Agricultural Economics Report

LET'S COMPETE -- MISSOURI'S COMPETITIVE POSITION IN CROP PRODUCTION

by

J. Bruce Bullock, Charles Dodson, and Maury Bredahl

AER 1988-7

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Questions are increasingly being raised about the ability of U.S. grain producers to compete in world markets. Our assignment is to explore first the competitive position of Missouri grain producers in the U.S. market and second the competitive position of U.S. grain producers in world markets. We will see that world grain trade depends more on the willingness and ability of governments to compete in dumping surplus production in world markets than it does on the relative costs of producing grain in exporting countries.

In an idealized world, trade flows would reflect the relative competitive position of countries with productive capacity in excess of domestic demand. Each country would produce and export the commodities for which it has the strongest competitive position.

The competitive position of a region or country in the production of agricultural products depends on five factors. The first factor is the production technology. The second factor is the management ability of producers. Modern production technology is increasingly management intensive. Thus, the education and management skill level of producers is an important component of a region's capacity to make effective use of available technology. The third factor is the capability of the input supply system to deliver quality inputs when and where they are needed. The fourth factor is the effectiveness of the product handling and distribution system at assembling, distributing, storing and maintaining the quality of products produced. We tend to take this component of competitive

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position for granted in the U.S. since our system is so well developed. However, it is a critically important factor in our ability to make products available in a timely and competitive manner in response to changes in world demand. The final factor is the amount and quality of natural resources available in the region. We should keep in mind that weather and water availability are equally as important as land quality in determining the competitive position of a region.

Within the United States there are no regional differences in the availability or quality of technology and management, or in the efficiency of the input supply/product distribution system. There are, however, substantial regional differences in the amount and quality of natural resources that result in regional differences in the level and variability of production costs and hence competitive position.

Missouri Competitive Position in U.S. Market

There are no major regional differences in technology or cost structure within the U.S. Therefore, regional differences in competitive position are largely reflected by the level and year to year variability in yields. Higher and more stable yields mean lower and more stable per unit production costs. Regions with below average yields or highly variable yields are at a disadvantage relative to more productive and less variable regions.

Figure 1 illustrates that the state of Missouri as a region has a competitive disadvantage in the production of corn. Over the 1974-86 period Missouri corn yields were below the national average and were considerably more variable from year to year. Missouri's competitive disadvantage in corn production is particularly evident relative to Iowa and Illinois. Both these states have higher average yields and less year to year variability than Missouri and the national average.

Corn Production by Yield Per Acre
1974-1986

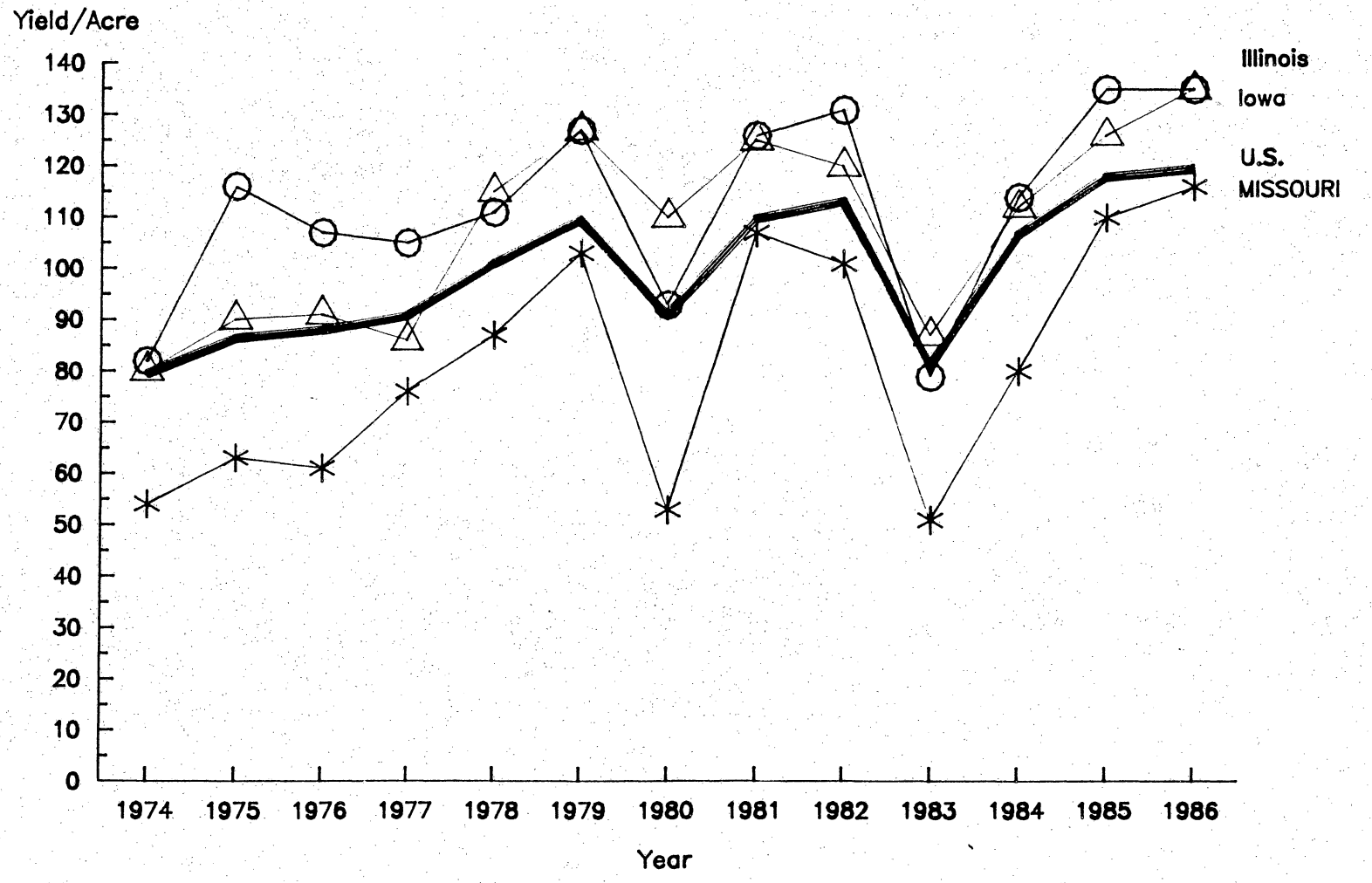


Figure 1

Source: U.S. Dept. of Agriculture

This does not mean, however, that all areas of the state have a competitive disadvantage in corn production. There are major differences in both the level and variability of corn yields between production regions within the state. Figure 2 shows the production regions used to examine regional differences in competitive position within the state.

Based on reported yields for the past 13 years there is over a 35 percent chance that the average corn yield in these counties will be less than 75 bushels per harvested acre. There is about a 42 percent chance that average yields will exceed 90 bushels per acre (Figure 3). In contrast, in the Bootheel (Region 6) there is a 20 percent probability that yields will fall below 75 bushels and a 63 percent chance that yields will exceed 90 bushels. Region 4 is the only area outside the Bootheel with over a 50 percent chance of average yields exceeding 90 bushels per acre. Keep in mind that national average yields over the 1985-87 period were 114 bushels per acre. Each of the other four regions have a 45 to 50 percent probability of average yield falling below 75 bu/acre.

Missouri is in a stronger competitive position for soybeans than for corn (Figure 4). The average yield is close to the national average. However, there is more year to year variability in yields in Missouri than the national average reflecting our unpredictable weather. The competitive position of Missouri relative to Iowa and Illinois is similar to that for corn. Our yields are lower and more variable than in those states.

Within the state there is over a 50 percent chance that average soybean yields will be less than 25 bushels per acre in Regions 5 and 6 (Figure 5). On the other hand, there is over a 40 percent chance that average soybean yields will exceed 30 bushels/acre in Regions 2 and 3. In Regions 1 and 4, yields are below 25 bushels about as frequently as they are over 30 bushels/acre. The relatively low and quite variable yields in the Bootheel reflect the high percentage of double cropping with soybeans in the Bootheel.

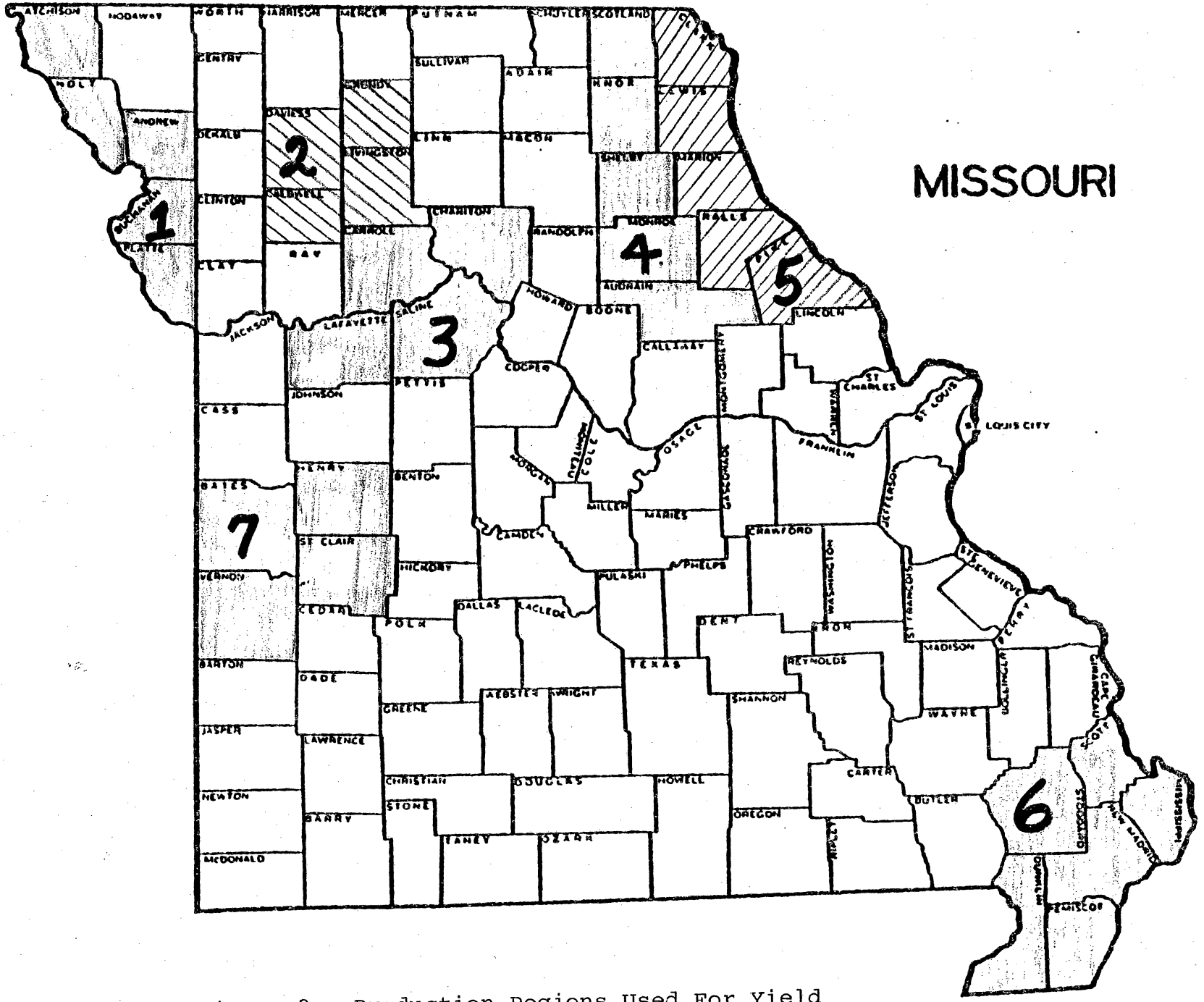


Figure 2. Production Regions Used For Yield Comparisons

Figure 3

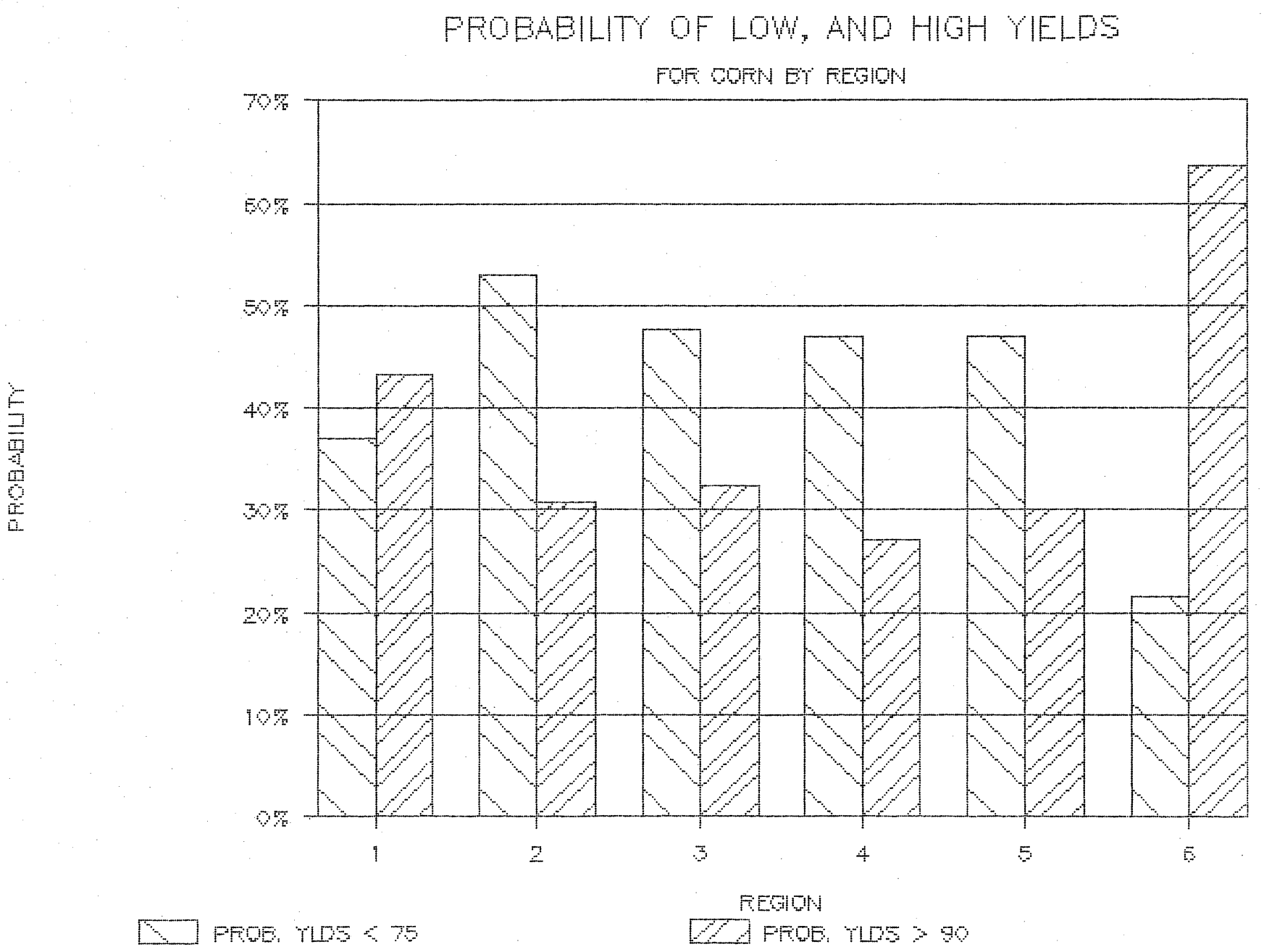
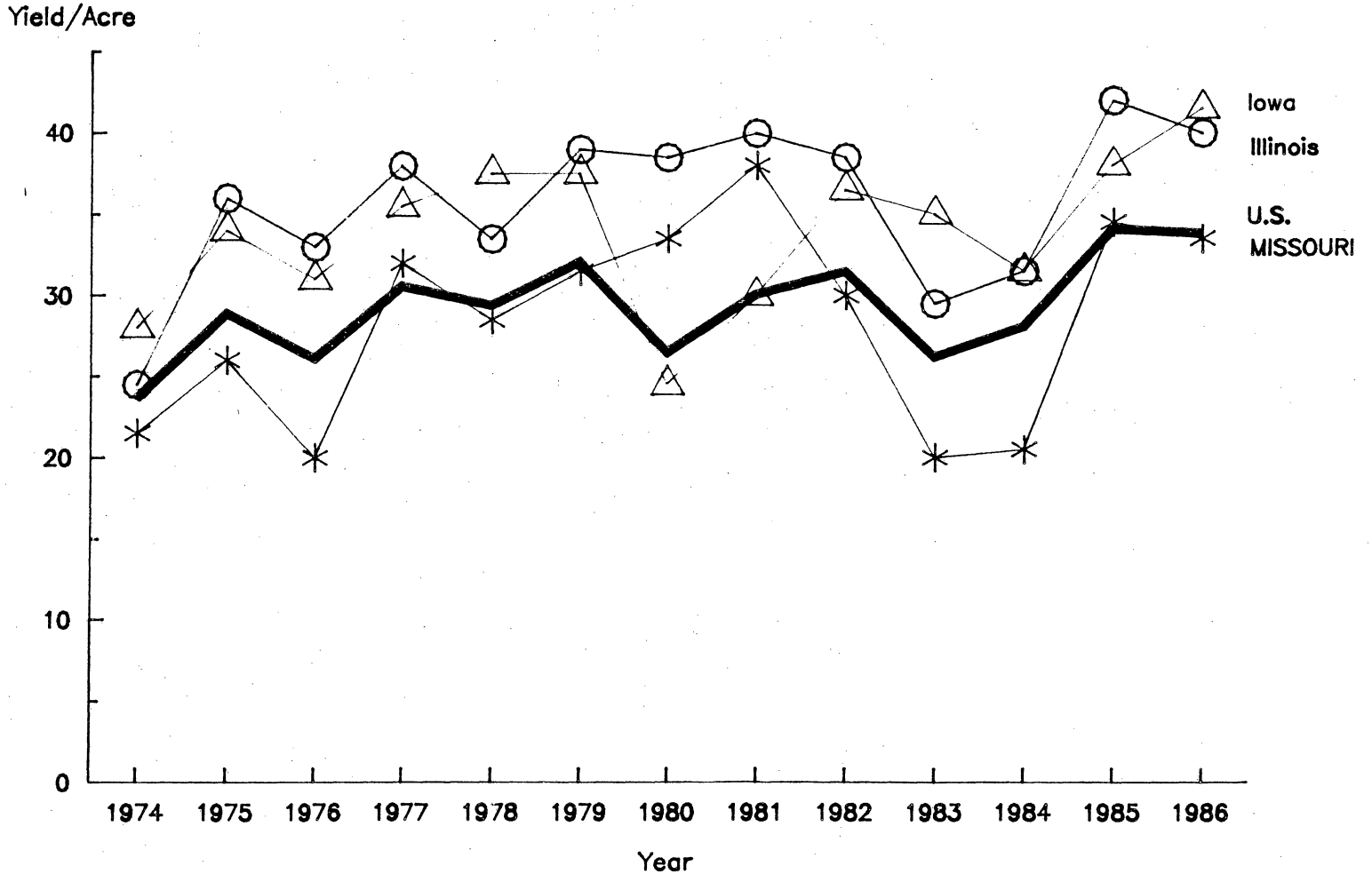

PROBABILITY OF LOW, AND HIGH YIELDS
FOR CORN BY REGION
70%
60%
50%
40%
30%
20%
10%
0%
PROBABILITY
1
2
3
4
5
6
REGION
PROB. YLDS < 75
PROB. YLDS > 90

Figure 4

Soybean Production by Yield Per Acre
1974-1986



Source: U.S. Dept. of Agriculture

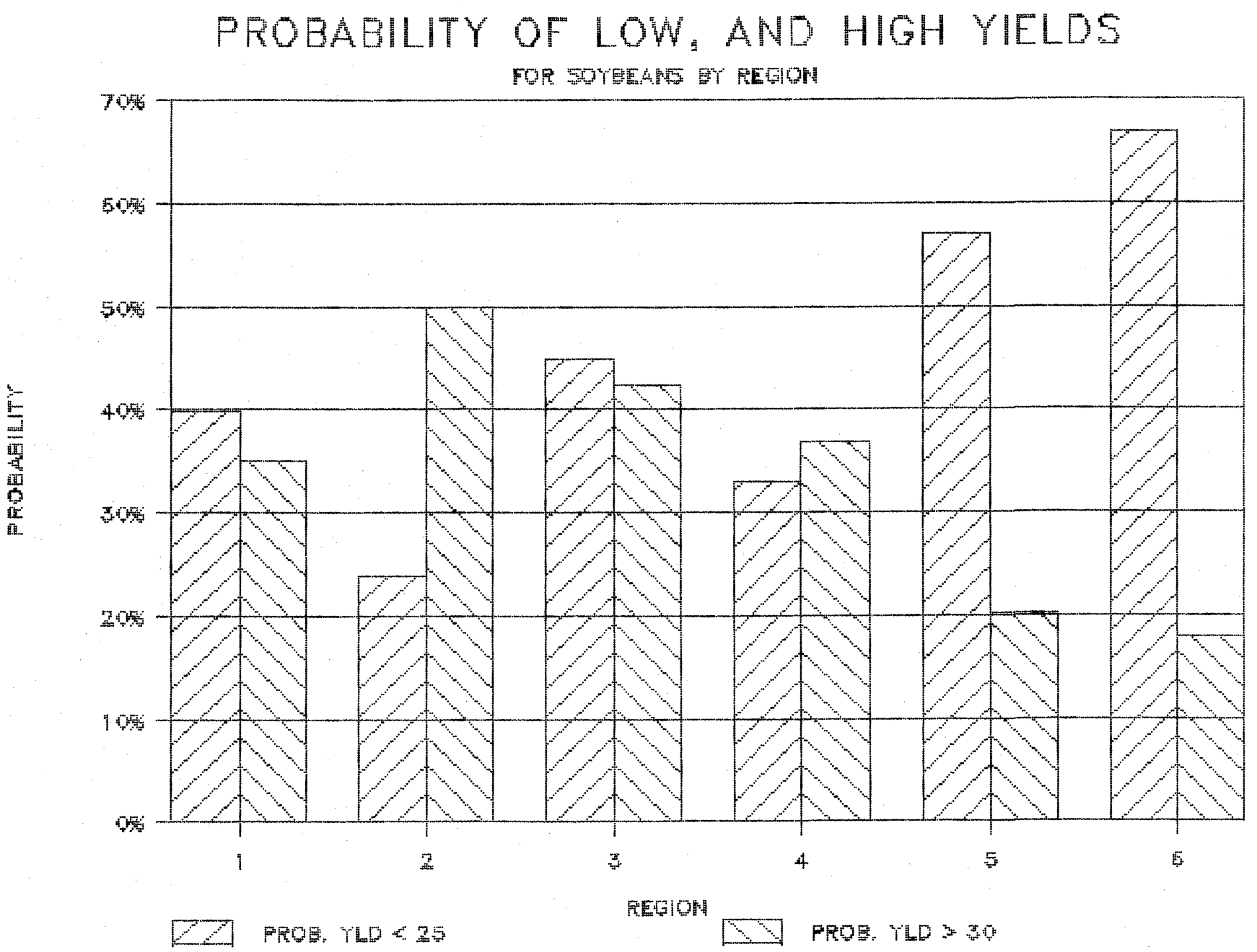

PROBABILITY OF LOW, AND HIGH YIELDS
FOR SOYBEANS BY REGION
70%
60%
50%
40%
30%
20%
10%
0%
PROBABILITY
1
2
3
4
5
6
REGION
PROB. YLD < 25
PROB. YLD > 30

Figure 5

Missouri has a fairly strong national competitive position in the production of soft red winter wheat. Our yields per harvested acre are generally above the national average of 37 bushels, but have about the same degree of variability (Figure 6). Region 4 is in the strongest competitive position where there is over an 60 percent chance of wheat yields exceeding 40 bu/acre (Figure 7). Average yields exceed 40 bushels per acre more than 1/3 of the time in Regions 3, 5, and 6. Yields are between 30 and 40 bushels per acre about 65 percent of the time in Regions 1 and 7. However, in Region 1, yields are below 30 bushels per acre bout 45 percent of the time.

Missouri's national competitive position in milo production is similar to its position for wheat. The state average yield is above the national average and has less year to year variability (Figure 8). National average milo yields were 63.6 bushels per acre over the 1985-87 period.

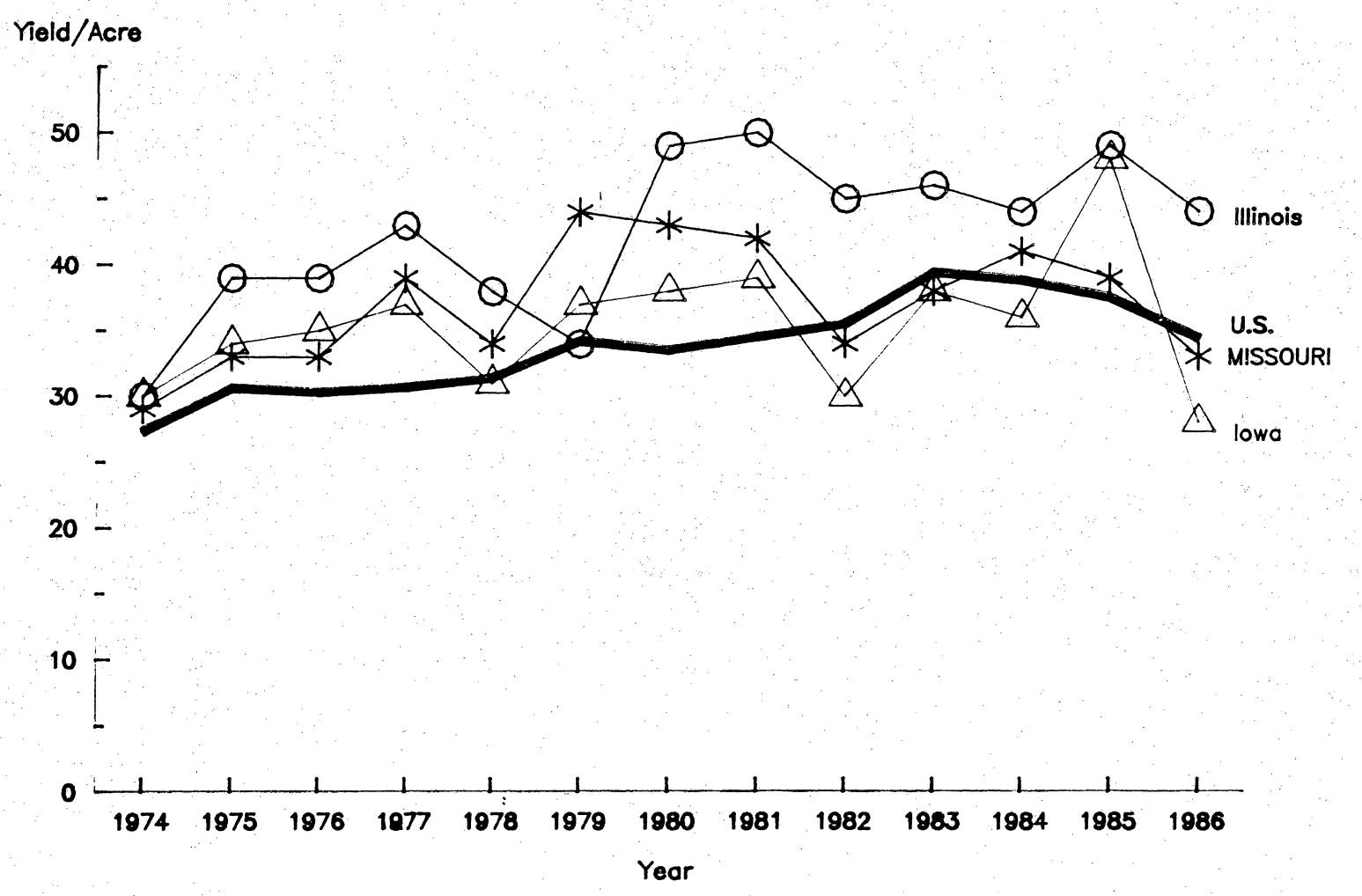
Within the state, Region 4 has the advantage in milo production with a 45 percent chance of yields exceeding 75 bushels per acre. There is less than a 10 percent chance that average milo yields will fall below 60 bushels in Region 4. Region 3 also has relatively high milo yields with a 33 percent chance that yields will exceed 75 bushels per acre. However, there is also a 25 percent chance that milo yields will fall below 60 bushels per acre in Region 3. Regions 7 and 2 have the highest probabilities of milo yields falling below 60 bushels, 42 percent and 38 percent respectively. Regions 1, 5, and 6 expect milo yields in the 60-75 bushel range over 50 percent of the time.

U.S. Competitive Position in International Markets

As we turn our attention to the international market, we need to expand our list of factors determining the competitive position of a region. Government policies can distort the national competitive position of a country's products in

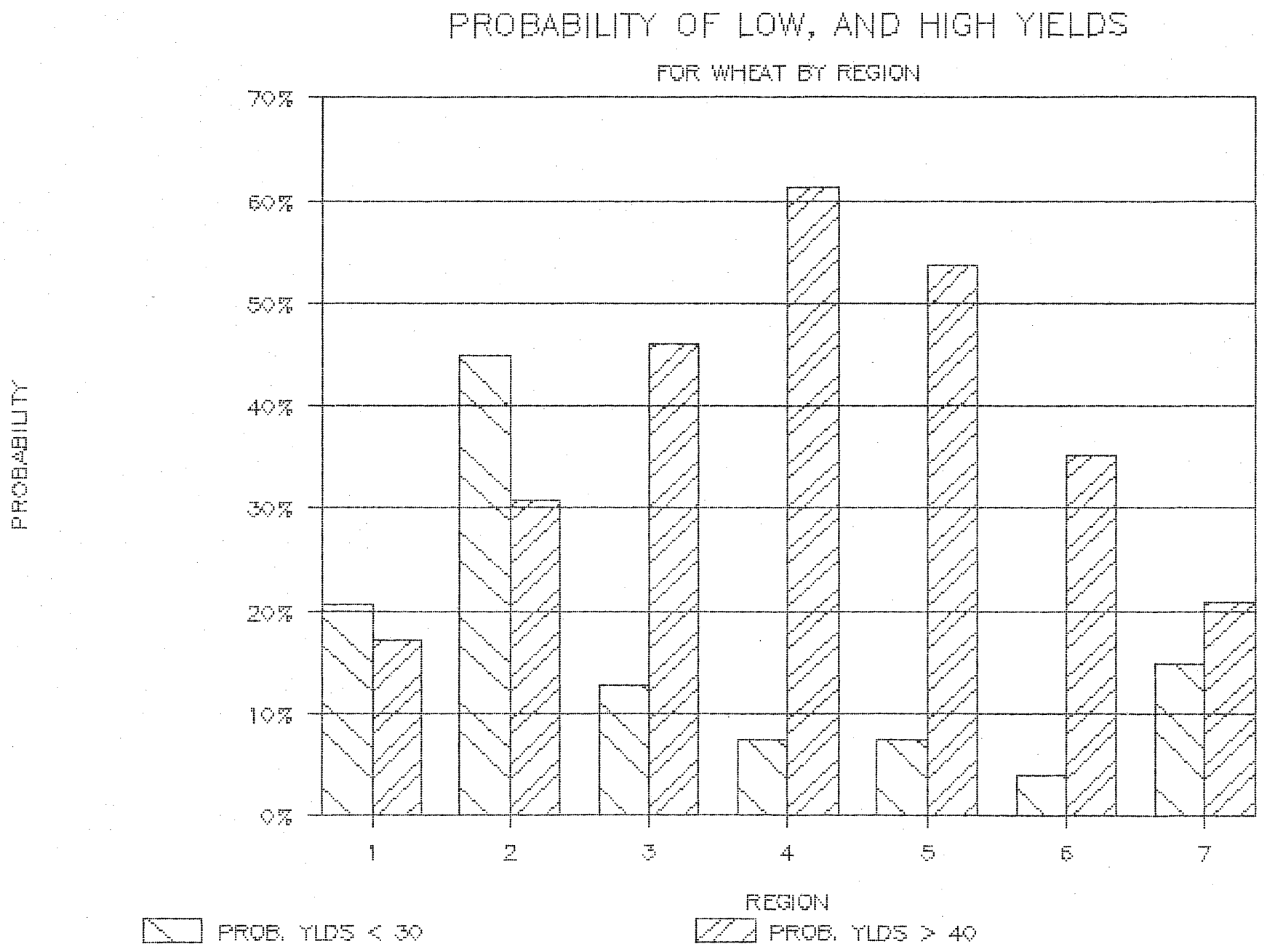
Figure 6

Wheat Production by Yield Per Acre
1974-1986



Source: U.S. Dept. of Agriculture

Figure 7


PROBABILITY OF LOW, AND HIGH YIELDS
FOR WHEAT BY REGION
70%
60%
50%
40%
30%
20%
10%
0%
PROBABILITY
1
2
3
4
5
6
7
REGION
PROB. YLDS < 30
PROB. YLDS > 40

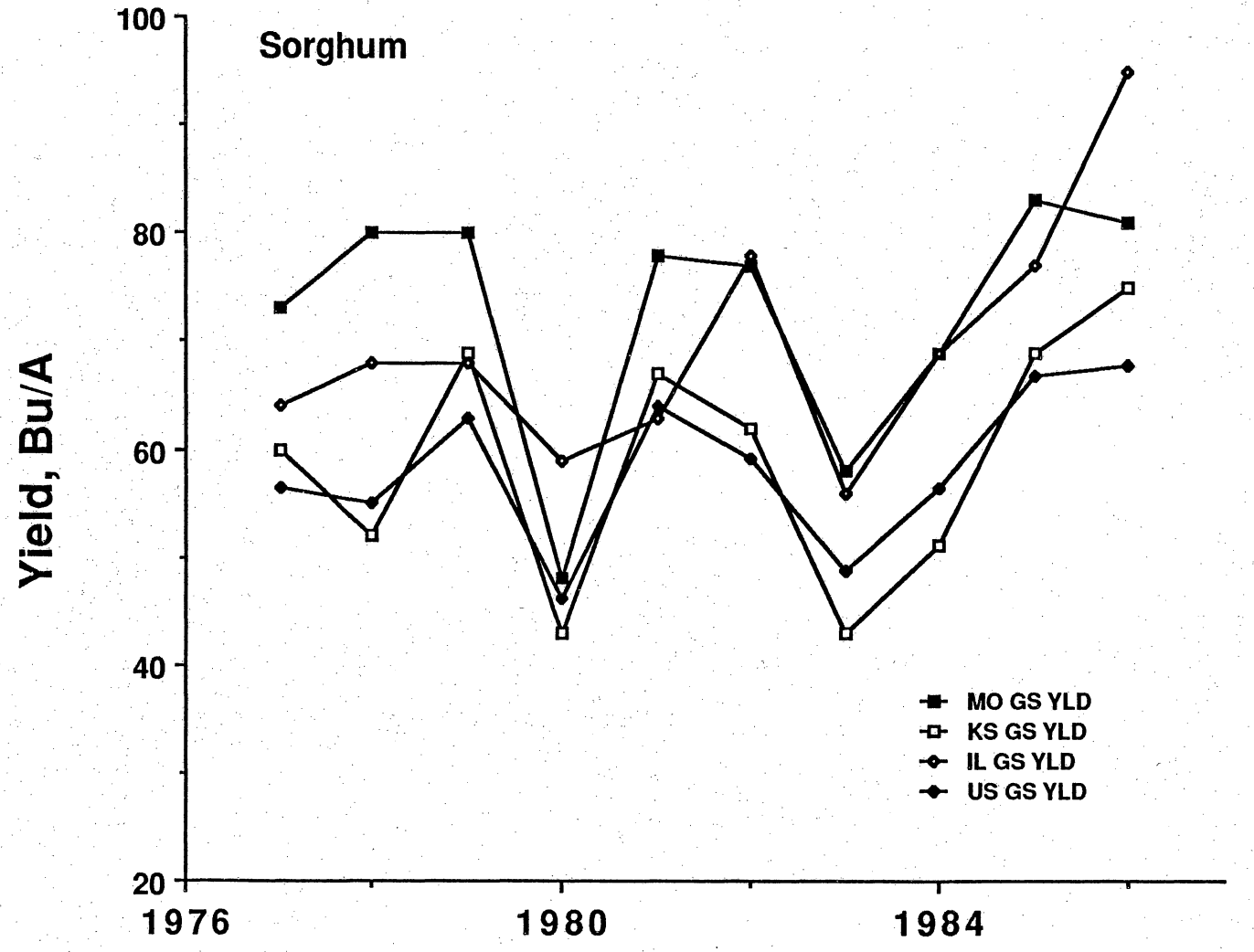
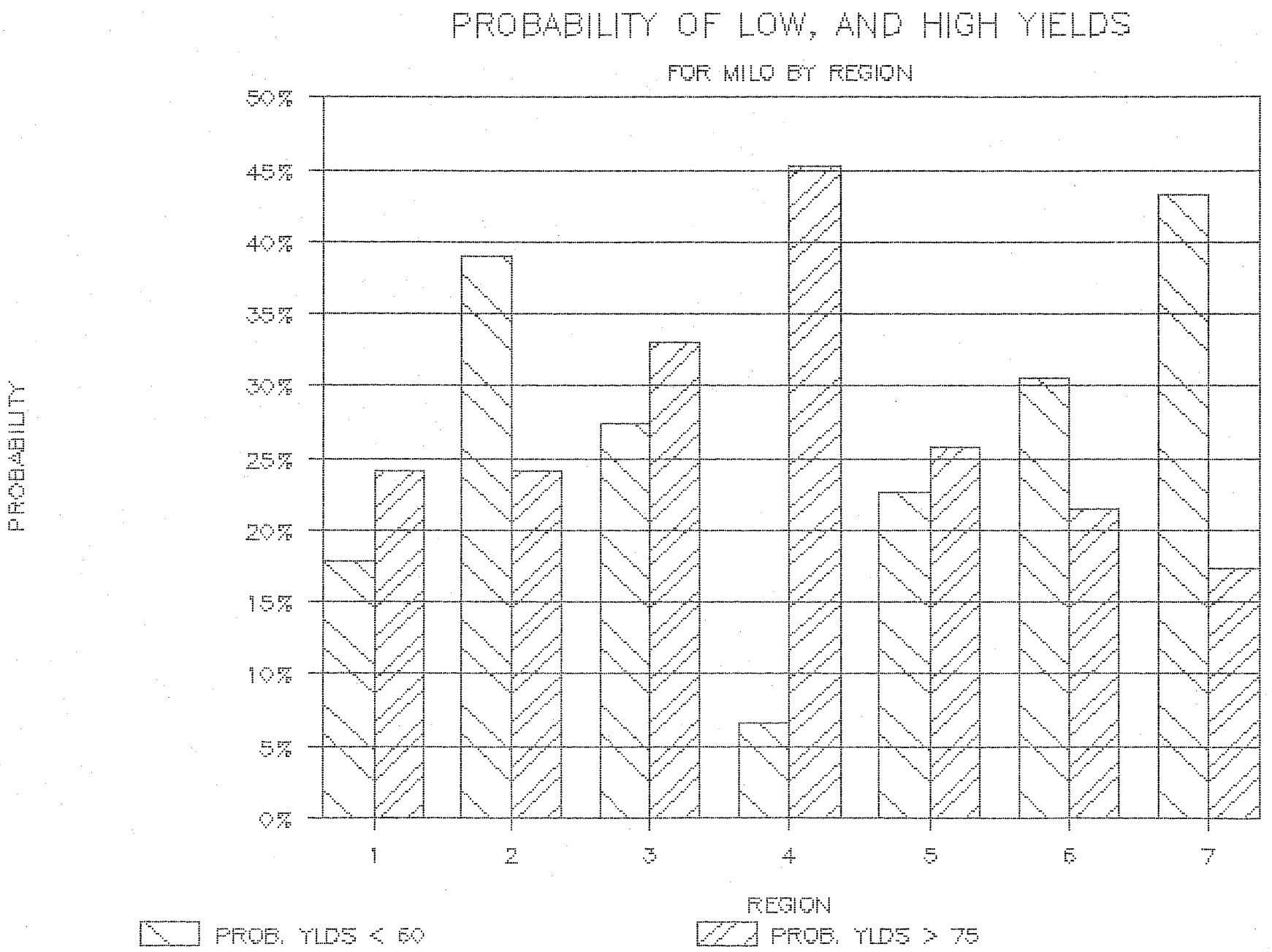


Figure 8. Average Soybean Yield by State and U.S. Average 1974-1986.

Figure 9


PROBABILITY OF LOW, AND HIGH YIELDS
FOR MILO BY REGION
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
PROBABILITY
1
2
3
4
5
6
7
REGION
PROB. YLDS < 60
PROB. YLDS > 75

world trade. Observed world trade patterns often reflect artificial trade incentives (barriers) provided by government policies of both exporting and importing countries as much as they reflect natural economic competitive positions (i.e., relative costs of production).

Comparisons of crop production costs between countries are rather scarce. There is currently an increasing research effort within the USDA to develop cost comparisons. Perhaps we will have more data available within a few months.

A study at Cornell University provides us with a bit of information about U.S. grain production costs relative to three European Community countries. Comparison of wheat production costs indicates that over the 1982-84 period the U.S. was at a 10-20 cent per bushel cost disadvantage in wheat relative to Britain and France (Table 1). The cost data for the U.S. are for all wheat and thus probably over state the cost of soft wheat production. We should also note that Britain produces a rather low quality soft wheat much of which is used as a feed grain. However, the data indicate that at least Britain and France are formidable competitors in the world wheat market.

Production cost comparisons between countries are quite sensitive to exchange rates. The value of the U.S. dollar relative to British and French currencies has changed substantially since 1982-84 when the Cornell Study was developed. At current exchange rates, U.S. wheat producers probably have a slight competitive advantage on production costs. Changing exchange rates alter relative production costs as well as relative market prices.

Table 1: Wheat Production Cost Comparisons - U.S., Britain, and France 1982, 1983, and 1984

	1982			1983		1984	
	U.S.	U.K.	FR	U.S.	FR	U.S.	UK
Bu/Acre	32.6	94.2	107.0	36.9	101.2	35.4	113.5
Variable Cost ($/bu)	1.53	1.53	1.06	1.45	1.23	1.55	1.35
Total Cost* ($/acre)	3.25	3.01	NA	NA	NA	3.22	2.59

Source: Stanton, Cornell University 1986.
*Excluding land cost.
NA = Not available.

Table 2: Corn Production Cost Comparisons - U.S., France, and Italy 1982, 1983

	1982			1983*		
	U.S.	FR	IT	U.S.	FR	IT
Bu/Acre	113.8	127.2	148.9	105.1	116.2	146.6
Variable Cost ($/Bu)	1.14	1.65	1.48	1.27	1.76	1.49
Total Cost** ($/Bu)	1.99	NA	4.81	2.24	NA	4.40

Source: Stanton, Cornell University, 1986
*1984 used for U.S. since 1983 was PIK year.
**Excluding land cost.
NA = Not available.

The same Cornell study shows that the U.S. has a strong competitive position in corn production relative to France and Italy (Table 2). U.S. variable costs of production are 20 to 50 cents below costs in these two countries. A report by the U.S. Feed Grains Council shows similar results with the U.S. having considerably lower corn production costs than Argentina, South Africa, and France (Table 3).

There are several additional factors to keep in mind in evaluating the U.S. competitive position. Until very recently, Britain imported cereals and the facilities used for importing must now be used for exporting. These facilities are not well suited for exporting cereals which cancels at least some of their production advantage. Moreover, Britain produces feed wheat and does not have a strong ability to insure the quality of export food wheat.

France, on the other hand, has modern facilities that can quickly export wheat at a low cost. They have also invested in facilities to insure the physical quality of wheat exports. Like British wheat, French wheat is not ideally suited

for bread production. However, both nations have a scale advantage relative to the United States since we tend to ship in large bulk shipments and they can more easily provide smaller scale shipments. The Soviet Union prefers to import wheat in small vessels that can be directed to a number of seaports because of a shortage of storage and over land distribution facilities. Many African nations require bagged wheat imports which can be more readily supplied by France and Britain.

Macroeconomic factors that cause changes in exchange rates are an important, if not dominant factor in international competitive position. During 1982-84 the value of the U.S. dollar was quite high relative to European and Japanese currencies. This made American goods expensive relative to European goods. The decline in the value of the dollar the past few years has made U.S. goods more competitively priced.

Analysis of Soviet Union purchasing power is an excellent example of this effect. The Soviet currency is non-convertible; that is, it is not bought or sold outside the Soviet Union. The Soviet Union sells oil and gold to obtain "hard" currencies to import goods. The decreased value of the dollar relative to the French franc over the 1984-87 period, meant that a barrel of Soviet oil would purchase eight bushels of U.S. wheat or eight bushels of French wheat in 1984. In 1987, the same barrel of Soviet oil could still purchase eight bushels of U.S. wheat, but only five bushels of French wheat.

An Ohio State study indicates that Argentina has a slight cost advantage on the U.S. in the production of soybeans -- primarily because of a slight yield advantage (Table 4). However, the relative efficiency of our handling and distribution system probably overcomes the slight production cost advantage reflected in these data. The Ohio study indicates that the U.S. has a substantial cost advantage relative to Brazil in the production of soybeans.

As in the case of France and Britain, other factors determine Argentina's exports of wheat and soybeans. Argentina desperately needs foreign exchange to service its large external debt and to finance its government. Agricultural exports provides 80 percent of Argentina's foreign exchange earnings. Thus, it is reasoned Argentina will export wheat regardless of the export price. Moreover, because of limited storage, they must move much of their production into world markets at harvest.

The limited cost information we currently have indicates that U.S. grain producers are quite competitive in the production of corn and soybeans, but that France and England are formidable competitors in the international wheat market.

Table 3: Comparisons of Corn Production Costs and Yields 1982-84

	U.S.	Argentina	South Africa	France
Variable Cost $/Acre	130.00	84.00	91.00	189.00
Fixed Cost $/Acre	77.00	42.00	63.00	197.00
Bu/Acre	105	53	88	116
Variable Cost/Bu	1.24	1.58	2.39	1.63
Total Cost/Bu	1.97	2.38	4.06	3.32

Source: U.S. Feed Grains Council.

Table 4: Comparison of Soybean Production Costs 1980-85 Average U.S. Brazil, and Argentina

	U.S.	Argentina	Brazil
Total Variable Cost ($/Acre)	69.73	67.82	88.84
Yield/Acre	29.0	31.2	26.8
Total Variable Cost ($/Bu)	2.40	2.17	3.31

Source: Rask, Ohio State University, 1987.

As noted earlier, government programs can and do substantially distort the trade picture relative to trade patterns based strictly on competitive position of producing countries. Figure 10 shows the market price of corn (in U.S. dollars) in three countries for the 1982-86 period. The producer price of corn in the European Community exceeded $4 per bushel four out of the five years and was $3.50/bu in the other year.[1] The EC market price is held at that level by placing a large tariff on cereal imports and providing a large export subsidy on cereal exports. The variation in the dollar price is due almost entirely to variation in exchange rates. The internal price (in French francs and U.K. pounds) has been relatively stable. At the same time U.S. corn prices exceeded $2.50 per bushel only in the PIK and drought year of 1983 and were as low as $1.50 in 1986. Brazilian prices were in the $2.00 to $2.50 range over this period. We were not able to calculate comparable prices in Argentina because of data limitations.

Market prices tell only part of the story. Figure 11 shows the percent of corn producer revenues provided by government programs. In 1985, government programs accounted for 65 percent of corn producer gross receipts in the EC. Direct and indirect subsidies in the EC accounted for almost 90 percent of producer receipts in 1986. The U.S.is apparently trying hard to catch up. In 1986, government subsidies accounted for about 40 percent of U.S. corn producer income. Argentina actually taxed corn exports rather heavily (20-25 percent) in 1982-85 as did Brazil in 1984 in an effort to generate hard foreign exchange currency.

It is evident from Figure 11 that world corn trade more nearly reflects relative government subsidies than it does the economic competitive position.

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[1]The market prices of grain by country and the estimates of government subsidies by country used in the balance of this paper are based on preliminary and unpublished USDA data from a study comparing producer subsidies among exporting countries.

Figure 10

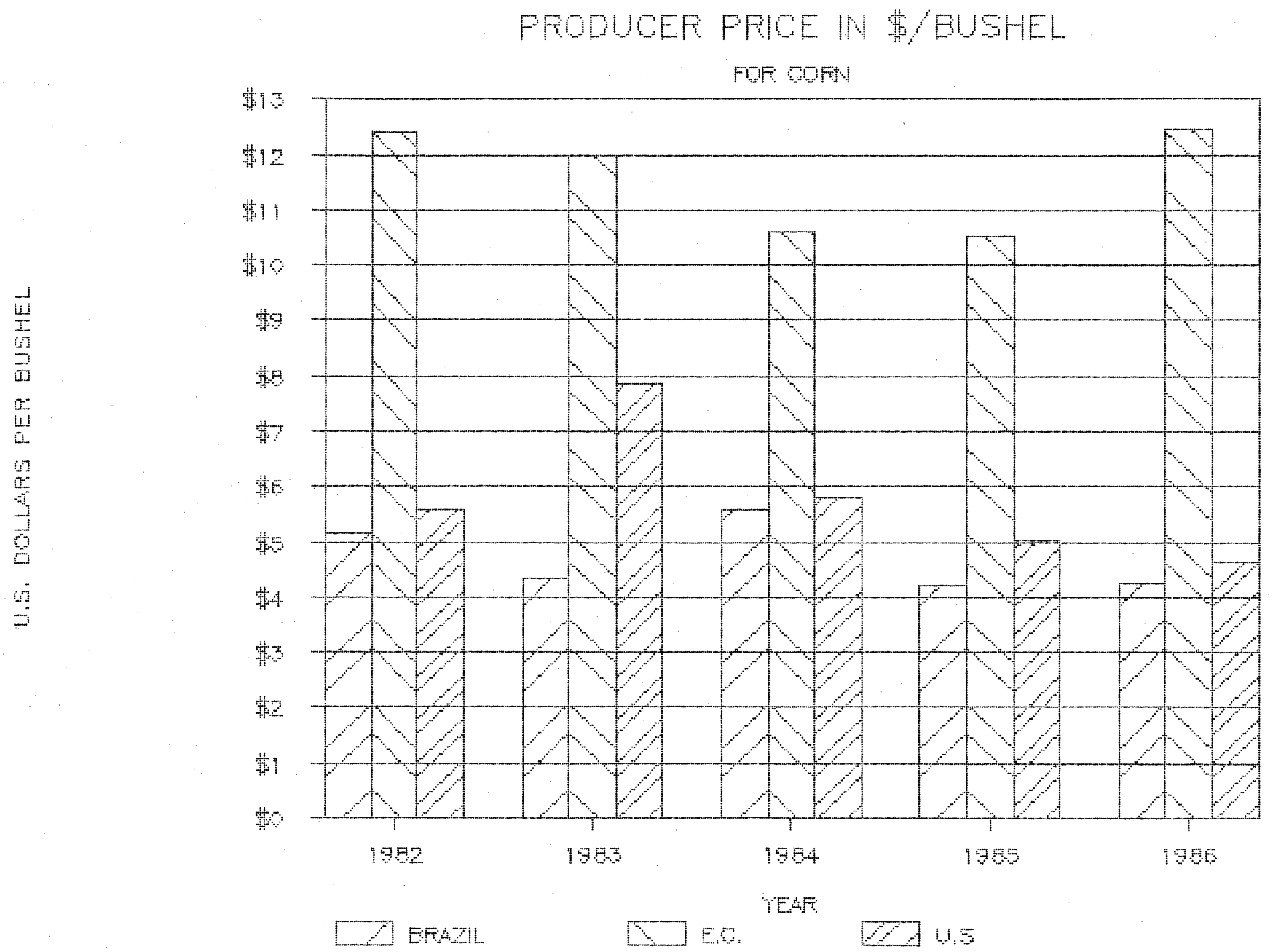
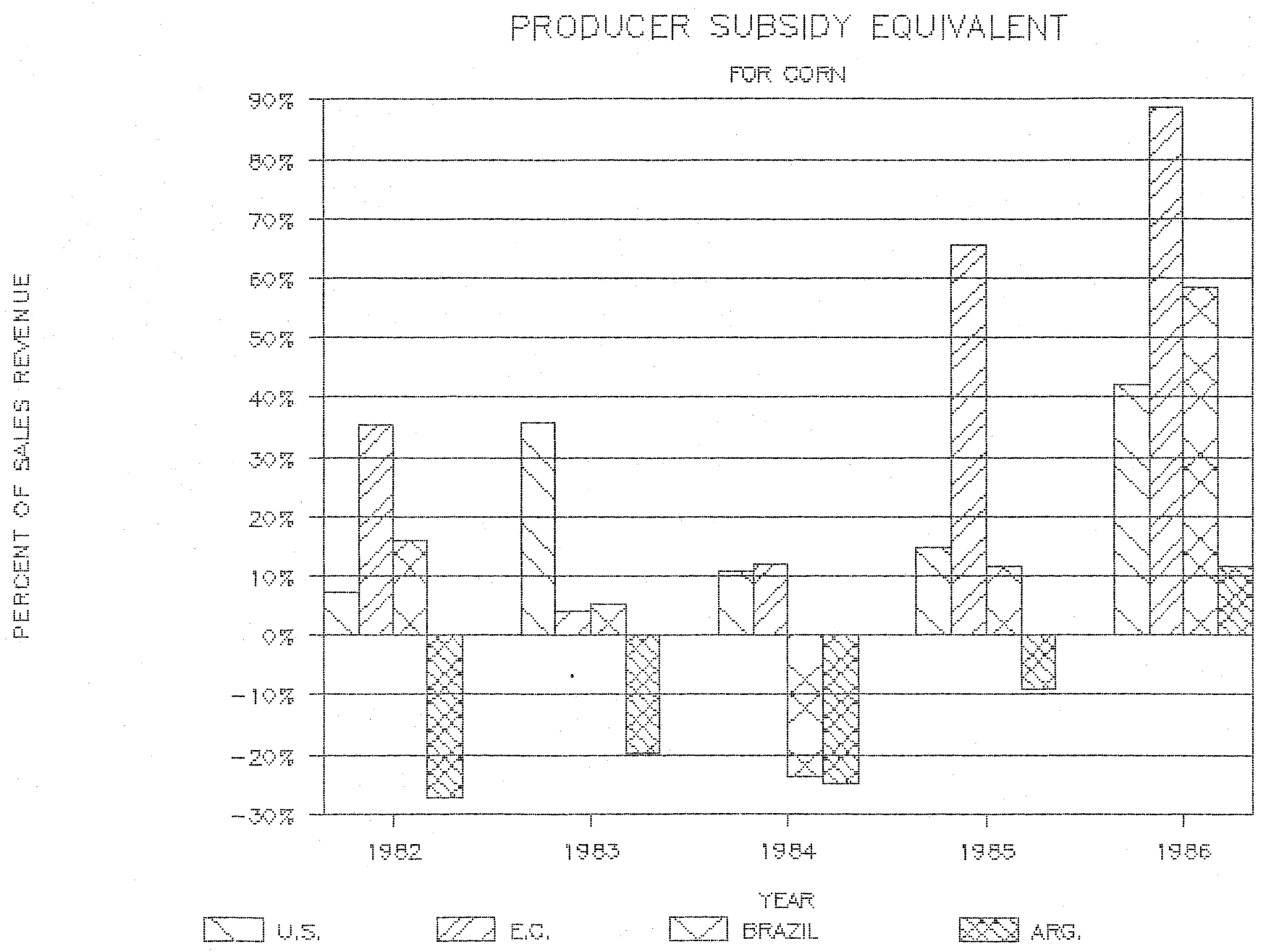

PRODUCER PRICE IN $/BUSHEL
FOR CORN
U.S. DOLLARS PER BUSHEL
$13
$12
$11
$10
$9
$8
$7
$6
$5
$4
$3
$2
$1
$0
1982
1983
1984
1985
1986
YEAR
BRAZIL
E.C.
U.S

Figure 11


PRODUCER SUBSIDY EQUIVALENT
FOR CORN
PERCENT OF SALES REVENUE
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
-10%
-20%
-30%
1982
1983
1984
1985
1986
YEAR
U.S.
E.C.
BRAZIL
ARG.

Political reality is clearly overshadowing economic reality in the current world corn market.

A similar situation exists for world wheat markets. EC and Canadian wheat prices have been consistently above U.S. and Australian prices. In 1980, EC prices were almost twice as high as in the other three countries.

Australian (green) wheat producers receive very low government subsidies compared to Canada (white) and EC (yellow) over this period. Argentina (blue) also taxed wheat exports over the 1983-85 period. Government subsidies accounted for over 80 percent of wheat producer income in the EC in 1983 and 1984. However, EC wheat subsidies have been substantially reduced since 1984. The U.S. and Canada seem to have jumped on the subsidy bandwagon as the EC has slowed down. Government subsidies accounted for over 50 percent of wheat producer income in the U.S. and Canada in 1986.

Figure 14 shows the high level of support prices for soybeans in the EC. EC soybean producers receive prices more than twice as high as their U.S. and Brazilian counterparts. Figure 15 shows that government subsidies to EC soybean producers have accounted for over 30 percent of soybean producer income in the EC except in 1983. In contrast U.S. soybean producers have received less than five percent of their income from government subsidies. Argentina producers have been saddled with 12 to 45 percent export taxes. Brazil sharply increased its subsidy on soybean exports in 1986 which accounted for about 28 percent of soybean income that year.

Subsidies for barley have escalated along with corn in all countries except Australia (Figure 16). In 1986, government subsidies accounted for 50 percent of U.S. barley producer income, 65 percent in the EC, and over 80 percent in Canada. If the trend continues, exporting countries will soon be paying importing countries to take barley off their hands.

Figure 12

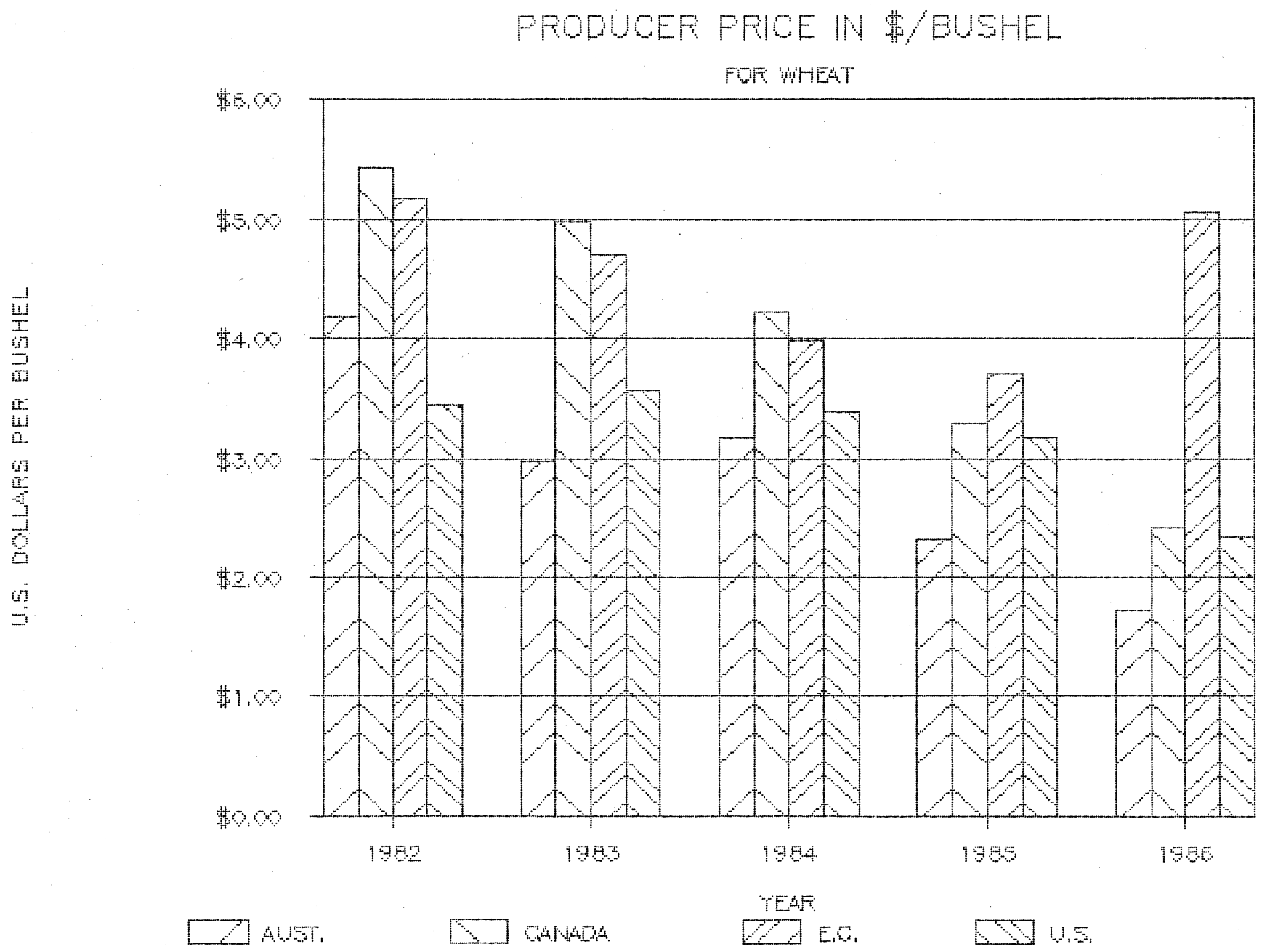

PRODUCER PRICE IN $/BUSHEL
FOR WHEAT
U.S. DOLLARS PER BUSHEL
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
$0.00
1982
1983
1984
1985
1986
YEAR
AUST.
CANADA
E.C.
U.S.

Figure 13

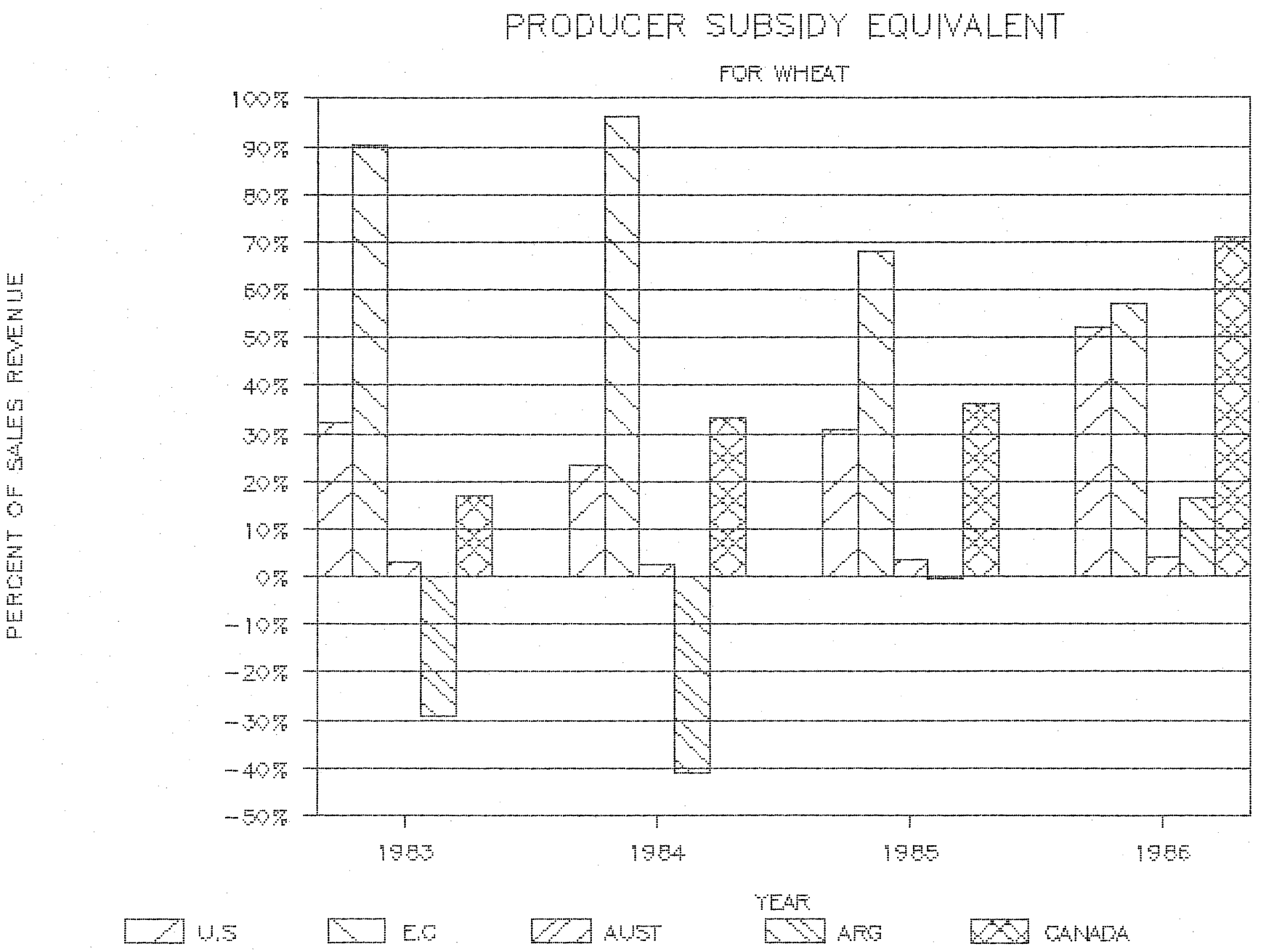

PRODUCER SUBSIDY EQUIVALENT
FOR WHEAT
PERCENT OF SALES REVENUE
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
-10%
-20%
-30%
-40%
-50%
1983
1984
1985
1986
YEAR
U.S
E.C
AUST
ARG
CANADA

Figure 14

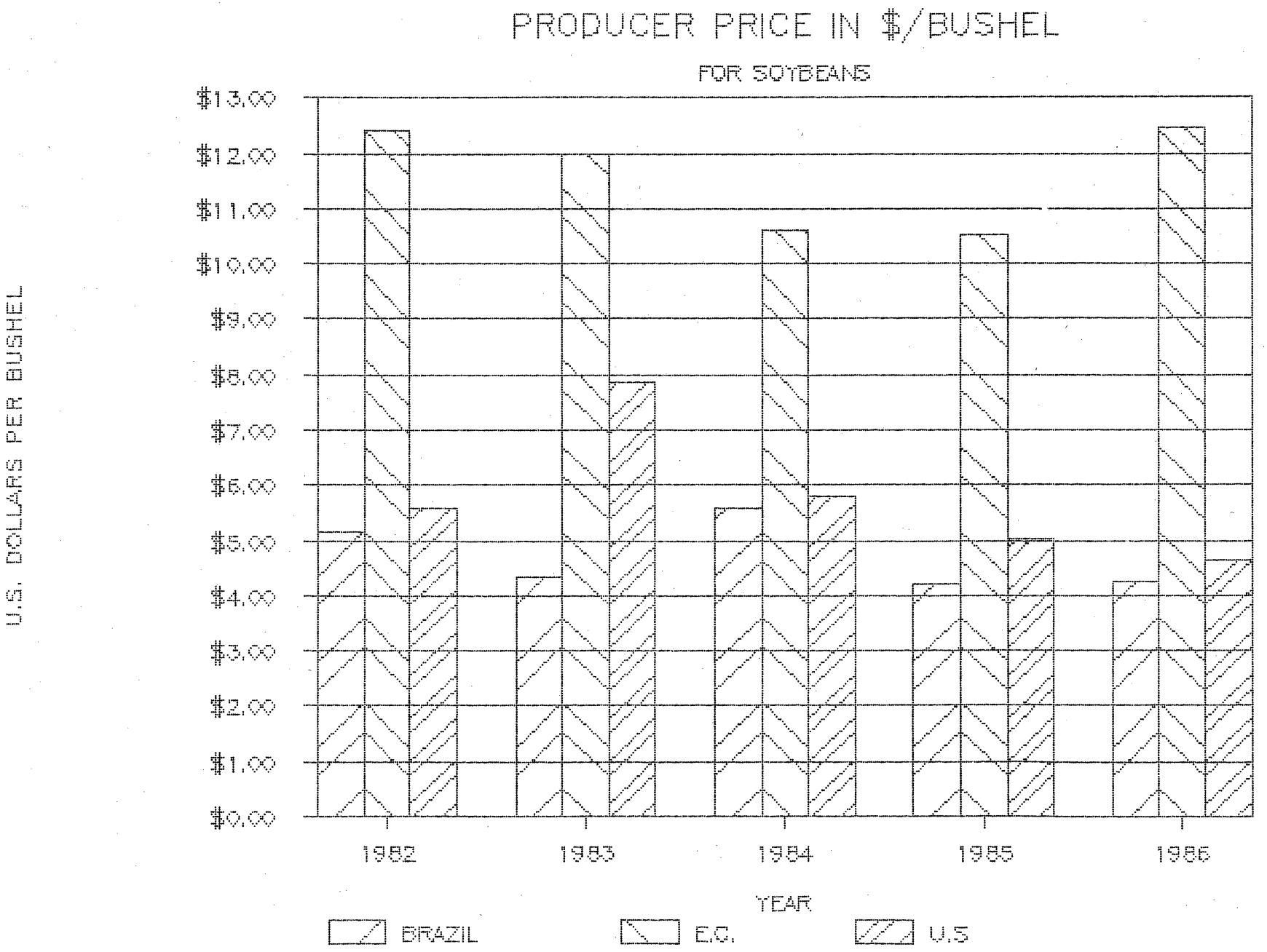

PRODUCER PRICE IN $/BUSHEL
FOR SOYBEANS
U.S. DOLLARS PER BUSHEL
$13.00
$12.00
$11.00
$10.00
$9.00
$8.00
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
$0.00
1982
1983
1984
1985
1986
YEAR
BRAZIL
E.C.
U.S

Figure 15

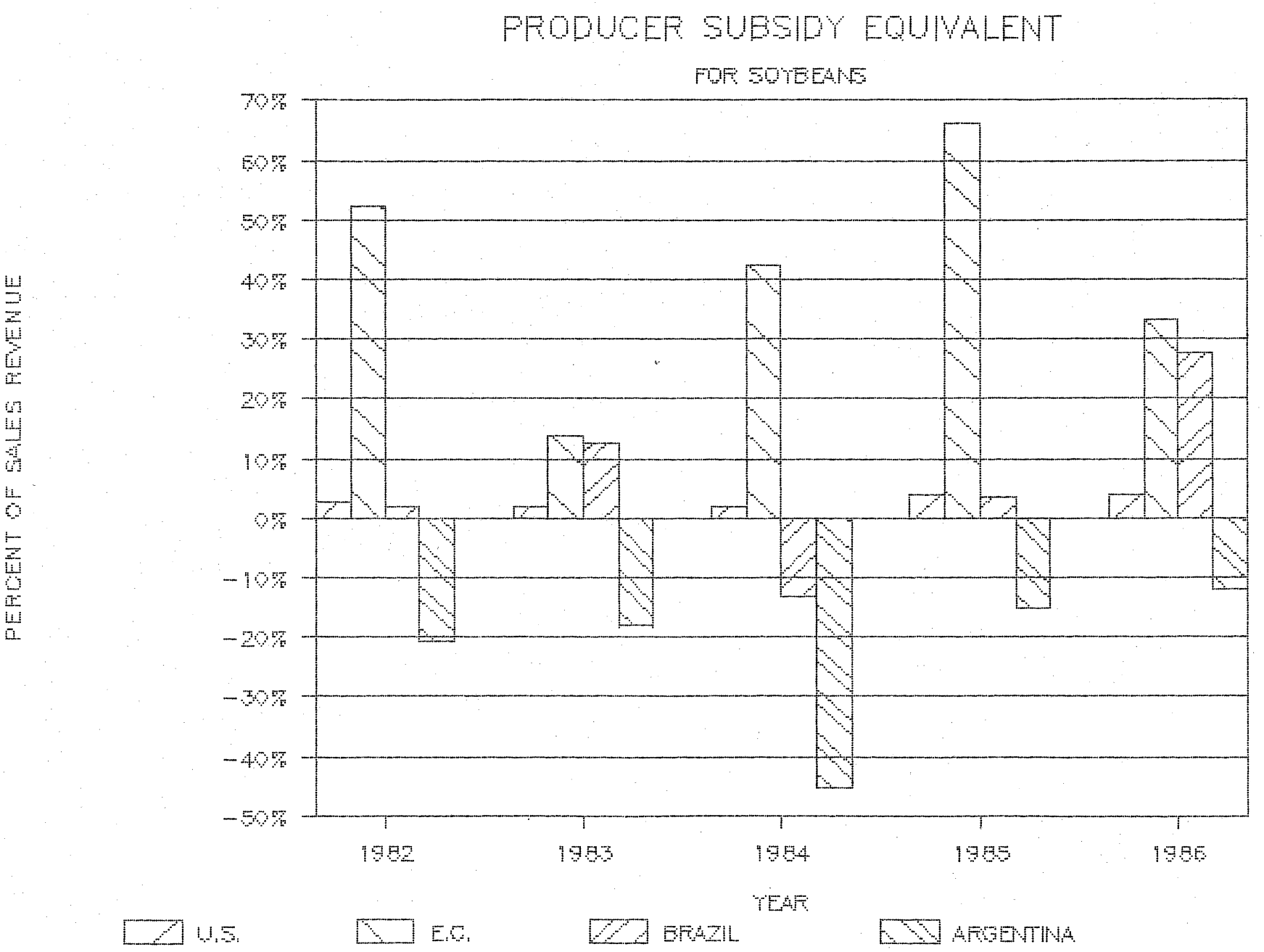
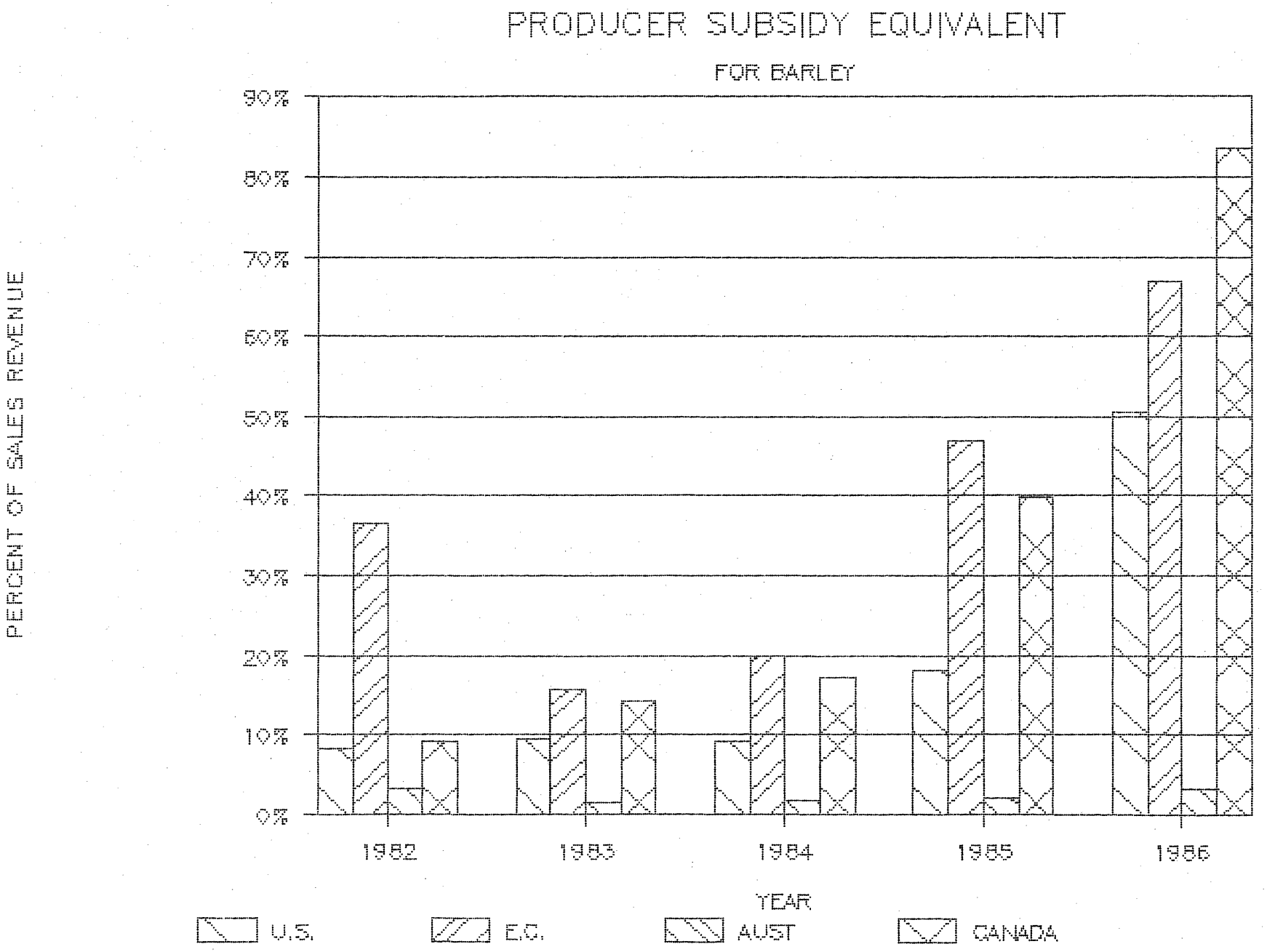

PRODUCER SUBSIDY EQUIVALENT
FOR SOYBEANS
PERCENT OF SALES REVENUE
70%
60%
50%
40%
30%
20%
10%
0%
-10%
-20%
-30%
-40%
-50%
1982
1983
1984
1985
1986
YEAR
U.S.
E.C.
BRAZIL
ARGENTINA

Figure 16


PRODUCER SUBSIDY EQUIVALENT
FOR BARLEY
PERCENT OF SALES REVENUE
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1982
1983
1984
1985
1986
YEAR
U.S.
E.C.
AUST
CANADA

Much ado has been made about the rebound in U.S. rice exports as a result of the marketing loan program. Figure 17 tells the real story. Thailand is taxing rice exports and U.S. government subsidies accounting for about 65 percent of rice producer income in 1986 up from 20 percent in 1982. The percent of rice producer income accounted for by subsidies was likely even higher in 1987. Expanded rice exports are due to the generosity of U.S. export subsidies and some weather problems in Thailand.

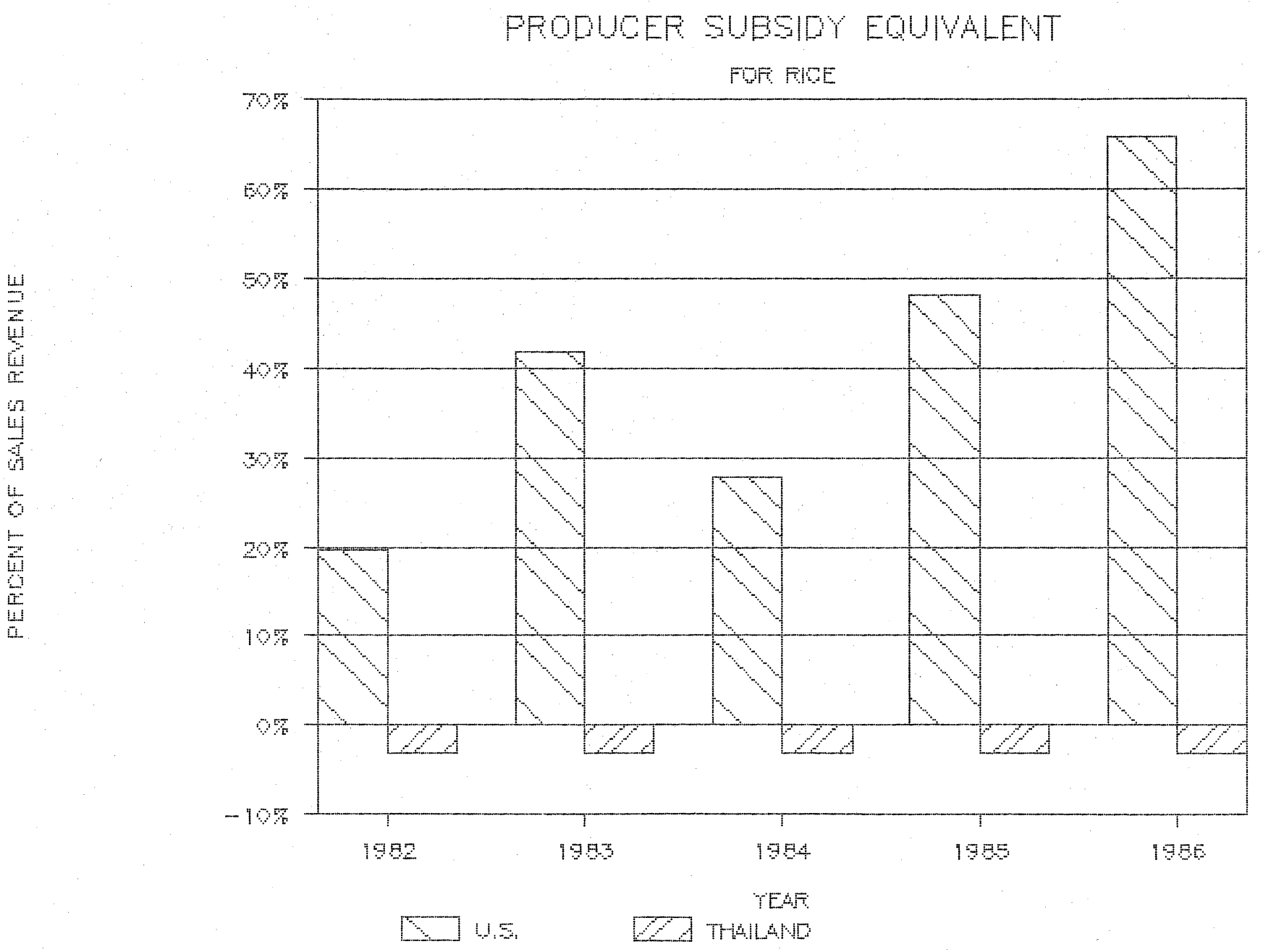
Conclusions and Observations

Based on available cost data, it appears that U.S. grain producers can effectively compete in world grain markets if trade was driven by relative costs of production. Missouri producers are competitive in the production of milo and wheat. Certain regions of the state can be competitive in the soybean and corn markets.

The facts of the current world trade situation are that governments, not producers, are competing for market shares. Trade flows more nearly reflect the relative willingness of governments to use export subsidies to move surplus production into world trade than they reflect relative costs of production. These government export subsidies are sending inappropriate signals to grain producers in the exporting countries about the size and profitability of export markets. If we remove the 40 percent U.S. export subsidies from corn, the 50 percent subsidy from wheat and the 65 percent subsidy from rice, would you be very excited about producing for the export market? Soybean producers are the only crop producers that have not had the economic realities of world export markets distorted by domestic price support programs and by U.S. export subsidies.

There would be world grain trade in the absence of government export subsidies and the U.S. would be a major exporter. However, world grain trade is in

Figure 17


PRODUCER SUBSIDY EQUIVALENT
FOR RICE
PERCENT OF SALES REVENUE
70%
60%
50%
40%
30%
20%
10%
0%
-10%
1982
1983
1984
1985
1986
YEAR
U.S.
THAILAND

reality much less profitable for grain producers than the current situation indicates. Our best estimates of long run world grain prices in a non subsidized trade environment are $2.00/bu for corn, $5.50/bu for soybeans, and $3.00/bu for wheat.

Grain producers in exporting countries are being sheltered from the economic realities of world grain markets. The cost of sheltering those producers from reality is getting increasingly high. Both the EC and U.S. are spending about $25 billion per year in farm income subsidies.

The distortions in world grain trade caused by domestic farm policies are well recognized and are a primary topic of discussion in the current GATT negotiations. There is rising interest in proposals to keep the impacts of domestic farm programs from spilling over into international grain markets. Such agreements would mean that producers, rather than governments, would then compete for world trade market shares. It remains to be seen if grain producers really want to compete in world grain markets, or if they prefer to have their governments wage semi trade wars on their behalf.

There is a tendency for us to focus on domestic farm programs and trade policies as being the only type of government policies that affect the agricultural sector. However, these government programs take a back seat to macro economic policy on the list of government policies affecting agriculture. General economic policies affect the growth rate of the economy, the rate of inflation and the value of the U.S. dollar. These factors determine the general economic climate for agricultural production and trade and, hence, the economic well being of U.S. agriculture. Budget deficits and the general health of the U.S. economy should receive at least as much, if not more, attention as domestic agricultural policy and trade programs as we consider the impacts of government policy on U.S. and Missouri agriculture's ability to compete in international markets.