RESEARCH REVIEW

CHRONIC INFLATION AND THE GNP

By Alan R. Bird*

Inflation and recession have long been considered mutually exclusive However, I suggest that chronic inflation, the increasingly important condition of the seventies and the eighties, is not the opposite of chronic recession The failure to recognize this difference between chronic and cyclical inflation and the associated efforts to "cure" inflation by traditional means intensify chronic inflation

Chronic inflation occurs when large, widespread, uneven, and frequent price increases persist to the extent that they are generally expected to continue They persist because of structural changes and attitudes beyond changes in the money supply, although the money supply itself becomes increasingly openended as more goods function as, and increasingly substitute for, traditional money as a store of value

Structural changes and attitudes undermine incentives for increased resource use and resource productivity to the point of precipitating chronic recession A notable structural change is the reduced mobility of skilled, experienced, and potentially the most innovative members of the labor force due to vested interests in pension plans and other perquisites specific to their respective employers, public or private This can reduce the incentive to increase productivity, salary scales are compressed for this group Featherbedding can exacerbate this problem Businesses tend to invest in appreciating items, such as real estate and inventories, at the expense of buying new equipment

In turn, chronic recession interacts with chronic inflation so that they occur jointly This explains the irony of attempting to cure chronic inflation with recession

Chronic inflation and chronic recession must be curbed together The role of the money supply alone becomes increasingly complex When inflation and recession coexist, is it more important to increase or decrease the money supply or keep it the same? Structural, attitudinal, and institutional changes have an intuitively larger role So does information on these changes and their effects on inflation

Price indices, such as those for consumer and producer prices, have come under attack as untrustworthy measures of inflation A slower increase in the Consumer Price Index is unlikely to indicate success in curbing chronic inflation, unless this change is accompanied by other changes that show increased resource productivity and resource use, including increased labor utilization These changes, in turn, should lead to an increased rate of real national economic growth Thus, a reliable measure of national economic growth is crucial to an adequate monitoring and understanding of inflation Yet our acceptance of the Gross National Product (GNP) as the prime indicator of national economic growth, even after the onset of chronic inflation, may be a crucial impediment to our understanding of chronic inflation and interrelated chronic recession

The standard national statistics show an average annual gain in current GNP of about 9 74 percent, from $935 5 billion in 1969 to $2,368 8 billion in 1979 The correction to 1972 prices shows a much smaller, but impressive, average annual gain of about 2 87 percent from $1,078 8 billion in 1969 to $1,431 6 billion in 1979 This implies an annual inflation rate of 6 87 percent that, I suggest, includes the chronic component that might be called the "core" rate

As population growth has slowed, converting real GNP to real GNP per capita would increase the estimated real growth rate, although there are offsetting considerations, such as the uncounted illegal immigrants Yet per capita real GNP overestimates U S economic progress in the seventies and thus works against solving the problem of chronic inflation

Current GNP is, of course, the sum of the quantities of all final goods and services for the latest year times their respective current prices GNP in 1972 dollars (real GNP) is the sum of the quantities of all new goods and services for each year times their respective 1972 prices

I suggest that events during the last decade underscore the well-recognized need to revise the real GNP to account for major changes in the quality of goods and services that are not reflected in price changes Under changes in quality, I include traditional changes such as those that affect the durability of an article I also include the remaining changes in social and economic conditions that have accompanied chronic inflation and could be expected to change people's per-

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ceptions of their levels of living The former changes are, more or less, included in routine updates of GNP estimation procedures, although periods of gross change are less easily assimilated this way The latter changes, the ones I contend have been dominant in the last decade, have not been accounted for, as such an accounting would require basic changes in the conventions associated with the calculation of the GNP

These events also call for two further revisions in real GNP These revisions would account for (1) inflation-induced changes between prices of currently purchased goods and services and those purchased previously and (2) inflation-induced changes between prices of goods and services counted in the GNP and other goods and services, such as land, that are traded in commercial markets but not counted in the GNP The result would be a conceptual "true real GNP" that, I suggest, would graph as a horizontal, or even a declining, curve over the last decade

Social change in the seventies was sufficient to mislead those who compare Consumer Price Index values in 1979 with those in 1969 Fifty-five percent of eligible adult women are now in the labor force, compared with 40 percent in 1970 and 35 percent in 1960 This change may partially reflect efforts by families to maintain their level of living in the face of increased inflation From 1970 to 1979, the ratio of all those currently divorced to those currently married doubled, from 47 to 92 per 1,000 persons, and the percentage of children under 18 living with one parent rose from 12 to 19 These changes suggest a major increase in the quantity of services traded in commercial markets, formerly provided within families or volunteered to society with no charge recorded in the public accounts, along with a likely increased demand for new services such as TV dinners

The average quality of some consumer goods and services may have declined For example, even after we allow for increases in oil prices, consumers are paying for an inferior petroleum product, compared with a decade ago There are fewer choices Some octane levels and kinds of gas are not generally and consistently available Many stations provide no regular maintenance or repair, not even the change or repair of a flat tire Some even charge for "air " "Self-service" is more common, but with a negligible price differential Other examples of quality decline come readily enough to mind Quality is increasing in some goods and services, but these improvements are increasingly offset by declines in other goods and services

The recent low level of business fixed investment is a factor in our resource productivity slowdown However, parallel changes in the quality of investment have occurred Two examples are "the apparent malnutrition of our research and development effort" and "the effects of escalating government regulation "[1] The latter are thought to dilute further the amount of investment directed toward increased production of goods and services for commercial markets Offsetting social benefits do not necessarily result in increased net total benefits to society Chronic inflation itself can compound this quality decline by discouraging needed long-term investment and diverting funds toward asset appreciation

Residential housing is another significant component of investment that is subject to quality changes As buying a house for cash is not generally an option, comparisons of true housing prices must include increased financing costs associated with increased inflation Moreover, mortgages are generally less assumable The quality of work and materials, and associated maintenance costs, while not easily measured, are potentially significant inflationary factors Bussing, increased energy costs, increased hazards from energy and chemicals, and the changing age structure of the population and associated school openings, closings, and consolidations have affected the average quality of new housing, particularly by distorting locational advantages, in ways unique to the seventies and eighties Changes in market prices do not necessarily reflect these major changes in life style, especially as earlier choices are no longer available
available

Government purchases of goods and services are valued conventionally at "cost," and this cost makes no allowance for quality changes It is not discounted for deficit spending, although this spending has probably added to inflation or lowered the capital

[1] Burton G Malkiel, "Productivity—The Problem Behind the Headlines," *Harvard Business Review*, May-June 1979, p 82

intensity of production or both [2] The switch to a volunteer military force, for example, has evoked widespread concern about defense preparedness Does each dollar of military expenditure buy what a comparable dollar would have bought in the days of the draft? The administrative costs of safety and environmental regulations need to be deflated in line with any net reduction in productivity that they cause Conventional real spending on education and training has increased greatly, yet the quality of these services is questioned

Chronic inflation creates two further needs to qualify the price component of real GNP Under conventional procedures, current GNP is corrected to real GNP by pricing current quantities of final goods and services at some historic or base price However, chronic inflation itself tends to cause final goods and services to appreciate A new durable good bought in 1972 would not depreciate so rapidly as without chronic inflation Alternatively, if a new 1972 good were available in 1979, it would sell for more than the 1972 price adjusted up to the 1979 price level Because of chronic inflation, the 1972 new good was actually underpriced in 1972 for consumption in 1979 Thus, the updated 1972 price should be higher than shown by the base

Another convention associated with calculating the GNP distorts the results in a time of chronic inflation Land and other natural resources, works of art, and other collectibles are not currently included in this calculation nor were they in the past Yet, the more intense the chronic inflation, and the more it is expected to continue, the higher the value of these assets relative to goods and services counted in the GNP Although these assets are not counted directly, they are traded in commercial markets in competition with goods and services that *are* counted In fact, increased demand for such assets is a feature of chronic inflation The prices of items counted in the GNP relative to asset values are, therefore, diminished by this progressive increase in asset values Yet, the prices of new goods counted in the GNP in years subsequent to the base year (1972) are not corrected for this asset appreciation in successive years The more inflation persists and intensifies, the greater would be the correction for this price change, and the more the curve showing real GNP would tend to flatten or decline over time The most significant asset appreciation for the average worker is that of his or her home To realize on this asset, however, he or she would need to sell that home or borrow on it more heavily, actions that would tend to increase the money supply The businessman or woman would have more incentive to buy assets as an inflation hedge than to buy plant and equipment that enhance labor productivity And these activities would likely fuel further inflation

To summarize, conventional accounting and estimation procedures used to derive real GNP probably result in a measure that progressively diverges from the real level of living of most families under chronic inflation This divergence may be large enough that correcting for it would reveal a real level of living over the last decade that has stagnated or declined and would thereby define a chronic recession paralleling chronic inflation Increased, chronic underutilization of labor is thus an expected feature of chronic inflation, as are reduced incentives and productivity for skilled, experienced, and potentially the most innovative members of the labor force Underemployment of the labor force and under utilization of national resources can thus be expected to intensify as chronic inflation continues, although the associated changes in unemployment rates may be more erratic due to the likely limited reliability of the unemployment rate as a measure of labor utilization Incentives for increased productivity-oriented investment, compared with appreciation investment, may likewise be dampened The coexistence of progressively more intense chronic inflation and recession suggests that changing the money supply, even to the point of worsening a recession, will never alone curb chronic inflation and may worsen it Parallel efforts to increase work incentives, enhance resource productivity, increase the average quality of output, and increase the utilization of all national resources, including labor and management, have an implied larger role in curbing chronic inflation The success of these efforts would depend on accommodating to major social and institutional changes, some of which may now be reinforcing chronic inflation

[2] Martin Feldstein, "Fiscal Policies, Inflation, and Capital Formation," *American Economic Review*, Vol 70, No 4, Sept 1980, p 647

MERGING RESOURCE DATA FROM DISPARATE SOURCES

By Linda L. Hagen and Paul T. Dyke*

Environmental cost-benefit issues have been gaining importance in congressional legislation and in public opinion In response, complex interdisciplinary modeling efforts have evolved These models may be multiobjective and multiresource in scope They require comprehensive data bases For example, determination of crop yields depends on soil characteristics, climatological factors, water balance characteristics, irrigation and management practices, available nutrients, and other physical factors To place a value on those yields, analysts need economic data on costs of production and crop prices Soil erosion changes the physical characteristics of the soil It also changes the costs of production as conservation practices are adopted, and use of inputs, such as fertilizer, increases Therefore, a complete study of the effects of soil erosion on crop yields, and their costs, would require both physical and economic data bases

Analysts of national environmental and natural resources policy require detailed cross-sectional data that are nationally consistent Massive amounts of data are available from various data collection efforts However, surveys are often designed for specific purposes, which limits use of the resultant data Two types of survey inadequacies are common

(1) Economic (physical) surveys do not contain physical (economic) data or locational codes matchable with existing physical (economic) data

(2) Economic (physical) surveys containing physical (economic) data may not use geographic boundaries, units of measure, or locational codes consistent with existing physical (economic) data bases

Additional surveys to collect the information needed would be costly and time-consuming Furthermore, policy questions often require immediate responses Given these time and budget constraints, creating a synthetic data file is sometimes the only feasible alternative A synthetic file is one created "by merging two or more existing ones [files] that, between them, contain the needed information" (*12*)[1] This is accomplished by matching selected codes or characteristics in existing data files The synthetic resource economic data file is one procedure that can be utilized as a partial substitute for a comprehensive data base

USDA personnel created a resource economic data file by matching and merging data from six disparate sources Here we discuss the steps by which the new data base was generated

BACKGROUND

The Soil and Water Resources Conservation Act of 1977 (RCA) was a congressional mandate to USDA calling for evaluation of USDA soil and water conservation programs As part of the RCA appraisal effort, we developed a yield/soil loss simulator (*4*, *7*, *8*, *9*, *18*) Earlier studies of erosion effects had been performed for specific sites or river basins Estimation techniques varied widely, thus, results are not easily compared Furthermore, these diverse results could not be aggregated for use at the national level Our analysis was the first attempt to evaluate the effects of soil erosion by use of a nationally consistent data base and model The simulator was incorporated into the structure of the National Agricultural Linear Programming Model located at Iowa State University (*11*, *18*)

To isolate the effects of erosion on productivity, we modeled yield as a function of soil characteristics Although the yield model was relatively simple, its data requirements were not The required data were located in six files Creation of the merged data base (see figure) involved the first application of the concepts utilized in the Land and Water Resources and Economic Modeling System (LAWREMS) LAWREMS is an information system of computerized data and models which was designed to promote use of data from disparate existing sources (*3*, *10*, *13*)

THE PHYSICAL DATA: SOIL CHARACTERISTICS

The Soil Conservation Service (SCS) *Soil Surveys* (*19*) identify and classify the soil series in a county and describe the soil's characteristics, formation, and morphology They provide information on capability groups, suitability ratings, and management needs of soils by land use, such as cropland, range,

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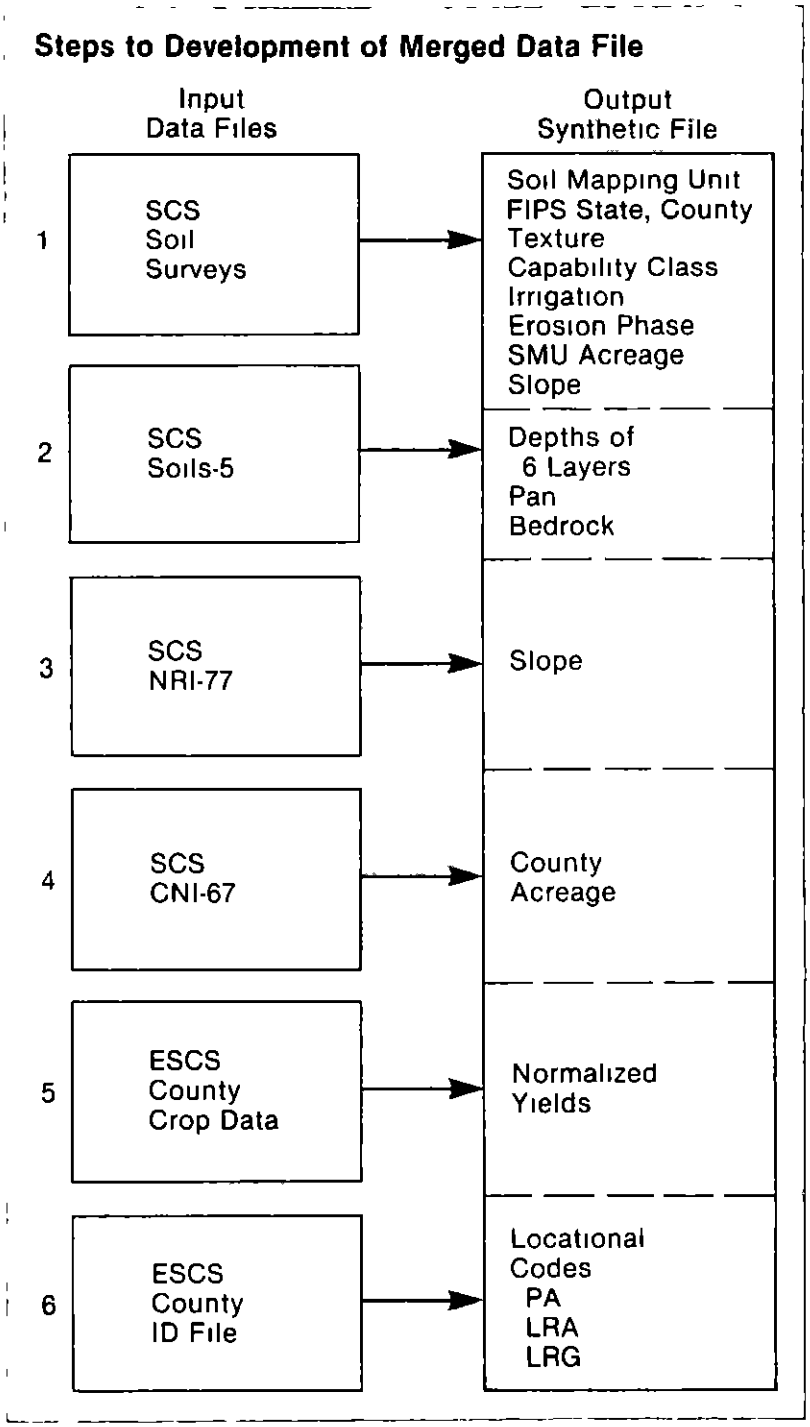
[1] Italicized numbers in parentheses refer to items in References at the end of this article



woodland, and wildlife habitat County soil maps (contained in the survey publication) define soil mapping units (SMU)[2] The SMU was the observation unit used in our

The *Soil Surveys* are widely used in county and project level development planning However, use of these data in research has been limited because they were not computerized Personnel in the Natural Resource Economics Division, ESCS, have automated selected soils data from the published county surveys (*6*) From this file we obtained the following data by soil mapping unit slope, texture, land capability class/ subclass, erosion phase, acreage, irrigation practice, and Federal Information Processing Standards (FIPS) State and county codes

Another SCS data base, the Soils-5 Soil Survey Interpretations file (*20*), is computerized but difficult to use The file contains over 12,000 records of unique soil series Each record is approximately 8,000 characters long and is interlaced with codes used to select characteristics relating to different phases of the soil series Soil depths of up to six layers and depths to bedrock were obtained from Soils-5, then matched and merged to *Soil Survey* data by soil mapping unit

As previously mentioned, slope data were obtained from the *Soil Surveys* However, in some cases, the slopes were reported descriptively, not numerically Examples include "steep," "hilly," and "undulating " These slopes would be considered as missing values by

[2] See Glossary at the end of this article

the computer model which would effectively lower the average slope in precisely those regions with the steepest slopes Therefore, we obtained numerical slope values from the 1977 SCS National Resource Inventory (NRI) (*17*) to replace descriptive slope terms

THE ECONOMIC DATA· NORMALIZED YIELDS

Approximately 1,100 county Soil Surveys were available at the time of the study These were published between 1958 and 1978 Yields reported in the survey data reflect random time and technology factors, depending on when during the 20-year period the county was surveyed Thus, the *Soil Survey* yields were normalized to bring all reported yields to a common base year—1974

The first step in the normaliza tion process was estimating 1974 normal yields at the county level These were calculated with linear regression time-trend analysis from published ESCS County Historical Crop Data for 1969-76 (*5*) These 1974 normal yields by crop and county were used as targets in the next step of the normalization procedure, the calculation of 1974 normal yields for each SMU within the county Two sets of acreage were used in the weighting process The *Soil Survey* was the source for the total acreage in each SMU Second, estimated acreages by SMU for each crop were derived from the SCS 1967 Conservation Needs Inventory (CNI) (*16*) The CNI was used because it is the only source of county-reliable data that contains capability class/subclass information by major crop groups The resulting normalized yields by SMU were merged into the original soil survey data file

A USEFUL LINK. COUNTY ID FILE

Observations in the yield/soil loss analysis were SMU's Final results were calculated for Producing Areas (PA), the geographic level used by the National Linear Programming Model The 105 PA's, which were defined by the Water Resources Council for use in the first National Water Assessment (*11*), overlap States but follow county boundaries

The ESCS County Identification and Cross-Reference Data File (County ID) (*1, 2*) contains many locational codes including Water Resource Sub-Area (WRSA), Land Resource Region (LRR), Aggregated Sub-Areas (ASA), Firm Enterprise Data System code (FEDS), Standard Metropolitan Statistical Area (SMSA), CNI State and county, National Science Foundation market regions, National Oceanic and Atmospheric Administration State and division, and latitude and longitude The file is useful in link ing data bases

The County ID file was the source for PA, Land Resource Area, and Land Resource Group codes We merged these into our synthetic file by matching State and county FIPS codes The final resource economic data base contained approximately 240,000 observations by SMU, ranging from 9,000 to 50,000 observations per crop

CONCLUSIONS

Although economic and physical data are rarely collected simultaneously, nationally consistent resource economic data files are increasingly needed for interdisciplinary models that can be used in natural resource policy and environmental cost-benefit analyses An interdisciplinary approach to data collection is recommended to solve the data problem

Creating synthetic files from existing sources has its limitations It can be very expensive in terms of labor and computer costs Loss of observations due to match failures can be a serious problem Some files simply cannot be matched with one another because no common characteristic exists between them In some cases, therefore, data collection is necessary, but a new approach is needed

Sample surveys should be designed with multiple objectives in mind That is, an interdisciplinary approach is needed when data are collected A test case in Missouri provides a good example It involved cooperation between SCS soil scientists and personnel in ESCS Statistics in collecting the Objective Yield Survey A soil classification and analysis were performed according to soil survey procedures for each sample point in the Yield Survey This type of coordinated data collection activity needs to be done on a national scale to provide good resource economic data for use in national policy analyses

GLOSSARY

Soil profile	The sequence of natural layers, or horizons, in a soil It extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots
Soil series	Soils having profiles that are almost alike Except for different textures in the surface layer, all soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics
Soil phases	Series are divided into phases on the basis of differences in texture of surface layer, and in slope, stoniness, or some other characteristic that affects use of the soil The name of a soil phase indicates a feature that affects management of the soil
Soil mapping units	The areas shown on a soil map On most maps detailed enough for use in planning, a mapping unit is nearly equivalent to a soil phase The mapping unit will indicate the dominant soil phase, although other phases may be present
Land capability class/ subclass	Soil classification scheme Numerals I-VIII indicate progressively greater limitations and narrower choices for practical use Subclass indicates kind of limitation or main risk e-erosion, w-wetness, s stony, d-droughty, c-climatic factors
Erosion phase	Classified as slightly eroded if 0-25 percent of topsoil is eroded, moderately eroded if 25-75 percent of topsoil is eroded, severely eroded if 75-100 percent of topsoil is eroded

Source (*15*)

REFERENCES

(1) Dyke, Paul "County Identification File " Data Base No 537 in *LAWREMS Directory, Version 1* U S Dept Agr , Econ Stat Coop Serv , Jan 1979

(2) _____ , and Diane Giardina *County Identification Codes and Cross Reference Table* Working paper No 67 U S Dept Agr , Econ Stat Coop Serv , Jan 1979

(3) _____ *LAWREMS Directory, Version 1* U S Dept Agr , Econ Stat Coop Serv , Jan 1979

(4) _____ , and Linda Hagen "The 1980 RCA Yield/Soil Loss Simulator," *Resources Conservation Act 1980 Appraisal, Part II* Review draft U S Dept Agr , Jan 1980

(5) Fritschen, John F , and Marlin Hanson "County Historical Crop Data 1969-76 " Data Base No 542 in *LAWREMS Directory, Version 1* U S Dept Agr , Econ Stat Coop Serv , 1979

(6) _____ "County Soils and Yields Data " Data Base No 618 in *LAWREMS Directory, Version 1* U S Dept Agr , Econ Stat Coop Serv , Jan 1979

(7) Hagen, Linda L , and Paul Dyke "Incremental Corn Yields as a Function of Soil Depth " Preliminary draft U S Dept Agr , Econ Stat Coop Serv , Aug 1979

(8) _____ "Yield/Soil Loss Relationships," *Proceedings of a Workshop on Influence of Soil Erosion on Soil Productivity*, Washington, D C , Feb 26-28, 1980

(9) _____ , and Gail Oemcke *The RCA Yield/Soil Loss Simulator Methods, Data, and Results for Selected Crops* Unpublished working paper, U S Dept. Agr , Econ Stat Coop Serv , Nov 1979

(10) Hogg, Howard, and Paul Dyke "The Land and Water Resources and Economic Modeling System (LAWREMS)," *Agricultural Economics Research*, Vol 30, No 3, July 1978, pp 22-23

(11) Meister, Anton D , and Kenneth J Nicol *A Documentation of the National Water Assessment Model of Regional Agricultural Production, Land and Water Use, and Environmental Interaction* Center for Agricultural and Rural Development, Iowa State Univ , Ames, Iowa, Dec 1975

(12) Sisson, Charles A "The Synthetic Micro Data File A New Tool for Economists," *Agricultural Economics Research*, Vol 31, No 3, July 1979, pp 1-9

(13) U S Department of Agriculture, Land and Water Conservation Task Force *LAWREMS Land and Water Resources and Economic Modeling Systems* Dec 1978

(14) _____, Science and Education Administration in cooperation with Purdue Agricultural Experiment Station *Predicting Rainfall Erosion Losses A Guide to Conservation Planning* Handbook No 537 1978

(15) _____, Soil Conservation Service *National Soils Handbook* 1974

(16) _____, "1967 Conservation Needs Inventory " Data Base No 530 in *LAWREMS Directory, Version 1* Jan 1979

(17) _____ "1977 National Resource Inventories " Data Base No 629 in *LAWREMS Directory, Version 1* Jan 1979

(18) _____ *The 1980 Resources Conservation Act — Appraisal Part II* Jan 1980

(19) _____ *Soil Survey* Various years

(20) Young, Keith, and D A McCormack "Soil Survey Interpretations (Soils-5 file) " Data Base No 598 in *LAWREMS Directory, Version 1* U S Dept Agr , Econ Stat Coop Serv , Jan 1979

PRICE AND EXCHANGE RATE TRANSMISSION

By H. Christine Collins*

World prices for major agricultural commodities rose dramatically in the early seventies The effect of international price changes on internal farm prices is interesting from a theoretical as well as a policy standpoint This article shows which countries responded internally to international price hikes, as mea sured by U S gulf port prices, and which ones did not The elasticity of price transmission and the elasticity of exchange rate transmission are the respective responses of a given country's prices to changes in the world price and the country's currency-dollar exchange rate, after transportation costs are taken into consideration The elasticities are used as a bridge between the world price and a country's internal price The principal findings in this article are

- Most countries have experienced rising farm prices for wheat, corn, and soybeans, particularly in the seventies Internal commodity prices rose in proportion to international trade prices in most major exporting countries, as expected under free trade Elasticities of internal price with respect to world price under free trade equal 1 0 However, for importing countries and for countries not heavily involved in world trade, most elasticities were significantly less than 1 0, which implies some internal protection from world price changes
- For wheat, Canada and Uruguay exhibit nearly perfect price and exchange rate transmission Argentina, Australia, and Turkey transmit price, but not exchange rates Argentina had a mul tiple exchange rate system to prevent exchange rate transmission for wheat The major wheat exporters, except France (which showed virtually no price transmission), had nearly perfect price trans mission
- Brazil, Thailand, Canada, Chile, Turkey, and Tanzania are the only corn-producing countries whose price and exchange rate transmission elasticities are close to 1 0 and, therefore, whose farm prices are closely related to the world market price Argentina, Pakistan, Zaire, and Morocco have nearly perfect price transmission, but exchange rate changes have not been transmitted to the farm level Argentina also has a multiple exchange rate scheme for corn The above two groups include all the world's major corn exporters, except South Africa South Africa shows imperfect price transmission and virtually no exchange rate transmission
- Brazil, Paraguay, and Canada are the only soybean producing countries with approximately perfect exchange rate and price transmission Brazil is the principal U S competitor on the international soybean market Japan appears to show price transmission This is contrary to what would be expected as Japan has an extremely high support price for soybeans
- Most other countries have some form of price protection for their wheat, corn, and soybean producers The European Community's Common Agricultural Policy for grains is the most signifi cant The Mexican Govern ment subsidizes its flour mills and feed compounders to offset high producer prices The Indian Government is the largest single buyer of grain and it guarantees a set price to the producer The Brazilian Government sets the farm price for wheat at a high level Mexican, Indian, and Brazilian farm prices are keyed from the U S gulf ports price, whereas the European Community's inter nal farm prices are generally not
- Some countries, like Yugoslavia, appear to set their internal farm prices with the gulf ports price, but 1 year later
- From 1966 through 1974, the exchange rate of eight countries changed more than 100 percent in relation to the U S dollar However, this change was not necessarily transmitted through internal

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farm prices of the major commodities Brazil, Chile, Colombia, Israel, and Korea permitted full transmission of the exchange rate influence to the farm price, but Argentina, Pakistan, and Zaire only partially did so Because of varying government policies toward exchange rates and farm prices, transmission of the exchange rate to farm prices was virtually zero to, for example, West Germany, but about 1 to the Philippines, Korea, and Japan

Price and exchange rate transmission elasticities for corn demonstrate that transmission can run the full range from zero to 1 Of the 33 corn-producing countries, 8 have price transmission elasticities not significantly different from 1, 5 have price transmission elasticities not significantly different from zero Yet a third category of countries falls between the extremes, which means internal producer prices are only partially insulated from world market prices Ten countries, including Brazil, Chile, and Colombia, had full exchange rate transmission from the world market to the farm However, 12 countries had no exchange rate transmission for corn, and 4 countries were between zero and 1

COMPARISON WITH OTHER STUDIES

Bredahl, Meyers, and Collins set the price transmission elasticity at either zero or 1 (*4*) [1] However, this study shows instead that elasticities range from zero to 1 A price transmission elasticity of 1 may be termed a perfect price transmission Where governments insulate internal producer prices from world market prices (with variable import levies, subsidies, or quotas), the price transmission elasticity will be at or near zero Whereas Bredahl, Meyers, and Collins used a price transmission elasticity for corn of zero for the European Community, the elasticities calculated in this study range from 0 043 in West Germany to 0 674 in Italy For Argentina, Bredahl, Meyers, and Collins set the elasticity at zero, but results of this study indicate an elasticity of 1 115 (not significantly different from 1 0) For South Africa, they assumed an elasticity of zero, calculations of this study show 0 426 Thailand and Brazil have price transmission elasticities of 0 999 and 1 101 (not significantly different from 1), respectively, in this study, rather than the zero which they assumed

Bredahl, Meyers, and Collins pointed out that a "key question that must be resolved in evaluating the elasticity of export demand is the size of the adjustment of foreign internal prices to U S prices ," that is, price transmission (*4*) They referred to the models for the elasticity of foreign demand set forth by Tweeten (*16*) and Johnson (*13*) Tweeten's model is an excess demand model The elasticity of price transmission (E_{pi}), the response of a given country's price to changes in the world price, is included in Tweeten's formulation as a bridge between the world price and a country's internal price Johnson uses a similar relationship However, Johnson states, "E_{pi} is set equal to 1 0 and can be ignored " Bredahl, Meyers, and Collins conclude that Johnson's assumption of perfect price transmission is a convenient simplification, but it has a profound impact on the calculated elasticities and raises serious questions about their applicability The same E_{pi} should be expected between the internal farm prices of an exporting country and the gulf ports price as exporting countries compete in the same international markets Although Bredahl, Meyers, and Collins appear to relate price transmission to demand, they include price transmission between the gulf ports and farms in major exporting countries in their example This article employs the Food and Agriculture Organization (FAO) data base (*9*) of internal farm prices for wheat, corn, and soybeans in selected countries (*6*) The U S gulf ports price for these commodities is used as a measure of world price (*17*) The FAO data base offers the most comprehensive and consistent coverage of farm-level prices

Although the FAO data base covers the 1966-74 period for most countries, it can sometimes be supplemented by earlier FAO price data published as *Agricultural Prices 1961-70* or by data published in agricultural yearbooks in some countries The major weakness of the FAO data base is its short price series for many countries, from 9 to 15 observations

Price transmission has been complicated by the shift in exchange rates for many countries relative to the U S dollar The

[1] Italicized numbers in parentheses refer to items in the References at the end of this article

exchange rates of Colombia, Korea, Pakistan, Israel, Yugoslavia, Zaire, the Philippines, Argentina, Bolivia, Chile, Costa Rica, and Brazil shifted so drastically that one must convert their internal prices to a common currency to unmask the existing price relationships

Argentina and Brazil's official exchange rates increased 13 and 11 times, respectively during the 1966-75 and 1963-73 periods Colombia and Korea (1963-74) and Zaire (1966-75) had exchange rates that tripled However, the exchange rates of many countries, including Mexico, did not change relative to the U S dollar (table 1)

If there is perfect transmission of the exchange rate, the transmission elasticity of a foreign internal price relative to the foreign currency/U S dollar exchange rate equals 1

EMPIRICAL MODEL

To test the relationship between the U S gulf ports price and domestic producer price for corn, wheat, and soybeans, I estimated the price transmission and exchange rate transmission elasticities from the following model

$$\log P = A + B_1 \log (P_{GP})$$

$$+ B_2 \log (EXR)$$

where P is the internal farm price of the commodity considered and is expressed in the currency of a specific country, P_{GP} is the U S gulf ports price for the commodity, and EXR is the exchange rate between the U S dollar and the country's currency This model assumes a constant percentage margin between the U S gulf ports price and the country's internal price

This model was tested with assumptions that (1) internal farm prices changed in the same year as the U.S gulf ports price and (2) internal farm prices changed a year later Lagged price variables were chosen when they provided a better statistical fit than the unlagged price variables Several other linear and log models were fitted to this data but they are not discussed here (*6*)

The resulting coefficients on the exchange rate and the gulf ports price were tested to determine if they were significantly different from zero or 1 Where the exchange rate had not changed during the years under study, the coefficient b_2 was set equal to zero

CONCLUSIONS

Price and exchange rate transmission elasticities can range any where between zero and 1 It can be misleading in policy models to assume *a priori* that real elasticities are exactly zero or 1 Table 2 summarizes the results of the regression analysis Commodity-specific conclusions appeared in the introduction as highlights More general conclusions are given Subsequent ESCS research on wheat and corn prices supports the estimates presented here and substantiates the

Table 1—Changes in currency/U S dollar exchange rate, 1966-74

100 percent or more	20-100 percent	10-20 percent	1-10 percent	No change
Argentina	Austria	Algeria	France	El Salvador
Brazil	Belgium	Australia	Italy	Guatemala
Chile	Bolivia	Congo	New Zealand	Kenya
Colombia	Germany, Federal Republic	Denmark	Nigeria	Mexico
Israel	India	Egypt	South Africa	Paraguay
Korea	Indonesia	Malawi	Spain	Tanzania
Pakistan	Ireland	Morocco	Thailand	
Zaire	Japan	Portugal	Venezuela	
	Korea	Uruguay	Zambia	
	Malaysian Peninsula			
	Netherlands			
	Philippines			
	Sweden			
	Turkey			
	West Germany			
	Yugoslavia			

Table 2—Calculated price and exchange rate transmission elasticities for wheat, corn, and soybeans

Country	Wheat		Corn		Soybeans	
	Price transmission elasticity	Exchange rate transmission elasticity	Price transmission elasticity	Exchange rate transmission elasticity	Price transmission elasticity	Exchange rate transmission elasticity
Algeria	0 166	0 183	—	—	—	—
Argentina	1 014(X)	361	1 115(X)	0 453	0 429*	0 491
Australia	707(X)	376	—	—	—	—
Austria	158	196	—	—	—	—
Belgium	068	366	—	—	—	—
Bolivia	—	—	250	238*	—	—
Brazil	199	932(X)	1 101(X)	782(X)	1 105(X)	734(X)
Canada	1 086(X)	1	1 038(X)	1	921(X)	1
Chile	—	—	594(X)	1 001(X)	—	—
Colombia	—	—	—	—	380	1 077(X)
Congo	—	—	526	681(X)	—	—
Denmark	088*	1 330(X)	—	—	—	—
Egypt	262	724	513	055*	—	—
France	166	011	481	522*	—	—
Germany, Federal Republic	140*	265	043*	302*	—	—
Greece	516	1	589	1	—	—
Guatemala	—	—	469	1	—	—
India	774	1 915(X)	—	—	—	—
Indonesia	—	—	486	819(X)	675	568
Ireland	511	1 262(X)	—	—	—	—
Israel	686	1 119(X)	—	—	—	—
Italy	484	1 638(X)	674	1 255(X)	—	—
Japan	262	776(X)	—	—	885(X)	1 484(X)
Kenya	614	1	447	1	—	—
Korea	615	1 348(X)	—	—	363	1 410(X)
Malaysian Pensinsula	—	—	290*	1 031*	—	—
Malawi	—	—	339*	1 121*	—	—
Mexico	541	1	455	1	753	1
Morocco	—	—	1 272(X)	2 802(X)	—	—
Netherlands	108	722(X)	—	—	—	—
New Zealand	398*	199*	678*	279*	—	—
Nigeria	—	—	531*	995*	—	—
Pakistan	—	—	981(X)	729	—	—
Philippines	—	—	623	988(X)	—	—
Portugal	218	382	687	547*	—	—
Spain	622	1 100(X)	715	1 206(X)	—	—
South Africa	309	623	426	054*	—	—
Sweden	268	447*	—	—	—	—
Tanzania	—	—	1 020(X)	1	—	—
Thailand	—	—	999(X)	1	572	1
Turkey	865(X)	563	861(X)	283*	—	—
United Kingdom	673	1 332(X)	—	—	—	—
Uruguay	1 349(X)	955(X)	470	1 102(X)	—	—
Venezuela	—	—	661	303*	—	—
Yugoslavia	426	1 382(X)	804	990(X)	538	1 024(X)
Zaire	—	—	896(X)	459	—	—
Zambia	—	—	413	441	—	—

*Not significant at the 95 percent level of confidence

[1]No change in exchange rates

(X) Indicates that coefficient is not significantly different from 1, for perfect price transmission
— = Less than 1 0 million tons per year for wheat or corn, less then 0 25 million tons per year for soybeans

price relationships based on FAO data The Commission of the European Community's July 1979 special publication, *Agricultural Markets, Prices Received by Farmers, Unit Values,* provides prices through the 1977/78 crop year Greece, France, Norway, Denmark, Ireland, and Italy have farm-level wheat prices for the crop years 1966/67-1977/78 that move with the U S gulf ports price, when measured by the coefficient of determination The Netherlands, Ireland, Italy, the United Kingdom, and Greece have exchange rate changes with a statistically significant impact on internal farm prices However, none of these countries has perfect price and exchange rate transmission

The basic transmission relationship also holds for corn, despite differences in data sources and updated time periods ESCS regression analyses of alternative data sources (*1, 2, 3, 4, 5, 7, 8, 10, 15*) yield approximately the same results as the FAO price series

When exchange rates change abruptly from an historically stable level, the model on page seems to attribute a transmission elasticity greater than 1 to the exchange rate This abrupt change may be caused by a "shock" effect on prices resulting from the sudden exchange rate change Or, when only small changes in exchange rates occur, the equation may attribute too much, including other statistical errors, to the exchange rate variable, or statistical aberrations may occur The data might be faulty or the exchange rate data might not line up with the price data in the respective time series This latter condition is a problem especially when a massive inflation and sharp changes in exchange rates have occurred Price policy during the years being studied may have changed and the coefficients may not be able to reflect such a change

This note is concerned with empirical estimates of the elasticity of transmission of price and exchange rates The results indicate that models which assume *a priori* elasticities of zero or 1 are likely to be in error I do not examine how such information should be incorporated into trade models For example, some models might use direct estimates, as was discussed, while other models might explain transmission with intervening variables and explicit policy instruments

REFERENCES

(1) Argentina, Bolsa de Cereales de Buenos Aires *Bolsa de Cereales* Buenos Aires, selected issues

(2) Australia, Bureau of Agricultural Economics *Situation and Outlook, Wheat* Canberra, selected issues

(3) Bank of Thailand, Department of Economic Research *Monthly Bulletin* Bangkok, selected issues

(4) Bredahl, Maury E , William H Meyers, and Keith J Collins, "The Elasticity of Foreign Demand for U S Agricultural Products The Importance of the Price Transmission Elasticity," *American Journal of Agricultural Economics*, Vol 61, No 1, Feb 1979

(5) Canada, Canadian Wheat Board *Annual Report* Winnipeg, selected issues

(6) Collins, H Christine, "Price Transmission Between the U S Gulf Ports and Foreign Farm Markets," IED Staff Report, Econ Stat Coop Serv , U S Dept Agr

(7) Commission of the European Communities *Prices Received by Farmers, Agricultural Markets* Special Issue *Agricultural Markets* Brussels, July 1979

(8) Eurostat (Statistical Office of the European Communities) *Selling Prices of Vegetable Products* Brussels, selected issues

(9) Food and Agriculture Organization "Farm Price Data Base" (unpublished) Available on USDA TDAM computer system and computer tape from FAO

(10) Food and Agriculture Organization *Monthly Bulletin of Agricultural Economics and Statistics* Selected issues

(11) International Monetary Fund *International Financial Statistics* Selected issues

(12) Japan, Ministry of Agriculture, Forestry and Fisheries, Statistics and Information Department *Monthly Statistics of Agriculture, Forestry and Fisheries* Tokyo, selected issues

(13) Johnson, Paul R , "The Elasticity of Foreign Demand for U S Agricultural Products," *American Journal of Agricultural Economics* 59(1977) 735-36

(14) Pakistan, Government of, Statistics Division *Statistical*

Bulletin Karachi, selected issues

(15) Spain, Ministerio de Agricultura, Secretaria General Tecnica *Anuario Estadistico de la Produccion Agricola* Madrid, selected issues

(16) Tweeten, Luther, "The Demand for United States Farm Output," *Food Research Institute Study* 7, 1967

(17) U S Department of Agriculture, Economics, Statistics, and Cooperatives Service "ESCS Price Data Base" (unpublished) Available on USDA TDAM system

CONSENSUS AND CONFLICT IN U.S. AGRICULTURE:

PERSPECTIVES FROM THE NATIONAL FARM SUMMIT

Bruce L Gardner and James W Richardson, editors,
Texas A & M University Press, College Station, 1979,
280 pp $17 00 (cloth), $7 95 (paper)

*Reviewed by Milton Ericksen**

In a sense this book is an anticlimax to the processes out of which it emerged The sharpness of the debates within the task forces charged with preparing reports and the confrontation atmosphere at the summit where these reports were delivered are not captured in the book An expansion of knowledge and a challenge to opinion had to occur among the 76 task force participants and the over 700 summit attendees That group forms a nucleus of people from wide-ranging backgrounds and disciplines who have had face-to-face experience in discussing, learning about, and disagreeing over food and agricultural issues

As one who belonged to a task force, attended the summit, and read the book, I was not surprised that the debate leaned more towards conflict than toward consensus If the task force-summit process is to achieve consensus, several more summits and several more books will be required For this first round, the participants reacted instinctively to defend their interests, ideologies, and positions

The chapters in the book are definitely influenced by the task force chairmen This might be expected as they had the task of giving cohesion and consistency to the subject area assigned to the task force The reader does not get a comprehensive view of the perspectives of individual task force members

Chapter 1, "Resource Allocation and Production Costs," states that the viewpoint of farmers distinctly differs from those of consumers, representatives of agribusiness, government officials, and others with an interest in agriculture Most of the material resembles that of classroom lectures in introductory agricultural economics No unique perceptions nor solutions are presented

The discussants of chapter 1 focused on regional problems or those in which they had a vested interest The reaction from the floor was to propose solutions to perceived problems and to solicit reactions from the panel of discussants The participants in the task force and at the summit seem not to have grappled with fundamental resource allocation and production cost problems

The task force report on "Farm Commodity Prices and Income" (appearing as chapter 2) generated the most hostility from the farmer segment of the audience A major reason was that it was less than subtle in indicating that high price supports are not the answer to the price and income situation This thesis is supported by data that include some fairly complicated derivations Cash flows are identified as a comparatively new ailment, and heterogeneity of individual farms is stressed Chapter 2, like the others, is identifiable with its task force chairman, but it also contains a section on task force perceptions allowing the reader to identify the task force members' preferences and responses to issues in farm policy

The task force report on "International Trade" (chapter 3) also met with reaction from the farm segment of the audience They simply did not agree that the long-run interests of society and agriculture are best served by open trade objectives Chapter 3 identifies those impediments to open trade that should be addressed by policymakers The opposing view is that these changes either cannot be made or will take too long so the shortrun alternative should be offsetting controls or agreements The discussants found the paper too academic

Chapter 4, "Nutrition, Product Quality and Safety," recognizes the broader context of food and agriculture policies The summit was held at the end of the seventies At the beginning of that decade, a national farm summit would not have occupied itself with this subject The inherent dilemma is captured by the following question "When private choices, even if fully informed, lead to public health problems, who shall decide on the nature and extent of remedies?" Chapter 4 examines the controversy surrounding nutrition, quality, and safety of food The writers admit that the task force could not recommend a feasible set of goals that would improve the nutritional quality and safety of the American diet The task force could not achieve consensus except on the point that a way needs to be found to formulate a policy that would satisfy all interested parties The chapter is a good statement of the controversy and suggests that the task force grappled with the issues

The fifth chapter, "Agriculture's Role in Government Decisions," is also new to the area of agricultural policy It should be interesting to those who believe the U S Depart-

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ment of Agriculture should be reharnessed as a political power base for production agriculture The theme of the chapter is that agricultural interests should refrain from ideological demagoguery and concentrate instead on building coalitions with other interest groups Parts of the chapter read like a sermon directed to those who either believe production agriculture has no political base or to those who believe that those in production agriculture need not be concerned with consumer interests, environmental interests, the regulators, and the Government The only chinks in what appears to be a consensus are two footnotes by a task force member who takes exception to examples that contrast positions of public benefit with negative individual costs The discussants agreed with the report in principle As the task force chairman and discussants all worked in Washington, D C , it could be expected they would be comfortable with coalition politics

Chapter 6, "Summit Review," classifies and summarizes the major points and attempts to identify points of consensus Chapter 7, "Comments of the American Agriculture Movement," presents views that conflict with many of the statements contained in the task force reports The reader can gain perspective on the consensus and conflict by reading these two chapters first

In this reviewer's judgment, *agricultural economists* will be most interested in chapter 4 and in the last two chapters The book will not provide much new knowledge, but is interesting Students of agricultural policy should add it to their general reading list

Producers will get an exposure to academic attitudes on production and trade and an economist's explanation of their problems Producers will recognize several areas of disagreement among farmers, academics, and bureaucrats

Consumers may be surprised by the pervasiveness of the distrust for their advocates They will be reminded of their good fortune regarding quantity, quality, and price of food They may also be surprised by the degree of conflict within the total food-producing system and by the discovery that there are advocates of improved nutrition who believe direct Government action is needed

Government policymakers familiar with food and agriculture policy will find little that is new They may gain some appreciation for the heterogeneity of the agricultural sector The book should allay any fears that there will be no policy issues to address during the eighties

Political scientists should gain a sense of the task facing the political system They will be disappointed if they expect to find well defined alternatives suitable for political debate and decision-making

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THE INNOVATOR'S SITUATION:

UPPER-MIDDLE-CLASS CONSERVATISM IN AGRICULTURAL COMMUNITIES

Frank Cancian,
Stanford University Press, Stanford, Calif , 1979,
159 pp , $12 50

*Reviewed by Robert D Munoz**

Competition among farmers for social and economic rank affects who adopts new technology Frank Cancian examines this hypothesis by attempting to demonstrate that, in the broad middle range of farmers who are neither rich nor poor by local standards, a large percentage of those who are lower middle class consistently adopt innovations earlier than those who are upper middle class Only later, when the first returns are in and the innovation is judged successful do farmers of upper-middle rank adopt the technology in comparable proportions

Cancian's theory tries to explain why both low-middle-rank farmers and high-rank farmers seem to adopt innovations faster than the upper-middle rank group His theory is stated in a general way, relating economic rank to the risk of various agricultural enterprises used to gain and maintain that rank Cancian uses two hypotheses to test for the fundamental principles in the inhibiting effect of rank explanation of an upper-middle class conservatism in the adoption process The first hypothesis tests whether in the early stages of the spread of an innovation, low-middle rank individuals are more likely to adopt it than are high-middle-rank individuals The second hypothesis tests whether, in the later stages of the adoption process, the adoption rate of high-middle-rank individuals will increase relative to the adoption rate of low middle-rank individuals

To test these hypotheses, Cancian examines secondary data from eight countries India, Japan, Kenya, Mexico, Pakistan, the Philippines, Taiwan, and the United States He analyzes data on more than 6,000 farmers included in 23 studies by rural sociologists, anthropologists, and agricultural economists

Cancian summarizes his study in three sentences

(1) It is useful to distinguish between an early stage in the spread of an innovation when uncertainty is high and a later stage where knowledge about the implications of using the new practice is much more widespread
(2) In the first stage of the spread of an innovation, farmers of high-middle position are apt to be conservative compared with those of low middle position in the community
(3) In the second stage of the spread of an innovation, these high middle-rank farmers catch up so that the overall relation of economic rank and adoption becomes monotonic positive That is, the relation of rank and innovation varies in a predictable way over time

The implications of these findings for agricultural development policy are broad Many programs to help small farmers are usually aimed at upper-middle-class farmers The reason is that, in many less developed countries, the upper-middle-class farmers appear to be the only ones except the rich with viable commercial farming operations If the programs fail to induce adoption among the upper middle class, the conclusion is that a program designed to give lower-middle-class farmers access to new agricultural practices will also fail According to Cancian, the failure of a program designed for the upper middle class cannot be taken as evidence that poorer local farmers will resist or reject new practices

This book adds to the body of knowledge on theories of innovation by filling the gap—within the middle class of farmers—on who is most likely to adopt innovations It goes beyond the assumption that larger, richer farmers are more likely to adopt innovations than smaller farmers

The book has several shortcomings The first, most obvious problem is its reliance on secondary data which may have errors that cannot be identified or corrected A second problem is Cancian's economic rank hierarchy, which is based on the assumptions that economic position is important to people and that most people expend great effort gaining and maintaining their economic rank These assumptions may not be true of all agricultural societies There are agricultural communities based on the barter system where economic rank means little and there are others at a subsistence level where survival is the main goal However, Cancian's book is well written and worth reading by the student of adoption-of-innovation theory

*The reviewer is a rural sociologist with the Economic Development Division, ESS