

Research Department  
Federal Reserve  
Bank of  
San Francisco

April 13, 1984

## Inflation and Capacity

Recent economic strength has been greater than most analysts had anticipated. According to the Commerce Department's flash report, real GNP increased at an annual rate of 7.2 percent in the first quarter. This rate is well above the 5.0 percent rise in the fourth quarter of 1983, and is higher than the 6.0 to 6.5 percent growth most forecasters were anticipating. Many people are concerned that this strength means that the economy may be growing too rapidly—becoming overheated, in other words—and that this overheating will raise interest rates and renew inflation.

The capacity utilization rate is a particularly helpful measure in judging whether the economy is overheating because it is possible to identify a rate of capacity utilization that, if maintained, is consistent with no increase (or decrease) in inflation. Factory operating rates above this "threshold" utilization rate are associated with increasing inflation, and below it, with decreasing inflation.

Between January and February of this year, capacity utilization in U.S. manufacturing firms increased from 80 to 81 percent. February's operating rate is no cause for alarm, however. In the past, we have experienced that level without touching off an upsurge in inflation. Our concern lies in how much farther that rate can rise without increasing inflationary pressures.

**Stable-inflation capacity utilization rate**  
Our research indicates that a capacity utilization rate of 82 percent is consistent with stable inflation, i.e., with no increase or decrease in inflation. We estimated this "threshold" rate for the periods from 1954 through 1973, then through 1977, and finally through 1982. These were periods in which the U.S. economy experienced a variety of economic shocks, such as the Vietnam War, wage and price controls, and

OPEC price increases, as well as progressively higher and more variable inflation. Therefore, these periods are good alternatives with which to test whether the "threshold" utilization rate had changed through time. We found that it has remained constant at 82 percent through the changing economic conditions since 1954.

The accompanying chart illustrates the association between year-over-year changes in the inflation rate and the level of capacity utilization. The tendency we observe is for inflation to decline when capacity utilization averages below 82 percent, as in 1982 and 1983, and to increase when the operating rate is above that value. Around 82 percent, and within the shaded interval, we observe relatively small changes in the inflation rate, but no general tendency for inflation to rise or fall. The exceptions to this general tendency, as in 1972 and 1975, can be traced to outside shocks such as wage and price controls in the former period and OPEC price changes in the latter.

The shaded area indicates that there is a zone or range of capacity-utilization rates, centered around 82 percent, within which there is no observable tendency for inflation to increase or decrease. This range reflects the fact that the 82 percent threshold rate is a statistical estimate. The true rate may differ from this estimate because of sampling error. But it is possible to calculate a range of utilization rates within which there is a high probability the true rate will lie. As the chart indicates, there is a high probability the threshold rate is somewhere between 80 and 83.5 percent. This zone of uncertainty about the true threshold rate is relatively narrow, compared to the wide range of observed utilization rates in the post-war period which have varied on an annual basis from as low as 69.0 percent to as high as 91.1 percent. Thus, it is possible to pinpoint the

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potential threshold rate with a relatively high degree of accuracy.

### Other inflation influences

The capacity utilization rate is used to gauge the extent of upward cost pressures caused by an expanding economy. However, outside "shocks" also can affect the inflation rate, at least temporarily. For the past ten years, the U.S. economy has been jolted first by energy price increases and then, more recently, by unexpected reductions in OPEC prices. Because of worldwide energy conservation, due in part to modest economic growth that has checked demand, OPEC may not change its prices very much in the next year or so. Food prices may increase this year as a result of the 1983 drought and severe winter weather, but the amount they will contribute to inflation in 1984 is small—about 0.4 percent. Barring any other outside shocks, the major changes in inflation this year and next will be related to business cost pressures as economic expansion continues, and these pressures may be measured by the spread between capacity utilization and its "threshold" rate.

### Overheating?

The question of whether the economy is overheating may be addressed by asking what operating rates would prevail if the economy grows about 5.0 percent over the four quarters of this year and about 3.5 percent next year, as most analysts forecast. This pattern, of course, suggests that real GNP growth slows down this year from its rapid pace in the first quarter. These yearly growth rates are likely to lead to an average capacity utilization rate of about 82 percent in 1984 and 83.5 percent in 1985, according to our calculations. Compared with the critical value of 82 percent, these rates are consistent with no rise in inflation this year (excepting what food price increases may contribute) and a possible increase next year—possible, because 83.5 percent is on the margin of the threshold range. The inflation risk, of course, increases for both this year and next if real GNP growth is

greater than what we have assumed. As a rough rule of thumb, one percentage point more real growth in either 1984 or 1985 would increase capacity utilization about 1 percentage point, raising the probability the economy would be pushed into the rising-inflation zone.

According to this analysis, overheating that risks renewed inflation is not likely to occur in 1984 if the economy slows from the strong first quarter pace. Once reached, to maintain an average 82 percent operating rate and hence to avoid increasing inflation, the economy should grow at roughly its longer-run or potential rate, which most analysts contend is about three percent for the next several years.

### Pricing decisions

The positive correlation between inflation and capacity utilization that we have observed empirically is also one suggested by economic concepts regarding market pricing behavior. According to these concepts, firms set prices as a mark-up over their production costs. The size of the mark-up depends upon demand pressures on the existing capacity of the firm. As these pressures build and utilization rates increase, firms raise their mark-up on costs. An increase in the mark-up during periods of increasing demand may also reflect non-competitive pricing behavior by firms that feel they can raise prices without a serious loss in sales.

The major costs for most firms are wages. Wages depend on expectations of future prices by labor and business, the productivity of labor and demand pressures in labor markets. Economists typically use the deviation of the unemployment rate from its long-run equilibrium value (often called the full-employment or natural rate of unemployment) to measure the amount of pressure in labor markets. Unemployment rates below the natural rate mean tight labor markets and upward pressures on wage costs. Unemployment rates above

the natural rate mean slower growth in wage costs.

Thus both reductions in unemployment (reflecting tightness in labor markets) and increases in capacity utilization (reflecting growing final product demand) are indicators of rising inflation. In practice, capacity utilization and unemployment generally give the same signal because higher utilization rates are associated with lower unemployment so that either measure alone may be an adequate indicator. The negative relationship between unemployment and inflation, popularly known as the Phillips Curve, has received wide attention. The capacity utilization rate, however, may be a more reliable indicator of inflation than the unemployment rate. As the discussion earlier indicated, the estimated threshold capacity utilization rate appears to have remained unchanged over time, giving one some confidence that it remains a reliable standard against which to assess the current inflationary situation.

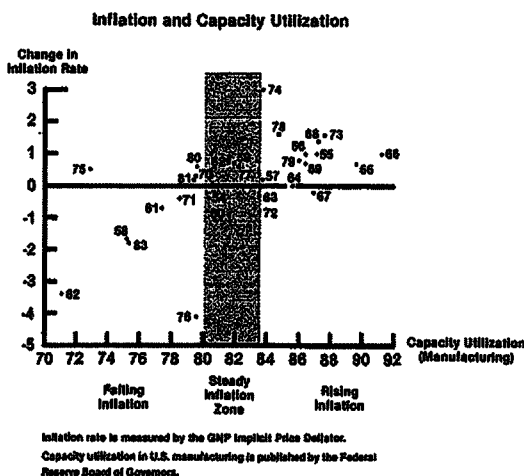
In contrast, there is a good deal of uncertainty surrounding the estimate of the stable-inflation unemployment rate. Economists agree that rate has probably been increasing over the past 40 years, but they have disagreed over the extent of increase largely because there is no consensus on the determinants of the natural

rate. Some economists have argued this uncertainty has led to some inflationary bias in past policy decisions. There was a natural tendency, they argued, to err on the side of underestimating the unemployment rate consistent with stable inflation and therefore to advocate policies which in retrospect were too stimulative and inflationary. If this assessment were correct, the use of capacity utilization rates to gauge inflationary pressures may be helpful as an independent check on the inflation assessments made by looking at unemployment measures.

### Conclusion

Some analysts have shunned the use of the capacity utilization data because they contend that it is not a utilization rate in some absolute, or engineering sense, but depends to a degree on the judgment of the business persons providing the data. This may be true but, like inflation expectations which are difficult to measure, capacity utilization is an economic concept bearing on pricing decisions. It may be a virtue of the capacity utilization data series that it contains a judgment by the business firm of its excess demands. And, importantly, the series has had a stable and close relationship with changes in the inflation rate over time. It therefore merits serious consideration as an inflationary signal.

Rose McElhattan



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**BANKING DATA—TWELFTH FEDERAL RESERVE DISTRICT**

(Dollar amounts in millions)

| Selected Assets and Liabilities<br>Large Commercial Banks | Amount<br>Outstanding<br>3/28/84 | Change<br>from<br>3/21/84       | Change from 12/28/83 |                       |
|---|----------------------------------|---------------------------------|----------------------|-----------------------|
|   |                                  |                                 | Dollar               | Percent<br>Annualized |
| Loans, Leases and Investments <sup>1 2</sup>              | 176,650                          | - 390                           | 625                  | 1.4                   |
| Loans and Leases <sup>1 6</sup>                           | 156,667                          | - 243                           | 1,312                | 3.3                   |
| Commercial and Industrial                                 | 46,961                           | 273                             | 998                  | 8.6                   |
| Real estate   | 59,419                           | 17                              | 520                  | 3.5                   |
| Loans to Individuals                                      | 27,436                           | 118                             | 785                  | 11.7                  |
| Leases  | 4,999                            | 3                               | 64                   | 5.0                   |
| U.S. Treasury and Agency Securities <sup>2</sup>          | 12,199                           | - 69                            | - 308                | - 9.8                 |
| Other Securities <sup>2</sup>                             | 7,784                            | - 79                            | - 379                | - 18.5                |
| Total Deposits  | 185,185                          | 322                             | - 5,812              | - 12.1                |
| Demand Deposits   | 42,973                           | 256                             | - 6,264              | - 50.8                |
| Demand Deposits Adjusted <sup>3</sup>                     | 29,276                           | 265                             | - 2,055              | - 26.2                |
| Other Transaction Balances <sup>4</sup>                   | 12,057                           | - 133                           | - 718                | - 22.4                |
| Total Non-Transaction Balances <sup>6</sup>               | 130,156                          | 200                             | 1,171                | 3.6                   |
| Money Market Deposit<br>Accounts—Total                    | 40,411                           | - 100                           | 814                  | 8.2                   |
| Time Deposits in Amounts of<br>\$100,000 or more          | 38,033                           | 61                              | - 132                | - 1.3                 |
| Other Liabilities for Borrowed Money <sup>5</sup>         | 18,635                           | 506                             | - 4,372              | - 76.0                |
| <b>Weekly Averages<br/>of Daily Figures</b>               | <b>Period ended<br/>3/26/84</b>  | <b>Period ended<br/>3/12/84</b> |                      |                       |
| Reserve Position, All Reporting Banks                     |                                  |                                 |                      |                       |
| Excess Reserves (+)/Deficiency (-)                        | 188                              | 0                               |                      |                       |
| Borrowings  | 44                               | 49                              |                      |                       |
| Net free reserves (+)/Net borrowed(-)                     | 144                              | 139                             |                      |                       |

<sup>1</sup> Includes loss reserves, unearned income, excludes interbank loans

<sup>2</sup> Excludes trading account securities

<sup>3</sup> Excludes U.S. government and depository institution deposits and cash items

<sup>4</sup> ATS, NOW, Super NOW and savings accounts with telephone transfers

<sup>5</sup> Includes borrowing via FRB, TT&L notes, Fed Funds, RPs and other sources

<sup>6</sup> Includes items not shown separately

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