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Employment growth and labor force participation: how many jobs are enough?

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Employment Growth and Labor Force Participation:
How Many Jobs Are Enough?

Julie L. Hotchkiss

Working Paper 2004-25
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Abstract: This paper demonstrates that, because of declining labor force participation rates, the usual estimates of job creation needed to keep unemployment in check are too high. It is estimated that only 98,000 jobs (rather than the usual goal of 150,000 jobs) need to be created per month to absorb the growing labor force. As the population ages, the labor force will grow even more slowly, and the number of jobs that need to be created will decline. This paper explores the potential implication of this decline in labor force growth on total output along with potential sources of replacement labor to fuel desired growth in the gross domestic product (GDP).

JEL classification: J21, E24

Key words: job growth, labor force participation, unemployment

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Employment Growth and Labor Force Participation: How Many Jobs are Enough?

There are two basic reasons to be concerned about the rate at which the U.S. economy is creating jobs. The first is what has captured the public's attention coming out the 2001 recession: the creation of enough jobs to provide work for people who want it. The lackluster job creation since the end of the recession has led to the recovery being dubbed "jobless." Analysis of post-recession job creation has spawned much discussion and debate about how many jobs are enough to provide work for the willing and able. The second source of interest in job creation is not how many jobs are needed to employ the willing, but how many jobs are needed to fuel a desired growth in overall economic output. There may be enough jobs to keep people out of the soup lines, but that doesn't necessarily mean there are enough people working to supply a growing level of production that leads to a greater quantity of goods, less expensive goods, and an improved standard of living. The purpose of this paper is to provide an analysis of just how many jobs are needed to keep unemployment in check and whether the current rate of labor growth is enough to supply the desired growth in GDP (Gross Domestic Product, or, total economic output).

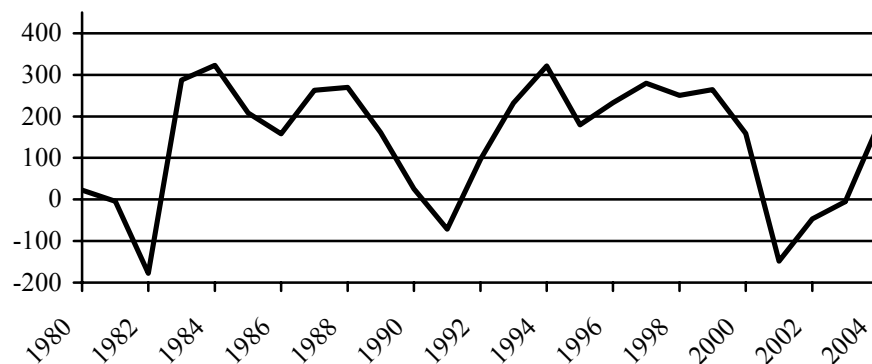
The job creation and unemployment paradox.

In February 2003, the White House Council of Economic Advisors predicted that the administration's tax cuts would contribute to an average monthly gain in jobs of 300,000. This figure was quickly picked up by the popular press and touted as a reasonable and necessary goal for the U.S. economy.

In a historical context, creation of 300,000 jobs per month would be quite an accomplishment (see Figure 1). There are no years in recent history in which the U.S. economy

has seen a creation of 300,000 jobs per month, every month. The years of 1984 and 1994 are the only years during which 300,000 jobs were added per month *on average*. The decade of the 1980s averaged a creation of 151,000 jobs per month and the 1990s averaged a creation of 181,000 jobs per month. Between January 2000 and August 2004, the U.S. economy has added 17,000 jobs per month on average. The Bush administration believed that its tax cuts would generate enough economic stimulus to create more than enough jobs to overcome these historical tendencies and to lower unemployment. In spite of the recent estimates that two-thirds of the Bush tax cuts were spent on nondurable consumption (as opposed to going into savings or toward debt retirement; see Johnson et al. 2004), the projected growth in employment was overly optimistic.

Figure 1. Average Monthly Employment Change, 1980-August 2004 (thousands).



Source: Bureau of Labor Statistics, Establishment Survey.

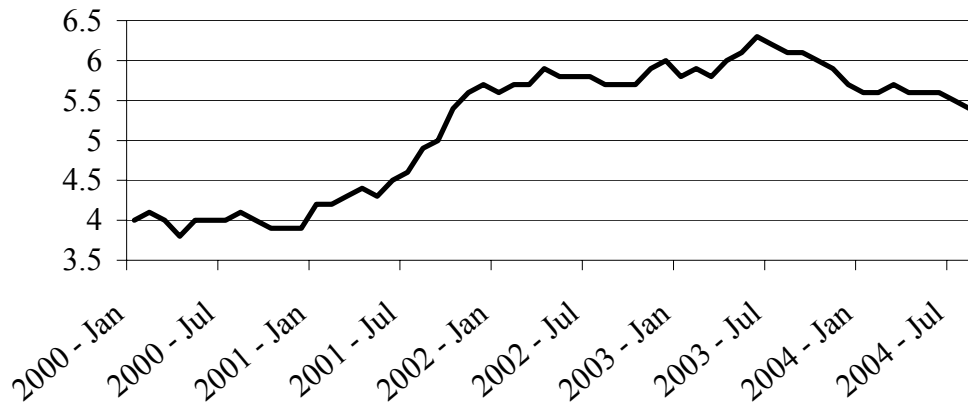
How can the less-than-hoped-for job creation that has occurred since the 2001 recession be expected to impact the unemployment rate?¹ In answering this question, it is typical to assume that job creation needs to grow at the same rate as the population in order to keep unemployment in check. Between 2000 and 2003 the U.S. non-institutional population experienced an average annual growth rate of 1.35%. Furthermore, in 2003 there were

¹ The popular press has been mulling over these issues, as well. See Porter (2004) and Lowenstein (2004).

approximately 130 million jobs in the economy. Applying the population growth rate to this employment base means the economy needs to create 1.76 million jobs per year, or an average of about 146,000 jobs per month, to at least keep unemployment from going up. Job growth, then, on the order of what was projected by the Bush administration would have resulted in the unemployment rate plummeting.

Between June 2003 and August 2004 the economy has created an average of only 107,000 jobs per month, which, based on the above calculations should have caused the unemployment rate to rise.² The apparent paradox is that over this same time period (June 2003 to August 2004) the unemployment rate (depicted in Figure 2) has *declined steadily*.

Figure 2. Seasonally Adjusted Unemployment Rate, through August 2004 (percent).



Source: Bureau of Labor Statistics, Household Survey.

Paradox resolved: labor force participation.

The "employment growth = population growth" estimation has typically proven to provide a reasonable lower bound target for policy makers. This simple formula, however, only works if the labor force participation rate is either increasing or, at least, not decreasing over

² These numbers reflect BLS adjustments to jobs numbers made through September 2004.

time.³ In August 2004, only 66% of the population was actually in the labor force (working or actively looking for work). And, indeed, it is not really the population growth that the labor market needs to absorb, but, rather, the growth in the labor force. If the percent of the population in the labor force remains constant over the period of time one calculates population growth, it doesn't actually matter what the percentage of participation is (adjusting each component in a percentage change calculation by the same number doesn't change the result; the population growth rate will equal the labor force growth rate). However, if the labor force participation rate is declining, leaving it out of the calculation means population growth will over-estimate the growth in the labor force and, thus, over-estimate the number of jobs needed to lower the unemployment rate. Indeed, the labor force participation rate has been declining steadily since 2000. In 2000, the labor force participation rate averaged 67.1% and in 2003 it averaged 66.3%. While only eight-tenths of a percentage point difference, when multiplied by a non-institutional population of 220 million, the resulting percentage change in the labor force can be quite different from the percentage change in the population.

So, the average annual percentage increase in population from 2000 to 2003, as stated above, was 1.35%.⁴ Adjusting the population levels in 2000 and 2003 by their respective labor force participation rates results in an estimated average annual growth in labor force participants of 0.9%. Using this percentage growth as a more accurate target, and from a base of 130 million

³ Technically, in order for the unemployment rate to not change, the percentage change in employment must equal the percentage change in the labor force, or

$$Urate_t = Urate_{t-1} \Rightarrow \frac{LF_t - LF_{t-1}}{LF_{t-1}} = \% \Delta LF = \% \Delta E = \frac{E_t - E_{t-1}}{E_{t-1}} .$$

This relationship is fairly transparent,

but is proved in the Appendix.

⁴ Estimating population levels is one of the more difficult tasks of the U.S. Bureau of the Census. The numbers reported by the Bureau are taken as accurate, although adjustments are made from time to time to incorporate new information. Details of recent adjustments to population estimates can be found in *Employment from the BLS household and payroll surveys: summary of recent trends* (Population control adjustments to the household survey), which can be found on the internet at <http://www.bls.gov/cps/ces_cps_trends.pdf>.

jobs (in 2003), the more appropriate job creation target to keep unemployment under control is 1.17 million jobs per year, or about 98,000 jobs per months. The actual average job creation of 107,000 per month since June 2003, then, was barely enough to have produced the observed steady decline in the unemployment rate over the time period.⁵

A closer look at the decline in labor force participation.

Of course, the percent of the population that decides to enter the labor force is not determined exogenously and it can change over time. It is primarily a function of the age distribution of the population, with older people less likely to enter the labor market (this will be explored further below) and the economic prospects in the economy. During an economic downturn, the benefits of entering the labor market are lower (it is harder to find a job and wages may be falling), so people find other, more personally valuable, uses of their time.⁶

The negative relationship between the labor force participation rate and the unemployment rate is well-known. In order to be counted as unemployed, one has to be actively searching for employment. The number of people unemployed, then, can decline if the unemployed transition into employment, or if the unemployed stop looking for work. In this second case, the resulting decline in the unemployment rate is not accompanied by an increase in employment, but, rather, only a decline in the total labor force.

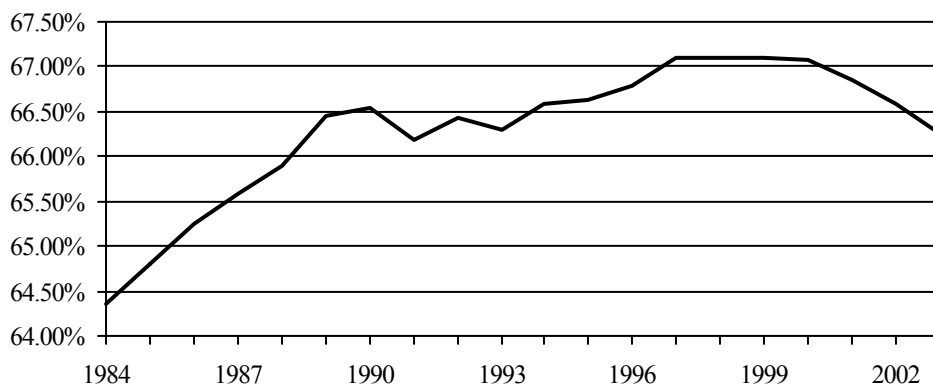
There has been some concern recently about the decline in the labor force participation

⁵ 96,000 were added to the U.S. economy in September 2004, which resulted in no change in the unemployment rate from August to September. These job growth estimates made by the Bureau of Labor Statistics are merely estimates and the numbers reported here are not intended to reflect a degree of accuracy that does not exist. Details on the accuracy of the monthly employment numbers can be found in the technical appendix on any Employment Situation new release. For example, see <<http://www.bls.gov/news.release/empsit.toc.htm>>.

⁶ It could also be the case that some individuals drop out of the formal labor market and supply their labor to underground or illegal activities. See Mocan and Billups (2000).

rate.⁷ Figure 3 depicts this decline graphically, and also puts it into perspective. The percent of the population working or looking for work in 2003 was, on average 66.3%, which is the same rate of labor force participation as in 1989. A number of sources have been identified for this declining labor force participation rate. One is that the labor force participation rate in the 1990s was artificially inflated; it actually happened, but was an anomaly of the times rather than any change in trend. In other words, that time period provided extraordinary economic opportunities, pulling people into the labor market who would not have otherwise entered. Other real potential contributors to the participation rate decline include a continuation of the trends in early retirement. The rising percent of social security recipients qualifying under early retirement rules has slowed since the mid-1990s, but is still on an upward trend.⁸ Part of the labor force participation rate decline was also likely a response to fewer job opportunities as a result of the 2001 recession. An analogous decline in the participation rate can be seen in the 1991-92 recession, as well. However, the recent decline, and even its acceleration, began well before the 2001 recession.

Figure 3. Labor Force Participation Rate, 1984-2003.



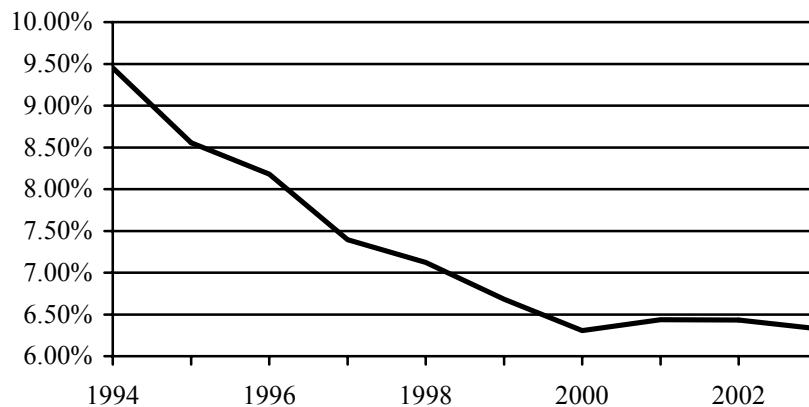
Source: Bureau of Labor Statistics, Household Survey.

⁷ For example, see Andrews (2004).

⁸ See the U.S. Department of Health and Human Services (2003). Conde-Ruiz and Galasso (2003) explore the source of political support for generous early retirement benefits.

There are basically two types of labor force non-participants: (1) those who don't want a job (these would be the retirees, for example), and (2) those who would like to have a job, but have stopped looking for some reason. The bulk of labor force non-participants (roughly 90% or more) do not want a job. These are non-participants that are of little concern to policy makers; they are people who would not take a job even if it were handed to them (given a certain wage structure). Figure 4 shows that the percent of non-participants who want a job declined steadily between 1994 (the first year such a question was asked in the Household survey) and the middle of 2000. It has stayed roughly constant at about 6% since that time.

Figure 4. Percent of Labor Force Non-participants Who Want a Job, 1994-2003.

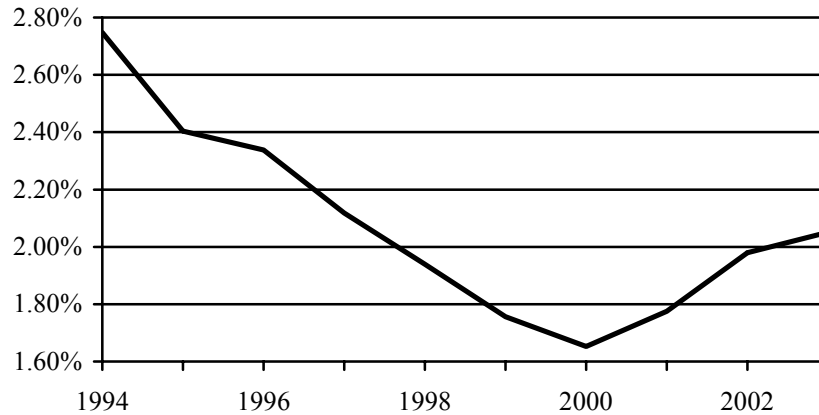


Source: Bureau of Labor Statistics, Household Survey.

An even smaller percentage of non-participants that are of the greatest concern are those who not only want a job, but have also actually looked for a job during the previous year and are available to take a job if one were offered. These people, given that they have actually exerted some effort to find a job in the past year, are considered to have demonstrated a commitment to the labor market. The fact that they've stopped looking is of interest, since it may reflect their negative assessment of overall job prospects. While only representing 2% of all non-

participants, there has been an even steadier increase in this percentage since 2000 (albeit by only four-tenths of a percentage point), and it has continued into 2004, as well. See Figure 5.

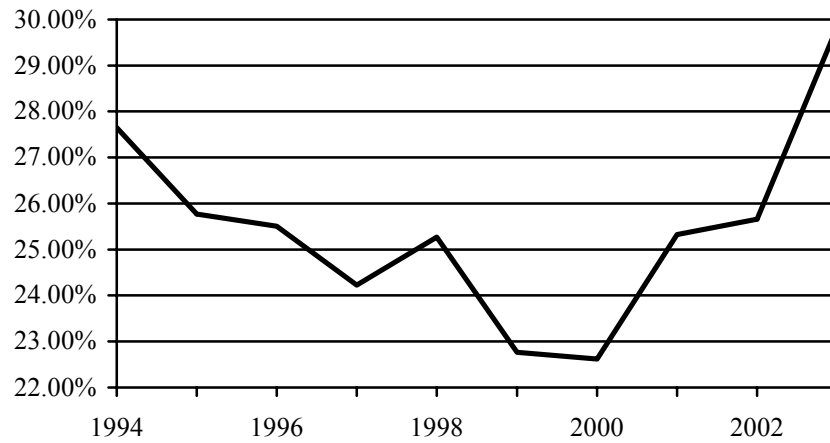
Figure 5. Percent of Labor Force Non-participants Who Want a Job, Searched in Previous Year, and are Available to Work Now, 1994-2003



Source: Bureau of Labor Statistics, Household Survey.

There are several reasons why one may have stopped looking for work, but would want a job and would take one if it were available to them. The answers given for not currently looking for work include: family responsibilities (such as child care difficulties), being in school, being in poor health, or being discouraged (there is an un-defined "other" category, as well). The one reason that has received most of the attention coming out of the 2001 recession is "discouraged." A discouraged worker is one who has given up the job search because of perceived poor prospects (the chance of getting a job isn't worth the effort one would have to exert to find it). In August 2004, these people represented 34% of non-participants who want a job, searched in the previous year, and are available for work now (see Figure 6). They represented less than 1% of all non-participants.

Figure 6. Discouraged Workers as Percent of Labor Force Non-participants Who Want a Job, Searched, and are Available, 1994-2003.

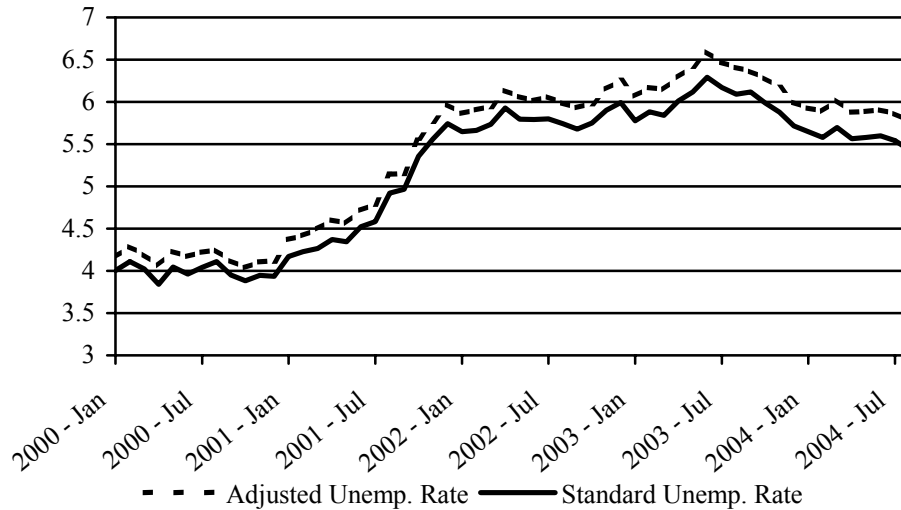


Source: Bureau of Labor Statistics, Household Survey.

While representing only 1% of all non-participants, the number of people classified as discouraged amounted to 534,000 in August 2004. If, indeed, these people were still actively searching for work, the total number of unemployed in August 2004 would have been 8.6 million and the unemployment rate for August 2004 would have been 5.8% (instead of 5.4%). Figure 7 plots the unemployment rate between January 2000 and August 2004 as reported by the BLS (solid line) and what the unemployment rate would have been if those classified as discouraged had not stopped looking for work (dashed line). The two series obviously track each other very closely, the largest difference between the two series is roughly four-tenths of a percent, but the difference has been growing steadily over the whole time period. Adding the discouraged workers to the official count of the unemployed, however, would not likely alter the view of the labor market, which is generally believed to be gaining strength. Furthermore, if the additional number of discouraged workers each month were actually counted in the labor force (as unemployed), the average number of jobs that would have needed to be created between June 2003 and August 2004 to absorb these additional workers increases to 108,000 per month (as opposed to only 98,000 per month without the discouraged worker addition). The bottom line is

that the 107,000 average monthly increase in jobs since June 2003 would almost be enough to accommodate labor force participants *and* discouraged workers.⁹

Figure 7. Standard Unemployment Rate and Adjusted for Discouraged Workers, through August 2004 (percent).



Source: Bureau of Labor Statistics, Household Survey.

As the unemployment rate continues to fall, however, people re-assess the best use of their time and are more inclined to enter or re-enter the labor market. We observed this cyclical increase in the labor force participation rate following the 1990-91 recession (see Figure 3). Not only will those currently classified as discouraged likely re-enter the labor force, there will likely also be entrance of non-participants who currently say they do not want a job; in a different, more lucrative economic environment, they just might. Of course, if this occurs, the creation of an average of 107,000 jobs per month may not be enough to keep the unemployment rate from rising. Over the next several years, however, the rate of labor force participation in the U.S. will face a natural non-cyclical decline.

⁹ The number of discouraged worker declined rather dramatically by 23 percent from August to September 2004.

Taking the age distribution into account.

It was stated earlier that an average of 66% of the population was in the labor force in August of 2004. In fact, the percent of the population participating in the labor market varies quite dramatically across the age distribution. For example, in August of 2004, 61.2% of those between the ages of 16 and 24, 82.7% of people between 20-54 years old, and 36.4% of those 55 years and older participate in the labor market.

In addition, the population growth in each of these age categories varies considerably. Specifically, between 2000 and 2003, the population of people between the ages of 16 and 24 years grew an average of 1.6% per year, between 25 and 54 grew an average of 0.7% per year, and the population of those 55 years and older grew at an average of 2.4% per year.

As a percent of their respective populations, the labor force participation has been changing in different ways across the age distribution. Adjusting the population growth in each age category by the labor force participation rates in each age category, the labor force of 16 to 24 year olds is estimated to be *decreasing* at an annual average rate of 0.2%; the labor force comprised of 25 to 54 year olds is increasing annually by 0.08%; and the labor force of those 55 years and older is increasing by 1.5%. Taking these different growth rates in the labor force across age groups into account, the estimate of the number of jobs needed to keep unemployment under control is refined further and turns out to be an average of 101,000 jobs per month.¹⁰

Looking into the future, the age distribution is expected to shift quite substantially with baby boomers retiring (increasing the number of people in the lowest labor force participation

¹⁰ The entire February 2004 issue of the *Monthly Labor Review* (volume 127, No. 2) is devoted to projecting GDP, employment, and labor force growth. Each of the articles assumes the same rate of growth in population and labor force between 2002 and 2012 as was seen between 1992 and 2002. Furthermore, there is no accounting for changes in the labor force participation rates among different age categories.

age bracket) and the number of workers in their prime working years (25-54) declining.¹¹ We can get a very rough idea about the average number of jobs that will need to be created per month just six years from now by imposing the age distribution that will exist in ten years on today's labor market.¹² The result of this exercise suggests that just the shift in the age distribution alone will decrease the number of jobs that need to be created to about 79,000 per month on average. This historically paltry number of jobs needed to absorb the labor force is a direct result of a slowing in the population growth of working-age adults (from 0.7% per year to 0.2% per year) and a large increase in the segment of the population with the lowest rate of labor force participation; the number of individuals in the 55 and older age bracket is expected to grow at 2.5% per year between 2003 and 2010.

Supplying job growth potential.

It's important to understand that the focus so far has been on the number of jobs that need to be created in order to keep unemployment in check. Nothing discussed here has anything to do with growth in consumer demand, labor productivity growth, or any other factors that may affect how many jobs are actually created or what the U.S. economy's job creation potential is. It may be in the interest of policy makers to set lofty goals for job creation in the U.S., but it is also important to realize that not meeting those goals doesn't necessarily mean more people are out of work; the jobs numbers presented earlier in this article should be considered a lower-bound target for policy makers.

¹¹ This, of course, assumes other infusions into the labor force are held constant. The potential role of increased immigration will be discussed below.

¹² This assumes that labor force participation rates stay the same (something just demonstrated to be problematic) and assuming that technological advancement is such that the same number of base jobs exists ten years from now. These are, obviously, both very crude assumptions. Estimates of population growth are obtained from population projections estimated by the U.S. Census Bureau (<http://www.census.gov>).

Sustaining a desirable overall growth in the U.S. economy, however, may require a rate of job creation that exceeds this lower-bound target. A recent OECD report indicated that differences in economic growth across developed economies can largely be explained by differences in labor utilization.¹³ In other words, countries in which employment and hours of work were among the lowest also experienced the slowest growth in GDP. It was also found that weaknesses in labor utilization were not able to be offset by faster growth in labor productivity. While the recent labor productivity growth in the U.S. is a likely culprit for explaining the unprecedented lack of employment coinciding with enviable levels of GDP growth, the OECD report points out that there are limits to the ability of labor productivity growth to sustain growth in GDP. Ensuring continued output growth will eventually require an infusion of labor to support it. Several options have been suggested as to how the United States can fuel its economic growth in light of the projected natural decline in the growth of its labor force.

Social Security Reform

One suggestion that is least popular with workers and policy makers is the encouragement of later retirement ages through modification of Social Security and Medicare policies. Since the mid-1990s Alan Greenspan, the Chairman of the Board of Governors of the Federal Reserve System, has been calling on policy makers to make benefits paid through these programs less generous, primarily through increasing the age at which one can qualify.¹⁴ The call for such a change is motivated by a realization that the programs may not be financially capable of continuing to provide the same benefits as baby-boomers begin to retire, and that

¹³ Organisation for Economic Co-operation and Development (2003). Also see Baily (2004) and Rhoads (2002).

¹⁴ See "Testimony of Chairman Alan Greenspan Before the Task Force on Social Security of the Committee on the Budget, U.S. Senate" (20 November 1997), <<http://www.federalreserve.gov/boarddocs/testimony/1997/>>. The Chairman also advocates a degree of privatization to ensure fiscal soundness of the program.

fewer benefits are better than none.¹⁵ The justification for increasing the qualifying age is based on the fact that the life span of Americans is growing. Greenspan has suggested that the normal age of retirement should be adjusted to, "keep the ratio of retirement years to expected life span approximately constant," (see footnote 14). Life expectancy at birth in 1946 (the first year of the baby-boom generation) was 66.7 years. The ratio of retirement years to expected life span, then, for someone born in 1946 is 0.025 ($= (66.7-65)/66.7$). If this same ratio is applied to someone born in 1964 (the last year of the baby-boom generation), the retirement age for that person should be 68.4 years ($=70.2-(0.025*70.2)$). Analogously, a person born in 2001 (the last year for which life expectancy at birth has been calculated) could receive Social Security benefits at age 75.3 years ($=77.2-(0.025*77.2)$).¹⁶

So how effective will raising the retirement age be in generating greater labor supply? Some evidence on this point is provided by seeing what happened to the incidence of retirement when the U.S. introduced an early retirement age. Beginning in 1961, workers were allowed to start receiving Social Security benefits at age 62. Early retirement Social Security payments are actuarially adjusted, based on life expectancy, so that expected total Social Security wealth for an early retiree is the same as if the person had waited to retire at the normal age. As a result of this change, the probability that a worker retired at age 62 increased from about two percent in 1960 to about seven percent in 1970 to over 20 percent in the late 1990s.¹⁷ An additional contributor to the tendency of U.S. workers to retire earlier and earlier is growth of private employer-provided pension plans which have a typical retirement age of 55 years. The bottom line is that

¹⁵ See Crossen (2004) on the dismal life of a retired person before the presence of Social Security.

¹⁶ It's of interest to note that the life expectancy of someone born in 1940 (the first year Social Security benefits were paid on a regular basis) was 63 years; 2 years before he (typically) could start receiving Social Security payments.

¹⁷ Gruber and Wise (1997). This paper documents the same retirement disincentive effects of early retirement provisions in social security programs in other countries.

people respond to incentives and if the incentives are appropriately structured the U.S. economy would benefit from more able-bodied elderly contributing to the labor force.¹⁸

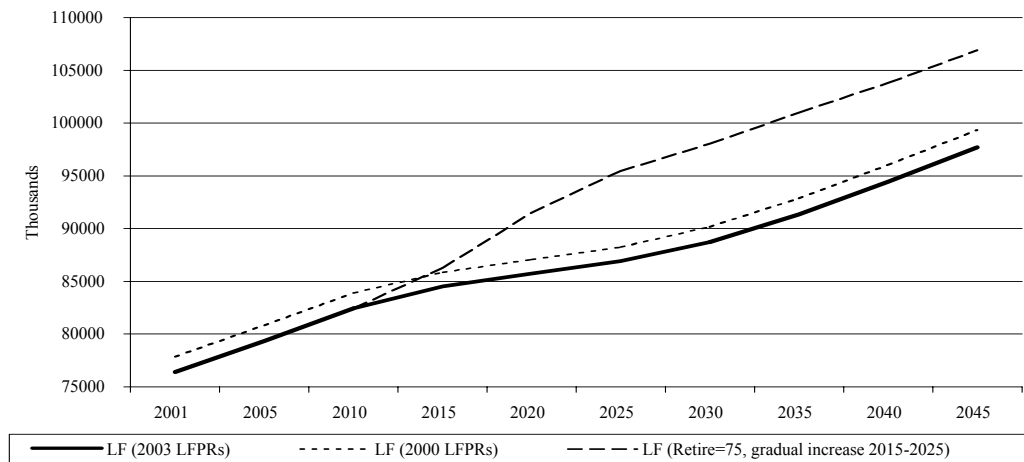
Figure 8 illustrates what the labor market can expect over the next 40 years regarding male labor force participants under a couple of different scenarios.¹⁹ The solid line depicts the expected growth in the labor force using the population projections from the U.S. Bureau of the Census and the labor force participation rates experienced for different age groups in 2003. The flattening of growth in labor force participants seen between 2010 and 2030 exactly corresponds to the retirement among baby-boomers when they reach 65 years of age. The small dashed line presents a scenario which corresponds to the same population projections, but assuming a return of labor force participation rates to their 2000 levels. The shape of this profile is the same shape, with numbers slightly higher. The suggestions by Greenspan to advance the age of Social Security eligibility is simulated by the large dashed line. Again assuming the same population projections, this profile depicts a delay in eligibility by five years, in five year increments, starting in 2015.²⁰ Delaying the age of eligibility has the effect of changing the structure of the labor force growth profile, retaining its pre-2010 trajectory.

¹⁸ More evidence on the power of the incentives of Social Security provisions can be found in Cole and Gruber (2000). One consideration with more elderly workers participating in the labor market is potentially higher health and disability costs for all workers, as these older workers would still likely be included in their employer-provided health and disability plans.

¹⁹ The trends discussed here for men are the same for women, but total numbers are always lower, as men have a higher labor force participation rate at every age.

²⁰ This assumption of a change every five years in five-year increments is for simplicity, since the population and labor force participation rates are reported for 5-year age categories.

Figure 8. Projected Growth in Male Labor Force, 2001-2045, Three Scenarios.



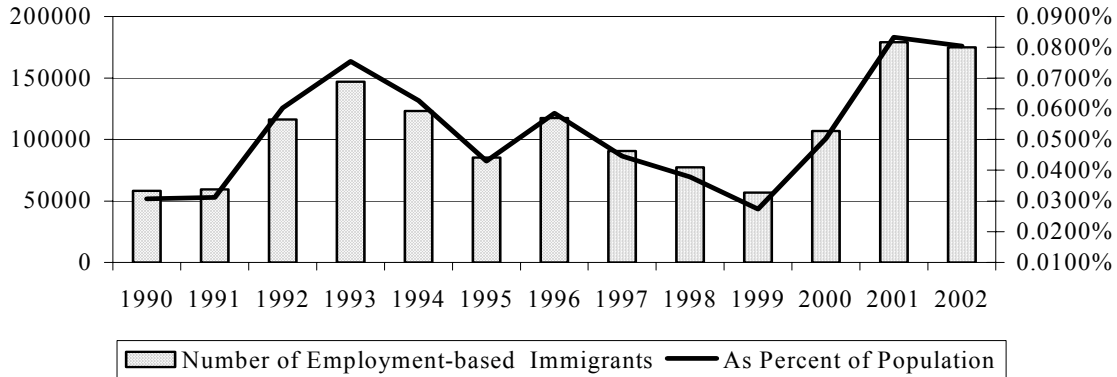
Increased Immigration

Another identified potential source for contributions to the declining native labor force in the U.S. is immigration. Industry lobbyists have been among the most vocal proponents for easing immigration restrictions to supply their skilled labor needs.²¹ Immigration policy has gone through many changes over the years as the flow of foreigners to the United States is affected by political whims, social forces, and economic need. Figure 9 depicts the recent trends in employment-based immigration to the United States, both the number and percent of population. These two statistics follow that same path and show a modest increase in immigration since the late 1990s.²² Post-9/11 immigration restrictions have arrested this growth most recently.

²¹ For example, see Aeppel (2004) and Machalabe (2004), who details the shortage of truck drivers in the U.S. Also see Lowell (2000).

²² These statistics actually over-count the number of workers added to the labor force through immigration since they include in the numbers the spouse and children of the immigrant who is coming to the U.S. for employment purposes.

Figure 8. Employment-based Immigration Levels and Percent of Population, 1990-2002.



Source: <http://uscis.gov/graphics/shared/aboutus/statistics/IMM02yrbk/IMMExcel/table4.xls>

The most recent efforts to change immigration policy is found in a guest-worker type program being promoted by President Bush. This program would allow foreign nationals to work for three years in the U.S. and would also ease their transition to permanent residency.²³ While some argue this program is motivated by security concerns and a desire for the U.S. to better document the many workers who are in the country illegally, the effect would still be to increase the pool of workers from which industry could draw.²⁴

There are two main criticisms of the immigration plan to fuel U.S. labor force growth.²⁵ The first is that there are not enough young, educated workers in the developing world to supply all of the growing labor force demands in the West. Not only is the population of the U.S. aging, but the populations of all major developed economies are going through roughly the same changes in their age distributions.²⁶ Furthermore, lower fertility rates in some countries (particularly in Eastern and Southern Europe) provide an even greater threat to longer-term

²³ Details of the Bush administration's proposal can be found at <http://www.whitehouse.gov/news/releases/2004/01/20040107-1.html>, "Fact Sheet: Fair and Secure Immigration Reform," (7 January 2004).

²⁴ A recent estimate is that there are 6 million undocumented immigrants in the U.S. labor force (Passel et al. 2004).

²⁵ See for example, Ip (2004).

²⁶ For example, see Gregor (2004).

declines in labor force growth than those faced by the U.S.²⁷ In other words, competition will be fierce for luring would-be immigrants to the U.S. to supply our employment demands. The second criticism of relying on immigration to make up labor force shortfalls is that by importing skilled workers from other countries, those countries of origin are being deprived the human capital they need to grow and develop. The concern about "brain drain" is not limited to the developing world. Saint-Paul (2004) documents the extent to which immigration to the U.S. from Europe during the 1990s has deprived European countries of some of its most talented resources.

Off-shore Outsourcing

The unpopular later retirement ages and the infeasibility of relying on immigration leads us to the third potential source of supplying growing labor needs in the U.S.: off-shore outsourcing. Making use of labor that stays in its own country provides needed labor inputs to fuel production in the U.S. and provides the returns to that human capital to the country of origin.

This solution is not without its critics, and the benefits will not be equally distributed, since it is not possible to outsource all types of production processes. For example, production processes that require customer contact, such as education, health care, and tourism (hotels and restaurants), can not be outsourced overseas and will continue to require domestic infusion of labor. It is also important to realize that while some jobs flow off-shore, the economic growth this source of labor will help to fuel will generate demand for domestic products and will be replaced by jobs we can't even yet imagine. "Logistics," for example, is a service industry that provides high-paying domestic employment to keep track of and direct the flow of products and services that are being supplied all over the world. As Greenspan testified before the Financial Services Committee in July 2003, "Innovation by its very nature is unforecastable...what we do

²⁷ See <<http://www.prcdc.org/summaries/worldpop/worldpop.html>>.

know is that if we have a sufficiently flexible labor market and a capital goods market which is functioning appropriately, that jobs will be created. They will be high tech, but we cannot know exactly where they will be."²⁸ This is also not the first time that fears of growing and rampant joblessness in the face of change has been the source of much debate. In 1964, President Lyndon Johnson was warned, "'the combination of the computer and the automated self-regulating machine' was creating 'almost unlimited productivity capacity which requires progressively less human labor.'"²⁹

Conclusions

The technological advancements through the 1990s are likely what has allowed the U.S. economy to grow at a respectable pace coming out of the recession of 2001 without the generation of the anticipated numbers of jobs such growth typically creates. This lack of anticipated job creation along with a continued decline in the unemployment rate has created some confusion about the number of jobs that *need* to be created versus the level of job creation that is desirable. While this article has explained the first part of this confusion, it has only just made suggestions as to the second. In other words, while the current rate of job creation appears to be able to sustain the expected growth in the labor force for the time being, it is not clear that it is enough to sustain the rate of economic growth that will be desirable in the long-run. This article has touched on several options available to policy makers in affecting this trend of slower labor force growth, but any one of them will take time to implement and adjust to, suggesting that serious and immediate discussion of their respective merits is in order.

²⁸ See Mehlman (2003).

²⁹ Wessel (2004).

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Appendix

The purpose of this appendix is to demonstrate algebraically that the unemployment rate staying constant from one period to the next must necessarily imply that the percentage change in the labor force equals the percentage change in employment across the two periods, as well. Let the subscript 1 correspond to the first time period and the subscript 2 to the second time period, UR is the unemployment rate, LF refers to the labor force, and E means employment.

Then,

$$UR_1 = UR_2 \Rightarrow \frac{LF_1 - E_1}{LF_1} = \frac{LF_2 - E_2}{LF_2}.$$

Multiplying this out ($LF_2LF_1 - LF_2E_2 = LF_1LF_2 - LF_1E_2$) and subtracting LF_2LF_1 from both sides and dividing by -1, yields:

$$LF_2E_2 = LF_1E_2.$$

Subtracting LF_1E_1 from both sides and re-arranging produces:

$$E_1(LF_2 - LF_1) = LF_1(E_2 - E_1).$$

Finally, dividing both sides by E_1LF_1 results in:

$$\frac{LF_2 - LF_1}{LF_1} = \frac{E_2 - E_1}{E_1},$$

which reflects the equivalence of the percentage change in the labor force and the percentage change in employment.