

# Economic Review



FEDERAL RESERVE BANK OF KANSAS CITY

November 1987

The Role of Universities  
In Economic Development

Loan Sales: Another Step in the Evolution  
Of the Short-Term Credit Market

Dollar Depreciation and Inflation

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## The Role of Universities In Economic Development 3

*By Tim R. Smith, Mark Drabenstott, and Lynn Gibson*

Economic sluggishness in the Tenth District has caused the major district universities to reevaluate their role in economic development. As a result, they have added new programs designed to improve regional economic prospects. A survey of major state-supported district universities suggests that the success of these programs will be enhanced by greater cooperation among universities and between universities and state governments.

## Loan Sales: Another Step in the Evolution Of the Short-Term Credit Market 22

*By Sean Beckett and Charles S. Morris*

The increase in loan sales by commercial banks over the past few years has raised concern about the effect of these sales on the safety and soundness of banks. The concern is misplaced, however, because the rise in loan sales, which is concentrated in large money center banks, is merely the latest development in the evolution of the short-term credit market.

## Dollar Depreciation and Inflation 32

*By George A. Kahn*

Recent declines in the foreign exchange value of the dollar have created fears of renewed inflation. Because a lower dollar generally leads to a higher price level, the concern is not misplaced. However, evidence suggests that the effect of a fall in the dollar on inflation will be small and temporary.



# The Role of Universities In Economic Development

*By Tim R. Smith, Mark Drabenstott, and Lynn Gibson*

Universities play a valuable role in economic development, but that role is neither well defined nor easily understood. The recent economic problems of the Tenth Federal Reserve District states and relatively low and uneven funding for higher education in the region make it especially important to understand the current and potential economic development opportunities available to universities in the region. States seeking to improve their economic fortunes are turning to universities to participate more fully in economic development. For their part, universities are promoting their own economic development agenda while trying to increase state support. How will district universities become more involved in economic development?

Universities in the Tenth District are taking steps toward economic development initiatives, but a bank-conducted survey of major state-supported universities in the seven states of the Tenth Federal

Reserve District—Colorado, Kansas, Missouri, Nebraska, New Mexico, Oklahoma, and Wyoming—shows that these initiatives stand a better chance of succeeding with closer cooperation between universities and state governments and among universities themselves. It is too early to judge the effectiveness of the new efforts universities are making to spur economic development. Instead, this article uses a survey of 11 major universities to explore the directions the universities are taking in fostering development.<sup>1</sup>

The first section of the article provides a brief overview of the recent sluggish economic performance of district states—the backdrop against which interest in economic development has grown. The second section discusses the connection between those economic conditions and state

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<sup>1</sup> The 11 major state-supported universities in the Tenth District states are the University of Colorado, Colorado State University, University of Kansas, Kansas State University, University of Missouri at Columbia, University of Nebraska, University of New Mexico, New Mexico State University, University of Oklahoma, Oklahoma State University, and the University of Wyoming.

funding for higher education, while reviewing patterns of overall spending for higher education in these states. The third section presents the results of an informal survey conducted by the authors of university presidents and other officials at the 11 large public universities in the district. The survey results provide insight into what universities are doing—and what they can do—to become more active in improving the region's economic outlook. The fourth section explores how cooperation between universities and state governments and among universities can be important to the success of economic development initiatives.

### **Recent regional economic conditions**

Economic growth in states of the Tenth Federal Reserve District has been sluggish for several years, and continued sluggish growth seems likely for the near future. Weak prospects for economic conditions in the region provide the critical backdrop for increased awareness of the need for economic development, both inside and outside of universities. And there are important links between economic activity and state financial support of higher education—a potential roadblock to successful university economic development efforts.

The slow growth of the district economy stems mainly from weakness in its two dominant sectors—agriculture and energy. Most states of the district have suffered from the effects of this weakness in recent years. Severe agricultural credit problems brought widespread farm and nonfarm business failures. Dramatically reduced discretionary purchases by farmers have further slowed the regional economy, with especially negative effects on rural communities. After peaking in 1982, the district's important energy industry weakened and was dealt a devastating blow when world oil prices plummeted in 1986. Currently, there are signs that both the agricultural and the energy sectors are stabilizing. Farm finances are

improving due to record farm income and stabilizing land values, and firming oil prices have brought some improvement to the energy sector. But over the next few years, these sectors are not likely to be the sources of rapid growth that they were in the 1970s.

Further underscoring the weakness of the region's economy, the Tenth Federal Reserve District generally has not performed as well as the nation as a whole during the current business expansion. Measured by growth in total non-agricultural employment, economic activity in the district has lagged the nation since the 1982 recession (Chart 1). Job growth in the district was flat in 1985 and 1986, for example, while the nation added jobs at rates of 2.4 percent in 1985 and 1.8 percent in 1986.

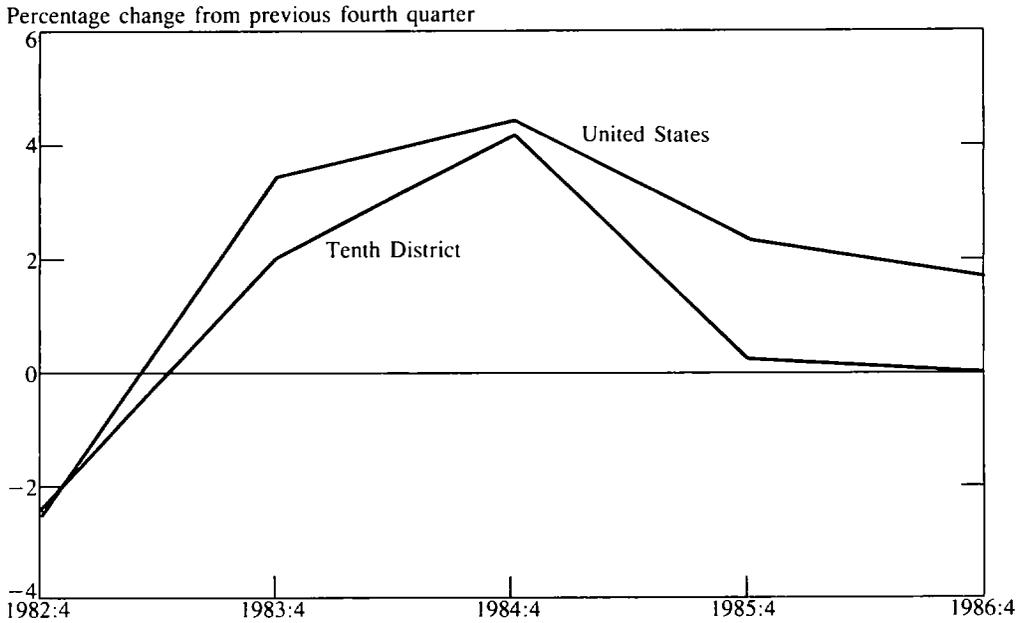
Economic conditions vary widely across the district, but conditions have been weaker in most of these states than in the nation. In all but two of the district states, employment growth has been slower than in the nation (Chart 2). Only New Mexico and Missouri recorded employment growth slightly higher than the nation between 1982 and 1986. Growth varied over this period from 11.5 percent in New Mexico to -8.4 percent in Wyoming, compared with an employment gain of 10.8 percent in the nation.

### **Tenth District higher education funding in perspective**

The economic strength of the region has considerable influence on funding for its universities. And the level of funding for higher education and the consistency of that funding affect the ability of the region's universities to become more active in economic development. Thus, efforts by district universities to become more involved in economic development must be gauged against the financial resources that will be available to fund those efforts. In good times, when the coffers are full and state revenue pies are expanding, it might be

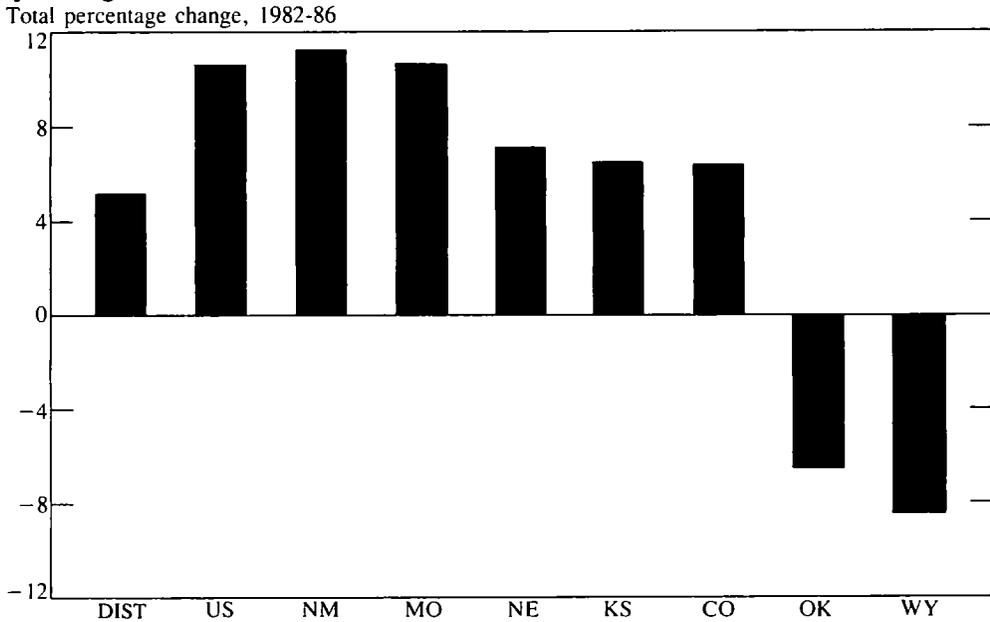
**CHART 1**

**Employment growth, Tenth District and the United States**

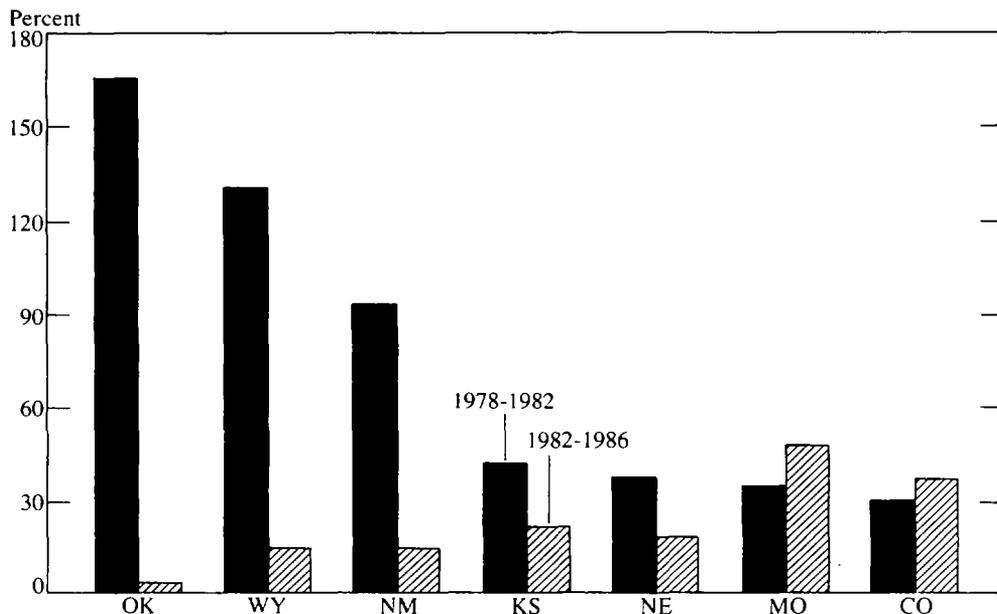


**CHART 2**

**Employment growth, Tenth District states, 1982-86**



**CHART 3**  
**State fiscal conditions: growth in total resources**  
 Tenth District states



expected that the slice for higher education would also grow. But as the pie shrinks, so do the slices. Charts 3 and 4 help illustrate this point.

District states are ranked in Chart 3 by the rate of growth in state budget resources for two periods, 1978-82 and 1982-86. During the first period, the energy sector prospered, and as might be expected, Oklahoma, Wyoming, and New Mexico led the district in growth of state fiscal resources. These three states also took the lead in growth of per-student state and local appropriations to higher education (Chart 4). In fact, the rankings in the two charts are similar. The increase in funding for higher education seemed to go hand-in-hand with the growth in state resources.

The downturn in the energy sector and the economic stress facing agriculture in the 1980s are clearly reflected in the slower rates of growth for state fiscal resources from 1982 to 1986 (Chart

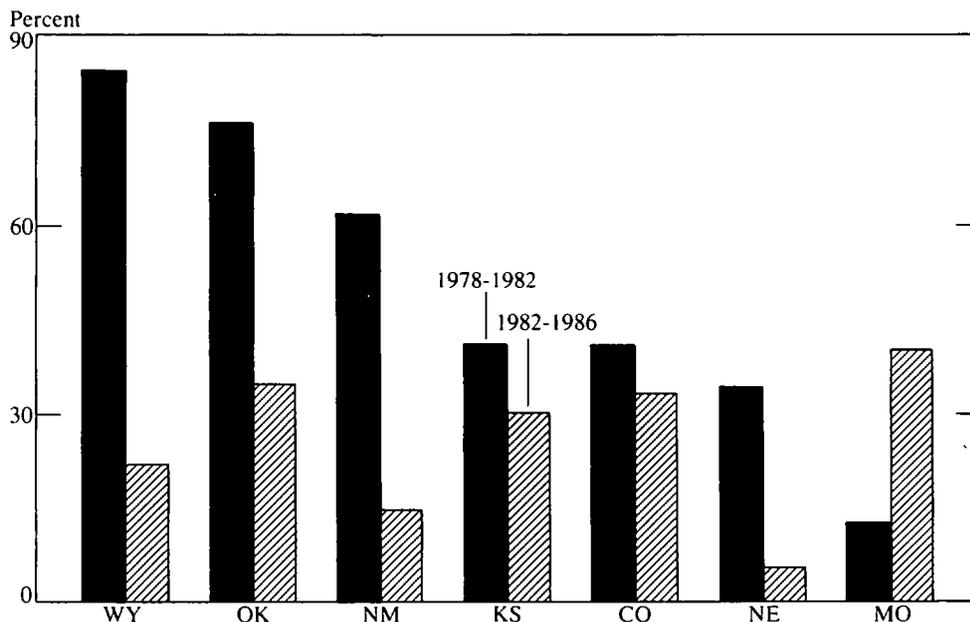
3). And as the growth in state resources slowed, so did the growth in appropriations for higher education (Chart 4). Missouri and Colorado were the only district states with an increase in resources during the 1982-86 period. Missouri, however, was the only state where appropriations to higher education increased faster during the 1982-86 period than during the 1978-82 period.

During the earlier period, state resources were expanding faster than appropriations for higher education in every district state but Colorado. During the more recent period, however, appropriations grew as fast or faster than state resources in Kansas, Oklahoma, New Mexico, and Wyoming. The pie was not expanding as rapidly as it had in the earlier period, but higher education was increasing its budget share in these states.

For a picture of state funding for higher education in the Tenth District, it is helpful to look at

**CHART 4**

**Growth in per student appropriations for higher education**  
Tenth District states



spending in the district states relative to other states. The 50 states are ranked in Table 1 by the per-student level of state and local appropriations to higher education in 1984, the most recent year for which data are available.<sup>2</sup> Also presented in the table are the indexes for the state "Tax Capacity," a measure of a state's potential to raise revenues, state "Tax Effort," a measure of a state's actual revenues as a proportion of potential revenues, and the percentage of state expenditures

going to higher education.<sup>3</sup> These figures provide proxy measures of a state's potential fiscal condition, the willingness of the state to raise public funds through taxation, and the relative importance the state places on higher education.

Four district states—Kansas, Nebraska, New Mexico, and Wyoming—funded higher education at levels above the national average in 1984. The other three—Colorado, Missouri, and Oklahoma—funded higher education at levels well

<sup>2</sup> State and local appropriations per student do not represent total funding for higher education. Some state universities depend heavily on tuition and fees to supplement their budgets. It should also be noted that ranking states by per student appropriations do not account for the costs each state faces for higher education. States supporting one or more medical schools, for example, will have higher education costs than states with no medical school facility.

<sup>3</sup> Tax capacity, as developed by the Advisory Commission on Intergovernmental Relations, is "... the revenue that each state would raise if it applied a nationally uniform set of tax rates to a common set of tax bases . . . . Because the same tax rates are used for every state, estimated tax yields vary only because of differences in the underlying basis." A tax capacity of more than 100 indicates the state has more fiscal capacity than average for the 50 states. Similarly, tax effort measures a state's total tax collection relative to its total capacity.

TABLE 1

## State and local fiscal condition and support for higher education in the 50 states, 1984

State	Appropriations for Higher Education per Student (Index)*	Tax Capacity (Index)	Tax Effort (Index)	Higher Education as Percent of Total Expenditures
U.S. Average	100	100	100	9.5
Alaska	312	272	166	6.6
Dist. Columbia	214	117	146	3.2
<b>Wyoming</b>	179	182	113	10.0
Hawaii	129	114	108	11.2
Kentucky	128	79	91	11.0
Texas	125	124	67	12.7
New York	122	95	163	5.5
Georgia	122	87	93	9.5
North Carolina	117	87	88	14.3
Iowa	117	91	109	13.6
South Carolina	116	76	96	12.5
<b>Kansas</b>	108	102	92	12.8
Florida	107	103	75	7.8
Wisconsin	106	87	137	12.7
<b>Nebraska</b>	104	101	94	11.6
Louisiana	104	107	81	9.6
Idaho	104	83	87	12.4
Utah	102	82	98	14.3
California	102	119	92	10.5
<b>New Mexico</b>	102	108	79	11.7
Maryland	101	99	107	9.5
Mississippi	100	68	95	11.8
Oregon	99	96	104	10.8
Arkansas	99	78	83	10.0
Rhode Island	99	86	126	7.9

\*State and local appropriations are expressed as dollars per full-time equivalent student and then indexed to the U.S. average. These figures include only state and local government tax revenues appropriated for higher education. Tuition and fees charged to students are not included.

below the national average. All the district states except Missouri have tax capacities above the national average. District states generally, however, have low tax efforts relative to the nation. Of the district states, only Wyoming used its taxing capacity at a level above the national average. Thus, it appears that the Tenth District states are more fiscally conservative than the nation, though

except for Missouri, they appear to have above-average revenue potential.

If the district states seem reluctant to realize their full revenue potential, they do not appear reluctant to use available funds for higher education. A look at the percentage of state and local government expenditures going to higher education shows that all district states, except Missouri,

<u>State</u>	<u>Appropriations for Higher Education per Student (Index)*</u>	<u>Tax Capacity (Index)</u>	<u>Tax Effort (Index)</u>	<u>Higher Education as Percent of Total Expenditures</u>
Washington	98	101	104	11.1
New Jersey	98	112	109	6.4
North Dakota	95	111	81	13.4
Minnesota	94	97	124	9.5
Indiana	92	86	89	12.3
Alabama	91	75	87	12.9
Connecticut	90	124	96	6.1
Arizona	89	97	91	13.6
Montana	88	105	94	8.6
West Virginia	88	87	88	9.2
Delaware	87	118	82	13.6
Illinois	86	98	107	8.8
<b>Oklahoma</b>	85	115	80	11.4
Virginia	83	96	89	11.6
Michigan	83	90	128	10.1
Maine	82	90	100	8.7
Ohio	81	89	103	9.4
Nevada	81	147	64	6.4
Tennessee	81	80	82	9.9
<b>Colorado</b>	81	122	79	11.6
<b>Missouri</b>	80	89	87	9.2
Pennsylvania	78	88	105	5.5
Massachusetts	75	107	112	5.0
South Dakota	70	87	85	9.3
Vermont	58	94	95	12.5
New Hampshire	51	108	69	8.6

Source: *Higher Education Financing in the Fifty States, Fiscal Year 1984*, National Center for Higher Education Management Systems, Marilyn McCoy and D. Kent Halstead.

are above the national average. A picture emerges, therefore, of a group of states relatively generous toward higher education—willing to give higher education a respectable slice of the revenue pie—but unwilling to increase the size of the pie through taxation.

Although a broad view of state spending for higher education in the district is provided in Table

1, “higher education” does not mean a completely homogeneous group of institutions. Of the 151 public institutions of higher education in the district, 11 are major state universities with significant emphasis on research. These 11 state universities are discussed in the next section. They account for 35 percent of the total post-secondary enrollment in the district and receive 40 percent

of the seven-state total of state appropriations to higher education. Except for Wyoming, a state which supports only one public university, the district states fall below the national average for state and local appropriations per student for their major universities.<sup>4</sup> In addition to the 11 largest universities in the district, 45 other public colleges or universities offer at least a four-year degree. Except for those in Nebraska and New Mexico, these schools also are funded below the national average.

With below-average funding to major universities, how do district states achieve generally above-average rankings in total appropriations to higher education? How can the states excel in overall funding if they fall behind in funding for universities and four-year colleges? The answer is that two-year institutions—both academic and occupational—receive above-average state and local appropriations. There are 94 two-year schools in the district, and these schools received 20 percent of the district's total appropriations to higher education in 1984. While the existence of numerous two-year institutions in the district may have led some states to spread their resources too thin, the major universities across the seven-state region still received a major proportion of appropriations and enrollment.

The district's major universities received more than three-quarters of a billion dollars in state and local funding in 1984. They also contributed significantly to state resources. These universities have traditionally provided jobs, stimulated local economies, and helped supply the district and the nation with an educated workforce. Now states and universities are seeking more active roles in state economic development. The major state

universities, with their high visibility, large student bodies, and tremendous research potentials, are likely to play a significant part in new initiatives for state economic development. The next section provides a look at how the 11 major state universities in the district are becoming involved in the region's economic development.

### **Public universities and economic development in the district**

A survey of the administrations of the 11 major state-supported universities in the district indicates that the region's recent economic problems have caused the universities to adopt an increasingly more active position in economic development.<sup>5</sup> Although activities related to economic development, both planned and ongoing, vary across universities and across states, two main themes emerge from discussions with university officials. One theme is that the universities are seeking to expand their role in economic development. The first subsection looks at three characteristics of this expanding role: the move from a passive to more active economic development, the increased emphasis on strategic planning, and the strengthening of university-business partnerships. The other theme is that universities are being influenced by the fundamental transition underway in the region's economy and, in turn, are becoming involved in shaping that transition. The second subsection looks at how the universities are responding to and participating in the regional economic transition with respect to traditional industries, emerging industries, international competitiveness, and rural development.

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<sup>4</sup> See state rankings for state and local appropriations per student for medical research universities, nonmedical research universities, medical universities, and nonmedical universities. Kent Halstead and Marilyn McCoy, "Higher Education Financing in the Fifty States, Fiscal Year 1984."

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<sup>5</sup> The survey, conducted by the authors of this article in July 1987, consisted of interviews with administrators at all 11 major state-supported universities in the Tenth Federal Reserve District. Those interviewed included presidents, vice presidents, and deans. These individuals were asked questions about the general nature and specific characteristics of their economic development efforts.

### *Universities expand their role in economic development*

Universities have numerous opportunities to enhance the economic future of their states. Some of these opportunities were seized long ago, while others are only now being recognized. Although some universities have long viewed their traditional research and teaching functions as major contributors to regional economic growth, their overall posture in the past can be described as passive. Except for the extension service at land grant institutions, few resources were directed to specific economic development objectives. Now all major state-supported district universities are becoming much more active. But in spite of the recent attention being given to the universities' role in economic development, few of the universities have formed an economic development agenda with clearly stated objectives. Few major changes have been made in university programs to reflect economic development efforts and few resources have been earmarked for economic development. Clearly, active university involvement in economic development is only beginning to take shape in Tenth District states.

*Moving from passive to active.* Economic development activities at universities can be ranked on a continuum from "passive" to "active." For example, this article considers the de facto provision of jobs and direct economic stimulus that a university campus brings to its local community to be passive since no specific economic development strategy is involved. Technical assistance to businesses and technology transfer are examples of active economic development initiatives. Somewhere between the active and passive extremes lie such activities as basic research and human resource development.

Although all 11 universities consider basic research and teaching to be the key to long-term economic development, they also consider themselves moving in a more active direction. This

change stems from two sources. First, the universities are reevaluating their traditional roles and focusing attention on the contribution of basic research and teaching to economic growth. Second, universities are starting to engage in new activities that directly contribute to economic development by fostering a stronger relationship between the universities' traditional functions and the private business sector.

(Continued on page 14)

### Major District Universities: Economic Development Prospects in Brief

The authors of this article conducted interviews with presidents, vice presidents, and deans of 11 major state-supported universities in the Tenth Federal Reserve District in July 1987. These individuals were asked questions about the general nature and specific characteristics of their economic development efforts. Their answers form the basis for the following summaries of individual university economic development activities.

#### *University of Colorado*

The University of Colorado views itself as having a very active role in economic development. Compared with the nation as a whole, Colorado's support of higher education is not high. As a result, CU has turned to private industry and the federal government for support of research. Recent economic problems in the state, therefore, have focused even more attention on the university's already important economic development function. As a result of the business community's importance to university funding, officials feel that the university can play the lead role in state economic

development. Space sciences, telecommunications, and microelectronics are some of the fields targeted for growth.

### *Colorado State University*

Colorado State is expanding its role in Colorado's economic development by continuing to build on its academic and research strengths. Its Center for Advanced Technology is just one outgrowth of the university's emphasis on basic and applied research. With more than \$70 million a year for sponsored research, CSU has produced world class research in engineering, veterinary medicine and biomedical science, natural sciences, and agriculture. The commitment to research provides creative outlets for the university's faculty members and valuable learning opportunities for students. Research has also built strong ties between CSU and the Colorado front-range economy through spinoff businesses and support for industry moving into the area.

### *University of Kansas*

The University of Kansas regards education as its principal economic development activity. Still, the university is actively seeking new opportunities to become involved in state economic development objectives. The university is developing its research strengths through the Kansas centers of excellence program, and there is interest in expanding existing research ties to the pharmaceutical industry. A university Task Force on Economic Development formed in 1986 has recommended program changes and initiatives, but the university considers education its number-one mission and its primary contribution to state economic development.

### *Kansas State University*

Kansas State is assessing the role it will play in economic development. The university envisions a more active role, though new initiatives are still being planned. Undergraduate teaching and basic research in material sciences, biotechnology (plant genetics), value-added agricultural products, and industrial technology transfer (including robotics) are the major focus of a new emphasis on economic development. Some faculty openings are being filled with an aim to building excellence in selected fields with economic development priority. The engineering college is establishing innovative partnerships with industry to encourage entrepreneurial discovery and alleviate research budget constraints.

### *University of Missouri at Columbia*

The University of Missouri is beginning to reassess its contributions to economic development. As a land grant institution, it has long supported the traditional Missouri agricultural economy. As the Missouri economy has changed, diversifying and expanding, the university has sought to keep pace. The Columbia campus boasts two state-funded programs to build centers of academic and research excellence—a molecular biology program and food for the 21st century program. In combination with other projects, these programs are part of the university's effort to take a more active part in Missouri's changing economic outlook.

### *University of Nebraska*

Nebraska appears to be in the early stages of economic development initiatives. The uni-

versity believes its best contribution will be in long-run investments in research and new partnerships with industry. Four areas of research are receiving emphasis: value-added agricultural products, biotechnology (especially plant genetics), optical measurements, and water resources. The Nebraska Food Processing Center, a joint venture with the state, provides technical and business support to food companies. The International Center on Franchising and the Nebraska Technical Development Corporation are university-related programs to assist small businesses.

### *University of New Mexico*

Basic research has been the traditional role of UNM in economic development, and plans are for the university to continue in this role. But the university is moving toward the center of the passive-active continuum with more emphasis on applied research. Attention has focused on business research and services (Institute for Applied Research Services) and technology transfer activities (New Mexico Technology Innovation Program). Government research at the nearby Sandia and Los Alamos laboratories is seen as an important seed for technology transfer to both established companies and to new homegrown spinoffs. The "UNM-Business Link," now in planning stages, promises to establish working groups that can address such economic development issues as a planned research park, data networks, business assistance, and international affairs.

### *New Mexico State University*

New Mexico State regards economic development as a fourth dimension to add to its tradi-

tional mission of education, research, and extension. The flagship development effort is Arrowhead Research Park. Envisioned as a 40-year project, the newly created park is intended to lure headquarters of budding companies as well as entrepreneurs from the university. The startup companies are expected to be attracted to the university's fields of research excellence in computers, telemetry, plant genetic engineering, and solar and geothermal energy. The university will take small equity positions in park companies.

### *University of Oklahoma*

The University of Oklahoma views its role in economic development as long term, primarily involving "the creation of new knowledge" through basic research. However, the recent downturn in the energy industry and a new university president have shifted the focus of economic development toward partnerships with private business. Most economic development activities are directed at the state's natural resource base, primarily energy, with the first priority being to keep and expand businesses already in Oklahoma. The primary vehicle for carrying out these activities is the Office of Business and Industrial Cooperation.

### *Oklahoma State University*

As a land grant institution, OSU has always been involved in economic development, but recent economic conditions have brought more interest in development. While the university has no formal economic development agenda, several initiatives have been developed in a decentralized fashion. The Telecommunications Center is aimed at improving university-industry relations and technology transfer. State

economic development is the primary objective for the university's planned Center for International Trade. Longer run plans include the establishment of research centers in biotechnology, manufacturing automation design, optical communications, international trade, and hazardous waste/water.

### *University of Wyoming*

The University of Wyoming seeks to improve the economic future of Wyoming through research programs aimed at diversification. Projects are being designed to help broaden the state's industry base and support traditional Wyoming businesses. The university's faculty and students continue to explore new directions for established industries, such as agriculture and tourism, while breaking ground in such diverse areas as composite materials, plant science, molecular biology, and computer vision. With the cooperation of state administrators, the university is helping address both the academic and economic needs shaping Wyoming's future.

(Continued from page 11)

New Mexico provides examples of these two sources of change. The University of New Mexico at Albuquerque has long emphasized basic research, but it stresses the contribution research makes to economic development and giving more attention to applications of research. The university also calls attention to its importance as an enhancement to the Albuquerque area through continuing education and cultural amenities.

New Mexico State University at Las Cruces has taken a different approach. Most of its recent economic development efforts center around Arrowhead Research Park, a business park serving as a new vehicle for technology transfer and business incubation. Both of New Mexico's major

universities are developing business parks, but Arrowhead appears to be much more central to New Mexico State's overall economic development strategy. The objectives of this long-term investment in university-business cooperation are to foster entrepreneurial ventures by university personnel and attract new firms to Las Cruces by using the university's research strengths as a lure.

What is responsible for the heightened awareness of economic development at universities in the region? According to the university administrators, their heightened awareness of economic development has been due primarily to the sluggish economic climate in their states stemming from problems in agriculture and energy. In some cases, new university presidents and other administrative officials led the movement toward more active university involvement in economic development. The change was clearly induced, however, by regional economic difficulties.

*More strategic planning.* Universities also are expanding their role in economic development by increasingly incorporating development considerations into their strategic planning. Most of the universities view economic development as a long-term undertaking, but since they are just beginning to formulate economic development strategies, many of their initial developmental activities are designed to alleviate short-term problems.

The University of Oklahoma, for example, views its role in economic development as long term, with the role primarily involving "the creation of new knowledge" through basic research. But there is also increased awareness at the university that Oklahoma and the surrounding region must move their economies in new directions in response to competition from other regions in the United States and other parts of the world. To that end, the university's overall economic development strategy involves using more of its resources to improve growth in existing businesses in the state because university officials see importing jobs to the state as risky, sometimes very costly,

and often unproductive. Thus, programs aimed at assisting small businesses are expected help to fill the short-term needs of existing businesses while the university takes aim at longer run goals such as adding value to Oklahoma's natural resource base.

The long-term nature of regional economic development can also be seen in the emphasis district universities continue to place on their traditional research and teaching functions. These activities lie somewhere midway between passive and active. Once entirely passive, universities are now incorporating strong research and human resource development into their overall economic development plans. Like other land grant institutions, Oklahoma State University's extension service has filled short-term economic development needs, but the university is now turning attention to long-term concerns. Central to their evolving economic development strategy is the creation of research "centers." Centers in fields such as biotechnology, automation design for manufacturing, optical communications, and robotics are expected to enhance technology transfer to the private sector. By bolstering basic research and education in these areas, the university also expects improvement in the skill level of the Oklahoma workforce.

Universities are reevaluating educational curricula with a goal of providing students diverse and flexible skills. Many universities are emphasizing liberal arts courses and communications skills, recognizing that graduates are likely to make an average of six to seven job changes in their careers. Thus, another example of traditional university functions forming the central focus of economic development efforts is at the University of Missouri-Columbia, where an important contribution to economic development is believed to be the preparation of responsible, educated citizens to take new jobs.

*Strengthening partnerships with business.* Besides strengthening traditional research and teaching functions, universities are turning their

attention increasingly to new initiatives that strengthen ties to private business. The survey revealed significant university resources being used to foster new relations with the private sector.

Two of the more successful examples of cooperation between the universities and businesses are at the University of Colorado and Colorado State University. According to administrators at both universities, comparatively low levels of state funding over many years have induced them to seek support from private businesses in building strong research programs and attracting federal grants. The currently active position these universities have taken toward economic development has increased attention to their usefulness to the state's business community. The increased cooperation has led to several economic development successes. In Boulder, for example, such firms as Ball Aerospace, Synergen, NBI, and Cadnedix trace their successes to the research faculty and students at the university.

The University of Nebraska has also stressed ties with business. One of the university's main initiatives in forging university-industry cooperation is its Food Processing Center, started in 1982 as a joint venture between the university and Nebraska's Department for Economic Development. So far, the center has been responsible for over 1,000 contacts with businesses and the creation of over 30 new food processing companies.

At Oklahoma State University, the partnership between business and the university has been increasingly important in funding research. The university established research expertise in web-handling technology, the running and handling of continuous flat materials through process machines. This expertise attracted to Oklahoma such firms as Armstrong, Moore Business Forms, and World Color Press, all of which rely on web-handling technology. These firms, in turn, can provide financial support to the university and share capital and human resources. Then, as the quality of research increases, the region becomes

more attractive to expansion of existing businesses and entry of new businesses that rely on similar technology.

### *Universities and economic transition*

Universities are becoming more active in economic development at the very time that the regional economy is undergoing transition. The decline of traditional industries and the emergence of new industries provide a challenge to the universities as they try more actively to mold the economic future of their states. Moreover, an increased awareness of the global marketplace and a renewed commitment to the region's rural economic development will no doubt influence the overall economic development strategies at universities in the district. How have the region's universities responded and how might they participate in this transition?

*Universities and agriculture.* Of traditional industries in the Tenth Federal Reserve District, agriculture is the most important. As a result, land grant universities have been especially important to the economic development of the district. The region's farm economy became an engine for economic growth partly because of the agricultural education and research that emanated from the land grant universities. Now, as agriculture undergoes a fundamental transition in response to international competitive pressures, the land grant universities are being forced to reevaluate the role agriculture will play in their programs.

Land grant institutions were built around the triad of education, research, and extension. Agriculture—specifically, production agriculture—has been at the heart of the triad. Though land grant universities have been committing more resources to other disciplines for years, agriculture still forms an arching theme to their mission. Education at these universities has been broadly based from the beginning, with special emphasis on agriculture and the mechanical arts (engineer-

ing). The research has emphasized agriculture and engineering as well. In recent decades, however, research has been broadened to include such disciplines as architecture, energy, and computers. The extension leg of the triad has continued to focus almost entirely on production agriculture, however, with a growing emphasis on managing production, financial, and marketing risk.

What should be the central focus of the land grant triad today? Should it continue to be agriculture, or even more narrowly, production agriculture? These fundamental questions are now the subject of great debate in land grant universities across the district. At this point, three preliminary conclusions can be drawn.

First, land grant institutions are redirecting agricultural programs with two main objectives in mind. One is making U.S. agriculture more efficient. Past advances in agricultural technology have been aimed at increasing output by improving productivity. These efforts have been marvelously successful, so successful that grain surpluses are now at record highs. But in an era of surplus and intense international competition for markets, universities are appropriately turning their attention to technologies that will cut costs and make U.S. producers more competitive. Current research is aimed at cutting production costs of major crops while improving financial management methods to emphasize efficiency still further.

Food processing is the other new focus of agricultural programs. Research dollars are being redirected at improving the industrial equipment and processes used in the manufacture of food products. Some states are creating centers that offer expertise in solving business, industrial, and marketing problems of food processing firms. The objective of these initiatives is to create a base of knowledge and technical support that will attract additional economic activity to the district's farm states. Thus, the attention of land grant institutions is beginning to shift away from the farm to the rest of the food chain.

Second, even as agricultural programs are redirected, land grant universities appear determined to continue supporting agriculture but at a reduced level in their overall curriculum. But they are having difficulty implementing that decision. The land grant system, with more than a hundred years of integral leadership in the farm economy, has a significant farm constituency that resists any reduction in emphasis. But agriculture is no longer the all-important industry it once was to district states. The share of state population engaged in farming has continued to dwindle, and in district states is now less than 5 percent. Thus, the administrations of district land grant institutions envision a more diverse mission in the future, but the mission has been slow to develop because the traditional farm constituent base opposes any deemphasis of production agriculture.

This political dilemma is creating some tension and frustration on land grant campuses. The engineering faculty at one district university, for example, felt constrained and frustrated in pursuing creative economic development ventures with corporate partners because the university budget and decisionmaking is "still hide-bound to production agriculture." Resources are being shifted to nonagricultural programs, but the shift is slow and deliberate.

Third, and related to the second, land grant institutions are seeking new arenas in which to concentrate excellence. Applied science is the theme of these new areas. The land grant system prides itself—rightfully so—on its ability to apply new frontiers of science to practical situations. That resident skill is being applied to such fields as biotechnology, material sciences, and computers to find commercially viable uses for technology. Many of these fields will have primary application beyond agriculture.

In many respects, the changes now sweeping land grant universities are historic. These institutions have been adjusting to a diminished role for agriculture for years. But it is only recently that

many of these changes have been fully recognized, and the universities have forced themselves to formulate, communicate, and begin to implement their new mission, which will involve redirecting and deemphasizing agricultural programs while identifying and nurturing new fields of excellence. The process is well underway, but the results may continue to be slow in manifesting themselves.

*Universities and alternative industries.* The land grant institutions and other surveyed universities recognize the need to adapt to changes in traditional industries. While most of the universities are looking to advanced technology as a means of enhancing the performance of traditional industries, others are targeting entirely different industries for prospective growth.

Many of the new areas being targeted rely on pioneering research in a variety of fields. Examples include space sciences, biotechnology, and telecommunications. Establishing research excellence in new areas requires a long planning horizon. Uneven funding has made it difficult for the universities to attract high-quality faculty and establish high-quality programs in new areas. But there have been some successes.

Although much of the economy of New Mexico is based on natural resources, the University of New Mexico views itself as a high-technology center because of its proximity to government research laboratories. The university has expanded its engineering programs, especially those involving the transfer of technology from military research to commercial applications. This effort has formal roots in the New Mexico Technology Innovation Program started six years ago to facilitate technology transfer. Therefore, the university supports an ongoing broadbased effort to move the state economy in new directions.

The emergence of new industries and programs to support them appears to be more deliberate at the University of Colorado. But as in New Mexico, the proximity to military installations has influenced the direction of new programs. Space

sciences, telecommunications, and microelectronics are examples of new industries targeted to grow in importance while reliance on traditional industries fades. In the words of the university president, "Until recently, the state's economic growth was based heavily upon agriculture, mining, and petroleum industries. Those industries are now giving way to new technology industries, and the change in economic trends will require a major strategic investment in development if the state is going to be able to compete on a national and international basis."

*Universities and international competitiveness.* International competitiveness in agriculture, energy, and manufacturing weighs heavily in the formula for improved economic growth in the region. Universities clearly regard competitiveness as a principal factor molding their economic development initiatives. Little is being done by the universities, however, to develop specific strategies that might enhance the region's international competitiveness. Most of the universities have only just begun thinking about the response their curriculums will make to an increasingly competitive international market. Many of the universities cite foreign language programs and exchange programs, but few are directing significant resources toward improvement of the region's competitiveness in world markets.

Of the universities making some effort to address competitiveness, Colorado State University appears to have committed significant resources. It ranks fourth among U.S. universities in the dollar volume spent on international research.<sup>6</sup> And other universities are targeting industries that may hold some promise for inter-

national competition. For example, the University of Colorado has directed research in microelectronics to improve the competitiveness of the U.S. semiconductor industry. Research programs at the University of Oklahoma have focused on food processing, enhanced oil recovery, and chemical processes.

Oklahoma State University has one of the most visible international initiatives. Now in the planning phase, its Center for International Trade Development will coordinate, enlarge, and make accessible university resources to solve problems and identify opportunities arising from increasing international interdependence. The center will be linked to the university's already extensive communications facilities, and its programs will be developed and conducted by academic units with faculty associates.

*Universities and rural economic development.* The region's economic transition of the 1980s has had a pronounced effect on the rural areas of the district. It is not surprising, therefore, that many existing and planned economic development efforts at universities in the district have a marked rural emphasis. In some states, such as Wyoming, the very nature of the state economy dictates a rural emphasis. In other states with more urban centers, universities appear to have taken an approach to economic development that addresses both urban and rural problems. These universities consider themselves statewide resources, regardless of their particular location.

At some universities, multiple campuses allow urban and rural problems to be treated differently. Campuses in urban areas can tailor programs to meet the needs of the surrounding metropolitan area, while campuses in rural areas target rural problems. For example, the University of Missouri-Kansas City has begun developing an economic development strategy that will be of benefit to the Kansas City metropolitan area. Likewise, the University of Colorado's Denver campus is more urban-oriented than the main campus at

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<sup>6</sup> "International research dollar volume" is a measure of the average annual dollar value of university grants and contracts for United States Agency for International Development programs. Source: *Research at Colorado State University, 1987*, editor Celia Walker, Colorado State University, Robinson Press, Inc., 1987.

Boulder. However, all of the major research universities, including those with a single campus, have taken an approach to economic development that reaches in principle to both urban and rural communities.

Although there is some degree of specialization in rural development at land grant institutions, all the single-campus universities either do not distinguish between urban and rural-oriented activities or take a statewide approach to their planning for economic development. Examples of programs aimed specifically at rural communities range from the broadbased agricultural extension services of the land grant institutions to small business assistance programs at other universities. Both the University of Oklahoma and the University of New Mexico, for example, include business assistance and infrastructure development as part of their overall economic development plans to help foster small business development in rural communities. At the University of New Mexico, a data network called Technet will be available to business firms in small communities throughout the state.

### **Future challenges for the region's universities**

Our survey of district educational institutions underscores the conclusion that a major evaluation is being made to determine what universities can do to stimulate economic development. Discussions with university administrators revealed the vigor with which those evaluations are being undertaken. Some universities have a clear vision of the role they will play and how their role will evolve. And major new university initiatives keyed to economic development are beginning to emerge. For the most part, however, economic development is still the subject of analysis, planning, and policy debate. In most cases, implementation is still in the future.

Will the region's universities fully implement

the economic development initiatives being discussed? Will these initiatives stimulate the region's economy? Two challenges will affect the outcome: university-state cooperation and university-university cooperation.

Cooperation between universities and their state governments appears to be the biggest challenge in implementing effective university economic development programs. Asked to rank the chief constraints they face in implementing their new initiatives, nearly all respondents listed inadequate state funding support as their main hurdle. University administrators expressed frustration at being unable to convince state leaders of the need for a stronger commitment to excellence at the universities. While acknowledging the budget pressures on their states, the administrators generally agreed that the states were not willing to make the sustained commitments to long-run investments in universities necessary for the planned economic development initiatives to succeed.

The challenge to improved university-state cooperation lies in overcoming problems with communication and commitment. The communication problem centers in different perspectives. Well aware of their economic problems, the states look to the universities for quick solutions to economic distress. The universities, with much longer planning horizons, look to state governments for sustained high levels of funding to produce results over many years. In fact, state funding of higher education in the region varies directly with economic conditions. This uneven funding commitment keeps the universities from fully implementing long-run investments in research.

Although states in the region may need to reevaluate their long-run commitment to university programs, the problem is finding the resources in already pressured state budgets to make additional investments in universities. Some empirical evidence suggests that if states raised taxes and then devoted the additional revenues to higher education, the resulting gains in economic activity

might more than offset the initially negative effects of the tax.<sup>7</sup>

If states make a greater financial commitment, it will be necessary for the universities to follow through with economic development initiatives. There is concern in some quarters that the universities might regard the current interest in economic development as only an opportunity to bolster their budgets. Cooperation between states and universities, therefore, is vital to successes in economic development.

States in the region must decide if they are willing to make the concerted effort needed to raise their universities to a higher echelon. Some university administrators admitted that unless such an effort was made, it would be increasingly difficult for their universities to take a meaningful part in technological advances. And with few large private universities in the region, states will have to turn to public universities for long-run economic development assistance.

States may be wary of long-run economic development projects, questioning whether the projects will produce results that are economically relevant. One way to offset that risk is to encourage projects in which private industry is a partner. Such partnership appears likely to yield practical results. Most of the universities appear eager to broaden their partnerships with the private sector.

Improved cooperation among universities also

poses a challenge to successful economic development initiatives. Universities were asked about the extent of their cooperation with other universities. The results indicate that cooperation among most universities in the region is limited at best. Even universities in the same state have virtually no channels of cooperation. University administrators admitted that improved cooperation could limit duplication of effort and free resources for high-priority programs, but they also admitted that there are few mechanisms for developing cooperation.

A need for regional university excellence is beginning to be recognized by university administrators in the district. The opinion was often expressed that the nation's heartland, including the Tenth District, is behind other regions in university excellence. Many administrators further agreed that the region could close that gap significantly by pooling its university resources in some type of regional centers of excellence. But there is no active discussion of this idea. A helpful first step would appear to be more open cooperation among universities within each state.

## Conclusions

Universities have been credited with stimulating local and state economies in many areas of the United States. How will universities help the region overcome the economic sluggishness brought on by recent problems in the agriculture and energy sectors? Interviews with administrators of large major public universities in the Tenth Federal Reserve District indicate that they are generally only in the first stages of formulating economic development agendas. However, their current activities provide a framework for understanding their prospective roles.

A more active posture toward economic development is clearly evident at all the major universities in the district. Recent economic problems have caused the universities to reevaluate their traditional roles and add new programs aimed

<sup>7</sup> For a discussion of taxation and expenditures for higher education, see L. Jay Helms, "The Effect of State and Local Taxes on Economic Growth: A Time Series-Cross Section Approach," *The Review of Economics and Statistics*, 67, November 1985, pp. 574-582. Helms concludes that higher state taxes retard economic growth when the revenue is used to fund transfer payments. But if the additional revenue is used to fund education or some other public service, such as health and public safety, the improved economic performance may outweigh the negative influence of the tax. For further information on this issue, see Stephen P. A. Brown, "New Directions for Economic Growth: Redesigning Fiscal Policies in Louisiana, New Mexico and Texas," *Economic Review*, Federal Reserve Bank of Dallas, July 1987, pp. 13-20.

at improving the economic outlook for their states. Many of the new initiatives are aimed at building links with private businesses and applying advanced technology to traditional industries. But the universities are just getting started. Much more time must pass before the effectiveness of these efforts can be evaluated. Meantime, it appears that

more cooperation between state governments and universities and coordination of economic development efforts among universities could enhance the overall effectiveness of their strategies. In addition, the survey of university officials supports the claim that regional cooperation may lead to more successful economic development plans.

# Loan Sales: Another Step in the Evolution Of the Short-Term Credit Market

*By Sean Beckett and Charles S. Morris*

Loan sales by commercial banks have increased dramatically in recent years. More and more banks are selling their loans, and individual banks are selling larger volumes of loans. This practice takes many forms. One familiar form is the pooling of mortgage loans by such agencies as the Government National Mortgage Association and the subsequent sale of securities representing undivided interests in these mortgage pools. More recently, banks have begun pooling other kinds of loans: automobile loans, credit card and lease receivables, agricultural loans, even pools of charged-off loans. In addition to pooling loans, some banks are selling whole, short-term commercial and industrial loans. This entire range of activities, from the sale of shares in a pool of loans to the sale of whole loans, is called securitization.

The recent increase in securitization has raised a host of concerns about the effects of these loan

sales on the safety and soundness of banks. One concern is the effect of securitization on the riskiness of individual bank and thrift loan portfolios. Another concern arises from the similarity of loan sales to underwriting securities, an activity commercial banks have been restricted from undertaking since passage of the Banking Act of 1933.

This article examines one aspect of securitization: the sale of whole, short-term loans, especially by large money center banks. It is argued that, instead of being a cause for concern, the recent increase in bank sales of whole, short-term loans is merely the latest development in the evolution of the short-term credit market. Moreover, loan sales do not appear to decrease the safety and soundness of banks. As a result, the increase in bank loan sales is likely to contribute to a smoother functioning short-term credit market.

The first section of the article reviews the history of the short-term credit market before the 1980s. Special attention is given to the development of the market for nonfinancial corporation commercial paper. The second section documents the rise

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in loan sales, considers some of the reasons for the rise, and discusses the innovative aspects of loan sales that ensure their continued importance. The final section examines the public policy issues surrounding the increase in loan sales.

### **The short-term credit market prior to the 1980s**

To understand the role of loan sales in the short-term credit market, it is useful to look at the short-term credit market before the 1980s. This section discusses the traditional organization of the short-term credit market and explains the emergence of nonfinancial corporation commercial paper in the 1960s.

#### *The short-term credit market before the 1960s*

Until the 1960s, nonfinancial business firms relied almost entirely on banks rather than capital markets to meet their short-term financing needs. Nonfinancial firms typically obtained short-term bank loans to finance inventories and meet seasonal and other working capital needs. While these types of credit needs are recurring, the term of the credit is so short that, in the past, it was impractical for most firms to obtain these funds from capital markets.

Close, long-standing ties between banks and nonfinancial firms made banks ideal as the source of short-term credit. A bank can correctly assess and monitor a firm's creditworthiness only by maintaining a close relationship with the firm. A firm may be thoroughly sound, but only someone intimately familiar with its management and prospects—in other words, only its bank—has enough confidence in the firm's ability to meet its financial obligations to advance it funds. Also, a bank is well suited to renegotiating loans to a firm if the firm suffers unexpected reverses.

Although most nonfinancial firms relied on banks to meet their short-term credit needs, firms

that were nationally known had more short-term financing options available than less-known firms. The management and prospects of Fortune 500 firms, say, are so well known that large institutional investors might be willing to make short-term loans directly to these firms. Again, the key factor is information. A nationally known firm might not be any more creditworthy than a local firm, but the larger firm's condition is monitored by an array of securities market participants. The condition of a local firm is monitored only by its bank. Hence, only the bank is in a position to assess a local firm's creditworthiness. Nevertheless, until the 1960s, nationally known firms rarely made use of nonbank financing options.

#### *The advent of commercial paper*

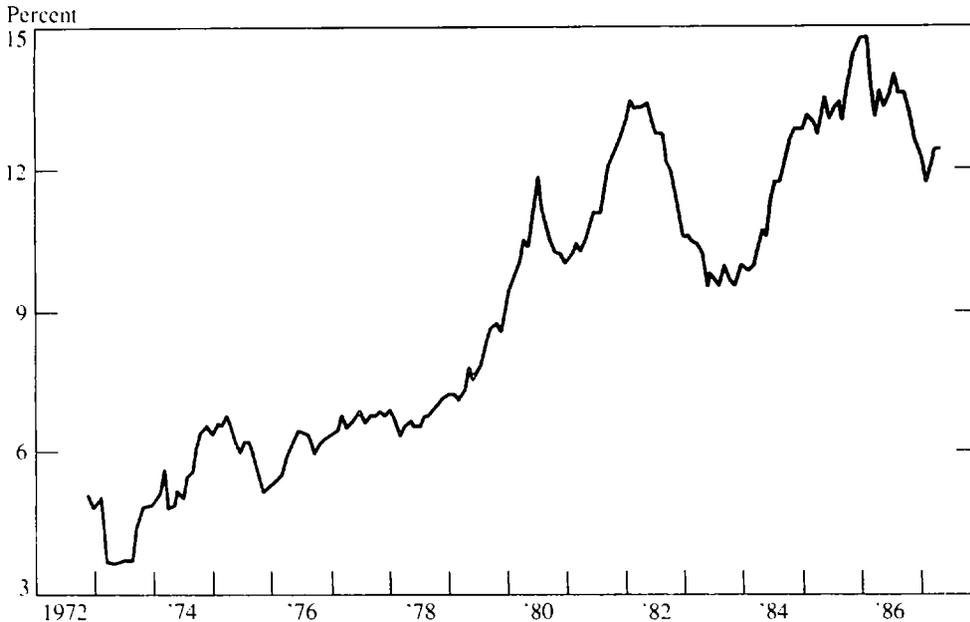
A major change in the provision of short-term credit to nonfinancial firms came with the rise of commercial paper in the late 1960s. Until then, commercial banks dominated the short-term credit market. In the second half of the 1960s, however, market interest rates rose above Regulation Q interest rate ceilings on large deposits, making it temporarily difficult for banks to raise the funds needed to meet the demand for short-term business loans. In the interim, some large, nationally known nonfinancial firms turned to meeting their short-term credit needs by issuing commercial paper through investment banks.<sup>1</sup>

Commercial paper is a short-term promissory note typically unsecured and issued in bearer form.<sup>2</sup> Like other corporate debt securities, com-

<sup>1</sup> Until recently, commercial paper has been issued through investment banks rather than commercial banks because the Banking Act of 1933 was thought to prohibit commercial banks from underwriting commercial paper. That situation changed somewhat in recent years, a point discussed more fully below.

<sup>2</sup> For a more detailed discussion of commercial paper, see Timothy D. Rowe, "Commercial Paper," *Instruments of the Money Market*, Federal Reserve Bank of Richmond, 1986, pp. 111-125.

**CHART 1**  
**Percentage of nonfinancial corporation**  
**commercial paper in short-term business debt**



mercial paper is given a rating to indicate the issuer's ability to repay. Two features of commercial paper make it desirable from the viewpoint of both the issuer and investor—its flexible maturity and its flexible denomination. The maturity of commercial paper ranges from one to 270 days, and, within that range, maturities can be tailored to the needs of individual investors.<sup>3</sup> Most issues have a maturity between five and 45 days, the most popular being 30 days. The denomination of commercial paper also can be tailored to the individual investor, the most common being \$1 million. Purchasers of commercial paper are usually institutional investors.

<sup>3</sup> Commercial paper issues rarely have a maturity greater than 270 days, because securities with longer maturities must be registered with the Securities and Exchange Commission and registration is very costly.

The importance of nonfinancial corporation commercial paper as a source of short-term credit has increased substantially over the last 15 years. Since the rapid rise in nonfinancial corporation commercial paper in the 1960s, the commercial paper market has become larger than the market for any other money market instrument except Treasury bills. Chart 1 shows the percentage of nonfinancial corporation commercial paper in short-term business credit.<sup>4</sup> The share has more than tripled over the period shown, rising from an average of only 4 percent in 1973 to 14 percent in 1986. This 1986 share represents \$82 billion in nonfinancial corporation commercial paper out

<sup>4</sup> Short-term business credit is defined as the sum of commercial and industrial loans and outstanding nonfinancial corporation commercial paper.

of a total of \$593 billion in short-term business credit that year.

The importance of nonfinancial corporation commercial paper as a source of short-term credit has increased because, for many large nonfinancial firms, commercial paper is cheaper than bank loans. Firms in the top two rating categories can usually borrow in the commercial paper market at rates lower than bank loan rates, although firms in the second rating category pay a substantial premium over firms in the top category. Commercial bank loans are more expensive than commercial paper because commercial banks have to cover costs that investment banks do not, such as deposit insurance premiums and capital and reserve requirements. As a result, many nonfinancial firms that turned to commercial paper in the late 1960s have continued to rely on commercial paper rather than return to bank loans. In fact, commercial paper has supplanted bank loans as the primary source of short-term credit for many of the country's largest nonfinancial corporations.

To recover some of the business lost to the commercial paper market, banks have tried in recent years to place and underwrite commercial paper.<sup>5</sup> Commercial banks are allowed to place third-party commercial paper, and the Board of Governors of the Federal Reserve System has recently ruled that several large bank holding companies can underwrite limited amounts of commercial paper through subsidiaries that are not "principally engaged" in underwriting impermissible securities.<sup>6</sup> However, the recently enacted Competitive

<sup>5</sup> "Underwriting" is purchasing new securities and selling them in the open market. "Placing" is locating investors, through direct contact, to purchase new securities.

<sup>6</sup> Impermissible securities include all securities except those that banks are explicitly allowed to underwrite by the Glass-Steagall Act. The Federal Reserve Board has ruled that a subsidiary is not principally engaged in the underwriting of impermissible securities if its revenues from such underwriting are less than 5 percent of its total revenues. The Federal Reserve also has placed other restrictions on the activities of subsidiaries.

Equality Banking Act of 1987 has placed a moratorium on this and other new bank activities until March 1, 1988.

## **Loan sales—the next development in the short-term credit market**

Loan sales by commercial banks have increased significantly in recent years. This section examines the recent increase in loan sales by commercial banks and argues that loan sales are simply the next step in the evolution of the short-term credit market.

### *The recent rise in loan sales*

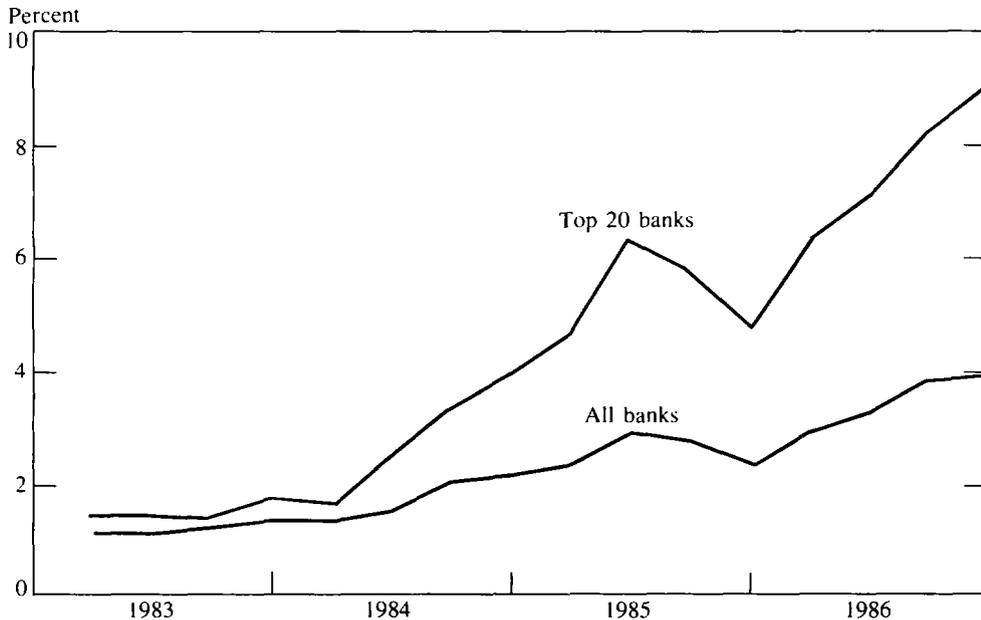
Various types of transactions are lumped together under the single term "loan sale."<sup>7</sup> The simplest type—the one considered in this article—is where a bank sells a single loan without recourse to another investor.<sup>8</sup> In a loan sale without recourse, all risk of default is transferred from the bank to the purchaser of the loan. At the conclusion of the transaction, the loan is taken off the

<sup>7</sup> The varieties of loan sales, bankers' motives for undertaking them, and the regulatory issues involved are all discussed in more detail in Sean Beckett, "Understanding Loan Sales," *Financial Letter*, Federal Reserve Bank of Kansas City, April 1987, and in David G. Hayes, "Some Issues in Asset Securitizations by National Banks," *Issues in Bank Regulation*, Winter 1987, pp. 5-14.

<sup>8</sup> Banks also sell loans **with** recourse, that is, banks retain a share in the losses if the borrower defaults. This type of loan sale is treated as a financing. In this case, the bank must usually keep the loan on its balance sheet, and it may have to hold required reserves against the proceeds from the loan sale. Banks use loan sales with recourse to lower their cost of funds.

Another kind of loan sale that has become more important recently is the sale of securities representing an undivided interest in a pool of similar loans. A familiar example of such a loan-backed security is the mortgage-backed securities sold by the Government National Mortgage Association and the Federal National Mortgage Association. Other more recent examples are securitized credit card balances and automobile loans. This type of loan sale is an important development in its own right, but it is not directly related to the short-term business credit market.

**CHART 2**  
**Loan sales as a percentage of bank assets**



bank's books and the purchaser of the loan takes the place of the bank in future dealings with the borrower. For a fee, the bank may service the loan. In this loan sale without recourse, as it is termed, the bank reduces its assets and, thus, reduces its required capital. For banks, this feature is one of the attractions of loan sales without recourse.

Loan sales have increased markedly in the last few years. Chart 2 records the growth in importance to banks of loan sales over the last four years.<sup>9</sup> In the second quarter of 1983, the ratio of loans sold to commercial bank assets was 1.2 per-

<sup>9</sup> The statistics reported in this subsection were calculated from the Consolidated Reports of Condition and Income that insured banks file with the FDIC every quarter. The reports began recording the volume of loan sales without recourse in the second quarter of 1983.

cent (\$27 billion of loan sales in 1982 dollars). By the first quarter of 1987, the loans sold to assets ratio had risen to 4.0 percent (\$115 billion of loan sales). The rise in this ratio has been even more dramatic at the 20 largest banks, where size is measured by assets. The ratio of loans sold to assets at these banks rose from 1.5 percent (\$12 billion) in the second quarter of 1983 to 9.1 percent (\$82 billion) in the first quarter of 1987.

#### *Why banks are selling loans*

The rapid rise in loan sales has led to increased interest in why banks are selling loans. Several explanations have been offered. One explanation is that banks are selling loans as a substitute for not being able to sell commercial paper. Another explanation is that reduced profit margins have led banks to look for new sources of revenue. Still

another explanation is that banks are simply responding to an increased demand for the short-term debt of highly rated corporations.

Many observers have advanced the notion that commercial banks are increasing their sales of whole loans because they cannot deal in commercial paper.<sup>10</sup> Like commercial paper, the loans banks sell are generally the short-term debt of highly rated nonfinancial firms. Thus, this explanation asserts that commercial banks, concerned about the encroachment of commercial paper on their traditional stronghold—the short-term business credit market—use loan sales to skirt the legal prohibitions against their dealing in commercial paper.

The more rapid growth in loan sales in the 20 largest banks than in all banks is consistent with the notion that much of the increase in loan sales reflects competition with commercial paper. Most commercial paper is issued by the highest rated nonfinancial firms. For that reason, only their banks—the largest banks in the country—are in direct competition with the commercial paper dealers. By the same token, the commercial and industrial (C&I) loans easiest to sell to the investors who buy commercial paper are those made to highly rated firms. It turns out that the increase in loan sales is more pronounced at the large money center banks. If the increase in loan sales were spread uniformly across banks of all sizes, these loan sales would more likely reflect only

an increase in traditional commercial banking activities.

Chart 3 reinforces the idea that the money center banks are responsible for the increase in loan sales. The chart shows the percentage of commercial banks with loan sales equal to at least 1 percent of their assets for all banks and for the 20 largest banks.<sup>11</sup> Twenty percent of all banks had loan sales equal to at least 1 percent of their assets in the second quarter of 1983. By the first quarter of 1987, that fraction had fallen to 17 percent of all banks. In contrast, there has been a pronounced increase in this fraction for the 20 largest banks. The percentage of the 20 largest banks with loan sales equal to at least 1 percent of assets rose from 50 percent in the second quarter of 1983 to 75 percent in the first quarter of 1987. In other words, all but 5 of the 20 largest banks had a loans sold to assets ratio of at least 1 percent in the first quarter of 1987.

Charts 2 and 3 document the marked increase in the importance of loan sales and support the notion that competition with commercial paper is one reason for the increase. However, other factors are also important in accounting for this development.<sup>12</sup> One factor is the decline in the profitability of traditional lending. A recent study by the Federal Reserve Bank of New York concluded that bank profitability has declined in the 1980s and is now close to a 15-year low.<sup>13</sup> The study emphasizes the decline in net interest

<sup>10</sup> Some representative articles are "Roundtable on Loan Sales," special supplement to *Bank Letter*, March 16, 1987; Lowell Bryan, "The Selling of America's Loans," *The Wall Street Journal*, October 20, 1986, p. 20; Carol Kizzia, "What's behind the growth in asset sales?" *ABA Banking Journal*, March 1987, pp. 32-36; George F. Salem. *Commercial Loans For Sale: The Marriage of Commercial Banking and Investment Banking*, Donaldson, Lufkin & Jenrette, September 30, 1985; George F. Salem, "Loan Selling: A Banking Revolution," an address to the 72nd Annual Fall Conference of Robert Morris Associates, reprinted by Donaldson, Lufkin & Jenrette, October 10, 1986.

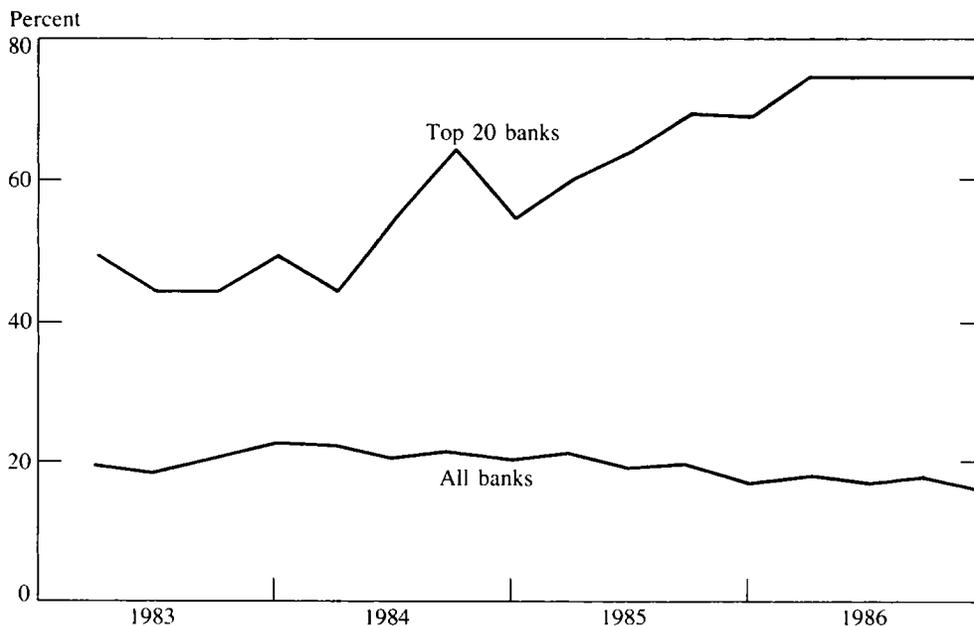
<sup>11</sup> A preliminary examination of the data indicates that a cutoff of 1 percent of assets appears to separate banks that are active loan sellers from banks that sell loans only intermittently.

<sup>12</sup> One reason that the rise in nonfinancial corporation commercial paper cannot entirely explain the rise in loan sales is that nonfinancial corporation commercial paper has been encroaching on C&I loans since the mid-1960s but the significant rise in loan sales did not begin until the 1980s.

<sup>13</sup> *Recent Trends in Commercial Bank Profitability—A Staff Study*, Federal Reserve Bank of New York, September 1986.

CHART 3

Percentage of banks with loans sales to assets ratios above 1 percent



margins as a causal factor in reducing bank profits and notes that banks have been shifting out of traditional loan-funding activities into fee-based intermediation activities. One such activity is the selling of whole short-term loans.<sup>14</sup>

Another reason for the increase in loan sales—and one not directly related to the squeeze on bank profits—is an apparent increase in demand for the short-term debt obligations of highly rated corporations. Some of this demand comes from regional banks wanting to diversify their asset

portfolios but not having direct ties with top-rated corporations. Another source of demand for these credits is foreign banks and foreign institutional investors that might want to hold high-quality, short-term, dollar-denominated debt.

*Innovative aspects of loan sales*

Loan sales have become important in much the same way that nonfinancial corporation commercial paper became important in the 1960s. Nonfinancial corporation commercial paper became prominent in the late 1960s in response to a temporary misalignment of interest rates. In the process, however, highly rated corporations found that commercial paper has some advantages for them over traditional bank loans. As a result, the commercial paper market has remained an important part of the short-term credit picture. In the same

<sup>14</sup> The decline in bank profitability also helps account for the timing of the increase in loan sales. In the early 1970s, banks could offset the loss of any profits due to the loss of C&I loans to non-financial corporation commercial paper by making more foreign loans. But this avenue was not open in the 1980s. In fact, banks have made fewer foreign loans in the 1980s because of the LDC debt crisis.

way, loan sales may have emerged as a temporary solution to the combination of the competitive threat of the commercial paper market and the lowered profitability of funding loans to maturity. And like commercial paper, there are innovative aspects of loan sales not found in other short-term credit instruments that may guarantee them a role in credit markets even after banking conditions change.

One innovative aspect of loan sales is that they are an asset that can fill the gap between commercial paper and traditional bank loans for credit-worthy but less well-known firms. Most loan sales so far have involved highly rated borrowers, firms that could have issued commercial paper. More and more though, banks are selling the loans of firms that are good credit risks but are not highly rated and, therefore, do not ordinarily have access to the commercial paper market.

Loan sales can fill this gap in a way that commercial paper cannot because commercial banks are better able to monitor a borrower's financial condition. Commercial paper is simply an IOU, a corporation's promise to pay. The purchaser of commercial paper has no way of monitoring the borrower's condition, and the commercial paper dealer bears no responsibility for the borrower's creditworthiness. Instead, commercial paper purchasers rely on the securities rating agencies, such as Moody and Standard and Poor, to determine and monitor the quality of the credit. As the loan sales market is now structured, banks sell loans of their regular customers, firms with a creditworthiness that the bank has been regularly monitoring. In effect, the bank serves as a rating agency for these firms. Although the bank does not share in the loss of a sold loan that turns sour, no bank can continue to prosper as a loan merchant if its reputation for controlling quality is suspect.

A second innovative aspect of loan sales is the option of having the bank continue servicing the loan. Since the bank has many other dealings with

its customers besides the loans it sells, the bank can probably service the loan and work out any problems at lower cost than any other firm. With commercial paper, the purchaser of the paper bears responsibility for collecting the funds due.

A third innovative aspect of loan sales relative to commercial paper is the flexibility of the terms of a bank loan. As commercial paper is simply an IOU, it is not designed to cover complicated contingencies, which is one reason that only highly rated, nationally known firms are able to issue commercial paper. But a bank loan is often tailored to take account of the borrower's particular circumstances. Specific performance and oversight clauses can be incorporated in the loan contract. This flexibility again reflects the commercial bank's intimate knowledge of its customers and its ability to guide their behavior to reduce the likelihood of loan default.

In summary, it is clear that loan sales are the latest development in the evolution of the short-term credit market. The volume of loan sales has increased markedly in recent years. The concentration of these loan sales in large, money center banks is consistent with the idea that these loan sales are different from the familiar loan participations of the past. Finally, the innovative aspects of loan sales set them apart from both commercial paper and traditional short-term business lending and suggest that loan sales will continue to be important in the short-term credit market.

### **The effect of loan sales on the safety and soundness of banks**

The rise in loan sales and the prospect that their prominence will continue have raised a host of concerns among regulators and policymakers about the effects of loan sales on the safety and soundness of banks. Some are concerned that banks are weakening their loan portfolios by selling the highest quality loans, while others are concerned that banks are bearing entirely new risks

associated with selling loans as opposed to holding loans—the risks of underwriting. This section examines these issues and argues that, on balance, loan sales do not appear to decrease the safety and soundness of banks.

Some observers have expressed the concern that by selling the least risky loans from their portfolio, banks are weakening their loan portfolios and increasing their riskiness.<sup>15</sup> However sales of existing loans are only a small fraction of all sales of short-term C&I loans—most of the sold loans are loans that are sold immediately after they are made.<sup>16</sup> As a result, loan sales have little effect on bank loan portfolios—the loans that are sold were never in bank loan portfolios in the first place.

Why does a bank make loans only to sell them, especially when the borrowers are often the highest rated nonfinancial corporations? The reason is that the bank cannot afford to hold these loans. A bank has to pay deposit insurance premiums on and provide reserves for the liabilities used in funding loans. The bank also has to hold capital against the loan. For these reasons, bank-funded loans are more expensive for highly rated borrowers than commercial paper. Only if the bank sells the loan can the bank offer its best customers loans at competitive rates. However, by making and then selling such a loan, the bank maintains its relationship with a highly rated customer and, thereby, paves the way for selling

this customer other bank services. In other words, a bank may have to sell its best loans to keep its best customers.<sup>17</sup>

Other observers are concerned that banks are bearing underwriting risk, and thus impairing bank safety, when they make loans only to sell them. The risk associated with underwriting a security is that the price of the security will fall between the time the underwriter buys the security and sells it. Although bank loans are not legally securities, there is no significant economic difference between the underwriting of commercial paper securities by investment banks and the sale of short-term C&I loans by commercial banks. This concern over loan sales, therefore, arises from the belief that underwriting activities are riskier than commercial banking activities and the recognition that selling whole, short-term bank loans is essentially the same as underwriting other kinds of short-term business debt.

Actually, combining underwriting-like activities, such as loan sales, with traditional commercial banking is likely to reduce, rather than increase, the risks of commercial banking. It is not at all clear that this kind of underwriting is riskier than traditional commercial banking activities. If a bank makes a loan and holds it in its portfolio, the bank bears default, interest rate, and liquidity risk. But if the bank sells the loan, it only bears underwriting risk while the purchaser bears the risks associated with traditional commercial bank lending. In the case of bank loan sales, however, underwriting risks are minimized because commercial banks need not make a loan until a buyer has been found. For the short-term credits considered here, this practice is common. To argue

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<sup>15</sup> Although the loans sold in whole loan sales are usually high-quality loans, this is not always the case. Latin American loans have been sold, as have charged-off loans, and several investment banks are working to securitize nonperforming and underperforming domestic and international loans.

<sup>16</sup> In fact, banks reduce their riskiness by selling loans from their portfolios, even when they sell their best loans. As an example, consider the case of a bank that sells the loan that is least likely to default. The riskiness of the remaining loan portfolio has increased, but the riskiness of the bank as a whole has decreased because the bank has traded a risky asset for riskless cash.

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<sup>17</sup> It could be argued that bank loan sales may increase default risk because banks that sell loans have less incentive to monitor the creditworthiness of the borrower. But, if a bank wants to pursue loan sales as a regular line of business, it will try to build a reputation for effectively monitoring the condition of borrowers.

that loan sales increase bank riskiness, therefore, requires showing that this small underwriting risk is greater than the combined default, interest rate, and liquidity risk the bank would bear if it held the loan.<sup>18</sup>

Even if underwriting is riskier than commercial banking, a commercial bank might reduce its overall riskiness by diversifying into some underwriting activities. By virtue of its diversified portfolio, a bank that makes loans to a wide variety of firms and individuals is safer than a bank that makes loans to only a single class of borrowers, no matter how creditworthy. In the same way, a bank that both makes loans and underwrites securities might be safer than a bank that engages in only one or the other activity. To the extent banks can reduce their overall riskiness by engag-

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<sup>18</sup> A precise calculation of the change in bank riskiness would also take account of the correlation between underwriting risk and lending risk.

ing in such underwriting activities as selling loans, loan sales may increase the safety and soundness of the banks.

## **Conclusion**

The increase in sales of whole short-term loans by commercial banks in the 1980s reflects banks' response to the competitive pressure of the commercial paper market, to the steady decline in the profitability of traditional lending, and to an increased demand for the debt of highly rated firms. Viewed in the perspective of the continuing development of the short-term business credit market, loan sales appear to be a natural extension of commercial banks' role as financial intermediaries. Moreover, loan sales do not appear to reduce the safety and soundness of banks. To the extent that loan sales combine the desirable aspects of traditional loans and of commercial paper, loan sales can improve efficiency and lower costs in the short-term credit market.

# Dollar Depreciation and Inflation

*By George A. Kahn*

Recent declines in the foreign exchange value of the dollar have created fears of renewed inflation. One reason for concern is the possibility that the falling dollar may indicate an underlying macroeconomic policy that is inflationary. For example, the falling dollar could signal an overly stimulative monetary policy that would result in higher future inflation. Another reason for concern is that the fall in the dollar might in itself put upward pressure on prices. In this case, a falling dollar would tend to raise prices, regardless of the stance of macroeconomic policy.

Apart from its role as an indicator of macroeconomic policy, what does the falling dollar itself imply about inflation? A lower dollar has direct and indirect effects on inflation. As a lower dollar forces up the price of imports, it directly raises the prices American consumers pay. As domestic producers raise their prices in line with the price

of competing imports and imported inputs, a lower dollar indirectly raises the price of domestically produced goods. Thus, the concern that a lower dollar will result in higher overall prices is not misplaced. It is practically a foregone conclusion. The relevant issue, therefore, is not whether a lower dollar will increase inflation, but whether the increase will be small or large, temporary or permanent.

Disregarding the dollar's potential role as a signal of macroeconomic policy, this article examines the causal relationship between the foreign exchange value of the dollar and the U.S. rate of inflation. It argues that changes in the value of the dollar have a relatively minor effect on domestic inflation and that this effect is temporary. The first section reviews the recent behavior of inflation and the U.S. dollar. The second section describes how the foreign exchange value of the dollar influences the inflation rate. And the third section presents evidence on the inflationary consequences of a decline in the value of the U.S. dollar. It shows that the 40 percent decline in the dollar since 1985 will eventually raise the level

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of consumer prices by about 14 percent. But because the rise will occur over a period of five or more years, inflation will increase by only a small amount.

### **The dollar and inflation: recent experience**

The value of the U.S. dollar has fluctuated widely since the advent of floating exchange rates in 1973. Along with these fluctuations in the dollar, U.S. inflation has been volatile. Between 1970 and 1980, the dollar was generally depreciating while inflation was generally rising. Between 1980 and 1985, the dollar was generally appreciating while the rate of inflation was falling. And since 1986, the dollar has again generally fallen, while inflation has increased. Putting these observations together, it is tempting to conclude that changes in the value of the dollar cause changes in inflation—or that changes in inflation cause changes in the dollar. However, this conclusion is unjustified because other factors have influenced both inflation and the dollar during this period.

In the 1970s, for example, the two main episodes of rising inflation also coincided with two sharp increases in oil prices engineered by the Organization of Petroleum Exporting Countries (OPEC). The first oil price shock saw the price of oil more than triple after the outbreak of the Arab-Israeli war in October 1973. The rate of inflation as measured by the consumer price index (CPI) rose from 3.3 percent in 1972 to 11.0 percent in 1974. The second oil price rise came in 1979. That time, the price of Saudi Arabian crude oil more than doubled, and inflation rose from 7.7 percent in 1978 to 13.5 percent in 1980.<sup>1</sup>

<sup>1</sup> The implicit GNP price deflator, a broader price index for nonimported goods and services, shows much smaller increases in inflation over this period.

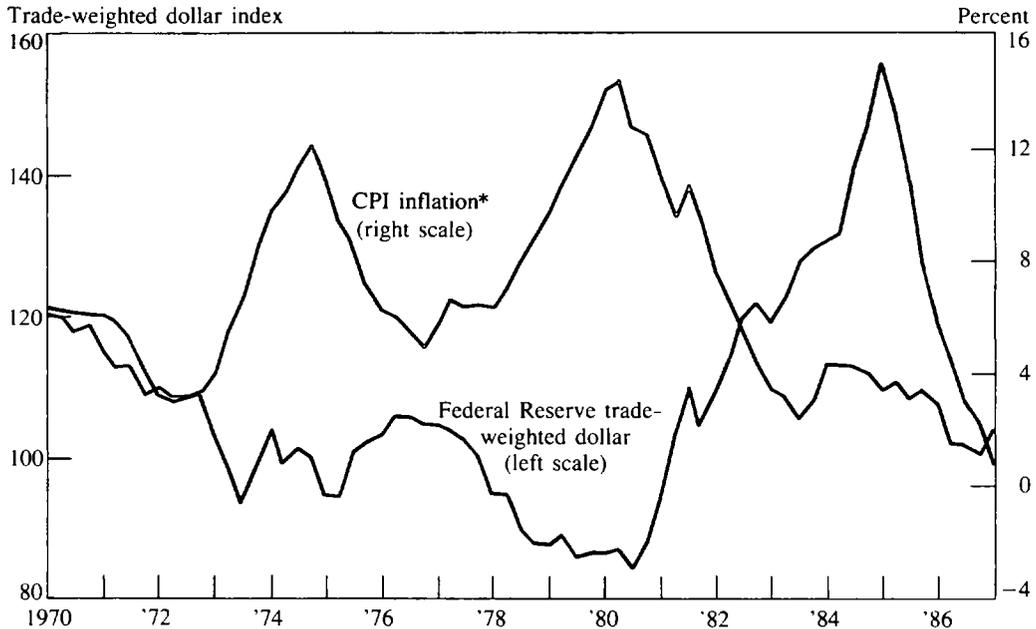
Meanwhile, the value of the dollar fell, especially after 1978, as U.S. inflation rose relative to inflation in other major countries.

In the 1980s, macroeconomic policy has influenced inflation, not only through changes in the value of the dollar but also through other channels. From 1980 to 1983, for example, inflation in the United States fell 10.3 percentage points. This decline in inflation coincided not only with a rise in the value of the dollar but also with the Federal Reserve's adoption of a strong anti-inflationary monetary policy. Associated with this policy, however, was a large increase in unemployment. Economic slack, an appreciating dollar, and tight monetary policy, all combined to contribute to declining inflation. More recently, falling unemployment, rising interest rates, and rising energy prices have combined, along with a depreciating dollar, to raise concern over the prospect for higher inflation.

Despite the variety of potential influences on inflation besides the value of the dollar, an inverse relationship between inflation and movements in the dollar is apparent. Chart 1 shows this relationship. In the chart, the left-hand scale measures the value of the dollar as determined by the Federal Reserve's trade-weighted dollar index, while the right-hand scale measures the rate of inflation as determined by the CPI. Although there are other measures of the dollar and inflation, these two indexes provide a typical picture of the dollar-inflation relationship.<sup>2</sup>

<sup>2</sup> The Federal Reserve's trade-weighted index gives the value of the dollar against a weighted average of ten leading currencies, with multilateral trade weights based on the relative importance of these currencies in total world trade. Because this index gives great weight to western European currencies and less weight to the currencies of Canada and the newly industrializing countries, it may provide a somewhat biased view of dollar fluctuations. However, other indexes constructed to correct this potential bias do not exhibit fundamentally different behavior. For a description and comparison of alternative exchange rate indexes, see Jack L. Harvey and William A. Strauss, "The New Dollar Indexes

**CHART 1**  
**Inflation and value of the dollar**



\*Four-quarter rates of change.

Chart 1 shows that periods of dollar depreciation are associated with periods of increasing inflation and that periods of dollar appreciation are associated with periods of declining inflation. The depreciation of the dollar from 1971 to 1973 was followed by rising inflation from 1972 to

1975. Similarly, the depreciation of the dollar from 1977 to 1980 was followed by rising inflation from 1978 to 1980. In contrast, periods of dollar appreciation are associated with moderating inflation. The best example of the association of falling inflation and a rising dollar occurs between 1980 and 1984, when the dollar rose 58 percent and inflation fell 66 percent.

Are No Different from the Old Ones," *Economic Perspectives*, Federal Reserve Bank of Chicago, July/August 1987, pp. 3-22.

Just as there are many dollar indexes, so are there many inflation indexes. Chart 1 depicts consumer price inflation because it is the most familiar inflation index and the general index most likely to reflect changes in the value of the dollar. The effect of the dollar on the CPI will be felt directly through the price of imported consumer goods and indirectly through the prices of domestic consumer goods that are sensitive to the value of the dollar. The other well-known price index—the implicit GNP deflator—is likely to be less sensitive to changes in the value of the dollar because it measures only the prices of U.S.-produced goods and services. Only through indirect avenues do changes in the dollar affect the GNP deflator.

Although Chart 1 provides compelling evidence of a strong association between the dollar and inflation, anecdotal evidence suggests other factors may be at work moving both variables. Economic theory provides a framework for analyzing the causal relationship between the dollar and inflation and for addressing the following questions. When do changes in the dollar lead to changes in inflation? Under what circumstances is the apparent inverse relationship between the dollar and inflation merely the result of the

influence of other factors? Do changes in the value of the dollar lead to permanent or temporary changes in inflation? The next section provides a theoretical framework for analyzing these issues.

### The relationship between the dollar and inflation

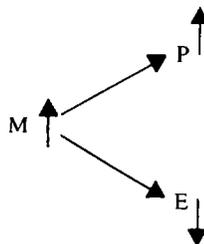
While this article focuses on the effects of changes in the value of the dollar on inflation, it is impossible to examine these effects in isolation from other economic relationships. Many factors influence both the value of the dollar and inflation. To the extent that these other factors cause the dollar and inflation to move in opposite directions, the apparent relationship between the dollar and inflation may be spurious. For example, the effect of the dollar on inflation may be much less important than the independent effect of other factors on each variable. This section first identifies factors that affect both the exchange value of the dollar and inflation. It then provides a framework for analyzing the effect of a change in the dollar on inflation, holding these other factors constant. The purpose, of course, is to identify the independent effect of exchange rate movements on inflation.

#### *Factors that influence both inflation and the dollar*

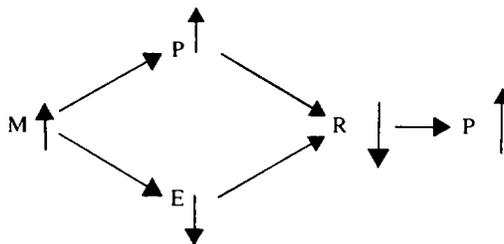
Exchange rate movements reflect, as well as affect, economic conditions. Care must be taken, therefore, in attributing economic developments to exchange rates without first examining the causes of exchange rate fluctuations. A variety of factors, including monetary and fiscal policy, affect the price level and the value of the dollar. To the extent that these factors move the dollar and prices in opposite directions, the independent effect of the dollar on prices will be obscured and difficult to detect. If, for example, these other factors cause the dollar to fall and prices to rise by the same

**FIGURE 1**  
**Effect of a third variable on the dollar and prices**

A. Increase in P equals the decrease in E



B. Initial increase in P is less than the decrease in E



amount, there will be no tendency for prices to rise further and no independent effect of the dollar on prices. This is because *real exchange rates*—market exchange rates adjusted for differences in domestic versus foreign price levels—have not changed. Only to the extent that other factors affect real exchange rates will there be an independent effect of exchange rate movements on prices.

Figure 1 shows how the observed relationship between exchange rates and the price level may result, at least partially, from the influence of a third variable. As shown in the top panel of Figure 1, an increase in a third variable, such as the money supply, M, may cause prices, P, to rise. At the same time, the increase in M may also cause the exchange value of the dollar, E, to fall. If the fall in the exchange rate just offsets the rise in the domestic price level, there is no further tendency for prices to rise. Prices and the exchange rate are causally unrelated, even though they

moved in opposite directions. But, as shown in the lower panel of Figure 1, if the exchange rate falls by more than prices rise, the real exchange rate,  $R$ , falls, and prices tend to rise further. In this case, the exchange rate exerts an influence on prices, independent of the effect of the third variable. In other words, the decline in the real exchange rate independently causes an increase in prices.<sup>3</sup>

Two examples of “third variables” that affect the dollar and inflation are money growth and changes in the federal budget deficit.<sup>4</sup> An increase in U.S. money supply growth, such as that of the late 1970s, lowers U.S. interest rates relative to foreign interest rates. As a result, foreign assets become relatively more attractive to investors than dollar-denominated assets. As the worldwide demand for dollar assets falls, an excess supply of U.S. dollars is created, and the value of the dollar depreciates in world currency markets. At the same time, faster money growth stimulates aggregate demand in the United States—because lower interest rates stimulate interest-sensitive spending—and upward pressure is exerted on U.S. prices. Thus, an expansionary monetary policy, such as that in the United States in the late 1970s, leads to declines in the dollar and higher inflation. Although a falling dollar may signal expansionary monetary policy and, therefore, the possibility of higher inflation, the falling dollar does not necessarily cause inflation.

<sup>3</sup> For example, if a 10 percent increase in  $M$  causes a 10 percent increase in  $P$  and a 10 percent decrease in  $E$  (and foreign prices are held constant), real exchange rates will not change, and there will be no independent effect of exchange rates on prices. If, on the other hand, a 10 percent increase in  $M$  causes a 5 percent increase in  $P$  and a 10 percent decrease in  $E$  (and foreign prices are held constant), real exchange rates will decline by 5 percent and exert independent upward pressure on prices.

<sup>4</sup> For a detailed analysis of the effects of fiscal and monetary policy in an open economy, see George A. Kahn, “International Policy Coordination in an Interdependent World,” *Economic Review*, Federal Reserve Bank of Kansas City, March 1987, pp. 14-32.

Not all third variables that affect both the value of the dollar and the inflation rate cause the dollar and inflation to move in opposite directions. For this reason, the historical inverse relationship between the dollar and inflation may not always hold. An example of a third factor that moves the dollar and inflation in the same direction is a fiscal expansion. When the budget deficit increases, domestic interest rates rise relative to foreign interest rates. As dollar assets become relatively more attractive to investors than foreign assets, the demand for U.S. dollars rises, causing the dollar to appreciate. At the same time, however, the increase in the budget deficit stimulates aggregate demand in the United States, exerting upward pressure on U.S. prices. Thus, an expansionary fiscal policy leads to increases in both the dollar and inflation.

To the extent that monetary and fiscal policies cause real exchange rates to change, there will be a tendency for prices to respond differently than they otherwise would. With both monetary and fiscal expansion, prices tend to rise. Even though changes in the value of the dollar are not the primary cause of the increase in prices, the dollar may have an independent effect on the price level. Because prices may not fully and immediately respond to policy changes, the real exchange rate may change. Changes in the value of the real exchange rate may lead, in turn, to independent, though perhaps small, changes in the overall price level. In the case of monetary expansion, the real exchange rate may fall, reinforcing the tendency for prices to rise. In the case of fiscal expansion, the real exchange rate may rise and partially offset the tendency for prices to increase. In any event, changes in the exchange rate have an independent effect on the price level only to the extent that they reflect real, as opposed to purely nominal, exchange rate movements.

Aside from macroeconomic policy changes, what causes the real exchange rate to fluctuate? Changes in the real exchange rate, other than those

resulting from monetary and fiscal policy, are caused by movements in relative prices or, more fundamentally, by changes in tastes and technology.<sup>5</sup> For example, changes in the domestic costs of production relative to foreign costs of production lead to changes in the real exchange rate. Likewise, changes in consumers' tastes for domestic products relative to foreign products lead to changes in the real exchange rate. Such fundamental changes affect the price of domestic goods relative to the price of foreign goods. Real exchange rate shocks thus cause real adjustments to take place and cause the level of prices to change. The next section describes how changes in the real exchange rate lead to changes in the aggregate price level.

### *Effects of the dollar on inflation*

Changes in the real exchange value of the dollar affect prices both directly and indirectly. By altering the prices American consumers pay for imported goods and services, a change in the real exchange value of the dollar has a direct effect on the U.S. price level. A decline in the value of the dollar, for example, causes the price of imports to rise, directly increasing the overall level of prices paid for goods and services.<sup>6</sup> A change in the real value of the dollar also has indirect effects on prices. As the dollar falls and import prices rise, domestic producers of import-competing goods can raise prices to increase profit margins. Alternatively, if domestic producers

require foreign inputs to production, costs may rise. Thus, domestic prices also may rise in response to a decline in the dollar and an associated increase in the cost of production. The exact nature of these aggregate price increases are best understood in the context of an economic model.

*Analytical framework.* An aggregate supply and demand model can be used to determine the effects of a change in the exchange rate on the aggregate price level, inflation, and output. In such a model, the economy is divided into a demand side and a supply side. The demand side represents spending on U.S.-produced goods and services by consumers, firms, and the government. The supply side represents the production of goods and services by firms using labor and other inputs. Changes in the real foreign exchange value of the dollar affect both demand and supply. How they affect demand and supply determines the response of the overall price level and output to fluctuations in the value of the dollar.<sup>7</sup>

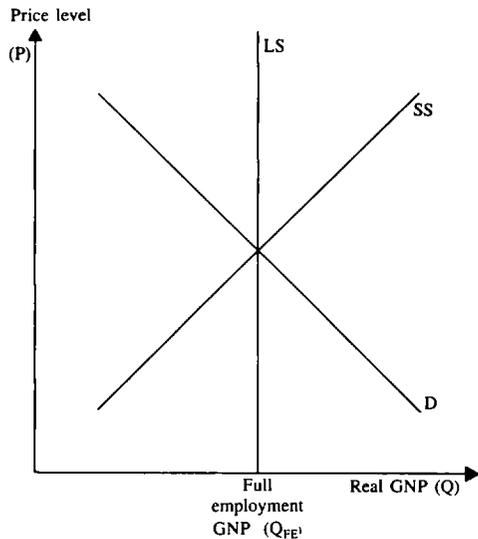
Figure 2 shows a typical demand and supply diagram. The price level is on the vertical axis, and real GNP is on the horizontal axis. The demand curve, D, summarizes the demand side of the economy. It slopes downward because a higher price level, other things equal, requires a higher interest rate to keep the demand for money in line with the given supply of money. The higher interest rate, in turn, causes interest-sensitive spending and real output to decline. Furthermore, higher interest rates cause the dollar

<sup>5</sup> An example of a relative price change is an increase in oil prices. An oil price increase might cause the real exchange rate of an oil-importing country to depreciate and ultimately cause its price level to rise.

<sup>6</sup> A decline in the dollar also causes the price of exports to fall. This fall leads to an increase in the demand for U.S.-produced goods and services and, possibly, to an increase in the aggregate price level.

<sup>7</sup> The framework used here is standard. It assumes that, in the short run, prices adjust gradually to changes in nominal aggregate demand. As a result, nominal shocks to demand temporarily affect aggregate output and employment. Other assumptions about price behavior may, however, lead to different conclusions. For a discussion of alternative models of aggregate supply and the determination of the economy's price level, see George A. Kahn, "Theories of Price Determination," *Economic Review*, Federal Reserve Bank of Kansas City, April 1984, pp. 16-27.

**FIGURE 2**  
**Aggregate supply and demand**



to appreciate. The resulting decline in net exports reinforces the tendency for output to fall. Thus, higher prices are associated with lower output.

The short-run aggregate supply curve, SS, summarizes the supply side of the economy. Along the short-run supply curve, nominal wages are held fixed. The short-run supply curve slopes upward because a higher price level, other things equal, lowers real wages. Lower real wages, in turn, induce firms to employ more labor and increase output. However, higher prices can generate greater output only in the short run. This is because workers eventually demand higher nominal wages to bring real wages back into line with desired levels. Thus, in the long run, aggregate supply is independent of the price level. The long-run aggregate supply curve, LS, is a vertical line drawn at the level of output associated with full employment.

*Dollar depreciation and demand-induced inflation.* Changes in the real value of the dollar affect the demand for U.S.-produced goods and serv-

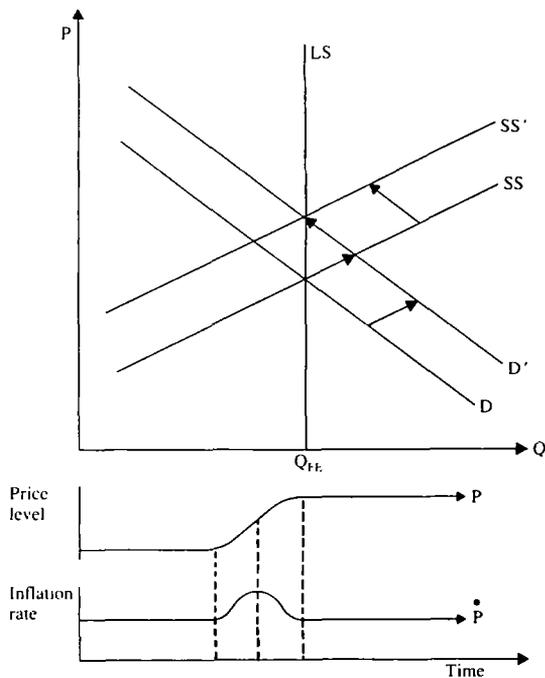
ices.<sup>8</sup> Suppose, for example, that the dollar depreciates. A depreciation in the value of the dollar causes the price of imports to rise and the price of exports to fall. As foreign and domestic consumers substitute less expensive U.S. goods for now more expensive foreign goods, aggregate demand for U.S.-produced goods and services increases. As shown in Figure 3, the aggregate demand curve shifts to the right from D to D'. Because nominal wages are fixed in the short run, real output and the aggregate price level both rise. Producers are willing to supply more output because real wages and, therefore, real labor costs have fallen.

But this is not the end of the story. Workers with fixed nominal wages are dissatisfied with the lower real wage that results when prices rise. As workers negotiate higher nominal wages to offset the higher price level, the cost of producing any particular level of output rises, and the short-run aggregate supply curve shifts upward. As a result, output falls. Eventually, the short-run aggregate supply curve shifts from SS to SS'. Real wages are bid back up to their initial level, and output falls back to its initial level. Thus, increases in aggregate demand generated by a dollar depreciation lead to a permanent increase in the price level but only a temporary increase in real output.<sup>9</sup> Similarly, an appreciation of the dollar causes a decline in aggregate demand, a permanent decline in the price level, and a temporary decline in real output.

<sup>8</sup> For the remainder of the article, all changes in the value of the dollar are assumed to be real. This assumption is fairly innocuous, in practice, since most exchange rate fluctuations have a large real component in the short run. That exchange rates are flexible (determined in spot markets) while national price levels are sticky (determined in "customer" markets) makes this result inevitable.

<sup>9</sup> A dollar depreciation would lead to a sustained period of higher inflation only if the Federal Reserve tried to maintain the higher level of output by increasing money growth.

**FIGURE 3**  
**Dollar depreciation**  
**and demand-induced inflation**



From the demand side, the inflationary consequences of a change in the value of the dollar are temporary. While the economy experiences a permanently higher price level after a depreciation of the dollar, inflation is only temporarily higher. Once the price level reaches its new equilibrium, the rate of inflation falls back to its previous level. The lower panel of Figure 3 shows these implied time paths for the level of prices,  $P$ , and the rate of inflation,  $\dot{P}$ .

*Dollar depreciation and supply-induced inflation.* Changes in the real value of the dollar also directly affect aggregate supply. Suppose again that the dollar depreciates and, therefore, import prices rise. Producers using imported inputs find that their costs have risen. To produce the same out-

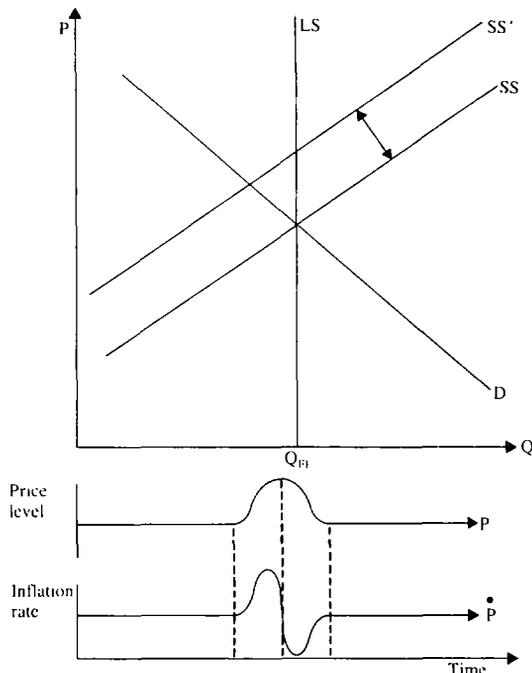
put as before, they must now charge a higher price to recover costs. In addition, producers manufacturing products that compete with foreign goods face less severe price competition. At every level of output, they may now be free to increase profit margins by raising product prices. For both reasons, suppliers produce less output at any given price level. As shown in Figure 4, the short-run aggregate supply curve shifts upward from  $SS$  to  $SS'$ . In contrast, an appreciation of the dollar lowers profit margins and the costs of imported inputs, thus causing producers to raise their output at any given price.

Given aggregate demand conditions, a decrease in aggregate supply caused by a lower dollar causes the price level to rise and output to fall. The higher price level implies that workers receive a lower real wage. But workers restrain their demands for higher nominal wages because output has fallen and unemployment has risen. Otherwise, unemployment would be exacerbated. In fact, for the economy to return to its initial level of employment, workers must lower their nominal wage demands and accept a permanent reduction in real wages.<sup>10</sup> As they do so, nominal wages fall enough to offset the increase in import prices so that production costs return to their original level. And as nominal wages fall, the short-run aggregate supply curve shifts back downward from  $SS'$  to  $SS$ . As a result, the long-run effect of a dollar depreciation is a temporary increase in the price level and a temporary decrease in real output.<sup>11</sup>

<sup>10</sup> For workers to maintain real wages in the face of higher prices, they must bid up the nominal wage. Such behavior, especially if ratified by more rapid money growth, could lead to a period of stagflation—rising unemployment along with rising inflation.

<sup>11</sup> If the decline in the dollar permanently reduces production possibilities, long-run aggregate supply will fall. A decline in the dollar will then lead to a permanent increase in the price level and a permanent reduction in real output. In this article, however, it is assumed that dollar fluctuations do not affect long-run production possibilities.

**FIGURE 4**  
**Dollar depreciation**  
**and supply-induced inflation**



Real wages, however, are permanently lower. Workers must accept a permanent decline in living standards.

As in the demand-side case, the inflation consequences of a dollar depreciation are temporary. However, the supply-side time paths of the price level and inflation are somewhat different. The price level rises temporarily, then falls back to its previous level. Inflation first rises, then falls below its initial rate, and finally returns to its initial rate. The lower panel of Figure 4 shows these time paths for the price level and the rate of inflation.

*Net effect of dollar depreciation on inflation.* A change in the foreign exchange value of the dollar can affect both demand and supply. The

net effect of a change in the value of the dollar, therefore, is the combination of its effects on demand and supply. Because both the demand and supply effects of a dollar depreciation raise the price level, the net effect of a decline in the dollar is clearly higher prices. As long as demand increases as a result of the dollar depreciation, the higher prices will be permanent. But any increase in inflation is temporary.

Short-run output effects are ambiguous. A decline in the value of the dollar temporarily increases output on the demand side and temporarily decreases output on the supply side. Thus, the net effect of a decline in the dollar on output cannot be determined purely by theory. Similarly, an appreciation of the dollar unambiguously lowers prices but has a theoretically ambiguous short-run effect on output.<sup>12</sup>

These results are subject to an important caveat. In assessing the effect of the dollar on inflation, the supply and demand analysis holds all other factors constant. In particular, a variety of other factors, including monetary and fiscal policy, affect aggregate supply and demand and, as previously shown, influence inflation and the value of the dollar. To unscramble the effect of the value of

<sup>12</sup> Attaining a new equilibrium, however, takes time. Price rises take time because domestic producers may have long-term contracts with foreign suppliers that fix input prices for the duration of the contract. And to gain market share, some domestic producers may only slowly raise prices in response to higher input and competing goods prices. Likewise, foreign producers may absorb losses for awhile in an attempt to preserve market share. While economic theory implies that a higher price level is the result of a lower dollar, it does not show how long it takes to fully adjust.

Similarly, adjustment in the labor market takes time. This is because workers are reluctant to accept lower wages. Economic slack in the form of unemployment may only gradually persuade workers to moderate wage demands. Furthermore, some workers may have long-term wage contracts that limit any short-run adjustment of wages. Ultimately, however, if the dollar has an adverse effect on aggregate supply, real wages must fall and standards of living must decline.

the dollar on inflation from the effect of other variables, it is necessary to hold other influences constant. To measure the effect of the dollar on inflation in isolation from other influences, it is necessary to estimate a model of inflation that explicitly controls for a variety of factors. The next section presents estimates from such a model.

### **Empirical evidence on the dollar-inflation relationship**

Economic theory provides a qualitative characterization of the dollar-inflation relationship. According to theory, a fall in the dollar temporarily raises inflation and permanently raises the average level of prices. Determining the size and timing of the effect, however, requires a statistical analysis. This section presents results from forecasts of an empirical model of the economy estimated with quarterly data from 1960:Q1 to 1987:Q1.<sup>13</sup> First, the model is briefly described. Then, conditional forecasts are presented and compared with results from other studies.

#### *Empirical framework*

To hold other factors constant, the estimated model must explain not only inflation but also other relevant variables. While it is impossible to control for all other factors, the model attempts to control for the most important. These factors include unemployment, real GNP growth, money growth, changes in energy prices, and changes in the value of the dollar. Each variable is explained by its own history and by historical values of all the other variables.<sup>14</sup> Each included

<sup>13</sup> The sample period includes data from the pre-1973 fixed exchange rate era to help determine relationships among the non-exchange rate variables included in the model.

<sup>14</sup> The exact form of the model is a six-variable vector autoregression (VAR) with ten lags on the value of the dollar and four lags

variable is designed to control for major factors, besides the value of the dollar, that affect aggregate supply or aggregate demand. For example, changes in money growth influence aggregate demand while changes in energy prices influence aggregate supply (in much the same way as changes in the value of the dollar). The other variables—unemployment and GNP growth—control for other cyclical factors.

The model is estimated using quarterly growth rates of the CPI to measure inflation. The Federal Reserve's trade-weighted dollar is used as the exchange rate. All variables are measured as deviations from their historic trends. When the past influence of relative energy prices, money growth, unemployment, real GNP growth, and inflation are held constant, changes in the value of the dollar have statistically significant effects on inflation.<sup>15</sup>

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on all other variables. Money growth is the quarterly rate of change of M1, and energy prices are the fixed-weight personal consumption expenditure index for energy relative to the index for all personal consumption expenditures. All variables are first regressed on a constant, a dummy variable set equal to one for the post-1972:Q4 period and zero otherwise, three quarterly seasonal dummies, and a time trend. Residuals from these regressions are used as the variables in the VAR. The model can be interpreted as a reduced-form version of the structural aggregate supply and demand model of the previous section.

To conserve degrees of freedom, only a relatively small number of variables is included. One potentially important omitted variable is fiscal policy. By including cyclical indicators such as real GNP growth, money growth, and unemployment, it is hoped that the influence of fiscal policy and other demand-shift variables is held constant. Because results from the empirical model are broadly consistent with results from a variety of other studies with a variety of specifications, it is doubtful that small changes of specification would dramatically change the results.

The lag length of four was chosen initially on the basis of a test suggested by Christopher Sims in "Macroeconomics and Reality," *Econometrica*, January 1980, pp. 1-48. Further experimentation quickly revealed, however, that four lags were inadequate to capture the inflation-exchange rate relationship. Thus, in the inflation equation, the lag length on exchange rate changes was increased to ten.

<sup>15</sup> When changes in the implicit GNP deflator are used to measure inflation, however, no statistically significant relationship can be found between inflation and the dollar, other things equal.

A decline in the value of the dollar, other things equal, has historically caused a small and temporary, but statistically significant, increase in CPI inflation.

### *Empirical relationship between inflation and the dollar*

To give an indication of the empirical relationship between inflation and the value of the dollar, the estimated model is used to forecast each variable under a set of constraints. Specifically, all variables are assumed to grow at their trend rate until, in the initial forecast period, the exchange value of the dollar is assumed to fall 10 percent. All other variables, particularly the inflation rate, are unchanged in the initial forecast period, and for that reason, the entire 10 percent drop in the exchange value of the dollar is assumed to be real. The cause of the decline in the dollar is not specified and could be attributed to any factor that affects the real value of the dollar. The model then traces out the independent effect of the dollar on inflation. Once the initial drop in the real exchange rate has occurred, all other variables in the model are allowed to react according to historical relationships. For example, unemployment is allowed to react to the change in the dollar so that the long-run adjustments described in the theoretical model can occur. Furthermore, money growth is not held fixed, but allowed to react to a lower dollar as it has in the past.<sup>16</sup>

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<sup>16</sup> Monetary policy is held fixed over the forecast horizon in the sense that money growth reacts to changes in the value of the dollar only as it has in the past. To the extent that the dollar has not been a target of monetary policy and that monetary policy has reacted passively to temporary, dollar-induced increases in inflation, the endogeneity of money in the presence of a change in the value of the dollar seems justified. During periods of money demand shocks, constant money growth would not be consistent with an unchanged monetary policy.

Two experiments are conducted. The first experiment assumes that after its initial decline, the value of the dollar remains permanently fixed at its new lower level. In this experiment, the dollar is treated as an exogenous variable that is unaffected over the forecast horizon by other variables in the model. While this assumption is somewhat unrealistic, it allows an examination of the effects of a once-and-for-all drop in the value of the dollar, ignoring feedback to the dollar from other variables. The assumed time path of the dollar might result if foreign central banks intervened in foreign exchange markets to lower the real value of the dollar in the initial period, then acted to maintain the lower nominal level of the dollar indefinitely into the future.

The second experiment allows the dollar to react, after its initial decline, to movements in other variables in the model. This experiment, therefore, allows feedback from inflation and other variables to the value of the dollar. Induced changes in the value of the dollar are then allowed to influence inflation and other variables. This assumed time path for the dollar might result if foreign central banks intervened in foreign exchange markets to lower the real value of the dollar in the initial period, then withdrew from the market and allowed the dollar to take its own course.<sup>17</sup>

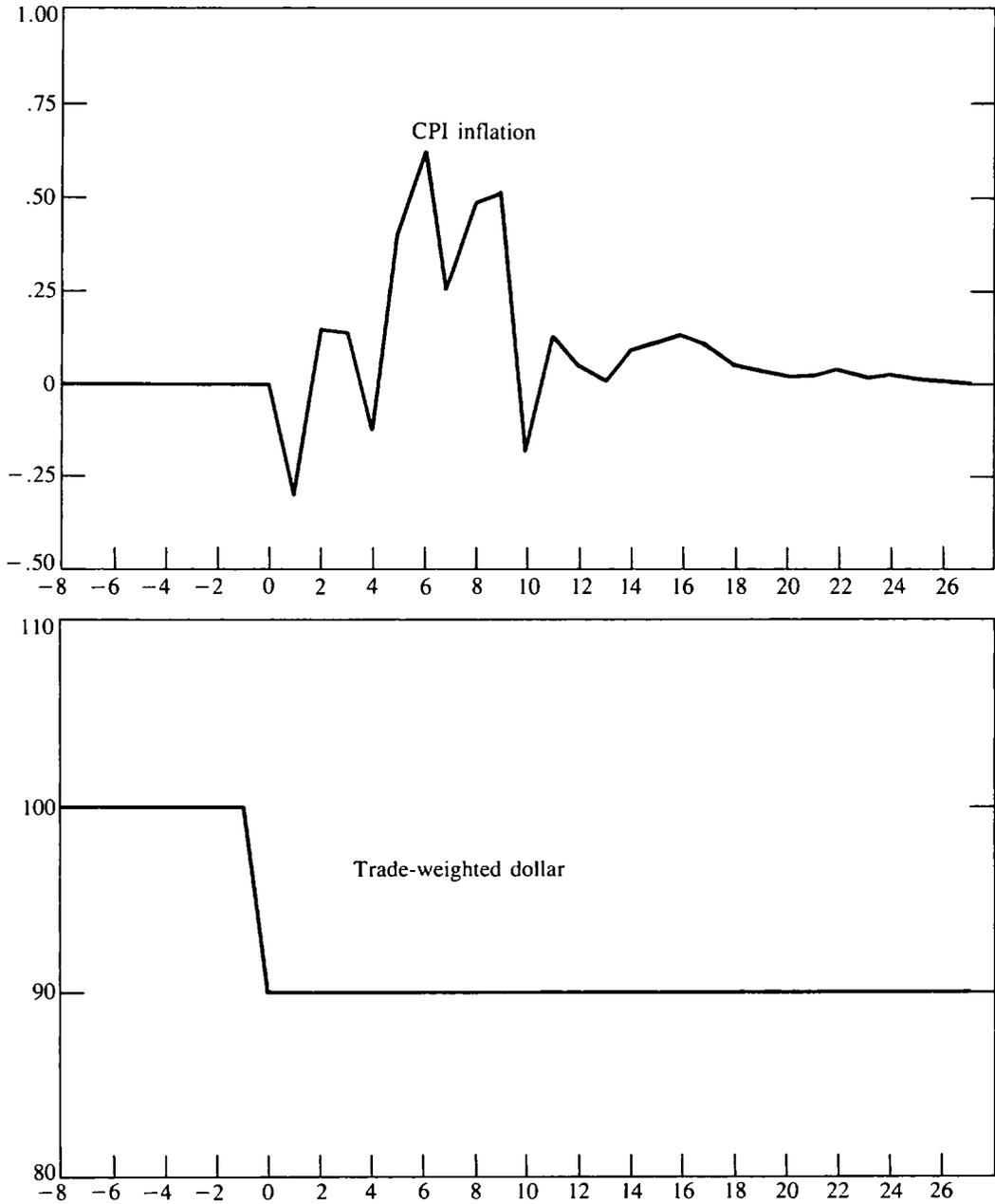
*Effects of a once-and-for-all decline in the dollar.* Chart 2 indicates that a once-and-for-all 10 percent decline in the dollar has historically led to an increase in inflation concentrated in the fifth to ninth quarters after the decline. The value of the dollar and inflation are measured as deviations from historic trends. Inflation peaks in the sixth quarter at 0.64 percentage points above

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<sup>17</sup> The forecasts are dynamic. In the first experiment, all right-hand side variables except the dollar are forecast. Over the forecast horizon, the dollar is made exogenous. In the second experiment, all variables are forecast, including the dollar.

CHART 2

Effect on inflation of a permanent drop in the dollar—without feedback



trend.<sup>18</sup> Inflation then begins to fall, returning to its trend rate of growth in about 14 quarters. Thus, the pattern of inflation depicted by the conditional forecast is consistent with theory. Inflation first rises, then falls back to its initial level. The size of the effect on inflation, however, is relatively small.

The effect of a decline in the dollar on the price level is given in Chart 3.<sup>19</sup> Here again, the forecast is consistent with theory. After an initial delay of about four quarters, the price level rises to a peak of about 103. Thus, the effect of a decline in the dollar on the price level is permanent, even though the effect on inflation is temporary. Because the price level is permanently higher, theory indicates that the decline in the dollar increased aggregate demand.<sup>20</sup>

*Effects of a decline in the dollar with feedback to the dollar.* When the dollar is treated as an endogenous variable—a variable that reacts to movements in other variables—the effect of a decline in the value of the dollar on inflation is more pronounced. Chart 4 shows that a 10 percent decline in the value of the dollar causes CPI inflation to increase to a peak of 0.84 percentage points above trend in the ninth quarter after the drop in the dollar. After about five years, however, inflation returns to its historic trend. The increase in inflation, which exceeds the increase from the previous experiment, is accompanied by an induced decline in the dollar of roughly 10 per-

cent.<sup>21</sup> This further decline in the dollar is temporary, lasting roughly 22 quarters. It is caused by feedback from the higher rate of inflation to the dollar, as well as by inertia in the behavior of the exchange rate itself. The further decline in the dollar exacerbates the increase in inflation.

The effect of a drop in the dollar on the price level, when the dollar is treated as an endogenous variable, is shown in Chart 5. After an initial delay of about four quarters, the price level rises from its initial level of 100 to a peak of almost 105. While the effect on inflation is temporary, the effect on the price level is permanent. Even though the price level falls off a bit from its peak, to about 104, prices remain permanently higher as a result of a fall in the dollar. Thus, each forecast, regardless of whether the dollar is assumed exogenous or endogenous, confirms theory. A decline in the value of the dollar leads to a permanently higher price level and a temporarily higher inflation rate. A 10 percent decline in the dollar leads to a 3 percent increase in the price level in the first experiment and a 4 percent increase in the price level in the second experiment. These results, as previously noted, assume that the Federal Reserve reacts to the falling dollar and its effects on inflation and output only as it has, on average, in the past.

Given the estimated effects of a hypothetical 10 percent decline in the dollar, the permanent effect on the price level of the recent dollar decline can be roughly predicted. Since early 1985, the Federal Reserve's trade-weighted dollar has fallen approximately 40 percent in real terms. The effect of this decline on prices can be predicted by multiplying the estimated effect of a 10 percent

<sup>18</sup> The initial decline in the inflation rate below trend should not be taken too seriously. It might simply be a statistical aberration.

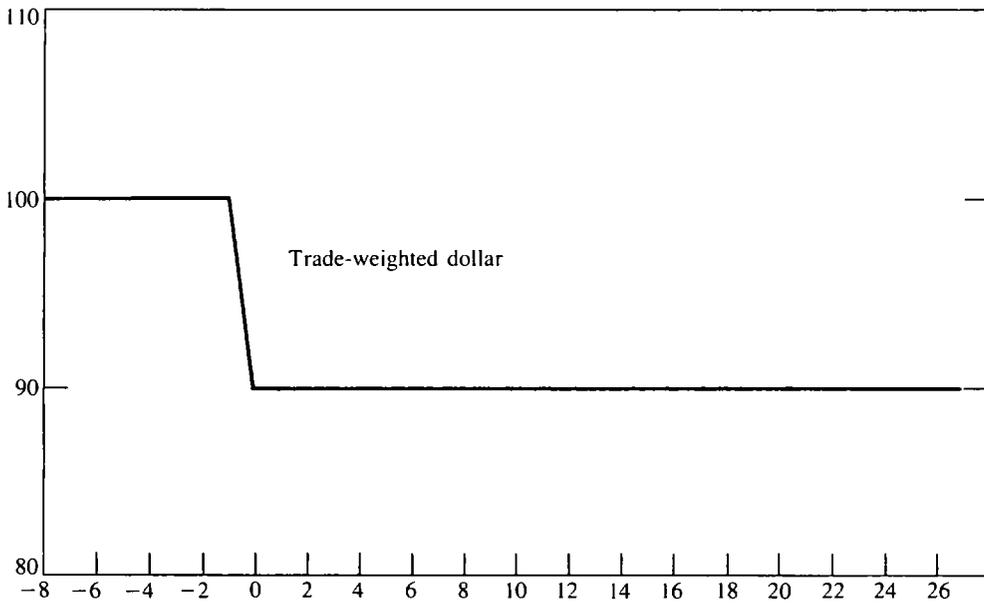
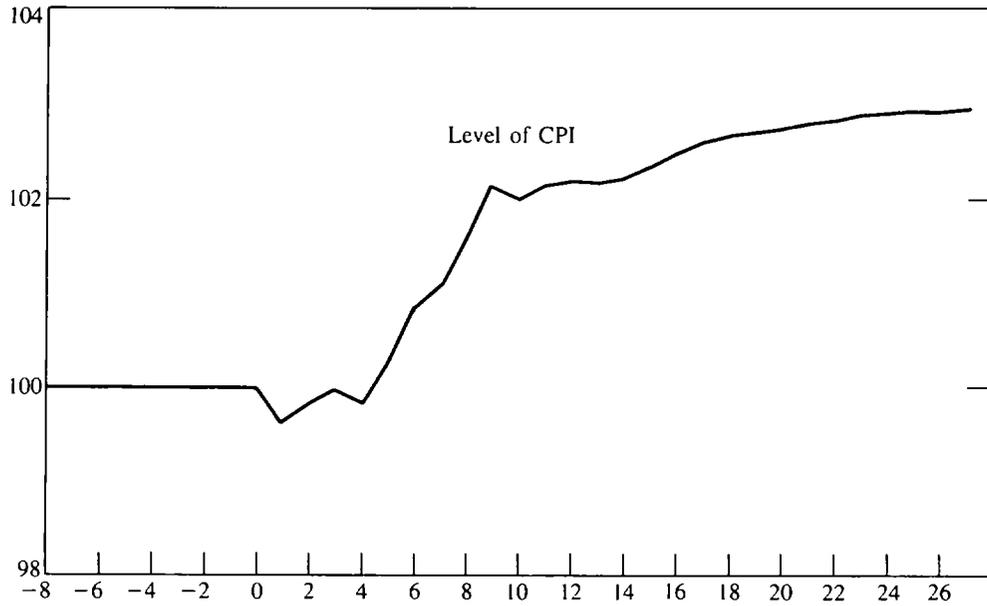
<sup>19</sup> The effect of the dollar on the price level is determined by cumulating the inflation effects, starting with an initial price level of 100.

<sup>20</sup> Any supply effects would have left the price level unchanged in the long run, assuming that long-run production possibilities are unaffected. Therefore, on the basis of the price level alone, it is impossible to determine to what extent aggregate supply was affected.

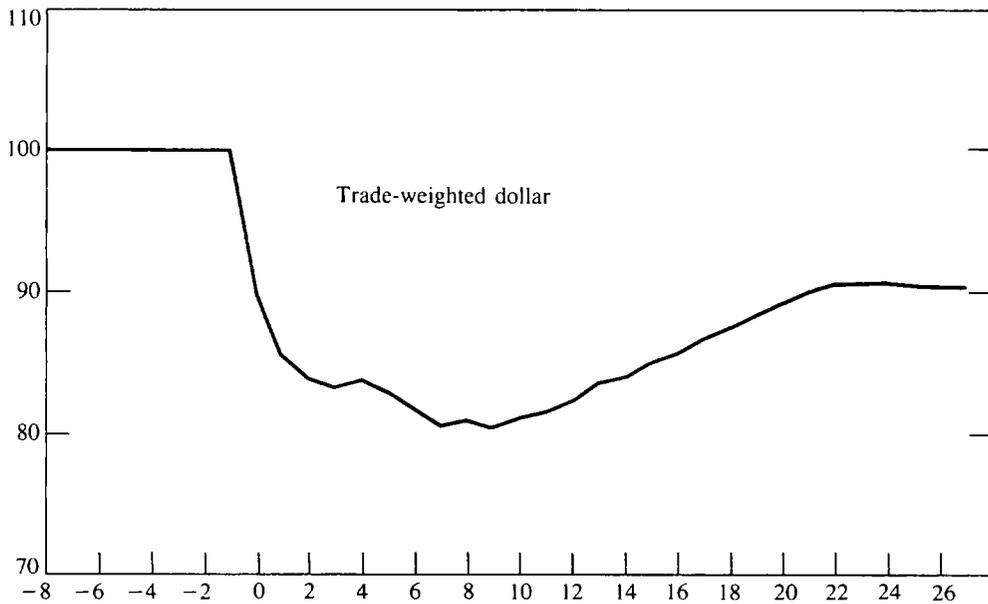
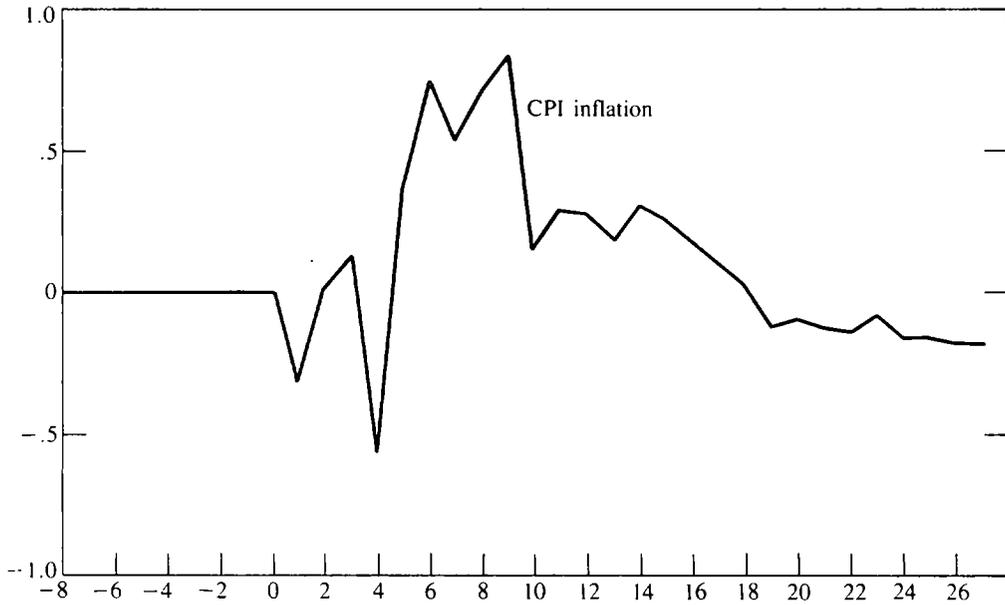
<sup>21</sup> Part of the recent decline in the dollar might have been induced. Thus, this result does not necessarily imply that the dollar will continue to fall.

**CHART 3**

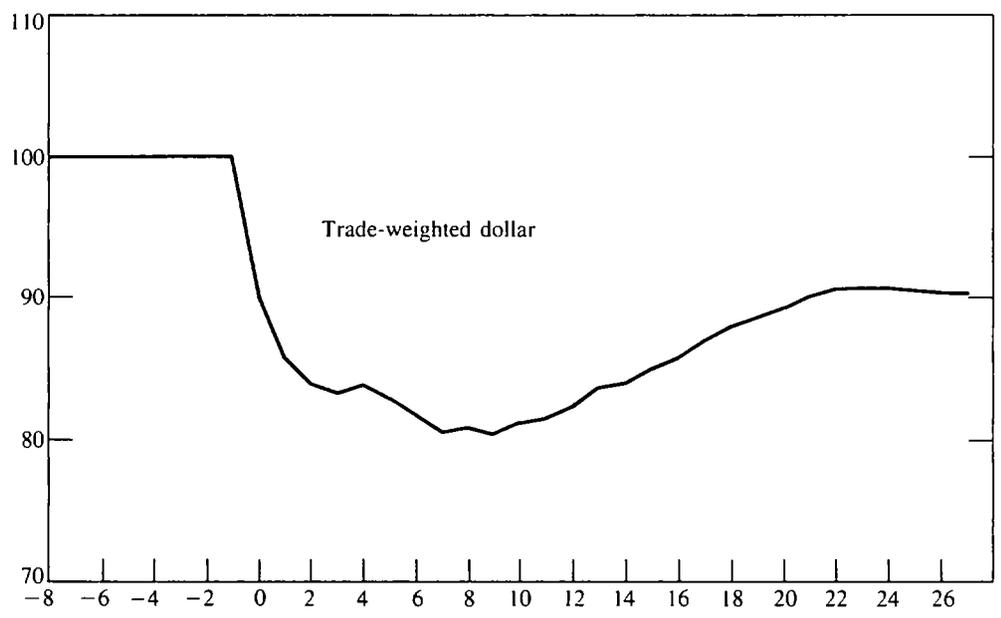
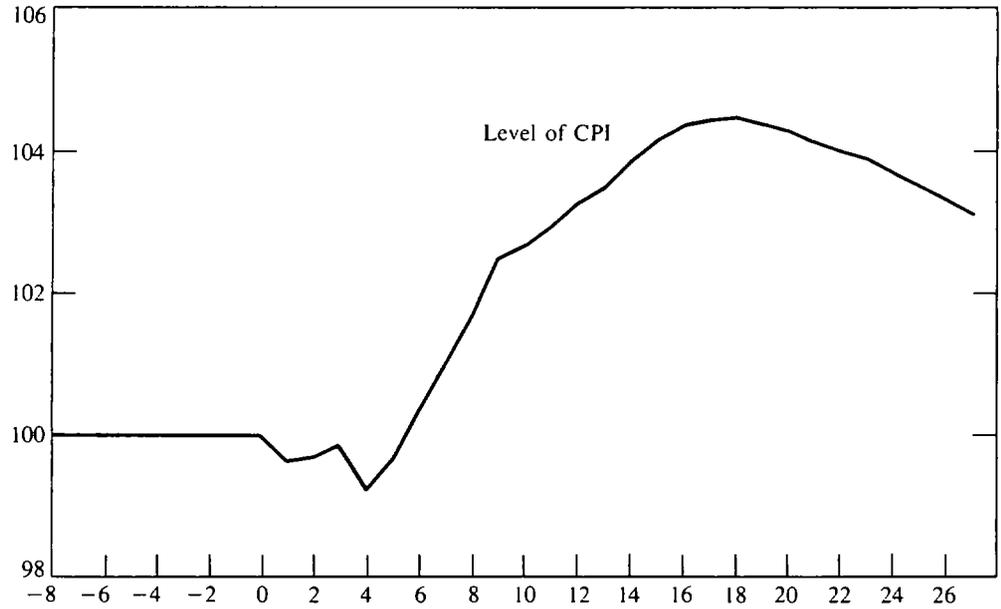
**Effect on the price level of a permanent drop in the dollar—without feedback**



**CHART 4**  
**Effect on inflation of a drop in the dollar—with feedback**



**CHART 5**  
**Effect on the price level of a drop in the dollar—with feedback**



decline in the dollar by four.<sup>22</sup> Thus, if all other factors are held constant, the recent 40 percent decline in the dollar will eventually cause the price level to rise by about 12 to 16 percent. If the dollar now stays around current levels, estimates from the first experiment will more closely apply, and prices will likely rise by an amount closer to 12 percent. If, on the other hand, the dollar falls further, perhaps in response to its own inertia and feedback from other variables, the second experiment will more closely apply, and prices will rise by an amount closer to 16 percent.<sup>23</sup> In either case, the increase in prices will take many years and, therefore, the effect on inflation will be relatively small. Inflation will temporarily increase by, at most, three to four percentage points.

Given the estimated lag structure, which suggests that a fall in the dollar begins to increase prices after four quarters, the decline in the dollar since early 1985 should by now be raising the level of consumer prices in the United States. However,

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<sup>22</sup> One important difference between the experiments and recent history is that, while the experiments assume the decline in the dollar occurs over one quarter, the historical decline in the dollar occurred over many quarters. Thus, it may take longer than the experiments predict for the actual dollar depreciation to raise prices to their new equilibrium level. The actual increase in inflation may be less, but also may persist longer, than predicted by the experiments. Another potential problem with the experiments is that the recent decline in the dollar falls outside the bounds of historical experience. Thus, using historical relationships as a basis for prediction may be risky. Nevertheless, in obtaining quantitative estimates, the only way to proceed is to assume history is a reliable guide to the future.

<sup>23</sup> A difficulty in applying the second experiment to the current situation is knowing where to start or, in other words, knowing how much of the decline is exogenous and how much is induced. If, for example, recent dollar declines are the result of feedback from inflation and other variables to the dollar, rather than the result of an exogenous shock, the starting point for predicting the impact on inflation of the dollar decline may be at some interval after the initial forecast period. It would then be appropriate to multiply the implied effect on inflation by an amount less than four. Thus, at best, the second experiment provides an upper bound for the long-run effect of the recent dollar decline on the price level.

the recent fall in the dollar followed an unprecedented rise in the value of the dollar. Assuming the estimated lag structure applies to increases as well as decreases in the value of the dollar, the rise in the dollar in the early 1980s may still be having a moderating influence on consumer prices, although by now these influences should be dying out. As these influences die out and the effects of the recent declines in the dollar take hold, consumer prices may begin to register more pronounced increases, other things equal. As determined by the empirical model, however, these increases should remain moderate.

*Results from other studies.* The estimated effects of the dollar on inflation—both their size and their timing—are broadly consistent with estimates from other studies. These estimates of the cumulative impact of a 10 percent depreciation of the dollar on the level of consumer prices range roughly from zero to 1.5 percent after one year, with most studies estimating about a 0.5 percent increase. Estimates reported in this article for the first-year impact of a 10 percent depreciation fall toward the low end of the range of estimates from other studies.<sup>24</sup>

Estimates from other studies of the cumulative long-run rise in the level of the CPI vary much more widely. Roughly, the range is from zero to 5 percent. Studies estimating a relatively large cumulative long-run effect typically fail, however, to control for energy price changes, macroeconomic policy changes, and other third-variable effects. Thus, it is not surprising that, when these influences are held constant, a smaller long-run effect of the dollar is estimated. In the first

<sup>24</sup> For a review of the empirical literature on the dollar-inflation relationship, see Joseph A. Whitt, Jr., Paul D. Koch, and Jeffrey A. Rosensweig, "The Dollar and Prices: An Empirical Analysis," *Economic Review*, Federal Reserve Bank of Atlanta, October 1986, pp. 4-18.

experiment reported in this article, the effect of a once-and-for-all 10 percent decline in the dollar is a cumulative long-run increase in the level of the CPI of roughly 3 percent. For this experiment, therefore, estimated results fall in the middle of the range of estimates from other studies.

In the second experiment reported in this article, a 10 percent decline in the dollar initially leads to almost a 5 percent increase in the price level. However, because the dollar is treated endogenously, it also leads to a further, temporary decline in the dollar of roughly 10 percent. The permanent part of this decline in the dollar is 10 percent. It is associated with a permanent increase in the price level of 4 percent. Although the estimated long-run impact of a decline in the dollar in the second experiment is on the high side of the range of estimates from other studies, the impact is spread over many quarters. Thus, the effect on inflation in any particular quarter remains relatively small.

Although the results reported in Charts 2 to 5 are subject to estimation errors, their general consistency with the results of other studies lends a degree of confidence to the analysis. Further confidence results from the consistency of the empirical findings with the theoretical analysis. Although reported forecasts should not be interpreted as highly precise, they do provide a sound

characterization of the effect of dollar fluctuations on inflation.

## Conclusions

It is a foregone conclusion that recent declines in the foreign exchange value of the dollar will raise prices. If historical experience is an accurate guide to the future and if other influences on inflation are ignored, the 40 percent decline in the dollar since 1985—to the extent that it is real—will increase the level of consumer prices by about 12 to 16 percent over a period of five or more years. But because the impact on the price level is spread over so many years, the short-run inflation effect will be small. As long as the Federal Reserve does not permanently increase money growth in response to a lower dollar, the higher price level need not lead to a permanent increase in inflation. Thus, the impact on inflation of a lower dollar should be temporary. Both theory and evidence support this conclusion. While concern that a lower dollar will result in higher prices is not misplaced, it should not, in itself, lead to fear of a return to an inflationary era. While the falling dollar may be a signal of underlying inflationary policies, it does not in itself imply a future of permanently higher inflation.

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