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*Executive Summary for
Productivity and Potential GDP
in the “New” US Economy*

A Special Analysis

By

Macroeconomic Advisers, LLC

September 1999

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Productivity and Potential GDP in the “New” US Economy

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I. Executive Summary and Conclusions

The Federal Reserve Board announced on June 30th it was boosting the federal funds rate by 25 basis points and adopting a symmetric policy directive. In explaining these actions, the Fed noted that “labor markets have continued to tighten over recent quarters, but strengthening productivity growth has contained inflationary pressures. Owing to the uncertain resolution of the balance of conflicting forces in the economy going forward, the FOMC has chosen to adopt a directive that includes no predilection about near-term policy action”. The Fed may be excused for expressing uncertainty about the sustainability of recent productivity trends. From 1973, when postwar productivity growth slowed dramatically, through 1995, output per hour in the private nonfarm business sector grew just 1.0% per year on average. However, from 1995 through 1998 that rose to 1.9% and, over the last four quarters, productivity expanded at a 2.9% pace, rivaling rates last enjoyed consistently during the 1950s and 1960s. This acceleration is unusual so deep into a business expansion. If even part of it is sustained, the implications for the US economy are far-reaching. In the near term, faster growth in productivity makes accommodative monetary policy not just acceptable but maybe even desirable. Over a longer haul, the impact on the US standard of living would be profound, radically changing perceptions on issues ranging from the sustainability of today’s equity prices to the affordability of the current Social Security System.

Part of the recent increase in productivity growth occurred simply because the Bureau of Labor Statistics started measuring consumer prices differently in the middle 1990s. Explanations of the rest of the productivity surge are as varied as they are numerous. Some argue it is a purely cyclical phenomenon coaxed forth by a surprising late-cycle spurt in aggregate demand. A variation on this cyclical theme is that we’re now experiencing a “catch up” in the level of productivity after a period of abysmally slow

¹ We wish to acknowledge valuable discussions we had during the preparation of this work with Lyle Gramley, Laurence Meyer, and staff members at the Federal Reserve Board, the Council of Economic Advisers, and the Congressional Budget Office. However, the opinions expressed and the conclusions reached herein are ours only.

growth in 1994 and 1995. Some point to the recent rapid expansion of the capital stock as an important contributing factor. Others argue that faster innovation has been facilitated by new technologies, like ever-improving computers and the hardware and software that have made the Internet possible.

At Macroeconomic Advisers, initially we viewed the acceleration of productivity as a transitory cyclical event because our then current econometric equations suggested so. However, nearly three years later, the persistence of strong productivity growth sheds increasing doubt on that interpretation. Therefore, this spring we undertook a comprehensive and remarkably successful effort to explain the recent episode within a single, cohesive econometric equation for productivity growth over the entire period since World War II. We then used that equation to generate new time series for potential GDP and the output gap. The preliminary results of this work were presented last June during our 15th Annual Model Conference in Saint Louis. This *Special Analysis* updates and finalizes our results which, in summary, are:²

- None of the growth in productivity over the last year is explained either by variations in utilization rates or by temporary accelerations of output and employment.
- *Potential productivity* is defined as the level of productivity consistent with sustainable utilization rates of capital and labor. Growth of potential productivity recently rose 2.6 percentage points from a low of 0.3% over 1994 to 2.9% over the year ending with the second quarter of 1999.
- Nine tenths of a percentage point of the *explained* acceleration in potential productivity since 1994 are attributable to an increase in the *rate of technical advance*. Another 1 percentage point is attributable to an increase in the rate of *capital deepening*. (See Chart S-1.) The remaining 0.6 percentage point is an *unexplained residual*.
- We identify three sources of technical advance: recently introduced methods of measuring prices, improvements in the quality of computers, and a residual time-varying component. (See Chart S-2.)
- Recently introduced methods of measuring prices contributed to an apparent 0.20 percentage point increase in the rate of technical advance since 1994. This would disappear if such methods were applied consistently over all history, because the entire path of post-war productivity growth would be higher. However, the contribution of price measurement to the rate of technical advance will actually increase another 0.04 percentage point in 2000 when “rotation by item” is introduced into the Consumer Price Index.³ In addition, some of the recent acceleration of

² For our clients, data used in this study are available from Macroeconomic Advisers in an Excel workbook that includes charts appearing in this report. Also available are the *EViews* programs and workfiles that generated the results.

³ Recently the Bureau of Labor Statistics began publishing a methodologically consistent version of the Consumer Price Index dating back to 1978. Inflation measured historically with the new index generally

productivity may be the result of methodologies for measuring prices used in the National Income and Product Accounts but not incorporated in either the Consumer Price Index or the Producer Price Index.

- An acceleration of productivity of the workers who make computers, manifested as a quickening decline in the quality-adjusted price of computers & peripherals, accounts for another 0.3 percentage point of the acceleration in technical advance since 1994.
- There has also been a modest 0.4 percentage point increase in the time-varying component of the rate of technical advance since 1996. It is tempting to view this as faster innovation prompted by the dissemination of information technologies throughout the general economy, but the increase is small compared to the large decline that occurred during the 1970s and, in any event, is not statistically significant.
- Almost half of the recent acceleration of capital deepening comes from a recent acceleration in the stock of computers that implies a corresponding acceleration of the productivity of workers who use computers. Most of the rest comes from the stock of other kinds of equipment. Little comes from growth in the stocks of land, nonresidential structures, tenant-occupied housing, or inventories. (See Chart S-3.)
- If continued, the current level of gross investment in equipment implies that the stock of equipment will continue to grow rapidly in the year immediately ahead. Therefore, there will be little diminution of the recent contribution of capital deepening to productivity growth unless investment contracts sharply.
- Combining the effects from workers who use computers (capital deepening) with the effects from workers who make them (quality improvements), the computer industry currently accounts for roughly 2/5 of explained growth in potential productivity. (See Chart S-4.) This is despite the fact that computers account for only 1.5% of nominal GDP in the private non-farm business sector and only 1% nominal business capital.
- Given the large gap between discovery and application in the computer industry, it is reasonable to assume that real computer prices, which on average have declined 20% per year since 1966, will continue falling rapidly. As long as they do, the special contribution to productivity growth coming from the technology sector will persist, or perhaps become even larger. However, it is likely that the use of periodically updated hedonic price regressions to estimate the quality-adjusted price of computers leads to an overstatement of the rate of decline in computer prices.

runs about 0.5 percentage point lower than the “official” numbers but, as discussed later in this paper, some of the methodologies used to construct the experimental CPI already are incorporated in the productivity numbers. In the upcoming benchmark revisions of the National Income and Product Accounts, The Bureau of Economic Analysis will re-compute real GDP back to 1978 using methodologically consistent prices. We expect productivity growth since 1978 to be revised up as well.

- While the recent growth of potential productivity rivals that of the 1950s and 1960s, the composition is very different. Then, roughly 2/3 emanated from technical advance and only 1/3 from capital deepening. Today, roughly more than 3/5 emanates from capital deepening, with much of that driven by technical advance in capital-goods industries.
- *Potential GDP* is the level of output consistent with sustainable utilization rates of labor and capital. Growth of potential GDP is not a smooth series, but has a random component and also varies pro-cyclically with the supplies of capital and labor.
- Driven primarily by the recent productivity surge, growth of potential GDP over the last year was 3.7%. In recent years it also has been boosted by strong growth in the labor force, by shifts in civilian employment into the private nonfarm business sector, and by shifts of armed forces into the civilian economy.
- Given our forecasts of investment spending and the labor force, and assuming that computer prices continue to fall at about their secular rate of decline, growth of potential GDP will be 3½% over the next year, and could average as high as 3% over the next decade. (See Table S-1.)
- While the unemployment rate is currently a full percentage point below our estimate of the Non-Accelerating Inflation Rate of Unemployment, the output gap is only half that implied by a simple *Okun's Law*, because of the unusual divergence between the utilization rates of capital and labor during this expansion.
- Given the sources of the recent productivity surge, the recent acceleration of aggregate demand may have been partly “created” by the acceleration of aggregate supply.

The rest of the study is organized as follows. Section II lays out the theoretical model underpinning our analysis and defines terms used throughout the paper. Section III presents the complicated series of calculations leading up to estimates of the contribution of capital deepening to productivity growth as well as the contributions coming from specific classes of capital. Section IV discusses the determinants of the rate of technical advance. Section V covers issues related to utilization rates and other temporary contributions to productivity growth. Section VI presents our regression analysis and uses them to decompose productivity growth into its various components. Section VII develops our estimate of potential GDP and the output gap. Section VIII asks whether our results imply that we are living in a “new” US economy. Section IX examines what our results imply about potential growth in the future. Finally, Section X concludes the study with some reflections on the implications of our analysis for monetary and fiscal policy.

Chart S-1
Decomposition of Explained Growth in Potential Productivity

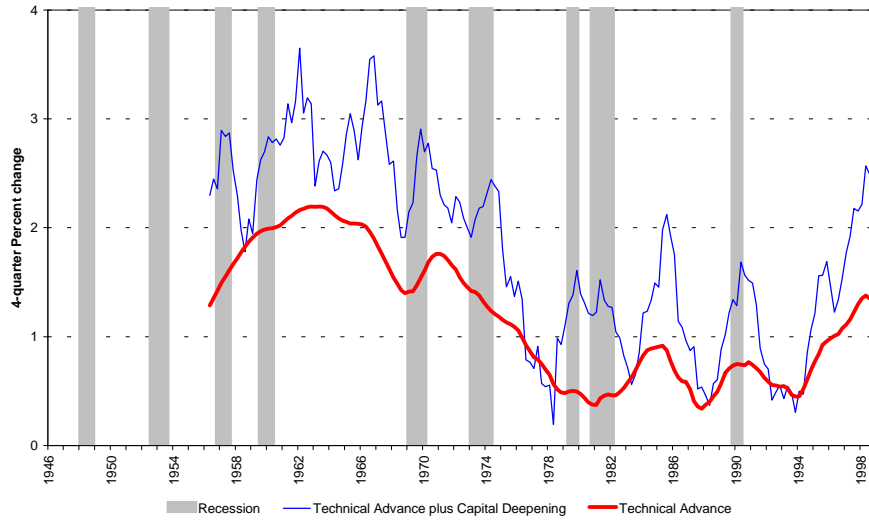


Chart S-2
Decomposition of the Rate of Technical Advance

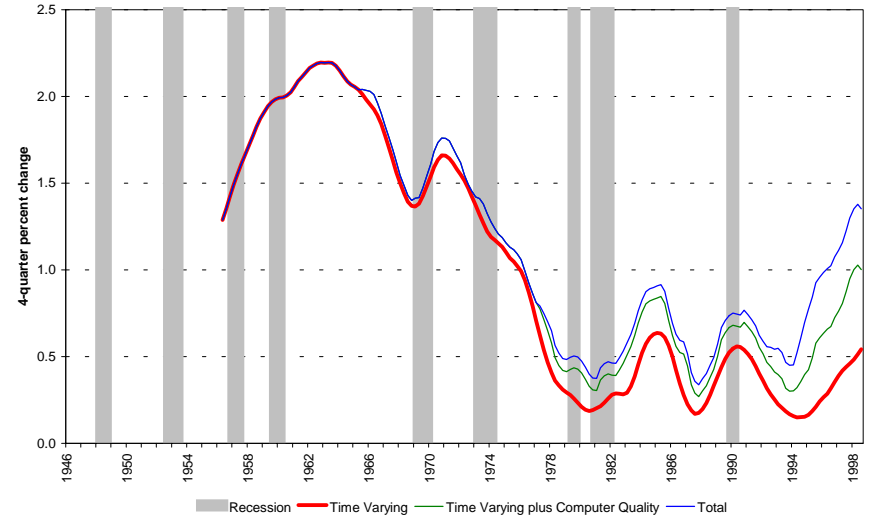


Chart S-3
Contribution to Productivity Growth From Capital Deepening

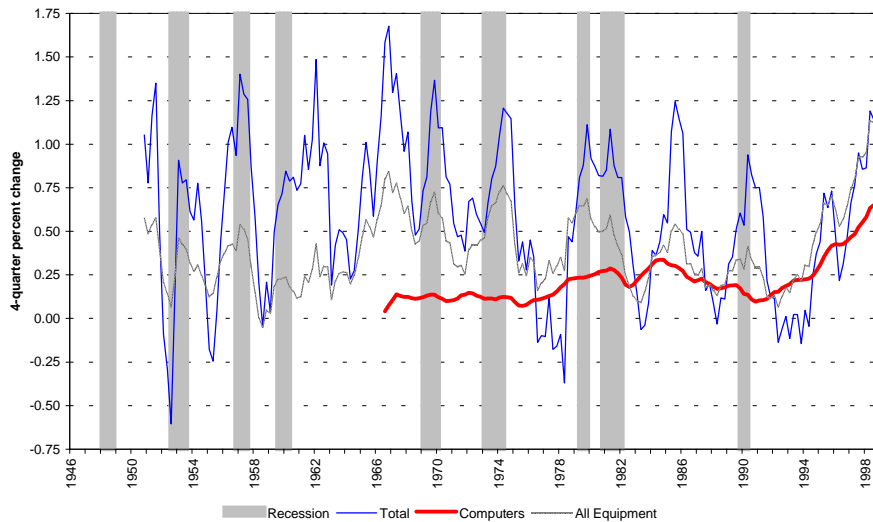


Chart S-4
Contribution of Computers to Explained Growth in Potential Productivity

