

**Saving and Investment in the Rise  
and Fall of the New Economy**

**Robert J. Gordon**

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I want to talk about the background of the recession with reference to the rise and fall of the US New Economy. We shall learn in a few minutes what the “New “Economy” is, and how we should define it. Allen Sinai's talk was forward-looking and tried to project into the future, whereas mine will be primarily backward-looking, and try to explain how we got into the situation in which we now find ourselves.

It was not so long ago that everything about the New Economy was wonderful. Let us remember how in 1998, in the words of a journalist, we “swooned” about the net. It was to change humanity, render large corporations helpless, make every teenage computer hacker into a king; then came the fall. What caused the rise, and what caused the fall? I like to think of the United States in the late 1990s in the form of a triangle, with three different interacting sides.

The first side consists of the new economy investment boom – the doubling of the rate of investment in computers and related equipment - and we will keep coming back to this.

A second side of the triangle consists of the general economic boom, i.e. the economic expansion that included components separate and different from the investment boom. Of course, with the economy so prosperous, investment was higher; and with higher investment, economic growth was greater, so there was some interaction among all the components.

The third side of the triangle was the stock market boom itself, both the fundamental part of the boom and the high-tech bubble. Our theme today is understanding the sides of the triangle, and how all three interacted with the others. We are going to define the New Economy in terms of basic economic concepts of supply and demand. We shall say a little bit about the difference between the evolution of Europe and the United States. We are going to look at why productivity growth in United States accelerated, which it did not in Europe, and how much of that acceleration is likely to persist. Then we shall look at the core of the problem: why so much of the technology investment boom was unsustainable. Looking towards the future, can we expect investment in high-tech sector ever to return

to the levels of the late 1990s?

What can we say about the economic miracle of the late 1990s? First, we can measure it in various ways. We are going to look at the behaviour of inflation and unemployment. Following the peaks of unemployment and inflation back in the 1970s and 1980s, we had low unemployment and low inflation together in the late 1990s. We are going to look at real GDP growth, and how fast we can expect it to be. We're also going to look at the stock market boom, and the subsequent collapse.

Let us begin, then, by looking at inflation and unemployment. This chart [Figure 1 Unemployment rate vs. inflation rate, 1960-2001] goes back over 40 years, all the way back to 1960, and what we notice here is: whatever happened to the trade-off? It is supposed to be that low unemployment gives us rising inflation, which is why central banks raise interest rates in the later stages of economic booms. That relationship comes from the 1960s where you can see how low unemployment (the brown line) was accompanied by a significant acceleration of inflation (the green line). But inflation is not just about demand and an overheated economy; inflation is also about supply. Things like oil prices and import prices can take on a life of their own, as they did in the 1970s. When oil prices go up, inflation can go up, the economy can teeter into recession and unemployment then goes up at the same time. Look what happened in the 1970s and 1980s: first, inflation rose; then unemployment followed. The late 1990s were exactly the mirror image, the opposite of what happened in the 1970s and 1980s. We had a temporary cessation of inflation centering around 1998, and that allowed unemployment to remain low without getting cut off by tight monetary policy.

The second picture [Real GDP Growth, 1987-2001] we want to look at is real GDP growth year-over-year (i.e., comparing one period of the year with the corresponding period of the previous year). We used to think that the maximum sustainable growth in the US economy was about  $2\frac{1}{4}$  percent a year. (The chart here refers to a shorter period, notice that it begins in 1987). You can see that until 1995 sustainable growth in the low 2% area seemed to be consistent with the data, but all of a

sudden, after 1995, the US economy looked like it was growing at 3 to 4%, and this is the period of the economic miracle that we are talking about. As we look at this rapid GDP growth in the late 1990s, followed by the recession that Allen Sinai talked about, we want to ask whether it was sustainable. How fast was the trend in the late 1990s, and how much more rapidly did the US economy grow than its trend?

The third side of my triangle was the stock market. Here [Figure 6 S&P 500/nominal GDP vs household saving rate] is an interesting new way of expressing the boom in the stock market. The purple line represents the ratio of the broad S&P stock market index for the United States divided by nominal current dollar GDP. You can see the enormous magnitude of this stock market boom in the late 1990s from the way in which the ratio of the stock market to dollar GDP more than doubled, after 20 years in which basically nothing happened. Those who fear that the stock market may still be overvalued are essentially saying that, despite the fall, the numbers that we see here are still relatively high.

Economists love correlations, and there is certainly a very nice correlation here consisting of a negative relationship between the stock market and the household saving rate. When the stock market was low household saving was high, and then, in the late 1990s, household saving collapsed and that forms part of this side of the triangle. The collapse in household saving allowed consumption to grow faster than income, and this constituted part of the economic boom that was not connected with the high-tech investment expansion. To summarise what was going on, and what pushed GDP growth so high: on the one hand, we have the stimulus of the new economy investment boom, which will come back to; and, on the other, consumption, which was propelled by the stock market wealth effect. These two factors were more than enough to outweigh the continuous decline in net exports (currently the United States has net exports of  $-4\frac{1}{2}$  percent of GDP). In fact, last year, and somewhat surprisingly as Allen said, exports declined so fast that we did not get the improvement in the current account that

many forecasters were anticipating.

Let us go back to the new economy investment boom, and start by defining "New Economy". It cannot just be computers. We have had computers for 50 years. Rather, there was a supply as well as a demand component in the New Economy boom. The supply component was a radical acceleration in the rate of decline of computer prices. In the eight years before 1995, computer prices fell at 15 percent per year; after 1995, the decline accelerated to 30 percent a year. As a result, as we shall see in a minute on the chart, the growth rate of real investment in computers doubled from +20 percent per year to +40 percent. If there is one thing to take home from this talk, let it be that number: just remember that computer investment went from 20 percent a year to 40 percent a year (we shall see in a minute what has happened to its more recently).

For the economy to revive fully to the level of the late 1990s computer investment would have to go back to 40 percent per year, and I shall try to convince you that this is a very unlikely. As for demand, the invention of the World Wide Web created a whole set of new uses for all those computers. In addition, the diffusion of computers in households in the United States rose greatly - not as much as in Sweden, Finland or a few other countries - but this was nonetheless the period during which almost every household bought a computer, and parents felt that their children needed a computer. We also saw the development of the mobile phone, which, as you know, is more common in Italy than in the United States. If we take real investment and the price decline, and plot them together on the same chart, this is what it looks like[Changes in Real Computer Investment and the Computer investment deflator, 1987-2001]. Here again, we begin in the late 1980s: this is the rate of decline in the price of computer hardware - notice the axis, -10, -20, -30. Here, in 1995-96, with this supply-side radical decline in prices, is where the "New Economy" began. It was not permanent; it went away in 1999 and 2000.

Throughout our discussions today, you should remember that magic number: namely the

doubling in the real growth rate of computer investment to 40 percent a year. I said I would tell you what happened to it after the New Economy boom was over -- and there you have it: in the last three-quarters, computer investment has declined at a rate of 30 percent per year. From +40 to -30: that is the collapse in business spending that was an essential feature in Allen Sinai's talk. I think the reasons for the collapse were fundamental and not just cyclical, so we are not going to see a turn-around in the near future. We can look at the late 1990s in terms of a simple theory of supply and demand [Figure 9 The price and quantity of computer characteristics]. In the whole history of computers, their supply (the red line) has gone down continuously. The only difference is the rate of decline of computer prices (this chart plots the prices of computers by measuring the costs of speed and memory and combining them into a single price index). On the horizontal axis, we have the quantity of speed and memory. So the history of computers is characterised by decline in the supply curve. Before 1995, this was 15 percent a year, and after 1995 it was 30 percent a year. In addition, the demand for computers rose with the arrival of the World Wide Web. Without the invention of the World Wide Web, we would have gone from A to B, but with it we went from A to E. How important was the supply stimulus with respect to demand? We can actually plot the numbers on the same axis of price versus quantity, and this chart goes back much further - all the way to 1960. If what happened after 1995 was a demand phenomenon caused by the invention of the Web, we should expect the line to become flatter, as if we were moving from A to E. If it was mainly a supply event, the line should remain fairly steep and go from A to B. If you look at this line, there is a point of inflection after 1987 where the line become steeper. But nothing much happens after 1995, except that the price goes down faster. My interpretation of this is that the New Economy was primarily a supply event related to the accelerated decline in computer prices. The invention of new uses for computers does not seem to have changed the relationship between quantity and price. I'm not going to try to argue this position, but I feel that the productivity benefits of computers largely lie in the past, back in the 1960s and 1970s, which is where the line is really flat. If

you are interested in the economics of this, the elasticity of this line, which measures the rise in the quantity of computers caused by the decline in their price, is -2 until 1987 and -1.3 thereafter.

How did Europe and United States compare in the late 1990s? US productivity growth accelerated, whereas productivity growth in some major European countries decelerated. We know that different countries have different methodologies for measuring computer prices. We use a so-called *hedonic* price index in the United States, which measures the actual price decline of memory and speed. Many European countries do not use this technique, but the difference in productivity between the US and Europe is too great to be explained by this methodological divergence. I find this chart [Figure 1.6 Pick up in MFP growth and increase in ICT use] very interesting. It plots the increase in the use of personal computers by country. The vertical axis, which plots the number of PCs per 100 people, illustrates the changes between 1992 and 1999. You can see the United States has the highest reading, and the Scandinavian countries are close. The chart, however, also measures the changes in multifactor productivity growth, which is the growth of productivity adjusted for the use of capital. Looking at the horizontal axis, the United States does not look particularly special. We have had better productivity performances in Ireland, Australia, Finland, Scandinavia and even Canada, while Spain and the United Kingdom have performed worst. The United Kingdom had a productivity boom under Margaret Thatcher that seems to have gone away. Notice that Spain and Italy have the lowest increase in the penetration of personal computers. It would seem that Italians prefer to spend on mobile phones and Americans on personal computers, and we shall see whether that difference continues to persist. The main conclusion, however, is that the United States has a good productivity performance but nothing special compared to other nations. When we were in the midst of the journalistic hype about the new economy, we heard predictions that the business cycle had become obsolete.

But that turned out to be wrong. We had a recession that proved the business cycle was not obsolete. We were told that the dominant trend in GDP was whatever was happening at the time, that

there was no cyclical component to the American economy of the late 1990s. A year ago, we thought that productivity growth in the US in the late 1990s had doubled from 1.4 to 2.9%, and that was said to be permanent as well. The august Annual Report of the Economic Advisors to the President said so. Exactly one year ago in January, they said that this 2.9% marked the permanent trend. So what happened to that? It went away, just like the New Economy. First, the statisticians played a trick on the optimists. What we thought was the case a year ago was revised away last July. The growth and productivity we thought had occurred, the top line in this chart [Nonfarm Business productivity growth], was revised down to the bold line here below. Much of the productivity boom of 1999-2000 was revised away, though growth was still faster than it had been before 1995.

The next question is how much of that impressive productivity growth in the 1990s was structural and permanent, and how much temporary and cyclical. It is very hard to tell by just looking at the numbers. This chart [US Labour Productivity Growth, three-year and longer averages, 1950-2001] shows the recorded rate of productivity growth from one year to the next. The blue line wiggles all over the place, and it wasn't even until 1999 that we noticed there seemed to have been an improvement. The red line is simply an average of long periods of time: the 20 years to 1972, the 23 years to 1995, and then this recovery. So, what do we make of the recovery? Well first of all, we have to judge it according to historical precedents. Throughout the post-war years, productivity has shown a tendency to be positively correlated to overall economic growth. So, if we ran a hypothetical experiment and started out at time zero with output, hours and productivity all rising at their trend, the vertical axis shows the ratio to the trend [Figure 1 Respose of hours and productivity to a permanent 4-quarter rise in output cumulating to 1.0 percent beginning in quarter 4]. What would happen if output grew faster than trend, so that the ratio of output to trend rose from 100 to 101? What happens to hours and output per hour, i.e., productivity, in that circumstance? Well, the number of hours increases, of course, because there are more jobs, but the number of hours does not grow by the full 1% but rather



by just three-quarters, and so they lag behind. Typically, in past business cycles a regular relationship exists so that when output is growing more rapidly than trend and causing a rapid increase in productivity, there is an initial overshoot. Roughly speaking, for every 1% of that output grows faster than trend, productivity grows one-quarter faster than its own trend. How do these numbers pan out as we look at them today? After a downward revision, productivity growth from 1995 to 2000 was 2.55 percent, still much higher than in the 20 years before 1995. This gap of 1.15 percent is the difference that we have to explain. The cyclical effect that I just explained, the typical relation of productivity growth to output accounts for about 0.3% of this, and so now we have to explain where around 0.85 percent of productivity growth comes from.

So, what explains this acceleration in productivity growth? There were two small contributions, namely inconsistent measurements in the US accounting system, and a slight improvement in labour quality, which means education. But the chief explanation for faster productivity growth is to be found in the extra production of all those computers during the period when investments in computers went from 20 to 40 percent. It didn't take many more workers to produce the extra computers, which form part of GDP, and this explains away a lot of the extra productivity, more than half of what is left unaccounted for. The rest can be explained by the use of these computers. The trading of those billions of shares on the New York Stock Exchange would have been impossible without the use of computers. Computers seem to have brought greatest benefits in securities, banking, and retail and wholesale trade. So this was the using of computers.

What is left over? What else was there in the economy apart from the making and use of all these computers? Effectively, nothing. In fact, the number is a minus. Thus computer use and production overexplain the increase in productivity that we have observed, and that is a problem for the future because, as we saw, at the boom in real computer investment has gone away: that 40% a year has fallen to -30% over the past 12 months.

So, to summarise: how do we know that output, and hence productivity, were growing faster than their trend in the late 1990s? One indication was that unemployment was falling, which is something that cannot continue forever. The growth in hours was almost double the growth in population, and that can't go on forever. We kept borrowing more from foreigners, which Alan thinks will continue in the future. Indeed it may, but can the amount of borrowing keep increasing as a proportion of GDP? A subtler reason for which our economy was growing faster than its long-run trend in the late 1990s was that several special factors were holding down inflation. Remember how inflation was so low in 1998? That was the result of special factors and not the result of some general repeal of the Philips curve. One way to think about low inflation in the 1990s is provided by this textbook diagram which plots inflation against the ratio of output to potential, or trend (on the horizontal axis) [Untitled Figure]. Normally, as the real GDP of the economy rises, inflation, too, also rises and this is why central banks tend to tighten the money supply. In the 1970s, we had those bad oil shocks and other things which made inflation rise even when output was falling, exactly the reverse of what happened in the late 1990s.

What were these special factors? One was the strength of the dollar which held down import prices by an impressive amount. This chart [Figure 8 Change in Real Import Prices, four-quarter moving average of rate of change, 1985:1-2000:4] shows the change in relative import prices plotted over 12-month periods. We can see how in 1996 to 1999 there was a tremendous downward pressure on the US inflation rate as real import prices declined by about 7% per year, which is enough to hold down overall inflation in the economy by almost 1% a year. Another uniquely American phenomenon was the behaviour of medical care prices. This chart [Figure 10 Change in Employee benefits, four-quarter moving average of rate of change, 1985:1-2000:4] plots fringe benefits, which are mainly medical care insurance, relative to overall inflation. Suddenly, the extra inflation in medical care prices came to a halt, and in the late 1990s was much lower than it had been is before. But that temporary

benefit also ended. What we had, then, were low import prices, low energy prices in 1998, and a cessation of medical care inflation, all of which held down inflation temporarily and thus allowed the greater growth in current dollar spending to appear as real GDP growth. This is one of the sides of the triangle. One side was the new economy, and this second side is the overall economy. Remember that there are two features of the overall economy quite apart from the investment boom. One was the high consumption as a result of the stock market; the other, as we see now, were temporary factors that held down inflation.

Let us turn our attention to the high-tech investment boom itself, which forms the core of the US economic miracle of the late 1990s. Why did it happen, and why was it unsustainable? There are many points to be made here, and they fall roughly into six main categories. First, you can only invent the World Wide Web once. It took higher investment in computers and software to set up all those web sites than it did subsequently to maintain them. That, then, is the first factor. Will we ever invent something that has as broad implications for computer investment as the World Wide Web? I leave that question for the technology experts in the audience. All over the world, we experienced a compression in the normal replacement cycle for computers related to the famous Y2K problem that turned out not to be a problem. Nevertheless, many people bought new computers in 1999 in anticipation of the problem. Something that has not been widely recognised is that a slowdown has occurred in the rate of replacement of old computers, because the need to replace old computers is not as pressing as it once was. My evidence to support this claim comes from the computer columnist of the *Wall Street Journal*, **Walter Mossburg**, who on October 25 last wrote a reminiscence on the 10th anniversary of his job as computer columnist. He spoke of all the changes that have taken place over the years. More germane for the purposes of my argument, he also noted that the upgrade cycle in PCs has all but “petered out”, as he put it. Back in 1991, we were still in an era when people needed to buy the latest and greatest processors and other hardware just to run all the new software. But it has been at least four years since

software challenged hardware in that way. The Internet does not require a continuous doubling of computer speed and memory. I am still living with one computer brought in 1998, and another in 1999, and I expect other people in the audience will agree with me that there is no longer a pressing need to upgrade. This is not just true for people with computers at home.

The same phenomenon explains the slowdown in business investment in computers, and let me quote again from the Wall Street Journal. The article refers to the Mohawk carpet company, just one of the many companies that brought a lot of computer equipment the late 1990s. "This year," it says, "Mohawk is scaling back" We are not spending as much because we already spent it. As the paper notes, Mohawk already has a great system of computers, "their network is built, they don't need to do that all over again." So in both the business and consumer sectors there isn't a pressing need to buy new computers.

The next factor is the large number of business failures in so-called e-commerce, the demise of the dot-coms. They certainly owned a lot of computer equipment, and that is now available for people to buy on the used computer market. People don't have to buy new computers because there is a lot of used computer equipment floating around – though this is that temporary factor, which will eventually disappear. Business-to-consumer e-commerce activity failed to revolutionise consumer retailing and put traditional corporations out of business. Instead, what we find it is that it strengthened traditional companies. Traditional booksellers and other retailers built their own web sites, as did the traditional mail-order catalogue companies, and they are now allowing people to buy on the Web. So, yes, the invention is still with us, but it has not led to the creation of the enormous number of new companies that were predicted a few years ago.

Only two years ago, business-to-business was thought to be the "killer application" for computer hardware and software, and that, too, has proved a substantial disappointment. This is mainly because many businesses have personal relationships with their suppliers, and do not want to broadcast

to the whole world exactly what prices they are quoting for their sales and purchases.

Finally, in addition to the computers themselves, we have the other part of the sector, namely the Telecom industry which vastly overinvested in hardware, especially in the United States and particularly in fibre optic capacities. As you can see, I love the *Wall Street Journal*, so I will quote from it again: All told, 39 million miles of fibre optic cables stretch underneath US railroad beds, cornfields and natural gas lines -- enough to circle the earth 1500 times. Companies racing to build nationwide networks laid some \$90 billion worth of fibre optic cable during the past four years. Of all of that, only 3% is currently being utilised and 97% is not. Will wireless Internet applications provide for the next five years the prosperity and boom in investment that the Web did in the previous five years? I doubt it. I'm sure the people here have varying opinions.

Here is a summary of why the two years ago the economic situation was unsustainable. Inflation could not continue to be so low because some of the factors holding it down were temporary. Real GDP growth, therefore, couldn't continue so high. Computer investment had doubled to 40 percent per year, but couldn't stay at that level forever because, as we have seen, many of the reasons for computer investment were temporary. The boom in the stock market was unsustainable. It created an unsustainable government surplus fuelled by all those capital-gains taxes that people paid on their profits from the stock market. The decline in personal savings couldn't go on forever since consumption couldn't continue to grow faster than household incomes. Nor could the high-tech investment boom continue. As for what will happen next, I am not so much of a pessimist to think that productivity growth will go back to where it was before 1995, but I think it will be a long time before we see productivity growth close to the rate of 3% that some economists were predicting only a year ago.

Will monetary and fiscal policies save us and bring about the recovery that, according to Allen Sinai, has already begun? Monetary policy has had a very special role in the past two years because it

had basically nothing to do with the boom, and nothing to do with the recession. How can I say that? I can say that simply by looking at the history of short-term interest rates. This chart [Nominal and real federal funds rate, 1970-2001] goes back to 1970. Here the blue line represents the actual short-term interest rate that has fallen so much in 2001, and a red line is the real interest rate. No matter which line you look at, the picture is the same and shows that interest rates were incredibly stable in the period 1995 to 2000, especially if compared to previous years. Look at real interest rates in the 1980s; look in 1980-81 when nominal interest rates hit 17 percent. Those were the periods when monetary policy created the recession, and the easing of monetary policy could simply reverse that and automatically bring about a recovery. But since monetary policy did not cause the recession this time, there is nothing to reverse. Those who expect the decline in interest rates to create a great economic boom may therefore be overly optimistic.

There is a more concrete way of making my case. There are three traditional channels of monetary policy: first, there are interest rates and, indeed, they have been working. Lower interest rates have stimulated the refinancing of mortgages and boosted automobile and housing sales. But not all spending depends on short-term interest rates. We just saw the short-term interest rate, now [Nominal Federal Funds Rate and Corporate Bond AAA Rate, 1970-2001] let us contrast the blue line, the nominal Federal Funds short-term rate with the corporate high-grade bond rate, which does not show anything like the decline in 2001 that Alan Greenspan engineered for short-term rates. So we have not had substantial monetary easing, when we look at long-term interest rates, especially if we look at the private sector rather than the government sector. So, yes, this first channel of monetary policy - interest rates - is working but not on all cylinders because long-term corporate bond rates have not declined very much.

The second channel of monetary policy is supposed to work through the stock market. A tremendous decline in short-term interest rates is supposed to create a stock market boom. Yet, what do

we have? Today, the S&P index is at 1,111, whereas a year ago on January 1st it was 1,320. Stock prices have gone down in spite of the decline in short-term interest rates.

The third channel of monetary policy is the exchange rate. When interest rates go down, the dollar is supposed to go down as well, only that didn't happen: the dollar went up. You might say that monetary policy is an eight-cylinder engine of which two or three cylinders are working. I am continually amazed to hear business forecasters say "oh, the recovery is just around the corner because we have had 11 cuts in short-term interest rates." They forget that the eight-cylinder engine is not working as it is supposed to.

Fiscal policy in the United States has created some stimulus but, as you may have read, there is currently a stalemate that has postponed, perhaps forever, the second stage of the fiscal stimulus. That is because of a deep political conflict in the United States Congress. Republicans just cannot get over their inbred desire to give billions of dollars to rich private Americans and corporations, and Democrats will simply not stand for it. They think the fiscal stimulus should go to the unemployed and low-income groups. This clash of irreconcilable views has caused the deferment of further fiscal stimuli.

In conclusion, let us ask: do we have a recovery at hand, or is it coming soon? I see a tug-of-war. I see a stalemate. We do have some good things coming for monetary policy, though not as much as most people expect. We have a tremendous benefit in the form of lower oil prices. In the United States, most people's main expenditure on energy is for their larger automobiles. Americans have large cars and drive a lot, and so Americans spend thousands of dollars a year on gasoline, the price of which has come down. Some of us, meanwhile, live in a cold climate in a large house. I spend much more on heating my home than running my car. My heating bills for December was one-third what it was a year ago. That is a tremendous benefit. It is a supply shock that lends credence to the optimistic projections for the economy. But those optimistic elements must fight against a series of continuing negatives. There are the lag-wealth effects relating to all those people who lost money from the bust-up of the

dot-coms, the decline in high-tech stock prices and, most recently, those who lost on Enron. There are the income effects from continuing layoffs. Are consumers going to continue to spend if they think their jobs are at risk? We still have headlines everyday with some company announcing thousands or tens of thousands of layoffs (most recently the Ford motor company). The lack of a pressing need to replace your computer, which I mentioned above, and the after-effects of all that over investment in computers, telecoms and that 97 percent of unutilised fiber-optics. Which way will it go in this tug of war? Come back next year and find out.