

# Economic Review



FEDERAL RESERVE BANK OF KANSAS CITY

July/August 1987

Banking Performance  
In Tenth District States

Has the Dollar Fallen Enough?

Employment Indicators  
Of Economic Activity

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# Economic Review



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## Banking Performance In Tenth District States

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*By William R. Keeton and Katherine M. Hecht*

The average profitability of banks in Tenth District states fell in 1986, for the fifth consecutive year, reducing returns on both assets and equity to less than a third of their 1981 peaks. Asset growth remained sluggish, and more banks failed during the year than were opened. Despite the decline in overall performance, some banks continued to do well and agricultural banks showed signs of bringing their loan losses under control.

## Has the Dollar Fallen Enough?

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*By Craig S. Hakkio and Richard Roberts*

Some analysts say the U.S. dollar has fallen enough and that the U.S. trade deficit will eventually decline to an acceptable level. Empirical evidence shows, however, that the dollar will probably have to decline further to eliminate the trade deficit.

## Employment Indicators Of Economic Activity

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*By Glenn H. Miller, Jr.*

The two measures of employment—the household measure and the payroll measure—do not always move together. Analysis shows that the payroll measure is a better indicator of economic activity over the short term.



# Banking Performance In Tenth District States

*By William R. Keeton and Katherine M. Hecht*

The year 1986 provided little relief for commercial banks in Tenth District states. The number of banks declined for the second year in a row and growth at remaining banks was slowed by weak credit demand and cautious lending policies. Not only did loan losses continue to climb during the year, but interest income fell more than interest expense, reducing bank profitability to less than a third of the previous peak. Capital-asset ratios remained relatively high, but only because slow asset growth helped make up for the failure of banks to reinvest earnings and raise new equity.

The decline in district banking performance in 1986 was not uniform. Although fewer in number, some banks continued to do very well. And significantly, the two groups of banks suffering the greatest deterioration in performance in recent years gave conflicting signals as 1986 progressed. At banks in energy-producing states, the steep decline in oil prices early in the year contributed

to mounting delinquencies, higher loan writeoffs, and sharply reduced earnings. Earnings of district agricultural banks also fell to new lows in 1986. However, at these banks, the stabilization of loan losses and the easing of delinquencies after midyear provided some indication that a turnaround might be near.

This article examines district banking performance in 1986, focusing on both the decline in overall performance and the divergence in performance among banks. The article first reviews two key aspects of performance, growth and profitability. Next, the article discusses the impact of net interest income and loan losses on profitability. The article then turns to another aspect of performance, the adequacy of banks' capital. The article concludes with a brief analysis of performance in each of the Tenth District states—Colorado, Kansas, Missouri, Nebraska, New Mexico, Oklahoma, and Wyoming (Figure 1).

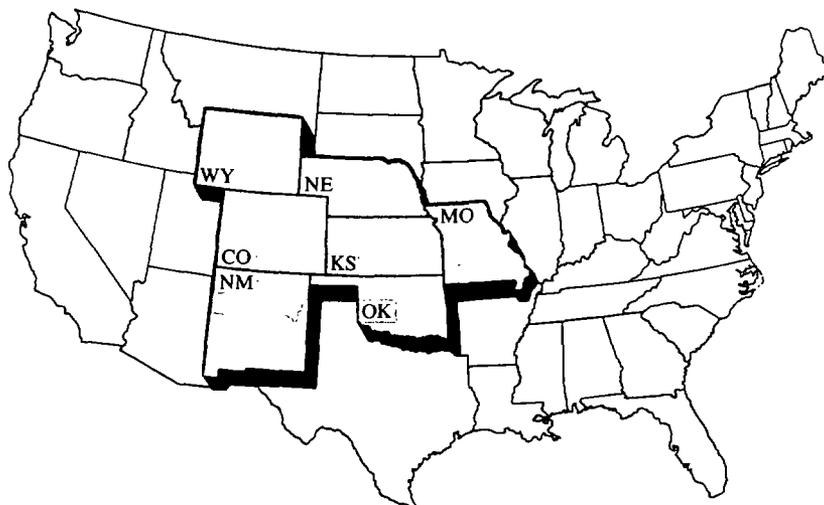
## **Growth**

One aspect of performance is growth, the increase in the amount of resources banks use and

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**FIGURE 1**  
**Tenth District states**



Shaded area is Tenth District

the amount of services they provide. In the past, the banking industry has grown in two ways—through increases in the number of banks and increases in the size of banks.

### *Changes in number*

Throughout the 1970s and early 1980s, the number of commercial banks in Tenth District states grew steadily, with bank openings exceeding bank closings. Over the last two years, the decline in the average profitability of district banks has helped reverse this trend, both by discouraging new bank formation and increasing the rate of bank failures.

The total number of commercial banks in Tenth District states declined in 1986 for the second year in a row. As shown in Table 1, only 18 new banks were started during the year, half as many as in

1985. Also, 69 banks failed or were closed voluntarily. Of the banks that failed, only 11 were succeeded by new banks formed to take over their deposits. The rest were either merged with existing banks or liquidated altogether. Finally, 76 open banks disappeared in 1986 through mergers with other banks. Although this number was even higher than in 1985, most of the mergers occurred in one state and most were with other banks in the same holding company. The net effect of the above changes was a reduction of 116 commercial banks in the district, almost twice the decline in 1985.

### *Changes in size*

At those banks that remained in business, the slowdown in growth that began in 1985 continued into 1986. Assets grew 3.8 percent over the

**TABLE 1**  
**Changes in number of insured commercial banks, Tenth District states\***

	<u>1984</u>	<u>1985</u>	<u>1986</u>
Banks established <i>de novo</i>	70	38	18
- Failed banks	23	63†	69‡
+ Banks established to succeed failed banks	16	22	11
- Open banks merged with other banks	32	56	76
= Net change in number of banks	+31	-59	-116

\*Excludes the change due to banks switching from uninsured to insured status. Seventeen banks made this switch in 1984, seventeen in 1985, and five in 1986.

†Includes one bank that closed voluntarily

‡Includes five banks that closed voluntarily and three banks that converted to savings banks

course of 1986 after increasing 4.8 percent in 1985. And loans increased a mere 2.1 percent during the year, down from 2.8 percent in 1985.

The slow overall growth in loans and assets last year masked significant differences among banks. Table 2 compares the growth in assets and loans at banks in three size categories and at agricultural and nonagricultural banks within each size category. Each of the three size categories holds a third of total bank assets in the district. In 1986, small banks had assets of less than \$60 million, medium-size banks had assets between \$60 million and \$320 million, and large banks had assets of more than \$320 million.<sup>1</sup> Table 2 also shows how growth within the two smaller size groups

<sup>1</sup> Because inflation and economic growth tend to increase the assets of all banks, the two size thresholds have risen over time. In defining size groups, many studies of bank performance use the same dollar thresholds in early years as in later years. That approach can produce distortions over long periods, because the tendency for all banks to grow in dollar terms causes the small size group to shrink relative to the larger groups.

differed between agricultural banks and nonagricultural banks. Agricultural banks are defined as those with at least 25 percent of their loan portfolios in farm real estate or farm-operating loans. More than 90 percent of these banks were small in 1986 and the rest were medium size.

Table 2 confirms that growth rates in 1986 differed significantly both by size and type of bank. In 1986, large banks experienced the slowest asset growth of the three size groups but significantly faster loan growth. This experience was in marked contrast to 1985, when large banks enjoyed average growth in assets but slower-than-average growth in loans. Within the two smaller size groups, Table 2 also shows that agricultural banks continued to grow more slowly than nonagricultural banks. The difference in growth was especially sharp for loans. Although loan growth slowed at both types of banks, loans continued to increase moderately at nonagricultural banks in the small and medium-size groups while falling sharply at agricultural banks. The contraction of loans at agricultural banks came as no sur-

**TABLE 2**  
**Growth in total assets and loans,**  
**commercial banks in Tenth District states\***  
 (percent)

	Number of Banks, 1986	Growth in Assets		Growth in Loans	
		1985	1986	1985	1986
All banks	2,804	4.8	3.8	2.8	2.1
Small banks	2,287	5.3	4.6	2.9	-0.5
Agricultural	1,158	2.6	3.6	-3.1	-5.3
Nongricultural	1,129	7.9	5.4	7.9	2.9
Medium banks	474	4.0	4.5	4.2	0.5
Agricultural	73	2.0	3.2	-3.9	-5.1
Nongricultural	401	4.3	4.7	5.3	1.2
Large banks	43	4.9	2.4	1.4	6.2

\*Growth from beginning to end of year at banks in operation the entire year

prise, reflecting continued weakness in farm borrowers' demand for credit and an increased desire on the part of banks to invest in safe assets.

### Profitability

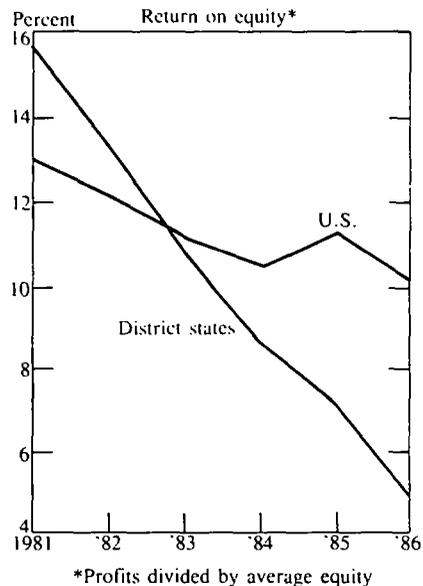
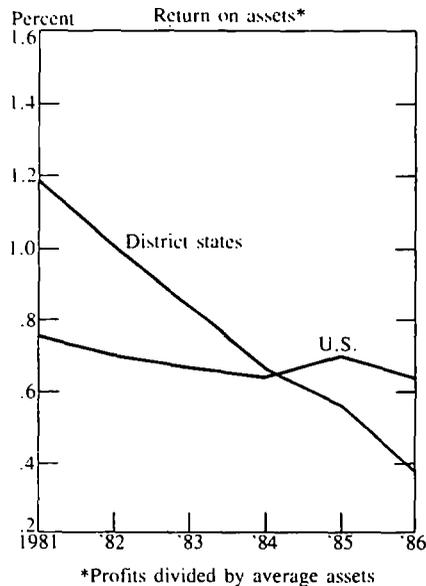
A second dimension of performance is profitability, the ability of banks to generate enough revenue to cover their costs and reward their shareholders. To compare profitability across time or across banks, profits must be deflated by some measure of bank size. Return on equity (ROE) deflates a bank's profits by its equity, the amount owners have invested in the bank through the purchase of stock or retention of earnings. Return on assets (ROA) deflates profits by total assets, including both financial and physical assets.

Measured by either ROE or ROA, the profitability of commercial banks in Tenth District

states fell sharply in 1986, the fifth decline in a row (Chart 1).<sup>2</sup> The decline in profitability left ROA at 0.37 percent in 1986, less than a third of the 1981 peak. Similarly, ROE ended up at 4.8 percent, down from 15.6 percent at the 1981 peak. As the chart shows, the decline in profitability last year was not confined to district banks. Profitability also declined at banks nationwide, wiping out the improvement of the previous year. As in the 1981-84 period, however, the decline was much smaller in the nation as a whole than in Tenth District states.

<sup>2</sup> All data in this article were taken from the Reports of Condition and Income filed by insured commercial banks. Balance sheet data for 1981 to 1983 were adjusted for mergers at the Board of Governors of the Federal Reserve System to ensure that the assets and liabilities of merging banks were combined as close as possible to the date they began reporting their income jointly. Data for 1984 to 1986 were adjusted the same way by the authors.

**CHART 1**  
**Profitability of commercial banks**



In the last two years, figures on the average profitability of district banks have been influenced by the high rate of bank failures. Many banks that incurred heavy losses and depressed average profitability in 1985 were closed in 1986, removing their influence from the figures. Thus, among banks that remained in operation throughout 1985 and 1986, the decline in overall profitability was even greater than indicated in Chart 1. For example, the average ROA of banks open both years declined 31 basis points, 13 points more than the decline in the average ROA of all banks in the district.

***Profitability by size and type***

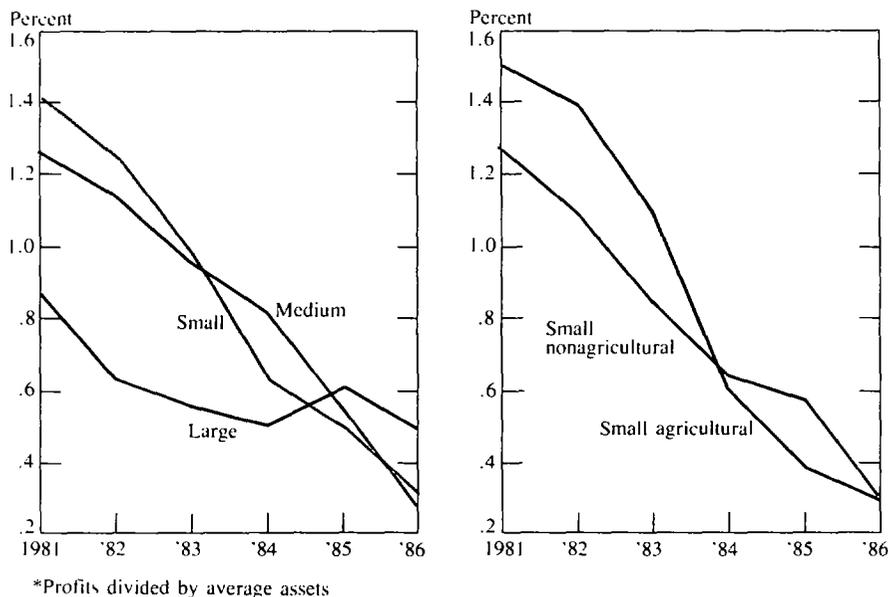
In 1986, earnings performance once again varied by size and type of bank. On average, declines in profitability were larger at medium-

size banks than at small and large banks. And for the first time in several years, profitability declined less at agricultural banks than at nonagricultural banks of similar size.

The left panel of Chart 2 shows how profitability has changed at the three size groups, as measured by ROA. Profitability fell at all three size groups in 1986. As in 1985, though, profitability fell most at medium-size banks, giving them the lowest ROA of the three size groups. At large banks, the decline in ROA in 1985 offset the rise in ROA the previous year. But because the decline was not as steep as at small and medium-size banks, large banks again earned the highest ROA of the three size groups.

In the district as a whole, profitability fell less at agricultural banks than at nonagricultural banks for the first time in four years. As noted earlier, most agricultural banks are small. The right panel

**CHART 2**  
**Return on assets at banks in Tenth District states\***



of Chart 2 compares the recent earnings performance of small agricultural banks with that of small nonagricultural banks. Although the ROA of small agricultural banks continued to decline in 1986, it fell significantly less than the year before. At small nonagricultural banks, by contrast, ROA fell significantly more in 1986 than 1985. Within the medium-size group, changes in profitability were more similar, with ROA falling just as sharply at agricultural banks as at nonagricultural banks.

Although earnings performance varied by size and type of bank, there continued to be important differences within each of the categories. In 1986, 26 percent of agricultural banks suffered net losses, the same proportion as the year before. At the other end of the spectrum, though, 28 percent of agricultural banks earned more than 1 percent on their assets—fewer than the 37 percent

that earned such returns in 1985, but a significant number just the same. Similar differences in earnings performance existed among nonagricultural banks. Reflecting the steep decline in average profitability, the proportion of nonagricultural banks with net losses rose from 20 percent in 1985 to 25 percent in 1986. But 34 percent of nonagricultural banks still had ROA's greater than 1 percent in 1986, down from 43 percent the year before.

***Determinants of profitability***

The decline in average profitability in 1986 resulted from two factors, a decrease in net interest income and an increase in the provision of funds for loan writeoffs. Profits can be defined as net interest income and net gains from security sales minus loan loss provisions, net noninterest

**TABLE 3**  
**Income and expense of insured commercial banks**  
**in Tenth District states\***  
 (percent)

	<u>1981</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Net interest income (NIM)†	4.70	4.30	4.37	4.12
+ Net security gains‡	-0.13	0.03	0.10	0.16
- Loan loss provisions	0.30	0.85	1.05	1.20
- Net noninterest expense	2.24	2.28	2.37	2.29
- Total taxes	0.86	0.54	0.49	0.43
<b>Profits (ROA)</b>	<b>1.18</b>	<b>0.66</b>	<b>0.55</b>	<b>0.37</b>

\*All variables are expressed as a percentage of average annual assets net of loan loss reserves. Average annual assets are computed from beginning, middle, and end-of-year figures with weights of one-quarter, one-half, and one-quarter, respectively. Data for each year are for banks in operation the entire year.

†Interest income is calculated on a taxable-equivalent basis. That is, each bank's tax-exempt income from state and local securities is adjusted by its marginal tax rate.

‡Includes net gains on extraordinary items

expense, and taxes. Table 3 deflates each of these components by total assets for the years 1981 and 1984-86. As shown in the table, net interest income declined sharply relative to assets in 1986, after increasing moderately in 1985. Last year's decline left the net interest margin (NIM) of district banks at 4.12 percent, down almost 60 basis points from the 1981 peak. Reinforcing the deterioration in NIM in 1986 was another sizable increase in the ratio of loan loss provisions. This increase was the fifth in a row for district banks and lifted provisions to 1.20 percent of assets, four times the 1981 level.

The adverse effects of the decline in NIM and rise in loan loss provisions were partly offset by favorable changes in the other profit components. Net gains on security sales were even higher in 1986 than 1985 as banks took advantage of the decline in market rates and resulting appreciation in security values to boost their reported earn-

ings. Net noninterest expense fell just enough to make up for the previous year's rise, and taxes continued to decrease in line with banks' before-tax income. Despite these offsetting factors, though, ROA still declined sharply, from 0.55 percent in 1985 to 0.37 percent in 1986.

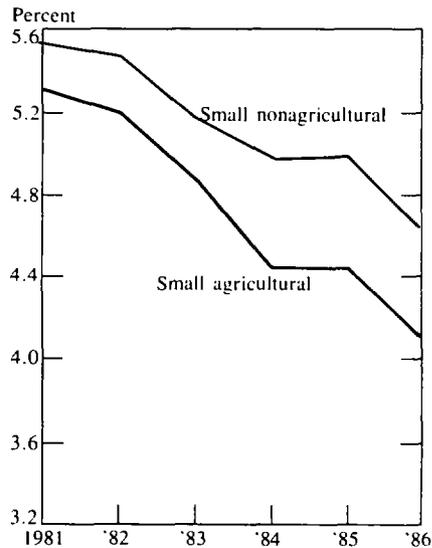
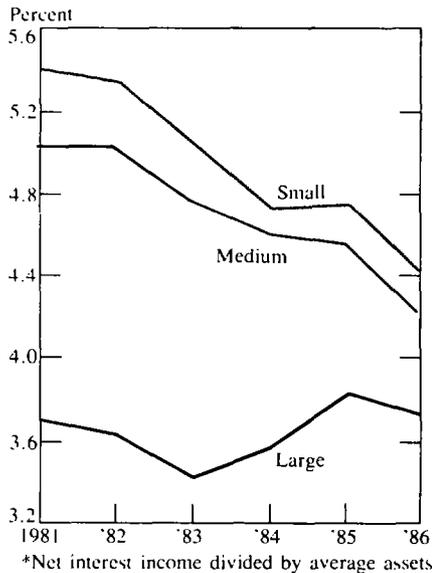
### Net interest margin

The decline in net interest margin (NIM) in 1986 represented a sharp reversal from the previous year (Table 3). After improving seven basis points in 1985, the NIM of district banks shrank 25 basis points in 1986, reaching its lowest level in ten years.

### NIM by size and type

Although NIM declined at all three size groups in 1986, the decline was significantly smaller at

**CHART 3**  
**Net interest margin at banks in Tenth District states\***



large banks than at small and medium-size banks. As shown in the left panel of Chart 3, the NIM of small and medium-size banks fell more than 30 basis points in 1986, matching the steep declines of 1983 and 1984. At the region's large banks, by contrast, NIM fell less than ten basis points in 1986. The decline in NIM at large banks represented a marked turnaround from the improvement of the previous two years. Because the decline was relatively small, however, the gap between the NIM of large banks and the NIM of small and medium-size banks narrowed further during the year.

In 1986 as in 1985, NIM behaved very similarly at agricultural banks and nonagricultural banks of the same size. As shown in the right panel of Chart 3, NIM fell by equal amounts at small agricultural banks and small nonagricultural banks in 1986, after remaining virtually unchanged in

both groups in 1985. Within the medium-size group, NIM also behaved similarly at the two types of banks, falling sharply in both cases.

#### *Determinants of NIM*

Banks' interest income and interest expense can change either through shifts in the composition of their assets and liabilities or through changes in the rates of return on their assets and liabilities. Table 4 shows the contribution of such portfolio shifts and rate changes to the behavior of district banks' NIM since 1984. These estimates were obtained by splitting banks' assets and liabilities into broad categories. The impact of portfolio shifts between categories was estimated by calculating the amount by which interest income, interest expense, and NIM would have changed if the average rate of return earned or paid on

**TABLE 4**  
**Changes in interest income and expense**  
**at banks in Tenth District states-**  
**(percentage-point change in ratio to average assets)**

	<u>1984-85</u>	<u>1985-86</u>
Change in interest income ratio	-0.74	-1.14
Portfolio shifts	+0.01	-0.08
Rate changes	-0.75	-1.06
Change in interest expense ratio	-0.81	-0.90
Portfolio shifts	+0.10	+0.01
Rate changes	-0.91	-0.90
Change in NIM	+0.07	-0.25
Portfolio shifts	-0.09	-0.09
Rate changes	+0.16	-0.16
<b>Memo:</b>		
Change in 6-month Treasury bill rate	-2.14	-1.63

each category had remained constant. The rest of the change is the "rate effect," the part due to changes in the average rates of return on different categories.<sup>3</sup>

The NIM of district banks not only continued to be hurt by adverse portfolio shifts in 1986 but also suffered from a large adverse rate effect. Because deposit deregulation had come to an end, unfavorable shifts in the composition of funds at small and medium-size banks had much less effect on interest expense in 1986 than in 1985. However, these banks suffered an unusually large adverse shift in the composition of their assets in 1986—a shift away from loans toward lower

yielding money market assets. As a result, the total effect of adverse portfolio shifts on the average NIM of district banks was just as large in 1986 as 1985—nine basis points. More surprising than the shift out of loans was the failure of district banks to benefit from the continued decline in market rates. In sharp contrast to 1985, rates on assets tended to fall more than rates on liabilities in all three size groups, producing an adverse rate effect on NIM of 16 basis points.

Why did the decline in market rates reduce banks' interest income more than their interest expense in 1986, narrowing NIM? It is not surprising that the recent decline in rates had a less favorable effect on NIM in 1986 than in 1985, when the decline began. As a result of deposit deregulation, rates on liabilities now respond more quickly to changes in market rates than rates on assets. Thus, when market rates headed downward in 1985, much of the decline in interest expense came in that year while much of the

<sup>3</sup> For a more detailed explanation of the decomposition, see William R. Keeton and Lyle Matsunaga, "Profits of Commercial Banks in Tenth District States," *Economic Review*, Federal Reserve Bank of Kansas City, June 1985.

decline in interest income was postponed to 1986. What is surprising is that interest income fell as steeply as it did in 1986, not only exceeding the fall in interest expense but wiping out the improvement in NIM the previous year.

Some observers have attributed recent declines in interest income to the increase in nonaccruing loans, loans on which borrowers are failing to meet interest payments. Although this factor may have been important at some banks, it appears to account for very little of the aggregate decline in interest income at district banks. The largest impact in 1986 was in the medium-size group, and in that group the increase in nonaccruing loans reduced NIM by only three basis points.<sup>4</sup>

Another possible explanation for the decline in interest income is that the sluggish regional economy reduced borrowers' demand for credit, forcing banks to reduce their loan rates more than they otherwise would. As shown in the left panel of Chart 4, however, the behavior of loan returns in 1984-86 was quite similar to the behavior of loan returns in 1981-83, a period when market rates also fell but the regional economy was stronger. Furthermore, if declining loan demand were primarily responsible for the fall in interest income, banks in areas with the greatest delinquencies or slowest loan growth should have suffered the steepest decline in loan returns, a correlation that failed to exist in 1985 and 1986.

The main reason interest income has fallen relatively steeply in the last two years is not that the regional economy has slowed, but rather, that

security returns are still showing the lagged effects of earlier declines in market rates. As shown in the right panel of Chart 4, the average return on securities fell significantly more from 1984 to 1986 than from 1981 to 1983, even though market rates fell less in the recent period. Because district banks hold roughly two-thirds of their security investments in long-term instruments, many of the securities maturing in 1985 and 1986 were securities purchased in the late 1970s and early 1980s when market rates were high. As banks rolled these securities over at lower rates, the average return fell. In 1982 and 1983, by contrast, banks were still enjoying the lagged effects of the earlier rise in market rates, rolling over securities at rates lower than at the 1981 peak but higher than when the securities were purchased.

### **Loan loss provisions**

Relative to assets, loan loss provisions increased 15 basis points in 1986, slightly less than in 1985 (Table 3). As in past years, most of the increase in provisions in 1986 was to cover higher chargeoffs of bad loans. Only 15 percent of 1986 loss provisions represented net additions to banks' loan loss reserves.<sup>5</sup>

#### *Provisions by size and type*

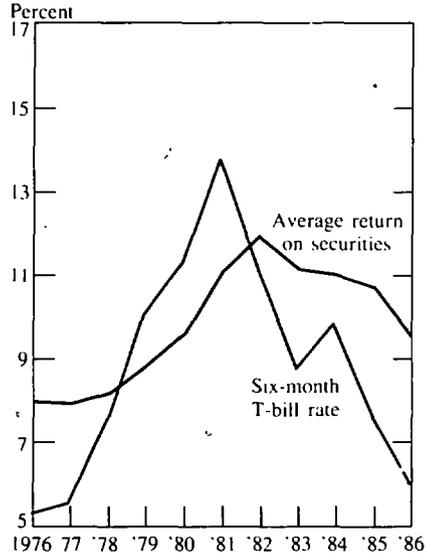
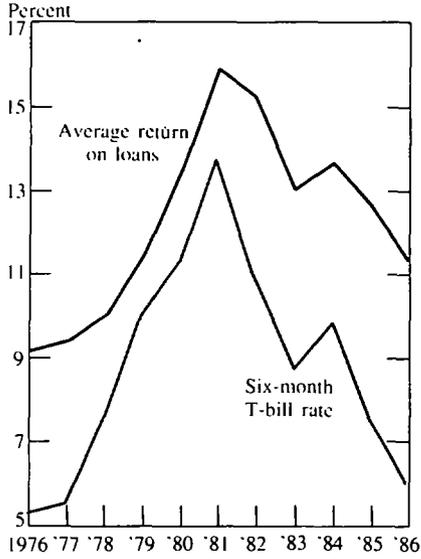
Changes in loss provisions in 1986 differed significantly among the three size groups (Chart 5). The provisions of small banks declined slightly for the first time this decade. However, provisions continued to rise at medium-size banks and increased sharply at large banks after leveling off in 1985. As a result of these changes, the provi-

<sup>4</sup> If a bank's accruing loans yielded 12 percent, a one percentage point increase in the proportion of nonaccruing loans would reduce the average return on loans by 12 basis points. However, because loans are about half of total assets at most banks, such a decline would reduce the ratio of interest income to assets by only six basis points. Furthermore, since assets are calculated net of loan loss reserves, the tendency for banks to increase their loss reserves in line with their nonaccruing loans works in an offsetting direction, raising the ratio of interest income to assets.

<sup>5</sup> When banks write off bad loans, they charge their loan loss reserves, not their earnings. Writeoffs affect earnings only to the extent that banks provide enough funds for their reserves to make up for the chargeoffs.

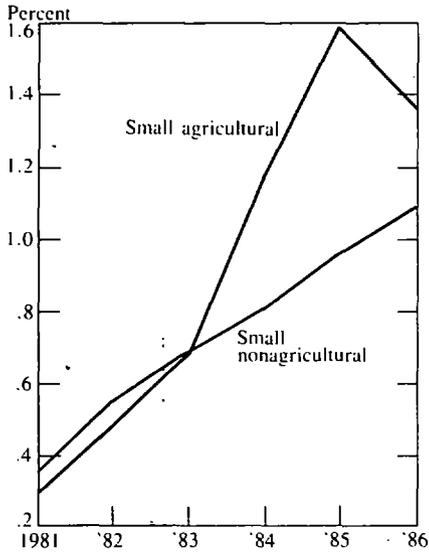
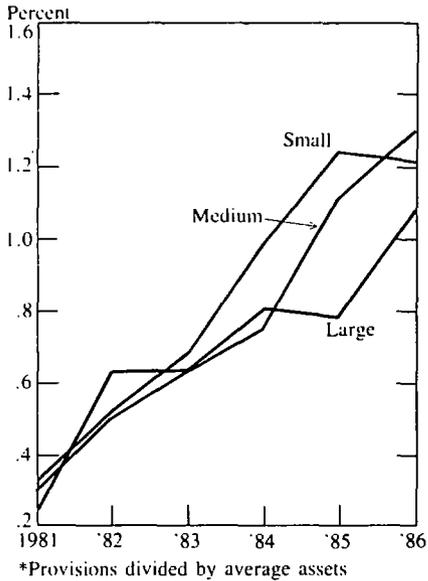
**CHART 4**

**Response of loan and security returns to market rates  
at banks in Tenth District states**



**CHART 5**

**Loan loss provisions at banks in Tenth District states\***



**TABLE 5**  
**Net chargeoffs by type of loan,**  
**Tenth District states**  
 (percent of end-of-year loans)

	<u>1984</u>	<u>1985</u>	<u>1986</u>
Real estate loans	0.4	0.6	0.8
Consumer loans	0.7	1.0	1.4
Agricultural operating loans	2.3	4.3	4.2
C&I and all other loans	1.7	2.1	2.6
Total loans	1.2	1.7	1.9

sions of the three size groups converged in 1986, ranging from 1.1 percent of assets at large banks to 1.3 percent at medium-size banks.

As the right panel of Chart 5 makes clear, the small decline in loss provisions in the small size group was due entirely to a sharp decrease in provisions at small agricultural banks. While the provisions of small nonagricultural banks increased about the same amount in 1986 as 1985, the provisions of small agricultural banks fell for the first time since the slump in agriculture began. Despite the improvement, the provisions of small agricultural banks remained exceptionally high—1.4 percent of assets versus 1.1 percent for small nonagricultural banks. Within the medium-size group, the relative performance of agricultural banks was similar, with provisions failing to increase but still very high.

Does the decrease in loss provisions at district agricultural banks mean that recovery is underway? On the positive side, the decline in provisions in 1986 did not reflect a decision by agricultural banks to draw down their loan loss reserves; relative to assets, chargeoffs fell almost as much as provisions and reserves continued to grow. However, the decrease in the ratio of chargeoffs and provisions to assets resulted from a steep decline in the ratio of loans to assets, and not from a decrease in the proportion of loans

written off. Relative to end-of-year loans, the total chargeoffs of district agricultural banks remained unchanged at 3.0 percent. Thus, while loan losses clearly stabilized in 1986, it is too early to conclude that they have started downward.

Further insight into loan loss trends can be obtained from loss rates on different types of loans. Table 5 breaks down the net chargeoffs of district banks by major categories of loans for the years 1984-86.<sup>6</sup> As would be expected from the stabilization of losses at agricultural banks, the chargeoff rate on agricultural operating loans was virtually unchanged in 1986 after almost doubling in 1985. The biggest increase in chargeoff rates in 1986 was in the category "commercial and industrial (C&I) and all other." The higher losses in this category probably reflect the worsening of the energy recession and further spillover of agriculture and energy problems to local businesses. The chargeoff rate on real estate loans remained the lowest of all, despite indications of mounting problems in commercial real estate.

<sup>6</sup> At the end of 1986, real estate loans accounted for 35 percent of total loans, consumer loans for 19 percent, agricultural operating loans for 8 percent, and C&I and all other loans for 37 percent.

**TABLE 6**  
**Nonperforming loans by size and type of bank,**  
**Tenth District states\***  
 (percent of total loans)

	<u>Dec.</u> <u>1985</u>	<u>June</u> <u>1986</u>	<u>Dec.</u> <u>1986</u>
All banks	3.7	4.4	4.4
Small banks	4.2	4.9	4.8
Agricultural	5.0	6.1	5.7
Nonagricultural	3.7	4.1	4.1
Medium banks	4.0	4.8	5.1
Agricultural	4.9	7.1	6.7
Nonagricultural	3.9	4.5	4.9
Large banks	3.0	3.6	3.3

\*Nonperforming loans at banks in operation all of 1986. Includes renegotiated loans in compliance with modified terms.

### *Nonperforming loans*

Future loan losses are closely related to the current level of nonperforming loans. These loans are loans that have not been written off but are at least 90 days overdue, nonaccruing, or renegotiated.<sup>7</sup> Although some nonperforming loans may be fully repaid and others partly salvaged, banks with high levels of nonperforming loans today are likely to have high rates of loan losses in the future.

The proportion of nonperforming loans increased at all sizes and types of banks in 1986

but showed some sign of peaking at agricultural banks. As shown in Table 6, the average delinquency rate of district banks increased from 3.7 percent at the end of 1985 to 4.4 percent at the end of 1986, continuing the upward trend of the last several years. In contrast to 1984 and 1985, however, the percentage of nonperforming loans at the two sizes of agricultural banks fell significantly after midyear.<sup>8</sup> Furthermore, though the proportion of nonperforming loans at agricultural banks was much higher at the end of the year than at the beginning, renegotiated debt accounted for

<sup>7</sup> Banks are allowed to count as income any interest that is due but not received, provided the interest and principal are less than 90 days overdue or the loan is well secured and in process of collection. Nonaccruing loans are overdue loans that do not meet either of these conditions. Renegotiated loans are troubled loans with terms that have been eased to facilitate repayment by the borrower.

<sup>8</sup> Since banks take most of their writeoffs late in the year, delinquencies usually increase less in the second half than the first half. What was different about 1986 was that the proportion of nonperforming loans at agricultural banks decreased in the second half instead of increasing at a slower rate. For similar evidence on the behavior of delinquencies at agricultural banks nationwide, see Emanuel Melichar, "Turning the Corner on Troubled Farm Debt," *Federal Reserve Bulletin*, Board of Governors of the Federal Reserve System, July 1987.

**TABLE 7**  
**Nonperforming loans by type of loan,**  
**Tenth District states\***  
 (percent of total loans)

	<u>Dec.</u> <u>1985</u>	<u>June</u> <u>1986</u>	<u>Dec.</u> <u>1986</u>
Real estate loans	3.4	4.0	4.2
Consumer loans	1.1	1.2	1.4
Agricultural operating loans	6.9	8.2	7.4
C&I and all other loans	4.5	5.5	5.4
Total loans	3.7	4.4	4.4

\*Nonperforming loans at banks in operation all of 1986. Includes renegotiated loans in compliance with modified terms.

almost all the increase at small agricultural banks and close to half the increase at medium-size agricultural banks—evidence that these banks were dealing constructively with their problem loans. Among nonagricultural banks, the biggest increase in nonperforming loans was at medium-size banks. Their delinquency rate rose throughout 1986, reaching 4.9 percent at yearend, less than the rates at the two sizes of agricultural banks but above the rates at other nonagricultural banks.

Signs of a possible turnaround in agricultural credit problems can also be found in the behavior of nonperforming loans by type of loan. As shown in Table 7, delinquency rates were higher at the end of the year in all major loan categories but declined in the second half of the year for agricultural operating loans. For the year as a whole, the largest increases in delinquency rates were for C&I and all other loans and real estate loans. However, agricultural operating loans continued to have the highest proportion of nonperforming loans, 7.4 percent.

The increase in the proportion of nonperforming real estate loans in 1986 raises an important question: will real estate chargeoffs remain low or will they begin to act as an additional drag on

banks' earnings. Although delinquency rates for different types of real estate loans are unavailable, these rates can be estimated by comparing delinquencies at banks with different lending specializations. As shown in Table 8, estimates derived in this manner confirm that the increase in real estate delinquencies in 1986 was due to the widely publicized problems of the commercial real estate sector.<sup>9</sup> Over the course of the year, the estimated delinquency rate on residential real estate loans changed little and the rate on farm real estate loans fell. However, the delinquency rate on construction loans increased to 8.2 percent and the rate on nonresidential real estate loans rose to 4.3 percent. The high and rising delinquency rates on these two loan categories suggest that chargeoffs will increase unless the commercial real estate market rebounds.

<sup>9</sup> At the end of 1986, residential real estate loans accounted for 46 percent of total real estate loans, nonresidential real estate loans for 30 percent, construction loans for 17 percent, and farm real estate loans for 7 percent. The estimates in Table 8 were obtained by regressing the total delinquency rate on real estate loans against the shares of real estate loans in the four subcategories, weighting each observation by the square root of the bank's total real estate loans.

**TABLE 8**  
**Nonperforming real estate loans,**  
**Tenth District states\***  
 (percent of total loans)

	<u>Dec.</u> <u>1985</u>	<u>June</u> <u>1986</u>	<u>Dec.</u> <u>1986</u>
Residential real estate loans	1.8	1.5	1.7
Nonresidential real estate loans	2.8	4.3	4.3
Construction loans	5.6	7.1	8.2
Farm real estate loans	10.9	11.3	9.9
Total real estate loans	3.4	4.0	4.2

\*Nonperforming loans at banks in operation all of 1986. Estimated for subcategories by regression analysis.

## Capital

A final dimension of performance is capital, the cushion banks build up to protect themselves against unforeseen losses. Like profitability, a bank's capital can be measured in various ways. The measure used in this article is primary capital, the sum of equity capital and loan loss reserves.<sup>10</sup>

Despite the continued decline in earnings, district banks on average were able to maintain their capital-asset ratios in 1986. Primary capital edged downward from 8.4 percent of assets at the end of 1984 to 8.3 percent at the end of 1986, as a small increase in the ratio of loan loss reserves to assets made up for a small decrease in the ratio of equity to assets. Although the ratio of equity to assets declined only slightly during the year, this achievement continued to reflect slow asset growth. For the first time in many years, banks paid out more in dividends than they

earned, subtracting from their equity growth. As a result, equity increased less than 1 percent over the course of the year.

The stability in the average capital-asset ratio for district banks masked some divergence among size groups. While rising 35 basis points at large banks, the ratio of primary capital to assets declined 30 basis points at small banks and 25 basis points at medium-size banks. Despite the declines, though, capital-asset ratios remained relatively high, ranging from 7.4 percent at large banks to 9.9 percent at small agricultural banks.

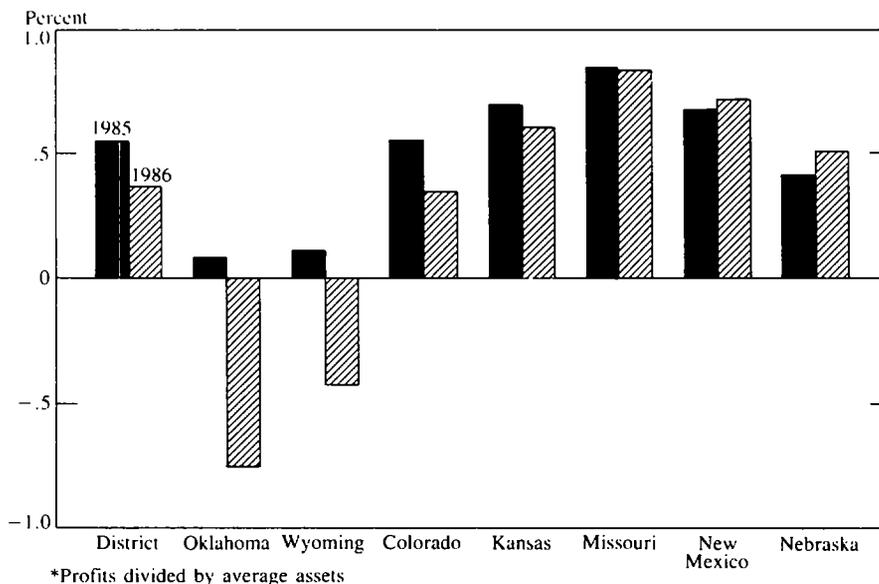
The adequacy of capital must be judged relative to the potential for future losses. As suggested earlier, a useful indicator of future loan losses is the level of nonperforming loans. At the end of 1986, 2,300 of the region's 2,800 banks still had more than twice as much primary capital as nonperforming loans. However, 165 banks ended the year with less primary capital than nonperforming loans, up from 116 at the end of 1985.

## Performance by state

Not all states shared in the continued deterioration in banking performance in 1986. By most

<sup>10</sup> In calculating primary capital to meet regulatory requirements, banks include minority interests in consolidated subsidiaries and mandatory convertible instruments and exclude intangible assets such as goodwill. These items are relatively unimportant at most district banks.

**CHART 6**  
**Return on assets at banks in Tenth District states\***



measures, performance declined sharply in Oklahoma, Wyoming, and Colorado but only moderately or not at all in Kansas, Missouri, New Mexico, and Nebraska. This section briefly analyzes the banking performance of each state in order of the decline in ROA last year.

### **Oklahoma**

The steep decline in energy prices in 1986 caused banking performance in Oklahoma to worsen significantly. Of Tenth District states, Oklahoma had by far the largest decline in ROA in 1986, 80 basis points (Chart 6). Sixteen of Oklahoma's 530 banks failed during the year and only two new banks were started.<sup>11</sup> At other Oklahoma banks, both assets and loans fell (Chart 7).

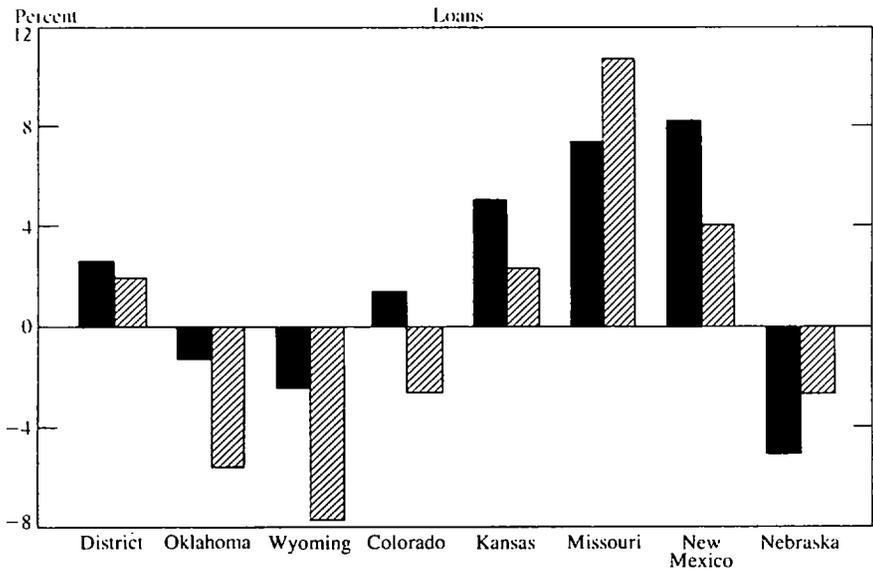
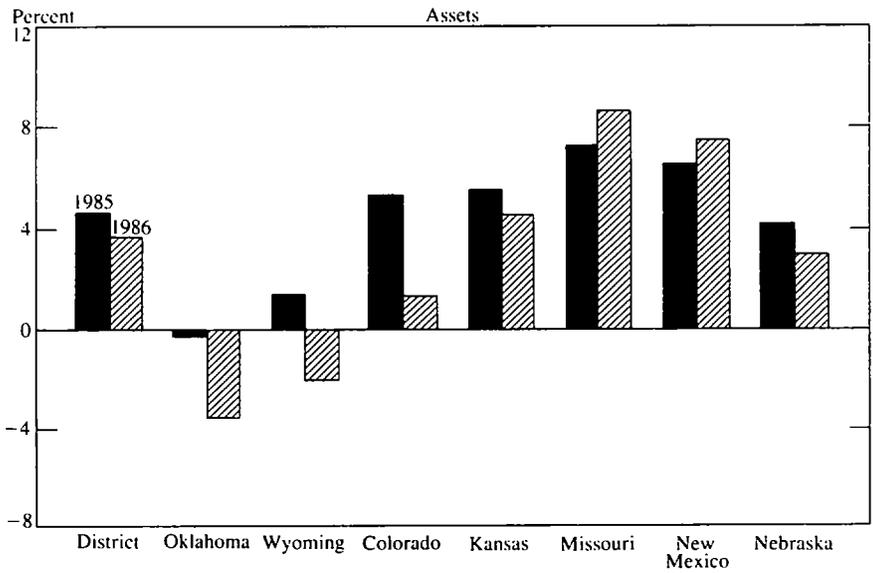
The sharp drop in profitability reduced average ROA to -0.7 percent and would have been even

greater were it not for the elimination of several banks that incurred heavy losses the year before. Although most banks in Oklahoma shared in the earnings decline, the greatest decrease occurred in the large size group. The net losses of banks in this group reached 1.8 percent of assets, while small banks almost broke even. Oklahoma's agricultural banks also suffered large declines in profitability in 1986. As a result, their ROA was only 0.1 percent, well below that of agricultural banks in most other states.

Although NIM declined significantly, the above-average decline in profitability at Oklahoma banks was due mainly to a sharp increase

<sup>11</sup> Throughout this section, the term "new banks" refers only to banks established *de novo* and not to banks formed to take over the deposits of failed banks.

**CHART 7**  
**Growth in bank assets and loans in Tenth District states**



in loan loss provisions. Provisions reached 2.1 percent of assets in 1986, with the steepest increase occurring at large banks. In the two smaller size groups, loss provisions increased just as much at agricultural banks as at nonagricultural banks—in sharp contrast to the district as a whole, where provisions of agricultural banks fell.

At the end of 1986, 8.0 percent of loans at Oklahoma banks were nonperforming. The delinquency rate on agricultural operating loans was about the same as in the district as a whole. However, delinquency rates on real estate loans and C&I and all other loans were four percentage points higher.

### *Wyoming*

Banks in Wyoming also suffered from the deepening recession in energy. ROA fell 50 basis points in 1986, giving Wyoming the second largest decline in profitability in the district (Chart 6). Seven of the state's 110 banks failed during the year and no new banks were started. At other banks, assets fell moderately and loans fell sharply (Chart 7).

Last year's decline in profitability left Wyoming banks with an average ROA of -0.4 percent, higher than in Oklahoma but much lower than in the district as a whole. No banks in Wyoming fell in the large size group in 1986. Medium-size banks suffered somewhat larger declines in profitability than small banks, further widening the gap between the two size groups. As in Oklahoma, agricultural banks also suffered steep declines in profitability. However, because these banks had been earning much higher profits than agricultural banks in the rest of the district, their ROA ended up at about the same level, 0.3 percent.

The main cause of the decline in ROA last year was a decrease of more than 40 basis points in NIM. Although interest expense fell about the same amount as elsewhere, interest income fell

more. Compared with other district banks, Wyoming banks not only experienced a larger shift in the composition of their assets away from loans, but also suffered a much larger decrease in the average return on their security holdings. Loan loss provisions also continued to increase. Although the increase was only slightly more than in the district as a whole, provisions reached 1.8 percent of assets in 1986, second only to Oklahoma.

Wyoming had the highest delinquency rate in the district at the end of 1986, with 9.5 percent of loans nonperforming. Delinquencies were a bit below average for agricultural operating loans but much higher than average for real estate loans and C&I and all other loans, especially the latter.

### *Colorado*

Colorado is less dependent on the troubled energy industry than Oklahoma and Wyoming but is more dependent than other Tenth District states. Accordingly, it comes as no surprise that ROA fell just over 20 basis points in 1986, about the same as in the district as a whole (Chart 6). For the first time in recent memory, the number of banks failed to increase. Eleven new banks were opened during the year, but seven of the state's 460 banks failed and five closed their doors voluntarily. At other banks, assets grew slower than average for the district and loans fell (Chart 7).

As a result of the decline in profitability last year, Colorado banks earned only 0.35 percent on their assets. Profitability was virtually unchanged at the state's large banks but fell sharply at small and medium-size banks. At agricultural banks, the decline in profitability was about the same as in the rest of the district, leaving ROA at only 0.1 percent.

The reduction in profitability in 1986 was caused by a steep increase in loan loss provisions and an even sharper decline in net interest margins. Contributing to the decline in NIM was

a large shift in the composition of assets from loans to money market assets, especially at larger banks. Although all three size groups shared in the increase in provisions and decrease in NIM, the adverse effect of these changes on large banks was partly offset by a sharp decrease in net non-interest expense.

At the end of 1986, 5.2 percent of Colorado bank loans were nonperforming. This proportion was the third highest in the district, reflecting above-average delinquencies in all categories except consumer loans.

### *Kansas*

Banking performance in Kansas remained above the average for the district, despite the high proportion of agricultural banks in the state. ROA declined less than ten basis points in 1986 (Chart 6). During the year, 14 of the state's 620 banks failed, almost as many as in Oklahoma. At those banks that remained open, both asset growth and loan growth slowed but were higher than in the district as a whole (Chart 7).

The moderate decline in profitability in 1986 left the state's ROA at 0.6 percent, significantly higher than the district average. Agricultural banks in Kansas suffered about the same decline in ROA as elsewhere, ending up with an ROA of 0.3 percent. Among nonagricultural banks, profitability declined significantly in the small size group but only slightly in the medium and large groups. All three sizes of nonagricultural banks continued to earn above-average profits. As in past years, though, large banks performed especially well. Their ROA was 1.2 percent in 1986, the highest in the district.

The reason ROA declined less in Kansas than in the district is that the state's nonagricultural banks suffered both a smaller increase in provisions and a smaller decrease in NIM. As elsewhere in the district, the largest increase in loan losses was at large banks, where provisions

reached 1.2 percent of assets. However, because their NIM remained very high, large banks were still able to earn significantly higher profits than small and medium-size banks.

Nonperforming loans were 3.6 percent of total loans at the end of 1986, a little below the average for the district. Delinquency rates on consumer loans and agricultural operating loans were about the same as elsewhere, but rates on real estate loans and C&I and all other loans were lower.

### *Missouri*

Banking performance in Missouri remained highly stable. ROA was virtually unchanged in 1986 (Chart 6). Nine of the state's 670 banks failed, and four new banks were started. During the year, 56 banks disappeared through mergers, an even higher number than in 1985. As before, though, most of these banks were absorbed by banks operating in the same area and belonging to the same holding company. Both asset growth and loan growth accelerated in 1986, in sharp contrast to the district as a whole (Chart 7).

Missouri continued to have the highest ROA in the district, 0.8 percent. Agricultural banks suffered a relatively small decline in profitability that left their ROA at 0.4 percent, slightly higher than the district average. Among nonagricultural banks, earnings fell slightly in the medium-size group and were unchanged in the other two size groups.

Profitability failed to change because the decline in NIM was offset by decreases in loss provisions at small and medium-size banks and decreases in net noninterest expense at large banks. At agricultural banks, loan loss provisions fell sharply to 1.1 percent, well below the average for the district. And even though loan loss provisions increased at large banks, the total provisions of nonagricultural banks in the state were only 0.6 percent of assets, half the district average.

Missouri continued to have the lowest propor-

tion of nonperforming loans in the district, 2.2 percent. Although the delinquency rate on agricultural operating loans was higher than in the district as a whole, delinquency rates on other categories of loans were much lower.

### *New Mexico*

Banking performance also changed little in New Mexico. Profitability was about the same in 1986 as in 1985 (Chart 6). Two of the state's 100 banks failed during the year. At other banks, assets grew rapidly and loans increased moderately (Chart 7).

The stability of profits in 1986 resulted partly from the elimination of the two failed banks, which incurred heavy losses in 1985. Even at other banks, though, declines in ROA were below average. Profitability declined least at the state's large banks, where ROA continued to exceed 1 percent. Small and medium-size banks earned 0.5 percent on their assets in 1986, down considerably from earlier peaks but still better than in the district as a whole.

Profitability declined only moderately at open banks because NIM fell less than average at small and medium-size banks and net noninterest expense declined more than average at large banks. Loss provisions rose in all three size groups, increasing almost as much in New Mexico as in the district. But at 0.9 percent of assets, total provisions remained less than in any other state except Missouri.

At the end of 1986, 3.9 percent of New Mexico bank loans were nonperforming. The delinquency rates on consumer loans and C&I and all other loans were the same as for the district, while rates on other categories were lower.

### *Nebraska*

Banking performance improved in Nebraska but remained lower than in Kansas, Missouri, and New Mexico because of the higher proportion of

agricultural banks in the state. ROA increased just under ten basis points in 1986 (Chart 6). Six of the state's 450 banks failed, half as many as in 1985, and one new bank was started. At other banks, assets increased a bit less than in the district as a whole and loans continued to fall (Chart 7).

The small increase in profitability in 1986 reflected a stabilization of earnings at agricultural banks and a significant increase in profits at nonagricultural banks. At agricultural banks, ROA remained just over 0.3 percent, about the same as in the district as a whole. At nonagricultural banks, the increase in profitability offset more than half of the previous year's decline, leaving ROA at 0.7 percent.

The improvement in profitability resulted from a sharp decrease in loss provisions at agricultural banks and a sharp increase in security gains at nonagricultural banks. Although the NIM of agricultural banks fell almost as sharply in Nebraska as elsewhere, the effect on profits was offset by a steep decline in loan loss provisions that left provisions at about the same level as in the district as a whole. Nonagricultural banks not only were spared the increase in loss provisions and decreases in NIM that hurt nonagricultural banks in other states, but also realized large capital gains on security sales.

At the end of 1986, 4.1 percent of loans at Nebraska banks were nonperforming. Delinquency rates were below average on all loan categories. But because agricultural loans are much more important in Nebraska than the district as a whole, the total delinquency rate was almost as high.

## **Conclusions**

The overall performance of banks in Tenth District states declined further in 1986. As in 1985, more banks were closed than were opened. At other banks, growth in assets remained slug-

gish and loans either declined or failed to keep pace with assets. Loan losses increased only slightly less in 1986 than in 1985. And net interest margins shrank during the year as banks shifted from loans to lower yielding assets and security returns showed the lagged effects of earlier declines in market rates. As a result of these developments, the average profitability of district banks fell for the fifth year in a row, leaving return on assets and return on equity at less than a third of their 1981 peaks. The capital-asset ratios of district banks slipped only slightly in 1986. However, this achievement resulted from increases in loss reserves and slow growth in assets. Because banks failed to reduce their dividends in line with their earnings, equity barely increased.

Performance continued to vary greatly across banks. Within each category of banks, some banks did poorly while others did very well. On average, agricultural banks and banks in energy-producing states continued to have the slowest growth, the highest loan losses, and the lowest profits. However, for agricultural banks the news

was not all bad. Their loan losses declined relative to their assets for the first time since the slump began. And even though more of their loans were delinquent at the end of the year than at the beginning, the proportion fell significantly after mid-year.

Although the regional economy is improving somewhat, the outlook for banking performance in 1987 is uncertain. The firming of oil prices in the first half of the year may slow the increase in losses on energy loans but is unlikely to produce a dramatic turnaround. And while the recent stabilization of farmland values may contribute to further declines in agricultural delinquencies, agricultural banks still have too many problem loans on their books for chargeoffs to come down quickly. Finally, though profits have so far been little affected by problems in commercial real estate, real estate delinquencies cannot continue increasing at last year's pace without banks eventually recognizing losses. In short, there are signs that the decline in district banking performance may be slowing to a halt. But to conclude that a recovery is underway would be premature.

# Has the Dollar Fallen Enough?

*By Craig S. Hakkio and Richard Roberts*

The exchange value of the dollar has declined substantially since the first quarter of 1985. But the U.S. trade balance did not begin turning around until late 1986, and the improvement has not been as large as predicted. Some analysts have argued that this belated and meager reduction in the trade deficit proves that the dollar has not fallen enough.

Whether the decline in the exchange rate is sufficient to reduce the trade balance to acceptable levels is an open question. Some people argue that the exchange rate has fallen far enough and that the trade deficit will eventually decline to an acceptable level, while others argue that the exchange rate must decline further for the trade deficit to improve sufficiently.

This article argues that the drop in the value of the dollar thus far will not by itself eliminate the trade deficit and so, unless other factors contributing to the trade deficit also improve, the dol-

lar will probably have to decline further. The article is divided into three sections. The first discusses the deterioration in the trade balance, and the second discusses the expected improvement. Since understanding why the U.S. trade balance deteriorated will help to understand why it is expected to improve, the first section briefly discusses how much the trade balance deteriorated and why. The analysis shows that the past appreciation of the dollar accounts for about two-thirds of the deterioration in the trade balance. The second section shows that the recent decline in the dollar will result in a significant further improvement in the overall trade balance. The third section shows, however, that unless recent efforts to achieve international coordination of economic policies succeed in achieving more rapid economic growth in the countries that buy U.S. exports, the dollar may need to decline further to eliminate the trade deficit altogether.

## **The deterioration in the U.S. trade deficit**

Understanding why the trade deficit worsened suggests reasons why the trade deficit will

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improve. Therefore, as a prelude to discussing the expected improvement in the trade deficit, this section discusses the deterioration in the U.S. trade balance in the first half of the 1980s. The evidence on the deterioration of the trade deficit is reviewed first, followed by a discussion of reasons for the deterioration. It will be shown that although the rise in the value of the dollar was the main reason for the deterioration in the trade deficit, other factors also contributed.

### *How much the U.S. trade balance deteriorated*

The deterioration in the trade balance in the early 1980s was dramatic. The real trade balance as well as real exports and real imports from 1975 to 1987 are shown in Chart 1. After small trade deficits throughout the second half of the 1970s, the trade balance reached a surplus in the beginning of 1980. After that, the trade balance deteriorated steadily, reaching a deficit of \$163 billion in the third quarter of 1986 before improving moderately in recent quarters. Since the trade deficit began to turn around in 1986, this section focuses on the period between 1980 and 1986. Most of the deterioration during this period was due to a rise in imports, which grew 45 percent, while exports fell 5 percent.

By definition, the overall trade balance includes merchandise trade and services trade. Merchandise trade is primarily trade in goods. Since most of the deterioration was in merchandise trade, most of the improvement is expected to be in this category. Agricultural exports and petroleum imports require special analysis because they are heavily affected by government programs and OPEC.<sup>1</sup> As a result, the concept of "exports"

<sup>1</sup> For further information about agricultural exports, see David Henneberry, Mark Drabenstott, and Shida Henneberry, "A Weaker Dollar and U.S. Farm Exports," *Economic Review*, Federal Reserve Bank of Kansas City, May 1987.

in this article will refer to nonagricultural merchandise exports, "imports" will refer to non-petroleum merchandise imports, and the term "trade balance" will refer to the difference between the two.

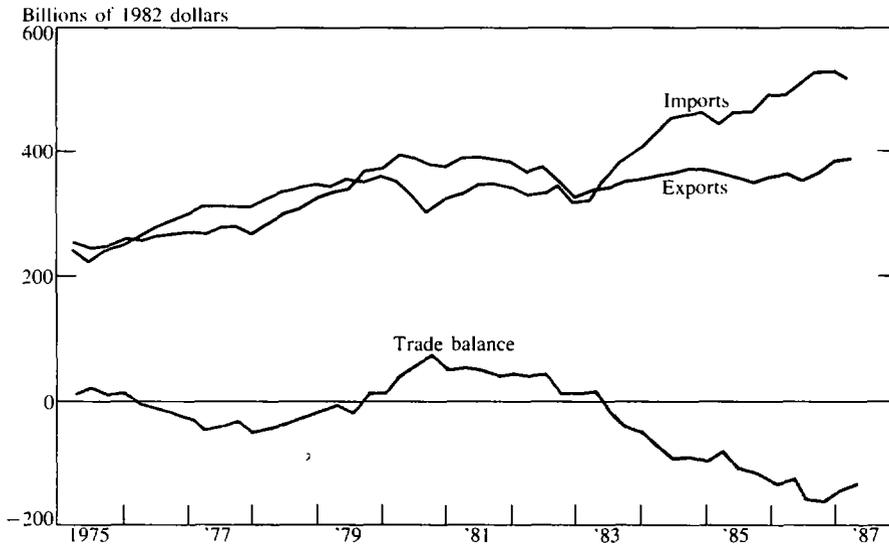
The general trends in the nonagricultural/non-petroleum trade balance are the same as in the overall trade balance. Nonagricultural merchandise exports, nonpetroleum merchandise imports, and the nonagricultural/nonpetroleum merchandise trade balance are plotted in Chart 2. A comparison of Charts 1 and 2 shows similar trends in both trade balances. For example, both trade balances reached surpluses in 1980 and then declined until the third quarter of 1986, before turning around modestly in the past few quarters. Of the \$205 billion deterioration in the overall trade balance between 1980 and 1986, \$168 billion was due to trade in nonagricultural/nonpetroleum merchandise.

### *Reasons for the deterioration*

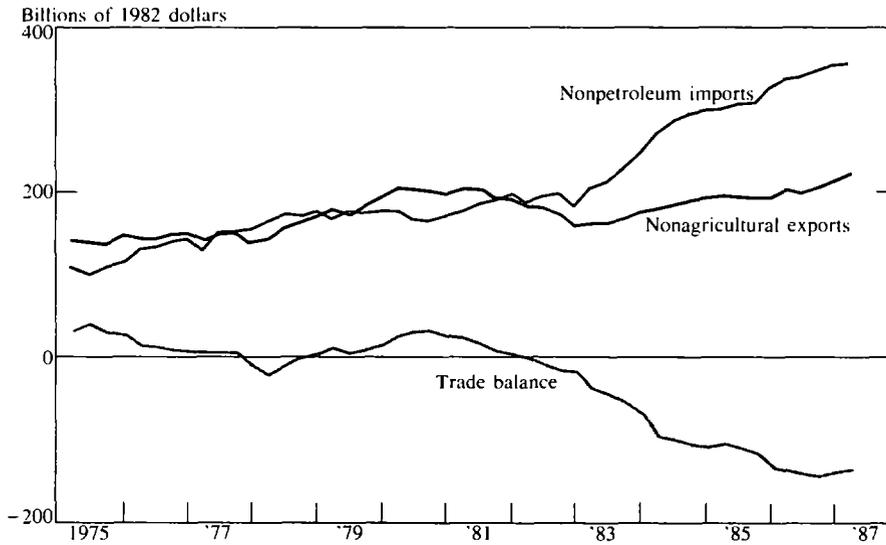
Several factors contributed to the deterioration in the (nonagricultural/nonpetroleum) trade balance. The two most important determinants of the trade balance are thought to be exchange rates, which affect the relative price of imports and exports, and real income growth at home and abroad, which affects total spending. Other factors were also important, however, in explaining the U.S. trade deficit in the 1980s.

This article focuses on the "proximate determinants" of the deterioration in the trade balance. The effect of exchange rates and real income on the trade balance is discussed, but not why the exchange value of the dollar rose 40 percent between 1980 and the first quarter of 1985 or why U.S. real income rose 11 percent during this period. The reasons the exchange rate rose so much and income increased are the more fundamental reasons for the deterioration in the trade balance. Macroeconomic policies are generally

**CHART 1**  
**U.S. trade balance**



**CHART 2**  
**U.S. trade balance excluding agriculture and petroleum products**



thought to account for most of the rise in the dollar.<sup>2</sup>

*Real income.* Increases in real income affect the trade balance by increasing demand for imports by U.S. residents and demand for exports by foreigners. The demand for imports—like the demand for any commodity—depends on real income. As U.S. real income rises, some of the additional income will be spent for imported goods. Similarly, as real income rises abroad, foreigners will increase their purchases of American goods. If U.S. growth is greater than foreign growth, imports will tend to grow faster than exports, causing the U.S. trade balance to worsen. But if U.S. and foreign income rise the same amount, imports and exports will also rise by about the same amount and the trade balance will not be much affected.

Empirical evidence suggests that real income growth at home and abroad had only a small effect on the U.S. trade balance in the 1980s. Real income is generally measured in one of two ways: real GNP or real domestic demand. While both measures have advantages, this article uses real GNP as its measure of real income.<sup>3</sup> Real GNP growth rates were similar in the United States and its trading partners between 1980 and 1986. The

U.S. economy grew 14.2 percent, while the economies of its trading partners grew 12.5 percent. The similarity of growth at home and abroad probably left the U.S. trade balance affected very little by this factor.

The small effect of relative income growth is confirmed by the breakdown of the deterioration in the U.S. trade balance between 1980 and 1986 shown in Table 1. The third line in Panel A shows that the deterioration totaled \$168 billion, as exports rose only \$5 billion while imports rose \$173 billion. The first line in Panel B shows that the 12.5 percent growth in foreign GNP during this period is estimated to have increased U.S. exports by \$61 billion.<sup>4</sup> The 14.2 percent growth in U.S. real GNP is estimated to have increased U.S. imports by \$59 billion. Even though U.S. income growth was slightly greater than foreign income growth, imports increased by less than exports because imports were \$32 billion less than exports in 1980. The estimated effect of relative income growth, therefore, is a slight improvement in the trade balance. Thus, relative income growth does not account for the deterioration in the U.S. trade balance.

<sup>2</sup> The more fundamental reasons would include restrictive monetary policy in 1980 and 1981, the large government budget deficit, the reputation of the United States as a safe haven for foreign investment, liberalization of Japanese financial markets, and the tax cut that improved the investment climate. For more details on the fundamental reasons for the appreciation of the dollar, see William Branson, "Causes of Appreciation and Volatility of the Dollar," *The U.S. Dollar—Recent Developments, Outlook, and Policy Options*, a symposium sponsored by the Federal Reserve Bank of Kansas City, August 1985.

<sup>3</sup> Real GNP measures production and real domestic demand represents total spending by U.S. residents. Real GNP was chosen as the measure of income because much of U.S. trade is in intermediate products. To the extent that imports represent the demand for intermediate goods, real GNP is a good measure of income. To the extent that imports represent the demand for final goods, domestic demand is preferable. For further discussion of the dif-

ference between GNP and domestic demand, see William Helkie and Peter Hooper, "The U.S. External Deficit in the 1980s: An Empirical Analysis," International Finance Discussion Paper No. 304, Board of Governors of the Federal Reserve System, February 1987, p. 22 and p. 46.

<sup>4</sup> The notes at the end of the table describe how these and other estimates in this section were calculated. Foreign real GNP is a composite index. Real GNP of 17 industrialized countries, excluding the United States, enter the composite. These countries are Canada, France, Germany, Italy, Japan, the United Kingdom, Australia, Austria, Belgium, Denmark, Finland, Greece, Netherlands, Norway, Spain, Sweden, and Switzerland. William Helkie and Peter Hooper argue that for every 1 percent increase in foreign income, exports should increase 2.1 percent and that for every 1 percent increase in U.S. income, imports should increase 2.1 percent. It should be noted that their definition of foreign real GNP differs from the definition used in this article. The definition of relative import and export prices also differ. Consequently, their elasticities should be viewed with caution when applied to the data in this article.

**TABLE 1**  
**Deterioration of the U.S. trade balance, 1980-86**  
(billions of 1982 dollars)

**Panel A: Magnitude of the Deterioration**

	<u>Exports</u>	-	<u>Imports</u>	=	<u>Trade Balance<sup>1</sup></u>
Levels in 1980	\$203		\$171		\$ 32
Levels in 1986	<u>208</u>		<u>344</u>		<u>-136</u>
CHANGES: 1980-86	5		173		-168

**Panel B: Causes of the Deterioration**

	<u>Changes in Exports</u>	-	<u>Changes in Imports</u>	=	<u>Changes in the Trade Balance</u>
Due to income <sup>2</sup>	\$ 61		\$ 59		\$ 2
Due to relative prices <sup>3</sup>	-49		46		-95
Due to other factors <sup>4</sup>	<u>-7</u>		<u>68</u>		<u>-75</u>
TOTAL CHANGES	5		173		-168

NOTES: <sup>1</sup> Exports refer to nonagricultural merchandise exports, imports refer to nonpetroleum merchandise imports, and the trade balance refers to the difference between the two.

All calculations in the table are done in the same way. For example, the percentage change in exports due to a change in relative prices equals the percentage change in relative prices times the elasticity of exports with respect to relative prices. Then, since exports in 1980 are known, one can calculate the change in exports due to relative prices. The change is based on percentage changes calculated as the difference in logarithms.

<sup>2</sup> Foreign income rose 12.5 percent. Assuming the elasticity of exports with respect to foreign income is 2.1, exports would rise 26.3 percent, or \$61 billion. U.S. income rose 14.2 percent. Assuming the elasticity of imports with respect to U.S. income is 2.1, imports would rise 29.8 percent, or \$59 billion.

<sup>3</sup> The relative price of exports rose 27 percent. Assuming the elasticity of exports with respect to relative price is -1.0, exports would fall 27 percent, or \$49 billion. The relative price of imports fell 24 percent. Assuming the elasticity of imports with respect to relative prices is -1.0, imports would rise 24 percent, or \$46 billion.

<sup>4</sup> Since exports rose \$5 billion, and since relative price changes and foreign income changes explain an \$18 billion increase in exports, other factors must explain the rest—a \$13 billion decrease in exports. Since imports rose \$174 billion, and since relative price changes and U.S. income changes explain a \$105 billion increase in imports, other factors must explain the rest—a \$68 billion increase in imports.

If income growth at home and abroad does not explain the deterioration in the trade balance, what does? The obvious choice is the value of the dollar.

*The value of the dollar.* The rise in the value of the dollar caused a substantial portion of the deterioration in the trade balance. Between 1980 and its peak in the first quarter of 1985, the value of the dollar rose 40 percent, as measured by the Morgan Guaranty index.<sup>5</sup> The exchange value of the dollar affects imports and exports by affecting the prices of U.S. imports and exports. An increase in the value of the dollar, for example, makes U.S. exports more expensive and U.S. imports cheaper. As exports become more expensive, fewer goods are exported, and as imports become cheaper, more goods are imported.

The amount by which the appreciation of the dollar affects imports and exports depends on the answer to two questions. First, how much did import prices fall and export prices rise as a result of the stronger dollar? Second, how much did imports rise and exports fall as a result of the price changes?

The effect of the exchange rate on the prices of imports and exports is shown in Charts 3 and 4. Chart 3 shows that import prices, measured relative to prices of domestically produced goods, fell as the exchange rate rose. Between 1980 and their low point in the fourth quarter of 1985, relative import prices fell 24 percent. The rise in export prices, measured relative to the price of foreign goods, associated with the higher dollar is evident in Chart 4, which shows that relative export prices rose 27 percent between 1980 and their high point in the first quarter of 1985.

Two things in Charts 3 and 4 are noteworthy. First, the rise in the exchange rate was not fully

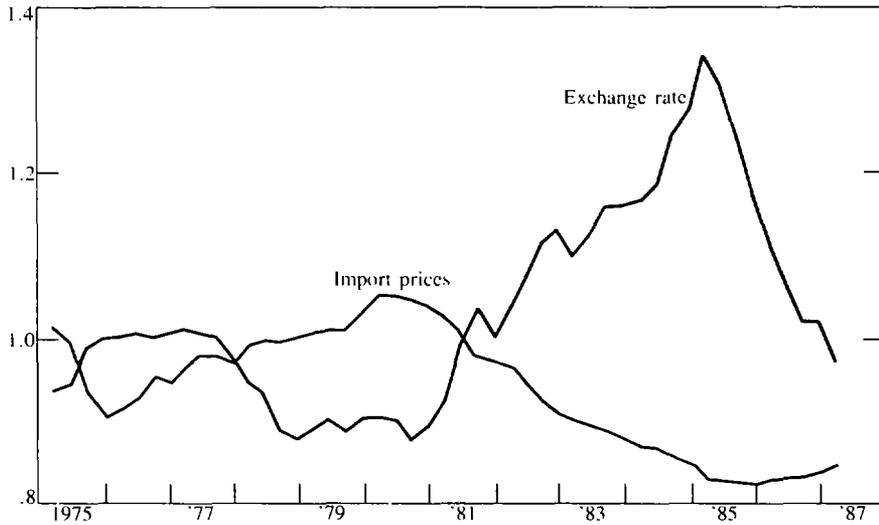
passed-through to import prices and export prices. That is, import prices fell and export prices rose less than the dollar, so that the exchange rate "pass-through" was only partial.<sup>6</sup> Second, the timing and extent of pass-through was different for export prices and import prices. Export prices rose quicker and more substantially than import prices fell. This tendency for import prices to react less to changes in the value of the dollar is consistent with the view that foreign producers may be more willing to absorb part of exchange rate changes in their profit margins than are their U.S. counterparts.

An example provides some insight into why the pass-through may be relatively slow and meager for U.S. imports. Suppose that a Toyota costs \$10,000 before the dollar rises 10 percent against the yen. In choosing the price to charge after the exchange rate change, Toyota must consider the effect of its decision on its profit margin and its market share. It could pass through the entire increase in the exchange rate, lowering prices 10 percent to \$9,000. In that case, Toyota's market share could rise substantially. And since the dollar has risen 10 percent against the yen while dollar prices have fallen 10 percent, Toyota's profit margin on U.S. car sales would be unchanged in terms of yen. Alternatively, Toyota could keep the dollar price of its cars sold in the United States constant, a pricing decision that would raise its profit margins 10 percent but have no effect on its market share. Finally, Toyota could choose to increase both profit margins and market share by passing through part of the increase in the dollar. If Toyota cuts prices 5 percent, it could gain market share in the United States while increasing its profit margins 5 percent. This trade-off between profit margins and market share

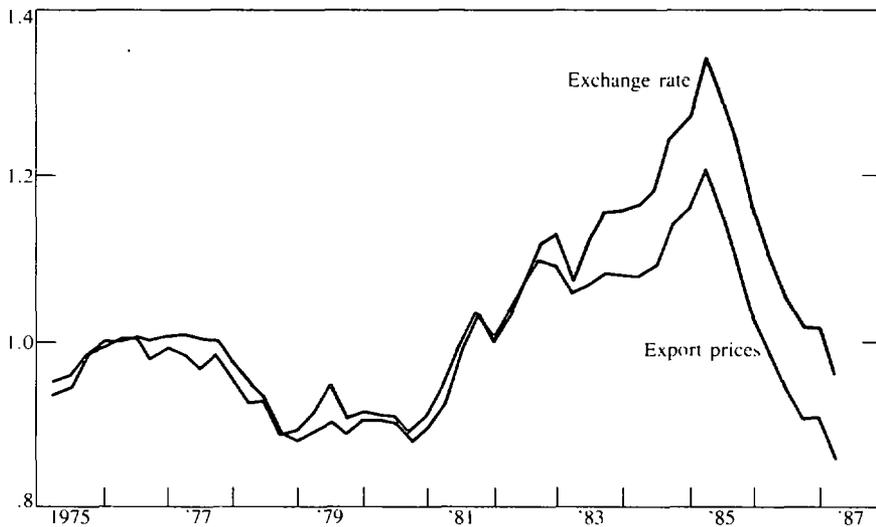
<sup>5</sup> The Morgan Guaranty index is a composite index of the values of currencies of 15 industrialized countries. The countries are the same ones that enter the foreign GNP index, except that Finland and Greece are excluded.

<sup>6</sup> Since the real and nominal exchange rate behaved similarly, the same basic results would hold if the real exchange rate were used instead of the nominal exchange rate.

**CHART 3**  
**Import prices and the exchange rate**  
(1980-82 average = 1.0)



**CHART 4**  
**Export prices and the exchange rate**  
(1980-82 average = 1.0)



explains why the pass-through of exchange rate changes to import prices is only partial.<sup>7</sup>

The pass-through for export prices was larger and quicker than for import prices. Export prices rose 27 percent, while import prices fell 24 percent.<sup>8</sup> Some evidence on the speed of pass-through can be seen by looking at when import and export prices changed direction after the dollar began declining in the first quarter of 1985. Since export prices stopped rising in the first quarter of 1985 and import prices stopped falling in the fourth quarter of 1985, the pass-through was quicker for export prices than for import prices. The difference in turnaround times is still another example of the lags between cause and effect.

The fall in import prices and the rise in export prices caused imports to rise and exports to fall. Charts 5 and 6 document these changes. Since imports and exports depend on income as well as prices, the income effect was removed before plotting the course of imports and exports.<sup>9</sup> To the extent that variables other than income and relative price affect imports and exports, however, the charts give an exaggerated impression of the price effect. Nevertheless, relative prices are the most important effect captured in the charts, as is documented below. Chart 5 shows, for example, that imports rose as their prices fell between 1980 and 1986, except for a slight dip in imports in 1982 caused by the recession. Similarly, Chart 6 shows that exports fell as their prices rose.

The evidence presented in Charts 3 through 6 suggests that the rise in the exchange rate between 1980 and the first quarter of 1985 accounts for a large part of the deterioration in the U.S. trade balance. Econometric evidence also confirms this impression. Such evidence suggests that imports and exports change proportionately to their prices.<sup>10</sup> The rise in the exchange rate caused import prices to fall 24 percent, which led to an estimated \$46 billion increase in imports. In addition, the 27 percent increase in export prices is estimated to have caused exports to decline \$49 billion. These estimates, shown in Table 1, imply that the rise in the value of the dollar accounts for \$95 billion of the deterioration in the U.S. trade balance.<sup>11</sup>

These results imply that the stronger dollar explains about two-thirds of the deterioration in the trade balance. The estimates are not precise because the total amount of the deterioration depends on the year chosen for comparison. Between 1980 and 1985, the trade balance deteriorated \$144 billion. But between 1980 and 1986, the trade balance deteriorated \$169 billion. If the deterioration is taken as \$144 billion, the exchange rate explains 66 percent of the deterioration in the trade balance. If, however, the deterioration is taken to be the larger amount, the exchange rate explains only 56 percent of the deterioration. For ease of exposition, it is assumed that the exchange rate accounts for two-thirds of the deterioration in the trade balance.<sup>12</sup>

<sup>7</sup> For further information on the pass-through, see Catherine L. Mann, "Prices, Profit Margins, and Exchange Rates," *Federal Reserve Bulletin*, Board of Governors of the Federal Reserve System, June 1986, pp. 366-379.

<sup>8</sup> The pass-through for import prices was 60 percent and the pass-through for export prices was 68 percent.

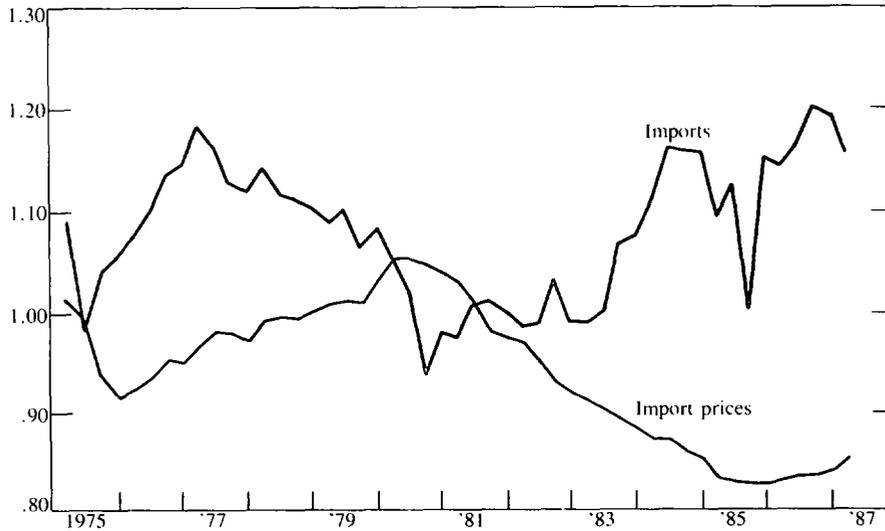
<sup>9</sup> Since the long-run income elasticities are assumed to equal 2.1 for imports and exports, imports purged of income equals  $IM/(Y^{2.1})$  and exports purged of income equals  $EX/(Y^{2.1})$ .

<sup>10</sup> According to Helkie and Hooper, the import price elasticity equals  $-1.05$  and the export price elasticity equals  $-0.83$ . They state: "The long-run price elasticities are both roughly in the neighborhood of  $-1.0$ " (p. 19).

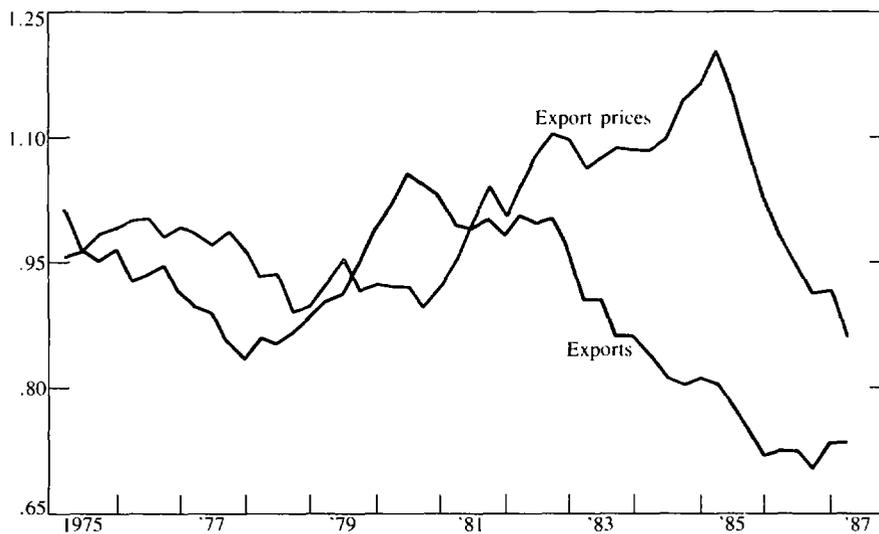
<sup>11</sup> Helkie and Hooper find that changes in relative prices explain a \$123 billion deterioration (p. 45).

<sup>12</sup> Robert Solomon, in "Effects of the Strong Dollar," *The U.S. Dollar—Recent Developments, Outlook, and Policy Options*, a symposium sponsored by the Federal Reserve Bank of Kansas

**CHART 5**  
**Imports and import prices**  
(1980-82 average = 1.0)



**CHART 6**  
**Exports and export prices**  
(1980-82 average = 1.0)



If the exchange rate explains two-thirds of the deterioration, what factors explain the other one-third? Several other factors can explain the deterioration.

### *Other factors*

Two factors often discussed as contributing to the worsening of the trade balance—a decline in U.S. competitiveness and foreign trade barriers—do not explain the dramatic deterioration in the U.S. trade balance. Productivity growth in the manufacturing sector since the third quarter of 1981 has exceeded the postwar average and the slow growth in the 1970s. Consequently, there is little evidence to suggest that declining productivity caused the deterioration.<sup>13</sup> And, while foreigners have erected trade barriers against U.S. products, the United States has also erected trade barriers against foreign products.<sup>14</sup> In any event, to the extent that these factors might lead to a worsening in the trade balance, the effects are not large enough to explain the dramatic deterioration.

At least two other factors, however, contributed to the deterioration in the trade balance. They are the LDC debt crisis and the increased importance of South Korea, Taiwan, Hong Kong, and Singapore—the so-called Newly Industrializing Countries or NIC's.

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City, August 1985, states "we have reason to accept the Federal Reserve estimate that something like two-thirds of the increase in the U.S. current account deficit is attributable to the appreciation of the dollar" (p. 68).

<sup>13</sup> For example, the *Economic Report of the President*, 1987, states (p. 118): "In sum, the deterioration of international cost competitiveness in U.S. manufacturing during the first half of this decade was the result of the real appreciation of the dollar, not sagging productivity growth or excessive wage increases."

<sup>14</sup> See, for example, C. Fred Bergsten and William Cline, *The United States-Japan Economic Problem*, Institute for International Economics, Vol. 13, October 1985, for evidence.

The LDC debt crisis was one factor contributing to the deterioration in the U.S. trade balance. The LDC debt crisis forced many Latin American countries to run large trade surpluses to pay their debt service costs. Since the United States was an important trading partner of these countries, the United States bore a large part of the necessary reduction in Latin American imports and increase in Latin American exports. Whereas Latin American countries had trade deficits before 1982, they have had trade surpluses since then. In 1981, for example, the United States had a trade surplus of \$1.3 billion with Latin America. Subsequently, the United States has had trade deficits averaging \$15 billion.<sup>15</sup>

Another factor contributing to the U.S. trade deficit was the emergence of the Newly Industrializing Countries. As their name suggests, the NIC's have recently become industrialized. And these countries have emerged as important trading partners with the United States. Whereas these countries accounted for only 11 percent of U.S. trade in 1975, they accounted for 16 percent by 1985. Moreover, the increased trade with the NIC's has been due primarily to an increase in exports to the United States. Between 1980 and 1986, the NIC's increased their exports by \$55 billion, of which \$30 billion went to the United States. Partly as a result of their export-oriented policies, these countries increased their trade surplus with the United States from \$3 billion in 1980 to \$30 billion in 1986.<sup>16</sup> Some of the deterioration is due to the increase in the dollar, which rose 30 percent against the Asian NIC's.

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<sup>15</sup> Of course, some of the deterioration in the U.S. trade balance with Latin America is due to the rise in the exchange rate and faster growth in the United States than in Latin America.

<sup>16</sup> For additional information on the NIC's, see "The Asian NIC's and U.S. Trade," *World Financial Markets*, Morgan Guaranty Trust Company of New York, January 1987.

Some of the deterioration, however, is also due to the emergence of the NIC's as important competitors to U.S. firms selling in the United States.

The effect of these other factors is shown in Table 1. The entries are the part of exports and imports that are not explained by relative prices or income. As a result, they actually reflect the combined effect of the two factors discussed above, plus any other influences not previously discussed.<sup>17</sup> According to the table, other factors explain \$7 billion of the decline in exports and \$68 billion of the increase in imports.

In summary, several factors contributed to the deterioration in the trade balance. By itself, income growth at home and abroad would have led to a slight improvement in the trade balance. But, the strong dollar caused the trade balance to worsen by about \$95 billion, and all other factors caused the trade balance to deteriorate by \$75 billion. Since the rising dollar was the primary reason for the deterioration, the falling dollar should be the primary reason for the expected improvement in the U.S. trade deficit.

### **An improvement in the U.S. trade deficit**

After worsening between 1980 and 1986, the trade deficit began improving in late 1986. Between the third quarter of last year and the first quarter of this year, the nonagricultural/nonpetroleum merchandise trade deficit declined \$8 billion, from \$140 billion to \$132 billion. This section argues that the improvement will continue.

<sup>17</sup> There is another reason why the full effect of the LDC debt crisis and the emergence of the NIC's on the trade deficit is not captured in Table 1. The foreign income variable and exchange rate index do not include any of the Latin American countries or the NIC's. Therefore, if these countries are different from the countries included in these two variables, the effect of the debt crisis and the NIC's may not be adequately captured in the estimated elasticities.

The decline in the exchange rate since early 1985 will lead to a significant further improvement in the trade balance. But by itself, the decline in the exchange rate will not eliminate the trade deficit altogether.

The reasons the trade deficit is expected to improve over the next three years are discussed in this section. Rough estimates of the expected improvement are discussed, based on certain simplifying assumptions.<sup>18</sup> The decline in the exchange rate is the main reason for expecting improvement. However, increases in U.S. and foreign real income and the "other factors" will also influence the improvement in the trade balance.

### *Real income*

Recent and prospective changes in income will tend to cause the trade deficit to worsen. From the third quarter of 1986 to the first quarter of this year, both U.S. and foreign real GNP grew about 1 percent. And according to projections by one forecasting service, Data Resources Inc. (DRI), U.S. real GNP will grow 7.3 percent between 1986 and 1989 and foreign real GNP will grow 7.7 percent. Since U.S. and foreign incomes are expected to grow at about the same rates, imports and exports should also grow at about the same rates. The trade balance will still deteriorate, however, even though imports and

<sup>18</sup> A three-year horizon was chosen to reflect the time it takes for the full effects of the decrease in the dollar to be felt. The dollar began falling in the first quarter of 1985. The latest available data are for the first quarter of 1987. It is assumed, therefore, that the effect of the dollar depreciation will be complete by 1989. To the extent the effects take longer, the three-year horizon is too short. In addition, it is assumed that the elasticities estimated over the period 1969:Q1-1984:Q4 are applicable for the period 1985-89. If these elasticities have changed, as some economists think, then the forecasts may be biased. For all of these reasons, the estimates of the expected improvement in the trade balance should be viewed as being suggestive.

exports grow at the same rate, because the value of imports greatly exceeds the value of exports. Hence, imports will change more than exports and the effect of income growth will be a worsening in the trade balance.

If imports and exports increase 2.1 times as much as income, in percentage terms, U.S. real GNP will cause imports to increase about 15 percent between now and 1989, and foreign real GNP will cause exports to increase about 16 percent.<sup>19</sup> As shown in the first line of Panel B in Table 2, foreign income growth should increase exports \$37 billion from the \$208 billion in 1986, and U.S. income growth should increase imports \$57 billion from the \$344 billion in 1986. These and other estimates in Table 2 explain the reasons for expecting an improvement in the trade balance. The terms "pessimistic" and "optimistic" in Table 2 refer to different assumptions about changes in import prices; the effect of income on imports is the same for both forecasts. Although income growth has the same percentage impact on exports and imports over the next three years, the trade deficit is nonetheless likely to worsen by \$20 billion because of growth in foreign income and U.S. income.

### *The value of the dollar*

The decline in the dollar since the first quarter of 1985 tended to reduce export prices and increase import prices. The exchange value of the dollar, as measured by the Morgan Guaranty index, has declined 33 percent since the first quarter of 1985. Export prices have fallen 33 percent since their high point in the first quarter of 1985, and import prices have risen 3 percent since their low point in the fourth quarter that year.

<sup>19</sup> The notes at the end of Table 2 describe how these and other estimates in this section were calculated.

Lower export prices imply an increase in exports of \$82 billion. The decline in relative export prices has completely offset their previous rise, with the result that export industries have regained the price competitiveness they lost in the early 1980s. These industries should be able to recapture the sales they lost as a result of the high dollar. The decline in export prices could then be expected to cause exports to increase \$82 billion by 1989.

The magnitude of the decline in imports is less certain though. Import prices have risen less than might have been expected. More than 60 percent of the increase in the exchange rate in the early 1980s was passed through to import prices. Import prices would be expected, therefore, eventually to rise 20 percent in response to the 33 percent decline in the dollar. But import prices have risen only 3 percent so far, for reasons that are not well understood.<sup>20</sup> The two forecasts in Table 2 reflect this uncertainty. The "pessimistic" forecast assumes that import prices rise 10 percent and imports fall 10 percent. Although 10 percent is more than import prices have risen so far, it is only half the increase predicted on the basis of the previous extent of pass-through. If imports decline proportionately to their prices, this 10 percent increase in import prices would lead to a 10 percent reduction in imports. The implied \$33 billion decline in imports is indicated in the second line of Panel B of Table 2, under the "pessimistic" forecast.

<sup>20</sup> One explanation is that while foreign producers could increase their profit margins when the dollar rose, they chose to reduce their profit margins rather than increase their export prices when the dollar fell. For more information on this subject, see Reuven Glick and Ramon Moreno, "The Pass-Through Effect on U.S. Imports," *Federal Reserve Bank of San Francisco Weekly Letter*, December 12, 1986, and Gerald Anderson and John Carlson, "Does Dollar Depreciation Matter: The Case of Auto Imports from Japan," *Economic Commentary*, Federal Reserve Bank of Cleveland, May 1, 1987.

TABLE 2

**Expected improvement in the U.S. trade balance—1986-1989**

(billions of 1982 dollars)

**Panel A: Magnitude of the Improvement**

	<b>“Pessimistic” Forecast</b>			<b>“Optimistic” Forecast<sup>1</sup></b>		
	<b>Exports</b>	<b>Imports</b>	<b>= Trade Balance</b>	<b>Exports</b>	<b>Imports</b>	<b>= Trade Balance</b>
Levels in 1986	\$208	\$344	-\$136	\$208	\$344	-\$136
Levels in 1989	327	348	-21	327	319	8
CHANGES: 1986-89	119	4	115	119	-25	144

**Panel B: Causes of the Improvement**

	<b>“Pessimistic” Forecast</b>			<b>“Optimistic” Forecast</b>		
	<b>Changes in Exports</b>	<b>Changes in Imports</b>	<b>Changes in the Trade Balance</b>	<b>Changes in Exports</b>	<b>Changes in Imports</b>	<b>Changes in the Trade Balance</b>
Due to income <sup>2</sup>	\$ 37	\$ 57	-\$ 20	\$ 37	\$ 57	-\$ 20
Due to relative prices <sup>3</sup>	82	-33	115	82	-62	144
Due to other factors <sup>4</sup>	0	-20	20	0	-20	20
TOTAL CHANGE	119	4	115	119	-25	144

NOTES: <sup>1</sup> Exports refer to nonagricultural merchandise exports, imports refer to nonpetroleum merchandise imports, and the trade balance refers to the difference between the two.

All calculations in the table are done in the same way. For example, the percentage change in exports due to a change in relative price equals the percentage change in relative price times the elasticity of exports with respect to relative price. Then, since exports in 1986 are known, one can calculate the change in exports due to relative price. The change is calculated based on percentage changes calculated as the difference in logarithms.

<sup>2</sup> Foreign income rises 7.7 percent. Assuming the elasticity of exports with respect to foreign income is 2.1, exports would rise 16 percent, or \$37 billion. U.S. income rises 7.3 percent. Assuming the elasticity of imports with respect to U.S. income is 2.1, imports would rise 15 percent, or \$57 billion.

<sup>3</sup> The relative price of exports has fallen 33 percent. Assuming the elasticity of exports with respect to relative prices is -1.0, exports would rise 33 percent, or \$82 billion. In the pessimistic forecast, the relative price of imports rises 10 percent. Assuming the elasticity of imports with respect to relative price is -1.0, imports would fall 10 percent, or \$33 billion. In the optimistic forecast, the relative price of imports rises 20 percent. Assuming the same elasticity of imports, imports would fall 20 percent, or \$62 billion.

<sup>4</sup> As discussed in the text, other factors are assumed not to change exports and to decrease imports by \$20 billion.

In contrast, the "optimistic" forecast shown in Panel B of Table 2 implies a larger decline in imports and a larger improvement in the trade balance. Reflecting the assumption that the full 60 percent of the decline in the exchange rate that would be predicted on the basis of past relationships is passed through to import prices, this forecast assumes that import prices rise 20 percent. Imports would then decline \$62 billion. Imports decline more and the trade balance improves more in the optimistic forecast because import prices are assumed to rise by more.

To summarize, the decline in the exchange rate should lead to a significant improvement in the trade balance. The amount of improvement in the trade balance due to the exchange rate depends on how much import prices eventually rise. Under the pessimistic assumption that they rise only 10 percent, the trade balance could be expected to improve \$115 billion. But under the more optimistic assumption of a 20 percent increase in import prices, the trade balance could be expected to improve \$144 billion.

In addition to changes in income and the exchange rate, other factors could lead to either greater improvement or less improvement.

### *Other factors*

Factors other than real income and the exchange rate are likely to contribute to a slight improvement in the trade balance. The previous section argued that the LDC debt crisis and the emergence of the NIC's as important international competitors of U.S. firms contributed to the deterioration in the trade balance. Although these two factors will likely contribute somewhat to the improvement in the U.S. trade balance, they will not contribute enough to reverse the entire amount of the worsening of the trade balance they caused earlier in the decade.

The U.S. trade deficit with Latin America should improve somewhat. The improvement

should occur because of faster income growth in Latin America and because of the decline in the value of the dollar. For the traditional reasons, these factors imply that exports to Latin America should pick up and imports from Latin America should recede. Although the LDC debt crisis appears to have stabilized, it is likely to continue in some form.<sup>21</sup> As a result, the U.S. trade deficit with Latin America is not likely to disappear entirely. As long as Latin American countries are required to run trade surpluses to service their debt, the United States will likely run trade deficits with Latin America.

For similar reasons, the U.S. trade balance with the NIC's is likely to retrace only part of the earlier deterioration. The recent decline in the dollar against the NIC currencies should tend to improve the U.S. trade deficit. Also, many of the NIC's are taking actions to reduce their surpluses with the United States by encouraging more imports from the United States.<sup>22</sup> The NIC's will remain formidable competitors for U.S. firms, however, partly because U.S. consumers have become accustomed to buying products from them and because their firms have developed marketing networks in this country. As a result, U.S. deficits with the NIC's will probably not be eliminated altogether.

On balance, the special factors that worsened the trade balance in the early 1980s are likely to

<sup>21</sup> For example, in a letter to Senator William Proxmire on May 5, 1987, Chairman Paul Volcker stated: "In my judgment, a great deal has been accomplished over that period [the past four years], and we are on a broad track that provides better chances for success over time than others . . ."

<sup>22</sup> Between the first quarter of 1985 and the first quarter of 1987, the dollar fell 12 percent against the Taiwan dollar and rose 2 percent against the Korean won. In addition, since the first quarter of 1987, the dollar has fallen an additional 11 percent against the Taiwan dollar. Furthermore, the Taiwan cabinet approved in late May a proposal to cut in half a harbor tax on imports and to impose a tax on exports.

contribute to its improvement in the late 1980s. These factors are not likely to contribute enough to eliminate the U.S. trade deficit entirely. Table 1 shows that the effects of these other factors led to a \$75 billion deterioration in the trade deficit. Assuming only 25 percent of these effects are reversed, these other factors will contribute approximately \$20 billion to the overall improvement in the trade balance.<sup>23</sup> For ease of exposition, it is assumed that these improvements take the form of a \$20 billion decrease in imports, as shown in Table 2.

To summarize the discussion so far, changes in real income at home and abroad, the exchange rate, and other factors suggest that the trade balance could improve by as much as \$144 billion or as little as \$115 billion. These estimates are shown in the final lines of both Panels A and B of Table 2, and simply reflect the changes in exports and imports due to their determinants. Changes in relative prices could cause the trade balance to improve by as much as \$144 billion or as little as \$115 billion. Changes in income at home and abroad should cause the trade balance to deteriorate by \$20 billion. Finally, other factors can be expected to offset the income effect, contributing \$20 billion to deterioration in the trade balance. As a result of these changes, the nonagricultural/nonpetroleum merchandise trade balance could decline sufficiently to lead to an \$8 billion surplus by 1989, or a \$21 billion deficit, as is shown in the second line of Panel A.

### **Has the dollar fallen enough?**

Whether the dollar has fallen enough depends on whether the decline in the trade balance shown

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<sup>23</sup> To prevent double-counting, the \$20 billion improvement represents the improvement in the trade balance associated with these two factors not captured by the income and exchange rate effects. A somewhat arbitrary 25 percent is used for illustrative purposes.

in Table 2 is large enough. There are both political and economic criteria for judging how much of an improvement is enough. The political criteria depend on whether the decline in the trade deficit is sufficient to stave the pressures for protectionist legislation. As long as the trade deficit is perceived as large or as not declining fast enough, political pressures for protectionist measures to limit imports will persist. But if declines in the trade deficit come soon enough, and are large enough, these pressures would diminish. Because resistance to protectionist sentiment is essential for continued worldwide growth and open trading, perceptions of whether the trade deficit is too large should be taken into account in judging whether the improvement in the U.S. trade balance is sufficient.

There are also economic criteria for judging whether the dollar must fall further. An equilibrium level of the dollar implies that the associated trade balance can be sustained. For example, if the decline in the dollar would eventually lead to a \$100 billion trade deficit, most analysts would say the dollar has not fallen enough because such a large deficit is not likely to be sustainable.

Economic criteria suggest that the dollar will probably have to decline further. The logic and evidence for this conclusion will be laid out in this section. The first element of the argument is that the lasting effect of past trade deficits requires that the United States run a surplus in merchandise trade in the future. And according to projections of oil imports and agricultural exports, this surplus must be in the nonagricultural/nonpetroleum component of merchandise trade. Although there are several ways this surplus can be obtained, the most likely is a further decline in the value of the dollar.

### ***Surplus in merchandise trade is needed***

There are two components of the overall trade balance: merchandise trade and services trade.

A major component of the service account is income earned on overseas investments, often called factor income. The United States has traditionally run a surplus in this category because of its net creditor status. The surplus has been declining sharply in recent years, however, as the long string of trade deficits has turned the United States into a net debtor nation. And as the United States goes deeper into debt due to continuing deficits in overall trade, the factor income component of the overall trade balance will turn from surplus to deficit. The larger the trade deficit and the longer it continues, the greater will be the factor income deficit. With the factor income component of the overall trade deficit in deficit because of the debt service burden associated with the recent and prospective trade deficits, merchandise trade, which is the largest component of the nonfactor income trade balance, must eventually be in surplus.

How large the merchandise trade surplus must be depends on the answers to several questions. How large will the overall trade deficit be in the coming years? How long before the overall trade deficit is in balance? And what interest rate should be used to calculate the debt service on the U.S. international debt? According to Paul Krugman and George Hatsopoulos, the factor income deficit will be \$21 billion (current dollars) in 1991. So for overall balance in the trade accounts by 1991, the nonfactor income surplus would have to be \$21 billion (current dollars).<sup>24</sup> Since the nonfac-

<sup>24</sup> See Paul Krugman and George Hatsopoulos, "The Problem of U.S. Competitiveness in Manufacturing," *The New England Economic Review*, Federal Reserve Bank of Boston, January/February 1987, pp. 18-29, for further details. The authors construct a simple model of international trade that allows them to estimate the improvement in the nonfactor income current account that is needed to give current account balance in 1991. They assume gross domestic product (GDP) grows 2.5 percent per year, inflation equals 3 percent, and the real interest rate is 4 percent. They estimate that the nonfactor income current account surplus, in current dollars, must be \$21.6 billion

tor income deficit was \$181 billion in 1986, this implies close to a \$200 billion turnaround in this category by 1991. And since merchandise trade is the major component, it is reasonable to assume that the merchandise trade deficit must decline by about \$175 billion between 1986 and 1989. A turnaround of this magnitude implies that merchandise trade would be in surplus by 1989.<sup>25</sup>

### *Surplus must be in nonagricultural/ nonpetroleum merchandise trade*

There are two ways the merchandise trade account could be in surplus. The nonagricultural/nonpetroleum component of merchandise trade could be in surplus, or the agricultural/petroleum component could be in surplus. Unless agricultural exports rise a great deal or oil imports decline, the only way to achieve a surplus in merchandise trade is to have a surplus in non-agricultural/nonpetroleum merchandise trade.

Evidence suggests that trade in agricultural and petroleum products will remain in deficit for the next several years. Although the exchange value of the dollar is an important factor in determining farm exports, it may not be the most important. According to one study, "U.S. agriculture

in 1991; if the inflation rate is 3 percent, this means the real value is about \$16 billion. If the current account declines linearly from 1986, then U.S. international debt would equal \$532 billion in 1991. As a result, the factor income deficit is 4 percent of the level of international debt in 1991.

<sup>25</sup> By bringing the target date up to 1989, the improvement was reduced to \$175 billion from \$200 billion. If current account balance occurs later than 1991, the improvement in merchandise trade would need to be larger since the total debt would be larger. Of course, the (larger) improvement would come at a later date. However, if the merchandise trade balance is in deficit in 1989, and if the effect of past declines in the dollar is completed by 1989—as assumed in this article—then the merchandise trade deficit will grow after 1989. The reason is that equal growth rates in U.S. and foreign real income mean equal growth rates in imports and exports. But as long as imports exceed exports, the equal growth rates would lead to deterioration in the trade balance.

can hope to find significant growth in exports only through improving economies in the developing world.''<sup>26</sup> Forecasts by DRI confirm this expectation of slow growth in farm exports. These forecasts imply that farm exports will average \$37 billion in 1988-90, up only modestly from the \$27 billion average in 1984-86. DRI also predicts that oil imports will average \$84 billion in 1988-90, up significantly from the \$66 billion average in 1984-86. As a result, the trade deficit for agricultural and petroleum products will rise from \$39 billion in 1986 to about \$47 billion in 1989.

Since a surplus in merchandise trade will not come from a rise in farm exports or a decline in oil imports, it must come from an improvement in nonagricultural/nonpetroleum trade. The previous subsection argued that the merchandise trade deficit must decline by \$175 billion by 1989. Adding the projected \$8 billion worsening of the agricultural/petroleum trade deficit yields a projection that the nonagricultural/nonpetroleum trade surplus must improve by \$183 billion.

With no further declines in the dollar, the non-agricultural/nonpetroleum trade balance must, therefore, decline even more than in the optimistic forecast in Table 2. According to that forecast, the nonagricultural/nonpetroleum component of the trade balance would improve only \$144 billion even if most of the exchange rate changes that have occurred so far are eventually reflected in import and export prices. Yet the nonagricultural/nonpetroleum component of merchandise trade must decline by substantially more than this to achieve the required decline of \$183 billion.

### *How to achieve the necessary surplus*

There are at least four ways to get such an additional improvement in the trade balance. U.S. real GNP could grow more slowly, reducing the

growth of imports, or foreign real GNP could grow faster, increasing the growth of exports. Alternatively, such other factors as solution of the LDC debt problem could lead to a larger turnaround in the nonagricultural/nonpetroleum trade balance than is generally thought likely. Or finally, the exchange value of the dollar could fall further, causing further increases in import prices and further declines in export prices, which would lead to more exports and fewer imports. Any combination of these possibilities could lead to the additional reduction in the nonagricultural/nonpetroleum merchandise trade deficit that is projected to be necessary for overall balance of trade equilibrium.

### **Conclusions**

The deterioration in the trade balance between 1980 and 1986 was a macroeconomic phenomenon. Several macroeconomic factors that account for the deterioration were identified in the first section. Chief among them was the loss of U.S. price competitiveness associated with the rise in the value of the dollar. Other factors include the debt servicing problems of Latin America and the increased competitiveness of the Asian NIC's. Underlying these developments were several macroeconomic imbalances, including the saving-investment imbalance due to large government budget deficits.

Although the trade deficit is expected to decline significantly, further macroeconomic efforts are needed to reduce the trade deficit further. While increased productivity would improve living standards in the United States, it would not significantly affect the trade deficit over the next few years. Macroeconomic coordination was successful in reducing the value of the dollar from its high in early 1985. The second section showed that with no further declines in the dollar, the non-agricultural/nonpetroleum merchandise trade deficit could optimistically decline by \$144 billion.

<sup>26</sup> See Henneberry, Drabentott, and Henneberry, p. 34.

However, the lasting effects of past trade deficits implies that this measure of the trade deficit needs to decline substantially more to pay the interest on the buildup of international debt.

Therefore, further efforts are needed to reduce the trade imbalance. The overall strategy is to reduce the U.S. trade deficit while avoiding protectionism and maintaining noninflationary growth at home and abroad. In furtherance of this strategy, the Federal Reserve and the Administration have urged foreign industrial countries to stimulate their economies, as a way to reduce the trade imbalance. But the outlook for foreign economic growth remains uncertain. Unless macroeconomic policies to stimulate faster growth abroad are adopted, either the U.S. economy will

have to grow slower or the dollar will have to fall further to eliminate the U.S. trade deficit. Since few would recommend slower U.S. growth, the most likely way to achieve an additional reduction in the merchandise trade deficit is through a lower value of the dollar, which would stimulate exports and retard imports.

More fundamentally, a reduction in the trade balance may require a reduction in the federal government budget deficit. The rise in the dollar during the early 1980s is thought by many to be due in large part to the burgeoning federal budget deficits. And without improvement in this area, significant and sustainable reductions in the trade deficit will be hard to come by without disruption in the U.S. capital market.

# Employment Indicators Of Economic Activity

By Glenn H. Miller, Jr.

Employment data are widely used in assessing current economic conditions and short-run prospects for the economy. In such use, measures of employment and estimates of changes in employment serve as indicators of the current behavior of, and near-term prospects for, overall economic activity.

In the first week of June, the Bureau of Labor Statistics (BLS) released U.S. labor market data for May that showed an increase in *total civilian employment* of 612,000 since April, an increase at an annual rate of about 6.6 percent. The same release reported a May increase of 123,000 in *nonfarm payroll employment*, a 1.4 percent gain at an annual rate. Such divergences raise questions about which of these two measures is the more reliable indicator of economic activity. For example, in late 1986, *Business Week* commented as follows in an article headed "Two Labor Market Indicators Are At Odds Once Again."

Which of the two employment measures published each month do you believe? Most economists favor the measure based on business payroll records. The other measure is based on responses to a monthly survey of households across the nation. Although the two employment gauges frequently give different readings for several months at a time, they tend to move in tandem in the long run.<sup>1</sup>

The two measures of employment—the household measure and the payroll measure—are independently derived series published monthly by the BLS. The two series are complementary, as each attempts to represent different aspects of the employment situation. Significant differences sometimes appear between the levels of the two measures, or changes in them, though they necessarily represent the same underlying economic circumstances.

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<sup>1</sup> *Business Week*, December 22, 1986, pp. 13-14.

This article examines the two measures of employment and contrasts their differences in concept, coverage, and other factors that might contribute to their divergences. The article then discusses the relationship between relative changes in the two measures in the short run and over somewhat longer periods. Finally, the article examines changes in the two measures as indicators of the current condition of the economy and addresses the question of which measure, when used alone, is the better indicator of the economy's current condition. The article concludes that changes in the payroll measure are generally better indicators of changes in economic activity over short periods than are changes in the household measure.

### **Differences between the two employment measures**

The two measures of employment differ partly because the information is collected from different sources. The household measure of employment is based on interviews with a sample of households across the country. The payroll measure of employment is based on payroll records of businesses and government records. Another important difference is that the household measure estimates the number of workers while the payroll measure estimates the number of jobs.

#### *The household measure*

The household measure of employment is produced for the BLS from the Census Bureau's monthly *Current Population Survey*. A sample of nearly 60,000 households in all 50 states and the District of Columbia is used to represent the nation's civilian noninstitutional population. Interviews are conducted to determine the employment status and certain other characteristics of all members of the household at least 16 years old. Information is collected for the week that includes the

twelfth day of the month, called the survey week.

Household members are identified as employed if, during the survey week, they worked at all as paid employees, were self-employed, or worked 15 hours or more without pay in a family enterprise. Also identified as employed are members of the household that did not work during the survey week but were only temporarily absent from their jobs or businesses because of illness, vacations, bad weather, strikes, or personal reasons.

The household measure is an estimate of the number of workers because every employed person is counted only once. People with more than one job are identified with the job in which they worked the most hours during the survey week. Members of the Armed Forces stationed in the United States may or may not be included in the household measure of employment. When they are included, the measure is called total employment. When they are not, the measure is called total civilian employment.

#### *The payroll measure*

The payroll measure of employment is produced by the BLS in cooperation with state agencies from monthly reports of the number of workers on the payrolls of a large sample of non-agricultural establishments across the country. Both full-time and part-time employees are included, and data on hours and earnings are also collected. The employment data are for the pay period that includes the twelfth day of the month, except that federal government workers are counted as of the last day of the month.

The payroll measure excludes proprietors and the self-employed, unpaid family workers, farm workers, domestic workers, and members of the Armed Forces. People on establishment payrolls during any part of the pay period are counted as employed. Thus, people on paid sick leave, paid vacation, or paid holiday are considered employed, as are people receiving pay for part

of the period, even though they might be on strike or unemployed for another part of the period. Persons on layoff, on leave without pay, or on strike for the full pay period are not counted as employed. Neither are workers that have been hired but have not yet reported for work.

The sample used for estimating payroll employment involves "the largest monthly sampling operation in the field of social statistics."<sup>2</sup> The current sample of about 243,000 establishments covers about 40 percent of all nonagricultural employees. This sample is designed to bring large establishments into the sample with certainty and to include an appropriate number of other establishments based on the distribution of employment between large and small establishments. Estimates of payroll employment are compared with comprehensive counts of employment, or benchmarks, that are not available as often as the monthly estimates. Estimates of payroll employment normally are adjusted to these benchmarks every year.

The payroll measure of employment is an estimate of the number of jobs because persons working more than one job during the pay period are counted every time their names appear on payrolls. Only civilian employees of governments are included in the payroll measure, except that certain employees of federal intelligence agencies are excluded along with military personnel.

### *The two measures compared*

Table 1 shows average annual employment in 1986 according to the household and payroll measures. A comparison of the two measures at the highest level of aggregation, with Armed Forces personnel excluded, shows that the household measure of total civilian employment was

**TABLE 1**  
**Household and payroll measures**  
**of employment, 1986**  
(in thousands)

<b>Household Measure</b>	
Total Civilian Employment	109,597
Agriculture*	3,163
Nonagricultural Industries	106,435
Self-employed workers	7,881
Unpaid family workers	255
Wage and salary workers	98,299
<b>Payroll Measure</b>	
Workers on nonagricultural payrolls	100,167

\*Includes self-employed workers, unpaid family workers, and wage and salary workers

Source: Bureau of Labor Statistics

109.6 million, thereby exceeding the 100.2 million workers on nonagricultural payrolls by about 9.4 million, or about 9.4 percent.

As noted earlier, the household measure is the more comprehensive of the two. Total civilian employment includes employment in agriculture, which is excluded from the payroll measure. Also excluded from the payroll measure but included in the household measure of total civilian employment are self-employed workers and unpaid family workers in nonagricultural industries. Data on these components of total civilian employment are published regularly. Subtracting the number of workers in these categories from total civilian employment provides a household measure of wage and salary workers in nonagricultural industries. This household measure, which is also reported regularly by the BLS, is more comparable in coverage to the payroll measure of workers on nonagricultural payrolls. Table 1 shows that in 1986 the 100.2 million workers on

<sup>2</sup> "Explanatory Notes," *Employment and Earnings*, U.S. Department of Labor, Bureau of Labor Statistics, March 1987, p. 141.

nonagricultural payrolls was about 1.9 million, or nearly 2 percent, more than the number of wage and salary workers in nonagricultural industries given by the household measure.<sup>3</sup>

There are other possible reasons for differences between these two measures, and some of these reasons are discussed below. But, as noted in Gloria Green's comprehensive discussion of the differences between the household and establishment data, "no attempt at reconciliation provides a complete answer accounting for all of the factors that influence the levels of the two series."<sup>4</sup>

*Multiple jobholding.* The household survey results in estimates that identify the employment status of every member of the civilian noninstitutional population as employed, unemployed, or not in the labor force. Thus, every person is counted only once—the household measure counts workers. For purposes of identifying such things as the industrial or occupational status of people with more than one job, employed people are classified according to the job in which they worked the most hours during the survey week.

The payroll measure, on the other hand, counts jobs not workers. A person is counted and included in the payroll measure every time his or her name appears on a payroll. This conceptual difference in the two measures helps account for the payroll measure being larger than the adjusted household measure of wage and salary workers in nonagricultural industries.

Many kinds of multiple job counting add to the payroll measure of employment. Some people in

the civilian noninstitutional population may hold more than one job. Some Armed Forces personnel, not included in the household survey, may hold part-time jobs in the private economy when they are off duty. And some teachers paid on a 12-month basis may have other jobs during the summer.

Some workers may change jobs in such a way that allows both their old and new jobs to be counted in one payroll survey. While the household measure includes workers employed any time during the survey week that includes the twelfth of the month, the payroll measure counts workers on payrolls at any time during the pay period that includes the twelfth of the month. The pay period might be a week or it might be two weeks, half a month, or a full month. This difference between the survey periods for the two measures increases the likelihood that job changing contributes to making the payroll measure larger than the household measure of nonagricultural wage and salary workers.<sup>5</sup>

*Unpaid absences.* Another difference in the size of the two measures results from the difference in their treatment of workers absent from their jobs during the full survey period. Both measures include those absent from work but paid by their employers. The household measure also counts people as employed if they are temporarily absent from work for any of a variety of reasons, even if they are not being paid. The payroll measure, however, does not count as employed people absent without pay for the whole pay period. For example, a person absent without pay for the full survey period because of a labor-management dispute would be included in the household measure of employment but not in the payroll measure.

<sup>3</sup> Over the 15 years ended in 1986, the household measure of total civilian employment annually exceeded the number of workers on nonagricultural payrolls by an average of nearly 11 percent. Over the same period, the payroll measure averaged just over 1 percent larger than the household measure of wage and salary workers in nonagricultural industries.

<sup>4</sup> Gloria P. Green, "Comparing Employment Estimates from Household and Payroll Surveys," *Monthly Labor Review*, U.S. Department of Labor, December 1969, pp. 9-10.

<sup>5</sup> For further discussion of job changing and the payroll measure, see Alexander Korns, "Cyclical Fluctuations in the Difference Between the Payroll and Household Measures of Employment," *Survey of Current Business*, U.S. Department of Commerce, May 1979, pp. 19-21.

The different treatment of unpaid absences contributes to the household measure being larger than the payroll measure.

*Other factors.* Other factors also may influence the size of the two measures. The household measure records the employment status of the civilian noninstitutional population age 16 and over, while there are no age limits for the payroll measure.

The household measure results from surveys using a sample designed to represent the civilian noninstitutional population. Current population estimates based on projections from the decennial population censuses are used as controls for the household survey sample. Thus the current population estimates depend on the completeness and accuracy of the censuses, and undercounts in the decennial censuses can affect the household employment measures resulting from the survey. The payroll measure is not affected the same way because it does not depend on probability population controls.

As noted earlier, employment estimates from the payroll measure are adjusted annually to benchmarks. Benchmark employment information comes primarily from data compiled from reports required under unemployment insurance laws, supplemented by social security records and other sources. Benchmark data are especially important in establishing payroll employment levels. Thus, the accuracy of the payroll measure depends heavily on the accuracy of the benchmarks, which may themselves be subject to various problems. As Green has said,

The possibility of error in the population censuses or the unemployment insurance benchmarks cannot be disregarded. There is no "true" total against which the accuracy of either can be measured. Although the benchmark data and the population totals are among the best statistical measures available, . . . neither is perfect.<sup>6</sup>

## **The relationship between changes in the measures**

Given the differences in the sampling, collection, and estimation techniques used in the two employment measures, it is not surprising that their levels differ or that they cannot be completely reconciled, although adjustments can be made to account for some of the differences. Differences in the two series are also seen when changes in employment, rather than levels, are examined. Month-to-month changes in the two measures may differ not just in size but even in direction of movement. Such discrepancies in short-run changes tend to be reduced, however, when changes in the measures are compared over longer periods. For example, the household series on total civilian employment and on wage and salary workers in nonagricultural industries declined 335,000 and 252,000, respectively, from January to February 1986 while the payroll measure increased about 133,000. Over the 12 months from February 1985 to February 1986, however, all three of these measures increased. Total civilian employment increased by nearly 2.0 million, the household measure of wage and salary workers in nonagricultural industries by 2.3 million, and the payroll measure by 2.9 million.

Although this illustration fits the conventional wisdom, it does not by itself prove that there is little relationship between the month-to-month changes in the household and payroll measures but a much closer relationship between changes over longer periods. More data and more formal

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<sup>6</sup> For more detailed discussion of differences in the levels of the two measures, see Gloria P. Green, "Comparing Employment Estimates from Household and Payroll Surveys." For further information on definitions and statistical procedures used in both measures, see "Explanatory Notes" in a recent issue of *Employment and Earnings*, for example, pp. 119-143, in the March 1987 issue.

testing of the relationship are needed to provide more reliable information.

The following data were collected in a search for more reliable information: seasonally adjusted employment by month from January 1948 through December 1986 for the household measure of total civilian employment (HTCE), the household measure of wage and salary workers in nonagricultural industries (HWSW), and the payroll measure of employees on nonagricultural payrolls (PME). To compare relative changes over very short-run and somewhat longer run periods, percentage changes at an annual rate in each of the three series were computed from one month earlier, from one quarter earlier (quarterly averages of monthly data), and from 12 months earlier. Correlation coefficients were then computed to measure the closeness of the relationship of percentage changes in the payroll measure with percentage changes in each of the two household measures. Correlation coefficients vary in size from one, when the values of the two variables being compared coincide exactly, to zero, when there is no relationship at all between the variables. Thus, the closer the relationship between percentage changes in two employment measures, the larger the correlation coefficient.

Correlation coefficients for PME and HTCE, and for PME and HWSW are shown in Table 2. The table contains information that helps answer three questions. Are percentage changes in the two employment measures related less closely in the very short run than in the longer run? Is the closeness of the relationships different in the 1980s from earlier in the post-World War II period? Are changes in the payroll measure of employment related substantially more closely to changes in the household measure of wage and salary workers in nonagricultural industries than to changes in the household measure of total civilian employment?

Percentage changes in the payroll measure are not as closely related to percentage changes in

the household measures over very short (month-to-month) periods as over longer periods. There is clearly less correlation between monthly changes than between quarterly changes and even less correlation between monthly changes than between changes from 12 months earlier. The comparisons hold for the correlation of PME with both HTCE and HWSW. The comparisons also hold for the full period 1948 through 1986 and for both subperiods examined.

There has been a concern that the two employment measures have diverged more than usual in this business cycle.<sup>7</sup> But the correlation analysis shows that the relationship between percentage changes in the two employment measures has been somewhat closer in the 1980s than earlier in the post-World War II period. The closer relationship in the 1980s holds for both month-to-month changes and the longer run changes. It also holds for comparisons of PME with both HTCE and HWSW. Statistical tests suggest, however, that the apparent closer relationships between the household and payroll measures in the 1980s are generally not statistically significant.

Changes in the payroll measure of employment do not appear to be substantially more closely related to changes in the household measure adjusted for coverage differences (HWSW) than to changes in the broader household measure (HTCE). This apparent lack of a closer relationship holds for comparisons of monthly, quarterly, and 12-month changes. This lack also holds for comparisons over the full period and both subperiods.

Simple correlation analysis shows that month-to-month changes in the payroll and household measures of employment are much less closely related than changes over longer periods of time. Changes in the payroll measure over the full period and both subperiods do not appear to be

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<sup>7</sup> *Business Week*, December 22, 1986, p. 13.

**TABLE 2**  
**Correlation coefficients between percentage changes**  
**in employment measures, 1948-86**

<b>Total Civilian Employment—Household Series and Nonagricultural Payroll Employment—Establishment Series</b>			
	<u>1948 Jan/Q1 to 1986 Dec/Q4</u>	<u>1948 Jan/Q1 to 1979 Dec/Q4</u>	<u>1980 Jan/Q1 to 1986 Dec/Q4</u>
Percent change from 1 month earlier	0.41	0.40	0.51
Percent change from 1 quarter earlier*	0.76	0.75	0.84
Percent change from 12 months earlier	0.87	0.86	0.93
<b>Nonagricultural Wage and Salary Employment—Household Series and Nonagricultural Payroll Employment—Establishment Series</b>			
	<u>1948 Jan/Q1 to 1986 Dec/Q4</u>	<u>1948 Jan/Q1 to 1979 Dec/Q4</u>	<u>1980 Jan/Q1 to 1986 Dec/Q4</u>
Percent change from 1 month earlier	0.45	0.44	0.56
Percent change from 1 quarter earlier*	0.78	0.77	0.87
Percent change from 12 months earlier	0.92	0.91	0.96
*Quarterly averages of monthly data			

much more closely related to changes in the household measure adjusted for coverage differences than for the broader household measure. And the payroll measure appears to be somewhat more closely related to both household measures in the 1980s than earlier. The less-than-perfect relationship between changes in the employment measures suggests that one measure may be more closely related than the other to changes in overall

economic activity, particularly in the short run. This issue will be discussed in the following section.

**The two measures  
as indicators of economic activity**

The most up-to-date data available on economic activity are always in demand by analysts of cur-

rent economic conditions and short-run prospects for the economy. Data on employment, as well as other labor market data, are among the first available every month or every quarter. As a result, analysts tend to rely heavily on employment data as an indicator until other data are available some weeks later, and to infer from employment data something about the coincident behavior of overall economic activity.

One approach, which emphasizes the determination of business cycle turning points, identifies comprehensive measures of employment as roughly coincident cyclical indicators of overall economic activity. The cyclical indicator approach to the analysis of business conditions and prospects is used in the U.S. Department of Commerce publication *Business Conditions Digest (BCD)*. In its primary set of comprehensive employment indicators, that publication uses both the payroll measure of employment and a household survey series called "persons engaged in nonagricultural activities."<sup>8</sup> The payroll measure of employment is one of four series included in the BCD composite Index of Coincident Indicators. Turning points in those four series—including the payroll measure of employment—roughly coincide with cyclical turning points in overall economic activity, and "have served as the primary observations for estimating the reference dates of business cycle peaks and troughs."<sup>9</sup> The payroll measure of employment is also identified as the best coincident indicator in the employment and unemployment group of indicators.<sup>10</sup>

<sup>8</sup> The household measure of wage and salary workers in non-agricultural industries used in this article (HWSW) plus self-employed workers and unpaid family workers in nonagricultural industries equals the BCD series "persons engaged in nonagricultural activities."

<sup>9</sup> Victor Zarnowitz and Charlotte Boschan, "New Composite Indexes of Coincident and Lagging Indicators," Appendix 2, *Handbook of Cyclical Indicators*, U.S. Department of Commerce, Bureau of Economic Analysis, 1977, p. 185.

A different approach examines monthly changes in employment to assess changes in industrial production or personal income to be reported later in the month or to assess the change in gross national product (GNP) to be reported later in a quarter after a quarterly average change in employment can be computed. As shown earlier, simple correlation analysis supports the conventional wisdom that quarter-to-quarter changes in the two employment measures are not perfectly related and that month-to-month changes are considerably less related. Since the two employment measures move differently over short periods of time, which is the better indicator until more information is available?

Regression analysis was used to find the employment measure that better explains same-period changes in overall economic activity. Thus, month-to-month percentage changes in the payroll measure and the two household measures were each used alone to explain same-month percentage changes in the index of industrial production and in real personal income. Quarter-to-quarter percentage changes in the employment measures were also used to explain same-quarter changes in real GNP as well as changes in industrial production and real personal income. The comparisons were made in terms of how much of the observed percentage changes in GNP, personal income, and industrial production are accounted for by percentage changes in each of the employment measures. That is, a comparison was made of the sizes of the coefficients of deter-

<sup>10</sup> This identification results from the use of an indicators scoring system that evaluates series according to seven criteria: timing, conformity, smoothness, currency, statistical adequacy, economic significance, and revisions. Scores for the series are based on their performance over business cycles between 1948 and 1980, and are shown in *Handbook of Cyclical Indicators*, 1984, Table 7, p. 169. For an explanation of the scoring system see Zarnowitz and Boschan in *Handbook of Cyclical Indicators*, 1977.

**TABLE 3**  
**Coefficients of determination ( $R^2$ 's)**  
**for regression of measures of economic activity on measures of employment,**  
**percentage changes from one month earlier, 1948-86**

<u>Dependent Variable</u>	<u>Independent Variable</u>	<u><math>R^2</math></u>		
		<u>1948-86</u>	<u>1948-79</u>	<u>1980-86</u>
Index of Industrial Production	PME	.51	.53	.39
	HTCE	.12	.11	.16
	HWSW	.10	.09	.14
Real Personal Income	PME	.14	.14	.13
	HTCE	.01	.01	.01
	HWSW	.02	.02	.00

PME —Payroll measure of nonagricultural employment  
HTCE—Household measure of total civilian employment  
HWSW—Household measure of wage and salary workers in nonagricultural industries

mination produced by the regression analyses (the  $R^2$ 's). Comparisons are made for the full period 1948-86, for the 1980s, and for the period 1948-79. Finally, tests were performed to see if the differences between the 1980s and the earlier period were statistically significant.

Table 3 shows  $R^2$ 's for the regressions of month-to-month percentage changes in industrial production and real personal income on percentage changes in the payroll measure and two household measures of employment. About 40 to 50 percent of the monthly percentage changes in industrial production is explained by percentage changes in the payroll measure, compared with about 10 to 15 percent that is explained by changes in the household measures. These comparisons suggest that percentage changes in the payroll measure are relatively good indicators of same-month changes in industrial production and substantially better indicators than changes in either of the household measures. As the lower section of Table 3 shows, none of the employment measures are good indicators of monthly

changes in real personal income, but the payroll measure is better than the household measures.

Table 4 shows  $R^2$ 's for the regression of quarter-to-quarter percentage changes in industrial production, real personal income, and real GNP on percentage changes in the payroll measure and the two household measures of employment. Quarterly changes in all the employment measures are better indicators of changes in output and income than are monthly changes. And as might be expected from the earlier discussion, differences in the  $R^2$ 's between the payroll and household equations are less for quarterly changes than for monthly changes. All three employment measures are least useful as indicators of changes in real personal income. Comparisons of the  $R^2$ 's show that in nearly all instances the payroll measure remains a more reliable indicator than the household measures. The exceptions are the cases of industrial production and real GNP in the 1980-86 period, when the sizes of the  $R^2$ 's are virtually the same for all three employment measures.<sup>11</sup>

**TABLE 4**  
**Coefficients of determination ( $R^2$ 's)**  
**for regression of measures of economic activity on measures of employment,**  
**percentage changes from one quarter earlier, 1948-86**

<u>Dependent Variable</u>	<u>Independent Variable</u>	<u><math>R^2</math></u>		
		<u>1948-86</u>	<u>1948-79</u>	<u>1980-86</u>
Index of Industrial Production	PME	.67	.68	.60
	HTCE	.40	.37	.58
	HWSW	.43	.40	.56
Real Personal Income	PME	.24	.22	.33
	HTCE	.10	.08	.20
	HWSW	.17	.15	.20
Real GNP	PME	.50	.48	.58
	HTCE	.29	.24	.59
	HWSW	.34	.30	.57

PME —Payroll measure of nonagricultural employment  
HTCE—Household measure of total civilian employment  
HWSW—Household measure of wage and salary workers in nonagricultural industries

<sup>11</sup> Two other analytical approaches tend to support the conclusion that the payroll measure is a more reliable indicator than the household measures. In one approach, all the regressions were run with two independent variables, PME and either HTCE or HWSW. Adding a household measure variable did not increase the  $R^2$ , nor was its contribution statistically significant, in any of the regressions dealing with changes from one month earlier. The same was true for changes from one quarter earlier, except in the cases of industrial production and GNP in the 1980-86 period. In those instances, the  $R^2$ 's were increased very slightly by the addition of a household measure as a second independent variable, and the HTCE variable was close to being statistically significant. Still, this extension of the analysis generally supports the view that the payroll measure of employment is a more reliable indicator of short-run, same-period changes in output and income.

In the second approach, the regression equations from the 1948-79 period were used to predict the monthly and quarterly percent changes in output and income in the 1980-86 period. Predicted values were compared with actual values and the better predictor was identified in each instance. In all but one instance, the payroll measure's prediction was closer in more than half the comparisons to the actual change in output or income than

It is not clear from looking at Tables 3 and 4, however, whether the differences in the values of  $R^2$  between the 1980s and the earlier period are true differences. A statistical test can be used to determine whether observations on the variables in the 1980s are from the same population as those from the earlier period. Application of the test to all the relationships shown in the tables

either household measure's prediction. Test results show that in three instances the payroll measure's better predictions were statistically significant at either the 10 percent or the 5 percent confidence level. Thus, based on relationships established earlier in the postwar period, changes in the payroll measure provided better predictions of changes in the output and income measures in the 1980s than did changes in the household measures, further supporting the conclusion that the payroll measure is a more reliable indicator.

reveals no statistically significant difference between comparable  $R^2$ 's for the 1980s and the earlier period. Thus, while the relationships between the employment measures and the other measures of economic activity may be changing in the 1980s, there is not yet firm evidence that such a change has occurred.<sup>12</sup>

### **Summary and conclusions**

Comprehensive measures of employment are good indicators of economic activity. There are two independently derived measures of employment in the United States—the household measure and the payroll measure. Differences between these measures—both in levels and changes—can arise from several sources, such as conceptual differences in the measures, differences in coverage, and differences in how the data are collected and estimates made. Some but not all of the differ-

ences can be reconciled, as for example, by adjusting for coverage differences.

Correlation analysis of data from 1948 through 1986 makes clear that changes in the household and payroll employment measures are somewhat related, though not perfectly, and that monthly changes are much less closely related than changes over longer periods of time. Because the measures move differently over short periods, it might be better to rely on one or the other as an indicator.

Regression analysis over the same years suggests that percentage changes in the payroll measure are relatively good indicators of changes in industrial production and real GNP over short periods, and generally better than changes in the household measures. Statistical tests also show no significant difference between the 1980s and the earlier post-World War II period in the explanatory power of the various employment measures.

While employment changes alone are not the best predictors of same-period changes in overall economic activity, better inferences about changes in economic activity can be made by examining changes in the payroll measure than changes in the household measure of employment.

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<sup>12</sup> The test used is the "Chow test." See Jan Kmenta, *Elements of Econometrics*, Second Edition, Macmillan Publishing Co., New York, 1986, pp. 420-421.



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