehensive concept, except in the work of the Hungarian statistician Frederic Fellner (1869-1944); and, of course, the national income calculations of the U.S.S.R. and other socialist countries were based on the Marxian concept.

In the middle of the twentieth century the importance of the growth of primary, secondary and tertiary industries, and of the shifts among them, were given prominence by Colin Clark in his famous work *The Conditions of Economic Progress*. Regarding the terminology itself Clark informs that

"the term tertiary industries was originated by Professor A. G. B. Fisher in New Zealand, and became widely known through the publication of his book, *The Clash of Progress and Security*, in 1935. It took its origin from the titles current in Australia and New Zealand of 'primary industry' for agriculture, grazing, trapping, forestry, fishing and mining, and 'secondary industry' for manufacture. In Australia and New Zealand these terms are not only used in statistical reference books but are widely current in popular discussion. The phrase 'tertiary industries' therefore immediately carries, in these countries, a suggestion of those excluded by the official definition of 'secondary industries.'"<sup>9</sup>

<sup>6</sup>Clark, *op. cit.*, pp. 395-396. In the third edition in 1957 Clark, though extensively praising Petty's contribution on the subject, did not use the term "Petty's Law."

<sup>7</sup>Theo Suranyi-Unger, *The Historical School in International Encyclopedia of the Social Sciences*, Volume 4, p. 455.

<sup>8</sup>Homa Katouzian, *Ideology and Method in Economics* (New York University Press, New York and London, 1980), p. 37.

<sup>9</sup>Colin Clark, *The Conditions of Economic Progress*, Third Edition (MacMillan, London, 1957), p. 490.

Among 20th century researchers Simon Kuznets has been recognized as a foremost authority in this field of study. Kuznets, in his study "Toward a Theory of Economic Growth" summarized certain findings, based on the review of long-term changes in the structure of production in the U.S. and abroad. The first was, of course, the shift away from agriculture, as economic growth accelerated. Beyond that, he wrote in the early 1950s "For the more advanced countries. . . we should also note some significant trends in the distribution of the non-agricultural sectors proper. The shares of mining and manufacturing in the total labor force grew significantly, but the increases have ceased or slowed down during the recent decades. The shares of the transportation and communications industries in the labor force also grew but became stable after World War I or even before; . . . The shares of trade and other service industries, a miscellaneous group including business, personal, professional, and government services, have grown steadily and have continued to grow in recent decades."<sup>10</sup> The basic thrust of Kuznets' finding apparently remained relevant for the 1960s and the 1970s as well and the many analytical points made by Kuznets continue to deserve close attention.

However here our aim is not to review the existing literature, which includes several seminal works by Leontieff, Fuchs and others. Rather we only recall the sometimes neglected fact that earlier economists, for several generations, paid considerable attention to sectoral-industrial problems. The earlier contributions usually focussed on: (a) the importance of key sectors in various historical epochs, (b) the delineation of productive from nonproductive labor, and (c) the identification of stages of economic growth. Intellectual efforts in these areas were not unrelated to each other, but these broad topics were usually dealt with in somewhat separate settings. Sectoral emphasis was mostly found in studies of economic development and planning; the lines between productive and nonproductive activities were usually elucidated by national accountants; and the stages of economic development were discussed in the framework of economic growth theories.

The existence of a wide range of earlier literature relevant to the sectoral-structural issues reflects the existence of underlying real economic problems. It would be difficult to imagine that the earlier thinkers' efforts were purely academic in nature, with no connections to practical problems. On the broadest plane an argument can be made that the emphasis first placed by early thinkers on agriculture, then by economists of the first half of the nineteenth century on materials production which also covered manufacturing and finally by most representatives of the economics profession since the second half of the last century on the comprehensive concept of production (which extended the scope of production to services as well) corresponds to the successive expansion of the nonagricultural activities in the Western economies.

It is a loss that the sensitivity of the earlier economists to the overall significance of the differences in the major production sectors of the economy is

<sup>10</sup>Kuznets (1968), p. 25 (W. W. Norton, New York, 1968). First published in 1965 in his *Economic Growth and Structure* (W. W. Norton, 1965), and written in the 1950s.

a trait that has mostly vanished from contemporary economics. Rather we should relearn some of their sensitivity in order to understand better the economic shifts of our own century and the structural perspective of the 21st.

## II. THE ASCENDANCY OF QUATERNARY ACTIVITIES

Two general propositions basic to the study of sectoral problems are: First, that the primary, secondary, tertiary, and quaternary activities of the economy are sufficiently different from each other to permit their separation and comparative analysis; and second, that the overall growth rate and the efficiency performance of the economy are influenced by changes in the relative importance, contribution, and input-output relationships of these four main sectors. In the setting of the U.S. economy and statistics the four major activities and sectors of the economy are postulated as follows:

<i>Name</i>	<i>SIC Major Group</i> <sup>11</sup>
<b>PRIMARY ACTIVITIES</b>	
Agriculture, forestry and fishing	01, 02, 07, 08, 09
Mining	10, 11, 12, 13, 14
<b>SECONDARY ACTIVITIES</b>	
Construction	15, 16, 17
Manufacturing	20 through 39
<b>TERTIARY ACTIVITIES</b>	
Transportation, electric, gas and sanitary services	40 through 49
Wholesale trade	50, 51
Retail trade	52 through 59
<b>QUATERNARY ACTIVITIES</b>	
Finance, insurance, and real estate	60 through 67
Services	70, 72, 73, 75, 76, and 78 through 89
Public administration	91 through 97

Simon Kuznets, in terms of broadest groupings, focused on only three key sectors: agriculture, industry, and services. However what he said about these three sectors we can apply as criteria for the selection of broad groupings in general: "The three major sectors do differ significantly from each other—in the use of natural resources, in the scale of operation of the productive units common to each, in the production process in which they engage, in the final products that they contribute, and in the trends in their shares in total output and resources used."<sup>12</sup>

<sup>11</sup>For the coverage of each category see *Standard Industrial Classification Manual* 1972, Executive Office of the President, Office of Management and Budget (U.S. GPO, Washington, D.C., 1972).

<sup>12</sup>Simon Kuznets, *Modern Economic Growth* (Yale University Press, New Haven, 1973), p. 87.

While adhering to the six main criteria emphasized by Kuznets here we return to schemes which suggest somewhat a “stage of processing” classification. Thus the terms primary, secondary, tertiary and quaternary<sup>13</sup> are applied, the fourth of which is not common in earlier literature.<sup>14</sup>

The available data for the U.S. suggests that the most outstanding feature of the sectoral shifts in the 20th century was the ascendancy of the quaternary sector of the economy. The distribution of output by the four main sectors of the U.S. economy, in 1947, 1969, 1979 and 1982 is shown below in terms of the Gross National Product by industry:

SECTORAL SHARES IN U.S. GNP  
(PERCENTAGE, CALCULATED FROM DATA IN 1982 DOLLARS)

Sector	1947	1969	1979	1985
Primary	11.5	8.0	6.6	6.2
Secondary	28.4	29.8	27.7	26.6
Tertiary	24.2	23.2	25.6	26.5
Quaternary	36.0	39.0	40.2	40.8

*Source:* Survey of Current Business, April 1986, p. 25. Because of rounding the components do not aggregate to 100.

The very large, and still increasing, proportion of the quaternary sector is clearly visible in the table. It should be mentioned that the growth in the share of the quaternary sector is not due to an increased significance of government, which had a share of 14.6 percent in 1947, 14 percent in 1969, 11.9 percent in 1979 and 11.2 percent in 1985. Comparable data for 1929 are not available, but the share in national income without capital consumption adjustment (calculated in current, not in 1972 dollars) for the primary sector was about 12, the secondary sector 30, the tertiary sector 26 and the quaternary sector 31 percent.

The preponderance of the service sectors in the U.S. economy is perhaps most pronounced in terms of developments in employment. In a recent study, Thomas J. Plewes emphasized the “Since 1920, the service producing share of nonagricultural employment has gone from 53 percent to 72 percent . . . . Over the past two decades, some 86 percent of job growth in the economy has occurred in the service-producing sector.”<sup>15</sup> As a matter of fact the importance of “service type” activities—particularly of the quaternary sort—should not be considered only by the magnitude of the sectors that specialized in these lines of endeavor.

<sup>13</sup>The importance of subdividing the large service sector—which contains industries that vary widely by growth rates, capital intensity and productivity growth—into further groups can be seen from the article by R. E. Kutscher and J. A. Mark, “The Service-Producing Sector: Some Common Perceptions Reviewed” in *Monthly Labor Review*, April 1983, pp. 21–24.

<sup>14</sup>In more recent times Herman Kahn used such a category. Professor Daniel Bell called the attention of the author to a neglected earlier article by Nelson N. Foote and Paul K. Hatt, “Social Mobility and Economic Advancement”, *American Economic Review*, May 1953, pp. 364–377. In it the term quaternary and quinary are utilized for economic megasectors. However in their classification the tertiary sector covers personal and related services; the quaternary includes transport, commerce, communication, finance and administration; and the quinary sector extends to medical care, education, research, recreation (including the arts).

<sup>15</sup>*Monthly Labor Review*, November 1982, p. 8.

An important part of these activities can be found in the "non-service type" sectors such as manufacturing, mining and agriculture.

It will be remembered that the industrial classification of establishments is determined on the basis of their main line of activity. If their main line of activity happens to be manufacturing, outputs related to their other lines of activities are still shown under manufacturing. There may be exceptions regarding large and separate headquarter facilities of corporations, etc.—but as a rule the main line of a given establishment determines its place in the statistics on industrial structure. At the same time manufacturing data suggest that the distribution of blue collar and white collar employment in this sector has shifted towards the latter.

#### EMPLOYMENT IN U.S. MANUFACTURING

Year	Million Persons	Percent of	
		Production Workers	Other Employees
1909	7.7	81.9	18.1
1919	10.7	80.5	19.5
1929	10.7	80.0	20.0
1939	10.3	80.9	19.1
1947	15.5	83.6	16.4
1959	16.7	75.6	24.4
1969	20.2	73.2	26.8
1979	21.0	71.6	28.4
1981	20.2	70.1	29.9
1986 December	19.2	68.0	32.0

*Source:* Historical Statistics of the U.S., Colonial Times to 1970, Part I, pp. 137-138<sup>13</sup> and NIH, Labor Statistics Data Base. BLS employment release, January 1987.

One can see major changes in this respect in the total economy as well. For the economy as a whole between 1900 and 1980 the total number of occupied persons grew about 3.5 times, while in white collar workers there was about a tenfold increase.

#### MAJOR OCCUPATION GROUPS IN THE U.S.

	1900		1960		1970		1980	
	Million	%	Million	%	Million	%	Million	%
White collar workers	5.1	17.6	28.5	43.3	38.0	48.3	51.9	52.3
Manual workers	10.4	35.9	24.1	36.6	27.8	35.3	31.5	31.7
Service workers	2.6	9.0	8.0	12.2	9.7	12.3	13.2	13.3
Farm workers	10.9	37.6	5.2	7.9	3.1	3.9	2.7	2.7
Total	29.0	100.0	65.8	100.0	78.7	100.0	99.3	100.0

*Source:* Statistical Abstract of the United States, 1982-83, p. 386 for 1960, 1970 and 1980 and Historical Statistics of the U.S., from Colonial Times to 1970, Part 1, p. 139, for 1900. Due to rounding components do not necessarily add to total. Categories considered broadly informative but not strictly comparable over time.

### III. INPUT-OUTPUT RELATIONS AMONG THE FOUR SECTORS

Ideally the changes in the relationships among the four main sectors of the economy ought to be analyzed in terms of comparable input-output tables over longer periods. In the following preliminary results are shown for a comparison of three four-sector U.S. input-output tables pertaining to 1967, 1972 and 1977. While these tables are preliminary in nature, they indicate certain specific characteristics for the four sectors highlighted in them.

INPUT-OUTPUT RELATIONSHIPS BY FOUR MEGASECTORS IN THE U.S. ECONOMY

Matrix of technical coefficients					Matrix of total requirements			
1967								
IO	SEC1	SEC2	SEC3	SEC4	SEC1	SEC2	SEC3	SEC4
SEC1	0.23240	0.06844	0.01314	0.00802	—	—	—	—
SEC2	0.13963	0.39496	0.07921	0.10828	1.33953	0.15979	0.03868	0.03412
SEC3	0.06573	0.07900	0.12758	0.05333	0.36216	1.74009	0.19017	0.22829
SEC4	0.09866	0.05703	0.10216	0.11751	0.14533	0.17883	1.17571	0.09432
IMPT5	0.03558	0.02393	0.01005	0.00694	0.18999	0.15101	0.15271	1.16264
					0.05911	0.05017	0.01880	0.01569
1972								
SEC1	0.22866	0.06750	0.01584	0.00750	1.33053	0.15589	0.04250	0.03194
SEC2	0.13238	0.38765	0.07930	0.10189	0.33615	1.71860	0.19002	0.21320
SEC3	0.06325	0.08538	0.12899	0.05319	0.14069	0.18979	1.18010	0.09444
SEC4	0.09264	0.06322	0.11213	0.11942	0.18202	0.16394	0.16838	1.16631
IMPT5	0.04241	0.02980	0.01034	0.00795	0.06934	0.06108	0.02100	0.01795
1977								
SEC1	0.15162	0.08171	0.02849	0.00251	1.21471	0.16694	0.06336	0.02055
SEC2	0.15223	0.36455	0.11282	0.07239	0.32795	1.66227	0.24251	0.15059
SEC3	0.05572	0.09271	0.12215	0.04609	0.11902	0.19276	1.17723	0.07796
SEC4	0.07744	0.04651	0.10629	0.12128	0.13880	0.12601	0.16082	1.15723
IMPT5	0.16298	0.06833	0.01553	0.01001	0.22362	0.14505	0.04679	0.02643

The aggregation of the 85 sector U.S. input-output tables into the primary, secondary, tertiary and quaternary sectors selected for this paper was carried out by Sheldon Cheng, who also calculated the technological coefficients, inverse matrices and other comparative tables for these periods for the aggregated tables.

One of these is the considerably higher share of value added in the tertiary and quaternary sectors, in comparison with the similar shares for the primary and secondary sectors. Conversely, the shares of intermediate inputs (gross output minus value added) is highest in the secondary sector, followed by the primary sector. Both the tertiary and quaternary sectors show much lower shares for intermediate inputs than do the primary and secondary sectors.

SHARES OF VALUE ADDED AND INTERMEDIATE INPUTS (PERCENT)

Sector	1967		1972		1977	
	V.A.	Interm. inputs	V.A.	Interm. inputs	V.A.	Interm. inputs
Primary	42.80	57.20	44.07	55.93	40.00	60.00
Secondary	37.67	62.33	36.65	63.35	34.62	65.38
Tertiary	66.79	33.21	65.34	34.66	61.47	38.53
Quaternary	70.59	20.41	71.00	29.00	74.44	25.77

The total requirement coefficients (based on both direct and indirect demands for inputs) are the highest, in the aggregate, for the secondary sector, followed closely by the primary sector. The tertiary and quaternary sectors both have markedly lower total requirement coefficients than the primary and the secondary sectors. Therefore the indirect (and thus the total) effects of identical amounts of output increases are different if they occur in the quaternary sector rather than in the secondary sector.

Other indicators, such as capital equipment per worker and energy use by employee, are also expected to show differences by these four broad sectors. One could even assume that the overall demand for credit, and other monetary magnitudes, may also be influenced by the changes in the composition of output by major sectors.

Studies of available U.S. and international data have consistently shown that in our century important sectoral shifts can be observed economies located on all continents. Indeed the relative size of the agricultural sector and the problems of industrialization became key issues in development economics. The seminal quantitative studies of Simon Kuznets threw much new light on the relationship between aggregate growth and production structures. Kuznets has shown that cross-section data across countries as well as experience with time series for individual nations show rather pronounced patterns of sectoral relationships in connection with economic development.

World Bank data are available on the average annual growth rates for the 1960-70 and 1970-79 periods for three key sectors (agriculture, industry and services) for large groups of countries classified as low income, middle income, and industrial market economies.<sup>16</sup> These data show the percentage shares of output originating in the three sectors for each grouping of countries for 1960 and for 1979. The high, and still growing, international importance of services is evident from these data, as is the slowdown in economic growth in the industrial market economies from the decade of the 1960s to the decade of the 1970s. Without going into the details, one can say that Kuznets' earlier findings regarding the pattern of production were broadly confirmed by the experience gathered in the last two decades and the data on new countries and longer time periods broadly support the earlier evidence on sectoral shifts along the path of economic development. The literature on the subject has grown considerably in the last two decades and the reader is referred to Chenery's works and the other sources of current economic literature on the subject.<sup>17</sup>

The preceding review of the three aggregative U.S. input-output tables suggests that the distinction between the primary, secondary, tertiary and quaternary areas of the economy is statistically feasible and analytically advantageous. These four main types and sectors of economic activity are apparently anchored to four major elements of the work process: *extraction, processing, delivery*, and

<sup>16</sup>For a listing of the countries involved, and other details, see *World Development Report 1981*. Published for the World Bank by Oxford University Press, 1981.

<sup>17</sup>Hollis Chenery, *Structural Change and Development Policy*, published for the World Bank by Oxford University Press, 1979, contains much valuable information on economic growth and structural change, the process of industrialization and other related topics. It also has a very useful list of references on pp. 497-514.

*information*. Production, even if specialized, usually is related to all four aspects of the process. Little economic output is conceivable without *extraction* since very few activities are completely “material-less,” even if their aim is to provide a predominantly non-material service: paper, electricity, and other material inputs are almost always present, even if their value within the total is small. Similarly production almost always need inputs from *processing*—not even the results of primary activities such as mining or agriculture lend themselves to final use without some amount of processing. *Delivery* involves both the delivery of goods and the delivery of persons: the combination of the factors of production requires a great deal of transportation and also the involvement of wholesale and retail trade to get the various items to their markets. Finally, *information* is the designation used for measurement, recordkeeping, accumulation, and dissemination of knowledge and of decisions.<sup>18</sup> Even simple acts within the production process will have relations to all four of these activities and in this sense all four have been in existence for ages. With increasing specialization in skills the division of labor has led to professions and establishments dedicated to the pursuit of predominantly extracting type of activities (such as in mining or agriculture); to establishments involved mainly in the processing (manufacture) of goods extracted in mining and agriculture; to entities specialized in delivery of the factors and the results of work (in trade and transportation of goods and persons); and finally to institutions of learning, healing and decision making which have information (in the broad sense of the word) of the center of their attention. Earlier ages have also seen specialized professions and even institutions devoted mainly to the cultivation of only one of these four major aspects of work. But in our age the division of labor has advanced much further than at any time before and in the 20th century particularly fast growth occurred in the information-related specialized activities, which was manifested in the spectacular growth of the service sectors of the modern economy.

#### IV. POTENTIAL INEFFICIENCIES IN QUATERNARY ACTIVITIES

In studying the apparently weaker overall performance of several Western economies during recent years, the quaternary sector and quaternary activities in general offer a legitimate target of inquiry. Given their very large share in the total, it would be unwise to overlook the potential—always present in every sector—for economic inefficiencies in the quaternary areas.

In simplest terms one could think about a comparison of the benefits, and the pitfalls, related to quaternary ascendancy and the accompanying spread of “white collar” jobs in the economy. This comparison would probably reveal how the increased share of white collar work contributed to the spread of modernized technological process, to higher management standards, to better recordkeeping and administration and to improvements in the work-place in general. At the same time it may also show the dangers and potential costs of growing bureaucratization.

<sup>18</sup>The word “information,” in information theory, is understood to reduce or eliminate uncertainty regarding an event; in this sense management, and the decisions taken in the management process, are components of information.

Unfortunately the thorough investigation of costs and benefits is hampered by many data difficulties. These still exist despite governmental and private efforts for data improvement and notwithstanding long and extensive effort by the National Bureau of Economic Research to investigate a number of aspects of the sectoral shifts in the U.S. economy. Early postwar efforts involved eminent representatives of economics including Milton Friedman, Solomon Fabricant, George Stigler, John Kendrick, and others.<sup>19</sup> A major NBER step was the publication in 1968 of the previously mentioned book by Victor Fuchs on services. One of the important findings was the often inadequate statistical basis on which to perform satisfactory analysis of service activities.

Victor Fuchs, in the Preface of his 1968 book, underlined that “The Service sector, also known as the ‘tertiary’ or ‘residual’ sector, has long been the stepchild of economic research. This was unfortunate but tolerable during the 19th and early 20th centuries” but “the emergence of this country as the first ‘service economy’ has created a new set of priorities for economic research.”<sup>20</sup> In the summary of his findings Fuchs stated that “The United States is now pioneering in a new stage of economic development. During the period following World War II this country became the world’s first ‘service economy’—that is, the first nation in which more than half of the employed population is not involved in the production of food, clothing, houses, automobiles, or other tangible goods.”<sup>21</sup> In his book Fuchs explored three principal hypotheses: “(1) a more rapid growth of final demand for services; (2) a relative increase in the demand for services; and (3) a relatively slow increase in output per man in services.”<sup>22</sup> He strongly urged the development of more statistical information for the service sector: “We need more analysis, but we also need the factual basis that will make the analysis more fruitful.”<sup>23</sup> The need for further statistical work on the service sector is still pressing in the 1980s and is well understood by the U.S. statistical agencies. In a study published in November 1982, an Assistant Commissioner of the U.S. Bureau of Labor Statistics emphasized that “In view of both the increasing importance of the service-producing sector and the shortcomings in the current statistical measurement system, improvement in the data for this sector takes on a very high priority in the Bureau’s plans for survey modernization.”<sup>24</sup>

A project under the aegis of the National Research Council (whose members are drawn from the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine in the United States) recently led to a comprehensive report on the many statistical needs which still exist for various

<sup>19</sup>Milton Friedman and Simon Kuznets, *Income from Independent Professional Practice* (New York, NBER, 1945); Solomon Fabricant (assisted by Robert E. Lipsey), *The Trend of Government Activity in the United States Since 1900 Economy Since 1869* (Princeton University Press for NBER, 1955); George J. Stigler, *Trends in Employment in the Service Industries* (Princeton for NBER, 1956); *Employment and Compensation in Education* (New York, NBER, 1950); *Domestic Servants in the United States 1900-1940* (New York, NBER, 1946); John W. Kendrick, *Productivity Trends in the United States* (Princeton for NBER, 1961).

<sup>20</sup>Fuchs, *op. cit.*, p. xxiii.

<sup>21</sup>Fuchs, *op. cit.*, p. 1.

<sup>22</sup>Fuchs, *op. cit.*, p. 3.

<sup>23</sup>Fuchs, *op. cit.*, p. 13.

<sup>24</sup>Thomas J. Plewes, “Better Measures of Service Employment Goal of Bureau Survey Redesign,” *Monthly Labor Review*, November 1982, p. 15.

service sectors.<sup>25</sup> This report quotes the statement of the Coalition of Service Industries, which maintains that the available statistical indicators “do not adequately reflect the dominant role of service in our economy. We do not gather data on services anywhere equivalent to the data we accumulate on other kinds of economic activity.”<sup>26</sup> And the detailed investigation of the authors confirmed the existence of numerous gaps and needs for improvements in the statistics of such industries.

It stands to reason that the statistical limitations for the service sectors are in and of themselves potential sources of inefficiencies. The organization, the goal-setting, the evaluation of service activities—whether by public or private organizations—are surely handicapped by our relative lack of measurements of the quantitative and qualitative performance of these industries. The measurement of gross product originating in the service sectors (Gross National Product or Gross Domestic Product by industrial origin) is also affected by the relative paucity of statistics for these fields.

In addition to simple lacunae in the industrial and aggregate sectoral data, which in themselves can be a cause of inefficiencies, there are major definitional-methodological issues which are of particular concern for the measurement of services. Economists, statisticians and national accountants, for example, have been struggling with the determination of the boundaries of production and the delineation of *final* use of goods and services from their intermediate use for over a century. Simon Kuznets suggested that “The possibility that conventional national economic accounting treats some outputs that are really the costs of production as final rather than as *intermediate* products required serious scrutiny.”<sup>27</sup> Kuznets’ explanation of this problem touches on a broad complex of issues. First “it must be recognized that urban life required more resources to satisfy the countryside level of wants for food, sanitation, recreation, transportation from home to job, and so on.”<sup>28</sup> A second factor is that “the greater complexity of industrial and other economic units may have required larger inputs into governmental regulation and adjudication.”<sup>29</sup> As a result of these two important trends—and some other factors—“many of these extra outlays, extra inputs of real resources, appear in national economic accounts under either household or government consumption, and are treated as *final* product, as a component of unduplicated aggregate output.”<sup>30</sup>

National accountants have been struggling with the problems of delineating final use (such as final consumption and capital formation) from intermediate use of goods and services (as inputs for the production of other goods and

<sup>25</sup>S. D. Helfand, V. Natrella and A. E. Pisarski, *Statistics for Transportation, Communication, and Finance and Insurance: Data Availability and Needs*. Prepared for the Committee on National Statistics (Executive Director: Edwin D. Goldfield), National Academy Press, Washington, D.C. 1984, pp. xi and 138.

<sup>26</sup>*Op. cit.*, p. 6.

<sup>27</sup>Simon Kuznets, *Economic Growth of Nations, Total Output and Production Structure* (Harvard University Press, 1976), p. 75. (Emphasis by Kuznets.)

<sup>28</sup>Kuznets (1976), p. 76.

<sup>29</sup>*Ibid.* In certain societies, however, for example in ancient Egypt, Mesopotamia and in the Inca empire, very complex governmental regulations were required for the maintenance of agricultural activities.

<sup>30</sup>*Ibid.* (Emphasis by Kuznets.)

services) for many decades.<sup>31</sup> Conceivably one could exclude some or all services from final production and treat them—irrespective of the actual purchaser of these services—as intermediate inputs to production in general. Under the current rules of accounting, services purchased by households or by governments constitute most of the services estimated to be put to final use. Often the government’s use of services (and of products) as “final use” can be queried and one can point to the differences between personal consumption and certain components of government consumption in respect of the “finality” of such use of goods and services. And Kuznets makes the point that even a part of the personal consumption items are really not “final” uses of outputs, but could be considered as inputs to the production process: “To the extent that the outlays, either by households or by government, are current expenditures necessary for the adequate participation in or smooth operation of the modern production process, they are intermediate, not final product; their inclusion represents duplication, and if their proportion to total product rises over time, their inclusion exaggerates the growth rate of unduplicated economic product.”<sup>32</sup>

Certain government activities are in particular tempting targets for exclusion from the sphere of final production (and if production is defined to include only activities resulting in certain final outputs, these activities may be considered non-productive). From the point of view of economic calculations an argument can be made that services which are not directly utilized in either personal consumption or in capital formation are not directly economic in character and constitute parts of the overall costs associated with the management of large-scale societies. According to this reckoning police protection, economic regulatory activities or community development services are not final but intermediate in character and their beneficial impact lies in the better environment they provide for the production of final goods and services and should be considered as costs or intermediate inputs to those.

Indeed, the materials concept of production—dating back to Adam Smith, David Ricardo, and Karl Marx—excludes the non-material items, including most of the services, from the scope of production and thus “radically resolves” the problems mentioned about the intermediate and final use of services. However, this approach is hardly applicable to societies with large, and even predominant, service sectors and creates various problems for the national accounts of those countries which do adhere to this principle.<sup>33</sup>

There may be a middle ground between the extreme positions of, on the one hand, excluding all nonmaterial services from final output and, on the other hand, including them all, without discrimination, in the aggregate final product of an economy. However, the idea of a reasonable compromise usually founders on

<sup>31</sup>National accountants, and of course economists in general, will recognize that the question of what is—and what is not—“output” has extremely wide-ranging consequences for analysis and should not be viewed as a purely “academic” issue.

<sup>32</sup>Kuznets (1976), p. 76.

<sup>33</sup>There are also suggestions for extending the production boundary. For example, Nancy Ruggles and Richard Ruggles in their book, *The Design of Economic Accounts* (National Bureau of Economic Research, New York, 1970), have suggested that productive activity by households should be recognized as production. (They also proposed that household capital formation should be introduced as a category.)

the rocks of statistical difficulties: the delineation of some services (considered as inherently intermediate services) from other services (deemed final services), in practice, runs into rather unsurmountable statistical problems. Therefore, instead of a rethinking of the boundaries of production in general and of intermediate and final services in particular, it is preferable to focus on the analysis of the aggregate product in terms of the four major activities and sectors of the economy (primary, secondary, tertiary and quaternary), while retaining the existing definition of the national accounts.

The economic and statistical realities of our time support a predilection to the comprehensive concept of production, but with an emphasis on the inter-industry (inter-sectoral) constraints on optimal growth and a stress on overall economic efficiency.<sup>34</sup>

Statistical deficiencies are only one of the potential sources of inefficiencies suspected in the service industries.<sup>35</sup> For example the institutional arrangements often typical of service production can be suspected as a more general potential source of economic inefficiencies. The provision of important services (such as health and education) in many economies is carried out mostly in a not-for-profit, non-market oriented setting. Both the statistical point made earlier and the institutional issue seem to affect the feasibility, and the need for economic calculations concerning service activities. There are historical reasons, some of them excellent, why economic calculations were not in the foreground for several service areas. At the present stage, however, the potential inefficiencies emanating from the not-for-profit arrangements may require more emphasis on economic calculation and analysis in these areas.

Investigations have revealed that assessments of the scope of the not-for-profit activities are far from easy. In the United States the government sector (federal, state and local), and the nonprofit institutions (foundations, universities, etc.) are the most visible components carrying out these activities. However, the indirect involvements in not-for-profit activities are also very wide. And it is very important to remember that the connotation "private" is not necessarily synonymous with "for-profit." The private sector today is considerably wider than the "for-profit" sector. It is interesting that in their widely disseminated and thought-provoking review Ginzberg and Vojta underlined that "At first it is difficult to understand how the national political ethos, expounded by Republicans and Democrats alike, continues to maintain that five out of every six jobs are created by the private sector . . . . The misconception arises in part from the classification of such non-profit institutions as Columbia University, the Metropolitan Museum of Art and the Jet Propulsion Laboratory as private-sector enterprises and from

<sup>34</sup>George Jaszi, in his wideranging overview, entitled "An Economic Accountant's Ledger," *The Economic Accounts of the United States: Retrospect and Prospect* (Survey of Current Business, Anniversary Issue, July 1971, Vol. 51, Number 7, Part II), has warned against attempts to construct a measure of output that can be used as a measure of welfare: "I do not think that we should set out on a venture that would lead to all the frustration associated with imperceptible progress toward an unreachable goal" (p. 226). His advice, we believe, has a broad validity and is relevant to the view that an analytical preference for sectoral studies does not necessarily call for changes in the boundaries of production.

<sup>35</sup>Inefficiencies, of course, can be found in any type of economic activity. Here the discussion is about inefficiencies more likely in respect of services than in other sectors.

categorizing the production of military aircraft by the Lockheed Corporation and nuclear submarines by the General Dynamics Corporation as private-enterprise activity.” Ginzberg and Vojta estimate that in some sense “the not-for-profit sector accounts for more than a third of total employment and nearly a third of the gross national product.”<sup>36</sup> Even allowing for a considerable error in their estimate, the significance of the not-for-profit activities is clearly of such an order that the grand total of national effort will be influenced by the behavior of the economic agents engaged in not-for-profit activities. One can presume that economic calculations—as opposed to broader societal considerations—play a smaller role in the not-for-profit sector and economic efficiency is of less concern than in the areas where profits are considered more vital. Thus, to a surprising degree, the post-industrial posture of American society is also a not-for-profit posture. There may be many beneficiaries of the not-for-profit posture: welfare recipients and defense contractors, students and professors, Blue Cross people and the physicians paid by them, etc. Usually the argument can be made—and it is not our purpose to dispute this—that many, most or perhaps all of the beneficiaries need to be treated beyond the norms of what “for-profit” attitudes would allocate to them. Nevertheless, once traditional economic calculations are pushed into the background—and on the scale now seen in many modern societies—the growth of economic efficiency, the source of all possible largesse, may be neglected.<sup>37</sup> This writer believes that largesse, not-for-profit motives, and the like have a very legitimate place in social life. However, the efficient production of the goods and services, indispensable for the execution of all the needed and good deeds (be it production of weapons or provision of homes for the aged) may suffer from the neglect of careful economic calculations—which may be difficult or even impossible in not-for-profit activities. Of course, with the growth of the size of economic entities, economic calculation may become very difficult in individual parts of for-profit organizations as well. This is not the place to dwell on the theoretical, organizational and political difficulties associated with the introduction of economic calculation and profit motives into previously nonprofit oriented activities. The saga of Eastern European economic reform movements attests both to the significance and to the difficulties involved in the quest for better solutions to this problem.

## V. THE POSSIBILITY OF SECTORAL MISEQUILIBRIUM

It seems, that the current international economic predicament is related to the sectoral-structural questions discussed earlier. It appears, that in the United States, as well as other countries, the allocation of resources among the major types of economic activities has become less than optimal. In our view some overemphasis evolved on quaternary type activities (which have especially heavy

<sup>36</sup>Eli Ginzberg and George J. Vojta, The Service Sector of the U.S. Economy, *Scientific American*, March 1981, Vol. 244, No. 3, p. 51.

<sup>37</sup>Frequently it is considered pedestrian or worse to analyze issues of health or medicine or defense in the context of economic efficiency; what is overlooked is that the loss of resources due to the inefficient use of factors of production in *any* area (however sacred) reduces the resources available for all purposes.

weight in finance, insurance and real estate services; education and legal services; and administration services); and as a premature acceptance of a post-industrial posture occurred, this overemphasis and related inefficiencies became a factor in the weaker performance of the economy. The new world centers of manufacturing—especially in the Far East—became efficient exporters of their products to the areas with a “post-industrial” structure, but it is not clear how international trade will achieve a dynamic (or even static) equilibrium under the present conditions.

The sectoral-structural hypothesis assumes, that at least in principle, the longer term quaternary expansion could have contributed to the more recent deceleration in economic efficiency. However the hypothesis *does not assume* that the factors of production employed in quaternary (or tertiary) activities are less productive than the ones employed in the primary or secondary activities, or that the rates of efficiency growth are inherently slower in the service activities as compared to the production of goods. Rather the presumption is maintained that the same overall potential for efficiency growth exists in all broad economic spheres.

What *is assumed*, however, is that the economy’s growth rates and its efficiency performance are influenced, among others, by the allocation of resources among the four main types of activities and sectors and that under given historical circumstances some combinations may lead to better overall results than others. It is also recognized that the relationships are importantly influenced by technological factors and significant input-output type linkages exist among the sectors. It is also assumed that currently the production coefficients for the quaternary activities are less well defined by unavoidable technological circumstances than the coefficients in the primary, secondary and tertiary activities. Finally, it is believed that generally the consumers’ satisfaction of wants related to quaternary activities—along the line of Engel’s law—are relatively the farthest removed from the primary wants such as food (satisfied by the primary sector) or clothing and shelter (satisfied by the secondary sector).

It is generally acknowledged that economic development involves growing shares for successive types of productive activities, progressively removed from the primary agricultural and mining levels. In turn the sectoral-structural hypothesis assumes that the primary, secondary, tertiary, and quaternary activities can be in broad equilibrium at somewhat different growth rates or performance levels for the economy as a whole.<sup>38</sup> A state of seeming sectoral “equilibrium” but one that is associated with sluggish growth rates and a low overall performance of the economy—say, with several years of efficiency slowdowns or recession—may be designated as a state of “misequilibrium” or “growth misequilibrium.”<sup>39</sup> It is also assumed that among the main activities generally an optimal, or at least an improved, growth equilibrium—one that brings higher levels of overall efficiency—is feasible. Thus a Pareto optimal equilibrium of activities and sectors

<sup>38</sup>In most situations, economic growth and economic efficiency are considered to be positively correlated with each other.

<sup>39</sup>The term implies a difference from the more usual expression of “disequilibrium” by suggesting the existence of an equilibrium that is suboptimal for growth and may involve a low level secular stagnation.

is considered feasible: it is thought to exist if overall economic efficiency cannot be enhanced by the increase in the efficiency of any sector (or activity) because such would entail an equal (or larger) decrease in the economic efficiency of others. Growth of real output is considered to be an acceptable proxy for the growth of efficiency in this context. The actual annual contributions of the major types of economic activities may oscillate around their optimal contributions to economic growth and both cyclical and other factors could explain the deviation. Therefore, only deviations of alarming proportions or longevity are considered manifestations of growth disequilibria; finally, disequilibria are viewed as contributing seriously to economic ills such as growing unemployment and accelerating inflation.

It is recognized that the existence of the structural-sectoral difficulties may not signify the existence of “too much” services in an economy or signal that the output of the service sectors, in some sense, is “too large.” Difficulties arise even if the output of services is at nearly desirable levels, but the production of the same absorbs resources out of proportion to these outputs, i.e. if more than the average inefficiencies creep into these activities.

The relative productivity performance in the service sector—which Fuchs and Kuznets considered to be lower than in the primary and secondary sectors—remained a controversial issue, and was assigned little weight in explaining the decelerating overall productivity performance of several developed market economies. Therefore, a few of Kuznets’ general insights of particular importance for the present discussion are shortly reiterated here. The first is the apparently “low elasticity of demand for food and other products of agriculture and the high elasticity of demand for durable consumer goods and some services—products of the industry and service sectors.”<sup>40</sup> A second is that “consumers, who as producers had to live in the cities, have required goods and services that were not essential in the countryside”<sup>41</sup> with the related fact that the greater complexities of economic organization [are] requiring government regulation and administration”<sup>42</sup> and the important concomitant that “large scale plants and associated economies has meant a greater need for transportation and distribution than would have been required by more small plants, serving local markets.”<sup>43</sup>

A third point of Kuznets’ assumes special significance for our inquiry, as Kuznets raises, in principle, the possibility of a sector increasing its share in total resource use at the expense of other sectors: “A decline in a sector’s share in total product is not necessarily accompanied by a decline in its share in total labor force or total capital: if productivity or efficiency, reflected in output per unit of input, has risen *less* in a given sector than in others, the sector may have absorbed a constant or even rising proportion of total resources.”<sup>44</sup> Kuznets also found that “the share of the service sector in total resources in a number of

<sup>40</sup>Simon Kuznets, *Modern Economic Growth, Rate, Structure and Speed* (Yale University Press, 1966), p. 98.

<sup>41</sup>Kuznets, *op. cit.*, p. 102.

<sup>42</sup>Kuznets, *op. cit.*, p. 103.

<sup>43</sup>Kuznets, *op. cit.*, p. 103.

<sup>44</sup>Kuznets, *op. cit.*, p. 105.

countries grew relatively more than its share in total product and . . . the rate of growth in productivity in the services sector must have been distinctly below that in productivity in the economy as a whole."<sup>45</sup>

We may be forced to recognize, that at our current level of knowledge and in some general sense the impact of physical effort—which often plays a more direct role in primary and secondary production—is easier to assess than it is to judge the outcome of mental (or intellectual) effort. From this it does not follow that somehow the results of mental efforts are intrinsically less valuable than those of physical efforts (actually they may be more valuable per unit of time spent on it).<sup>46</sup> It appears, however that often the product of physical effort is less “fakeable”—while the often intangible qualities of mental effort leave more room for make-believe and for doubtful results. Since the share of mental and intellectual work is often higher in the quaternary area, the measurement of results in general, and the accounting for production in particular, is very difficult. As mentioned earlier, in the statistics of services the quantity of inputs is often utilized to estimate output. Once again it is useful to underline that the two types of activities—physical and mental—are not compared to the detriment of either. Intellectual work may be considered even superior to physical work, but when it comes to evaluation, to judgments regarding the quantity and the quality of output, intellectual work is frequently less amenable to checks and measurements. This circumstance—*ceteris paribus*—may favor, during price and wage negotiations, those sectors of the economy which rely on a lot of mental effort.<sup>47</sup>

The needs of man which are satisfied by quaternary products and services are frequently less tangible than the products necessary for primary survival, such as the food coming from the primary sector or clothing and shelter provided by the secondary sector. Noting this, one again has to caution about hasty conclusions: health, car, education and cultural services—which generally elevate modern life above the level of earlier times—are all outside the area of primary and secondary activities but nevertheless constitute most valuable areas of social endeavor. The relatively intangible nature of a need does not place it low on man’s scheme of values but apparently makes the evaluation of the efforts expended to its fulfillment more complex and makes economic calculations more complicated regarding the service areas in general and the quaternary type activities in particular.

<sup>45</sup>Kuznets, *op. cit.*, p. 113.

<sup>46</sup>The difficulties of converting skilled labor into units of more simple labor were considered already in the 19th century. Usually these efforts were not extended to mental work, in part because of assertions that mental activity has no costs. On the other hand Georg Simmel, in 1900 in his *Philosophie des Geldes*, in analyzing “the role that the mental expenditure of energy plays in the creation of value alongside manual labor” suggested a broader approach to the matter: “The reduction of the importance of mental labour to that of physical labour is ultimately only one side of the general tendency to produce a unified concept of labour. What has to be discovered is the common factor in all the diverse types of labour—a much broader and more differentiated diversity were achieved, then an extraordinarily large theoretical and practical gain would be made, as much in fact as the gain from the existence of money.” Georg Simmel, *The Philosophy of Money*, translated by T. Bottomore and D. Frisby, Routledge and Kegan Paul, 1978, p. 412.

<sup>47</sup>A large number of artists would doubt the validity of this proposition.

#### IV. SOME RELATED POINTS

##### (1) *Connections to Current Economic Thought*

Perhaps it is useful to point to some apparent connections between the sectoral-structural propositions discussed and current economic thought. Beyond their potential intrinsic value, such connections may entice some readers (unwilling to consider ideas outside the framework of their own school of thought) to contemplate the perspectives discussed in this paper.

##### (a) The Leontief-Sraffa Connection

As shown in Section III above, the input-output relationships among the four sectors of the U.S. economy are of considerable interest to our topic. This necessitates first a reference to Leontief's work. A second reference, only loosely related to the first, concerns the distinctions introduced by Sraffa about basic and nonbasic commodities. Naturally, given the significance and the complexity of their ideas, both Leontief and Sraffa ought to be studied in the original.<sup>48</sup> Many readers can profit also from the presentations of Luigi Pasinetti, whose own contributions treat Leontief's and Sraffa's ideas in a joint framework relevant to our investigation. Indeed Pasinetti's own work and his interpretation of Leontief and Sraffa should be viewed as additional and original contribution to this field of study.<sup>49</sup>

It appears that in the context of our hypothesis the following three items of Leontief's work are of special importance: first, the assumption that the sectors (industries) of an economy are mutually interrelated and that their links are both direct and indirect and changes in final demand can have important repercussions for both direct and indirect output requirements; second, the observation that the linkages among the sectors of the economy are importantly based on technological relationships, which can be captured by the technical coefficients of production and shown in appropriate matrices for purposes of analysis and planning; and finally, the experience that most statistical input-output tables handle the primary and secondary sectors of the economy somewhat differently from the tertiary and quaternary sectors.

In this last respect Pasinetti underlines the existence of "peculiar industries" in the input-output tables. As he states, "In compiling transactions tables one is faced, furthermore, with certain rows and columns which refer to very special 'industries,' for which the inputs and outputs do not reflect flows of strictly technical nature. The rows and columns in question are those referring to commercial services (wholesale and retail trade), transport, public administration, and importing and exporting."<sup>50</sup> Especially for the public administration sector he stresses that its "relationships are to only a minimal degree of a technical nature."<sup>51</sup>

<sup>48</sup>The seminal work of Wassily W. Leontief, *The Structure of American Economy*, first was issued by Harvard University Press in 1941. Piero Sraffa's famous *Production of Commodities by Means of Commodities* was published by Cambridge University Press in 1960. Both authors have formulated some of their basic ideas well before these publishing dates.

<sup>49</sup>Luigi L. Pasinetti, *Lectures on the Theory of Production* (Columbia University Press, New York, 1977). See also his *Structural Change and Economic Growth* (Cambridge University Press, 1981).

<sup>50</sup>Pasinetti, *op. cit.*, p. 41.

<sup>51</sup>Pasinetti, *op. cit.*, p. 42.

The connection of the handling of the service sectors to Sraffa's system is a more involved one. We are not going to try to describe his system—for this the reader is referred to Pasinetti's introduction<sup>52</sup> and to Sraffa's own book—and will invoke only those aspects of Sraffa's system which seem to be of particular relevance to our topic.

Sraffa's system places much emphasis on a so-called "standard system" which is an economy that exhibits certain proportionality relations. In Pasinetti's summary "the positive physical quantities which represent the solution of the system are such that the *proportions* in which the various commodities are produced are equal to the proportions in which the same commodities are used as means of production in the economic system as a whole, and are also equal to the proportions in which the same commodities are devoted to final uses (in the present context, consumption)."<sup>53</sup>

One ingredient of the "standard system" is the logical construct of "standard commodity," which is "a particular composite commodity, into which the various commodities enter in precisely determined proportions."<sup>54</sup> The standard commodity and the standard net product of Sraffa serve as the numeraire of the price system and provide the theoretical basis to explain income distribution. Sraffa's theory also assumes that the distribution of income can be treated independently of prices and that this possibility is not tied to the pure labor theory of value.<sup>55</sup> For our purposes the more involved aspects of Sraffa's system are not directly relevant and here we restrict ourselves to his distinction between *basic commodities* and *nonbasic commodities*. The *basic commodities* enter the standard system and the methods of production of these commodities play a role in the determination of the prices of the same; moreover, they also play a role "in the determination of maximum rate of profit and the uniform rate of surplus for the economic system as a whole."<sup>56</sup> The *nonbasic commodities*, on the other hand, play a limited role and do not appear in the standard system.

The basic and nonbasic commodities derive their distinction from certain characteristics of production technology.<sup>57</sup> Basic are those commodities which are required for the production of both basic and nonbasic commodities, in a direct or an indirect manner. The nonbasic commodities, on the other hand, are not required for the production of the basic commodities, while they may be needed for their own production. In Sraffa's system two further distinctions follow: zero production in even one basic commodity arrests the output of all

<sup>52</sup>Pasinetti's book makes extensive use of matrix algebra and therefore his treatment is probably more accessible to the economists trained in input-output analysis and linear programming.

<sup>53</sup>Pasinetti, *op. cit.*, p. 99. Emphasis by Pasinetti.

<sup>54</sup>*Ibid.*

<sup>55</sup>Pasinetti suggests that "In the economic literature the rejection of Ricardo's pure labor theory of value has generally been associated also with the rejection of his (quite legitimate) claim that his theory of income distribution is independent of his theory of value" (*op. cit.*, p. 120, footnote). This would also seem to apply to Sraffa's income distribution theory and, in some perhaps less convincing sense, to basic tenets of his standard system as well.

<sup>56</sup>Pasinetti, *op. cit.*, p. 104.

<sup>57</sup>Pasinetti defines these in terms of matrix calculations. "If the matrix of technical interindustry coefficients is an irreducible matrix, than all the commodities in the economic system are basic commodities; on the other hand, if the matrix is reducible, some of the commodities are basic commodities, while others are not basic commodities." Pasinetti, *op. cit.*, p. 104.

basic and nonbasic commodities of a closed system, but this is not the case for zero production of a nonbasic commodity; and second, when any one of the production coefficients for a basic commodity changes, this causes price changes for all basic and nonbasic commodities, but a similar change regarding a nonbasic commodity would not have the same repercussions. Pasinetti notes that “the distinction between basic and non-basic commodities corresponds to the distinction which the classical economists made between ‘necessary’ or ‘subsistence’ commodities and ‘luxury’ goods. The novel feature of Sraffa’s analysis is that the distinction is shown to arise from the technical properties of the production processes.”<sup>58</sup>

In our estimate Sraffa’s system symbolizes a return by means of complex analysis to certain of the great concerns of early thinkers. Should further research reveal that quaternary activities fall more often in the category of nonbasic commodities than into the group of basic ones, that could contribute to our understanding of the differences suspected in their pricing compared to the pricing on non-quaternary activities. Of course, from the viewpoint of the possible remedies to the sectoral-structural problem, which are sought in the magnitude and distribution of capital formation, the unresolved problems and debates of modern capital theory can be of certain significance, but, as indicated earlier, our article is not the place to discuss them.

In spite of the difficulties mentioned we see the sectoral emphasis broadly supported by certain features evident in the systems of Leontief and Sraffa. Given the Walrasian connections of the former and the Ricardian links of the latter, this may put the hypothesis—depending on the predilection of the reader—in some “bad company” one way or the other. However, these apparent connections suggest that the hypothesis is a reflection of certain real-life relationships which also received attention in the systems of Leontief and Sraffa which, of course, both cover wider ground than the sectoral-structural issues discussed here.

#### (b) Services in the Neo-Classical Framework

As already mentioned, Leontief’s system is typically linked to the work of Leon Walras—who was certainly as famous an expositor of the marginalist theory of production as one can think of. Therefore, the investigation of the interindustry relations of the service sectors is not a departure from mainstream thought in the neo-classical framework.

It could be argued, of course, that a pure neo-classical scheme leaves no room for the evolvment of a premature post-industrial syndrome. One could suggest that if fully efficient markets and nearly perfect resource allocation mechanisms existed the type of sectoral disequilibrium considered in this analysis could not have emerged. We fully believe that to the extent this is the case, the elimination of impediments to competition and improvements in the allocation of resources should be considered desirable, and indeed may constitute remedies to the problems discussed. It should be noted, at the same time, that staying within the neo-classical framework does not necessarily preclude arriving at conclusions of possible misallocation of scarce resources, such as capital. Lewis

<sup>58</sup>Pasinetti, *op. cit.*, pp. 108-109.

Johnson suggested that “unfortunately it can be shown that competitive equilibrium need not lead to an efficient capital stock.”<sup>59</sup>

The possibility also exists that while the neo-classical approach is a useful guide to the behaviour of economic agents, to pricing and other phenomena *within* each of the four main sectors or regarding these four activities; however the special features of the primary, secondary, tertiary, and quaternary sectors from time to time may limit the achievement of optimal equilibrium *among* the four.

### (c) Relationships to Institutional Thought

In our previous discussion the works of Kuznets and some other authors were considered in the context of the neo-classical framework. Daniel Bell suggests that “the initiation of statistical studies, such as those of Wesley, C. Mitchell, and such subsequent students at Columbia as Arthur F. Burns, Simon Kuznets, and Milton Friedman,” clearly “gave new life to neo-classical theory” after it had fallen low in esteem in the U.S. in the first three decades of this century.<sup>60</sup> At the same time these works also followed the traditions of the American institutionalism of John R. Commons. Indeed the statistical works stimulated by the NBER focused on the institutional reality of the U.S. economy, and in Bell’s estimate most of these efforts—including the system of national accounts—are “atheoretical.”<sup>61</sup>

For our sectoral-structural approach it seems particularly helpful to include references to thoughts contained in a recent book of Professor Douglass C. North. Professor North’s central concern is “the structure and performance of economies through time.”<sup>62</sup> In the Preface of his book he underlines that “Since Adam Smith, economists have constructed their models on the firm bedrock of the gains from trade. Specialization and division of labor are the key to *The Wealth of Nations*. In constructing their models, however, economists have ignored the costs arising from such specialization and division of labor.”<sup>63</sup> From the viewpoint of our hypothesis the issues raised by North, especially the costs of specialization, can be of great import. The great increases in the 20th century in the specialized activities grouped in the quaternary (and to a lesser degree in the tertiary) activities clearly involved a large step in the division of labor. Our hypothesis implies that, for a number of reasons, several Western societies were not attentive to the costs involved, which, given the difficulties of measuring both the costs and the benefits in this further process of specialization, is rather understandable.

<sup>59</sup>Lewis Johnson, “Capital Formation in the Long Run,” in Part II. Neo-classical Growth Theory, *Public Policy and Capital Formation*, Board of Governors of the Federal Reserve System, Washington, D.C., 1981, p. 96. He also suggests that “There are no forces in the economy to guide the competitive outcome of an optimal steady-state level of per capita consumption.” *Ibid.*, p. 276 (in his contribution “Life-Cycle Saving, Social Security, and the Long-Run Capital Stock” of the same volume).

<sup>60</sup>Daniel Bell, Models and Reality of Economic Discourse, in *The Crisis in Economic Theory*, Daniel Bell and Irving Kristol, eds. (Basic Books, New York, 1981), p. 58.

<sup>61</sup>*Ibid.*

<sup>62</sup>Douglass C. North, *Structure and Change in Economic History* (W. W. Norton, New York, 1981), p. 3.

<sup>63</sup>North, *op. cit.*, p. ix. He also advises that “These transaction costs underlie the institutions determining the structure of political-economic system.” (*Ibid.*) Hence our review of his work as an institutionalistic type contribution.

North also calls attention to the fact that with increasing vertical integration and the growing concentration of economic activities in fewer corporate entities, there is a trend for the “firm to replace the market.”<sup>64</sup> From the narrower viewpoint of our hypothesis this trend is in line with the inclusion of an increasing amount of quaternary type activities in the three other sectors. North is also cognizant of the fact that “When we shift from orange juice to more complex goods or services such as a television set, the quality of repair work on an automobile or the quality of a physician’s service, the costs of measurement are increased immensely and we tend to rely on various surrogates such as brand names, trade marks, warranties, reputation.”<sup>65</sup> The difficulty is large even in the more traditional production areas where now larger teams of workers are involved in the output of many goods: “Because it is costly to measure individual performance (and perfect measurement is frequently impossible), shirking, cheating, and so forth are common, workers are paid by input, and various costly but imperfect monitoring devices are employed to reduce shirking.”<sup>66</sup> And it seems that such measurement difficulties are, as a rule, even more momentous in various fields of the quaternary activities.

Professor North suggests that “*The greater the specialization and division of labor, the more steps in the production process from initial producer to final consumer and the greater the total costs of measurement* (since measurement must occur at each step).”<sup>67</sup> Our hypothesis, of course, involves a stage-of-processing approach to the sectoring of the economy and the distinguishing of four major types of economic activity. Coupling North’s suggestion with our hypothesis means that due to the inherent difficulties of the measurement of quaternary activities, and because of the increased share of such activities within the grand total, the overall costs related to measurement must increase and in the complex new world the room for inefficiency is also larger.

The relationship between the measurement of production and institutional change is more complex than usually realized. Of course, informed economists and statisticians are familiar with the complexities of estimating changes in output in the quaternary sector in particular. Often it is thought, however, that the difficulties are mainly technical or due to lack of data. In fact, of course, the statistical difficulties in measuring output of the services areas are closely related to the relatively early developmental state of economic theory regarding important contemporary economic circumstances. In Daniel Bell’s formulation currently we may live in a postindustrial order, “yet contemporary economic theory, rooted in the world of agriculture and industry, has no means of measuring the ‘output’ of science and little, even, of technological change.”<sup>68</sup>

A deep-going and complex observation is offered by Douglass C. North in his analysis of the neoclassical theory of state. He suggests that “The costs of measuring the dimensions of the inputs and outputs will dictate the various

<sup>64</sup>North, *op. cit.*, pp. 37–38.

<sup>65</sup>North, *op. cit.*, p. 39.

<sup>66</sup>North, *op. cit.*, p. 40.

<sup>67</sup>North, *op. cit.*, p. 41. Emphasis added.

<sup>68</sup>Daniel Bell, Models and Reality in Economic Discourse, in *The Crisis in Economic Theory*, Daniel Bell and Irving Kristol, eds., Basic Books (New York, 1981), p. 80.

property rights structure for the diverse sectors of the economy, which therefore will be dependent on the state of the technology of measurement. Common property resources have persisted where the costs of measuring the dimensions of the resources have outweighed the benefits. The development of standardized weights and measurements is almost as old as government and has typically been fostered by the state. Standardization performs the function of lowering transaction costs and of allowing the ruler to extract the maximum amount to rent. The higher the cost of measurement of the multiple dimension of a good or service, the greater the dissipation of rent.”<sup>69</sup>

There are many implications related to North’s proposition. A most obvious one, from the viewpoint of the structural-sectoral hypotheses, is that certain of the differences in the nature of output, input and their relationships among the four major sectors of the economy are deeply rooted in the differences in the costs of measuring the dimensions of the inputs and outputs. Thus the state of art of the measurement of economic magnitudes assumes a significance not usually realized. And the difficulties of measurement, such as the ones mentioned about the statistical problems of services, become issues of import beyond their apparently narrow, technical field.

Probably to the astonishment of the humble economic statistician, this suggests that depending on the state of his art, the world may assume rather different structural characteristics, especially regarding property rights. For those familiar with the many institutional changes in the field of monetary affairs, this situation, in which the tail appears to be wagging the dog, is not inexplicable. The revolutionizing effects of computerized recordkeeping (which, of course, involves much faster measurement of assets and liabilities and other magnitudes) led to numerous institutional changes, such as the establishment of the so-called money market mutual funds and other new forms of asset management. In turn, these institutional changes led to new complications in statistical measurement, as exemplified by the difficulties in evaluating various monetary aggregates. Indeed in the United States monetary statistics is the foremost recent example of the complex interrelationship between institutional change and measurement and recordkeeping. And, keeping in mind Professor North’s analysis, one should consider the impact of the impulses that emanate from the latter and influence the former.

#### (d) Extensions of the Hypothesis

The four basic types of economic activities, which were distinguished earlier to characterize a basic aspect of the primary, secondary, tertiary and quaternary activities, were analyzed mainly in the context of the developed economies of the industrialized (or even post-industrial) West. The hypothesis of the premature post-industrial syndrome was designed certainly with a view to mature market economies of the capitalist sphere.

The stage-of-processing distinctions used in this analysis, and even the related sectoring, are apparently not out of place in the other types of economies existent

<sup>69</sup>Douglass C. North, *Structure and Change in Economic History* (W. W. Norton, New York, 1981), p. 26. The overall gains in the situation described may be such that the ruled may accept the arrangements as sufficiently beneficial.

on our planet today. Indeed it is tempting to apply the basic hypothesis of relating economic growth to the interrelationships of the four major divisions of activity to some basic economic problems experienced in the developing countries of the "third world," and also in the socialist economies. In the case of the developing nations the general backwardness of the secondary activities, as well as the lack of infrastructure (frequently a sign of the weakness of tertiary and quaternary activities) are, of course, often diagnosed among the key factors of economic backwardness, manifested in a low-level equilibrium trap. On the other hand the outstanding cases of economic success observed in the "third world"—apart from some oil producing countries—are usually based on fast gains in the secondary division and growing strength in the tertiary and the quaternary divisions. Admittedly relating the hypothesis to the "third world" does not add too much to the understanding of the development process per se—except, perhaps, making the improvements in the infrastructure conceptually a more organic component of the overall development effort. However, the potential applicability of the general hypothesis to the situation in the "third world" strengthens the likelihood of its validity for the "first world." Of course one does not expect the hypothesis to hold very well for smaller economic units in any part of the world since the effects of sizable foreign trade and other international linkages may complicate the analysis of the relationships among the major divisions of activity in many but the largest units of the world economy, such as the United States, the European Economic Community (as a whole), the U.S.S.R., India and China.

Regarding the socialist economies, certain aspects of the U.S.S.R. history also seem to indicate the need for studying the interrelationships among the four major divisions of economic activities as one of the explanatory factors of economic development. The considerable overall success with Soviet industrialization for example, is obviously in line with "Petty's law." At the same time the problems of Soviet agriculture seem to be related, in part, to a long-term underrating of the role and overall contribution of this component of the primary division of the economy. Regarding the tertiary and quaternary divisions the Soviet experience seems to suggest both serious underdevelopment in certain areas (such as trade) and burdensome overdevelopment in others (such as governmental/military activities). It is probable that the apparent imbalances among its major economic activity areas have contributed to the overall efficiency and economic growth problems of the U.S.S.R. Thus, some key economic problems in the economies, certain major growth problems in the development nations, and the inflationary pressures and other serious issues in the developed market economies may have a potent common characteristic related to the structure of their own four main kinds of economic activities.<sup>70</sup>

Considering the extension of the validity of the stage-of-processing sectoring approach back in history to precapitalistic societies, one has to realize that very large shares of tertiary and quaternary activities in total output are mostly 20th century phenomena which attained prominence only in the developed market

<sup>70</sup>One can think of a variety of national, institutional, and cultural reasons why a particular type of imbalance among the four main activities or sectors may emerge. Still it is interesting to note that they all appear to manifest themselves in sectoral imbalances, and ultimately, in efficiency losses. The retardation of economic growth is a typical corollary.

economies. The origins of such activities, however, go back for thousands of years. In some form and manner tertiary and quaternary type activities were part of the social endeavor much before our times. Therefore, one wonders whether growing imbalances among the four major divisions of activity (or among their ancient equivalents), were not among the economic factors of the much discussed declines of past civilizations. "Over-taxation" in general and the economic burdens related to military ventures have been often cited by historians as the factors of declines which occurred in the past. Is it not possible that imbalances among the four main divisions of activity contributed to such declines as they led to the loss of overall efficiency, retardation of growth, or outright overall contraction of output? Indeed, it may not be farfetched to think that an element of the picture in Rome's decline in antiquity was an imbalance among its main sectors of activity and a misallocation of Rome's resources.

### CONCLUSIONS

Current national and international economic predicaments are apparently related to sectoral-structural developments. The ascendance of many service-type quaternary activities in developed economies, and the emergence of new centers of secondary, especially manufacturing activities (for example in the Far East), created new, as yet unbalanced, patterns in world trade and production.

The input-output relationships among the primary, secondary, tertiary and quaternary sectors of the U.S. economy offer some clues about the nature of the sectoral-structural problems. Since the proportion of value added is highest in the quaternary sector, while the use of intermediate inputs (especially materials) is the highest in the secondary sector, the faster growth in quaternary outputs may provide less indirect stimulus for the national (or the world) economy than the same growth in secondary outputs would. And the shifts to the use of imported secondary outputs in mature economies may exacerbate this problem for the "post-industrial" economies, and may, for a while, mask the challenge for the new industrial centers.

Modern economics, despite the long (albeit often flawed) tradition of thoughts about sectoral differences, has mostly neglected structural-sectoral analysis. Therefore the kernels of truth discernible in the classical studies as well as some directions offered in the analyses by Leontief and Sraffa, and more explicitly by Kuznets, Clark, Olson and North, need to be taken to heart at this stage.

The issues of measurement, especially the difficulties in defining output in the quaternary areas, constitute a key, and integral component of the problem. The institutional setting typical for many quaternary service activities is a related matter.

The difficulties of assessing the costs of increases specialization and growing division of labor is a closely connected issue. The effects of these difficulties, for overall economic efficiency growth can be significant. If large—and growing—areas of the modern economy are, to a considerable degree, beyond the reach of usual statistical and financial measures and analysis, the careful husbanding of resources in these areas can suffer.

Nevertheless the advancement of the service area is both inevitable and beneficial. However the adjustment to the new situation is not easy, the room for inefficiency is considerable and the national and international handling of the matter leaves much to be desired. In part this is due to our limited understanding of the sectoral-structural problems. One can assume that with the accumulation of knowledge on the subject, the more promising courses of action will become clearer, at least from an intellectual perspective. After all, the needs and best modes of transition from the age of agriculture into the modern industrial economy were not easily perceived either and were even more difficult to implement. There is every reason to expect many intellectual and practical difficulties in the transition to the service (post-industrial) economy<sup>71</sup> as well. The political difficulties of the transition from predominantly agricultural to predominantly industrial economies were also pronounced. The transition to predominantly service type economies may similarly involve considerable political stress. And there may be some intriguing, and rather monumental, international difficulties involved in the process.

Clearly far-reaching accommodations need to take place in the world economy before the optimal geographic distribution of production in general, and of the primary, secondary, tertiary and quaternary activities in particular, will be reached. Economic theory, statistical research, and many other fields of human effort need further advancement if we want to meet, at least half-way prepared, the challenge posed by this prospect.

<sup>71</sup>The term "post-industrial" involves the same difficulties as the designation of the industrial economies as "post-agricultural." After all, agriculture has not disappeared from the scene, and neither will industry in the process of development.