



Management Recruiters International, Inc.

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# Taking the Measure of Labor Department Surveys - 2004

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# Executive Summary

## Overview:

Management Recruiters International (MRI), the largest professional staffing institution in the world, has become concerned that increased hiring demand observed by its affiliates is not correlating with the measure of the total U.S. employment numbers released by the Bureau of Labor Statistics (BLS). Consequently, in an effort to educate its clients on how the numbers are calculated, MRI commissioned this study to explore the mechanics of the BLS monthly Employment Situation report.

There are two surveys that BLS uses to generate the monthly report, the household survey and the payroll survey. With the survey findings now seen as influencing everything from the broader stock market to the hiring practices of major businesses to the presidential race, the two BLS surveys are considered the preeminent yardsticks for calculating hiring practices on a national scale. This report contrasts positive official labor statistics with the negative payroll estimate of total employment, and identifies new technical problems with its methodology. The large sample size of the payroll survey has overshadowed sample quality issues.

Following are some of the study's highlights:

## The payroll survey has an inconsistent success rate:

The MRI research found that the preliminary payroll estimate of employment growth is pointing in the wrong direction 9.1 percent of the time. There have been 177 monthly reports since January 1990, and given the two-month delay in preliminary data being finalized, 175 finalized revisions. In 16 cases, the preliminary estimate of job growth was changed to decline, or vice versa. Once the effect of annual benchmarks is considered, the number of false growth signals rises to 25 occurrences, for a failure rate of 15.7 percent.

As recently as September 5, 2003 when BLS announced 93,000 payroll jobs were lost in August, *The New York Times* wrote that the "disappointing jobs report rattled Wall Street." Two months later, *The New York Times* trumpeted "3 Months of Job Growth Best in 3 Years" because the August numbers had been revised to a positive gain of 35,000 jobs. In contrast, March, April, and May of 2002 were all announced as months of jobs gains, but each was ultimately revised as a job loss.

## The BLS is not providing a clear margin of error for its payroll survey:

MRI research uncovered a dramatic swing in the margin of error that accompanies the release of the preliminary payroll numbers. Buried in technical footnotes of the BLS report, one finds that the margin of error for the level of payroll jobs is 0.2 percent (plus or minus 500,000 jobs), but this presumably applies to final – not preliminary – estimates. Every month's announcement uses preliminary data, with an average of only 57 percent of responses, implying a margin of error almost 50 percent bigger still: plus or minus 750,000 jobs. Also, the monthly growth in payroll jobs has an advertised margin of error of 135,000, but the preliminary data may well have a margin of error of 200,000.

- In absolute value terms, the MRI study found that since 1990 the preliminary estimate of payroll job growth has been off by an average of 49,869 jobs between preliminary and final estimates. The number is twice as high for annual benchmark revisions.
- Imagine how differently the market would react to the headline of "Job gains of 32,000, plus or minus 200,000" instead of the real headlines of "Job gains of 32,000."

## The Payroll Survey has technical limitations:

The BLS recently acknowledged a technical problem with its sampling methodology: job turnover causes an overstatement of one to four million jobs in the payroll survey, and an overstatement of job losses or gains when the rate of job changing varies. In addition, the report found non-traditional positions such as contractors, limited liability companies and other growing segments of the labor force are not included in the BLS Reports. This report emphasizes that regardless of sample problems, both the payroll and household survey are static yardsticks of the labor force. BLS has recently unveiled new dynamic data series showing gross job creation and destruction, which is a vital aspect of the changing U.S. economy. MRI encourages BLS and Congress to accelerate the development of the Job Openings Labor Turnover Survey (JOLTS), the Business Employment Dynamic (BED) Series, and other dynamic surveys that reveal the inner workings of job creation and loss.

# I. Introduction

“Forget outsourcing, offshoring and cost-cutting – the most potent destroyer of jobs in the past couple of months has been the Bureau of Labour Statistics.”

– *The Economist*, August 11, 2004

The U.S. economy in 2004 is producing ten percent more goods and services than it produced before the terrorist attacks of September 11, 2001, and it has apparently generated this heightened level of output with less labor input. One view of these facts is that the U.S. economy has become even more productive, cementing its position as the most productive economy in the world. Another view is that the advance of free markets has left many workers behind, causing an alarming loss of net jobs.

The executives at Management Recruiters International (MRI) hold a third view: over the last few years the demand for labor has been much stronger than some official statistics indicate. In particular, the U.S. Bureau of Labor Statistics (BLS) measure of “total nonfarm employment” remains nearly one million jobs below its 2001 peak, which is inconsistent with our observed demand for workers. Other measures from BLS reinforce our view, notably the low unemployment rate of 5.4 percent in August 2004 and the low level of initial jobless claims.

Table 1. Strong macroeconomic indicators in 2004

	Current as of Aug 2004	Average 2004	Average 1974-2004
Unemployment Rate	5.4	5.6	6.4
Monthly Payroll Job Growth	144,000	180,000	146,822
Weekly Initial Jobless Claims	340,000	340,000	382,800
Inflation Rate	2.7	2.5	4.7
GDP Growth Rate	2.8	3.7	3.1
Labor Productivity Growth Rate	2.5	3.1	2.0

When considering a comprehensive set of economic measures, the current economy is stronger than its historical and recent averages. Table 1 compares current macroeconomic indicators for the month of August 2004 to averages over all months (quarters) in 2004, and to the average over the last 30 years. In every case, the average 2004 indicators exceed the 30-year average. Weekly initial jobless claims represent the regular churn of layoffs in the dynamic U.S. economy. Despite a 40 percent increase in the U.S. population since 1974, jobless claims remain 40,000 below the 30-year average. The sum of the inflation rate and the unemployment rate, known as the misery index – today stands at 8.1, far below the 30-year average of 11.1.

Why does the news continue to focus on the negative payroll number? Some people note that the current political season accentuates the hype, while still others note that the media is especially cautious about cheerleading another dot-com style

bubble. In the media's defense, the nonfarm employment total is acknowledged as the most important mover of financial markets – and that statistic is surprisingly depressed. However, all of these points become moot once we realize that the payroll survey has distortions in its sample.

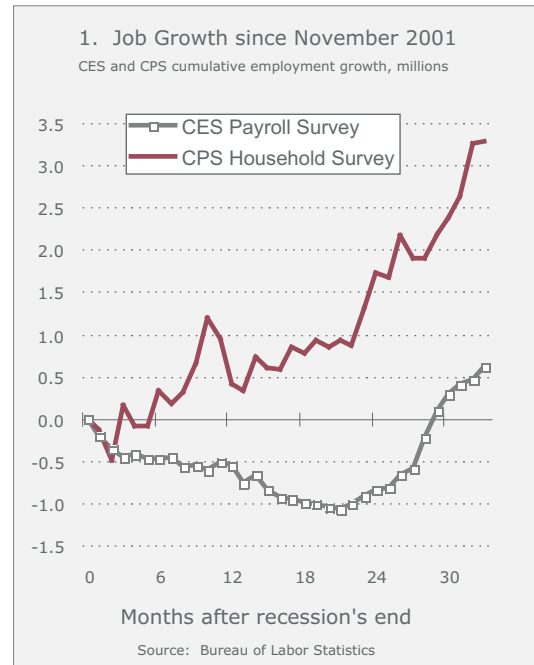
Figure 1 shows the net job growth in total nonfarm employment as measured by Current Employment Statistics (CES) establishment survey, conventionally known as the payroll survey. Payroll employment continued to decline after the recession ended in November 2001. Yet another BLS measure of total employment derived from the Census Bureau's monthly Current Population Survey (CPS) – known as the household survey – shows an increase of 3.3 million jobs since that same point. An analyst at economy.com wrote in September 2003, "Something is amiss in the establishment survey...if history is any guide, conditions now are not as bad as the establishment survey would tell us."

Assessing objective truth is inherently difficult, and this difficulty is compounded when using multiple subjective measures. The economy is especially difficult to measure because it is not a stable system; it constantly moves and evolves. Analysts should take into account how statistics designed to measure a traditional labor market will be skewed when measuring a changing objective reality.

This paper turns the spotlight on the BLS monthly "Employment Situation" report. We review the historical development of the measures that make up the monthly BLS report. We find that, while in some ways the BLS measures are better than ever, they remain structurally unable to accurately assess the internal mechanics of labor markets and the larger economy.

A yardstick provides a useful operational metaphor for the standard BLS surveys. A yardstick is effective in describing the height of a child, even a growing child, but not much use in assessing weight, temperature, and blood pressure. That is, a yardstick is an external measure of net changes. Both BLS yardsticks – the payroll survey and household survey – are static measures and are not able to assess the internal dynamics of the economy. Analysts need to go beyond static external measures and develop internal measures to assess employment flows. Examples of internal employment measures include gross job accessions and losses simultaneously, compensation, job satisfaction, frequency of job changing, and observed demand for labor. Many of these types of measures are available, some from the private sector and some from the government.

In assessing the payroll survey, this paper provides a technical critique of its inherent sample quality problems. Many analysts point to the large sample size of the payroll survey as a defense of its accuracy, without considering how newly discov-



ered sampling quality issues affect both the estimates of employment growth and the associated margins of error. Unfortunately, the BLS does not state the margin of error for either survey in its Employment Situation Summary news release. This is a serious oversight, as the margin of error is not consistent over time, and the BLS procedure of relegating such concerns to separately published technical notes inhibits the usability of the survey results.

The paper also considers other trends in U.S. employment, from improved pay and job satisfaction to the changing structural makeup of the economy. The paper concludes with recommendations for supplementing the static BLS surveys and for changes in the process of BLS presentation of its findings and methodologies to the lay public.

### How the Labor Department Defines a Job

The Labor Department's Bureau of Labor Statistics (BLS) has two ways of counting employment, and they are conceptually different. One way is to count workers by taking a personal survey of a sample of the U.S. population and determining what percentage of people are unemployed, employed, and not in the labor force. The other way is to count jobs by taking an impersonal survey of a sample of employers, also known as establishments' payrolls.

The BLS explains its technical definitions of employment in the two surveys in the following text we quote directly from the Employment Situation report:

"Household Survey. People are classified as employed if they did any work at all as paid employees during the reference week; worked in their own business, profession, or on their own farm; or worked without pay at least 15 hours in a family business or farm. People are also counted as employed if they were temporarily absent from their jobs because of illness, bad weather, vacation, labor-management disputes, or personal reasons.

"Establishment Survey. Employees on nonfarm payrolls are those who received pay for any part of the reference pay period, including persons on paid leave. Persons are counted in each job they hold.

"Differences in employment estimates. The household survey includes agricultural workers, the self-employed, unpaid family workers, and private household workers among the employed. These groups are excluded from the establishment survey.... The household survey has no duplication of individuals, because individuals are counted only once, even if they hold more than one job. In the establishment survey, employees working at more than one job and thus appearing on more than one payroll would be counted separately for each appearance.

Source: BLS "Employment Situation" <http://www.bls.gov/news.release/empsit.tn.htm>

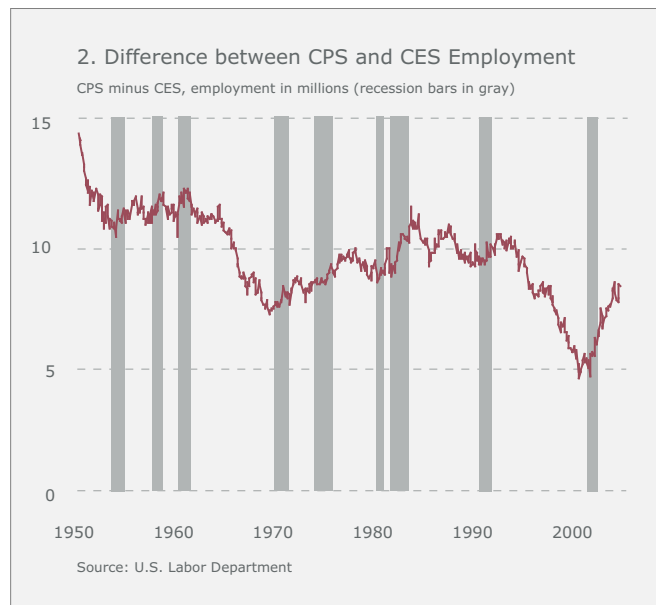
## II. The Problem

The public perception of a jobless recovery after 2001 was substantiated by a single statistic from the BLS monthly payroll survey. The “total nonfarm employment” number from that survey currently remains 900,000 jobs below its peak level in March 2001. Even though this measure of payroll jobs has grown every month since mid-2003, the growth has not been strong enough to overcome the severe losses of 2001 and 2002.

However, this lone statistic is problematic because many other labor indicators imply the opposite conclusion. Most notably, the other primary BLS product, the household survey shows a net gain of millions of workers since March 2001. The gap between the two BLS surveys is a problem for professional economists, Wall Street, and especially the BLS itself.

When the Joint Economic Committee (JEC) studied this issue, it concluded, “At this time, the remaining disparity between the two surveys cannot be explained.” For decades, the standard position was that the payroll survey was best for analysis of employment levels, while the household survey was better for ratios like the unemployment rate and employment-to-population rate. The reasoning for this is that the household survey relies on uncertain estimates of U.S. population for calculations of employment levels. If the population estimate is incorrect, then the household survey measure of total employment will be incorrect to the same degree. Worse yet, population adjustments were factored in only once a year by the Census Bureau, in January, making the household survey’s level measures suffer from annual break points in its series, and making those series effectively useless for comparisons across time. The JEC report proposed a fix which smoothed out January population adjustments, and offered an adjusted series. The BLS responded quickly a December 2003 report titled “Creating Comparability in CPS Employment Series” with an officially approved methodology for population smoothing of the household survey’s numbers.

Using the smoothed CPS employment data means the two series can now be properly compared. Figure 2 shows the difference between the two surveys’ total employment estimates. Though the difference has trended down over time, the sharp upward movement of recent years is unprecedented, suggesting that standard business cycle dynamics are not causing the divergence.



<sup>1</sup> JEC, Tale of Two Employment Surveys, Oct 14, 2003.

A March 4, 2004 letter from the Federal Reserve to the Joint Economic Committee of Congress noted that the gap between the household and payroll series varied up and down with the business cycle but had never before been so wide. The letter then said, "Neither we, nor any other analysts who have studied this issue, have been able to fully explain this cyclical pattern, and we do not know why the most recent episode has been more exaggerated than earlier ones."<sup>2</sup>

"There is always a discrepancy between the two surveys because of differences in what they measure and how they measure it, and monthly changes often move in opposite directions," wrote Global Insight economist Cynthia Latta, "Over a period of several months, however, the two series have tended to tell the same story." Similar concerns were raised by economists from all quarters, including Gary Becker, Robert Barro, Allan Meltzer, Greg Mankiw, and even the Congressional Budget Office:

"Over the past six months, startups of new businesses and expansion among small firms that are not directly measured in the establishment survey may have occurred more frequently than the official data assume. Moreover, recent data on tax withholding, though by no means definitive, are consistent with the view that employment growth may have been somewhat stronger during the second half of 2003 than is reflected in the current establishment survey data."<sup>3</sup>

Resolution of this discrepancy is difficult because the issue has become politicized as America approaches the 2004 elections. For example, the last few years of are often described as the first time since the Great Depression that America has lost jobs during a presidential term. However, the implied reference to the decline in payroll jobs (because that is the only type of employment still below its 2001 peak) isn't really appropriate for historical and technical reasons.

Historically, the comparison of President George W. Bush to President Herbert Hoover is inappropriate because the payroll survey did not exist in its modern form until 1939, seven years after Hoover was president.

Technically, the payroll survey has come under increasing scrutiny, and weaknesses in the methodology have been exposed in recent months. For example, a single worker can show up on two payrolls whenever they change jobs, which implies that the payroll survey is systematically inflated. A reduced turnover rate will show up as lost jobs in a count of payrolls.

Another technical problem is the wide margin of error in payroll estimates, which are received by the public as if they were precise. We analyzed the initial announcement seasonally adjusted data and compared it to the "final" revisions, which are made with a two-month delay, and the benchmark estimates. Since January 1990, there have been 177 monthly reports, 175 final revisions, and 159 benchmark revisions. In 113 cases the preliminary estimate of growth in nonfarm employment was revised upwards in the final revision. In 86 cases, the final estimate of growth was revised upwards in the benchmark revision. Moreover, in 25 cases, a preliminary estimate of growth in total nonfarm employment was changed to decline in the benchmark release, or vice versa. That is, the BLS announcement of job change pointed in the wrong direction 15.7 percent of the time.

Regardless, the payroll survey remains the main mover of markets, and its primacy is firmly defended by no less than Federal Reserve Chairman Alan Greenspan.

<sup>2</sup> Zickler, Joyce K., Deputy Associate Director, Division of Research and Statistics, Board of Governors, Federal Reserve System, in a March 4, 2004 letter to the Joint Economic Committee, U.S. Congress.

<sup>3</sup> Congressional Budget Office, The Budget and Economic Outlook: Fiscal Years 2005 to 2014, January 26, 2004.

Greenspan explained his preference in Congressional testimony in February, then reaffirmed it in a letter to Congressman Doug Ose on February 11, 2004:

“...our assessment is that the data from the payroll survey generally are more accurate than those from the household survey. One reason for this conclusion is that the payroll survey is based on a much larger sample than is the household survey (400,000 establishments versus 60,000 households). A second reason is that the payroll data are benchmarked each year...”

Economists commonly use the large sample size argument to explain the divergence between the two employment estimates. This paper takes that logic to task. Sample size is an important factor in establishing the accuracy of a survey, but sample quality is equally important. When the sampling and non-sampling errors that are endemic in the CES are factored in, its margin of error rises considerably.

## III. History of BLS Measures

The Labor Department was created in 1913 by an act of Congress that was reluctantly signed into law hours before Woodrow Wilson was sworn into office as the newly elected President. The Department consisted of a number of previously existing bureaus, one of which was the Bureau of Labor Statistics. At the time, the BLS did not publish the CES or CPS as we know them today. Those surveys were improved by BLS economists gradually over the decades, and continue to be enhanced with refined techniques.

When a visitor to the BLS website at [www.bls.gov](http://www.bls.gov) explores "Detailed Statistics," they might be surprised to find payroll survey series CES0000000001, total nonfarm employees, begins in January 1939. The "employment level" series from the household survey is LNS12000000 and doesn't begin until January 1948. Anyone claiming that job losses today are comparable to the "Great Depression" which started in 1929 is not using comparable data.

The BLS publishes two surveys of labor market conditions for a good reason: each survey offers a unique perspective. The CES, for example, teaches us about average hourly earnings, hours worked, and net job growth across numerous sectors of the economy. In contrast, only the CPS provides information on people who are unemployed and not in the labor force, as well as demographic details by gender, age, and ethnicity. The CPS is actually conducted by the Census Bureau, but the BLS reports its employment component monthly. For all its differences with the payroll survey, the CPS has many similarities such as the common use of a reference period including the 12th day of the month. For this reason, the BLS publishes the results simultaneously in its Employment Situation report, which is usually released on the first Friday of each month.

Traditionally, the publication of the Employment Situation report coincided with a congressional hearing by the Joint Economic Committee. This was an occasion for the BLS Commissioner to respond to policymakers' questions, and clarify the technical issues that often arose. Unfortunately, the JEC hearings have been held with less frequency over the years, even though the CES and CPS data continue to be published monthly.

The BLS actually publishes a wide variety of economic statistics, including the consumer price index (CPI) and producer price index (PPI). It constantly updates the mix of measures for policymakers and the public, such as the 2003 launch of the business employment dynamics (BED) survey of gross job flows. However, the CES and CPS remain its flagships, partly due to their historical role.

### How the Payroll Survey Developed

According to the Bureau's *Handbook of Methods*, "The first monthly studies of employment and payrolls by BLS began in 1915 and covered four manufacturing industries. Before 1915, the principal sources of employment data in the United States were the census surveys—the decennial Census of Population and the quinquennial Census of Manufactures. No regular employment data were compiled between the censuses."

The collection of labor data was pioneered by State governments, but nothing comprehensively attempted to cover the entire economy until the Great Depression exposed a need for such information. The Labor Department moved to expand coverage to non-manufacturing sectors, increase the frequency of reporting to monthly rather than annual surveys, and broaden the indicators assessed to include hours, earnings, and the status of the unemployed population.

In 1990, the CES began using automated data collection methods, such as telephone data entry. Recently, more employers have used the internet to respond to the payroll survey.

Four major innovations to the CES were implemented in June of 2003. The most significant was the introduction of a new North American Industry Classification System (NAICS), which replaced the older SIC codes. In addition, the payroll survey was converted over to a random probability sample from the previous quota sampling. The probability methodology is theoretically more accurate and should be considered an improvement. All the changes confirm the tireless efforts of the BLS professionals to keep their products up to date with best practices.

The composition of the CES includes all kinds of employers, mostly from the business world, but also including non-profit firms and government agencies. Essentially, any establishment is eligible for inclusion if it participates in the ES-202 program, the federally mandated employee tracking system that provides unemployment insurance (UI) benefits –and not incidentally collects UI taxes. All respondents participate voluntarily and are included in the sample for 4 years, then rotated out of the sample for 4 years.

Data collection is conducted through a network of State agencies and BLS Data Collection Centers. According to the BLS, "Data are collected through various automated collection modes and by mail. Touch-tone data entry (TDE) serves as the primary type of electronic reporting, although a large number of reports are collected via direct electronic file transmission (EDI), and a small but growing number are received via the Internet (Web). Additionally, many respondents report via computer-assisted telephone interviews (CATI) or FAX."

Data are collected for the pay period that includes the 12th day of each month. Thus, if a firm issues paychecks once a month, the 12th will fall in the monthly payroll, but another firm issuing bi-monthly paychecks should only report numbers from the first half of the month. This feature explains why BLS assumes that hurricanes or other major events that hit the economy at the end of the month are less likely to have an impact on payroll statistics than events that occur early in the month.

The BLS Form 790 is the cornerstone of the survey, and a handful of versions exist that differ slightly for industry types (e.g., construction). The form lists persons that should be included in the tally, such as full- or part-time employees, persons on paid vacation or leave, and even trainees. It also lists persons who should not be counted, such as owners, pensioners, armed forces personnel on active duty for the entire pay period, unpaid family members, and outside contractors.

The sample of establishments cannot include firms that are created during the year, so the BLS uses an internal estimate of firm births and deaths to supplement its statistical estimates. Every year, the total employment estimate is benchmarked to the entire universe of UI records as of March. That is, the CES data are completely

revised to a new benchmark month, which means that every month's employment number in the year prior to March and every month's number since March is revised. In percentage terms, this revision sounds small, but in absolute numbers it can be large. Over the last decade, the benchmark revision has averaged 0.3 percent in each month, which corresponds to about 400,000 jobs. Seasonal adjustments to the estimates are also recalculated at the same time as the benchmark revision. The benchmarking process takes many months to complete, and was traditionally not finalized until 15 months after the March in question. Only recently was the process accelerated to January, instead of June, with a pre-announcement of the probable impact in October. Thus, the benchmarked figures for March 2004 will be finalized in January 2005, but the likely impact will be pre-announced on October 8, 2004.

## Influence of BLS Surveys

Most macroeconomic models of the U.S. economy by definition include the key variables of gross output, jobs, unemployment, and inflation. Such models are based on estimates of relationships over time between aggregate measures. As a result, the CES measure of "total nonfarm employment" has become the de facto definition of "jobs" in the U.S. economy. When the parameter relationships among different variables are being determined, the historically revised and benchmarked payroll data are naturally used most of the time.

The danger of these models, however, is that one cannot accurately assume the other variables will move according to a formula based on the BLS jobs number if it is a preliminary number. That is, real-time payroll data are not nearly as stable as the historical data that most model estimates are based on.

Nevertheless, financial markets react strongly to the payroll jobs number. As recently as September 5, 2003 when BLS announced 93,000 payroll jobs were lost in August, *The New York Times* wrote that the "disappointing jobs report rattled Wall Street" when the Dow Jones Industrial Average lost 0.9 percent. In the same article *Reuters* noted "Treasury prices leapt yesterday after unexpectedly weak job figures convinced market skeptics that official interest rates would not be rising for a long time to come." Two months later, *The New York Times* trumpeted "3 Months of Job Growth Best in 3 Years" because the August numbers had been revised to a positive gain of 35,000 jobs. In contrast, March, April, and May of 2002 were all announced as months of jobs gains, but each was ultimately revised as a job loss.

Indeed, economic studies of official statistics show that the CES employment statistic is the most influential of all:

"Consider, for example, Nonfarm Payrolls and the Civilian Unemployment rate. These announcements are always released together at 8:30AM. Thus, without knowing the surprise components of the two announcements, there is no way to separate their influence. However... shows that the surprises in the Civilian Unemployment rate affect prices much less than surprises in Nonfarm Payrolls. We show that the Nonfarm Payroll figure affects bond prices, while the Civilian Unemployment rate is much less important." <sup>4</sup>

<sup>4</sup>Balduzzi, Pierluigi, Edwin J. Elton, and T. Clifton Green, "Economic News and Bond Prices: Evidence from the U.S. Treasury Market," *Journal of Financial and Quantitative Analysis*. December 2001; 36(4).

## IV. Evolution of the Labor Market

Among academics, the concept of jobless recovery – in which gross domestic production (GDP) expands while labor markets contract – is a paradox, contrary to theory and history. In fact, nearly every measure of the U.S. labor market has improved during the recovery period after 2001, all save the one that is most watched: total nonfarm employment. Payroll jobs are down by 900,000 since March 2001, and the Department of Labor cannot explain why. There is clear evidence that the economy is evolving rapidly, and the “creative destruction” of jobs is upending some sectors while opening new opportunities. For example, in manufacturing alone, one and a half million positions were slashed after the recession officially ended, capping 42 straight months of losses.

Part of the loss in manufacturing employment, though surely not all of it, is due to increased productivity. In fact, even as industrial jobs have declined, output has increased over the last few years. And part of that enhancement of productivity has been a shift in the way factories organize their tasks. Irwin Seltzer puts this in the context of the payroll survey, which is consequently “bleak because of the way it is designed. Assume, for example, that a factory employs some 3,000 workers making widgets, and 300 workers in the on-site canteen. Management decides to outsource the food service. When this employer next responds to the employment survey, he will report a job cut of 300 and, best of all, that he is now producing all of the widgets that he once produced with a workforce of 3,300, but using only 3,000 workers--a bogus productivity miracle. Even more misleading is that fact that the new firm formed to handle the canteen catering is not picked up in the employment survey, which does not cover either new firms or the newly self-employed.”<sup>5</sup>

Among the many explanations offered by economists for the jobless recovery of 2002-2003, the theory with the most intuitive appeal is that the rapidly changing economy causes displacement of labor in declining sectors that is not suitable for employment in expanding sectors. A longer period of retraining leads to a higher level of joblessness. Indeed, an influential 2003 paper from two Federal Reserve economists suggested a higher percentage of job losses during this recession are permanent than in past recessions.<sup>6</sup>

The U.S. is defying traditional economic theory by pushing out the frontier of productivity even faster than other advanced economies can catch up. When Japan’s per capita GDP grows at 2 percent a year, it is simply catching up to America’s. But when U.S. per capita GDP grows each quarter, it advances further into the uncharted frontier of potential human output. The miracle of the new economy is that American output per person seems to be accelerating, not just growing, in sharp contrast to the perception of professional economists a decade ago. The infamous productivity slow-down of the late 1970s when productivity growth dipped from the 2 percent norm closer to 1 percent, now seems more of a hiccup than a plateau. Labor productivity has grown at 3.7 percent annually since 2000.

The implication of rapid productivity is that fewer workers can produce the same amount of goods. For example, new car factories don’t require as many production workers, and the image of millions of displaced industrial workers is daunting. Despite having better goods at lower prices than ever before, the employment question remains: who can see beyond the veil of unstoppable, unpredictable

<sup>5</sup> Stelzer, Irwin, January 22, 2004; *The Weekly Standard*.

<sup>6</sup> Groshen, Erca, and Simon Potter, 2003, “Has structural change contributed to a jobless recovery?,” *Current Issues in Economics and Finance*, Federal Reserve Bank of New York, Vol. 9, No. 8, August.

growth? That is, "Where will future jobs be?"

Such fears were addressed most perceptively by Nobel economist Herbert Simon. In a 1960 essay, recognizing that most early human labor involved muscle power which was being gradually replaced by engineered power, Simon queried, "Won't a point be reached where men are less productive than machines in all processes, hence economically unemployable?" His answer was no.

Simon's prediction of the mechanization of ever more factory work by 1985 was realized, as was the computerization of most office tasks like inventory and payroll accounting. There is irony in the automation of payrolls leading to the current payroll muddle, and subsequent misinterpretation of automation. Nevertheless, millions of clerks have been permanently displaced by computers, but Simon believed that humans would shift to new comparative advantages in the same way that free trade enhances output, contrary to persistently misplaced fears that trade will destroy economic opportunity. Simon's insight was that automation was a liberating force that allowed humans to specialize in new niches as the economic environment evolved in scale.

Fundamentally, humans have been freed from working to protect, feed, and clothe themselves – basic survival – in order to return to the essentials of nurturing, healing, educating, and entertaining one another. Simon was confident about growth in "occupations where 'personal service' involving face-to-face human interaction." But he cautioned that we could never know precisely what new jobs would come.

What we do know is that waves of labor dislocation have yet to fulfill dystopian predictions of mass unemployment. Indeed, 2004 has seen an extraordinarily low rate of unemployment, currently at 5.4 percent. This is firmly within the range of the "natural" unemployment rate taught in most Economics 101 classes.

The most persistent counter-charge among today's pessimists is that the unemployment rate does not count discouraged workers. But the evidence does not support the "discouraged" assertion. In fact, discouraged workers have been counted in the CPS since 1994, in response to the criticism made during the 1992 election. Including discouraged workers in a calculation of the unemployment rate (which the Labor Department does in its U-4 version) adds 0.3 percent (i.e. an underemployment rate of 5.7 percent), which is exactly the same ratio of discouraged workers during the typical month in the 1990s.

Policymakers must grapple with the reality, not of recession and recovery, but a unique restructuring of the workforce. It involves the demise of whole industries, and the rise of unforeseen ones. Driving this process is the embodiment of technology in new capital. Simon understood that computers would change everything, but he scoffed at the antagonists predicting that mankind would become alienated from a world of working machines. We, too, can see that consumers greatly enjoy their cars, appliances, and electronic gadgets.

Details on occupational shifts seem to indicate that most of job losses in industry are exactly what Simon predicted: automation of repetitive muscle jobs on the assembly line, even as design and maintenance positions hold steady. Human labor is being liberated from the dangerous factory floor of the 20th century, just as it was liberated from long hours in agricultural fields. Modern admiration for the necessity and dignity of hard labor should not rewrite the dismal experience of pre-modernity.

The central near-horizon challenge of modern capitalism is constant, unpredictable change in demand for different worker skills. Thus, the debate among policymakers is how to guide the transition to new skill sets. On one side are the fading industries that use their leverage to subsidize the past. Directly opposed is the libertarian solution: do nothing and trust in the efficient force of laissez-faire. Proponents of new-fashioned government planning and labor/industrial policy propose a third approach: using government resources to aid the transition to new worker skills. This policy debate will be sorted out over the coming decades, and thoughtful observers will watch the experimental diversity of all 50 states for clues about the appropriate direction of national policy.

## V. Technical Critique: Challenges and Alternative Perspectives

Wall Street's emphasis on payroll jobs is surprising, given what it should know about markets. The quantity of transactions in a market is meaningless without reference to the price of the commodity being traded. Yet the public perception of the health of labor markets is dominated by quantity. Growth in the number of jobs, not growth in compensation, is what Wall Street pays most attention to when assessing the health of the workforce. This emphasis on quantity over quality of U.S. employment, ironically, mirrors the problem with CES sample itself.

This section first explores the limitations of the CES and CPS, going into more detail than section II. We describe the sampling and non-sampling structural problems in the payroll survey, the most notable of which is the turnover effect. Then, we describe the inherent limitation on both measures as static snapshots of net changes in employment. We discuss these two problems separately. The section concludes with a discussion of alternative measures of employment.

### The Payroll Survey's Structural Problems

The CES sample quality falls short of the theoretical ideal because it is not truly a random sample of total employment. First, the payroll sample does not take observations from the entire population of jobs in the U.S., but only from the sub-population of payroll jobs. As that sub-population changes its relative size, even slightly, CES statistics become less representative of the larger population.

The non-inclusion of self-employed workers is a well-known limitation. Imagine estimating the increase in the national population over the last ten years, but not counting any babies with green eyes. We know from the discussion above that new business institutions are plainly unlike old businesses. A limited liability company is essentially a new eye color in the mix, and such firms are routinely – though not entirely – missed by the CES methodology.

The second structural problem is that workers who change jobs are often counted twice in the survey. A 2003 study by BLS hinted at this problem: "If a person leaves one job and starts another during a relatively short time span, they could appear on both employers' payrolls for the CES reference period. They would be counted twice."<sup>7</sup> However, job-changing was considered a minor issue in the payroll survey sample until the turnover effect was quantified in a Heritage Foundation paper which said, "decelerating turnover is artificially deflating company payrolls, creating an illusion of 1 million jobs lost since 2001."<sup>8</sup> The BLS published its own study on August 6, 2004, titled "Effects of Job Changing on Payroll Survey Employment Trends" which read:

"If the job changer rate is variable however, especially if it is cyclically sensitive, it could affect reported job growth trends from the payroll survey in a way that is not mirrored by the household survey. This effect might then help explain some of the recent divergences between the household and payroll survey employment trends."<sup>9</sup>

<sup>7</sup> Nardone, et al., "Examining the Discrepancy in Employment Growth Between CPS and the CES."

<sup>8</sup> Kane, Tim, " March 4, 2004.

<sup>9</sup> Bureau of Labor Statistics, "Effects of Job Changing on Payroll Survey Employment Trends," August 6, 2003. <http://www.bls.gov/ces/cesjobch.pdf>

This problem creates both the non-sampling and sampling errors in the survey. It creates non-sampling errors by underestimating employment growth when the job-changing rate declines. This is called non-sampling error because it would be present even if the BLS counted all workers at all firms. It creates sampling error by increasing the margin of error of the estimate it obtains from its sample. The margin of error is the margin that is expected to include the correct number with 95% probability. For example, if employment growth is estimated at 144,000 with a 120,000 margin of error, we can be 95% confident that the actual value of employment growth lies between 14,000 and 244,000.

The sampling error in the CES survey is often discounted because of the large sample size. The payroll survey reaches 400,000 worksites in the United States, reaching approximately one third of all workers. Large sample size usually implies an accurate survey; if the CES were to cover only 200,000 worksites in its survey instead of the current 400,000, its margin of error would increase. However, while 400,000 may seem like a large sample, appearances can be deceptive, especially when estimating month-to-month changes.

To understand how sample quality issues distort the CES accuracy, consider a simple example of a school principal trying to count all the students in his large high school. He decides count one-third of the classrooms in the school, instead of the entire population. Further, he uses the teachers as intermediaries, rather than counting each student individually. The rosters for each class are used to tally up each classroom total, which he sums and multiplies by three to estimate the entire student population.

Specifically, suppose the school contains 750 students randomly distributed across 30 classrooms. Some classrooms have more students than average and others have less, but most classrooms have between 24 and 26 students.<sup>10</sup> The problem with the student estimate is that each monthly roster has some probability of counting students who are newly enrolled, quit, or moved between classrooms. For example, a classroom roster could contain 25 names for the month of September and 28 names for October. The number increased because Sean arrived mid-month from California and Naomi and Katie, who swapped teachers with Heather and Hiromi, were still listed on the class roster. By including Naomi and Katie, the turnover effect amplifies roster totals.

The turnover effect is magnified substantially when assessing month-to-month changes. The overcounted students, Naomi and Katie represent just two out of the 28 names on the class roster. However, they represent two thirds of the estimated growth in student numbers. The measured change in student numbers is three times greater because of the turnover effect.

<sup>10</sup> We assume that the standard deviation of the number of students across classrooms equals 0.5.

The TABLE below summarizes the margin of error that arises from a theoretical random sampling of one-third of student classrooms in school incorporating the effect-of turnover. We assume that 22 students in the school randomly switch classes each month and that all of these students remain on the class roster for one month after they depart. We also assume that 10 new students arrive at the school in October and are randomly distributed across classrooms.

	September Total		Change from Sept to Oct	
	Correct	Turnover Effect	Correct	Turnover Effect
Estimated number of students in school on average	750	772	772	772
Margin of Error	± 8	± 15	± 8.8	± 20.4

The turnover effect means that 3 percent of students are counted twice, inflating the margin of error on the total number of students from 8 to 15. The margin of error on the change in student numbers jumps from 8.8 to 20.4. Even if we assume that only half of students who change classrooms are double-counted, the margin of error on the change still almost doubles to 15.7. The inflated margin of error on the change in student numbers is especially alarming. Given that the actual change in the number of students equals 10, the margin of error includes zero after accounting for the turnover effect; the survey may indicate no growth even though the number of students grew by 10.

The lesson from this example is that, especially when measuring changes in employment, the turnover effect can dramatically affect the margin of error. This lesson makes it all the more important for the BLS to report margins of error in its employment report, especially for the preliminary employment estimates which are only based on a subset of the sample.

If the turnover rate changes over time, then estimated growth rates are distorted, but the margin of error is relatively unaffected. For example, if the number of students changing classrooms in September was 22 and in October it was 15, the margin of error for the growth rate equals 19.1, rather than 20.4 for the case where the turnover rate remained constant.

This example does not incorporate the phenomenon of undercounting due to the exclusion of the self-employed. In the context of the school example, one could imagine a group of special / gifted students who are not counted on standard rosters. This problem will lead to an estimate of the number of students in the school that is too low and will also increase the margin of error somewhat. One reason is that the number of special / gifted students is not stable over time. For example, suppose the group is growing from 50 students by two students every month. That is, two fewer students show up on the standard rosters, but they are still part of the student body, although we do not know whether they are included in the one-third of rosters in our sample or not.

The school metaphor provides a close analogy to the way the payroll survey works. The analogy to special / gifted students is self-employed workers. And the turnover that occurred in classrooms is precisely what occurs every month on payrolls across the nation.

Instead of classrooms, the CES samples enough worksites to reach one third of all employees. Specifically, the BLS samples approximately 400,000 of the more than 8 million worksites in the United States. Even though this sample includes only 5 percent of worksites, the BLS reaches 32 percent of workers by concentrating on large companies when forming the sample. This sample selection strategy, known as stratification, generates a smaller margin of error than would a completely random sample.

The large sample of 400,000 worksites and the stratified sample has caused the BLS to become complacent about the margin of error in its surveys. The BLS makes some margin of error calculations, but buries them deep inside the technical notes that are attached to the monthly Employment Situation report. These margin of error estimates are calculated using the method of Balanced Half Samples which, when applied correctly, is capable of generating margins of error that incorporate the turnover effect. However, this issue should be investigated further, especially given the newness of the turnover effect literature. As this paper's school roster metaphor illustrates, a small turnover effect of 3 percent can dramatically inflate margins of error.

What is clear is that BLS is not clearly addressing the margin of error in its monthly Employment Situation release. Thousands of other polls are reported every year in the public media, and margin of error is commonly referenced up front. In contrast, BLS estimates have no mention of confidence intervals or margins of error unless the reader is self-motivated to look to the technical footnotes. And even there, we find the details are unsatisfactory. Every month, this problem afflicts estimates of the level of payroll employment and also the change in payroll employment.

In its Technical Notes Table 2-E, the BLS quotes a margin of error equal to 0.2 percent<sup>11</sup> for estimates of total nonfarm employment. While this margin of error is impressively small from a statistical perspective, it still amounts to a total of plus or minus more than 500,000 jobs. No one should make statements on the health of the economy based on the CES employment number without acknowledging that the estimate is only accurate to a range of plus or minus half a million jobs.

The margin of error issue becomes more troubling when one considers that every month's announcement is based on a preliminary sample, which presumably increases the range of error. Only 57 percent of respondents submit their CES survey data in time for the first preliminary announcement. Under conventional statistical assumptions, cutting the sample size in half in this way inflates the margin of error by a factor of 1.5. For the second preliminary announcement, one month later, figures are revised based on an average of 74 percent of responses. Interestingly, it is unclear what percentage of responses are provided on average after the third month, but at the point the BLS considers the tally complete, and removes the "p" designation (for preliminary) that accompanies data for the current and previous months figures.

The BLS does not mention whether the 500,000 margin of error on total employment applies to the preliminary data or the final data. If it applies to the final data,

<sup>11</sup> The Table gives a standard error of 0.2%. Using conventional statistical assumptions, the margin of error is approximately twice the standard error.

then the margin of error in the first preliminary release exceeds plus or minus 750,000 jobs.

In its Technical Notes Table 2-F, the BLS quotes a margin of error on the one-month change in employment equal to 135,000 jobs. Again, the BLS does not clarify whether this applies to the preliminary data or the final data, but if it applies to the final data, then the margin of error in the first preliminary release exceeds 200,000 jobs. The turnover effect is one reason for this large margin of error.

Since 1990 the preliminary estimate of payroll job growth has differed from the benchmark estimate by an average of 123,561 jobs. The benchmark estimate arrives approximately 10 months after the preliminary release, though it has historically been a 15 month delay. Even the "final revision," which occurs just two months after the first preliminary release, has changed the estimate of payroll job growth by 49,869 jobs on average since 1990. These large revisions to the job growth numbers reflect the large margins of error in the preliminary and final survey estimates. The margin of error is currently omitted from the main release of the employment numbers. MRI's analysts discovered that the margin of error on job growth could be as high as plus or minus 200,000 jobs for preliminary data.

Imagine how differently the market would react to "Job gains of 32,000 plus or minus 200,000" instead of the "Job gains of 32,000" as was reported in July 2004. No one should have been surprised when that number was revised up to 73,000, and they should not be surprised when it is revised further in a future benchmark revision. Precise reporting of margins of error will enable analysts to more accurately determine the likely magnitude of revisions to the payroll estimates of job growth.

A review of BLS publications seems to reveal that a large percentage of establishments refuse to participate in the survey, perhaps up to 20 percent. We can only imagine the impact on tallying a school population if one-fifth of all teachers refused to participate.

Finally, one BLS study of respondent fidelity reported that up to 7 percent of respondents use employment figures for different periods (e.g. including more than the reference period of the 12th day). If this is done consistently, it will overstate turnover. If inconsistent, it will amplify margin of error. We do not calculate a number here, but the result is once again that CES sample accuracy is not the textbook ideal.

## Static Nature of the CES and CPS

One way to view labor measures is to think of the CES payroll survey as a yardstick. The CES yardstick provides a generally reliable measure of the size and composition of the economy. So far we have focused on the overall size of total nonfarm employment, but the CES also includes employment level estimates for scores of industry sectors and sub-sectors (e.g. manufacturing employment includes sub-sectors for durable goods: wood products and durable goods: transportation equipment, among others). In addition, other tables generated from payroll data provide information on average weekly hours (also by industry sector and detail), average hourly and weekly earnings, and diffusion indexes of employment change. The importance of these statistics cannot be overstated.

Even so, the CES paradigm is inherently limited to a static snapshot of the economy. For example, the preliminary announcement of a gain of 144,000 payroll jobs

in August 2004 does not reveal how many gross jobs were created and lost. It may mean that 644,000 jobs were created across the country, but 500,000 other positions were eliminated. Or it might mean 1,144,000 were created and 1,000,000 lost. There is no way of knowing the gross dynamics.

Similarly, the CPS measure of the unemployment rate and other ratios is comparable to a weight scale. An unemployment rate of 5.4 percent seems high at first glance. It means that one in twenty willing workers cannot find a job. But when one learns that the median duration of an unemployment spell is only a few months, the number seems less alarming. Unemployment is not a permanent condition.

Indeed, if the average worker takes three months off between jobs every five years, he has a personal unemployment rate of 5 percent. In an economy where searching for the best fit between employer and employee takes considerable time, and is key to worker happiness, pay, and productivity, such a rate seems natural.

Using the paradigm of the economy as a patient, one recognizes that measuring height and weight are useful, but incomplete assessments of health. These yardsticks may be of excellent quality, but many measures regarding the internal dynamics of the workforce are often only available from the private sector.

## Alternatives

Fundamentally, experience teaches us that no single statistic can provide a definitive objective measurement of the underlying process being measured. Rather, a comprehensive view welcomes as many statistics as possible. To return to the health metaphor, analysts should be looking at temperature, heart rate, and blood counts. But even these sophisticated measures do not obviate the need for height and weight as well. So when we consider alternative labor measures, we consider them as supplements to the CES and CPS, not replacements.

The idea of simultaneous job creation and job destruction was summarized by the economist Joseph Schumpeter who coined the term "creative destruction" in the 1950s. He believed that any economy that grew in per capita terms would have to utilize new productive techniques that would ultimately destroy old industries. One thinks of the automobile destroying horse-drawn buggies and all their intermediate industries (horseshoe makers, whip makers, buggy makers).

The theme was picked up in our time by economists Steven Davis, John Haltiwanger and Scott Schuh who initiated an economic research literature focused on internal dynamics of gross job flows rather than net – Job Creation and Destruction – that was summarized in their book of the same name in 1996.

The BLS followed academics in this instance by working on a new data series to supplement the traditional CPS and CES. The new data series was launched by BLS in 2003 and is called the Business Employment Dynamics (BED) series. The time series of job creation and job destruction actually extends back to 1993, and is improving the depth of the BED series incrementally. It currently provides aggregate information on hiring at existing firms and newly established firms, for example, but much more remains to be done. Three top economists working on the project wrote in April:

[T]he Bureau is preparing further data series at more detailed levels. Plans are in the works to release gross job gain and gross job loss statistics for industries and geographical regions, although confidentiality restrictions will determine just how much detail will be published. The Bureau also is working on gross job gain and gross job loss data by size class, which will allow the commonly asked question "Who creates the most jobs?" to be answered. The statistics presented in this article are all at the establishment level; the Bureau is working on gross job gain and gross job loss statistics at the firm level as well. Finally, BLS researchers are working on annual gross job gain and gross job loss statistics, and related issues such as business survival rates.

Yet for all its promise, there are challenges and limitations for the BED series as well. Right now, a nine-month lag exists for the data. The most recently published Bed report only has information up to December 2003, which offers little guidance to markets and policymakers in the present. The other challenge is conceptual: BED tallies gross job flows from an employer establishment perspective, and is derived from payroll-like records. Consequently, it is an improvement over the static CES, but limited to assessing job turnover in conventional payroll industries only. Entrepreneurial firms and the new class of self-employed, consulting, and contract workers are left out of the mix.

Many of the challenges can be overcome, and BLS deserves the resources to make the BED series as current and in-depth as the older, static measures. But sooner or later, these new types of internal measures will be developed fully. Then Wall Street and Capitol Hill can react appropriately in advancing the macroeconomy.

## VI. The Recommendations

This paper documents multiple limitations of the BLS payroll survey, and confirms the suspicions of many private market labor professionals that the labor force in the U.S. is much healthier than some official statistics indicate. Specifically, we show that an array of other statistics paint a picture of a healthy growing economy, including many Labor Department statistics. We document that the payroll survey is limited in scope (i.e. conventional workers only), it suffers from newly documented sample quality problems that directly affect its level and growth estimates (i.e. the turnover effect), and it does not clearly display the margin of error alongside preliminary monthly announcements of U.S. employment.

BLS and Congress can improve the process of publishing economic statistics by taking the following steps:

- (1) **Hold congressional hearings every month** when the Employment Situation report is released as has traditionally been done. In recent years, the JEC hearings on the morning of the release have evolved from being the rule to being the exception. It would benefit the public to have these hearings every month and to invite external panelists to discuss the labor situation from other perspectives. Whether or not Congress is not willing to host monthly hearings, the Labor Department might find enormous response from a monthly press conference, live online Q&A boards, and other innovative approaches to providing its expertise to the public so as to clarify the meaning of the arcane statistics.
- (2) Include measures of precision such as margins of error prominently alongside announcements of payroll employment and the unemployment rate. In our view, the BLS treatment of margin of error is unacceptable and should be remedied immediately. Not knowing and not being able to clearly discern the margin of error in a preliminary announcement of payroll job gains is an unfair burden on the public. The first page of the Employment Situation report should present the margin of error alongside the announcement of payroll measures especially. Including these margins of error may diminish the impact of the report on the market, but only in the sense that other labor measures will be seen in proper balance.

The BLS should also include a discussion of sample quality in its technical notes. Although the Bureau has done some excellent research on the turnover effect and other explanations of the divergence between its CES and CPS employment estimates, that research should be noted in the main monthly report, and linked in online HTML versions.

- (3) **Accelerate the development of dynamic, internal workforce measures** such as the BED and include them in an integrated monthly report. The Labor Department offers a wide variety of labor measures, and sooner or later they will rise in importance simply because they offer insights on internal dynamics that the older CES and CPS cannot provide. The use of all possible measures will be the norm, but Congress should accelerate the funding of the BED in particular to bring it up to the level of prominence of the traditional surveys.

In the future, MRI is committed to making its private data on U.S. employment available to the public. We will carefully develop a forthcoming MRI index of employment over the next year, making draft documents available for advisory feedback.

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