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Compete in the World Market?

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Banks in the Monetary Policy Process?

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Can U.S. and Great Plains Agriculture Compete in the World Market? 3

By Alan Barkema and Mark Drabenstott

Sluggish growth in global food markets has diminished the competitive advantage U.S. agriculture derives from its huge resource base and superior infrastructure. Unless robust growth in foreign markets resumes, U.S. policymakers will face a difficult choice—let the market remove farm resources from production or keep resources in production at high public cost.

Should We Reduce the Role of Banks in the Monetary Policy Process? 18

By John F. Boschen

The traditional view of banks in the monetary and price level control process is based on banks being producers of money in the form of deposits. Some economists have recently argued, however, that growth of bank deposits has no effect on price level stability. They say that the role of banks in the monetary policy process could be reduced with no adverse effect on price level stability, principally by removing reserve requirements.

Can U.S. and Great Plains Agriculture Compete in the World Market?

By Alan Barkema and Mark Drabenstott

The past 15 years have seen extraordinary change in the nation's farm trade. The 1970s began with farm exports a small, little-noticed part of U.S. agriculture. Starting in **1972**, those exports began to boom, swelling to nearly \$44 billion in **1981**. As exports grew, so did confidence that the United States would be the world's granary for years to come.

The export boom crashed in the **1980s**, and U.S. agriculture's confident expectations gave way to serious questions. Can the United States compete in the world food market? Will the United States be forced to downsize its agricultural industry in the face of weak demand abroad? The answers bear on the future of U.S. agriculture in fundamental ways that will influence the financial health of the industry, the regional mix of

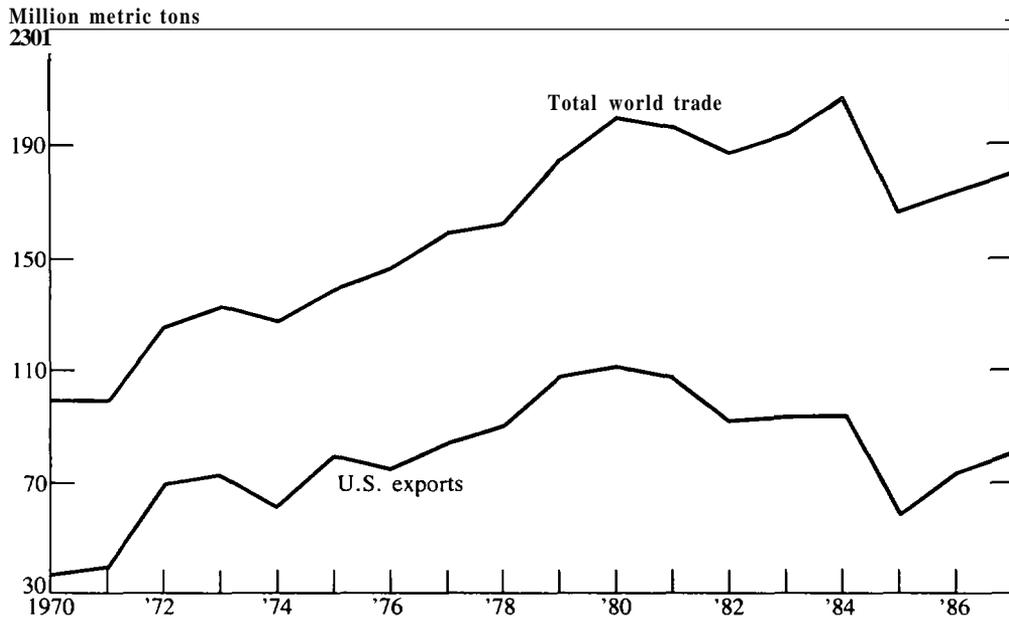
agricultural production in the United States, and the evolution of farm policy.

This article concludes that U.S. and Great Plains agriculture both retain significant competitive advantages but that more rapid growth in world food trade is needed to exploit those advantages. Conclusions about competitiveness in agriculture are necessarily imprecise because farm and trade policies here and abroad distort markets. Moreover, investments abroad have significantly diminished the competitiveness of U.S. agriculture. Nonetheless, evidence shows the United States still holds a strong competitive position in a number of farm commodities because of its leadership in agricultural technology and its superior agricultural infrastructure.

To support these conclusions, the article focuses on U.S. and Great Plains agriculture in four steps. First, recent trade patterns for basic U.S. farm commodities are discussed to show the challenge facing U.S. agriculture. Second, the essential factors that determine the competitiveness of U.S.

Alan Barkema is an economist at the Federal Reserve Bank of Kansas City and Mark Drabenstott is an assistant vice president and economist at the bank. Landell Froerer, a research associate at the bank, assisted in the preparation of the article.

CHART 1
World wheat and coarse grains trade



agriculture are identified. Third, current and prospective trends in these key factors are compared for the United States, separate U.S. growing regions, and other countries. Finally, future directions in the competitiveness of U.S. and Great Plains agriculture are explored in light of possible trade and policy developments.

Trends in U.S. agricultural trade

Two clear trends have been at work in U.S. agricultural trade in recent years. First, world food trade has been stagnant as a result of a weak world economy. This stagnation has meant the United States has been facing an extremely weak market for its farm products. And second, competing supplies have increased.

In discussing these trends, this section focuses on the farm commodities most basic to U.S. agricultural trade—feed grains, soybeans, and

wheat. Together, these commodities account for roughly 60 percent of the value of U.S. agricultural exports. These crops also are the principal commodities produced in the Great Plains states.¹ Thus, focusing attention on this handful of commodities leads to some broad conclusions about both U.S. and Great Plains agriculture.

Slowing world food demand

Burgeoning grain trade in the 1970s made the United States the world's most important food exporter. In the 1970s, world trade in wheat and coarse grains grew at an annual rate of more than 7 percent (Chart 1). Growth in world trade

¹ The Great Plains region includes all or parts of the states of Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming.

stopped in the early 1980s, however, and then declined sharply in 1985. Growth in world wheat and coarse grain trade stagnated because of the crippling effects of the 1981-82 recession. Also, many developing countries suffered sharp reductions in foreign exchange when world commodity prices slumped as a result of the unwinding of and coarse grain trade has rebounded somewhat in the last two years, but still remains well below peak levels.

The slump in world wheat quickly translated into lost export markets for U.S. farmers. U.S. exports of wheat and coarse grains peaked in 1981, leveled out for two years, and then began to decline. Reductions in world trade came mostly at the expense of the United States. In 1985, for example, more than 85 percent of the 40 million metric ton drop in world trade was in U.S. exports.

The export difficulties of U.S. producers were made worse in the early 1980s by the sudden emergence of keen competition abroad. Competition grew from production expansion in traditional importing areas—the European Community and China, for example—as well as in traditional exporting areas. Although foreign production had increased steadily throughout the 1970s, strong growth in world wheat demand paved room for those additional supplies. Not until world trade stopped growing and began shrinking did U.S. agriculture come face to face with its foreign competition. *Wheat markets.* The world wheat market became extremely competitive in the 1980s. When world trade was expanding in the 1970s, the United States was able to increase its market share from a fifth in 1970 to almost a half in 1981 (Chart 2). But as world demand fell and other

Increasing world supply

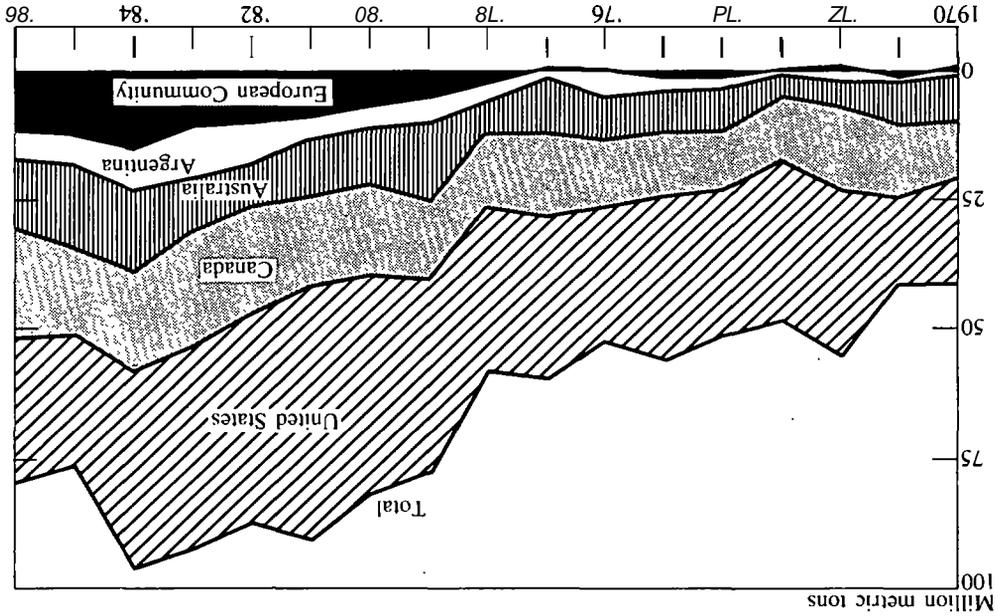


CHART 2
World wheat trade: major exporters

supplies increased, the U.S. share fell to a fourth in 1985. Meanwhile, Argentina, Australia, Canada, and the European Community steadily built market share. The European Community, for example, was a net importer in the 1970s, but it has held 13 to 15 percent of the world wheat market for the past few years. Australia's market share is more than half again larger than in the 1970s. And the Canadian share has nearly doubled, while Argentina's share, though still small, has tripled.

Feed grain markets. The United States has remained the major exporter of feed grains throughout the 15-year cycle in world grain trade. Even so, the United States has lost some of the overwhelming market share it had in the late 1970s. By 1979, the United States held nearly 80 percent of the world corn market, only to watch that share dip to between 50 and 60 percent the last two years. Argentina has clearly added to its market share, although sizable variations in production affect its share any given year. A collection of small exporters also has cut into the U.S. market.

Soybean markets. U.S. producers are still the dominant soybean exporters, but their position has eroded. The United States supplied four-fifths of the world soybean market in the 1970s, but that share has fallen to as low as two-thirds in 1984. Argentina has become a strong competitor and Brazil remains a key world supplier. Soybean trade has also suffered in recent years from large supplies of competing oils, notably Malaysian palm oil.

Effects on great plains agriculture

What effect have these fundamental trends in world supply and demand had on Great Plains agriculture? The most significant effect has been on the intensity of cultivation. Having broad regions of marginal crop land, the Great Plains traditionally has devoted a large portion of its

acreage to grazing. The surge in U.S. farm exports caused many marginal acres to shift into crop land use. The Great Plains had about 48.8 million acres in the production of wheat, corn, soybeans, and sorghum in 1970. By the time U.S. farm exports peaked in 1981, that crop base had been boosted to 76.0 million acres, a 55 percent increase. The expansion in the Great Plains accounted for 37 percent of the total U.S. expansion in these crops. The problem facing the region now is the reduction of this expanded crop base. Much of the Great Plains' grain is produced on marginal land and is not needed under current world demand.

Summary

U.S. agriculture is facing weak world demand and large world supplies. As residual supplier to the world market, the United States has borne a disproportionate burden in reduced exports, increased stocks, and excess production capacity. The Great Plains responded to the growth in world trade in the 1970s by swinging some 27 million acres into crop production. Now, U.S. and Great Plains agriculture must ponder whether they can remain competitive in the world market, and if not, how to idle excess productive capacity.

What determines competitiveness?

This section assesses the current competitiveness of U.S. and Great Plains agriculture. **Competitiveness** is defined as the ability to attain and maintain a given share of the world export market.² Distinctions are also made between static

² The definition of the term competitiveness used in this article is that adopted by John C. Dunmore, "Competitiveness and Comparative Advantage of U.S. and Southern Agriculture," Conference on Competitiveness of Southern Agriculture, Atlanta, Georgia, November 1986. Dunmore also provides an excellent comparison of the concepts of comparative advantage and competitiveness.

and dynamic assessments of competitiveness. The static competitiveness of U.S. agriculture is assessed by comparing production costs in the Great Plains and other major U.S. producing regions with foreign production costs. By contrast, the rate at which cost competitiveness is changing—dynamic competitiveness—is gauged by exploring trends in U.S. and foreign agricultural productivity. In short, costs of production provide a static picture of competitiveness while trends in productivity provide a more dynamic assessment of competitiveness.

Costs of production

A comparison of the costs of producing agricultural commodities in the United States with production costs in competing countries provides a starting point for assessing U.S. agriculture's competitiveness in world markets. Three problems arise in using a comparison of production costs to assess competitiveness, however. First, economic theory suggests that production increases and production costs rise accordingly when government policies subsidize production or penalize competing imports. Use of production and export subsidies and import penalties around the globe dictates, therefore, that a comparison of production costs provides only a crude measure of competitiveness.

Second, trade theory suggests that production costs compared across countries should measure opportunity costs, the value of production inputs in their best alternative uses.³ But opportunity

costs are rarely measured. Instead, prices of inputs used in producing agricultural commodities are used to estimate opportunity costs because these inputs are usually bought on competitive markets. For example, the cost of labor used in producing farm products usually reflects the value of farm labor in its best alternative use, such as an industrial wage rate.⁴ Third, currency

domestic supply. Scarce domestic resources are then freed for other, more profitable uses. By specializing in the production of goods in which each country holds a comparative advantage and trading for other products, the trading partners collectively make the most efficient use of their resources.

The theoretically elegant concept of comparative advantage is relevant to the trading patterns that would occur as individual countries assess the relative costs of producing or trading for various products in a world free from price distortions imposed by government policy. The real world, however, is replete with trade, agricultural, and tax policies that distort market prices. In brief, comparative advantage applies to an idealized world of perfect markets that exists only in theory, and competitiveness applies to the world as it actually is. For a more complete and mathematically rigorous discussion of the theory of comparative advantage, see Edward E. Learner. *Sources of International Comparative Advantage, Theory and Evidence*, The MIT Press, Cambridge, Massachusetts. 1984.

⁴ The method of measuring capital costs in crop production budgets presents a special problem. A land charge, either a direct rental payment or an indirect charge representing the opportunity cost of capital committed to land ownership, is part of the full economic costs of crop production that the producer must take into consideration in long-run business planning. If crop revenues fall below production costs, including the land charge—perhaps due to a decline in crop prices after a reduction in export demand—the price of land would eventually fall, reducing the opportunity cost of invested capital as well. With no more profitable alternative use for land, however, crop production would continue, perhaps at a less intensive level. Therefore, differences in land charges are not emphasized in the cross-country cost comparisons in this study.

Similarly, an argument can be made for excluding charges for farm machinery and other nonland capital inputs from these production cost comparisons. The ambiguity surrounding the different methods of accounting for these nonland capital charges in different countries adds error to cost comparisons. Excluding these charges from consideration, however, would mask important differences in the cost structures of capital-intensive and labor-intensive production technologies. Therefore, the costs chosen for emphasis in the cost comparisons in this study are

³ Competitiveness is closely related to comparative advantage, the cornerstone of economic trade theory, but important differences distinguish the two concepts. At issue is which products should be produced domestically and which should be imported. According to the theory of comparative advantage, each trading partner should specialize in the production and export of those goods produced with resources in relatively abundant domestic supply. Likewise, each country should import from its trading partners those goods produced with resources in relatively scarce

exchange rate fluctuations can also complicate cost comparisons. To minimize the effect of the recent large cycle in the value of the dollar, six-year average exchange rates are used in the cost comparisons in this study.⁵ In summary, these problems suggest that little attention should be given to slight differences in production costs between countries.

Domestic production costs. Comparison of production costs in different regions of the United States is useful because a decline in export demand for U.S. crops might well be reflected in cutbacks in production in higher production-cost regions before lower production-cost regions. Inflation-adjusted or real costs of producing corn, soybeans, and wheat have declined significantly in each of the major producing regions in the 1980s. The average cost of producing winter wheat in the United States is lowest in the Central Plains region, and the average cost of producing corn and soybeans is lowest in the Corn Belt/Lakes States region (Table 1). These data suggest that shrinking world crop markets would have a greater impact in the Northern and Southern Plains than in the Central Plains or Corn Belt.

Foreign production costs. A comparison of average production costs in the United States with

average costs in other countries provides a general overview of U.S. agriculture's current cost competitiveness. Wheat production costs in Argentina, a country that uses almost no commercial fertilizer, are almost 35 to 50 percent lower than in other principal exporting countries (Table 1). Argentina is also the low-cost producer of soybeans. Thailand, with labor-intensive production technology, holds a narrow lead over Argentina as low-cost producer of corn. Except for Argentina, average U.S. wheat production costs are competitive with costs in other countries. Furthermore, average production costs in the lower cost corn and soybean-producing regions of the United States are only modestly higher than Argentine costs. On balance, U.S. production costs for its principal export crops are competitive with most other major exporters, but the United States can no longer claim outright cost advantage.

A comparison of production costs across countries should also recognize that costs vary according to the quantity of grain produced. Production costs in any year vary widely from farm to farm within a region or country because of differences in yield potential, production technology, and management expertise. Some of a country's

inclusive of nonland capital costs but exclusive of land costs.

For a more complete discussion of similar problems in the development and use of cost-of-production budgets, see David A. Harrington, "Costs and Returns: Economic and Accounting Concepts," *Agricultural Economics Research* 35(4), pp. 1-8, 1983.

⁵ Several adjustments are made to annual production cost estimates in this analysis. Average annual costs in each country are based on the mean yield during the years 1980 through 1985 to minimize the effects of annual, weather-induced yield variation on production costs. Average costs in each country are then adjusted to the 1987 price level using the country's index of consumer prices. Each country's costs, slated in terms of 1987 prices, are then exchanged to U.S. dollar equivalents using the mean real exchange rate prevailing during the six-year period from 1982 through 1987. This six-year mean was chosen because it averages across a large cycle in the value of the U.S. dollar.

Note that the use of a higher exchange value of the U.S. dollar—the value of the dollar in early 1985, for example—would reduce the apparent cost competitiveness of the United States. For example, Brazil's high rate of domestic price inflation and a relatively low mean real exchange rate of the dollar bias Brazilian soybean production costs upward in Table 1.

Sources of production cost data include: USDA, "Economic Indicators of the Farm Sector: Costs of Production," various issues; J. Dawson Ahalt, "Annual Agricultural Situation Report, Argentina," April 1985; B. F. Stanton, "Production Costs for Cereals in the European Community: Comparisons with the United States, 1977-1984," A.E. Res. 86-2. Department of Agricultural Economics, Cornell University, Ithaca, New York, March 1986; and Gerald F. Ortman, Valter J. Stulp, and Norman Rask, "Comparative Costs of Agricultural Commodities Among Major Exporting Countries," Working Paper ESO 1325, Department of Agricultural Economics and Rural Sociology, The Ohio State University, Columbus, Ohio. 1986.

TABLE 1
Crop production costs in principal exporting countries
1987 U.S. dollars per metric ton

Wheat Production Costs								
	<u>United States*</u>							
	<u>Central Plains</u>	<u>Northern Plains</u>	<u>Southern Plains</u>	<u>Lake States/ Corn Belt</u>	<u>Argentina</u>	<u>Canada</u>	<u>United Kingdom</u>	<u>Australia</u>
Total Variable	47.66	64.71	82.14	67.02	44.34	63.67	82.64	56.53
Total Fixed	91.13	92.14	91.61	83.71	42.33	115.59	64.23	102.56
Total Production	138.79	156.85	173.75	150.74	86.67	179.26	146.87	159.09
Total Production Costs minus Land Charge	111.90	132.97	147.70	122.33	70.34	137.39	117.78	125.07
Avg. Yield 1980-85t	2.2	2.1	1.7	2.8	1.8	1.9	6.4	1.3

Corn Production Costs					
	<u>United States</u>				
	<u>Central Plains</u>	<u>Lake States/ Corn Belt</u>	<u>Argentina</u>	<u>Thailand</u>	
Total Variable	53.81	49.92	47.91	44.92	
Total Fixed	63.00	60.06	41.62	35.93	
Total Production	116.80	109.97	89.53	80.85	
Total Production Costs minus Land Charge	97.23	85.46	74.84	68.78	
Avg. Yield 1980-85t	6.1	6.7	3.3	2.2	

Soybean Production Costs					
	<u>United States</u>				
	<u>Central Plains</u>	<u>Lake States/ Corn Belt</u>	<u>Della</u>	<u>Argentina</u>	<u>Brazil</u>
Total Variable	63.38	59.73	103.81	82.02	179.91
Total Fixed	148.05	150.22	140.85	71.04	112.78
Total Production	211.44	209.96	244.65	153.06	292.69
Total Production Costs minus Land Charge	152.11	141.38	196.58	130.08	229.64
Avg. Yield 1980-85t	1.8	2.3	1.5	2.1	1.7

Source: See footnote 5.

*States included in U.S. production regions are: Central Plains (South Dakota, Nebraska, Kansas, Colorado); Northern Plains (Idaho, Montana, Wyoming); Southern Plains (Oklahoma, Texas, New Mexico); Lake States/Corn Belt (Minnesota, Wisconsin, Iowa, Michigan, Illinois, Missouri, Indiana, Ohio); and Delta (Arkansas, Louisiana, Mississippi).

†Metric tons per hectare.

total crop is always produced at a cost above the country's average production cost, and some is always produced at a cost below the average. Therefore, a complete assessment of the relative cost **competitiveness** of different regions or countries must compare production costs throughout a range of production levels.

Data to support a more complete analysis of corn, wheat, and soybean production costs are extremely limited.' This lack of data severely restricts the ability of analysts and policymakers to understand the true nature of the competitive challenge facing the United States. Data are available, however, to suggest that the production cost of a large part of each crop produced in the United States is below the average cost in most other countries. A unique U.S. Department of Agriculture study of U.S. costs in 1974 and 1981 showed that the variable cost of approximately 60 percent of total U.S. corn production in both years was less than the average variable cost for the crop as a whole. The portion of the total U.S. wheat crop produced at a less-than-average variable cost increased from about 40 percent in 1974 to about 55 percent in 1981.⁶ These limited data suggest that a substantial portion of the U.S. corn and wheat crops may be produced at costs lower than competitor countries with moderately lower average production costs.

Recognition that the production and export volumes of U.S. wheat, corn, and soybeans are several fold larger than the production and export volumes of other major exporters, especially the low-cost producers like Argentina and Thailand, is also critical. For example, the United States produced 20 times as much corn as Argentina in

⁶ Furthermore, in 1981, 80 percent of the corn crop and 75 percent of the wheat crop were produced at variable costs not more than 20 percent over the national average variable cost. See USDA Economic Research Service, "Agricultural Food Policy Review: Commodity Program Perspectives," Agricultural Economic Report Number 530, July 1985, pp. 142-147.

TABLE 2
Production and export volumes of principal exporting countries, 1986
Thousand metric tons

Corn	Production	Net Export
Argentina*	9,500	5,500
Thailand*	4,100	2,800
United States	209,632	38,025
Wheat		
Argentina*	9,000	4,490
Australia	16,700	15,000
Canada	31,850	20,000
EC-12	66,923	12,600
United States	56,793	27,650
Soybeans		
Argentina*	7,500	2,500
Brazil	17,000	2,800
United States	54,622	19,051

*Low-cost producer

1986, six times as much wheat, and seven times as many soybeans (Table 2). Clearly, U.S. agriculture would maintain a significant presence in world markets, even with a moderate **reduction** in U.S. production volume, because such a reduction would lower average U.S. production costs by limiting high-cost domestic production. In summary, the analysis suggests that U.S. agriculture, the high-volume producer, would be a strong competitor in world markets even without being the world's least average-cost producer.

Agricultural productivity

The preceding discussion focused on the current competitiveness of U.S. agriculture. The

TABLE 3
Indices of agricultural output per unit of labor input
 (1974-76 = 100)

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
Brazil	100	98	106	102	111	123	127	123	124	133
Thailand	101	102	100	119	108	116	120	120	133	130
Argentina	99	112	113	125	131	115	126	138	127	142
Australia	103	102	103	123	123	112	128	116	147	149
Canada	101	112	120	130	127	138	157	170	169	171
United Kingdom	99	100	114	122	127	138	141	155	159	182
United States	102	108	119	124	134	129	148	153	129	158

Sources: *FAO Production Yearbook*, various years; U.S. Department of Agriculture, *World Indices of Agricultural and Food Production*, various issues.

remainder of the section focuses on the rate at which the competitive position of U.S. agriculture appears to be changing—the dynamic competitiveness of U.S. agriculture—by reviewing recent trends in agricultural productivity. Because complete time series of production costs are available for few countries, an alternative indicator of trends in production efficiency must be considered. One readily available indicator of production efficiency is the index of agricultural labor productivity, a measure of total agricultural product per unit labor input.

The index of agricultural labor productivity provides an alternative to production costs for comparing trends in agricultural productivity in the United States and six of its principal competitors in agricultural trade. Total agricultural product per unit of labor input increased by approximately one-third from 1975 to 1984 in Thailand and Brazil, countries with growing agricultural labor forces (Table 3). Higher rates of growth in agricultural labor productivity were obtained in countries with declining agricultural labor forces. Agricultural labor productivity advanced almost 45 percent in Argentina and Australia, 70 percent in Canada, and 83 percent in the United Kingdom, bracketing the 55 per-

cent increase in productivity in the United States. Improvement in production technologies leading to greater production efficiency clearly played a major role in **boosting** agricultural output in countries with declining agricultural labor forces. Furthermore, U.S. agriculture's intermediate record of productivity growth suggests that foreign producers will continue to contest U.S. agriculture's position in world markets.

Summary

Average production costs for the United States' principal export crops are not the world's lowest, but these costs are competitive with average production costs in most major exporting countries. On average, the United States produces corn and soybeans at nearly as low a cost as the world's least-cost producers. Average production costs of wheat in the United States are competitive with average costs of all other major wheat exporters except Argentina. Moreover, the United States produces and exports far greater volumes than the current least-cost producer of each **commodity**, and production costs of a significant portion of U.S. production may well be below costs in competitor countries. Hence, these data suggest

that the United States continues to be a strong competitor in world agricultural markets.

The United States' record of intermediate growth in productivity, however, suggests that the future position of U.S. agriculture in the world marketplace is not certain. More rapidly advancing agricultural productivity in other parts of the world could be reflected eventually in lower foreign production costs and erosion of U.S. market share. The following section broadens this perspective on U.S. agriculture's future competitiveness by considering two factors significant in determining U.S. agriculture's future in world markets—infrastructure and policy.

Future competitiveness of U.S. agriculture: the key factors

This section considers the factors that will determine the position of U.S. agriculture in world markets in the longer run. First is an examination of the underlying infrastructure supporting U.S. agriculture. Then the effects of agricultural and trade policies are reviewed.

Agricultural infrastructure

The previous section suggested that maintaining the ability to produce and market large volumes of commodities efficiently is critical to maintaining U.S. agriculture's competitiveness. Maintaining production efficiencies depends on a steady stream of innovative production technologies from the industry's research and development infrastructure. **Similarly**, moving large commodity volumes from farm gate to export **terminal** depends on an efficient marketing and transportation infrastructure. These two key infrastructure components have formed a solid but often forgotten foundation for U.S. agriculture in the past. However, this infrastructure base has shown signs of weakening in recent years. Further deterioration in agriculture's infrastructure base could

jeopardize U.S. agriculture's future in world markets.

Agricultural research and development. Technological innovation holds much promise for productivity growth, declining production costs, and a strong future competitive posture for U.S. agriculture. But a recent slowing in the growth of funding for agricultural research and development could adversely affect the sector's future productivity. Without domestic gains in productivity, continued productivity gains abroad could eventually cause further erosion in the competitiveness of U.S. agriculture.

The United States is believed to hold a lead over other countries in developing and applying new biotechnologies, the newest and one of the most promising areas of agricultural research.⁷ The principal sources of the U.S. lead in these new technologies are well-established public and private research and development capabilities. However, growth in spending on agricultural research in the United States, public and private, has slowed sharply in recent years.⁸ Adjusted for inflation, average growth in public spending on research in the 1980s has been less than a fourth of the rate in the 1960s. After strong growth in the 1970s, growth in public extension funding has fallen by half in the 1980s. Growth in private research spending also weakened in the 1980s though not as much as growth in public spending (Table 4 and Chart 3). As a result, the private

⁷ For a more thorough assessment of the United States' position among other countries in developing new technologies and a summary of the expected impact of new technologies on U.S. agriculture, see U.S. Congress, Office of Technology Assessment, *Technology, Public Policy, and the Changing Structure of American Agriculture*, OTA-F-285, March 1986.

⁸ This discussion is drawn from the more complete history of public agricultural research in the United States found in Wallace E. Huffman and Robert E. Evanson, *The Development of U.S. Agricultural Research and Education: An Economic Perspective*, forthcoming.

TABLE 4
Decade average growth rates in
real agricultural research and
extension spending
 (in percent)

	<u>Public</u>	<u>Private</u>	<u>Total</u>	<u>Extension</u>
1950s	3.4	—	—	2.8
1960s	4.2	3.5	3.8	1.8
1970s	2.3	3.8	2.9	3.7
1980-84	0.9	2.7	1.9	1.8

Source: Huffman and Evanson. See footnote 8.

sector enlarged its share of annual real agricultural research expenditures from an average of 55 percent in the 1970s to an average of 60 percent in the 1980s.⁹

Despite the private-sector's relatively consistent record of supporting agricultural research, private-sector research cannot fully substitute for public-sector research. The public-sector role includes the advancement of basic knowledge, the development of generic applications of new technologies, and the training of new **scientists**—activities that are not commercially feasible in the private sector. In summary, a greater public commitment to research is very likely needed for U.S. agriculture to improve its record of productivity growth and maintain its competitive position in world markets.

⁹ The recently increasing share of research spending in the private sector can be attributed in part to a significant private sector interest in the most recent biotechnology research. Specific data on the level of private biotechnology research are not available, but private sector spending on biotechnology research is believed to exceed public spending on biotechnology research by two to three times. See Michael J. Phillips, "Enhancing Competitiveness: Research and Technology in Agriculture," in *Compering in the World Marketplace: the Challenge for American Agriculture*, proceedings of a symposium sponsored by the Federal Reserve Bank of Kansas City, October 31, 1985, pp. 25-47.

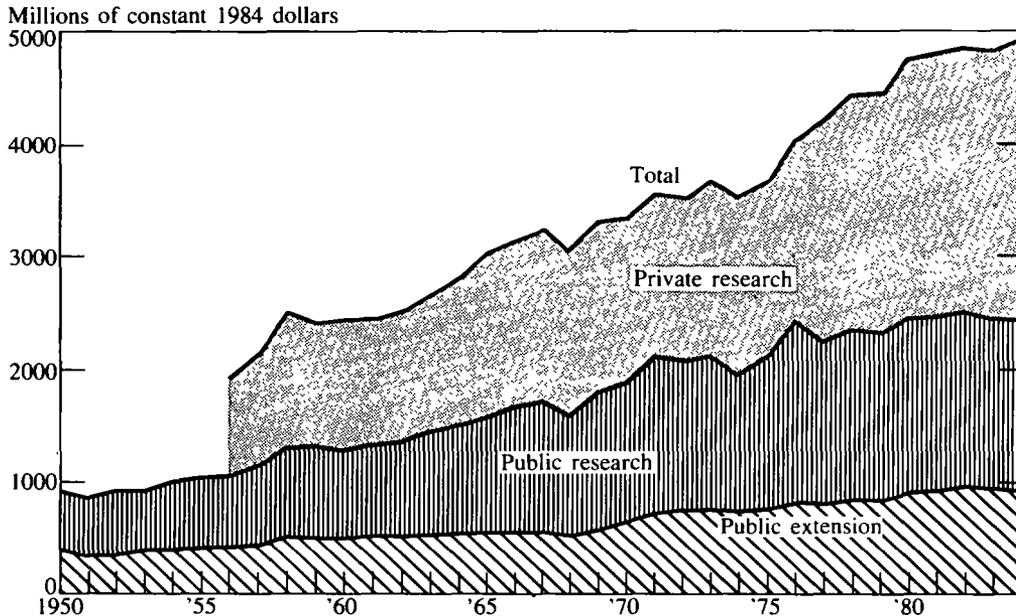
Transportation infrastructure. The development and maintenance of the transportation infrastructure that delivers exportable supplies from the farm gate to the export terminal is a vital determinant of competitiveness that cannot be overlooked. U.S. capital investments in the 1970s built a system capable of **transporting** the huge volumes of grain flowing into export channels in the early 1980s. Grain industry analysts estimate that the U.S. transportation system today could accommodate grain exports of nearly 200 million metric tons a year, nearly twice the volume that strained the system in the 1970s. Transportation costs in the United States have been shown to be roughly the same as those in Canada and the **United Kingdom**, slightly less than those in Argentina and Australia, and well below those in Brazil,¹⁰ where transportation infrastructure is especially lacking.¹⁰

Approximately half of the U.S. system's estimated peak capacity has been idled, however, by the sharp decline in export volume, and the system's capacity has diminished slightly in recent years. The large excess U.S. transportation capacity indicates that significant expansion in domestic export volume could be readily absorbed with little increase in relatively low marketing costs. At larger export volumes, the contribution of a well-developed transportation infrastructure to U.S. agriculture's competitiveness on world markets would likely increase as capacity **con-**

¹⁰ For example, U.S. transportation costs to export terminals represent a significant **proportion**, about one-fifth, of **nonland** production costs plus transportation costs. But U.S. domestic transportation costs are only about four-fifths as large as Argentina's. See Ortman et al., "Comparative Costs of Agricultural Commodities Among Major Exporting Countries," and also **Ten-pao Lee**, C. Phillip **Baumel**, and Robert W. **Acton**, "The Impacts of Transportation Rates on World Soybean Trade Competition," in Richard Shibles, ed., *World Soybean Research Conference III: Proceedings*. Westview Press, Boulder, Colorado, pp. 116-123.

CHART 3

Real U.S. spending on agricultural research and extension



Source: Huffman and Evanson. See footnote 8.

straints push marketing costs much higher in other countries.

Farm and trade policy

The future competitiveness of U.S. and Great Plains agriculture cannot be separated from the future course of U.S. farm and trade policy. Farm programs are well entrenched in both exporting and importing countries, considerably distorting world food markets. Japan, for example, insulates its farmers from world markets through an extensive system of import quotas, domestic price supports, and nontariff barriers. Because Japan is such an important food importer, these programs increase market price volatility elsewhere and effectively limit the efficiency of the market for the food-exporting countries.

The United States is entering the important Uruguay General Agreement on Tariffs and Trade

(GATT) negotiations with a fairly simple bargaining position—that participants agree to phase out all agricultural import restrictions and all subsidies that directly or indirectly affect trade over a ten-year period. What effects might such agricultural trade liberalization have on U.S. agriculture? Many in U.S. agriculture believe that reducing government support here and abroad would make the U.S. more competitive, allowing it to increase its market share. But is that necessarily so?

One recent U.S. Department of Agriculture study suggests that U.S. farmers would not benefit from multilateral trade liberalization." The study concludes that the net effect of global withdrawal

¹¹ See Vernon Roningen, John Sullivan, and John Wainio, "The Impact of the Removal of Support to Agriculture in Developed Countries," paper presented at the American Agricultural Economics Association annual meeting, East Lansing, Michigan, August 1987.

TABLE 5

Future directions in the competitiveness of U.S. and Great Plains agriculture

Sluggish Trade Growth	Farm Policy Trend	Public Cost	Trend in Market Share		U.S. Cost of Production Relative to Rest of World
			U.S. Agriculture	Great Plains Agriculture	
Outcome 1	Status quo	High	Stable	Stable	High
Outcome 2	More market-oriented	Medium	Stable to weak	Weak	Moderately high
More Rapid Trade Growth					
Outcome 3	Status quo	Medium to low	Stronger	Stronger	Moderate to low
Outcome 4	More market-oriented	Low	Stronger	Stronger	Low to very low

of farm subsidies would be higher world prices, lower value for U.S. production, and lower income to U.S. producers. However, U.S. consumers would benefit from lower retail prices as domestic price supports were withdrawn. The benefit to consumers would outweigh the reductions in farm income. An important assumption of the study is that 1984 world trade levels would continue to prevail. Thus, the study's findings are consistent with declining **U.S. competitiveness** in major crops when world food trade is sluggish. This is as expected. As shown in the preceding section, the United States derives its principal competitive edge by being able to deliver large volumes at low unit cost. When operating at only half of its export capacity, the United States cannot be fully competitive, even if farm policy becomes more market-oriented.

Implications for the future of U.S. and Great Plains agriculture

How competitive will U.S. and Great Plains agriculture be in the future? The factors discussed above suggest that the industry's competitive position depends on two principal factors: the rate of growth in world food trade and the direction of U.S. farm policy. The rate of advance in U.S.

biotechnology application to agriculture will also be important—potentially critical—but for now, it appears less vital than the other two factors.

Four outcomes appear possible in the next ten years. These can be ordered according to two levels of growth in world food trade—sluggish and more rapid. These two trade outcomes can be paired, in turn, with unchanged farm policy and more market-oriented farm policy, both here and abroad.

Sluggish trade growth

Current U.S. macroeconomic policy of large budget deficits that lead, in turn, to large trade deficits and a weak dollar is one principal factor in sluggish trade growth. That policy could lead to high U.S. interest rates, slowing economic growth here and in the developing world. The sluggish growth in world trade deprives U.S. agriculture of its most significant competitive factor—its ability to deliver large volumes of grain at low unit costs. In short, sluggish growth in trade deprives the United States of its infrastructure advantage and its cost advantage at high levels of output—advantages that only come into play at much larger trade levels.

With sluggish trade growth, the United States

could choose one of two farm policy paths. A status quo policy would appear likely, given depressed U.S. commodity prices. Such a policy would entail high public costs from the United States being forced to subsidize exports (Table 5, Outcome 1). High public expenditures would allow the United States and the Great Plains to retain market share. Strictly speaking, both U.S. and Great Plains agriculture would remain competitive. But farm production costs would be high relative to the rest of the world. The high relative cost results from marginal acres being kept in production by continued target price protection. Thus, competitiveness is being "purchased" by expensive policy measures.

Adoption of a more market-oriented farm policy when growth in world trade is sluggish would reduce the United States' market share—competitiveness in its narrow sense—while lowering somewhat the relative cost of U.S. farm production (Table 5, Outcome 2). The United States would retire more of its high production-cost acres—including many acres in the Great Plains—and overall average costs of production would decline somewhat. U.S. production costs would still remain moderately high relative to the rest of the world, however, because foreign costs are relatively low at low levels of world output. In effect, the weak export demand would still prevent the United States from flexing its infrastructure muscle and taking advantage of its elastic resource base. For the Great Plains, market share might decline slightly because the region would still have somewhat higher production costs than some other growing regions of the world.

More rapid trade growth

A U.S. macroeconomic policy of greater fiscal and trade balance would help to lower interest rates, in turn, stimulating long-run growth here and abroad. Growth in trade could be stimulated even further if major industrial nations, such as

West Germany and Japan, adopted more expansionary fiscal and monetary policies. With the U.S. and other industrial economies in greater balance, more capital would be available for funding economic growth in the developing countries. Despite a somewhat stronger dollar, U.S. agriculture would benefit, on balance, from a much improved world economy. This macroeconomic setting would push U.S. agriculture toward its competitive potential—using more fully its infrastructure advantage and producing larger volumes at low costs. With strong world demand, no other producer can deliver large volumes at costs competitive with the United States.

With more rapid growth of trade and a status quo farm policy, competitiveness strengthens in both the United States and Great Plains (Table 5, Outcome 3). Under this scenario, other producers would be expanding into the sharply rising portions of their cost curves. Meanwhile, U.S. costs would rise somewhat, although the increase in unit costs would be less for the United States than for most (if not all) foreign producers.

A more market-oriented farm policy coupled with more rapid trade growth gives U.S. agriculture its greatest competitive advantage (Table 5, Outcome 4). Resources are used at high levels while some marginal acres go idle as support prices decline. Costs of public programs are low, and the relative cost of U.S. farm production is very low. U.S. costs would be marginally lower than under Outcome 3 because some marginal lands would likely be withdrawn and resources would be allocated more efficiently. The Great Plains also is most competitive under this outcome, although on a proportionate basis, the region probably must make more resource adjustments than the nation as a whole.

Summary

In sum, U.S. agriculture becomes more competitive as the growth in demand for U.S. farm

exports increases. That improvement will be influenced by the future direction of macroeconomic policy in the United States and other industrial nations. If export demand remains weak, the United States can "buy" competitiveness by maintaining a status quo farm policy. Continuing current programs while demand is weak, however, will leave U.S. costs of production high relative to the rest of the world, raising some questions about the ability of the United States to compete in the long run. Thus, U.S. and Great Plains agriculture must consider the future with one eye on macroeconomic developments and the other on farm and trade policy developments. Competitiveness may well be purchased by high public outlays if world economic growth is slow. Only when demand growth is vigorous will market forces confer significant competitive advantage to the United States, and especially, the Great Plains.

Conclusions

Can U.S. and Great Plains agriculture compete? The answer is yes. But a complex set of narrower conclusions combine in that simple answer. First, U.S. agriculture needs strong trade growth to flex its greatest competitive muscle. The United States has a great reservoir of resources that the market brings into play only at higher levels of world trade. Much of the United States' resource reserve that strong demand brings into productive use lies

in the Great Plains. If growth in world demand is sluggish, the United States—and especially the Great Plains—faces a difficult choice: let the market remove farm resources or keep resources in production at high public cost. The choices favored by the nation and the Great Plains may not be the same.

Second, the United States may need to pay more attention to the place of infrastructure in competitiveness. Much of the United States' competitiveness in world agriculture stems from its unmatched array of research and transportation. The infrastructure is in some jeopardy, however, with only half of the transportation network fully used. Moreover, the United States is making comparatively smaller investments in research than some competitors. Thus, longer run questions remain about the ability of U.S. agriculture to stay ahead of the rest of the world. For the Great Plains, the future of agricultural infrastructure could spell the economic future for many small communities.

Finally, better data are needed to provide rigorous empirical answers to some of the hypotheses presented. The United States must better understand how its costs compare with those of other countries. The data for making solid judgments are simply not available. The stakes are high as the United States enters a new round of GATT negotiations. It is unfortunate that the potential effects of the possible outcomes must be estimated so tenuously.

Should We Reduce the Role of Banks in the Monetary Policy Process?

By John F. Boschen

The growth rate of bank deposits is often considered an important monetary factor affecting inflation. As a consequence, regulatory control of the banking system's production of deposits is seen as critical to monetary policymaking.

An important part of the deposit control framework is the reserve requirement on transactions deposits. While the Federal Reserve's monetary control procedures do not ordinarily focus directly on the reserve-deposit linkage, reserve requirements play a crucial indirect role in determining the banking system's demand for reserves.¹

Reserve requirements also impose costs on the banking system because reserves held at the Federal Reserve earn no interest. Because of these costs, it is important to determine whether deposit regulation is necessary for inflation control.²

This paper examines whether the Federal Reserve's regulation of bank deposit growth, by reserve requirements or other methods, is necessary to ensure price stability. Using the recent work of several economists, dubbed the New Monetary Economics, this paper argues that regulation of deposit growth may not be the only way to control inflation.³ The first section

¹ "Is the Fed's Money Policy Pointing to a Return of 70's-Type Inflation?" *The Wall Street Journal*, February 19, 1987; Daniel L. Thornton, "The FOMC in 1982: De-emphasizing MI," *Review*, Federal Reserve Bank of St. Louis, June/July 1983, pp. 26-35; and Henry C. Wallich, "Recent Techniques of Monetary Policy," *Economic Review*, Federal Reserve Bank of Kansas City, May 1984, pp. 21-30.

John F. Boschen is assistant professor of economics at Tulane University and a visiting scholar at the Federal Reserve Bank of Kansas City. The views expressed in this article are those of the author and do not necessarily represent those of the Federal Reserve Bank of Kansas City or the Federal Reserve System.

² See Stuart E. Weiner, "Payment of Interest on Reserves," *Economic Review*, Federal Reserve Bank of Kansas City, January 1985, pp. 16-31, for a detailed discussion of these proposals. If deposit control is necessary, the issue would simply be to keep the costs for reserve requirements as low as possible. In this vein are proposals to reform the current reserve requirement system by paying interest on reserves.

³ The New Monetary Economics is a term used by Robert Hall. "Monetary Trends in the United States and the United Kingdom: A Review from the Perspective of New Developments in

describes the traditional transactions approach to money and price level determination and summarizes the costs of involving banks in monetary policy through reserve requirements. The second section describes the New Monetary Economics and its implications for the role of banks in the monetary process. The third section discusses empirical evidence.

The transactions approach to price level determination

Banks have been viewed traditionally as producers of money because they issue demand deposits.⁴ Demand deposits are special because,

in principle, they can be converted to currency on demand at the face value of the check or deposit account. As a result, checks drawn against demand deposits are a widely accepted means of payment in the United States.

The widespread use of demand deposits for transactions is the basis for including demand deposits in most standard transactions-based definitions of money. Indeed, demand deposits and similar checkable accounts comprise the largest component of the M1 money stock.⁵ Checkable deposits at the end of 1987 were about 74 percent of M1, or \$553.3 billion. Of the total M1 money stock, \$256.7 billion was supplied directly by the Federal Reserve as the monetary base (currency plus deposits held as reserves) and the remaining \$496.3 billion was "produced" by banks. Banks, therefore, created as deposit liabilities slightly less than two-thirds of M1.⁶

A transactions view of money suggests a connection between the growth in nominal deposits and increases in the general price level. Deposits are a major part of the payments system, entering many transactions where money is swapped for goods or services. Because deposits appear on one side of so many transactions, an increase in nominal deposits relative to the available supply of goods and services would imply a rise in the deposit price of goods and services. The price level stated in terms of, say, a standardized

Monetary Economics," *Journal of Economic Literature*, December 1982, pp.1552-56, and Tyler Cowen and Randall Kroszner, "The Development of the New Monetary Economics," *Journal of Political Economy*, June 1987, pp. 567-590, in referring to a literature that examines a variety of implications of legal restrictions on intermediation. Principal contributors to this literature are Fischer Black, "Banking and Interest Rates in a World Without Money," *Journal of Bank Research*, Autumn 1970, pp. 9-20; Eugene F. Fama, "Banking in the Theory of Finance," *Journal of Monetary Economics*, January 1980, pp. 39-57, and Eugene F. Fama, "Financial Intermediation and Price Level Control," *Journal of Monetary Economics*, July 1983, pp. 7-28; Robert L. Greenfield and Leland B. Yeager, "A Laissez-Faire Approach to Monetary Stability," *Journal of Money, Credit and Banking*, August 1983, pp. 302-315; Robert E. Hall, "Explorations in the Gold Standard and Related Policies for Stabilizing the Dollar," in *Inflation*, Robert E. Hall, ed., National Bureau of Economic Research, Chicago, 1982, pp. 111-123, and Robert E. Hall, "Optimal Fiduciary Monetary Standards," *Journal of Monetary Economics*, July 1983, pp. 33-50; Thomas J. Sargent and Neil Wallace, "The Real Bills Doctrine Versus the Quantity Theory: A Reconsideration," *Journal of Political Economy*, December 1982, pp. 1212-1236; and Neil Wallace, "A Legal Restrictions Theory of the Demand for 'Money' and the Role of Monetary Policy," *Quarterly Review*, Federal Reserve Bank of Minneapolis, Winter 1983, pp. 1-7. This literature has recently gained attention as a means of analyzing monetary questions in a deregulated banking environment.

⁴ A good treatment of banks as creators of money is found in George G. Kaufman, *The U.S. Financial System*, Prentice-Hall, Englewood Cliffs, N.J., 1986. The historical role of reserve

requirements in generating revenue for the U.S. Treasury is presented in Marvin Goodfriend and Monica Hargraves, "A Historical Assessment of the Rationales and Functions of Reserve Requirements," *Economic Review*, Federal Reserve Bank of Richmond, January/February 1983.

⁵ The M1 money stock is composed of currency, travelers checks, demand and other checkable deposits at depository institutions, and demand deposits at credit unions and thrift institutions.

⁶ See statistical releases H.3 and H.6, Board of Governors of the Federal Reserve System, Washington, D.C., January 28, 1988.

deposit would go up.

A conflict between bank behavior and price level stability can arise if no external force limits deposit expansion. For example, in an unregulated and competitive banking system, individual banks may find that the opportunity costs to issuing additional demand deposits are negligible. In such cases, according to one influential economist, the late Harry Johnson of the University of Chicago, the "competitive banking system would be under constant pressure to expand the nominal money supply and thereby initiate price inflation. [Therefore] stability in the trend of prices requires social control over the quantity on money supplied by the banking system."⁷

As Johnson suggests, economic policy enters the banking domain because growth in bank-produced money is considered causally related to inflation. Since monetary policy is responsible for price level stability, most economists and policymakers consider regulatory control over deposits an unavoidable aspect of the monetary policy **framework**.⁸

In principle, reserve requirements, along with control of the nominal stock of reserves, represent the anchor that limits expansion of the deposit money **supply**.⁹ Under the Federal Reserve's cur-

rent operating procedure, reserve requirements serve mainly to peg the banking system's demand for the additional reserves needed to back deposit growth. The banking system must obtain an additional 12 cents in reserves for every dollar of new transactions deposits issued. As a result, the Federal Reserve can link deposit growth to growth in the banking system's reserve liabilities.

Impact of monetary control on the banking sector

Reserve requirements impose a cost on banks by requiring that part of the **banking sector's** portfolio be held as noninterest-earning **reserves**.¹⁰ Because nonbank financial **intermediaries** do not face reserve requirements, the cost of holding reserves places banks at a disadvantage relative to other financial institutions. Given this disadvantage, banks can survive in the long run only if they can pass on the costs of reserve requirements to their customers. Banks will be able to pass on these costs if depositors and loan customers value the special services banks offer and if these services are not readily available at lower cost from competitors outside the banking system.

Banks traditionally have been protected from the intrusion of competitors in the deposit and loan markets in three major ways. First, legal restrictions have prevented nonbank financial intermediaries from offering demand deposits. Second, only banks and closely related institutions have offered deposits carrying FDIC or other similar government-sponsored insurance. Finally, in the loan market, banks have traditionally specialized in supplying financing services to commercial and industrial customers that do not have low-cost access to other forms of finance, such as com-

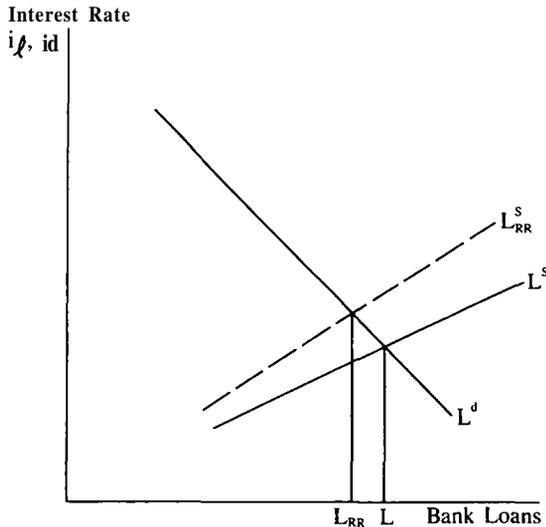
⁷ See Harry G. Johnson, "Problems of Efficiency in Monetary Management," *Journal of Political Economy*, September/October 1968, pp. 971-990 and especially p. 976.

⁸ A good summary of this view from a policymaker's perspective on the role of monetary policy in inflation control is Roger Guffey, "The Federal Reserve's Role in Promoting Economic Growth," *Economic Review*, Federal Reserve Bank of Kansas City, February 1987, pp. 1-7.

⁹ Under current law, depository institutions with transaction account deposits of \$3.2 million or less are exempt from maintaining reserves. The institutions with higher transaction account deposits are required to maintain reserves equal to 3 percent of the first \$40.5 million in transaction account deposits, net of the first \$3.2 million, plus 12 percent of deposits over \$40.5 million. Depository institutions must also meet a 3 percent reserve requirement on nonpersonal time deposits with a maturity of less than one and a half years.

¹⁰ The discussion in this section draws heavily on the analysis in Eugene F. Fama, "What's Different About Banks?" *Journal of Monetary Economics*, December 1985, pp. 29-39.

FIGURE 1
Effect of reserve requirements
on bank loans



mercial paper or bond issuance." As a result, advantages unique to bank deposits and bank loans have made banking customers willing to bear the cost of reserve requirements.¹²

Figure 1 shows the effect of reserve requirements on bank lending. The vertical axis measures both the bank loan rate (net of specialized monitoring fees charged by banks), i_l , and the gross return paid on deposits, i_d . The gross return paid on deposits is the deposit interest rate plus unremitted service charges. The horizontal axis measures banking industry loans. The upward-sloping curve labeled L^S is the supply of loanable funds to the banking sector. The L^S curve is

upward sloping because depositors must be paid higher gross returns to call forth more loanable funds. Without reserve requirements, L^S would be the cost curve for deposits raised by the banking sector. The downward-sloping curve, L^d , is the demand for bank loans. This curve slopes downward because higher interest rates on loans reduce the number of loan customers willing and able to borrow. Without reserve requirements, the amount of bank lending is determined at the intersection of the supply curve, L^S , and the bank loan demand curve, L^d .

With reserve requirements, a bank requires a higher return on assets to cover the unchanged cost of each dollar of deposits plus the added cost of maintaining idle reserve balances. As a result, banks solicit deposits and supply loans only if the loan rate they can charge is higher than the cost of obtaining depositors' funds. Consequently, the loan supply curve under reserve requirements, L^S_{RR} , lies above the loan supply curve without reserve requirements, L^S . The quantity of bank loans is then determined at the intersection of the loan demand curve, L^d , and the loan supply curve, L^S_{RR} .

The adverse impact of reserve requirements on bank loans is the difference between the level of bank loans when no reserve requirements are imposed, L , and the smaller level of loans when reserve requirements are imposed, L_{RR} . The distance between L and L_{RR} is the amount of loan activity either not undertaken or forced into the nonbank financial sector because of reserve requirements.

The New Monetary Economics

In contrast to the traditional view, the New Monetary Economics (NME) views banks as producers of financial services.¹³ The economics of

¹¹ Ben Bernanke and Mark Gertler develop a formal model of the role of specialized bank services in the loan market in "Banking and Macroeconomic Equilibrium," Social Systems Research Institute, University of Wisconsin, May 1986.

¹² John P. Judd documents the trend toward commercial paper borrowing by large nonfinancial corporations in "Competition Between the Commercial Paper Market and Commercial Banks," *Review*, Federal Reserve Bank of San Francisco, Winter 1979.

¹³ This section draws on the discussions in Black, "Banking and Interest Rates in a World Without Money;" Fama, "Bank-

the banking industry essentially involves the same considerations as any other service industry. That is, the amount of bank services produced depends on the costs of production and the willingness of bank customers to pay for bank services. Indeed, treating banks simply as producers of money rather than producers of services can be misleading in understanding the economic role of banks. According to Eugene Fama, a principal contributor to the NME literature, "The banking system is best understood without the mischief introduced by the concept of money."¹⁴

The NME view of banking as a service suggests a potential distinction between deposit accounts as a means of payment and the monetary assets involved in price level determination. To ascertain the monetary assets relevant to price determination, it is useful to introduce the concept of the numeraire.

A numeraire is a commodity or asset in which prices of other goods and services are quoted. The best known example of a commodity numeraire is the classical gold standard that operated in the United States from 1879 until World War I. Under the gold standard, the dollar was simply a measurement equal to about 1/21 of an ounce of gold. Consequently, the "dollar" price of any other good, such as a railway ticket or loaf of bread, was easily and directly interpreted in terms of a fraction of an ounce of gold.

Under the gold standard, the "price level" was

just the average price of all goods and services in terms of ounces of gold. The price level was determined by the supply of and demand for gold relative to the supply and demand conditions for other goods and services. If gold became more plentiful relative to other goods and services, then the prices of other goods and services rose in terms of gold and the economy experienced inflation. Indeed, the mining of new gold supplies was a principal cause of inflationary episodes under the gold standard.

According to Fama, the numeraire in the current U.S. monetary system is the dollar-denominated monetary base. Similar to the gold standard, the dollar price of other goods and services can be measured directly in terms of the monetary base.

With one important difference, the monetary base numeraire operates much like the gold standard. Similar to the gold standard, the price level under the current system is just the average price of other goods and services in terms of the monetary base. Also like the gold standard, the price level is determined by the supply of and demand for the monetary base relative to the supply of and demand for other goods and services. If the base becomes more plentiful relative to the stock of other goods and services, the price of other goods and services increases in terms of the base, and inflation ensues. The one important difference between the gold numeraire and the base numeraire is that the size of the monetary base is a policy tool determined by monetary policy goals, as well as by the public's demand for currency and reserves.

The NME distinction between the monetary base as numeraire and the money stock as transaction-balances is crucial in considering the role of deposits. On the one hand, bank deposits clearly should be included in transactions monetary aggregates, since they are an important means of payment in the U.S. economy. On the other hand, the transactions use of deposits does not

ing in the Theory of Finance" and "Financial Intermediation and Price Level Control;" Greenfield and Yeager, "A Laissez-Faire Approach to Monetary Stability;" and Hall, "Explorations in the Gold Standard and Related Policies for Stabilizing the Dollar."

Also see James Tobin, "Commercial Banks as Creators of Money," in *Banking and Monetary Studies*, Dean Carson, ed., Irwin, Homewood, Ill., 1963, pp. 408-419, for a seminal treatment of the New Monetary Economics view of banks as producers of services.

¹⁴ Fama, "Financial Intermediation and Price Level Control," p. 44.

imply that they play a special role in determining the price level. In the NME view, bank liabilities, such as demand deposits, are best seen as entries in an accounting system in which the basic unit is priced at a fixed one-to-one exchange rate relative to the dollar. These accounting entries do not define the dollar itself. Because deposits are a means of payment but not a component of the numeraire, deposits play no singular part in determining the price level.

This analysis suggests a different role of banks in the monetary policy process. This role is best illustrated by contrasting Johnson's view that the banking system initiates inflation with a view expressed by Fama. According to Fama, "A competitive banking sector is a largely passive participant . . . with no special control over prices or real activity, which in turn means that there is nothing in the economics of this sector that makes it a special candidate for government control."¹⁵

Some policy choices under the NME

Under the NME, a numeraire—perhaps different from the existing base numeraire—must be chosen. One objective in this choice might be to separate, partially or completely, the bank-supplied transactions money stock from the numeraire. This separation may be desirable because the numeraire is more closely associated with the price level, while the transactions money supply is more closely associated with the services offered by banks.

The decoupling of the numeraire from the deposit liabilities of the banking sector would considerably reduce the traditional role of banks in the monetary policy framework. Since reserve requirements are a primary link between the monetary base and the liabilities of the banking

sector, practical implementation would entail the removal of reserve requirements on transactions balances. Removing reserve requirements would, of course, eliminate the demand for the required component of reserves. The NME encompasses several alternatives for maintaining price level control that do not rely on a demand for required reserves. Eugene Fama and Robert Hall provide two examples.

Fama's example. Fama has proposed that the supply of currency function as the numeraire in a financial system without reserve requirements.¹⁶ His arguments in favor of a currency standard are the following. First, there is a well-established and stable real demand for the services of currency as a hand-held medium of exchange. Second, currency has a fixed nominal return of zero and, consequently, a fixed face value. Third, in principle, the Federal Reserve can control the nominal stock of currency in circulation with little or no error. Under the Fama proposal, deposits and similar accounts would continue to operate as a payments system, except that settlement between banks would no longer necessarily involve swapping central bank reserves.

In some respects, Fama's proposal is not a radical change in the current system. Although the elimination of reserve requirements on transactions balances would break the direct connection between the numeraire and bank-created transactions balances, the currency numeraire would also function as a major medium of exchange. Further, since the removal of required reserves would not eliminate the desire of banks to inventory vault cash to service demand deposits, there would still be a link between the total supply of demand deposits and Federal Reserve liabilities. Quantitatively, a currency numeraire would only modestly differ in nominal size from the monetary base numeraire. By the

¹⁵ Fama, "Banking in the Theory of Finance," p. 47.

¹⁶ Fama, "Financial Intermediation and Price Level Control."

end of 1986, only 16 percent of the monetary base was held as noncurrency reserves."¹⁷

Hall's *example*. Robert Hall has made a more striking proposal involving complete separation of the numeraire from the banking system.¹⁸ His proposal is based on a commodity standard in which the basic unit of value is composed of a group of industrial commodities. The unit itself would be denominated in dollars, much the way an ounce of gold was denominated in dollars under the gold standard.

Hall's proposal involves constructing the unit from a core group of standardized industrial commodities that have shown fairly stable value relative to the Consumer Price Index. Hall would use a specific weighted average of these commodities to construct the standard unit of value. He names this unit the **ANCAP**.¹⁹

In Hall's view, the current system of using reserve requirements on bank deposits to determine both the demand for nominal central bank reserves and the price level is an "accident of history."²⁰ In suggesting the **ANCAP** as the successor to the monetary base system, he tries to remove the banking sector completely from any special role in price level control.

Hall's proposed use of the **ANCAP** as the unit in which other prices are quoted is reminiscent of the gold standard. However, the **ANCAP** proposal differs in several critical ways from the classical gold standard. These differences highlight the issues involved in Hall's scheme. First,

by proposing a commodity bundle rather than a single commodity, Hall defines a numeraire with a more stable demand relative to other goods and services. Demand stability is necessary to make any numeraire scheme attractive. A commodity standard based on a single commodity, such as gold, might be subject to wide changes in demand, causing a widely fluctuating price level.

Second, Hall's scheme promotes long-run price stability by allowing for frequent changes in the scale of the **ANCAP**. This feature could correct for secular changes in the relative demand for the **ANCAP** and reduce secular deflation, one of the well-known problems of the gold standard. In a growing economy with a fixed stock of gold, the price of other goods and services tends to fall relative to gold, causing a general deflation. Hall deals with this problem by frequently rescaling the **ANCAP** (changing the volume of each product comprising the standard unit) by small amounts, thereby keeping the price of the **ANCAP** roughly constant.

Third, the central bank is not allowed to inventory (or contract for future delivery) stocks of the **ANCAP** unit or otherwise intervene in the **ANCAP** commodity markets. This feature would prevent the Federal Reserve from selling stocks of the commodity reserve—from engaging in open market operations—to validate a rise in prices. Hall's concern is that the central bank might respond to an initial inflation by postponing the downward readjustment of the price level needed to ensure long-run price stability. Readjustment could be postponed by drawing down reserves of the commodity standard instead of letting the commodity price standard work on its own to deflate the price level.

The **ANCAP** proposal is a good example of a policy designed to separate completely the numeraire from the transactions function of money. As such, it is the more controversial of the two proposed numeraires. Many economists believe the full benefits of a modern monetary system can

¹⁷ See *Federal Reserve Bulletin*, July 1981

¹⁸ See Hall, "Monetary Trends in the United States and the United Kingdom: A Review from the Perspective of New Developments in Monetary Economics."

¹⁹ The term **ANCAP** stands for the commodities comprising the commodity standard. They are ammonium nitrate, copper, aluminum, and plywood.

²⁰ See Hall, "Explorations in the Gold Standard and Related Policies for Stabilizing the Dollar," p. 1553.

be obtained only when the principal means of payment and the numeraire asset are tied together.

Unresolved *issues*. At least two issues associated with the Fama and Hall proposals remain unresolved. First, there is considerable skepticism that greater economic efficiency would result from separating the numeraire from the means of payment. Second, more evidence is required to establish that the proposed systems would actually result in a more stable price level than the current monetary base system.

Recent critiques of the NME have noted that the payments system appears to work best when the numeraire and a major transactions medium are one and the same.²¹ Transactions are more easily understood and carried out when the transacting medium is the good in which prices are quoted. A simple example illustrates the inefficiency caused by separation of the numeraire and the principal medium of exchange. Suppose the numeraire was Hall's standardized commodity group, the **ANCAP**, but that the principal transacting medium was a standardized deposit unit backed by high-grade stocks and bonds. The price of stocks and bonds—and, therefore, the deposit unit—would vary relative to the **ANCAP** numeraire. As a result, every transactor would have to keep track of the numeraire price of the goods involved, as well as the price of the standardized deposit unit **terms** of the numeraire.

An efficient payments system involves exchange media priced at a fixed rate in terms of the numeraire. Effective enforcement of the fixed rate of exchange depends on convertibility

to the numeraire at the fixed rate. However, since convertibility into a cumbersome unit like the **ANCAP** would entail significant shipping and storage costs, a competitive payments system would likely drop the **ANCAP** as the numeraire and price goods directly in terms of the standardized deposit or some more convenient item, such as currency.

The stability of the price level under alternative monetary systems—the second unresolved issue—depends largely on the supply and demand characteristics of the numeraire. For proposals such as Hall's, in which a commodity group is the numeraire, supply depends on conditions in the relevant industries producing the **ANCAP** commodities, and demand depends on the industrial use of these materials. Hall presents evidence that the **ANCAP** commodity price has had a relatively stable history. But there is no evidence that the price stability of the **ANCAP** commodities is a fundamental characteristic that will prevail in the future.

Fama's currency proposal also requires evidence that currency supply and demand is more stable than the monetary base supply and demand. Fama presents some evidence on this issue, and historical studies of currency use suggest a large and stable "hoarding" demand for **currency**.²² However, much more detailed work on the currency stability issue is needed to fully assess his proposal.

Empirical evidence

Has nominal deposit growth been important in the inflation process? The answer would suggest whether relinquishing control of deposits would have price level consequences. The empirical evidence is limited, though one recent study by

²¹ The discussion is based on the analysis by L. H. White, "Competitive Payments Systems and the Unit of Account," *American Economic Review*, September 1984, pp. 699-712, and Gerald P. O'Driscoll Jr., "Money in a Deregulated Financial System," *Economic Review*, Federal Reserve Bank of Dallas, May 1985, pp. 1-12. Also see Bennett T. McCallum, "Bank Deregulation, Accounting Systems of Exchange, and the Unit of Account: A Critical Review," National Bureau of Economic Research, Working Paper 1572, March 1985.

²² See Paul S. Anderson, "Currency in Use and in Hoards," *New England Economic Review*, Federal Reserve Bank of Boston, March/April 1977, pp. 21-30.

Fama presents some relevant findings.²³ Using U.S. inflation rate data over the 1954-76 period, Fama compares the performance of competing models of inflation in which deposit growth, monetary base growth, and the M1 growth rate are tried separately as the relevant monetary aggregate. To control for shifts in asset demand, each inflation model also includes a nominal interest rate variable and a measure of real activity.

There are two important findings from Fama's experiments. First, models that use monetary base growth as the monetary variable usually explain inflation movements more accurately than models using either deposit growth or M1 growth. Second, when deposit growth or M1 growth is entered into the inflation model simultaneously with monetary base growth, only monetary base growth has significant effects on inflation. Deposit growth makes no separate contribution to inflation.

While these findings are suggestive, more empirical studies are needed to draw firm conclusions. Also, because the inflation data set in the Fama study ended in 1976, there is no empirical evidence on the deposit-inflation relationship based on information from the most recent decade. The post-1976 period is particularly interesting for the issues at hand because it witnessed considerable swings in inflation and because the financial system underwent a significant transformation through the offering of a variety of new transactions accounts.²⁴

Because there is little empirical evidence, par-

ticularly for the period since 1976, a set of empirical experiments are carried out similar to those Fama reports. Two versions of an empirical model of inflation are used in these experiments. The first model includes current and lagged monetary base growth, and current and lagged growth in the deposit component of M1. The second model uses currency growth in place of base growth, essentially separating M1 growth into its currency and deposit growth components. Both models control for the separate impact of interest rates and output growth on inflation. The first model is the one Fama used. The second model is a more favorable environment for finding a positive effect of deposit growth on inflation since, under this specification, deposit growth will likely pick up the impact of reserve growth on inflation. Separate coefficients are estimated on deposit growth and, depending on the model, either base growth or currency growth. Estimates of the model coefficients are obtained using U.S. annual data over the 1953-86 period. The estimates and the details of the estimation procedure are presented in the Appendix.

Overall, the empirical results corroborate Fama's findings. In the first model, the sum of coefficients on current and lagged monetary base growth is **0.64**. In the second model, the sum of coefficients on currency growth is 0.68. Both estimates are statistically different from zero. These numbers mean that a 1 percent increase in the growth rate of either the monetary base or currency leads to about two-thirds of a percent increase in inflation. In contrast, the effect of deposit growth on inflation is not statistically different from zero. These results are consistent with Fama's estimate of a sum of coefficients of **0.66** on base growth and statistically unimportant coefficients on deposit growth.²⁵ Empirically at least, it appears that deposit money growth simply has

²³ Eugene F. Fama, "Inflation, Output and Money." *Journal of Business*. April 1982. pp. 201-231.

²⁴ For example, the NOW (negotiable order of withdrawal) account was made available on a nationwide basis in December 1980. Super-NOW accounts became available in January 1983. Quasi-transactions accounts, such as money market mutual funds, became widely used during this period while bank money market deposit accounts were introduced in December 1982.

²⁵ See Fama, "Inflation, Output and Money." Table 2. Model No. 14, p. 208.

not mattered much in the inflation process. Consequently, U.S. experience since the Korean War supports the proposition that deposit growth is not of special concern for price level stability.

Conclusions

The traditional view of banks in the monetary and price level control process is based on banks being producers of money. Control of the bank money supply is considered important in controlling the price level. In this view, reserve requirements limit the expansion of deposits. Thus, reserve requirements are useful in attaining macroeconomic policy goals, although they impose costs on the banking sector.

The traditional view has been challenged by recent models of money and prices in a deregulated banking environment. These new monetary models suggest that growth in commercial bank liabilities has no particular consequence for policy goals such as price level stability. In this view, the role of banks in the monetary policy process could be reduced with no adverse effects on price level control, principally by removing reserve requirements.

Specific proposals for monetary reform based on the New Monetary Economics are provocative. Although considerable further analysis is required, the New Monetary Economics provides insights into monetary policy issues in an increasingly deregulated financial environment.

Appendix

This appendix describes an empirical model of inflation. The model is used to estimate the extent to which bank deposit growth contributed to U.S. inflation over the post-Korean War period.

The standard inflation model relates inflation to nominal money growth in excess of growth in real money demand.^{A1} Specifically,

$$(1) \text{INFL} = \text{MG}^S - \text{mg}^d,$$

where INFL is the inflation rate, MG^S is the nominal money supply growth rate, and mg^d is real money demand growth.

The demand for money is negatively related to the opportunity cost of holding money and positively related to the level of economic activity. The opportunity cost variable is the 3-month Treasury bill rate. Economic activity is measured

as the current and once-lagged values of industrial production.^{A2} Use of these two factors yields the empirical model of money demand growth,

$$(2) \text{mg}^d = a_0 \text{IP} + a_1 \text{IP}_{-1} - a_2 \text{TBR}.$$

IP is current industrial production growth, IP_{-1} is once-lagged IP. TBR is the change in (the log of) one plus the 3-month Treasury bill rate, and a_0 , a_1 , and a_2 are coefficients. Substituting equation 2 into equation 1 yields

$$(3) \text{INFL} = \text{MG}^S - a_0 \text{IP} + a_1 \text{IP}_{-1} + a_2 \text{TBR}.$$

Two versions of the above inflation model are estimated. In the first version, the monetary base growth, denoted as BG^S , and the growth in the bank deposits, denoted as DG^S , are entered in the

^{A1} See Robert J. Barro, *Macroeconomics*, Wiley, New York, 1987, 2nd edition, Chapters 7 and 8.

^{A2} Fama also includes a one-period-ahead value of IP in his proxy for real activity.

model as competing measures of money growth, and the impact of each of these monetary variables on inflation is estimated. Placing these two measures of money growth into equation 3 for MG^S yields the first estimated model of inflation.

$$(4) \text{ INFL} = \sum_{i=0}^1 gb_i \text{ BG}^S_{-i} + \sum_{i=0}^1 gd_i \text{ DG}^S_{-i} - \sum_{i=0}^1 a_i \text{ IP}_{-i} + a_2 \text{ TBR} + e.$$

The coefficients gb_i , on current and lagged monetary base growth, and the gd_i , on current and lagged deposit growth measure the impact of each of these monetary variables on inflation.

The second version of the model estimates equation 4 with currency growth, denoted CG^S , substituted for monetary base growth. Both versions of the model are estimated over the 1956-85 period.^{A3} The bank deposit growth rate is measured as the growth in the noncurrency component of M1. The estimated model that includes

^{A3} The data are annual growth rates computed from last month in the year data points. The basic data set spans 1953 through 1985. The regression equation starts in 1956 because of differencing and the use of lagged data.

The model is estimated by a two-stage procedure to eliminate the simultaneous equations bias resulting from the appearance of IP and TBR in the model. The variables used in the first stage to estimate IP include current and one lag of the marginal tax rate on total income and the price of crude oil and two lags of IP, real exports, the inflation rate, and deposit growth. The variables used in the first stage to estimate TBR include current and two lags of deposit growth, current and one lag of the marginal tax rate on total income and the price of crude oil, and two lags of TBR and inflation.

the monetary base is

$$(5) \text{ INFL} = .02 \text{ + } .64 \text{ BG}^S - .50 \text{ DG}^S \\ \text{ (2.6) (4.0) (-1.7)} \\ - .42 \text{ IP} \text{ + } .01 \text{ TBR.} \\ \text{ (-3.4) (2.5)}$$

$$R^2 = .78$$

$$\text{Durbin-Watson} = 1.9,$$

$$\text{Sample period} = 1956-85.$$

The estimated model that includes currency growth is

$$(6) \text{ INFL} = .02 \text{ + } .68 \text{ CG}^S - .11 \text{ DG}^S \\ \text{ (3.0) (5.8) (-.42)} \\ - .47 \text{ IP} \text{ + } .01 \text{ TBR.} \\ \text{ (-5.1) (4.4)}$$

$$R^2 = .85,$$

$$\text{Durbin-Watson} = 2.6,$$

$$\text{Sample period} = 1956-85.$$

The coefficients reported for BG^S , DG^S , CG^S , and IP are the sums of the coefficients on the current and once-lagged values of these variables^{A4}

The numbers in parentheses below the estimated coefficients are t-statistics. A t-statistic greater in absolute value than 2.0 indicates that the sum of estimated coefficients is statistically significantly different from zero.

^{A4} The separate coefficients (and t-statistics) on current and once-lagged BG^S in equation 5 are 0.34 (1.7) and 0.30 (1.3), respectively. The separate coefficients (and t-statistics) on current and once-lagged CG^S in equation 6 are -0.14 (-0.6) and 0.82 (3.4), respectively.

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