



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

International Agricultural  
Trade Research Consortium

Comparative Advantage, Competitive Advantage,  
and U.S. Agricultural Trade

By

T. Kelley White\*

Working Paper # 87-2

The International Agricultural Trade Research Consortium is an informal association of University and Government economists interested in agricultural trade. Its purpose is to foster interaction, improve research capacity and to focus on relevant trade policy issues. It is financed by USDA, ERS and FAS, Agriculture Canada and the participating institutions.

The IATRC Working Paper series provides members an opportunity to circulate their work at the advanced draft stage through limited distribution within the research and analysis community. The IATRC takes no political positions or responsibility for the accuracy of the data or validity of the conclusions presented by working paper authors. Further, policy recommendations and opinions expressed by the authors do not necessarily reflect those of the IATRC.

This paper should not be quoted without the author(s) permission.

\*The author is the Director, International Economic Division, Economic Research Service, USDA. Correspondence or requests for additional copies of this paper, should be addressed to the author at this address:

USDA/ERS/IED  
1301 New York Avenue N.W.  
Washington, D.C. 20005

COMPARATIVE ADVANTAGE, COMPETITIVE ADVANTAGE, AND  
U.S. AGRICULTURAL TRADE\*

by  
T. Kelley White\*\*

World trade in agricultural commodities grew more rapidly than production during the 1970's. The percentage of world agricultural production entering world trade increased from about 10 percent in the early 1960's to about 17 percent in 1980. Aggregate value of agricultural trade doubled between 1970 and 1975 and almost doubled again by 1980. The rate of growth in agricultural trade has slowed rapidly during the 1980's and both volume and value actually declined between 1981 and 1984.

The United States participated more than proportionately in the boom in world agricultural exports capturing a large share of total growth. The total value of U.S. agricultural exports grew from less than \$10 billion dollars in 1970 to a peak of \$44 billion in 1981. The farm sector, as a consequence, experienced a period of prosperity (income of farm families approached equality with that of nonfarm families), invested heavily in increased production capacity, bid the price of land up to historic levels, and significantly increased sectoral debt load.

---

\*Comments presented at meeting of NCR-113, St. Louis, Missouri, October 7, 1986. Views are those of the author and do not necessarily reflect official positions of USDA.

\*\*Director, International Economic Division, Economic Research Service, USDA.

The depressed world market conditions of the 1980's have also affected U.S. agricultural trade and the farm sector more than proportionately. From the peak in 1981, the volume of U.S. agricultural exports has fallen by more than one third and the value by nearly 40 percent. For the first time in 15 years the monthly agricultural trade balance was negative in May of this year and continued negative through July. Not only have U.S. exports declined to levels of the mid 1970's, but the U.S. share of major world commodity markets has declined.

The farm sector is experiencing serious economic difficulties as commodity prices are depressed, land prices have fallen by as much as 50 percent in some areas, and a significant number of farmers are unable to service debt incurred during the 1970's. Government and Farmer Owned Reserve stocks are at or near record levels and cost of government commodity programs is at record high level.

The reserval in U.S. agricultural export performance in world markets raises questions as to whether the U.S. has lost its ability to compete, has lost its comparative advantage, is no longer the world's most efficient agricultural producer, and what can be done to regain our "rightful" share of world markets. Increasingly, we hear charges of unfair competition by competitors, pleas for protection from imports and subsidies for our exports, and protests that U.S. farmers cannot be expected to compete with cheap labor and land in other countries. The 1985 Food Security Act was shaped importantly by the objective of making

American agricultural commodities competitive again. The Export Commission was charged with making recommendations for policy action that would restore U.S. competition in world markets, including agricultural markets.

The questions of the current competitive position of U.S. agriculture in world markets, how it is likely to change in the future, and what we can do to change it through domestic and trade policy initiatives are obviously important ones. They are especially important because policies adopted to improve our export position and the financial situation of the agricultural sector, if based on incorrect answers to these questions, can make the situation worse rather than better, especially in the long run.

In this paper, I will consider two different but related concepts that are most frequently used in attempting to explain trade performance--comparative advantage and competitiveness. For each I will discuss the concept, identify determining factors, discuss measurement (and present some examples of attempts at measurement for the U.S.), and comment on the usefulness of these concepts as a basis for policy. Finally, I will present a research agenda through which the agricultural economics profession could contribute to a broader understanding and a better basis for dealing with the competitiveness problem.

## Comparative Advantage

The concept of comparative advantage states that countries tend to export those goods for which the relative autarkic price is higher and import goods for which the relative autarkic price is lower than in potential trading-partner countries. This assumes that the autarkic (self-sufficient, closed economy) prices are determined solely by forces of supply and demand in a perfectly competitive economy. Thus, resources are allocated to their highest economic use at the margin and social and private costs and returns are equal. Historically, two different reasons have been given for the existence of autarkic price differentials. The Ricardian view of comparative advantage stresses differences in factor productivity attributable to use of different technologies. The Heckscher-Ohlin view of comparative advantage stresses differences in factor endowment (Haley).

As presented in the usual textbook, comparative advantage is easily understood and provides a firm basis for gains from specialization and trade. The most important contribution of this concept as the basis for trade is its dependence on differences in relative costs or prices rather than absolute differences. A country does not necessarily have to be the low-cost producer in order to gain from exporting and importing. Another important contribution of the concept of comparative advantage as the basis for trade is that, in a perfectly competitive world, free trade is

demonstrated to be superior to any distorted version. Under these assumptions forces of supply and demand will allocate resources efficiently--any distortion would reduce efficiency and thus the total size of the economic pie.

In its conventional form, the concept of comparative advantage has two important limitations (actually there are others that will be discussed later) as a basis for explaining trade behavior. Haley has identified these as: (1) its static nature and (2) that it is a supply side concept. In his award-winning Ph. D. dissertation, Haley develops a theoretical model of trade which incorporates both the Heckscher-Ohlin and Ricardian bases for different relative autarkic prices from the supply side (different resource endowments and different technologies). He adds dynamics by providing for investment which over time allows for augmentation of the resource base and modification of the technology used. He also includes a demand structure which recognizes the changing income elasticity of demand as income level differs, allowing for demand induced differences in relative autarkic prices.

Even in its expanded form, the concept of comparative advantage is limited in its ability to explain or predict trade behavior of a country or trade patterns among countries.<sup>1/</sup> Trade as determined by comparative advantage is dependent on relative autarkic price differences in a perfectly competitive, nondistorted world. It therefore provides a

---

<sup>1/</sup> Haley discusses some of the technical reasons and cites several attempts reported in the literature.

normative view of what trade ought to be in an idealized world. Autarkic relative prices cannot be observed because not all, or even most, markets are competitive and many policy distortions exist within and among countries.

Attempts have been made to determine comparative advantage using the Domestic Resource Cost (DRC) approach (Pearson and Meyer). However, data availability severely constrains the usefulness of this method for international comparisons. Also, it assumes that the world price is an undistorted market price. Given the many difficulties involved with the DRC approach, we often fall back on comparisons of accounting costs of production (Stanton, and Stanton and Neville-Rolfe). Paarlberg, et al, have discussed the problems associated with the use of costs of production as an indicator of comparative advantage. Various measures of relative factor productivity and changes in factor productivity among sectors within countries and among countries have been cited by Dunmore and by Paarlberg, et al, as indicators of comparative advantage and changes in comparative advantage.

All these attempts to use comparative advantage tend to lead to the conclusion that the United States maintains a comparative advantage over many countries in the production of her major, traditional export crops. However, these results also indicate that the U.S. comparative advantage has declined during the 1980's.

Comparative advantage between two countries or among countries is determined by two sets of factors--those that determine supply and those



that determine demand within a country under undistorted competitive market conditions. Determinants of supply include factor endowment, the technology set employed, investment functions by which the available technology set and the basic factor endowment is modified, and the process by which technology adoption is determined. To be most useful in explaining trade the supply or production function must be broader than onfarm production of a commodity. It must extend from supply of factors of production through processing and handling to the port. Factor endowment should also be broadly defined to include infrastructure and human capital. It is also important that factors used in more than one sector be priced to the sector of interest at their intersectoral opportunity cost.

On the demand side, factors include population, income level, income distribution, and taste and preference. Population needs to be disaggregated by age, sex, and rural-urban location. Income and taste and preferences should be associated with components of the disaggregated population.

As an important aside to the foregoing discussion which has accepted comparative advantage as the conceptual underpinning for trade with the implication that undistorted free trade is the ideal, there is an evolving school of economic thought which does not accept this. They argue that some sectors are natural monopolies or oligopolies, that in some industries there are significant barriers to entry, that some industries have significant positive externalities, and that governments

do intervene in markets. They then argue that under such conditions national welfare can be increased in some cases by government intervention and departure from free trade based on comparative advantage. However, they tend to argue that these cases are limited in number and agriculture does not seem to be an area in which they argue for intervention. A recent book edited by Krugman presents a good overview of this debate.

### Competitive Advantage

Competitive advantage, unlike comparative advantage which is a well defined concept, means many things to different people. Competition is defined by Webster's as, "the effort of two or more parties acting independently to secure the business of a third party by offering the most favorable terms." To a businessman, competition is defined in terms of the ability to win, to achieve some goal. Those goals tend to be stated in terms of maintenance or increase in sales or in terms of maintenance or increase in market share. There is often the side condition of making a profit.

In international trade the concept of competitiveness tends to be the same except it is from the view of a nation rather than a firm. A book edited by Scott and Lodge defines competitiveness as, "the ability of a nation to produce, distribute, and service goods in the international economy in competition with goods and services produced in other countries and do so in a way that earns a rising standard of living." This definition assumes a national goal of improving the well being of

the population. A similar definition by Langley is, "a nation's ability to produce and market products in international trade while earning a level of returns to the resources (both human and physical) used to produce those products which is at least comparable to what those resources could earn in alternative activities."

These two latter definitions are closer to comparative advantage as a basis for trade in that they introduce concepts of resource use efficiency. They also imply that trade (exports) are "good" only when the result is an increase in the total quantity of goods and services available to a country for consumption and investment. While most economists would probably not be troubled by this restriction on competition, much of the concern about U.S. competition and policies proposed for restoring competitiveness seem to make higher levels of exports or larger market share an end in itself.

Regardless of which of these definitions is chosen, competitiveness or competitive advantage differs from comparative advantage in several ways. First it is a positive rather than a normative concept. It is a statement of what is or has been rather than a statement of what ought to be. Second it is a statement about the ability to sell under the conditions that exist rather than what would happen under hypothetical conditions. Competitive advantage, as a concept, recognizes that markets are not perfectly competitive and undistorted by government policy. Competitive advantage is a relationship between "market prices" not relative autarkic prices.

Market prices is placed in quotes above because the quoted nominal price is not always the basis upon which choice between sellers is made. Recent research in ERS by Gardner and Skully has shown that for countries with foreign exchange constraints real economic cost as affected by credit terms is the basis for choice. They also show that credit terms offered result in real economic cost being discounted to between 80 and 36 percent of nominal selling price.

The determinants of competitive advantage include the determinants of comparative advantage plus three other sets: (1) those causing the private costs of production to differ from social costs; (2) those causing the private value of goods and services to differ from social value; and (3) those affecting international mobility of goods, services, and factors of production--those distorting international terms of trade (White). These sets of factors are principally policies and institutions employed by governments. In the first set are policies and institutions which distort factor mobility, relative factor prices, production levels, and investment decisions. In the second set are policies affecting income distribution, allocation of income among consumption items, and allocation of income between consumption and investment. The third set includes those government policies and institutions such as trade policies, immigration policies, exchange rate policies and state trading institutions.

While competitive advantage is less well defined and a broader concept, it is easier to measure because more measures are observable. It is measured by market share, price comparisons, cost of production

comparisons, and market penetration. One of the more interesting measures has been developed by Vollrath of the Economic Research Service. The method is an extension of the Balassa method and is a comparison of how well a country has done in exporting some particular good relative to how well it has done in total exports. The measure, revealed competitive advantage (RCA) is calculated as follows for wheat:

$$RCA_{i,wh} = RCS_{i,wh} - RCD_{i,wh}$$

Where:

$$RCS_{i,wh} = \frac{X_{i,wh} \div X_{i,gs}}{X_{w,wh} \div X_{w,gs}}$$

and

$$RCD_{i,wh} = \frac{M_{i,wh} \div M_{w,wh}}{M_{i,gs} \div M_{w,gs}}$$

X = value of exports  
M = value of imports  
i = country  
w = world  
wh = wheat  
gs = all goods and services

Results of this calculation for the United States, France, Argentina, Canada, and Australia for total agriculture, wheat and wheat flour, coarse grains, and soybeans and groundnuts are presented in figures 1-5. The results indicate that the United States has a competitive advantage for total agriculture and for all three commodity groups. The U.S. competitive advantage in all three commodity groups is greater than for total agriculture. U.S. competitiveness increased during the 1970's and has stagnated or declined during the 1980's.

France, Canada, and Australian have a competitive advantage for wheat and coarse grains but a disadvantage for oilseeds. Argentina has a competitive advantage for all three groups and a stronger advantage than the United States. Except for Argentina, the calculations do not show our competitors having gained competitive advantage during the 1980's.

This rather complex measure of competitive advantage, like the simpler ones, is useful primarily as an indicator of what has happened. It is based on observed trade performance and not on changes in the underlying factors determining competitive advantage. Thus, it can identify the existence of a problem but is not very helpful in anticipating a future problem (except by projection of trend) nor in prescribing corrective action.

#### Research Needs

The concerns of public and private sector decisionmakers about the United States' competitive position or comparative advantage in world agricultural markets are real and important. Given the financial problems of the agricultural sector and the increasing cost of farm programs, policies are likely to be adopted in attempts to improve the U.S. competitive position. If based on insufficient or inaccurate information about causes of current problems, such policies are likely to reduce the efficiency of world markets and quite likely, in the long run, reduce the comparative advantage of U.S. agriculture. It is important that the agricultural economics profession conduct research which

provides (1) broader understanding of competitiveness in world markets; (2) identification of the factors which determine competitiveness; and (3) an enhanced ability to analyze the effects of alternative policies on our competitiveness and comparative advantage.

In order to make this kind of contribution I believe we should focus research on the following:

- o We need to develop better measures of competitive advantage. These measures should be based on the factors determining competitiveness rather than observed market performance so as to be more useful not only in diagnostics, but in prescription.
- o We need better quantitative information about resource bases, infrastructure, technical efficiency, and costs and returns of modifying these through research and investment in different countries. That is, we need better understanding of the short and longrun production functions in the world.
- o We need to develop a consistent demand system for the major countries of the world.
- o We need to better understand, within a general equilibrium context, the effects of policy (agricultural, general economic, and trade) and of macroeconomic conditions and variables on both supply and demand within countries and thus upon their excess supply and demand relationships.

- o We need to better understand in a functional way how policy is made and how policymakers respond to changing economic and policy conditions.
- o We need better theory and methodology for analysis under conditions of less than perfect competition.
- o Finally, we need to increase our capacity for modeling within a global, general equilibrium framework while retaining sufficient country and commodity detail to be useful for policy analysis.



## REFERENCES

1. Dunmore, John C., "Competitiveness and Comparative Advantage of U.S. Agriculture." Paper presented at the 1986 National Public Policy Education Conference, Denver, Colorado, September 16, 1986.
2. Gardner, George R. and David W. Skully. The Conduct of Wheat Marketing in North Africa. Economic Research Service, Staff Report No. AGES860808, Washington, D.C., September 1986.
3. Haley, Stephen Lawrence. The Theory of Agricultural Comparative Advantage. Unpublished Thesis. Purdue University, West Lafayette, Indiana, May 1985.
4. Krugman, Paul R. (Ed.) Strategic Trade Policy and The New International Economics. The MIT Press, Cambridge, Massachusetts, 1986.
5. Langley, James A., "The Wheat Prototype Study Within An Overall Conceptual Framework of Competitiveness." Paper presented at ERS Workshop on Wheat Competitiveness, Washington, D.C., June 1986.
6. Paarlberg, Philip L., Alan J. Webb, John C. Dunmore, and J. Larry Deaton. "The U.S. Competitive Position in World Commodity Trade." Agriculture-Food Policy Review: Commodity Program Perspectives. Economic Research Service, U.S. Dept. Agr., July 1985.
7. Pearson, Scott R. and Ronald K. Meyer. "Comparative Advantage Among African Coffee Producers." American Journal of Agricultural Economics, Vol. 53, No. 2, May 1974.
8. Scott, Bruce R. and George C. Lodge (Eds.) "U.S. Competitiveness in the World Economy." Harvard Business School Press, Boston, Mass. 1985.
9. Stanton, B. F. "Production Costs for Cereals in the European Community: Comparison with the United States, 1977-84." A.E. Res. 86.2. Dept. Ag. Econ., Cornell University, Ithaca, NY. March 1986.
10. Stanton, B. F., and E. Neville-Rolfe. "The Cereals Dilemma: Surpluses in Western Europe and North America." A.E. Res. 86-13. Dept. Ag. Econ., Cornell University, Ithaca, NY. May 1986.
11. Stanton, B. F. "Comparative Statements on Production Costs and Competitiveness in Agricultural Commodities." Ag. Econ. Staff Paper No. 86-27, Dept. Ag. Econ., Cornell University, Ithaca, NY. October 1986.
12. Vollrath, Thomas. "Revealed Competitive Advantage for Wheat." Paper presented at ERS Workshop on Wheat Competitiveness, Washington, D.C., June 1986.
13. White, T. Kelley. "Are U.S. Farmers The Most Efficient Producers of Food and Fiber in the 1980's?" Journal of Agribusiness, Vol. 4, No. 1, February 1986.

FIGURE 1

# UNITED STATES' RCA COMPOSITION

**TOTAL AGRICULTURAL, GRAINS & OILSEEDS**

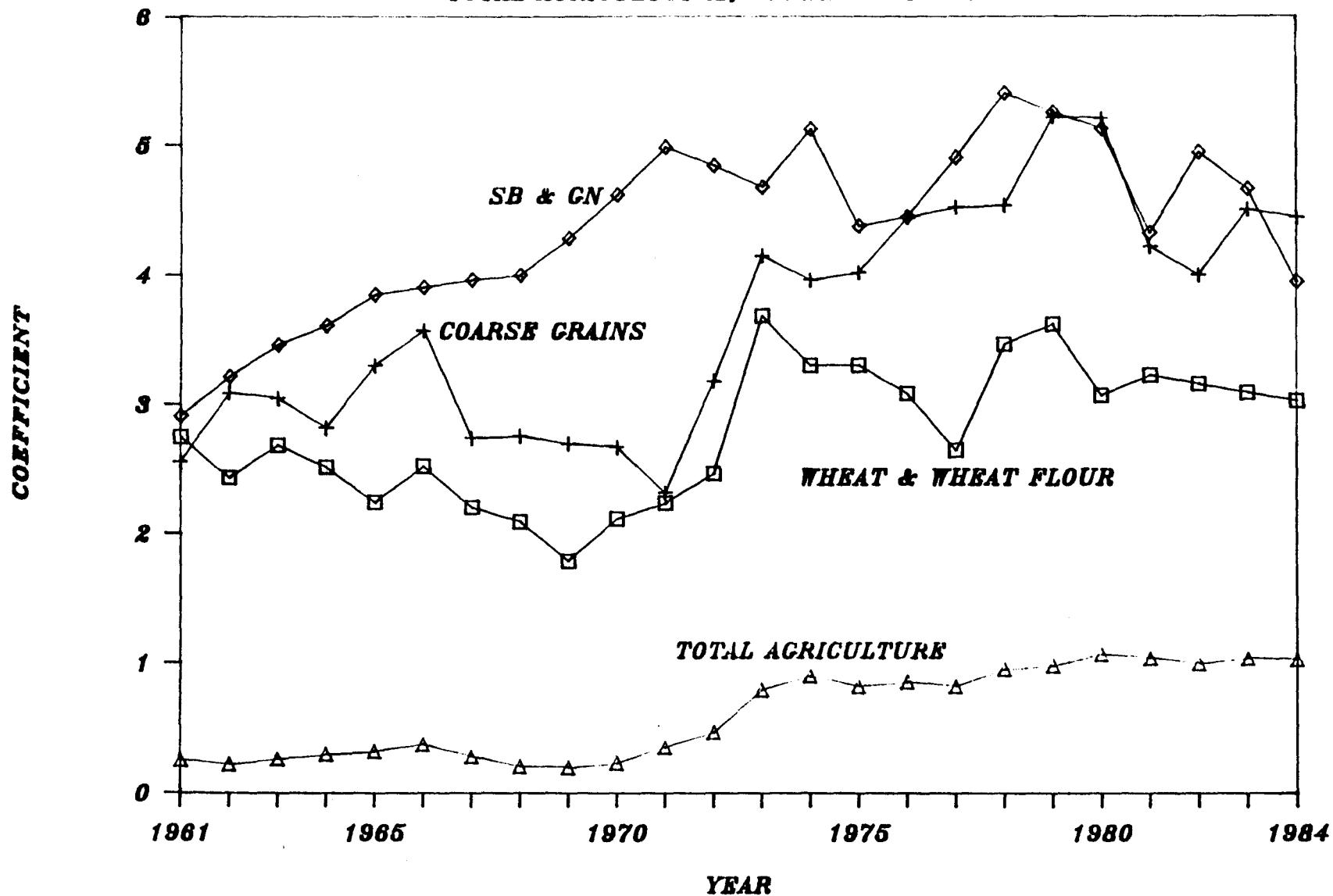


FIGURE 2

# FRANCE'S RCA COMPOSITION

**TOTAL AGRICULTURAL, GRAINS & OILSEEDS**

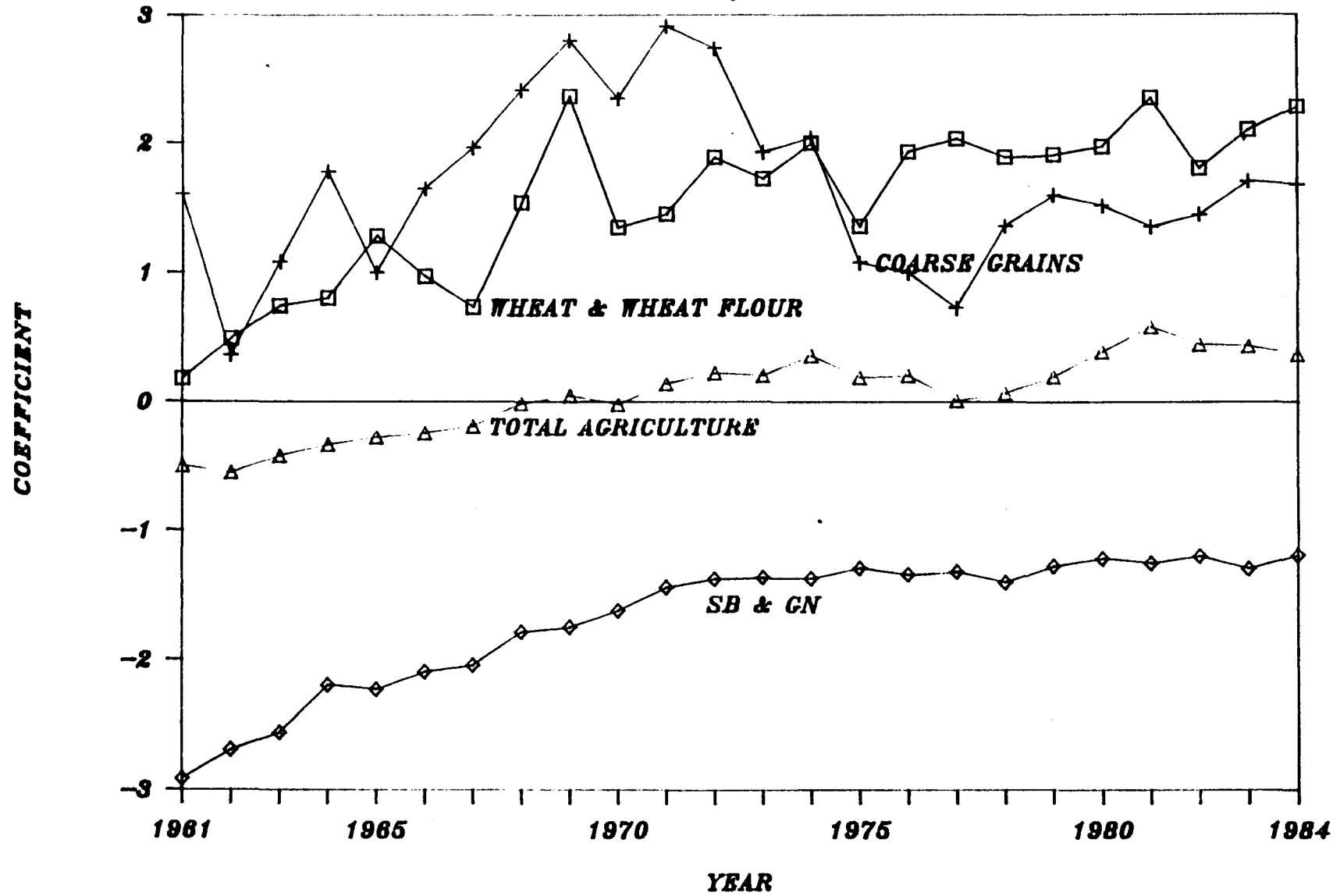


FIGURE 3

# CANADA'S RCA COMPOSITION

TOTAL AGRICULTURAL, GRAINS & OILSEEDS

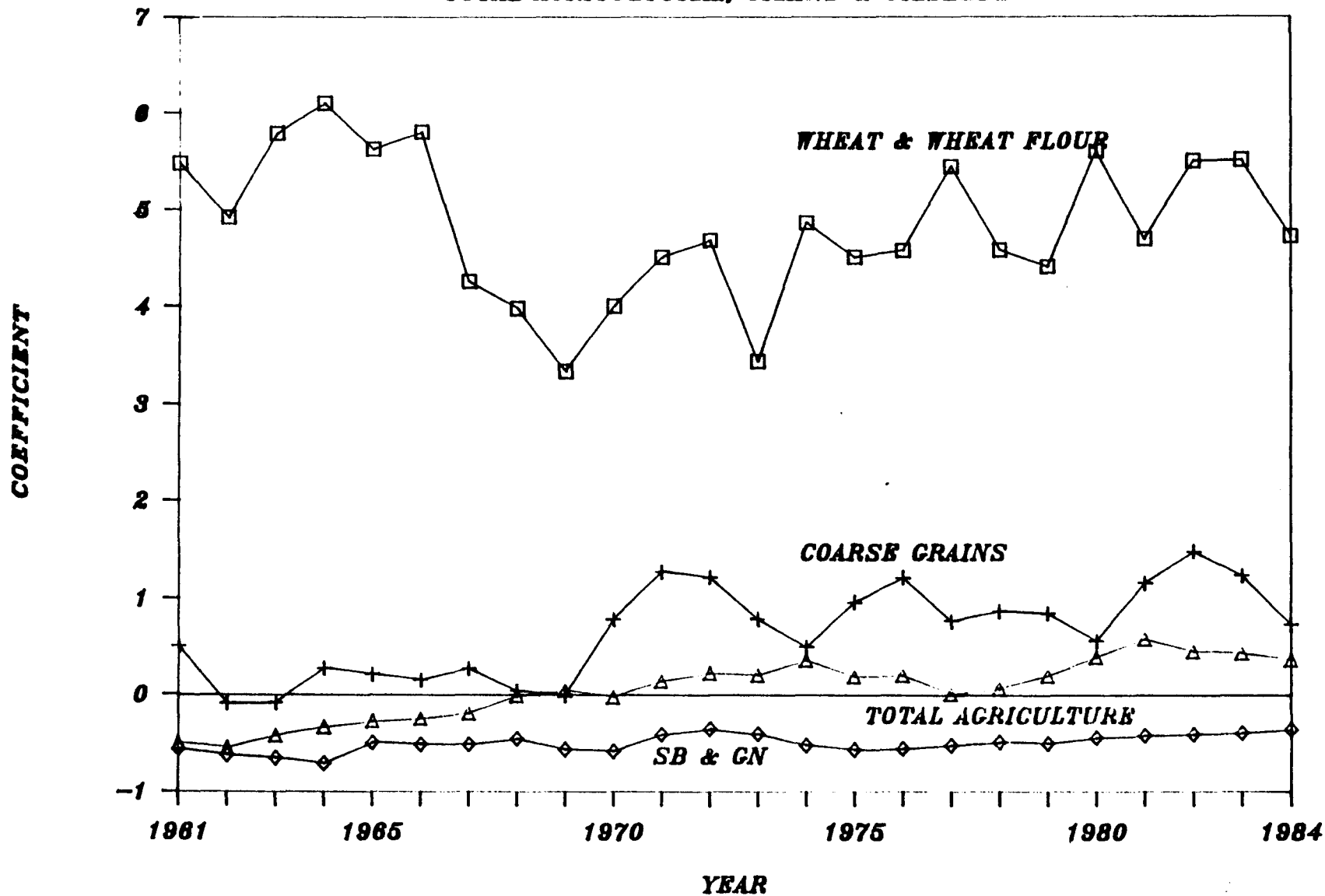


FIGURE 4

# AUSTRALIA'S RCA COMPOSITION

TOTAL AGRICULTURAL, GRAINS & OILSEEDS

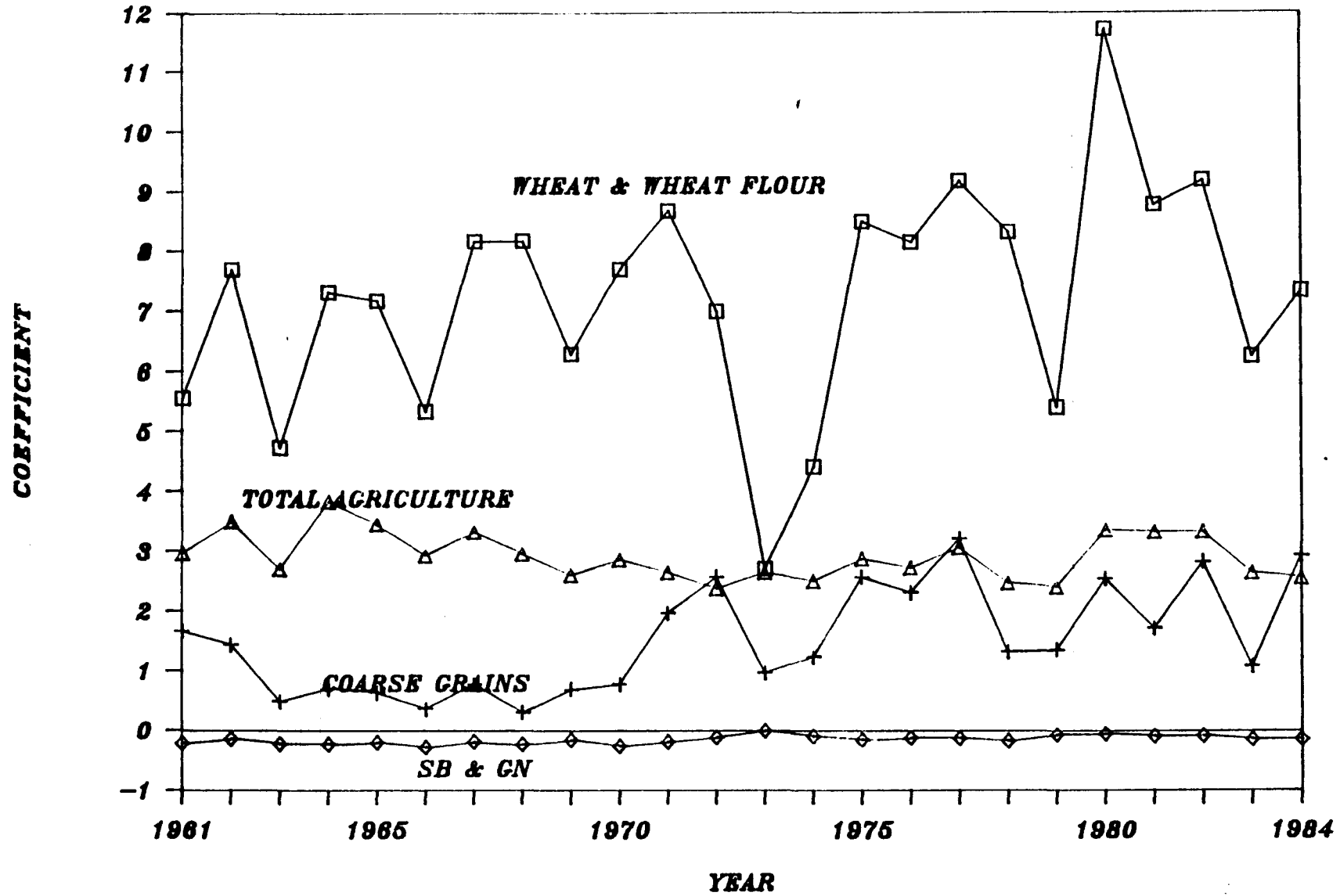


FIGURE 5

# ARGENTINA'S RCA COMPOSITION

TOTAL AGRICULTURAL, GRAINS & OILSEEDS

