



## Employ America Research Report

# The Dream of the 90's is Alive in 2024: How Policy Can Revive Productivity Growth

## *Full Series*

Preston Mui  
Senior Economist,  
Employ America

*The last major productivity gains in the US economy happened in the 1990s. We have the opportunity today to recreate some of the dynamics that produced those sustained productivity gains. To restore this productivity growth today, policy should focus on the core drivers of 1990s measured productivity growth: a mature labor market, a fixed investment boom, and a stable supply of essential commodities and services. Each of these dynamics should be reinforced using the relevant fiscal, monetary, and industrial-level policy tools. Failure to do so risks abandoning strong growth, a more resilient economy, and sustained wage growth.*

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## I. The Dream of the 90's: the Three Drivers of Productivity Growth

**Despite recession worries, the 2023 economy outperformed.** One of the biggest surprises last year was the remarkably strong growth in real output and productivity. Against headwinds from rising interest rates, real GDP grew at a steady rate of just over 3% during 2023. Labor productivity, which had disappointed in 2022, made a significant comeback in 2023. Output per hour in the nonfarm business sector grew by 2.7% in 2023, substantially above the 2010s average of 1.1%, and a substantial turnaround from the 2% contraction in productivity in 2022. Many policymakers and commentators reflexively credit this productivity growth to the latest technological developments, such as artificial intelligence to GLP-1 agonists. However, [a more detailed and data-driven view](#) tells us that—at least so far—the causes of the 2023 productivity rebound are more like those which drove the 1990s boom instead.

**Will this pace of productivity growth continue, or will we return to the slow growth of recent years?** The 2010s were a decade of low productivity and GDP growth. It is tremendously important that we avoid that same fate today as the pandemic recedes.

Productivity growth provides the foundation for sustainable wage growth and long-term improvements in living standards. The first chapter of the most recent [Economic Report of the President](#) is devoted to policies designed to promote growth. [Chicago Fed President Austan Goolsbee](#) says that continuing to see high productivity growth rates “would be one of the greatest developments ever.”

### The Three Drivers of Productivity

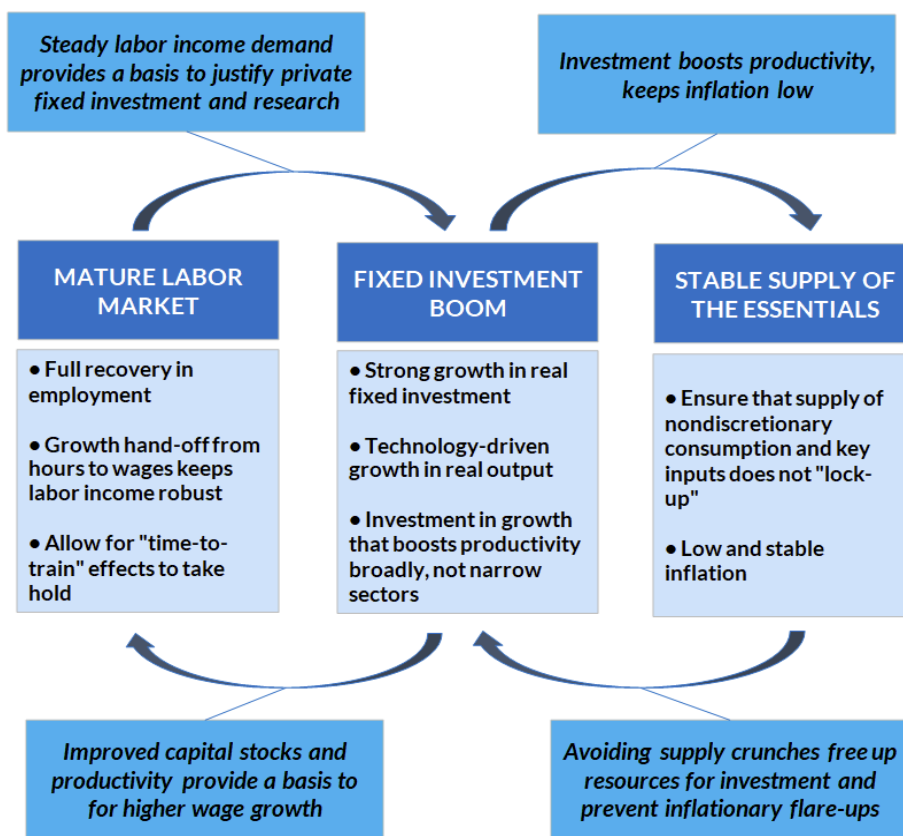
We don't know with certainty whether the coming years will once again bring strong productivity growth. But that doesn't mean productivity growth is determined simply by luck and random technological developments that policymakers will need to simply react to. In this report, we argue that the lessons of the past—particularly the 1990s—show that productivity growth is the result of three particular macroeconomic conditions that foster an environment conducive to productivity growth:

- 1. A mature labor market:** During a recovery, workers return to employment and move to better jobs. After a period of getting accustomed to these new jobs, output per hour increases. As the labor market reaches full employment, “job-driven” growth transitions to “wage-driven” growth, supporting consumer demand.
- 2. A fixed investment boom:** led by strong consumer demand and accommodative financing conditions, businesses invest in expanding equipment, supplies, and intangible capital which leads to increased

productivity and improved price-to-quality ratios.

- A stable supply of “the essentials”:** Low and stable inflation in non-discretionary consumables (such as food, energy, housing and healthcare) subdues broader inflation and creates budgetary space for increased discretionary goods and services spending, supporting the fixed-investment boom.

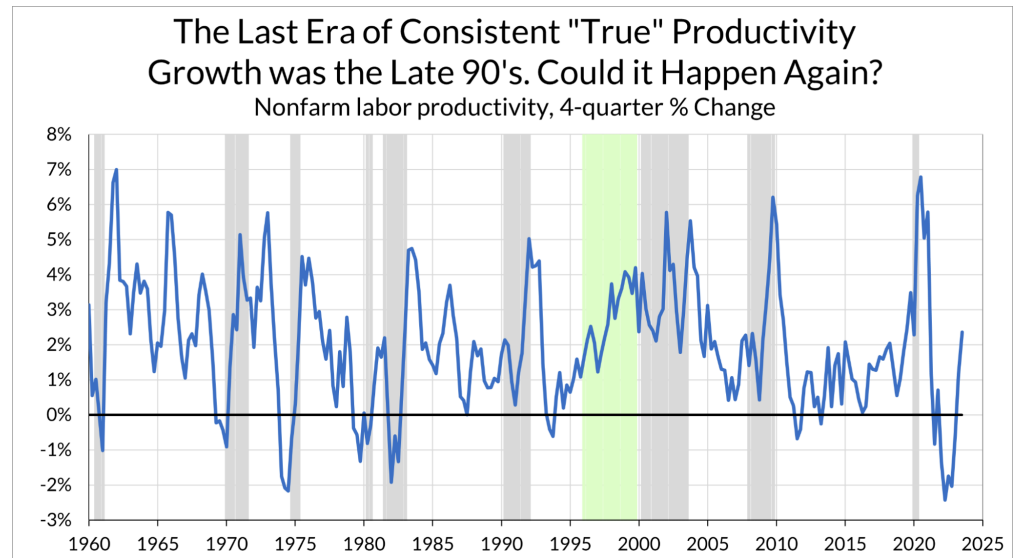
These dynamics are mutually-reinforcing. Full employment provides sustainable growth in labor income and consumer demand. This growth of demand, in turn, justifies the investments in productivity-improving technology made by companies. These investments then deepen the capital stock—the factories and equipment in the economy—which in turn boosts labor productivity and minimizes any inflationary consequences of wage growth. Investment in the supply of non-discretionary consumption can improve price stability in those sectors.



### Party Like It’s Nineteen-Ninety-Something

To understand how policy can foster the conditions that lead to productivity growth, we will look at the most recent episode of sustained productivity growth: the late 1990s. From there, we can come to a clearer understanding of what policies need to be enacted to repeat that experience.

Productivity is a tricky metric to really understand. The way that productivity is measured means that productivity is reported to increase during recessions, when businesses are doing poorly and often actively slowing down or curtailing production. When employment goes down quickly, and output takes longer to go down, [measured productivity increases quickly and mechanically](#). Outside of these spurious “productive recessions,” productivity growth has largely been stuck since the 1990s.



Source: Bureau of Labor Statistics. Grey-shaded areas indicate peak-to-trough prime-age employment declines around recessions, when measured productivity spuriously increases for composition reasons. Green indicates 1996-1999

The high productivity growth in the late-1990s was made possible by a unique confluence of conditions. While other recoveries before and after the 1990s met some (but not all) of the three drivers of productivity growth, what made the late-1990s so special was the fact that the U.S. economy experienced all three conditions of a full and sustained labor market recovery, a fixed investment boom, and a steady supply-side.

After the recession of 1990, prime-age employment rates regained their pre-recession highs by 1995 and continued to climb further. Employment rates peaked at the end of the decade, with prime-age employment reaching its highest-ever recorded value of 81.9% in April, 2000. In the late-1990s, job growth handed-off to wage growth as the pace of job growth slowed (but remained positive) and wage growth accelerated.

In the late-1990s, growth in real private fixed investment boomed. This investment boom was in large part driven by rapid quality improvements in computer equipment and software. These quality improvements appeared in the national statistics as a decline in the price index for those investment components, leading to substantial real growth in investment without requiring

a commensurate increase in nominal investment. The widespread usage of computers also led to improvements in growth across the broader economy.

Finally, the 1990s were fortunate enough to avoid substantial supply disruptions in food and energy. Luck played an important role here; the American consumer benefitted from the Asian financial crisis in the form of lower import and commodity prices. This fortune, combined with low rates of health services and rent inflation meant that the 1990s saw the lowest share of personal consumption expenditures going to food, energy, health, and shelter in the last 75 years.

Other recoveries did not share the experience, due to missing one or more of the three drivers of productivity growth. The 1980s, for example, did not see a boom in fixed investment, due to tight monetary policy. The sluggish 2010s labor market recovery from the Global Financial Crisis was so sluggish it failed to regain its pre-recession level of prime-age employment until the end of the decade. The 1970s and 2000s were afflicted with energy shocks.

	Complete Labor Market Recovery	Boom in Fixed Investment	Stable Supply of the Essentials
1970s	Present	Weak	Plagued by energy crises
1980s	Present	Weak, hampered by tight monetary policy	Relatively stable
1990s	Present	Strong, driven by technological improvements and R&D expenditures	Steady, some luck involved due to the Asian financial crisis
2000s	Not Present. Employment never fully recovered.	Weak	Food, energy shocks
2010s	Not Present. Under full employment for most of the decade.	Weak, hampered by weak demand	Relatively stable, cost controls in health care
Today	Labor market recovery, but continued strength is not guaranteed	Supported by fiscal policy, but held back by tight monetary policy	Supply vulnerabilities exposed by COVID, but public investment is helping

### Productivity Growth is a Choice

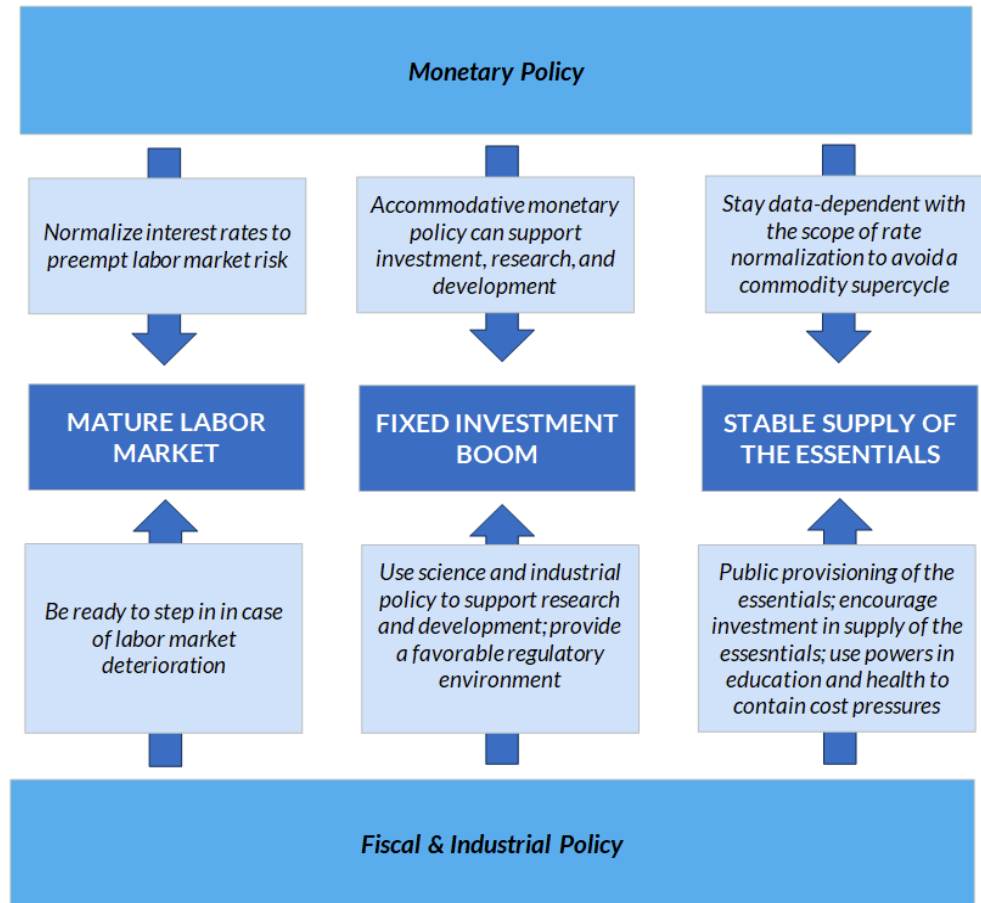
What has to happen for the economy to return to a period of strong productivity growth? To restore 1990s-style productivity growth today, policy should encourage the core drivers of productivity growth: a mature labor market, a fixed investment boom, and a stable supply of essential commodities and services. We have the opportunity to recreate the positive productivity dynamics of the

1990s, as long as fiscal, monetary, and industrial-level policies provide smart support to the economy. Continued productivity growth is possible, and it depends on enacting sufficiently supportive monetary, fiscal, and industrial-level policies. **Strong productivity growth is not just something to hope for; it is a goal that policymakers can actively aim for.**

Things look good for the first driver, a **mature labor market**. The labor market has fully recovered thanks to the strength of the post-pandemic recovery and the support of fiscal and monetary policy. As churn slows and workers develop experience in their current jobs, a maturing labor market will likely continue to support higher productivity growth. This will likely become a stronger force as we move away from the “early innings” of the recovery. However, consolidating and expanding these gains will require policymakers to preempt any downside labor market risks.

For the second driver, a **fixed investment boom**, the recovery has not been as remarkable as that in the labor market. This is not all bad news though, as this room to run provides further runway for this productivity-enhancing dynamic. As it stands, tight monetary policy appears to be slowing investment growth. Despite this, fiscal supports are helping to keep investment into energy and manufacturing construction on a firmer trajectory. If the Fed is generous in its approach to interest rate normalization, a boom in fixed investment may well be possible without overheating consumption (or inflation).

As to the last driver, a **stable supply of the essentials**, the economy is in a bit of a tricky spot right now, and would benefit from more policy attention. Pandemic supply chain disruptions and commodity price spikes—which the 1990s economy was lucky to avoid—have shown how important it is to maintain a stable supply of basic goods. The energy transition in particular is an elephant in the room. We at Employ America have [proposed and helped implement](#) approaches to ensuring the cost of energy goods and services remains appropriately affordable and stable by using the Strategic Petroleum Reserve. At the same time, public provisioning of inventory and storage in critical minerals such as lithium can help manage commodity market volatility, spurring private investment in more energy infrastructure. Finally, good public options for certain non-discretionary services, such as housing, healthcare, childcare, or home care, can help make sure prices remain structurally stable, rather than tracking directly with rising wages.



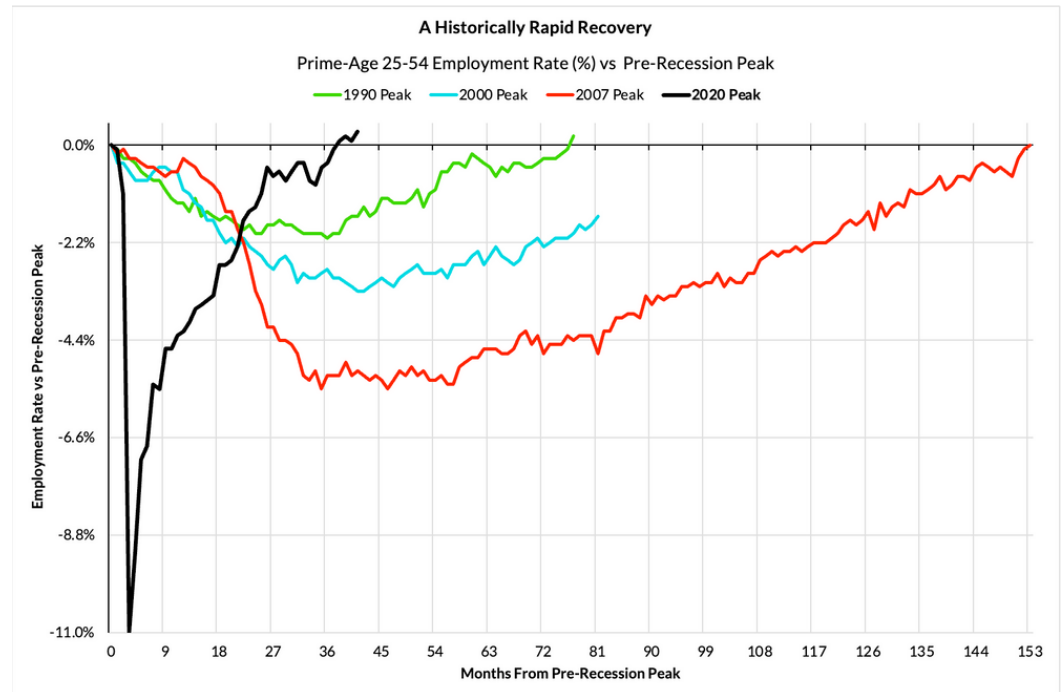
The next three chapters of this piece will examine the 1990s through the lens of each of these three key drivers of productivity growth. As we will demonstrate, the 1990s experience of full employment, a fixed investment boom, and a steady supply-side was partly due to policy, and partly due to luck. At the end, we will assess where we stand today with respect to each condition, and what policies can be brought to bear to ensure that each leg of the productivity stool is sound.

The core lesson is clear: **We should not simply rely on luck to bring another era of productivity growth; policy must be proactive in securing all three of these necessary ingredients for another productivity boom.**

## II. A Mature Labor Market

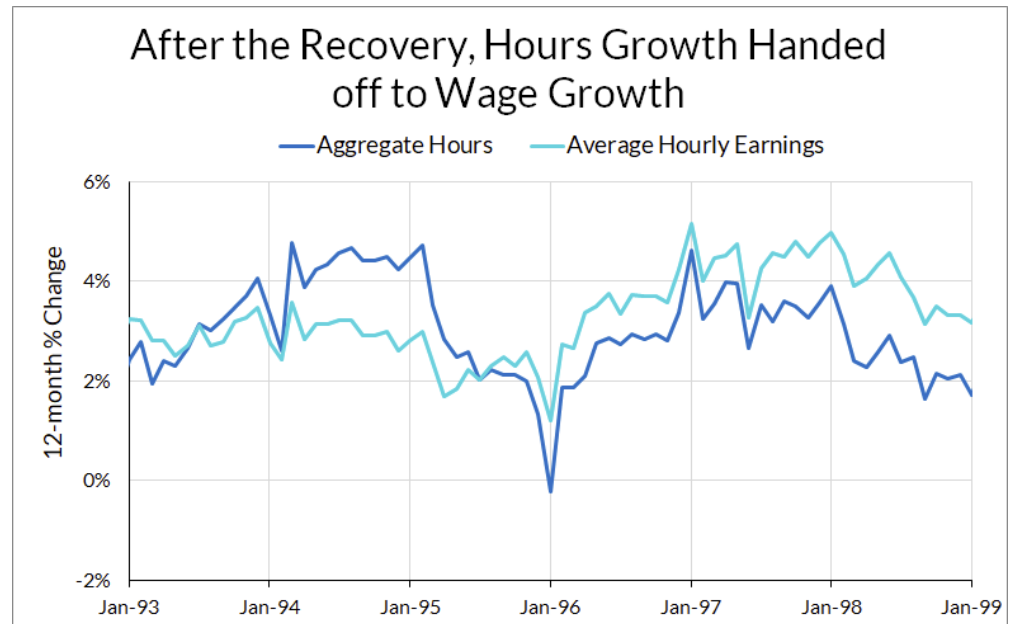
For decades, “jobless recovery” has been a watchword in the aftermath of each recession. It took well over a decade for the labor market to recover from the Great Financial Crisis, and that was after a solidly incomplete recovery from the 2000s dot com bust. This has meant the economy has rarely had the chance to reap the productivity benefits from a mature labor market near full employment. But in the 1990s—and today—we saw a fully recovered labor market.

Until the post-pandemic recovery, the last time the US labor market fully healed from a recession was the 1990s. Although the current recovery has moved faster than the 1990s recovery, the employment gains seen then were far stronger than those of the post-2000 and post-GFC recoveries. By the summer of 1998, prime-age employment nearly recovered to its pre-recession peak of 80.2%, about three and a half years after its worst reading.



After recovering, the labor market progress kept going. Prime-age employment eventually reached a peak of 81.9% in 2000. The unemployment rate, which had averaged 5.6% in 1995, gradually fell to an average of 4.0% in 2000. While this continued labor market expansion was never an explicit goal of the Fed—members saw low unemployment as inherently inflationary—they still let it happen. Rather than preempt inflation, the Fed waited for inflation to arise, effectively adopting a stance of policy “forbearance” ([Blinder and Yellen, 2001](#)) during the late-1990s expansion. This helped support the tight labor market: as the labor market matured, the source of labor income growth shifted from primarily employment growth into wage growth.





*Source: Bureau of Labor Statistics*

### The Good That Mature Labor Markets Do

Mature labor markets contribute to productivity growth in several ways. The first is through iterative and improved matching by workers towards higher productivity jobs. When workers change jobs, they generally move up the productivity ladder towards higher-paying jobs. This dynamic also varies in intensity with the business cycle; when labor markets are tighter, higher-wage firms hire more workers from non-employment and from lower-wage firms ([Haltiwanger, et. al, 2024](#)). In addition, as Skanda Amarnath explains [in depth](#), it is worth accounting for “time-to-train” effects when thinking through the timeline on which to expect contributions to productivity growth. It takes time for workers to get settled into their jobs and train up before they can make their full contribution to overall output. The faster the recovery, the sooner these time-to-train effects wear off.

Mature labor markets recursively support productivity growth by supporting steady labor income growth. As employees move to higher-paying and higher-productivity jobs, employment growth hands off to wage growth, keeping total labor income growth steady. This labor income growth makes it possible for consumer spending to continue growing.

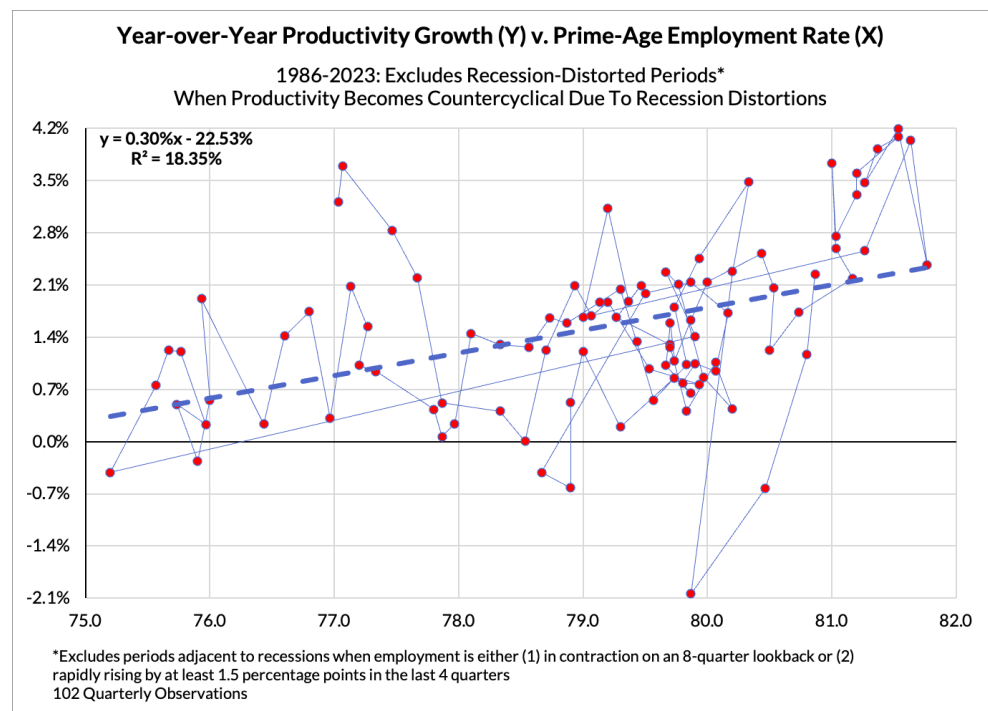
Businesses expand their investment plans when they see and expect continued consumer spending growth. This consumer spending growth means increased revenue, which justifies investments in productivity-enhancing capital goods.. As many [economists and policymakers](#) have argued, inadequate demand slows growth in output and productivity by eroding workers’ skills and curtailing

investment in capital and innovation.

[Benigno and Fornaro \(2018\)](#) call this situation a “stagnation trap,” and argue that:

**“...aggregate demand is one of the key determinants of business investment spending and productivity growth. For example, companies have little appetite for investing in new technologies during a recession, because they anticipate that the profits derived from this investment will be low. As a result, future productivity growth falls and the economy’s potential output drops. Through this channel, temporary recessions can have persistent adverse consequences for long-run output.” - [Benigno and Fornaro \(2019\)](#)**

A similar dynamic can be found in the empirical data on productivity and employment, which provides some cautious support for the idea that full employment supports productivity. As we mentioned before, productivity is a tricky metric to really understand. When employment goes down quickly, and output takes longer to go down, [measured productivity increases quickly and mechanically](#). During times of rapid changes in employment, such as during recessions or in early parts of recoveries, labor productivity growth is also inadvertently driven by the disproportionate firing or hiring of lower-wage workers. When this dynamic is in play, measured labor productivity growth increases during recessions and falls in the early innings of labor market recovery. Outside those periods, growth in labor productivity correlates positively to the level of employment.



[Source: Amarnath \(2023\)](#)

While the 1980s and 1990s saw complete labor market recoveries, the recessions in 2000 and 2007 were not followed by full recoveries. Thanks to the swift and supportive monetary and fiscal policy response to the pandemic, we have seen a complete recovery in the labor market. Prime-age employment rates have reached, then surpassed, the highs of the 2010s ([although recent months have seen some give-back in that recovery](#)). **As in the 1990s, today's economy has the full employment leg of the productivity stool.**

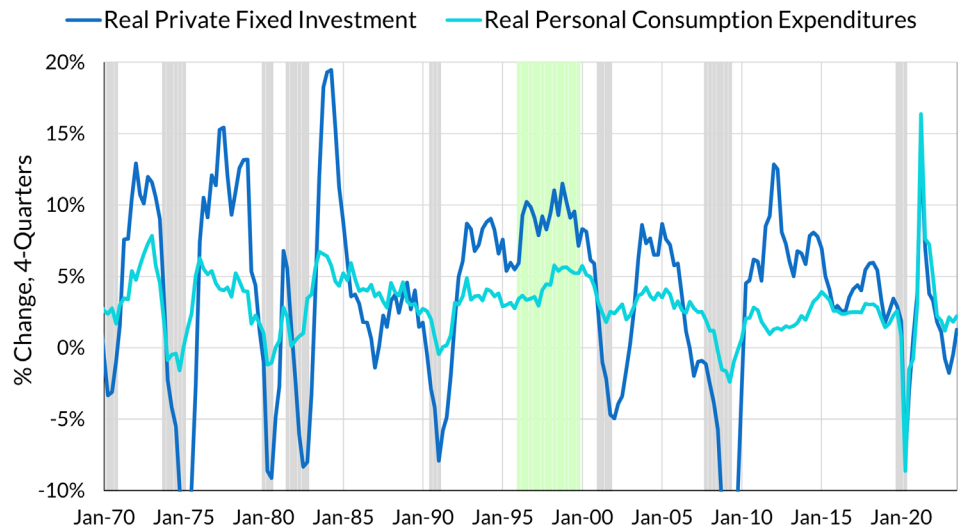
However, continued labor market strength is not a guarantee. Employment rates have fallen from their post-pandemic peaks as [job gains and hiring have slowed down](#). When the labor market breaks, it generally does so rapidly, so prevention is the best medicine here. Securing continued labor market strength will require a Federal Reserve [willing to normalize interest rates](#) with an eye towards preempting downside labor market risks.

### III. A (Real) Fixed Investment Boom

The second leg of the productivity growth stool is a boom in fixed investment. This means businesses buying more equipment and bigger facilities in order to expand capacity or improve efficiency or productivity. As new technology is adopted and production methods improve, greater output can be achieved without increasing hours worked. This is the heart of productivity growth in many ways, and is critical to achieving disinflationary dynamics over the medium term.

The 1990s productivity boom saw substantial growth in investment, particularly in business and nonresidential fixed investment. Throughout the period, businesses were steadily investing in expanding equipment, supplies, and intangible capital to meet consumer demand. As those new and improved capital goods came into service, businesses steadily shifted to higher-productivity production processes.

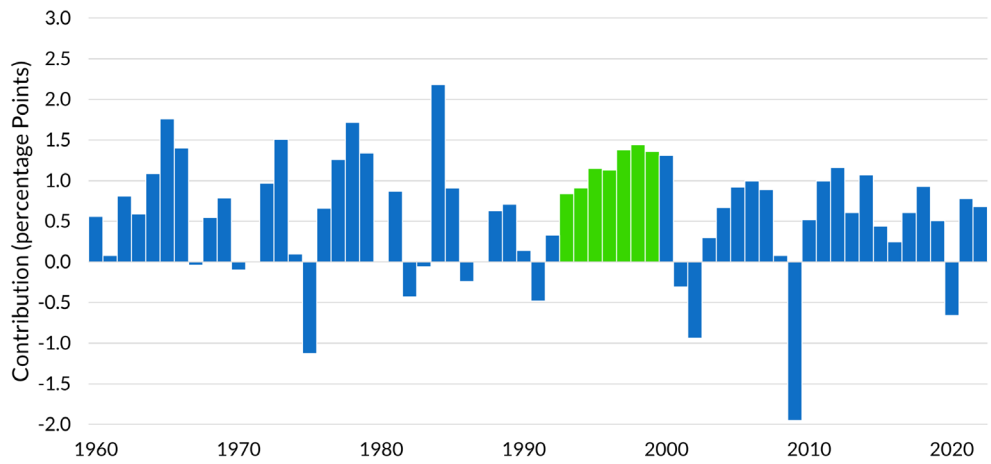
### The 90's Saw a Boom in Fixed Investment



Source: Bureau of Economic Analysis. Grey-shaded areas indicate NBER recession dates. Green-shaded areas are 1996-1999.

During this period, fixed investment made solid contributions to real GDP growth, reliably contributing between 1.0 and 1.5 percentage points. Fixed investment did grow during the post-2000 and post-2007 recoveries, but neither recovery saw investment really boom the way it did in the late-1990s.

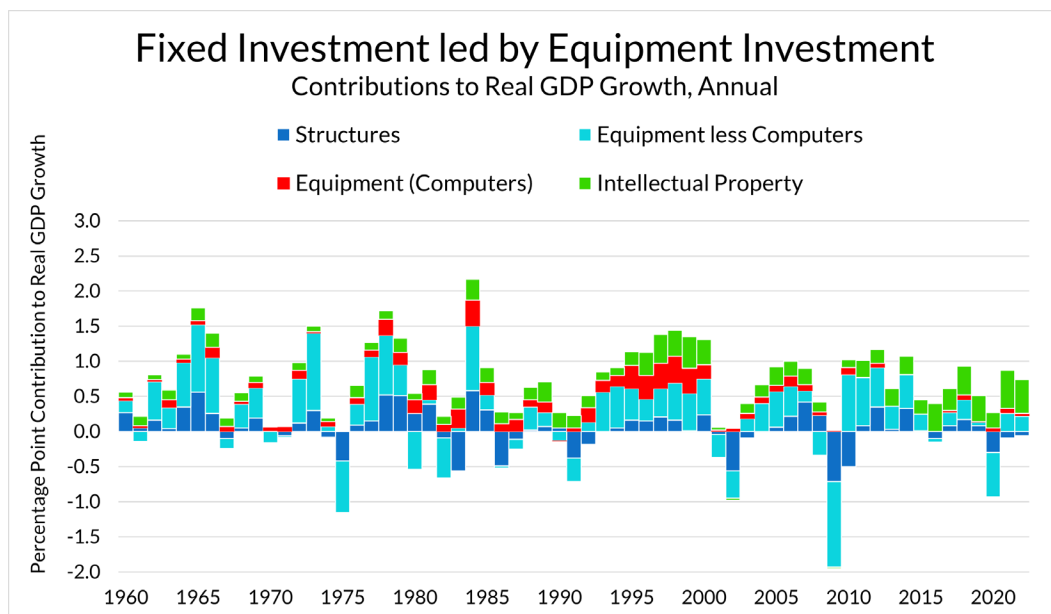
### Contributions to GDP Growth: Nonresidential Fixed Investment



Source: Bureau of Economic Analysis. Green bars indicate 1993 - 1999.

## Quality Improvement and Real Growth

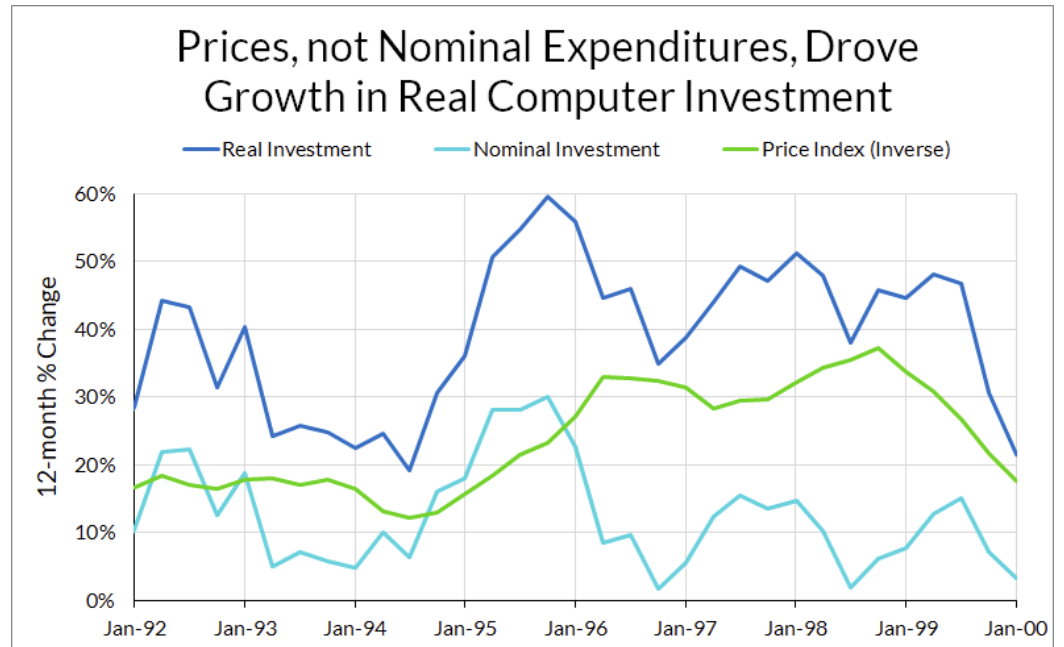
In the 1990s, equipment investment—particularly in Computers and Peripherals—led the investment boom. Investment in computer equipment alone reliably contributed upwards of 0.3 percentage points to GDP growth between 1995 and 1999, a remarkable contribution rare outside this era. Investment in software (a subcomponent of Intellectual Property Products investment) also played an important role.



*Source: Bureau of Economic Analysis*

Crucially, the 1990s fixed investment boom did not come at the expense of personal consumption growth. In fact, real personal consumption expenditure growth accelerated in the late-1990s. Some worry that there is a fixed level of output that the economy can achieve, such that increasing investment must mean decreasing consumption, and vice versa. This viewpoint is flawed for a number of reasons, and the experience of the 1990s is clear evidence of that fact.

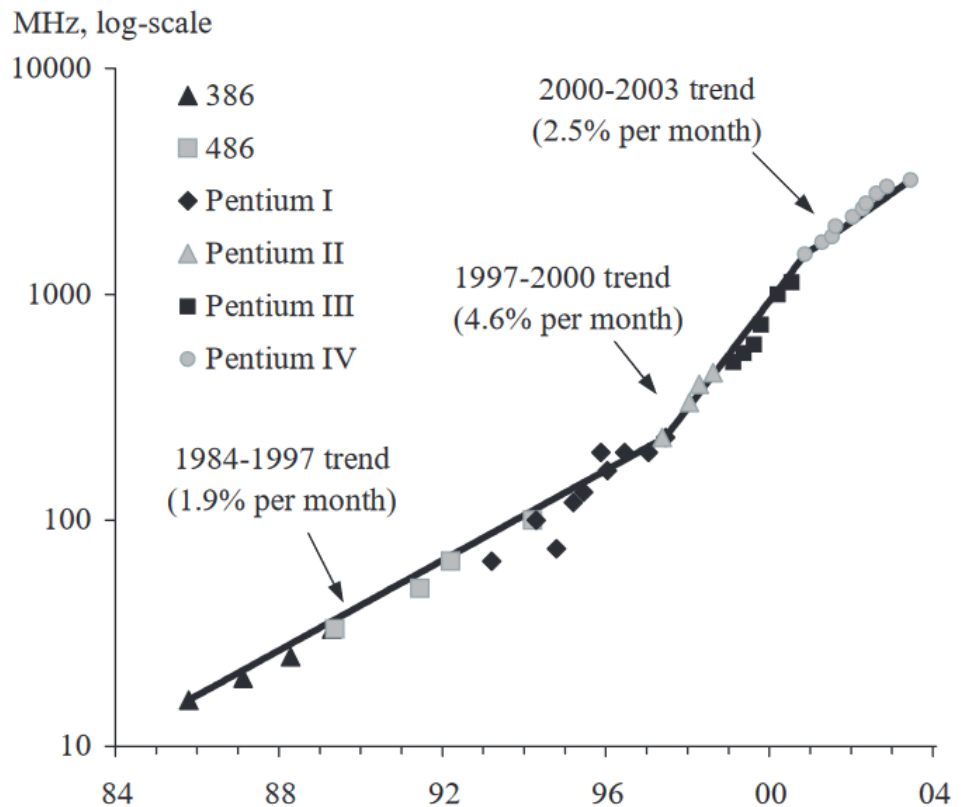
For one, the inputs to fixed capital and consumption can be quite different. Second, technological improvements made it possible for real investment in computers to grow rapidly with a commensurate increase in nominal expenditures. Nominal expenditure grew at a steady rate of 10% per year throughout the decade, but the strong acceleration in the late-1990s was also a consequence of the rapid fall in the relevant price deflators.



Source: Bureau of Economic Analysis. The inverse price index is the growth rate of  $1 / PI$ , where  $PI$  is the price index for investment in computer equipment.

Those deflators fell so quickly, primarily, thanks to the tremendous improvement in the [quality of computers](#), particularly in [semiconductor technology](#) (and thus processing speed). Even if a new computer model keeps the same price as an old model, better specs mean a de facto decline in the price of computing speed. The efficiency gains were so significant that the industry temporarily outperformed Moore's Law—a technological, rather than economic law—as the rate of improvement in processing speeds accelerated.

FIGURE 7  
PROCESSOR SPEED BY INTEL PROCESSOR FAMILY  
AND DATE OF INTRODUCTION (MEGAHERTZ)



Source: Intel.

Source: Doms (2004)

The improvement in computer quality was so rapid that the Bureau of Economic Analysis and Labor Statistics had to engage the industry proactively in order to capture these changes in price indices. There is no guarantee that national price statistics correctly account for improvements of quality, and price changes are even more difficult to measure when consumers are rapidly substituting between items as quality increases. During this time period, the frequency at which computer models would improve features such as storage capacity, memory, and processor speed was quite rapid:

**Table 3. Frequency of changes in computer components, October 1988–July 1990**

[In percent]

Category of components, quality adjusted	Frequency of change
Hard-disk storage . . . . .	31.9
Random-access memory . . . . .	18.8
Clock speed . . . . .	14.6
Warranty . . . . .	6.8
Floppy disk storage . . . . .	4.9
Tape drive . . . . .	4.8
Number of users . . . . .	4.2
Keyboard . . . . .	3.5
Operating system . . . . .	3.5
Port . . . . .	3.5
Terminal . . . . .	3.5

Source: [Sinclair and Caton \(1990\)](#)

What makes this dynamic so interesting is how integral appropriate price indices are to establishing the possibility of continued real growth even as nominal investment holds steady. The BEA, for their part, [worked with IBM in the 1980s](#) to develop quality-adjusted price indices for computer investment, partly in an effort to encourage the BLS to develop hedonically-adjusted price indices for the computer industry. The BLS began to study hedonic adjustments in the producer price indices for the computer industry [in 1987](#), and found that the normal resampling schedule for the PPI was far too infrequent to capture the frequent changes in computer models. Hedonic adjustments for computer investments were incorporated into the PPI series [by 1990](#), and [are used to derive the BEA price indices](#) for computer investment to this day. The storyline of the development of price indices highlights an important fact about growth: given sufficient technological advancement, real growth is possible even without a surge in nominal expenditures.

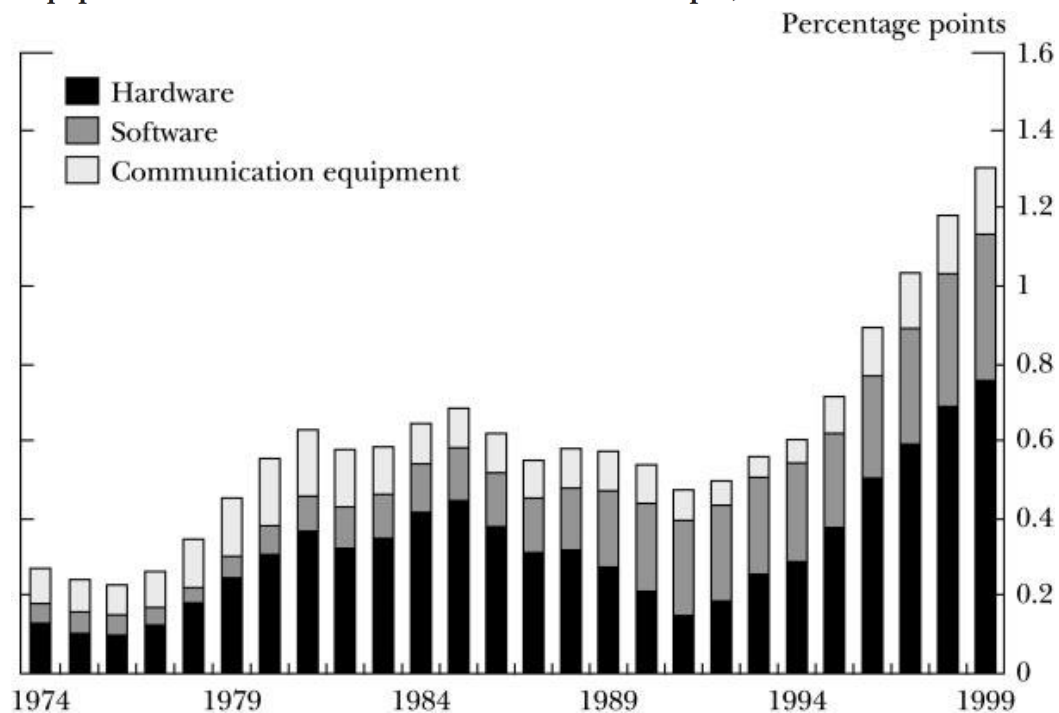
The capital deepening from increased real computer investment contributed to labor productivity growth in a number of other sectors. [Oliner and Sichel \(2000\)](#)



estimate that of the 1.04 percentage point increase in labor productivity from the first half to the second half of the 1990s, 0.45 percentage points came from the capital deepening associated with information technology investments. These estimates are similar in magnitude to other estimates from [Jorgenson and Stiroh \(2000\)](#) and [Whelan \(2002\)](#).<sup>1</sup>

Figure 1

**Contributions From the Use of Computer Hardware, Software and Communication Equipment to Growth of Real Nonfarm Business Output, 1974-1999**



Source: [Oliner and Sichel \(2000\)](#)

These technological advancements didn't happen only by chance. Businesses had made decisions to invest more into research and development, and new technologies followed. Private research and development, led primarily by the semiconductor, electrical components, computer manufacturing, and non-manufacturing scientific research and development components, consistently grew at a healthy clip during the late 1990s in a manner not seen in the post-2000 and post-2007 recoveries.

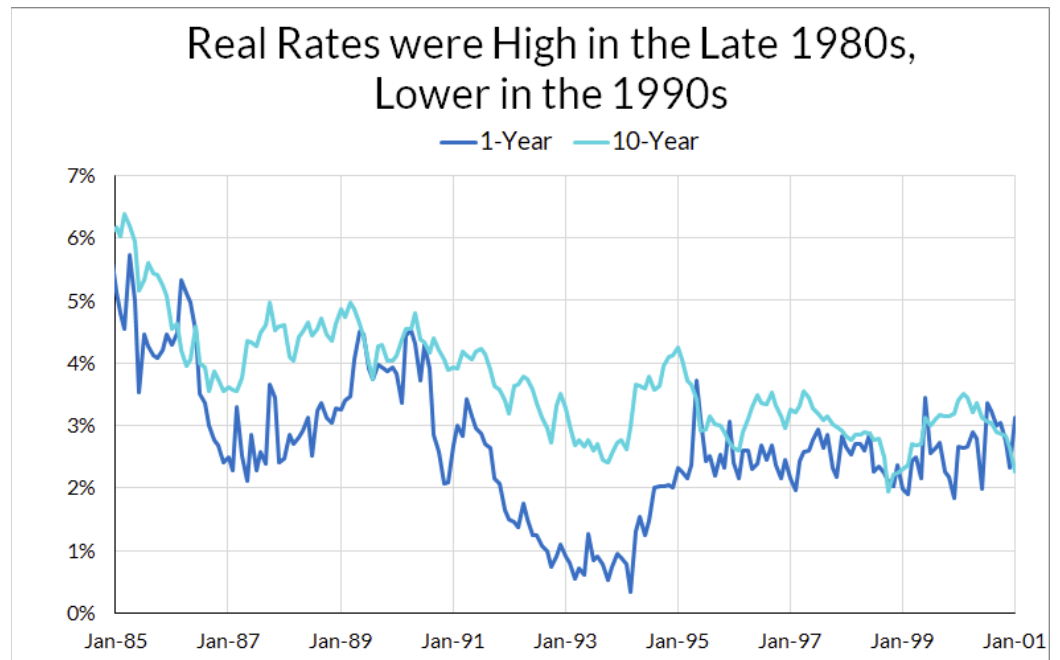
1- In the same issue of the *Journal of Economic Perspectives*, [Gordon \(2000\)](#) argued that the contribution of computers to technology growth is far less impressive. As Oliner and Sichel (2000) point out, Gordon's argument is based on interpreting a large portion of the 1990s productivity boom as explained by cyclical factors, and is more focused on the implications of computers for trend productivity. Since our focus in this piece is on productivity as a cyclical phenomenon itself, we consider the interpretation by Oliner and Sichel (2000) as the relevant lens through which to view the data.

Growth in Real Research and Development Investment			
Component	1990-1995	1996-1999	2000-2019
Software	11.8%	23.3%	8.0%
Semiconductor Manufacturing	4.9%	12.2%	3.6%
Other Computer Manufacturing	4.4%	10.9%	1.5%
Scientific R&D Services	19.2%	20.7%	1.7%

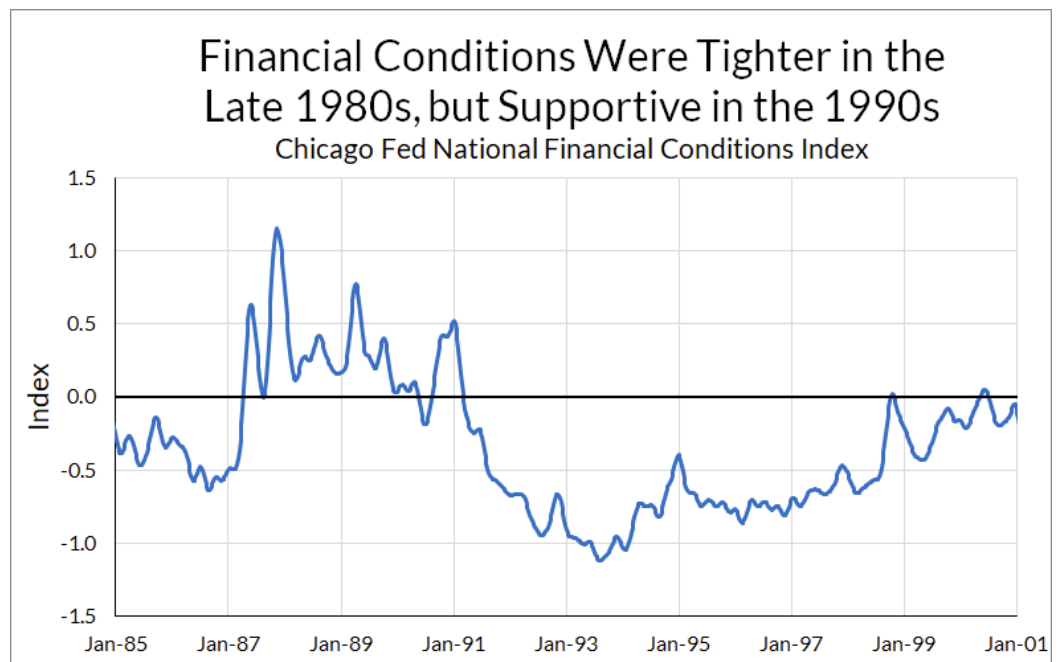
Source: Bureau of Economic Analysis

Three policy factors enabled the 1990s surge in fixed investment and technological growth: **sustained demand** sufficient to justify these investments, sufficiently **accommodative financial conditions**, and **public support for research and development**. As discussed previously, the first was enabled by the maturation of the labor market from a full employment recovery to strong wage growth (and thus robust labor income growth). This was missing from the post-2000 and post-2007 recession recoveries, neither of which saw persistent growth in research and development spending at the level of the late-1990s.

Yet, a full recovery in employment alone is not sufficient to produce the kind of productivity growth we are looking for. The 1980s, like the 1990s, saw a similarly strong recovery in employment but never achieved the fixed investment growth of the 1990s. The [tight monetary policy of the time](#) and the ongoing [savings and loans crisis](#) meant high real interest rates and tight financing conditions increased the cost to finance investment for firms. These high financing costs in turn likely prevented a fixed investment boom. Indeed, the 1990s boom ended just as the Fed began aggressively tightening in 1999 and 2000 and broader measures of financial conditions tightened.



Source: Federal Reserve Bank of Cleveland



Source: Federal Reserve Bank of Cleveland

Ultimately, financial conditions likely played a role in the achievement of the 1990s productivity growth through their impact on business investment in fixed capital. In the 1990s, this strong investment reinforced productivity growth, and was supported by favorable financing conditions, especially within technology-adjacent sectors. When it came to a close, this was in part due to the tightening of financial conditions. The manufacturing sector saw general weakness in the

aftermath of the Asian Financial Crisis, and the rest of the economy aggressively weakened in response to the Fed's 1999-2000 hiking cycle.

There is also a growing literature exploring the endogenous relationship between productivity growth and the business cycle, both empirically and theoretically. [Ma and Zimmermann \(2023\)](#) show that tight monetary policy is associated with reductions in innovation investment, using measures such as investment in intellectual property products, venture capital funding, and patents. They argue that both of the channels discussed here—expectations of demand and financing conditions—are at play (tight monetary policy reduces expected future demand and tightens financial conditions).

### Semiconductors and Telecoms

Finally, the actual technological improvements that drove the quality improvements in semiconductors were themselves products of deliberate efforts by the government to coordinate research and development under a “[science policy](#)” paradigm. Although it came with some longer term strategic costs, the US semiconductor industry managed to recapture the technological frontier during this decade by using a low-budget strategy that focused on dividing and coordinating research between public and private research labs.

This strategy shortened product cycles, allowing for faster innovation. Prior to the 1990s, companies generally planned their product cycles assuming that the rate of technological progress would generally follow Moore's Law. But in the 1990s, the semiconductor research consortium and a public-private partnership SEMATECH created industry roadmaps that moved the industry from a three-year development cycle to a two-year development cycle. While the government cannot summon technological progress out of thin air, the public coordination of private resources played an important role in directing resources towards technological development ([Flamm 2009](#)):

***“Economists are largely accustomed to thinking of the speed of technological change as something that is exogenous, dropping in gracefully from outside their models. One moral of the history of SEMATECH and the technology roadmap is that the pace of technological change may have an internal policy component as important as its external scientific foundations. Particularly where many complex items of technology secured from a broad variety of sources must be coordinated in a fairly precise manner in order to create economically viable new technology platforms, vague and diffuse factors like expectations and even political coalitions may play an important role.” - ([Flamm 2009](#))***

Despite these benefits, some information technology investments had more

ambiguous impacts. The very end of the decade saw a huge boom, and subsequent bust, in investment in telecommunications equipment and structures. Unlike the technology-driven improvement in real computer investment, the acceleration in telecommunications investment in 1999 and 2000 was primarily driven by an increase in expenditures in telecommunications equipment and structures. Enabled by the 1996 Telecommunications Act and spurred by an overly-optimistic view of demand growth, the industry overinvested in expanding fiber-optic networks.

FIGURE 4  
CAPITAL SPENDING BY PUBLICLY TRADED  
TELECOMMUNICATIONS SERVICE PROVIDERS

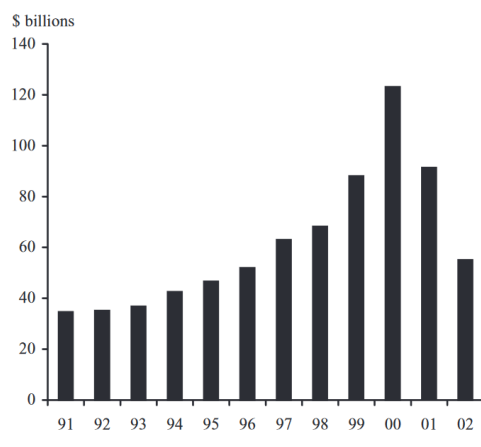
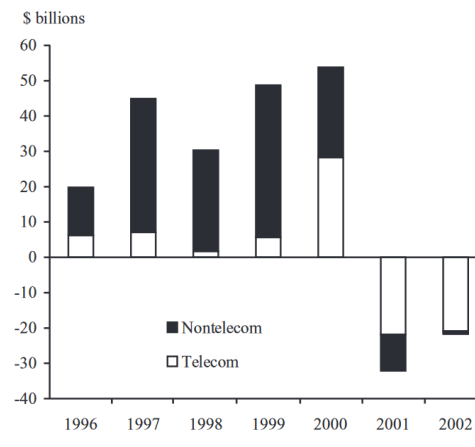


FIGURE 5  
CHANGES IN ESTIMATED NOMINAL IT SPENDING  
BY TELECOM AND NONTELECOM COMPANIES (\$ BILLIONS)



Source: [Doms \(2004\)](#)

While the tech bubble affected information technology investment more broadly, the boom-and-bust was primarily felt within telecommunications investment. While we will not go into a full accounting of the 1990s tech bubble here, overoptimism about demand for telecommunications services, winner-take-all competition to achieve scale and benefit from scale effects ([Doms, 2004](#)), and corporate fraud all contributed to overinvestment in telecommunications. The tech overoptimism allowed telecommunications (and broader information technology) investment to continue to boom in 1999 and 2000, even as credit spreads widened.

Unlike the growth in computer investment, which consistently boosted growth throughout the late-1990s and boosted productivity growth, the telecommunications bubble played a much smaller role in supporting productivity growth. Of [Oliner and Sichel \(2000\)](#)'s estimate that information technology capital deepening boosted labor productivity by 0.45 percentage points in the late-1990s, only 0.05 percentage points came from telecommunications.

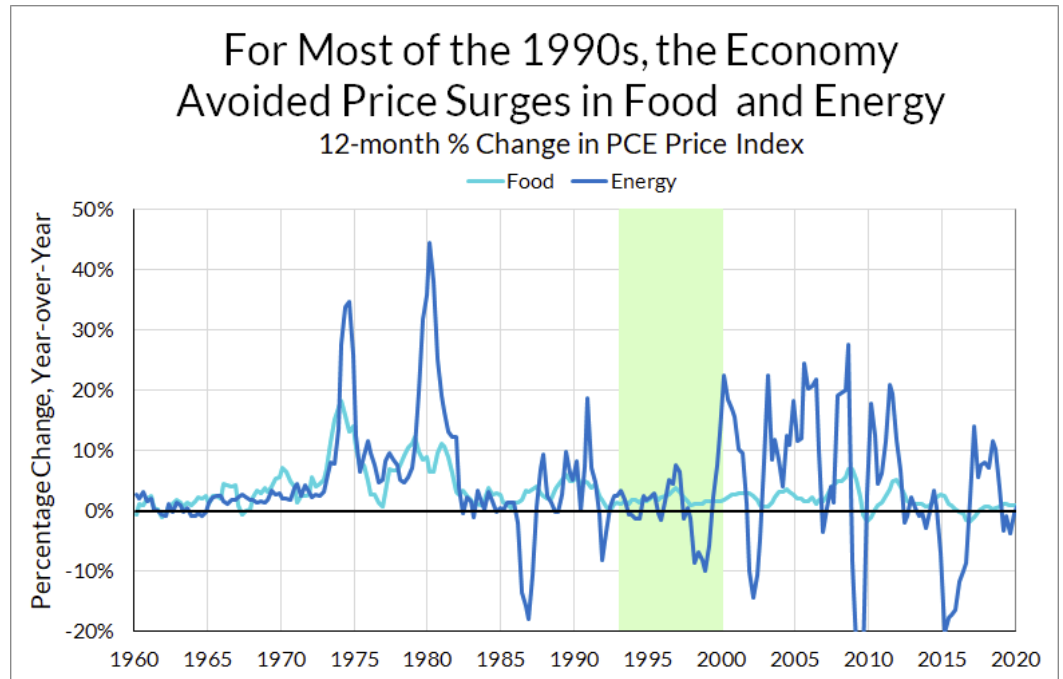
Today, the outlook for fixed investment is mixed, and highly dependent on the

policy trajectory. While GDP growth was strong in Q3 and Q4 2023, the fixed investment picture is mixed. On one hand, fixed investment in areas supported by fiscal policies (such as Computer Equipment, from CHIPS, or Electrical Power Structures, from IRA) have proven resilient. On the other hand, other areas of investment appear to be held back by tight monetary policy. Worryingly, real investment in research and development declined in the last two quarters of 2023. To support the three-legged stool of productivity growth, the economy needs fixed investment. Choosing the right mix of monetary policy accommodation and industrial-level policies to support will determine the success of policy.

### **IV. A Stable Supply of the Essentials**

Tight labor markets and strong investment are crucial to securing the three-legged stool of productivity growth, but a stable supply of the essentials may be the most important to focus on today. Without an adequate supply of certain essential commodities, inflation can quickly erode any boost to growth. For this reason, it is critical that policymakers understand the range of tools available to help secure this supply of essentials.

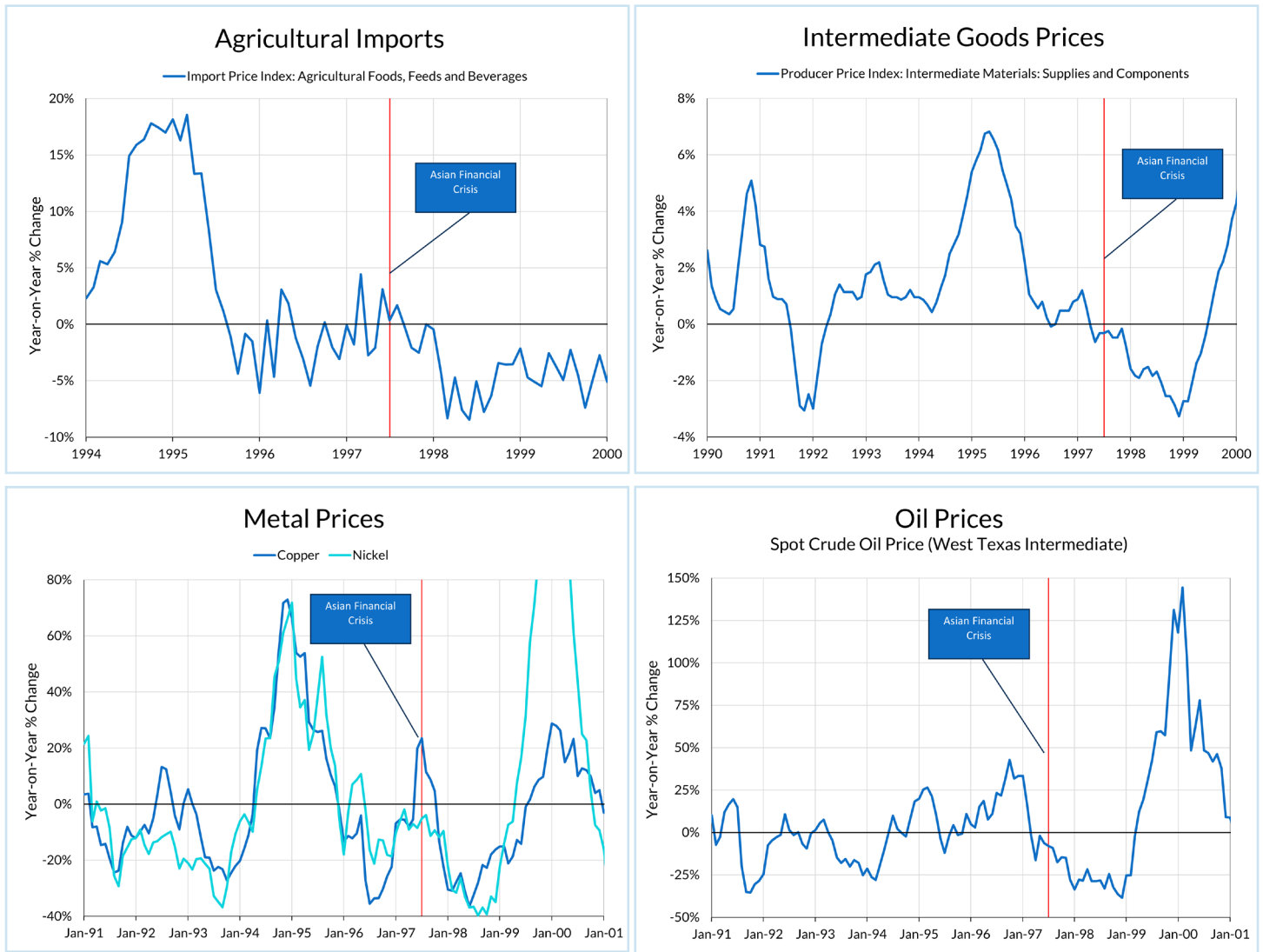
The booming economy of the 1990s did not see any significant supply-side disruptions, and few sources of supply-side inflation. During the 1970s, by contrast, these supply-side issues created significant difficulties. In the 1990s, the supply of basic components of personal consumption, such as energy, food, health, and shelter, remained robust and adapted to growing demand. Supply side stability meant inflation pressures remained contained in these key sectors, and created space in household budgets to increase their spending on durable goods, helping to justify the investment boom.



Source: Bureau of Economic Analysis. The shaded green area indicates 1993 - 1999.

Now, the good fortune of the 1990s was in part a question of luck. The devaluation of Asian currencies and falling commodity prices after the Asian Financial crisis turned out to mostly be a boon for US consumer prices. Prices of raw materials—metals, oil, and agricultural products—fell as a result of the crisis. Consumers, who already enjoyed years of mostly stable oil prices after the US intervention in Kuwait, saw a decline in the price of energy goods and services.

## The Asian Financial Crisis Lowered Prices in the US

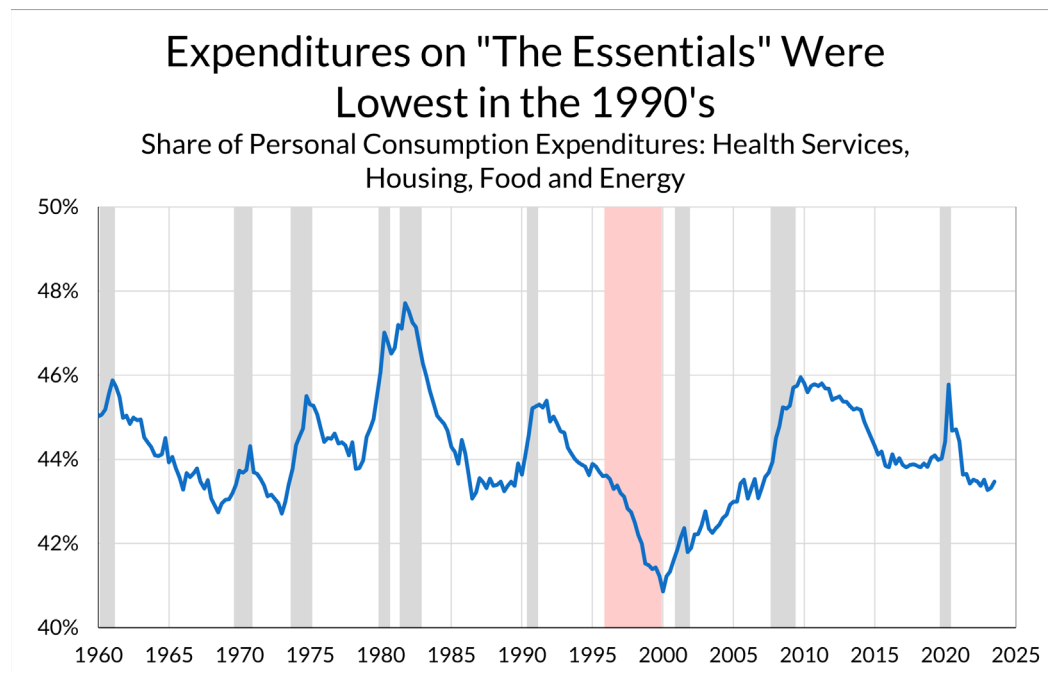


Sources: IMF, Federal Reserve Bank of St. Louis, Bureau of Labor Statistics



In health care, constrained inflation was the result of deliberate efforts to rein in cost growth by domestic policymakers and businesses. Part of this was attributable to the rise of HMOs in the early 1990s, which managed health care spending not only by managing access to care, but by [negotiating better prices from health care providers](#). Policy also played a role, as the Balanced Budget Act of 1997 introduced provisions to reduce the growth of Medicare and Medicaid spending by managing utilization and reducing the growth of prices paid ([Catlin and Cowan, 2015](#)). Given [the influence of Medicare payment rates on private reimbursement rates](#), these changes to government health programs likely also helped reduce private costs of healthcare spending.

Thanks to this stable supply of “essentials”, consumers spent a lower share of their overall consumption expenditures on energy, food, health, and shelter in the late-1990s than at any other point in the data. The late 1970s, 2000s, and 2010s faced supply challenges in one or more of these areas. Energy supply issues were particularly challenging during the 1970s, as well as during the 2000s commodities boom. Medical inflation was relatively well-contained in the 2010s after an inflationary decade in the 2000s, but shelter inflation was a chronic issue. As our own Alex Williams chronicled in his piece on [“Physical Capacity Shortages”](#) the 2006-10 housing bust structurally scarred homebuilders’ investment intentions and with it, we lost a substantial share of the homebuilding supply chain. From food to energy to housing to healthcare, the low share of income spent on these essentials in the 1990s set consumers up to spend more generously on discretionary goods and services so long as capacity constraints did not bind. This confidence in consumer spending redounded to business revenue, and gave firms the reason and the funding to stand up additional supply as a result.



Source: Bureau of Economic Analysis. NBER Recession dates in gray; 1996-1999 in red.

The stability of the supply-side in the late-1990s helped keep inflation contained, and as a result the Federal Reserve was comfortable allowing the labor market to remain tight. The unemployment rate fell below 5% in mid-1997—and kept falling—for the first time since the 1960s. Reading the FOMC meeting transcripts during this time, a recurring theme arises where FOMC members were puzzled at the fact that they were seeing such high growth and low unemployment without a rise in inflation. Fed estimates of the “Non-accelerating inflation rate of unemployment” (NAIRU) [were around 5.5% during this time](#).

***For a number of meetings now, the economy has seemed to be déjà vu. For some time, we have felt that we were looking at a fully utilized economy, one with tight and tightening labor markets that seemed likely to begin to show escalating labor costs and from there escalating inflation—in short, an overheating economy. But that has not happened so far. In fact, inflation is flat to down according to many statistical series. - Edward W. Kelley Jr (member of the Board of Governors of the Federal Reserve, 1987 - 2001), during March 25th, 1997 FOMC Meeting***

The lack of inflation raised enough doubt about these NAIRU estimates that the FOMC was willing to avoid trying to preempt inflation, and instead wait to see inflation before acting:

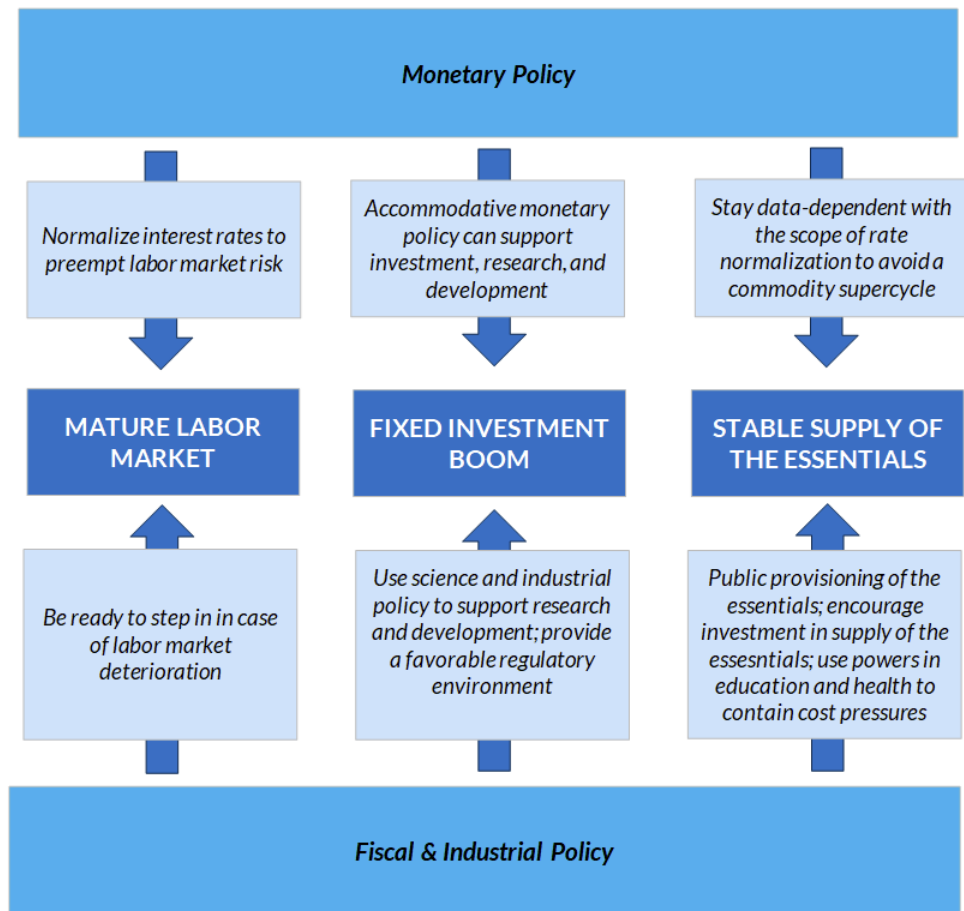
***Uncertainty about NAIRU has, in my view, made monetary policy more cautious in responding to forecasts of inflation that depend on the relationship between the current unemployment rate and some estimate of NAIRU.*** - [Laurence H. Meyer \(member of the Board of Governors of the Federal Reserve, 1996 - 2002\), January 16th, 1997](#)

If inflation had reared its head, the Fed would likely have tightened policy, risking knocking out the other two legs of the productivity stool. The committee was primed to see growth and the labor market as a harbinger of inflation—but because inflation cooperated, they were willing to let the boom continue.

Of the three productivity drivers of the 1990s discussed here, the supply-side situation for essentials looks to be the most precarious of the three legs of the productivity stool. The recent recovery was plagued by supply chain issues, leading to price spikes in food and energy. With interest rates as high as they are, firms may be less willing to hold the requisite inventory to weather new exogenous shocks, and less willing to make broader investments in resilience on their own. The demand for shelter from the rapid labor market recovery, the pace of household formation and the shift towards work-from-home ran up against a highly constrained supply of housing after [decades of underbuilding](#). What this means is that policy has the most work to do in reinforcing and bolstering the supply side. This dovetails neatly with a broader push towards decarbonizing and revamping the energy system, but similar efforts for other sectors like housing may also be needed.

## **V. Policy Today: How to Return to 1990s Productivity Growth**

So far, we have established how full employment, a fixed investment boom, and a secure supply-side provided the conditions necessary for the 1990s productivity boom. We have also shown that we have many of the policy tools necessary for securing productivity growth again today. **These conditions can and ought to be reinforced using the fiscal and monetary levers appropriate to each driver.**



### Keep the Labor Market Gains and Let it Mature

The biggest risk to a mature labor market today is a labor market recession. To protect this mature labor market, and the productivity gains it brings about, the Fed must be willing to [preempt](#) risks to unemployment and ensure workers have the opportunity to grow into their new jobs. Although the Fed cares about getting [wage growth](#) down to levels they consider “sustainable” with low inflation, they should remain attentive to overall labor income growth, especially if employment gains slow. Labor markets look tight today, but we know that when they start to break down, problems can [quickly snowball](#).

To hold onto the hard-won labor market strength of the past four years, the Fed must be willing to normalize interest rates with the preemption of labor market risks in view. In “[Three Motivations for Interest Rate Normalization: A Playbook for Fed Policy in 2024](#),” Skanda Amarnath and I made the argument that the Fed should adopt a strategy of front-loading rate cuts in 2024 for precisely this reason.

## Encourage Investment and Innovation

In the 2020s, the economy is at a crossroads with respect to investment. Like the 1980s and 1990s, we've experienced a full recovery in employment. How policy acts to support investment from here will do a lot to determine whether the investment picture looks more like the 1980s or the 1990s. So what can policy do?

Macroeconomically, expected demand is a critical variable for policy; to secure an investment boom, policy should make sure demand remains adequate. Quick actions by both monetary and fiscal policymakers ensured a quick recovery by supporting demand and helped us avoid another stagnation trap. [The Fed's embrace of the soft landing as a real possibility](#) has provided further optimism about the investment outlook. However, the Fed has also been consistent in its identification of "below-trend growth" as [a necessary step to return to 2% inflation](#). Maintaining consumer demand by ensuring a baseline growth rate of labor income should be a priority. Without this, we risk declines in expected demand that invalidate the investment decisions of firms, and which may even reverse an incipient investment boom.

The second key to a fixed investment boom is to make sure the market avoids the tight financial conditions that straitjacketed fixed investment in the 1980s. As we argued in [Three Motivations for Interest Rate Normalization: A Playbook for Fed Policy in 2024](#), the Federal Reserve cannot take the recent supply-side expansion for granted. We believe it must consider the investment consequences of monetary policy on investment, particularly investment in productivity-improving research and development. The Fed does not need to add productivity as a third mandate to its mission, but they should be aware that slowing investment today may exacerbate medium-term inflation risks, as argued by [Fornaro and Wolf \(2023\)](#).

***"Anticipation of the U.S. Federal Reserve holding off on interest-rate changes will encourage more companies to spend on capital investments again" - Survey Respondent, December 2023 Manufacturing ISM Report On Business***

The last piece of the puzzle is an accommodative fiscal and regulatory environment. A unique dynamic in the investment outlook today is the tremendous fiscal support for investment, thanks to IRA and CHIPS. Despite tight monetary policy, this fiscal support [is buoying fixed investment](#) (a combination of tight monetary policy and fiscal support for investment is in fact one policy mix suggested by [Fornaro and Wolf \(2023\)](#)). Maintaining a balance between these factors is critical to ensuring that a fixed investment boom can proceed.

For an example of how policy can help support investment in research and

development, consider our series on next-gen geothermal energy, [Hot Rocks](#). In that series, we argue that programs such as the [Loan Program Office at the Department of Energy](#), which provides subsidized loans for high-risk investment, could help directly target the financing barriers to investment in the current high-interest rate environment. Other policy innovations like changing the accounting rules to [better allow for equity investments](#) by the federal government could also help. To return to the topic of semiconductors, smart and targeted science policy is [useful but not sufficient](#) to maintain a robust supply; [sometimes industrial policy is needed](#) as well. Finally, providing an appropriately supportive regulatory environment will be important across many sectors, from easing permitting reform for power transmission sites to easing zoning laws for multifamily housing projects.

### **A Resilient Supply-side is a Stable Supply-side**

Of the three core productivity drivers, a secure supply of essentials is the most complex but the most powerful, especially from a policy perspective. Both monetary and fiscal policymakers should take what actions they can to ensure that supply of these essentials does not “lock up”. While the 1990s benefited from the luck of relatively calm oil prices and a foreign financial crisis, luck is not a strategy. Overall, the biggest lesson from the last few years is simply that we cannot take orderly supply chains for granted. [As our own Alex Williams has argued](#), industrial policy should be undertaken with a macroprudential view to help stabilize inflation.

A stable supply of the essentials is an even more complex goal in the context of the energy transition. Successfully translating energy production from fossil fuels and into cleaner sources will require substantial fixed investment. The Fed will need to ensure that the monetary policy environment remains sufficiently conducive to fixed investment by ensuring robust consumer demand and favorable financial conditions. On the other hand, excessive monetary easing may result in adverse supply-side developments; as [Skanda Amarnath and I argued](#) in our piece on Fed normalization, a depreciating dollar could stoke commodity demand and a commodity supercycle. The appropriate amount of monetary easing will depend on the relevant transmission mechanisms.

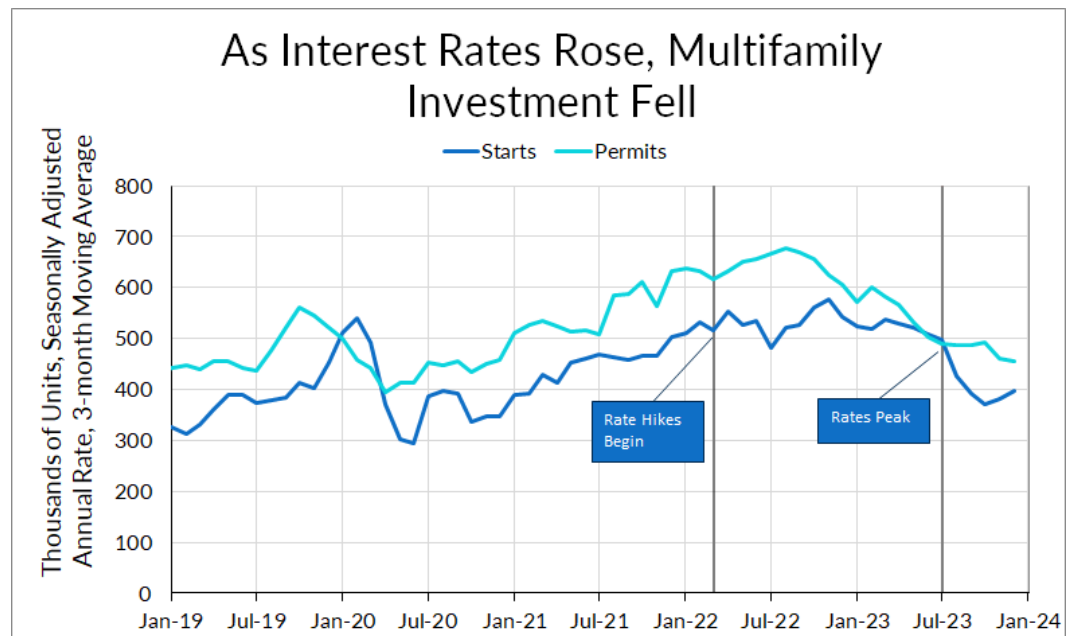
The bluntness of monetary policy as a tool means there will remain important problem areas for fiscal policy to target. Building out a decarbonized electrical grid will require securing the minerals critical to green technologies. We have [long been proponents](#) of the Department of Energy using long-term fixed price contracts to stabilize the price and supply of oil. Fortunately, the Biden Administration has taken up the approach we advocated for and has [made significant steps](#) towards using these powers. They can go further by applying similar strategies to govern the supply of critical materials such as [lithium](#).

Regulatory policy should also be reformed to reduce barriers to development where appropriate (see [our piece on policy interventions to promote geothermal energy](#) for an example).

Housing is just as – maybe more – sensitive to financial conditions and regulatory policy as green energy projects. As the Fed raised rates in 2022, new multifamily housing permits and starts have fallen substantially, which bodes poorly for the supply of rental housing in the future. As Mortenson Construction Chairman David Mortenson told Neel Kashkari recently, the current rate environment is holding back construction:

**Kashkari: We know the single-family home building slowed down a lot in response to monetary policy but it seemed like there was still a boom of multi-family in this region... are there more yet to come or are those on hold pending the rate environment?**

**Mortenson: I think they're more interest rate sensitive, just like the single-family home. We've got a number of pieces of land that we're trying to do multifamily on answer need rates to come down another 100 basis points before we think they're viable. - [January 12, 2024 Regional Economic Conditions Conference at the Minneapolis Federal Reserve](#)**



Source: Census Bureau

There are roles for a wide range of policy improvements here. Besides encouraging housing development by relaxing zoning regulations and barriers

to development, local governments can boost housing supply by finding ways to directly provide public housing options, as with the case with [Montgomery County](#).

Finally, the federal government should take care to contain cost increases in sectors where it has significant sway over pricing. Thankfully, medical services inflation has remained relatively low, due to [aggressive cost-saving measures in Medicare](#); we should continue this by [implementing site-neutral payments in Medicare](#) to constrain costs in hospital services. Elsewhere, the Department of Education should use its leverage from financial aid to [encourage higher education institutions to limit tuition increases](#).

### **Productivity Is More Than Just Luck**

**Declining to make these straightforward policy moves means abandoning strong growth, a more resilient economy, and a better deal for workers without receiving anything in return.** The 1990s productivity boom was born out of the confluence of a mature labor market, a fixed investment boom, and a period of strong supply. There is much that policy—monetary, fiscal, and regulatory—can do to support these dynamics.

The pandemic recovery has left us at a crossroads in the 2020s. We've experienced a full and rapid recovery in employment, but monetary policy must be prudent in ensuring that wage growth and labor income growth remain robust enough to maintain demand and allow workers a chance to settle into their new jobs. Fiscal policy is doing much to encourage fixed investment, but tight financing conditions are holding back investment, especially in research and development. Encouraging fixed investment will be necessary to ensure that a steady supply of the essentials—especially energy and housing—remain available.

Whether or not we see another boom in productivity is a question of policy, not a question of fate. With the appropriate policy supports, these productivity drivers—a **mature labor market, a fixed investment boom, and a stable supply of the essentials**—may bring about a period of sustained economic growth and robust productivity growth.