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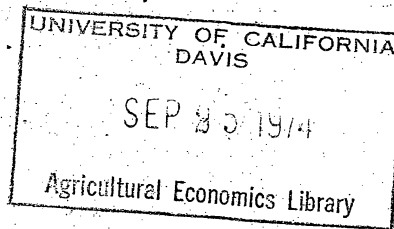
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Monitoring the Agricultural Economy:

Strains on the Data System

BY

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INTRODUCTION

One can easily infer from the preceding paper that its authors think there should be sector accounts for the food and fiber system. The accounts should cover sufficient "scope" of sector activity to provide a perspective within which a large number of issues may be examined. The accounts should be formatted to facilitate intersectoral and international comparisons,¹ and analysis of such issues as factor roles and shares, structure, interindustry dependencies, economic well-being of participants, industry capacity and utilization, and industry productivity.

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AGRICULTURE -- STATISTICS

This discussion adopts the same definition of the food and fiber system that was used in the preceding paper. The system is composed of farming, marketing, and direct input supplying subsectors.

NATURE AND PURPOSES OF ECONOMIC ACCOUNTS FOR THE FOOD AND FIBER SYSTEM

"Basic" economic accounts for the food and fiber system should be designed to provide a comprehensive picture of the economic situation by recording and presenting an interrelated structure of economic stocks and flows of a nation's food and fiber economy in terms of aggregate value statistics. Other related and supplementary statistical information such as quantities, prices, population, etc., should also be provided systematically in supporting tables.

Perhaps the most efficient way to present such aggregate information is in a system of accounts for the entire economy of a nation [6]. Food and fiber system economic accounts, therefore, should amplify and be consistent with the general national accounts. It can not be too strongly emphasized that economic accounts for the food and fiber system have important roles to play in providing statistical information of a nature which can only become available when a sector of an economy is singled out and presented in a systematic way. National accounts loaded with such sector detail would require unmanageable sets of tables,

thereby losing their distinctive role of presenting systematic overall information compactly.

Uses of Food and Fiber System Accounts

There are, perhaps, two general kinds of uses for food and fiber system accounts which should be stressed. One is to show the size of the system and its contributions as a locus for national tangible wealth and as a contributor to national product, income, etc. The other is to provide insight into the structure and situation of the food and fiber economy.

Sector Size

Although the general national accounts include national product by industrial origin, the specific subsectors are not consistent with the designation of an operating food and fiber system. Consequently, the role of food and fiber system accounts is one of identifying, highlighting, and making better estimates for the appropriate subsectors for such measures as total outputs, intermediate products consumed, value added, and stocks of fixed factors.

Why should we be interested in better estimates of the size of the food and fiber system and its component sectors? These measures and their major components provide unambiguous and directly interpretable monitors of change in the same terms that change is being observed in other sectors. Also, they provide for a control-total type of discipline, thereby reducing inclinations to

"net out" items appearing otherwise on both sides of the same account. Thus they introduce greater perspective for detecting structural changes that would otherwise simply be reflected as changes in the aggregates. Here we are referring to structural changes of the type that can be illustrated by increases in sales of hay which may result from either increases in hay production or increases in farm specialization. Perhaps even more importantly, major sub-aggregate series are instrumental for accurate estimation of such sector-wide performance related measures as productivity, level of capacity utilization, rate of return, and the like. These measures, in addition to their direct use for current evaluation of performance, are important for planning related to economic stability and development.

Sector Structure

The magnitude of the food and fiber system in the national economy is one thing, and, as we said before can be partially observed in the national accounts. Perhaps it is even more important to see how these contributions by the food and fiber system are made possible by the important mechanism of economic flows within and among sectors. Perhaps these can best be elucidated by seeing how, in the simplest format possible, production in the food and fiber system and its component sectors is carried out by use of intermediate consumption and primary factors to produce goods and services [6].

A current production account, which measures in value terms the total inputs used on one side and the corresponding total outputs on the other, is the recommended presentation of production on an aggregate basis for the food and fiber system and its component sectors. The information must be well classified with respect to components of both inputs and outputs. Classifying inputs into intermediate consumption and primary factors is essential and, preferably, intermediate products and services consumed should be further classified on the basis of sector of origin. Similarly, the outputs should be classified into finished product and work in progress, preferably with both further divided into major commodity groups. What is really needed in the presentation of such accounts is a desirable balance between data presented in a compact form and in different degrees of detail.

Beyond simply monitoring the size of the capital stock in the various sector components of the food and fiber system, different types of capital formation and disposition should be enumerated by type of capital goods. Monitoring capital flows is especially important in the farming sector, first because part of the capital goods are produced and used on farms, and secondly because of the continuing need to enhance productivity through technological progress. Both the size of the capital stock and its distribution by kind are intimately related, also, to broad questions of markets for current output, requirements for maintenance of capital

stocks, factor productivity, and the attribution of joint and common costs encountered in estimating shares of costs and profits from the distribution of products of special interest.

The owners of primary factors employed in food and fiber production receive value added in return for their factor commitment. The owners of primary factors are households, corporations, or other institutions. An income and outlay account for any defined group of sector-participant institutions can be designed to show the sources, shares, and disposition of incomes accruing to that group of sector participants. The establishment of income and outlay accounts for categories of sector participants reflects specific income roles the sector plays for those who commit factor. Yet the maintenance of such accounts permit sharpened distinctions between sector production activity of persons and institutions and the sector's roles in the acquisition and disposition of household income. The anatomy of the relationships is made more apparent by the presentation format. Data contained in these accounts would be necessary for the examination of issues of well-being and equity involving actor roles and factor commitment levels in the food and fiber system. And they would relate to occupational or investor classes much as the establishments with which they are associated are related to industries as classified in the Standard Industrial Classification System, rather than pertaining to actors on the basis of residence such as is now done for the farm population.

Other Desirable Sector Account Characteristics

There is a whole set of issues related to industry structure, conduct, and performance. If we can agree that an appropriate set of sector accounts should monitor important aggregates such as total output flows, stocks and flows of inputs, flows of factor shares, and the contributions of sector activity to actor income levels, then perhaps we can also agree that it is important to provide flexibility in the monitoring system. This means that we should, if the appropriate data are acquired for the proper units of observation, be able to present the aggregates broken out by any desired industry structural characteristic such as size of firm, size of establishment, ownership of assets, sub-type of establishment, or geographic region.

Recognizing that future needs for data will be unpredictable reinforces the notion that the presentation format for important sector aggregates should be as compact and easily understood as possible. The aggregates themselves should have enduring meaning for direct intersectoral and international comparisons. The interrelated set of aggregates and the formats used to present them should allow for almost any kind of data disaggregation to reflect important structural and institutional characteristics of sectors and industries.

Carlin and Handy, validly for their purposes, discussed establishment and commodity concepts of industry [2]. They also note that the prevailing present concept of industry for farm

sector aggregates is the National Farm. In our opinion the farm may be viewed as a special case of an establishment in order to capture nearly all the production of characteristic farm products within the farming sector. Alternatively, we may view industry as composed of firms whose major outputs are the goods and services which characterize the designated industry. If we are going to pursue our interests in issues of asset ownership and control, our interests are often in the sense of the relationships between firms on the one hand and related quantities of specific commodities on the other. Thus, current issues may take us into analyses involving more than one view of industry.

Another dimension of desired flexibility is a capability to monitor commodity flows (both quantities and values) across sectors and industries, and to identify the costs and returns flowing in the reverse direction. Given the nature of industries in the food and fiber system, the flow monitoring for an individual commodity frequently means following flows "across the grain" relative to industry activities. This calls for an ability to detect product transformation coefficients. An understanding of the structure of intermediate consumption and primary factor commitments with related earnings shares is facilitated by using common concepts and terms among sectors.

In summary, we should recognize that we will probably be faced with the need to reconcile different concepts of industry if we are to be able to relate to each other such issues as asset

ownership and control on the one hand and commodity supply and disposition on the other.

EXISTING MONITORS OF SECTOR AGGREGATES

Carlin and Handy noted that the principal existing monitors of sector aggregates are specially defined ones. They are Farm Income, Balance Sheet of the Farming Sector, and the Marketing Bill. Literature on their definitions, content, and shortcomings is abundant and it would take too much time to give that literature a rigorous review at this point [1, 5, 9, 11, 15, 16, 17, 18]. Nevertheless, some characterizations are necessary in order to relate these measures to strains on the data system.

To some considerable extent, these aggregates were constructed to meet special information needs related to shares, equity, and industry viability. Consequently, their development did not begin from a common, overall frame of reference with a consistent set of operational definitions and concepts involved in sector total factor use, intermediate consumption, and outputs. Thus these measures are difficult to reconcile with each other. Each is a legitimate but specially defined measure.

The realized net farm income measure, in particular, is susceptible to change as a result of redefining institutions and populations. This is partly due to the historic associations between small proprietorships and farming activities. Obsolescence occurs when institutional changes or farm business practices render

such assumptions and concepts at least partially invalid. This is particularly the case when the both the conceptual outlines and much of the data are rooted in special issues of times past. There has never been any pretention that the net farm income measure was derived from measures of total outputs and total inputs for the farming sector.

The balance sheet of the farming sector was initially designed to measure the financial viability of farming operations. It has never been oriented specifically toward measuring the formation and disposition of farm capital and has always included both sector and personal account items. There is the emerging question of whether greater emphasis should be placed on measuring capital stocks for the farming sector and then present these capital stocks as elements of balance sheets for sector decision making institutions. As it is now, the balance sheet reflects a sector composed entirely of proprietorships, and still focuses on a combined view of financial viability for both the farmer and his sector activities.

The marketing bill was initially designed as a tool measure of the difference between farm value and U.S. civilian consumer expenditures for domestically produced farm food products. It is an attempt, then, to show farm and marketings shares of receipts for domestic consumer expenditures for domestically produced farm food products. Thus, fish, shellfish, and imported foodstuffs are omitted, as are domestic farm foodstuffs produced for export and

for military consumption. The marketing bill is an aggregation over a large number of industries as industries are defined in the Standard Industrial Classification Manual. Most disaggregations are, in fact, made to functions rather than to industries.

There are no existing aggregate monitors for the input subsector similar to those for the farming and product marketing subsectors.

STRAINS ON THE DATA SYSTEM

Generic Strains

Carlin and Handy presented a set of possible economic accounts which, if implemented, would add to our present ability to monitor the performance of the food and fiber sector and both provide and require a more completely organized data base for economic research and analysis in this sector. However, borrowing an analogy from the marketing arena, when one is designing a new container it is well to consider, in addition to the neat appearance of the container, the stresses this container will be subject to in use. Thus it is well that we review the strains which would be put on any data system for the food and fiber system.

If we polled each member of AAEA on the adequacy of the present data base for analysis in his particular field of interest, the resulting list of inadequacies would be large. This type of detailed listing will be avoided by discussing three broad types of strains, those related to interdependencies, to access to data,

and to the resource commitment to the data base.

Any attempt to respond to the present strains on the data system with the provision of new information will inevitably affect the power sets of various actors in the food and fiber system. The provision of information is an activity which makes some decisions more likely and others less likely than would be expected in the absence of its beneficiaries by making institutional changes to their benefit more likely through its impact on the social decision process or by increasing their abilities as choosers. Conversely, this power could be decreased if others are benefited relatively more, or if the information makes institutional change to their detriment more likely. The authors acknowledge the importance of this role of information but the discussion of the distributional impact of any modifications of the data system is beyond the scope of this paper.²

The first strains to be discussed are those introduced by interdependencies. Reams have been written about the trend towards specialization in almost all parts of the food and fiber system. Specialization and interdependence of the components of the system go hand in hand, creating situations where an individual actor is highly dependent upon the other actors and vulnerable to changes in other components of the system. This results in a proliferation of demands by individual actors for information about the rest of the system as a means of obtaining some degree of control over their vulnerability.

Since participants in the rest of the economy may place different emphases on issues, considering the interdependence between the food and fiber system and the rest of the private economy introduces a new type, as well as level, of demands for information. These, added to information demands for public policy decisions, create potential total demands for information about the food and fiber system that may well approach insatiability. This pattern of proliferating demands for data is a logical development of an increasingly complex society.

An ideal data system should service the maintenance of a relevant data base with periodic survey supplementation for additional and specific problems. The question faced by the data manager is how best to modify the various sources of data to obtain and maintain completeness and relevancy in the data base. A data base that adequately services such an interrelated sector as just described is obviously very interrelated itself and any proposed modification may indeed be a very complicated venture. Much care must be exercised that a related section of the data base is not compromised more than the benefits expected from the initial modifications to the system.

One additional strain on a data system as industries institutionalize closer coordination is that the accompanying product flows may result in fewer public market transactions and thus less information for other interested actors in the system who were not part of the transaction. This brings us to the

second general area of strains, access to data.

One of the more valuable uses for data is to serve various kinds of decision making. Data are information. Only when they are ordered and analyzed do they become economic intelligence and useful to decision makers. Some types of decisions will likely have to be made with or without such information. Thus, simply put, the decision maker must have access to the data in the form desired and by the time he is to make the decision if they are to have greatest value. This is a payoff for the maintenance of a data system. Many problems are involved in the process of reaching this point. First, the data collector must have access to base information relating to either or both subject and pertinent units of observation. This is no small problem with data from larger firms and certain types of financial, conduct, and performance types of information.

Second, the data provided must meet the occasionally conflicting conditions of relevancy, accuracy, and timeliness. Relevancy, having the appropriate information by the time a decision must be made, can strain the data system by demanding data in an embryonic stage or with different conceptual properties than those contained within the system. Since it is virtually impossible to avoid errors of measurement completely, it is hard to conceive of absolute accuracy. Beyond these direct errors of measurement, additional errors may occur in compiling selected aggregates. Almost any complex statistical series will

reflect judgments required to make the series representative of those characteristics which it attempts to measure [4, pp. 1-3].

Timeliness of data is especially critical when so much of our work is concerned with projecting and forecasting. Many data users claim they prefer preliminary data labelled as such to no data at all. However, this charitability often fades when subsequent information results in a substantial change in the preliminary estimate.

A third, yet essential point, is that the decision maker or data users should be aware of the existing data series. An alarming number of members of our profession have a knowledge of the existing data series limited to those published in Agricultural Statistics, which represent the core but certainly do not contain all the relevant data for analysis of the food and fiber sector. This is difficult to explain under the conditions of demands for the data far in excess of the available supply.

The final generic strain we wish to discuss is the commitment of resources to data collection and data system maintenance. After the characteristics of an optimal data system are delineated, and potentially effective means of obtaining the required data are developed, inadequate funding would be a severe strain. Particularly if these levels are below those required to support a critical mass of data and research personnel to develop, implement, and maintain basic series with properties consistent with various further uses.

Specific Strains Encountered Now

In the current agricultural data system, there appear to be at least four major types of strains: (1) lack of public data; (2) lack of data in a form that is readily usable by our current data system from both secondary and primary sources; (3) changing time frames; and (4) the fitting of the agricultural data system components into the broader and expanding federal data systems.

While monitoring the agricultural economy with the present data system, we have found many gaps in the public data system relevant to important current issues. For example, ERS was given a Congressional mandate to break out cost components of the margins of selected food items. A search of available data revealed that only bits and pieces of the necessary information existed from secondary sources. To fill in the gaps, ERS contracted with two universities and a private source to develop the methodology and the necessary data. One phase of this research is reported in another paper given at these meetings [3]. However, for many questions of public interest that are raised, we find that appropriate properties are not present in data readily available from private sources. Similarly, there is a great reluctance on the part of many respondents to furnish the same data items to public agencies although the information is to be made available only in aggregate form.

Closely related to lack of data is the problem of data in a form that cannot be used consistently in the current data system.

Many times in researching a problem we have to make do with less than ideal data. In cost surveys, we find many firms have set their accounting system to minimize the income tax paid when we as economists would prefer to have the "true" costs. In making our agricultural data system operational we often find that we have to "make do" with existing statistical series that were not designed for our use and may have to compromise intended concepts somewhat. In the marketing bill work, for example, the labor cost component is estimated from data from the separate Censuses of Manufacturers and Business which are on an establishment basis and the depreciation cost component is estimated from Statistics of Income which reports data on a firm basis for tax purposes.

The volatility of prices and interest rates have recently introduced another strain on our agricultural data system, that of changing time frames. Before the recent volatility of prices, periodic annual and quarterly data were considered adequate. Now we are faced with providing quarterly, monthly and sometimes weekly data instead. Two obvious possible approaches to the problem are: (1) rise the frequency of surveys or (2) continue to make estimates based on existing data flows. However, using data as now gathered by other agencies presents a problem of timeliness with respect to current demands for information. When they are obtained from someone else there must be turnaround time if the estimate is to remain timely.

The other strain of our present agricultural data system is

of a legal type. Every agency of the federal government that collects and publishes statistics must conform to certain legal conditions as prescribed in their statutory and budgetary authority and in the federal information acts. In the statutory and budgetary authority, agencies are required to collect and publish statistics for certain specific purposes. In some instances an agency may be responsible for expanding a component of a broader statistical series of another agency. For example, the retail cost of the market basket for U.S. farm produced food published by ERS is actually a specially defined component of the CPI that is published by the Bureau of Labor Statistics. Within the broader federal data system, there are many other interrelationships between the agricultural data system and the data system of other executive departments. The Office of Management and Budget overall has control and coordination of the different data systems within the federal government to avoid duplication of effort and to interpret statutory authority. The primary data gathering agencies, such as SRS and Bureau of Census are obligated to expend principal effort on mandated missions. Many of the features of industry aggregate accounting measures must rely on "piggy-backing" their data needs on these missions. In addition, administrative data are often either confidential or lack properties consistent with those already embodied in ongoing accounting measures.

From Present Sector Aggregates to Economic Accounts--

Expected Additional Strains

Our present data system has evolved from combinations of issues and resource commitments of the past. Many of the pressures and issues have survived with only changes in priority. Some have left, new ones have emerged. Thus the process of evolution continues to lead data system development. We now address ourselves to the pressures which we could expect to be exerted on the system by an extension of present measures to a set of sector economic accounts.

Semantics can be a severe strain. Problems of defining difficult concepts increase the likelihood of misrepresentation and mismeasurement.³ The implementation of a set of sector accounts would introduce a number of new concepts. One need only to reflect on the difficulty of arriving at a consensus definition of a farm to visualize the strains in arriving at operational definitions to implement measurement of the concepts presented by Carlin and Handy.

The importance of retaining a flexibility to reflect change and still preserve the basic conceptual properties of sector aggregate measures is illustrated by recent experience in the farm income accounts with farmers' expenditures for custom work. When the accounts were established, the primary interest was in estimating the net farm income of farm operators. Since most custom work was assumed done by farmers for other farmers, these

transactions would net out in the accounts, and were not included as receipts and farm production expenditures. By the time the emergence of a viable custom farm service operation was perceived and data collected to include these expenditures in the accounts, the magnitude of farmers' expenditures for such services was nearly a billion dollars.

The implementation of a complete set of economic accounts may require more detailed information than is presently available. A data system which must service both a commodity and an establishment view of an industry must allow for the differentiation between primary and ancillary outputs of the producing units as well as the associated fixed and variable inputs for each type of output. This is especially necessary if there is to be consistency between commodity information systems and sector economic accounts. For example, all of the Economic Censuses would have to collect much more detailed costs, product flows, and related statistics to estimate all of the components of the marketing bill on consistent establishment and commodity bases.

Some of the information required to implement the proposed sector accounting system may be difficult to obtain. This difficulty arises from two sources, the reluctance and the inability of the respondent to supply the requested information. Examples of data which respondents are sometimes reluctant to supply are data on income, debt-status, or other information which may reveal market share or market strategies for firms. Respondents may not

be able to supply valuations of assets and inventories because of incomplete records and lack appropriate of market prices.

Other data requested may not be available from respondent records in the form or concept demanded by the data system. Some available data are present accounts because they are simply assumed to net out. The system outlined by Carlin and Handy would require estimation of values for all outputs and inputs.

Economists are often like hunters in constant search of elusive prey. Their prey is the ultimate stable relationship. Implementing a set of sector economic accounts would undoubtedly open a new round of searching. The data requirements for filling the cells in a sector accounting scheme may be great and possibly expensive to obtain on a frequent basis. However, if stable relationships can be identified between benchmark estimates and periodic correlates, the data can be maintained with a less elaborate data gathering system. The identification of these stable relationships and the optimal mix of data gathering resources between benchmark estimates and periodic moves would appear to be a researchable problem for examining specific aspects of a specific system.

CONCLUDING OBSERVATIONS

We who work in the agricultural data system feel like the operators of a city street department told that a certain street is too small, dilapidated, and congested to accommodate the present traffic flow. The operators must keep the traffic flowing while a better street is designed and constructed. As many of you know, new road construction while maintaining traffic flow is not done easily or quickly.

The present data system was built up over a long period of time from concepts and data sources of an earlier era which were expanded as outstanding needs arose. There is no reason to believe that the system as it now exists should be scrapped and replaced. Perhaps the concepts and measures now provided will continue to be of value for a long time to come. Still, it is increasingly apparent that these concepts and the system used to quantify them fall considerably short of being sufficient for many of the questions we must try to answer and many of the comparisons we must make.

The present system can be used selectively as a take-off point for the implementation of additional and expanded measures such as the alternatives discussed by Carlin and Handy. A large, complex data system will always be strained when changes are made. Major additions to the concepts to be quantified by the system would require both new data and the stresses involved in trying to bend some of the old data to new uses.

We have discussed some of the likely sources of strain

associated with reconciliation of various perspectives of food and fiber industry; with generic roots in complexity, access to data, and resource commitment to the system; and with take-off points such as detailed commodity and cost information more amenable to aggregation procedures.

Before the subject implied by the title of this paper can be fully developed, certain other explorations must be developed and completed. There are other layers of operational definitions and concepts which should be explored thoroughly--depreciation, in-kind transfers, farm housing, and the like. An inventory of available data and their acquisition procedures should be made and examined. And an estimation, then, of remaining data requirements should be made based on what is available for doing specific jobs. Then the strains on the data system could be viewed from a more specific set of circumstances than were available to us for preparation of this discussion.

Footnotes

- 1 To facilitate international comparisons of output input, productivity, and the like, there is considerable effort being exerted toward the end of improving country statistics in general and agricultural statistics in particular, in properties and formats so that worldwide and regional situations can be identified and appraised. See, for example, [6, pp. 1-3].
- 2 The reader is referred to [10, pp. 227-234], for an excellent discussion of the issues raised for economists by this role of information.
- 3 For example, see [7, pp. 17-19] for a discussion of four concepts of value added.

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