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# economics

## Internet revolution and new economy



### Focus on the new economy and productivity

This issue looks at two aspects related to the broader topics of productivity and the new economy in the USA. Certainly, the recent terrorist attacks on the USA have led to noticeably higher risks to economic activity. This is making the job of forecasting economic growth anything but easy at present. It also impacts the assessment of productivity growth over the next few quarters. However, this publication focuses on long-term, structural aspects and should thus remain valid for some time.

#### New economy: is the “productivity miracle” in the USA only a statistical phenomenon?

- In the measurement of productivity growth, an important part is played by the price deflator used to calculate real output. While hedonic price indices are used in the USA, traditional methods are applied in Germany. Significant differences are registered above all in the development of computer prices on both sides of the Atlantic.
- If German methods were used, GDP and productivity growth in the USA would have been considerable weaker since 1996 than recorded in the official statistics. The growth gap between the USA and Europe, as well as the technology gap, would then be smaller, and the controversial “new economy” phenomenon would have to be called into question, at least in several areas.
- Nevertheless, US productivity growth is still remarkable. Unlike in most other industrial countries it accelerated in the second half of the 1990s, which suggests the new economy does in fact exist.

#### Productivity, wages & earnings: the new economy has an effect – but less than expected

- While productivity and corporate earnings were closely correlated in the USA until the start of the 1990s, the connection between the two has since been much less pronounced and even seems to have reversed since the mid-1990s.
- This is due above all to wage costs, which rose markedly faster than productivity. It is obvious that the link between changes in unemployment and rising wage costs, which is called into question by the advocates of the new economy, still exists.
- As the new economy has led to a reduction not in the pricing power of the factor labour, but of the pricing power of companies because of intensified competition, the distribution of income has shifted to the benefit of employees.
- Productivity growth remains a critical variable for long-time earnings prospects. However, it is as yet unclear whether the pace of productivity growth seen in the second half of the 1990s (2 ½% p.a.) can be maintained.

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# New economy: is the "productivity miracle" in the USA only a statistical phenomenon?

Although economic growth in the United States has fallen radically of late, the performance of the US economy during the preceding period since the middle of the 1990s was extraordinary. Economic growth accelerated over the period and reached an average of a good 4% p.a. for the past five years (compared to about 3% p.a. during the first four years of the upswing that followed the recession of 1990/91). The unemployment rate declined by almost 2%-points since the beginning of 1996, temporarily dipping below 4%, and inflation remained modest despite steep increases in oil prices.

The combination of brisk economic expansion and low inflation is often cited as a defining macroeconomic characteristic of the "new economy". The sustained higher trend growth is attributed in part to the effects of liberalisation, the impact of growing globalisation and the more flexible labour markets. However, much of the credit for the extraordinary growth in the USA is also given to a broad-based, IT-propelled increase in productivity.

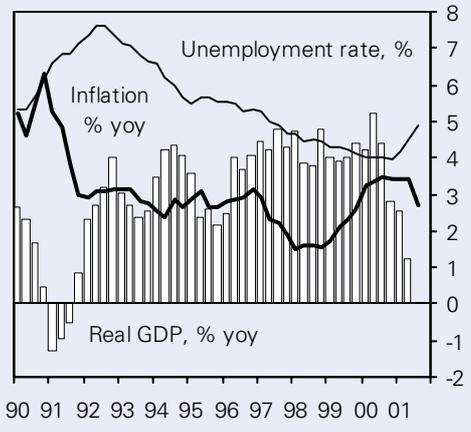
## Debate over new economy has recently intensified

The recent data on productivity growth in the second quarter, and above all the marked downward revision for the past year, have lent new impetus to the debate over whether the new economy exists in the USA. Those who champion the new economy's existence largely name cyclical causes for the pronounced flagging of productivity growth during the past three quarters. They also do not think that even the revision of last year's productivity gain from 4.3% to only 3.0% casts fundamental doubt on their case. The sceptics, on the other hand, feel vindicated by the data. They point out that the trend growth of the US economy does after all appear to be substantially slower than had been believed. As they see the matter, it remains an open question whether a lasting, broad-based and chiefly-IT-driven productivity surge exists and has lifted the pace of US economic activity to a sustained higher trend growth. These doubters believe that only the future – that is, the next upswing – will show whether the hypothesised new economy is real.

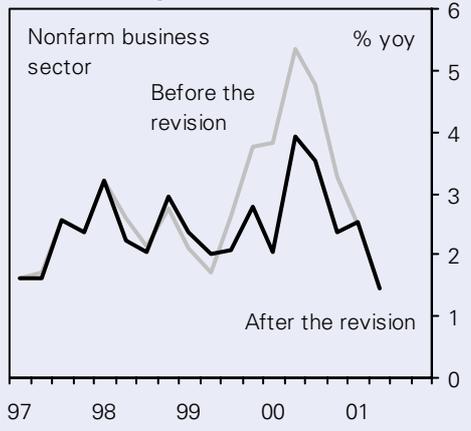
## Atlantic marks a divide between disparate measurement concepts

Not only the revised, sharply lower productivity gains for last year, but the very methods of measuring productivity growth in the USA invite critical scrutiny of the case to be made for the new economy. Thus, as it turns out, the acceleration in productivity growth in the second half of the 1990s would look much less spectacular if measured, say, by German methods. To be sure, even by this foreign yardstick, productivity grew in the USA during the second half of the 1990s while declining in many other developed countries. This argues in favour of a new economy in principle. However, the effects of the new economy are probably significantly less important than is commonly believed. Moreover, the technology gap and the growth difference between the USA and Euroland are much narrower than the official statistics show. This may have far-reaching implications for currency relations between the euro and the US dollar.

**Growth, inflation & unemployment**



**Productivity**



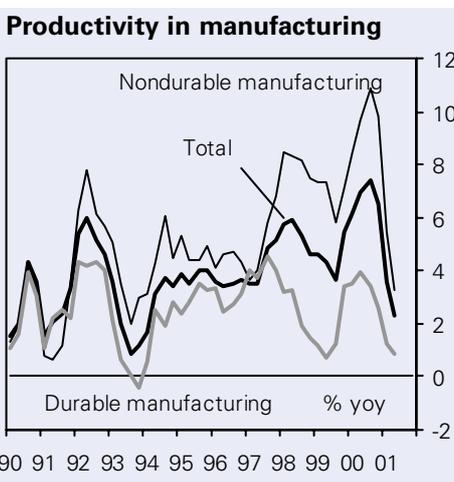
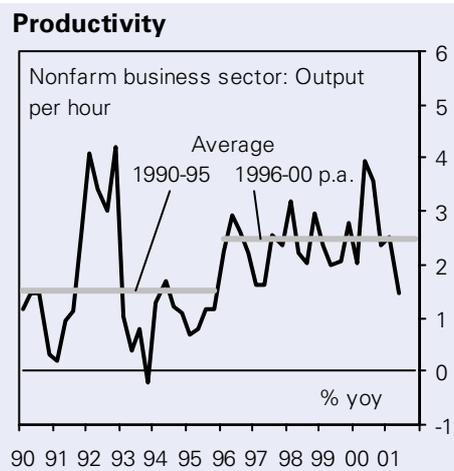
## Official statistics have it that productivity accelerated sharply during the second half of the 1990s

Growth in labour productivity has accelerated in the USA since about the middle of the past decade. Non-farm labour productivity rose by 2 ½% p.a. since 1996, even reaching annual growth of 3% in 2000. From 1990 to 1995, by contrast, the average gain was merely 1 ½% (as in the previous decade), which at first glance seems to corroborate the hypothesis of a new economy. In their study based on the old figures, Oliner and Sichel conclude that about one-half of a percentage point of the overall acceleration in productivity since 1996 is explained by the use of computers [OISi00, 21]. Their analysis employs a production function that explicitly accounts for computers, software and communication equipment in the capital stock.

A look at sectoral productivity growth shows, however, that the quickened pace of productivity gains is attributable primarily to the trend in computer manufacturing and the IT-related industries themselves, where efficiency growth since 1996 has amounted to 25-45% p.a. In almost all other sectors of the US economy, meanwhile, productivity grew at a moderate rate barely exceeding that of the previous five-year period. This observation strengthens the doubts about the broadly-based productivity increase that new-economy champions believe in. It implies that a spill-over into other sectors has not yet occurred, at least not to a degree that already justifies accepting without reservations the existence of a new economy. One of the most popular critics of the notion of the new economy, Robert J. Gordon, attributes the accelerated productivity growth since the mid-1990s to better ways of determining price deflators (which underlie the computation of real expenditures and which explicitly take into account quality improvements), to the cyclical increase in productivity (an increase that is normal during periods when economic growth exceeds trend growth) and especially to vigorous productivity advances in the production of computers and other IT goods [Gord99, 3-5].

## Productivity paradox at least partially resolved

If Oliner and Sichel are right, the productivity paradox brought to the world's attention by Robert Solow's quip that "You can see the computer age everywhere but in the productivity statistics" [Solo87] is resolved. The productivity paradox is a hypothesis that has most of its empirical



USA: Productivity - output per employee													
	Manufacturing										Mining		
	Total	Non-durable	Durable	Stone, Clay, Glass Products	Primary Metals	Fabricated Metal Products	Industrial & Equipment	Machinery thereof Computer	Electrical Machinery	Transportation Equipment		Instruments thereof Motor vehicles	
	.....% p.a. ....												
1960-69	3.6	3.8	3.4	2.0	3.2	1.2	3.4	7.5	5.0	3.3	3.5	4.5	5.0
1970-79	2.8	3.3	2.4	2.3	1.4	1.7	3.2	13.4	4.8	2.5	2.8	5.1	-3.3
1980-89	3.2	2.4	3.8	1.8	3.2	2.1	5.7	21.3	6.5	3.1	3.0	3.0	3.0
1990-00	4.5	2.4	6.4	1.9	3.2	1.8	8.6	32.7	18.8	3.0	3.4	3.8	2.0
1960-90	3.1	3.1	3.2	2.0	2.6	1.6	3.9	13.7	5.5	2.9	3.0	4.1	1.5
1991-95	3.9	2.0	5.5	1.7	3.6	2.6	7.9	26.9	14.4	3.3	3.9	4.6	3.5
1996-00	5.8	3.1	8.3	2.5	3.2	1.7	11.4	44.4	25.7	3.2	3.6	3.2	1.0

basis in the period preceding the mid-1990s. It asserts that, despite mounting computer power, growing IT investment and the proliferating utilisation of IT by companies, productivity is not rising in corresponding measure. On the other hand, based on the studies by Gordon, the productivity paradox is resolved only for the computer-producing and IT-related manufacturing sectors, but continues to apply to the other sectors of the economy.

### How prices are measured makes a difference to measured productivity

Labour productivity is the ratio of output to labour input per unit of time. Essentially, it can be measured as output per hour of labour or as output per worker. In both cases it is necessary to know not only the number of hours worked or the number of people employed (both variables can be statistically determined with relative ease and accuracy), but the real, price-adjusted output.

In other words, productivity depends on nominal output, on the amount of labour used and on the price trend in period t. This means that finding the "true" price is of central importance in quantifying real output, and thus in determining productivity [Schr00, 11]. This is especially true when sustained, profound change has been occurring in prices or quality, as is the case with computers.

### Drastic price decline for IT goods in the USA

A look at the official figures shows that, according to the US national accounts, computers and peripherals have fallen by far more than four-fifths in price since 1991 on a quality-adjusted basis. Over the same period the prices of comparable products in Germany, based on the producer price index for office machines, IT equipment & IT facilities (incidentally, OECD estimates place the values of this index much closer to its US counterpart [Schr00, 11]) eased only by slightly more than one-fifth.

In light of the law of uniform prices for internationally traded goods, this discrepancy comes as a surprise. The extent of the disparity indicates that it is due in large part to regional methodological differences in how the prices are determined [Oecd00a, 203].

In Europe, inflation is commonly measured by determining the price of a good at two points in time. This approach is especially error-prone when the good in question is no longer comparable to that of a month or a year earlier, for example because of qualitative changes. This particularly applies to computers and other IT products, whose performance, and hence "quality," has improved tremendously over the years. Thus, the processing speed of mainstream microprocessors has increased more than 16-fold in the course of the 1990s, and the capacity of a standard hard disk has grown by a factor of more than 200. Similar developments have taken place in telecommunications equipment, with cellular phones a prime example [Oecd00a, 203]. Just how difficult it is in these circumstances to measure the change in the price of PCs is illustrated by the following example. A basic desktop computer package has consistently cost about DEM 2,000 in Germany. This was as true for the "386" generation of PC (introduced in 1985) as for a 486 (1989), Pentium I (1993), Pentium II (1997) and Pentium III (1999). But while the starting price of PCs has been near-constant, their computing power has grown enormously. As well, soon after the

#### Prices and productivity

$$(1) \quad P_t = OR_t / A_t$$

where

$P_t$  = (labour) productivity in period t

$OR_t$  = real output in period t

$A_t$  = labour input in period t

and

$$(2) \quad OR_t = ON_t / D_t$$

where

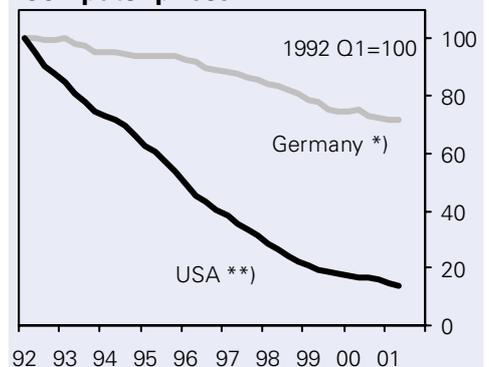
$ON_t$  = nominal output in period t

$D_t$  = price deflator in period t.

Therefore

$$(3) \quad P_t = ON_t / (D_t * A_t)$$

#### Computer prices



- \* Producer price index (Office and IT equipment)
- \*\* Computer and peripheral equipment deflator (National accounts statistics), based on hedonic method

introduction of a new generation of PC, the older models become unavailable in the market, quickly making conventional price comparisons impossible.

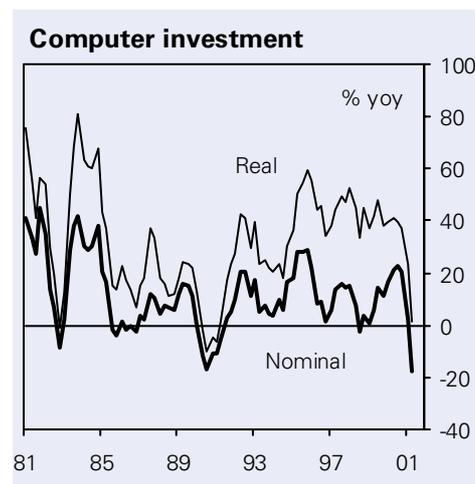
It goes without saying that changes in quality need to be factored into the calculation of the price trend. While German statistics are based on relatively traditional methods of valuing quality changes (the monetary value of the quality improvement is typically estimated on a case-by-case basis using rules set by the Federal Statistical Office [Buba00, 8]), a "hedonic" price index is applied in the USA [Grim98].

Hedonic pricing, which is based on econometric methods, works on the premise that an economic good (i.e., a product or service) can be described by a combination of constituent attributes and that changes in the price and quality of such a good can be described by the entirety of the trends in the prices of these constituent characteristics. This means that a product in the CPI basket of goods is not captured as a whole, but decomposed into attributes relevant to quality, thus statistically isolating the pure price effect from the quality effect. For instance, in hedonic pricing of computers, the clock speed of the central processing unit and the amount of RAM and hard disk storage capacity are explicitly incorporated as independent variables in the price equation.

### Does a quality improvement amount to a price decline?

New technological developments (especially in the IT sector), and hence a new economy, certainly require new methods of price measurement. The conventional techniques applied in Germany reach their limits when used in the IT segment. There is much to indicate that the German methods tend to underestimate quality improvements – and thus price declines – in the IT sector, which is characterised by particularly rapid improvements in performance. Generally speaking, new, more sophisticated measures of inflation that permit quality and price changes to be captured with greater accuracy are preferable to the more conventional methods. However, the US experience suggests that some reservations are in order even about the new measurement methods. There is the question, for example, of how to value quality improvements that the consumer does not use. For instance, merely to ensure compatibility with other users' technology, many PC users routinely need to update a software programme on their machine. What is more, they commonly need a new computer to go with the upgrade (because the new software will not run on the old machine) – yet will use the new software and computer only to do the same work as before. A second example may illustrate the issue even more clearly: Does a mobile phone handset with video games and other state-of-the-art functions (such as Internet access) truly represent an improvement in quality for a mobile user who wishes only to make phone calls? The adjacent chart shows just how widely the nominal and the real trend in computer investment diverge when quality improvements are taken into account.

Outside the IT sector too, quality improvements affect price trends. For instance, cars are frequently offered with comprehensive packages of optional equipment, including amenities such as a radio and air conditioning, at prices only slightly above those of the base models. The options included surely justify assigning such a car a higher "real" value than the base model without these extras. However, improvements in automobile quality (and their effect on real production) are made at a slow pace that is hardly comparable to that in the computer and general IT sector.



On balance, then, hedonic methods – contrary to the older pricing techniques – probably tend to overestimate declines in prices. The “true” price trend for IT goods is thus apt to lie somewhere between the trajectories measured in the USA and Euroland.

## An alternative analysis of the growth and productivity trend: The effect of hedonic price indices

### Hedonic price indices may overstate economic growth ...

In order to estimate the influence of hedonic price indices for computers and other IT goods on economic and productivity growth in the USA, we have deflated (that is, converted to real figures) the nominal investment in computers and peripheral equipment in the USA using the appropriate sub-index of the German producer price index for commercial products (subgroup “Office machines, IT equipment and IT facilities”). In the USA, according to the national accounts, investment in IT from 1996 to 2000 increased by a nominal 11 ½ % p.a. In real terms, based on a hedonically-determined price decline of 22% p.a., IT investment expanded by about 43% p.a. By contrast, according to our analysis using the German price trend (a price decline of 5% p.a.), real IT investment in the USA increased by only 17 % p.a. Applying this method, US economic growth since 1996 would have been 0.4%-points lower per year than in the official statistics.

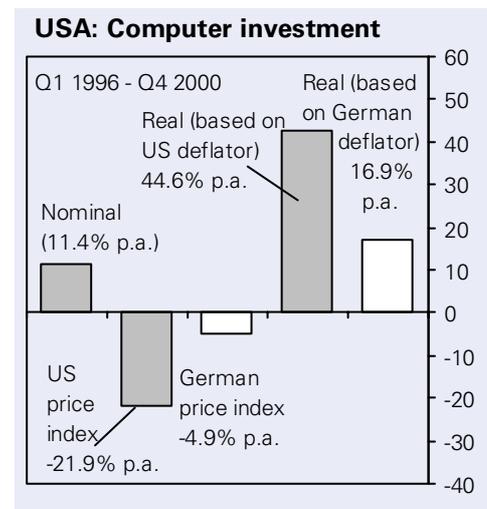
Similar conclusions are reached in a study by the Bundesbank that approached the subject from the other direction. By deflating German IT investment with the US deflator for computers and peripherals, the real annual rise in German IT capital spending from 1992 to 1999 would not have been approximately 6% as calculated by the conventional method, but 27 ½% [Buba00, 8].

The effect of hedonic price indices on US economic growth is further magnified by their influence on exports. As the USA is a major exporter of high-tech goods, a smaller price decline for IT products – taking the actual nominal increase in exports – would mean a smaller real rate of export growth, and thus slower economic growth. Depending on definitions, between 10 and 20% of US exports consist of computers and other IT equipment. If the prices of these exports had declined by only a scant 5% p.a. instead of the officially recorded 22%, the export growth since 1996 would have been lower by between 2%-points (assuming computers made up 10% of total exports) and 4%-points (assuming a share of 20% in total exports), and US economic growth would then have been 0.2 - 0.4%-points p.a. lower. This effect could be somewhat smaller if hedonic price indices were also used on the import side.

All told, the effects of a smaller price decline for IT goods on overall economic growth in the USA add up to 0.6 - 0.8%-points p.a. In consequence, GDP growth since 1996 would have amounted to only slightly more than 3 ¼% p.a. instead of the average of just over 4% given by the official statistics. This less vigorous expansion in GDP would require much less explaining and would probably accord better with the previously-accepted trend growth rate.

### ... and may overestimate productivity growth

Gauged by this different yardstick, the productivity gains in the new economy would also have been much less pronounced. The increase in labour productivity since 1996 under the alternative method of



calculation would have amounted to only 1 ¾% - 2% p.a., compared to the official figure of 2 ½%. Productivity growth would thus have accelerated by just ½%-point annually relative to the average for 1990 to 1995 (1.5%), or half as much as the government statistics indicate. As the difference between the German and US price deflators was a phenomenon primarily of the second half of the 1990s, we can dispense with correcting the productivity growth figure for the period from 1990 to 1995.

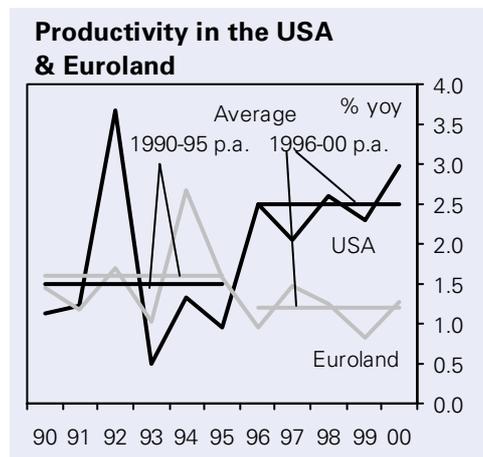
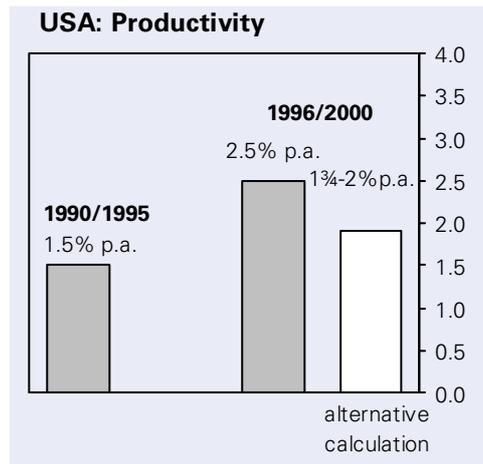
### Even after allowing for possible overstatement, US productivity growth is impressive

Although these alternative figures are significantly lower, US productivity growth and the events of the new economy remain remarkable. Even by these more conservative estimates, the USA is still one of the few countries where the increase in labour productivity has accelerated appreciably. Nor is this increase attributable to differences of methodology. Rather, US productivity growth is genuinely and significantly stronger than the trend in other major industrial economies (such as Japan, Germany, France and Italy), where the pace of productivity increases has slowed to varying degrees [GuMa00, 671]. As computed by the ECB, productivity in Euroland during the period from 1996 to 2000 grew by only 1.2% p.a., compared to a rate of 1.6% in the first half of the decade. This could be because the new technologies still account for too small of a share of the economy in Euroland and because other productivity-enhancing factors, such as flexibility of labour markets, are not present in the same measure as in the USA [Feld00, 191]. Whereas the IT sector contributed nearly 7% to US nominal national product in 1999, the corresponding share in Germany was less than 4% [Euro00, 115].

### Conclusion

The calculation of real production of IT and communications goods is based on price trends that are measured by very different methods in the USA than in Europe. This divergence of methods goes a considerable way towards explaining the American productivity surge. An alternative calculation using a German deflator shows that, by this more conservative measure, US productivity growth since 1996 would have been far lower than in the official statistics. All the same, the productivity gain during this period in the US – unlike many other industrial countries – would still have exceeded the average increase of the first half of the 1990s. Procedural differences alone thus do not explain the US "productivity miracle". This conclusion generally supports the existence of a new economy – but one that, on the basis of the results presented here, is far less distinct in its manifestation than is commonly asserted in the USA. When the same methods of measurement are employed on both sides of the Atlantic, the perceived technology gap and growth differential between the USA and Euroland narrow sharply compared to that separating the official statistics – but still remain wide enough to make it an urgent matter in Euroland to identify and remove obstacles to productivity, for example by hastening the urgently needed structural reforms.

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# Productivity, wages & earnings: the new economy has an effect – but less than expected

Numerous experts believe the broadly based, mainly IT-driven boost to productivity will lead to higher long-term trend growth. This would imply that, thanks to productivity gains, wages may rise strongly without pushing up unit labour costs, enabling profits to rise as well.

There have been doubts for some time that these central hypotheses may not hold – not only because of the recent downward revision of productivity statistics. The critics of the new economy phenomenon have pointed out that productivity increases are being recorded mostly in computer production and the IT sector itself, and that the hedonic method of price measurement normally used in the USA plays an important part in this context<sup>1</sup>. In addition, the theory of simultaneously rising wages and earnings must be called into question in light of the recent revisions. Apparently, the effects attributed to the new economy are smaller than assumed so far. For instance, hourly wage costs have risen considerably faster than productivity in the last few years despite the emergence of the new economy phenomenon. Moreover, the gap between the two has widened, pushing up unit labour costs markedly. The US economy thus had a huge problem with wage costs last year. Against this backdrop, the decline in corporate earnings in the USA and the disappointing stock market development cannot come as a surprise.

## Productivity & growth: close correlation until the start of the 1990s, lower earnings despite rising productivity since mid-1990s

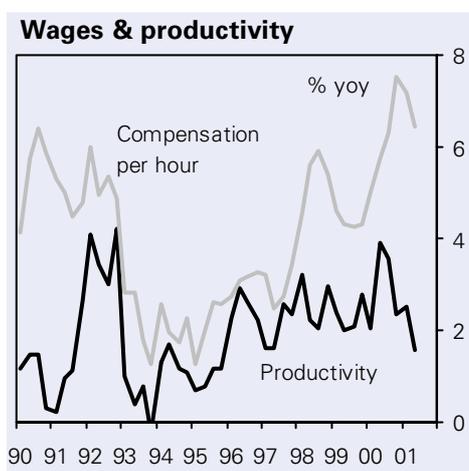
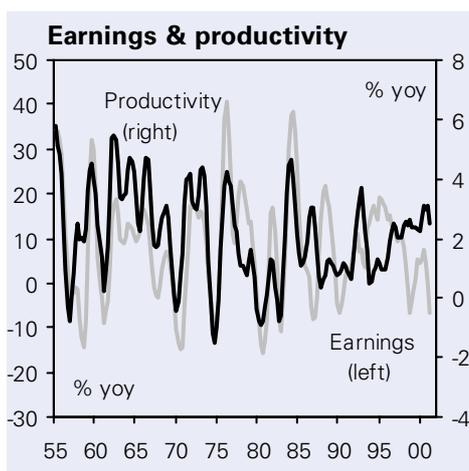
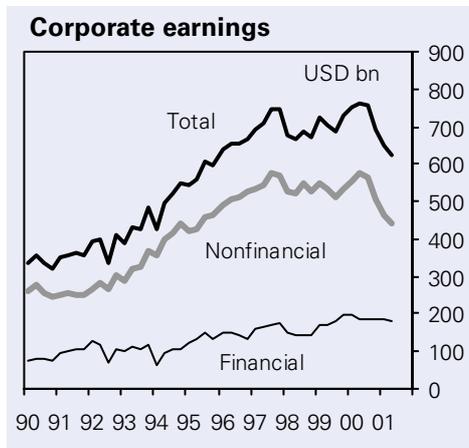
Up until the early 1990s, there was a strong functional link between the development of productivity and corporate profits in the USA. With productivity on the rise (and, as result, unit labour costs on the decline) profits rose (and vice versa), as had to be expected. From 1990, this link was less pronounced and seems to have reversed around the mid-1990s: profits fell when productivity rose. Productivity growth accelerated from roughly ½% (yoy) in Q1 1995 to temporarily almost 4% (Q2 2000), for example, whereas profit growth weakened noticeably (from +28% in Q1 1995) and has even become negative recently. In Q1 2001, corporate earnings (in the national accounts definition) dropped 13%, and by as much as 18% in Q2.

This seemingly paradox development is attributable above all to unit labour costs, which rose despite higher productivity. While productivity and unit labour costs developed inversely until the middle of last decade, they have since moved more or less in tandem. This is due to labour costs rising markedly faster than productivity. As a result, higher unit labour costs for companies led to pronounced earnings shortfalls.

## Unemployment and wages: correlation exists also in the new economy

It is obvious that the connection between declining unemployment and emerging pressure on wage costs, which has so far been questioned by the advocates of the new economy, still existed in the period

<sup>1</sup> See: "New Economy: is the 'productivity miracle' in the USA only a statistical phenomenon?" in this issue.



attributed to the emergence of the new economy (1995-2000). The drop in the unemployment rate below the 5% mark in Q2 1997 and its further decline to 3.9% (October 2000) was followed by an accelerated rise in hourly wage costs from 2.5% to 7 ½%! As a consequence, the growth of unit labour costs nearly doubled to 5% yoy in Q4 2000. Hence, the assumption that productivity growth in the new economy puts a cap on rising wage costs has not proved correct. In the course of this year, too, unit labour costs have risen by more than 4 ½%.

Recent developments also reveal that the traditional correlation between changes in unemployment and higher wages still exists – despite widespread assumptions to the contrary. Apparently, the same applies vice versa: rising unemployment or a less tight labour market leads to slower wage growth. Unemployment has climbed back to 4.5% from its latest low, and the increase in hourly wage costs slowed by roughly one percentage point to just under 6 ½% in the same period.

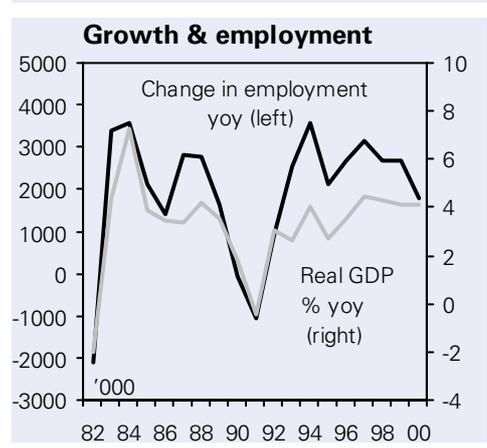
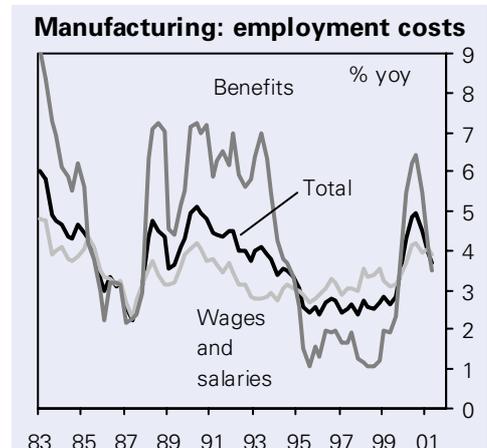
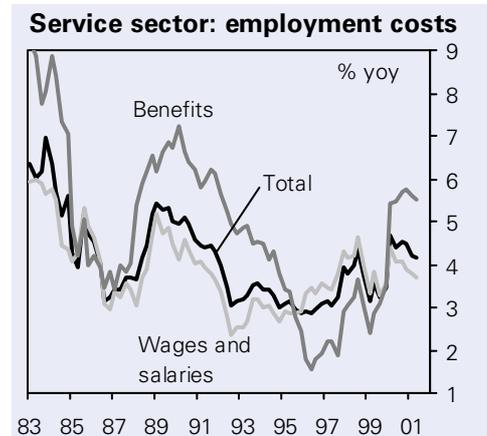
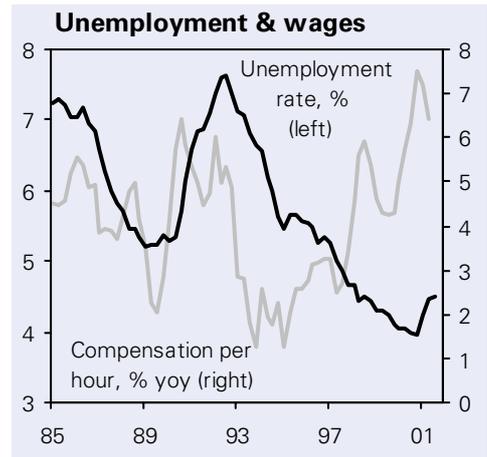
**Rise in employment appreciably stronger in the current cycle**

The extremely pronounced rise in unit labour costs per hour registered in the last few years may be explained by the „efficient wage“ theory. It implies that companies are prepared to pay higher wages to both attract and keep qualified employees. This helps reduce staff fluctuation, which may in turn lower the cost of hiring and training to a considerable degree. These two aspects could mean that the hourly wage at which a company achieves maximum profits is higher than the wage which is in keeping with full employment. The development of wage and salary structures suggests that companies are keen to keep their workforce or even poached staff from other firms given the tight labour situation and the lack of qualified personnel. In both the manufacturing industry and the services sector, benefits such as paid holidays, bonus payments, remuneration for special projects, and contributions to private and state insurance schemes rose particularly strongly, whereas hourly wages were up only moderately.

However, other factors contributing to the problematic pay rises at US enterprises, which had markedly increased their capacities and thus employment since the start of the 1990s, are that the growth and sales potential as well as the concept of virtually unlimited expansion in the new economy had been thoroughly overestimated. Private-sector employment, for example, rose by nearly 13 million between 1995 and 2000; almost 220,000 new employees were hired on average every month. The monthly rise in employment was only slightly higher than in the 1980s growth cycle. Then (i.e. between 1983 and 1989), economic growth – at an average 4 ¼% p.a. – was roughly one quarter of a percentage point higher than between 1996 and 2000. In relation to economic growth, i.e. measured against the increase in employment per percentage point of growth, hiring in the later phase of the current cycle was noticeably higher (634,000 persons per year) than on average in 1983-1989. This implies that the use of additional labour was less efficient in the second half of the 1990s than in the 1980s.

**Inflation remained moderate, though – a feature of the new economy**

With competition intensifying in the new economy, most companies were unable to pass on cost increases to consumers. Core inflation remained relatively stable (fluctuation only between 2 and 2 ¾%). Higher wage costs therefore led to lower corporate earnings in the



USA. This means the new economy triggered a reduction in companies' pricing power, but not in the pricing power of the factor labour. Income distribution shifted to the benefit of employees.

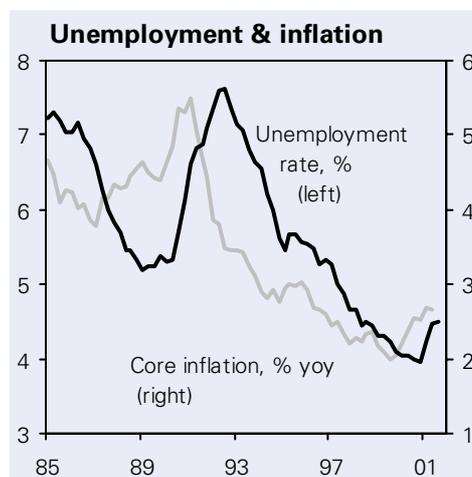
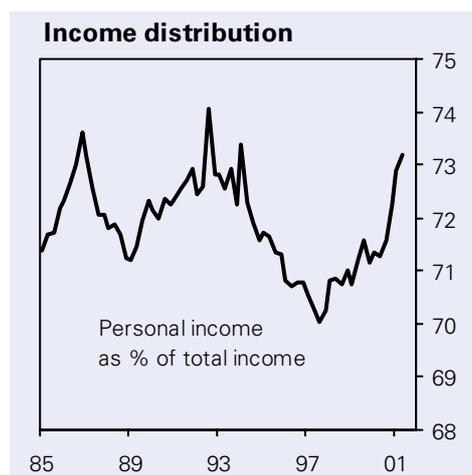
The last few years have seen the first round in the unemployment-wage-price spiral, but the second round, which implies that price increases are passed on to consumers, has not yet materialised. This suggests the NAWRU (non-accelerating wage rate of unemployment), i.e. the level of unemployment below which wage pressure is created, has fallen only slightly in the new economy. For the 1990s, the OECD puts this critical rate of unemployment at 5 ½-6%, compared with 6 ½% in the 1980s. By contrast, the NAIRU (non-accelerating inflation rate of unemployment), i.e. the level of unemployment below which inflation rises and which had in the past been put at 6%, has fallen to around 4% in the new economy. This happened at the expense of corporate earnings, though.

## Outlook: productivity development the decisive factor

How will productivity develop? What conclusions can be drawn from the experience of the last five decades? To be sure, the new economy is fuelled by higher productivity growth. However, the effects associated with it will probably be smaller than originally expected by many optimistic observers.

Against the backdrop of rising unemployment – a result of weak economic activity and large-scale capacity adjustments – we expect the current, extremely dynamic development of hourly wages to slow down. Moreover, productivity growth will likely pick up strongly, mostly for cyclical reasons, when the US economy recovers. But whether a pace of 2 ½% p.a. or more can be maintained and thus allow the business environment for corporate earnings to stay positive in the long term, remains to be seen. The latest revision of the figures has already shown that productivity growth in the new economy has been markedly slower than assumed so far. The reading for last year, for instance, was revised downward to 3.0%, from 4.3%. The acceleration in productivity growth in the second half of the 1990s (from 1 ½% p.a. in 1990-95 to 2 ½% p.a.) was thus one quarter of a percentage point slower than believed up to now. In addition, it is unclear as yet whether we are actually witnessing a structurally induced, broad-based and IT-driven boost to productivity. The real test is yet to come.

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