

# REAL OUTPUT GROWTH AND UNEMPLOYMENT, 1947-77

by William N. Cox

Real output must expand significantly to keep the unemployment rate from rising. Merely avoiding a recession—a period when real output shrinks—is not enough.

Why? For two reasons. First, our labor force is constantly expanding. If employment doesn't grow at least as fast as the labor force, the unemployment rate will obviously go up. To get an increase in employment, we need an increase in output. During the 1947-77 period, for example, the U. S. labor force expanded at an average rate of 1.7 percent per year. Employment growth averaged 1.6 percent, however, not quite matching the labor force increase. The shortfall implies that our unemployment rate must have risen over the 1947-77 period, and, of course, it did: from 3.9 percent in 1947 to 7.1 percent in 1977.

During that same 30 years, our nation's real output actually expanded at a 3.6-percent annual rate. With annual employment growth of 1.6 percent, our average output per worker grew, on average, by 2.0 percent per year. These figures illustrate the second reason why real output must grow significantly to keep our unemployment rate from rising: Postwar real output would have had to expand by about 2 percent per year just to stabilize the *number* of people employed; output

growth less than that could have been accomplished with a reduction in employment. So our growth of real output has to exceed the combined growth of the labor force and output per worker before we can expect to see the unemployment rate come down.

This combined growth rate, then, constitutes a threshold of sorts. We might even choose to call it the threshold rate of real growth, except that a prominent economist named Arthur Okun gave it another name 15 years ago: the potential rate of real growth.<sup>1</sup>

Our purpose in what follows is to examine the postwar patterns of this potential, or threshold, growth rate and its components, both for the sake of a consistent description and to help us assess what our potential growth rate might be in the years ahead. We live in a time when inflation and unemployment rates are both too high and economists and policymakers are much less confident than their predecessors that suitably enlightened policies will enable us to fine-tune the management of our economy. Fearing that

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<sup>1</sup>Arthur M. Okun, "Potential GNP: Its Measurement and Significance," 1962 *Proceedings of the Business and Economic Statistics Section*, American Statistical Association. Okun was interested in the rate of real growth which would stabilize the unemployment rate at full employment, then defined by an unemployment rate of 4.0 percent. Viewed in this way, the sum of labor force growth and output-per-worker growth measures the potential growth of output at full employment.

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too rapid economic growth will lead to accelerated inflation and recession and that growth which is too sluggish will bring rising unemployment, many policymakers seek a moderate economic growth path. One side of that path is defined by the potential growth rate we have been discussing, since it is the growth rate our economy must surpass to keep unemployment coming down.<sup>2</sup> That rate has averaged about 4 percent over the past 30 years. Can we confidently expect the rate to be 4 percent in the future? How consistent has it been? What about the consistency of its components? How do we add up, compare, and forecast the effects of widely discussed influences, such as the decline of the workweek, the baby boom, and the entry of women into the labor force? These are some of the questions we shall probe below.

**An Important Adjustment.** Okun’s work tells something else: For every additional percentage point the unemployment rate falls (or rises) from one year to the next, our real output growth must rise (or fall) by an additional 3 percent. This three-to-one relationship we call Okun’s Law; it’s part of every economic forecaster’s tool kit. An example may help. In 1977, we posted a 7.0-percent average unemployment rate and a 5-percent gain in real output over 1976. Okun’s Law suggests that a real growth rate of 8 percent (the 5 we got plus 3 we didn’t get) would have produced an unemployment rate of about 6.0 percent (7.0 actual minus one-third of the addition to output growth). Going the

other way, real output growth of 2 percent from 1976 to 1977 would have raised the unemployment rate to about 8.0 percent, or so Okun’s Law tells us.

Why does it seem to take an extra 3 percent of output growth to get a 1-percent reduction in the unemployment rate? Because both the labor force and output per worker respond to changes in the unemployment rate. A falling unemployment rate seems to draw new job seekers into the labor force: Lower unemployment makes people more confident a job search will be successful, for one thing. For another, tighter labor markets generally mean higher wages; available jobs are more attractive. Output per worker seems to respond oppositely to unemployment: Employers are very conscious of hiring and training costs; they tend to be cautious both in reducing employment levels when output falls and in expanding employment when output increases. There is a tendency to retain experienced workers in a business slump and add to the number of hours each person works in an expansion, at least until there is room to believe an expansion will persist.

So when our economy’s real growth rate accelerates, three things usually happen: (1) Employment expands, pulling down the unemployment rate; (2) labor force growth accelerates, retarding the fall in unemployment; and (3) output per worker rises, reducing the amount of employment growth necessary to accomplish the output acceleration. A 3-percent output acceleration contributes only 1 percent to employment and thus to the unemployment rate, *with the other 2 percent being absorbed by the labor force and output-per-worker responses*. This is what is referred to when people talk of a “sluggish” or “sticky” unemployment rate, as they did during much of 1977.

We adjust for these responses, as the reader can see in the algebra in Appendix I, by turning Okun’s Law “inside out” and assuming that an actual decrease of, say,

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<sup>2</sup>Okun (Ibid.) estimated the relationship at 3.2-to-1. Subsequent estimates, notably by George Perry (“Labor Force Structure, Potential Output, and Productivity,” *Brookings Papers on Economic Activity*, 1971:3), put the relationship slightly below three.

**THE POSTWAR EXPERIENCE**  
(national growth rates expressed as annual percentages)

	1947-52	1952-57	1957-62	1962-67	1967-72	1972-77	1947-62	1962-77	Range of 5-year Growth Rates
<b>Output/Worker (Y/N)</b>	<b>3.9</b>	<b>1.4</b>	<b>2.4</b>	<b>2.5</b>	<b>1.1</b>	<b>0.7</b>	<b>2.5</b>	<b>1.5</b>	<b>0.7 to 3.9</b>
Private Output/Hour (Y/H) <sub>p</sub>	3.8	2.8	3.1	3.5	2.1	1.3	3.2	2.3	1.3 to 3.8
Private Hours/Worker (H/N) <sub>p</sub>	-0.2	-0.6	-0.1	-0.4	-0.5	-0.6	-0.3	-0.5	-0.6 to -0.1
Imputed Public-Private Adjustment $\left[ \frac{Y/N}{(Y/N)_p} \right]$	0.3	-0.8	-0.6	-0.5	-0.5	0.0	-0.4	-0.3	-0.8 to 0.3
<b>Civilian Labor Force (L)</b>	<b>0.9</b>	<b>1.5</b>	<b>1.1</b>	<b>1.8</b>	<b>2.3</b>	<b>2.4</b>	<b>1.2</b>	<b>2.2</b>	<b>0.9 to 2.4</b>
Population 16-to-65 (P)	1.0	1.1	1.3	1.6	1.8	1.7	1.2	1.7	1.0 to 1.8
Participation Rate (L <sub>i</sub> /P)	0.5	0.1	-0.3	0.3	0.1	0.6	0.1	0.3	-0.3 to 0.6
Armed Forces Adjustment (L/L <sub>i</sub> )	-0.6	0.3	—	-0.1	0.3	0.1	-0.1	0.1	-0.6 to 0.3
<b>Unadjusted Potential Real Growth Rate</b>	<b>4.8</b>	<b>2.9</b>	<b>3.5</b>	<b>4.3</b>	<b>3.4</b>	<b>3.1</b>	<b>3.7</b>	<b>3.7</b>	<b>2.9 to 4.8</b>
<b>Unemployment Rate Changes*</b>	<b>-0.9</b>	<b>1.3</b>	<b>1.2</b>	<b>-1.7</b>	<b>1.8</b>	<b>1.5</b>	<b>1.6</b>	<b>1.6</b>	<b>-1.7 to 1.8</b>
<b>Okun's Law Adjustment</b>	<b>-0.4</b>	<b>0.6</b>	<b>0.5</b>	<b>-0.7</b>	<b>0.8</b>	<b>0.7</b>	<b>0.3</b>	<b>0.2</b>	
<b>Estimated Potential Real Growth Rate</b>	<b>4.4</b>	<b>3.5</b>	<b>4.0</b>	<b>3.6</b>	<b>4.2</b>	<b>3.8</b>	<b>4.0</b>	<b>3.9</b>	<b>3.5 to 4.4</b>

\*Actual changes, not annualized.  
Sources: Departments of Commerce and Labor

1 percent per year in the unemployment rate must have been accompanied by something like a 2-percent response in labor force and output-per-worker growth. We can measure actual changes in the unemployment rate, in the labor force, and in output per worker. What we want to know, though, is how much real output growth would have been consistent with no change in the unemployment rate. (That is, after all, the definition of the potential, or threshold, growth rate we seek.) So our estimate of the potential growth rate equals the actual labor force growth plus the actual output-per-worker growth plus twice the actual change in the unemployment rate.

**The 1947-77 Experience.** Our postwar experience with the potential growth rate is summarized in the table. Every number in it (except the unemployment rate changes) is an annual rate of percentage growth (or decline) during the five- or fifteen-year period shown.

Turning first to the boldface numbers and using the 1972-77 column as an example, we can see that output per worker grew 0.7 percent and the civilian labor force grew 2.4 percent. We adjust by

estimating that the sum of output per worker and labor force growth would have been 0.7 percent higher if the unemployment rate had held steady rather than rising at an annual rate of about 0.3 percent. Our estimate of the potential growth rate for 1972-77, therefore, is 3.8 percent: That real growth rate would have been necessary, over the 1972-77 period, to hold the unemployment rate constant at its 1972 level of 5.6 percent. As it happened, our real growth averaged only about 2.7 percent, thanks to the 1974-75 recession, and our unemployment rate rose to 7.1 percent.

Still focusing on the boldface statistics, we can see that the potential growth rates

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were about the same for the first and second halves of the thirty-year period and that there is no clear trend in the potential growth rates over the six five-year periods, although they range more broadly between 3.5 percent to 4.4 percent than do the fifteen-year rates. If we look no further than these numbers, we might well conclude that for the 1977-82 period, an extrapolated potential growth rate of 4 percent would be our best bet.

It might be. But before we decide that, we should look at how productivity and labor force growth behaved individually. Here we find no such stability but rather offsetting trends apparently caused by unrelated developments. Labor force growth accelerated sharply from 1947-62 to 1962-77. Our potential growth rate might have jumped just as sharply and unemployment with it, except for a decline in productivity growth which offset the labor force acceleration almost exactly. The five-year growth rates show the same trends: labor force up; productivity down.

Two offsetting growth rates like these usually lead an economist to suspect a behavioral relationship between the two. Are productivity and labor force growth somehow interrelated, once we adjust for the reaction of each to changes in unemployment? Can we count on an acceleration in one being offset by a deceleration in the other? If we can, we would feel more confident about extrapolating the 4-percent potential growth rate into the future. To answer this question, we need to look closely at the components of labor force and productivity growth. When we do that, we shall see that the two seem substantially independent and that the offsetting growth

patterns, therefore, seem largely coincidental.

**Civilian Labor Force Growth.** First, let us look more carefully at postwar labor force growth, defining it more carefully to mean the expansion of the *civilian* labor force. As Appendix I shows, we have divided our labor force growth in each period into three components: (1) growth of our working-age population, age 16 and above; (2) changes in the “participation rate,” or the proportion of that population in the total labor force, including the armed forces; and (3) fluctuations in an adjustment ratio measuring the proportion of our total labor force in the civilian labor force—that is, outside the armed forces.

Qualitatively, we can see that our civilian labor force would increase by (1) growth in our working-age population, (2) an increase in the participation rate within that population, and (3) a reduction in our armed forces personnel, some of whom will be seeking civilian jobs.

Quantitatively, our use of annual growth rates enables us to compare the effects of each component on unemployment. Some of these comparisons are quite revealing in themselves. For example, we can see that the much discussed entry of women into the labor force between 1972 and 1977 contributed (through the overall participation rate) only a third as much to labor force growth as did growth in our working-age population (0.6 percent versus 1.7 percent).<sup>3</sup> We can see, too, that higher participation rates during the past five years had about twice the effect of our armed forces reductions during the Vietnam wind-down (0.6 percent versus 0.3

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<sup>3</sup>Our purposes here preclude a detailed discussion of the breakdown of postwar participation rates by age and sex, but we have included a 1962-77 summary in Appendix II. Earlier data were not collected on a detailed basis.

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percent). The table provides material for other specific comparisons, which we leave to the reader.

Our primary interest is to learn more about why civilian labor force growth has accelerated. The data in the two fifteen-year columns suggest that most of the acceleration came from population growth (which picked up from 1.2 percent to 1.7 percent) rather than from the rise in the participation rate (0.1 percent to 0.3 percent), which roughly equaled the effects of reductions in our armed forces (-0.1 percent to +0.1 percent). Documented immigration had very little influence on our working-age population growth over the past 30 years. The acceleration basically comes from the baby boom: High birthrates during the 1947-62 period brought large increases in the 16-to-65 population 16 years later. When we turn to assess the potential growth rate components in the years ahead, we shall be interested in what more recent birthrates suggest and whether we can continue to ignore the influence of immigration.

Although the contribution of the participation rate was fairly small in the 15-year periods, it has jumped dramatically since 1972. Moreover, the 0.6-percent contribution tabulated for 1972-77 would probably have been about 0.2 percent higher had the unemployment rate not increased at the same time. (Common sense tells us that it is the participation rate rather than population growth or the armed forces adjustment which has reacted to unemployment changes in the way we discussed at the beginning of this article.) When we turn later to guess at the future, our job will be to judge whether the participation rate will continue to rise the way it has for the past five years. Not surprisingly, the answer seems to rest in the participation rates of women, which have gone up dramatically, overcoming a smaller and less discussed decline in the

participation rate of men. In any case, the relevant question for us is not whether participation rates will fall or not but rather how fast they will grow.

There is little to add here about the armed forces adjustment—our percentages measure changes in the ratio of the civilian labor force to the total labor force—except to note that the effects on our potential growth rate have at times been fairly significant. Future effects will tend to reflect whether or not we have another Korean or Vietnamese build-up.

**Growth in Output Per Worker.** Our experience with output per worker is tougher to deal with than the labor force for two reasons. First is the inherent ambiguity of effects. Productivity growth is counted as a good thing in our society. More output per worker means more consumption per worker and a higher economic standard of living. Higher wages and profits, undiluted by inflation, are part and parcel of this higher living standard. Most economists would find it difficult to argue that higher output per worker is something that we don't want.<sup>4</sup> Yet in our peculiar context here, there is no question that higher productivity growth has perverse effects on unemployment unless our economic growth rate itself rises to offset the productivity increase. From the standpoint of bringing the unemployment rate down, higher productivity has a negative effect.

Another thing makes the productivity side more difficult to analyze: We cannot decompose it as neatly for

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<sup>4</sup>For a contrary view highlighting the essential conflict between productivity and employment, see E. F. Schumacher, *Small Is Beautiful*, Vantage Books, 1977.

## APPENDIX I

### MEASUREMENT OF THE POTENTIAL GROWTH RATE AND ITS COMPONENTS

We begin by noting that in any year

$$(1) \quad Y = \left(\frac{Y}{N}\right) \left(\frac{N}{L}\right) L,$$

where Y is real output (GNP in 1972 \$)

N is civilian employment, and

L is the civilian labor force.

Y/N is output per worker, and N/L is the complement of our conventional unemployment rate U. (If U is 5 percent, for example, then N/L is 1 minus .05 = .95.) If we convert each of these terms to percentage changes at annual rates and denote the conversion by placing a dot over each term, then

$$(2) \quad \dot{Y} \cong \left(\frac{\dot{Y}}{N}\right) + \left(\frac{\dot{N}}{L}\right) + \dot{L}.$$

Real output growth, this says, is approximately equal to growth in output per worker plus growth in the employment rate plus growth in the labor force. This approximation is very close for small percentage changes like the annual rates we use in this article.

Our interest is not in the actual rate of economic growth  $\dot{Y}$  but rather in the potential rate of growth—that rate which would have been consistent with no change in the unemployment rate. Calling this potential rate  $\dot{Y}_0$ , we can see that

$$(3) \quad \dot{Y}_0 \cong \left(\frac{\dot{Y}}{N}\right)_0 + \dot{L}_0 + 0,$$

where  $(Y/N)_0$  is the output per worker we would have had, and  $\dot{L}_0$  is the labor force growth we would have had, with no change in unemployment. (In such case, of course,  $(\dot{N}/L)$  would have been zero.)

$$(4) \quad \dot{Y} - \dot{Y}_0 \cong 3 \left(\frac{\dot{N}}{L}\right).$$

Next, this says that the excess of actual over potential economic growth equals three times the fall in the conventional unemployment rate or, equivalently, three times the percentage increase in the employment-to-labor-force ratio.\* If we reorder (4) and substitute (2) into the result, we get

$$(5) \quad \dot{Y}_0 \cong \dot{Y} - 3 \left(\frac{\dot{N}}{L}\right)$$

$$(6) \quad \dot{Y}_0 \cong \left(\frac{\dot{Y}}{N}\right) + \dot{L} + \left(\frac{\dot{N}}{L}\right) - 3 \left(\frac{\dot{N}}{L}\right)$$

$$(7) \quad \dot{Y}_0 \cong \left(\frac{\dot{Y}}{N}\right) + \dot{L} - 2 \left(\frac{\dot{N}}{L}\right).$$

Equation (7) provides a way of estimating the potential growth rate: We start with measured growth in output per worker, add measured growth of the civilian labor force, and correct the sum for the effects of unemployment rate changes by subtracting twice the change in the ratio of employment to the civilian labor force.

We have also found it analytically useful to break  $Y/N$  and  $L$  into three components each. For  $L$ :

$$(8) \quad L = \left(\frac{L}{L_t}\right) \left(\frac{L_t}{P}\right) P$$

$$(9) \quad \dot{L} \cong \left(\frac{\dot{L}}{L_t}\right) + \left(\frac{\dot{L}_t}{L_t}\right) + \dot{P}$$

where  $L_t$  is the total labor force (including persons in the armed forces) and  $P$  is 16-and-over population. Here  $L_t/P$  is the familiar participation rate—the proportion of working-age Americans in the total labor force. The  $L/L_t$  term adjusts for movements in and out of the armed forces. This breakdown enables us to see, for example, during the 1972-77 period, that of the 2.4-percent annual expansion in the civilian force, 1.7 percent was attributable to the growth of working-age population, 0.6 percent came from expanded participation of that population, and 0.1 percent came from a movement out of the armed forces into the civilian labor force.

Our breakout of the productivity term is similar. We have data for the private sector on output per hour  $(Y/H)_p$  and on the average number of hours worked per week  $(H/N)_p$ .

We use it by noting that

$$(10) \quad \left(\frac{Y}{N}\right) = \left(\frac{Y}{H}\right)_p \left(\frac{H}{N}\right)_p \left[\frac{Y/N}{(Y/N)_p}\right]$$

$$(11) \quad \left(\frac{\dot{Y}}{N}\right) \cong \left(\frac{\dot{Y}}{H}\right)_p + \left(\frac{\dot{H}}{N}\right)_p + \left[\frac{\dot{Y/N}}{(Y/N)_p}\right]$$

where the third term adjusts for the public-private discrepancy.

Our summary table, then, is based on equations (7), (9), and (11), which when combined give us

$$\dot{Y}_0 \cong \left(\frac{\dot{Y}}{H}\right)_p + \left(\frac{\dot{H}}{N}\right)_p + \left[\frac{\dot{Y/N}}{(Y/N)_p}\right] + \left(\frac{\dot{L}}{L_t}\right) + \left(\frac{\dot{L}_t}{L_t}\right) + \dot{P} - 2 \left(\frac{\dot{N}}{L}\right)$$

\*Our estimates employ a factor of three: Of a 3-percent change in the rate of economic growth, 1 percent will show up in the unemployment rate and the other 2 percent will be offset by increases in productivity and the labor force. Estimates of this relationship by various economists over the past 15 years seem to cluster in the 2.7- to 3.4-percent range. Okun's original estimate was 3.2. The most recent estimates are toward the lower end of the range and would suggest our using perhaps 2.7 or 2.8, but we chose 3.0 because of a subjective suspicion that the statistical associations were in part reflecting coincidental rather than causative relationships.

***“Our reading of the 1947-77 experience, then, is that our stable potential growth rate reflects a coincidence of offsetting independent factors. Labor force growth accelerated sharply, partly in response to the baby boom and partly in response to expanded labor force participation by women. The offsetting deceleration in output per worker seems largely the result of shifts in the composition of our output and employment.”***

description and analysis. The obvious breakdown is to separate output per worker into two components: output per hour and average hours per worker (per week, per month, or whatever; it doesn't matter because we are interested in annual rates of percentage change). We can get data to separate these components, and we have, but only for the private sector. For government employees, who do not produce goods and services priced and valued in private markets, there is no standard against which to measure productivity. The builders of our national income accounts simply estimate government productivity growth as zero. Our nation's productivity statisticians, recognizing the lack of information in our government-sector productivity figures, stick to the private-sector data. So shall we, except that we include an imputed adjustment to highlight the public-private discrepancy in coverage.

What do these private-sector figures tell us about the decline in productivity we mentioned earlier? Overall, we can see from the 15-year figures that output per hour is by far the most important of the two components and has decelerated significantly. (This is true, incidentally, even if we attribute a substantial portion of the “Okun's Law adjustment” to the output per hour component.) The workweek reduction has continued through the 30-year period too, though the percentage decreases have recently been larger.

The reasons for the postwar declines in the growth in output per hour and the workweek are largely structural. New technology and additions to physical and human capital (plant and equipment; education and training) exert upward pressure on output per hour, year after year. Virtually all the changes in productivity growth have been related to three structural shifts: (1) the substantial movement of workers from farm to non-farm jobs, which boosted overall productivity substantially until the early 1960s; (2) the continuing shift in our nation's output from manufacturing to service occupations, which has retarded the growth of hourly productivity; and (3) the recent increase in the proportion of inexperienced workers, whose average productivity tends to be below that of their more seasoned counterparts. Studies by the Bureau of Labor Statistics suggest that these factors are sufficient to account for most of the postwar deceleration and are more important than the effects of changes in capital investment, labor-management relations, and the like.<sup>5</sup> Basically, then, most of the postwar productivity slump has come from the exhaustion of the farm-to-nonfarm transfer, from continuing shifts from manufacturing into services, and from the recent reduction in the experience level of our labor force.

Accelerated declines in the average workweek seem to be explained by similar factors. Until about ten years ago, there had been a small but consistent shortening of the average workweek through all

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<sup>5</sup>Summarized in Kutscher, Mark, and Norsworthy, “The Productivity Slowdown and the Outlook to 1985,” *Monthly Labor Review*, May 1977

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sectors of our economy. Talk was widespread then about the 32-hour week. More recently, however, such attention has been diverted to flexible working hours and 4-day, 40-hour weeks, perhaps stimulated by consciousness of higher commuting costs. Cutbacks in average hours of work have come, instead, from the shift from manufacturing to services and the increase in part-time employment.

What about our imputed discrepancy between the public and private sectors? Persistent negative adjustments suggest that public-sector productivity, as estimated, lagged behind the private sector until the past five years. We are reluctant to say much more about the reasons for this pattern without further study, but we cannot resist the guess that the improvement posted for this component in the 1972-77 period reflects recent heavy pay increases in the public sector rather than a stalling of productivity declines.

Our reading of the 1947-77 experience, then, is that our stable potential growth rate reflects a coincidence of offsetting independent factors. Labor force growth accelerated sharply, partly in response to the baby boom and partly in response to expanded labor force participation by women. The offsetting deceleration in output per worker seems largely the result of shifts in the composition of our output and employment.

The diversity of these contributions and influences suggests that we cannot simply extrapolate our potential growth into the future. A reasonable assessment of our future potential growth requires, instead, that we examine each component in the light of the influences peculiar to it.

**What Lies Ahead?** We venture these prospects with considerable uncertainty:<sup>6</sup>

1. We expect the potential growth rate to fall from the 4.0-percent postwar average to about 3 1/2 percent, since declines in the working-age population will not be fully offset by increases in participation rates or output per worker.

2. Additions to the labor force through immigration (legal or otherwise) are the biggest question mark. If our unemployment rate falls and the supply of entry-level job applicants decelerates, such immigration could push potential growth and unemployment up significantly.

3. The strong deceleration in our working-age population suggests that our potential growth rate will be falling rather than rising *within* the next five-year period, implying that a constant actual rate of economic growth throughout the period would make increasingly more headway against unemployment as the period transpires.

Before we elaborate a bit, a couple of warnings are appropriate. The potential growth rate we discuss here is based on the capacity and willingness of our labor force to expand real output. It takes no account of other bottlenecks, notably shortages of physical capital or natural resources.

Second, we need to recognize the attention economists have recently paid to

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<sup>6</sup>As this article goes to press, we notice that the 1978 Report of the President's Council of Economic Advisers contains similar answers to similar questions, including a real potential growth rate between 3.3 and 3.8 percent per year

**"On the productivity side, we expect output per worker to grow 1.8 percent during the next five years."**

natural, or noninflationary, rates of unemployment.<sup>7</sup> These studies suggest that if we push the conventional unemployment rate below some level, widely estimated at between 5 and 5 1/2 percent, inflation will accelerate unacceptably. This work suggests, quite credibly, that Okun's 3-to-1 ratio of above-potential economic growth to unemployment rate reductions may be too low as the unemployment rate comes into the 5- to 5 1/2-percent range, and forecasters and policymakers should be prepared to see their unemployment and inflation hopes disappointed in such a case. This prospect is pretty well recognized.

The determinants of the natural, or noninflationary, level of unemployment may include the same factors as our potential growth rate: productivity and the labor force. If so, and if we expect our potential growth rate to slow down, the natural rate of unemployment may fall with it, giving us more room to reduce unemployment without an acceleration of inflation. This hypothesis, however, is obviously well beyond the scope of this article.

How do we get our expectation that the potential growth rate will fall? On the labor force side, we start by accepting the official forecast of 1.3-percent growth in our 16-to-65 population. This projection is based on previous birthrates and is not affected significantly by inclusion of the over-65 age group. This rate should fall steadily from 1.7 to 1.1 over the five-year period.

Participation rates are much harder to forecast. Studies are pouring out on the subject, incorporating many possible influences: childbearing patterns of working women, school enrollments, single-parent families, purchasing power of

young workers in relation to their parents, advantages of working versus public assistance programs, and so forth. Some analysts, notably at the Bureau of Labor Statistics, project a much slower increase in participation rates than the 0.6 percent experienced in 1972-76. Others see a continuation of our recent increases.<sup>8</sup> Our subjective judgment, after examining these forecasts, is that additions will continue to be strong but not as strong as recently, perhaps at an 0.4-percent contribution to civilian labor force growth. As to our armed forces adjustment, we project no change there, in the absence of a good reason to expect anything else.<sup>9</sup> Adding these numbers up, we expect the civilian labor force contribution to potential growth to average 1.7 percent: 1.3 percent from population growth and 0.4 percent from participation rate growth. This is midway between our experience for the 1947-62 and 1962-77 periods, respectively.

On the productivity side, we expect output per worker to grow 1.8 percent during the next five years. We accept the BLS estimate of a 2.4-percent increase in the private output per hour component, reflecting a continuing shift from manufacturing to services and a gradual seasoning of the labor force as the influx of inexperienced entrants subsides. The workweek, we expect, will continue to decline at an 0.4-percent rate: a continuation of the long-term shift to shorter workweek service activities, offset partly by a dropoff in the influx of secondary workers desiring part-time employment. As to the public-private discrepancy, we have estimated a decline of 0.2 percent, expecting public-sector wage increases to taper off. This component may fall more than that, but our doubts here are somewhat counterbalanced by a fear that the output per hour and workweek projections may each be (algebraically) a little high. ■

<sup>7</sup>See, for example, Arthur M. Okun, "Conflicting National Goals" in *Jobs For Americans: A Look to the Future*, American Assembly on Manpower Goals for American Democracy, 1976

<sup>8</sup>Interested readers are urged to consult three recent articles in the *Monthly Labor Review*: Devens, "Labor Force Trends, A Bibliography," October 1977; Bednarzik and Klein, "Labor Force Trends: A Synthesis and Analysis," October 1977; and Fullerton and Flaim, "New Labor Force Projections to 1990," December 1976

<sup>9</sup>Manpower levels in the volunteer army may move in response to lower unemployment, however

## APPENDIX II

**LABOR FORCE PARTICIPATION RATES BY AGE**

Year		(percent)							
		Total	16-19	20-24	25-34	35-44	45-54	55-64	65 and over
1962	Female	38.0	39.1	47.4	36.4	44.1	50.0	38.7	9.9
	Male	82.8	57.7	89.1	97.4	97.7	95.6	86.2	30.3
	Total	59.7	48.5	68.2	66.5	70.2	72.3	61.5	19.0
1967	Female	41.2	41.7	53.4	42.0	48.1	51.8	42.4	9.6
	Male	81.5	59.2	87.5	97.4	97.4	95.2	84.4	27.1
	Total	60.6	50.5	70.5	69.4	72.2	72.8	62.4	17.2
1972	Female	43.9	45.9	59.1	47.6	52.0	53.9	42.1	9.3
	Male	79.7	59.9	85.9	95.9	96.5	93.3	80.5	24.4
	Total	61.0	53.0	72.5	71.4	73.7	72.8	60.2	15.6
1977 (est.)	Female	47.9	50.7	66.8	57.0	57.9	55.7	42.0	8.3
	Male	78.1	60.2	84.7	95.3	95.9	91.7	75.4	20.2
	Total	62.4	55.5	75.8	76.0	76.4	73.1	57.7	13.2

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