Is there a "new economy", and is it coming to Europe?

By Jonas A. Eriksson and Martin Ådahl*

The "new economy" has become something of a buzzword and the topic of extensive debate both in the media, enthusiastically, and in academic circles, more reluctantly. Above all, it refers to the US economy's astonishing performance in recent years with high growth, falling unemployment and low inflation, coupled with a real breakthrough in the use of new information technology, in particular the Internet. The purpose of this article is to try to analyse what the evidence tells us about the US and what this implies for Europe.

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Unfortunately there is no generally accepted definition of the new economy. The term is used to cover everything from statistical research into the growth and inflation figures of the 1990s to far-fetched visions of the new millennium.

Some commentators claim that the IT revolution has transformed the economy in such a way that the old laws of economics no longer apply (for example, the old in the relationship between supply and demand no more applies) and, in principle, spells the end of the traditional business cycle.[1] However, we have chosen to stick to established, albeit modern, economic theory. The relationships between different macroeconomic variables will, of course, evolve over time, but this has nothing to do with new laws of economics.

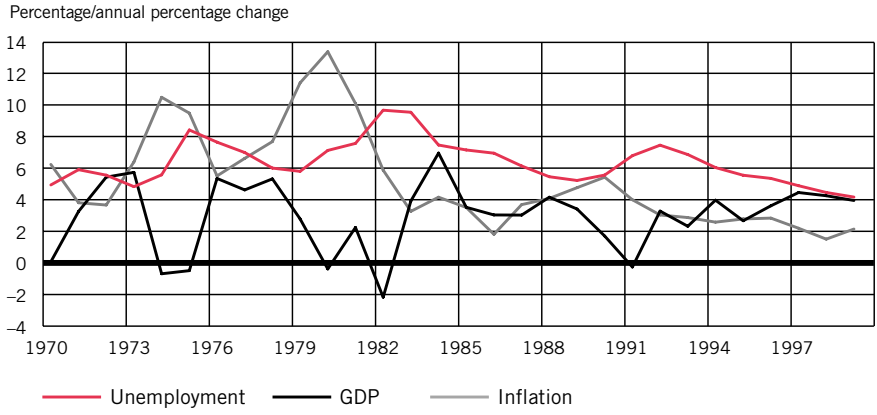
As a result, this article takes the new economy to mean *an increase in the economy's growth potential as a result of more rapid productivity growth*, since productivity tends to be highlighted as the most important contributing factor to long-term growth.[2]

* The authors would like to thank Mikael Apel, Claes Berg, Mårten Blix, Per Jansson, Staffan Viotti and Anders Vredin for valuable comments.

[1] Kelly (1995 and 1999) and Sahlman (1999).

[2] For a discussion of the basis of economic growth, see, for example, Barro and Sala-i-Martin (1995).

Figure 1. GDP, unemployment and inflation in the USA



Source: Bureau of Economic Analysis.

This article takes the new economy to mean an increase in the economy's growth potential as a result of more rapid productivity growth.

First we will take a look at the US as something seems to have happened to the American economy in recent years that appears to be more than just a temporary phenomenon. We will discuss the factors that might lie behind the upswing, focusing primarily on *macroeconomic stability, microeconomic reforms (deregulation and free trade) and their interaction with globalisation and technological advances.*

We will also ask why the change seems to have come right now and how far the accelerating growth rate should be considered temporary or permanent. We will then examine whether there are signs of a new economy emerging in Europe before ending with a summary of our conclusions.

It is important in this context to distinguish between two issues that are often muddled in this debate:

- Firstly, seeing whether signs of the new economy can be found in existing economic statistics – in other words, *what we can observe today*. Here there is a need to take a critical look at the statistics, which do not always present an accurate picture of events.
- Secondly, *what kind of breakthrough we might expect for the new economy in the future.* Historically there has often been a time lag between a new technology becoming available and businesses actually being able to use it in a way that increases productivity. For example, it is often assumed in the debate that the Internet revolution has already had a major impact on macroeconomic statistics, even

though the technology is only a few years old in most workplaces. What we should be seeing today is more the effects of *computerisation*.

The origin of the debate – the US as the "best economy ever"

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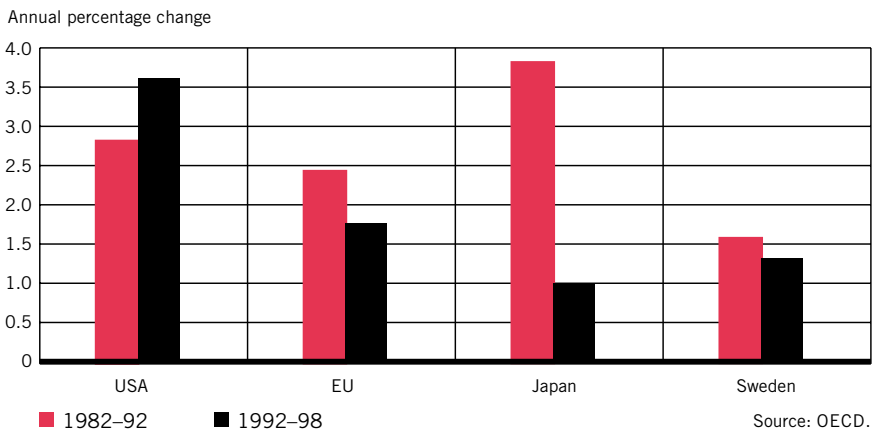
Something has happened to the US economy. An economy that seemed to have begun to lag behind the other industrialised countries somehow managed to find a renewed strength in the 1990s and widen the prosperity gap to its peers (see Figure 2) – the exact opposite of what should be happening according to the convergence hypothesis, which predicts that countries with a lower initial per-capita GDP should grow more rapidly than those with a higher initial per-capita GDP.[3]

Otherwise the 1990s were a decade of disaster and stagnation for much of the global economy, with crises in Mexico, Asia (including Japan), Russia and elsewhere having global repercussions.[4]

Figure 2. GDP growth



[3] See, for example, Calmfors and Persson (1999) or Romer (1996).
[4] See IMF (1999a).

Characteristic 1: he investment boom

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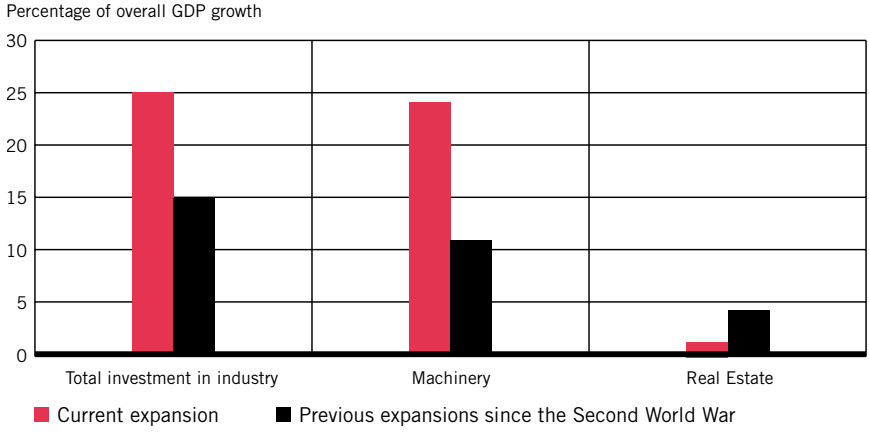
A number of phenomena on both the supply side and the demand side support the US economy's longest ever expansion, which began back in early 1991.[5] One key factor has been the investment boom seen in the 1990s, with businesses investing heavily, especially in information technology.[6] In real terms, gross capital investments have almost doubled since 1991. The increase has been so rapid that it has not been possible to finance these investments through domestic saving, leading to a substantial current account deficit equivalent to around 4 per cent of GDP, the highest in US history.

Investment has accounted for around 25 per cent of real GDP growth during this economic expansion, compared with only around 15 per cent in other expansions since the Second World War (see Figure 3). In nominal terms investment in information technology at the end of the 1990s was twice that of a decade earlier, but in real terms the increase was almost twelve-fold on account of the dramatic slide in the price of computers during the period. It is also worth noting that investment in property has been lower than in previous upswings (see Figure 3).

The relationship between unemployment and inflation observed in previous decades would appear to have changed, since the falling unemployment of recent

Figure 3. Contribution of investment to real GDP growth



Source: Council of Economic Advisers.

[5] According to the National Bureau of Economic Research (NBER), which officially announces the beginning and end of a business cycle.
[6] See Sichel (1999).

The relationship between unemployment and inflation observed in previous decades would appear to have changed.

years has not led to sufficiently high capacity utilisation for inflation to take off. One major reason for this seems to be the extremely high levels of investment, which have resulted in production capacity being expanded at a rate not seen since the late 1960s. Consequently, capacity utilisation has held at historical levels, even though production has soared and employment has risen. While employment has decreased in industry, this has been more than offset by increases in other sectors. Although unemployment is nudging down towards 4 per cent, its lowest since the 1960s, wage growth has been moderate and not, as yet, inflationary.

Characteristic 2: The acceleration of productivity growth[7]

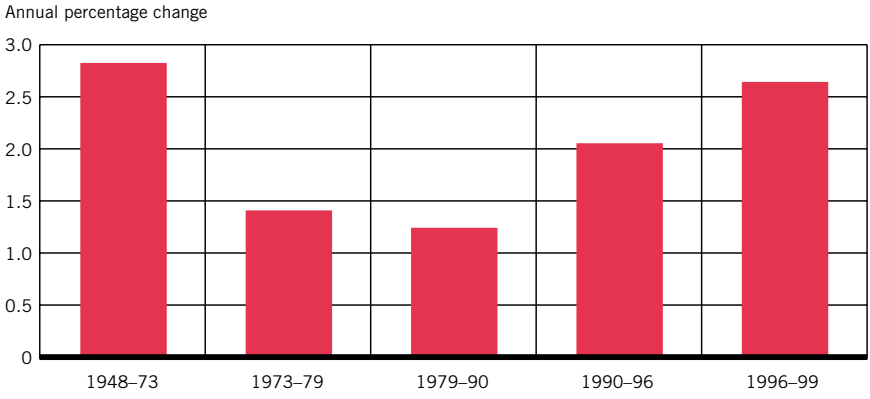
While productivity growth has slowed during previous economic expansions, this time it has accelerated.

One explanation for the greater willingness to invest is that productivity growth has also begun to climb in recent years. The most common measure of productivity, output per man-hour in the non-farm business sector, accelerated during the 1990s. Annual productivity growth averaged around 2 per cent over the decade as a whole and has averaged more than 2.5 per cent over the last three years, which is back at the levels seen during the "Golden Age" (see Figure 4). While productivity growth has slowed during previous economic expansions, this time it has accelerated (see Figure 5). The investment boom has led to a process of "capital deepening" – an increase in capital per employee.[8] The rapid improvement in productivity has meant that profits have been maintained and real wages have risen.

Of particular interest is the increase in that part of productivity known as total factor productivity (TFP), which depends on factors other than just increases in inputs of labour or capital and tends to be linked with technological development and organisational improvements (also called the "Solow residual").[9] It is, above all, the increase in TFP in recent times that has given rise to hopes that the

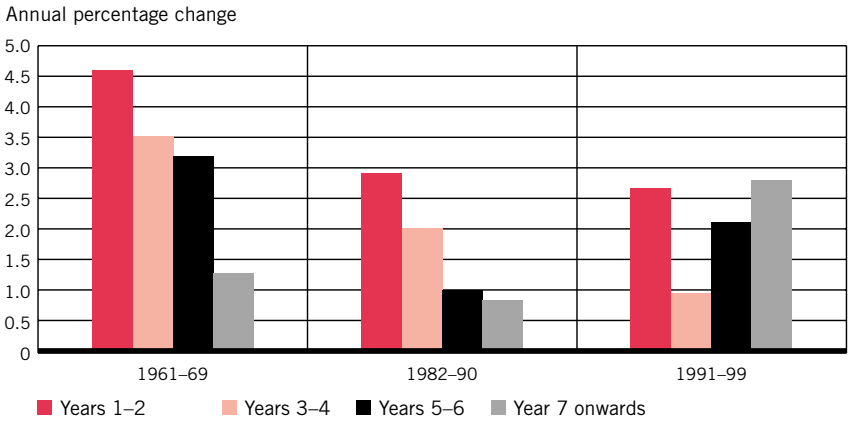
[7] See, for example, the box in Sveriges Riksbank (1999) for a review of the different measures of productivity.
[8] See Council of Economic Advisers (1999).
[9] In Robert Solow's original basic, neo-classical growth model based on labour and capital alone, the rate of growth per capita decreases with time. Each worker receives more and more capital and machinery until he or she can no longer handle it all and the return on capital no longer matches its cost. As a result, high levels of saving (which can be used for capital investments) do not help long-term growth if the capital is ultimately of no benefit on the margin. The difference between this model and reality (where growth has not slowed) is a factor known as the Solow residual, which Solow does not explain in his model but cites as some form of "technology factor". Comparisons are often drawn between TFP and the Solow residual.

Figure 4. Output per man-hour (non-farm economy)



Source: Bureau of Labor Statistics.

Figure 5. Growth in productivity (non-farm economy) during various economic expansions



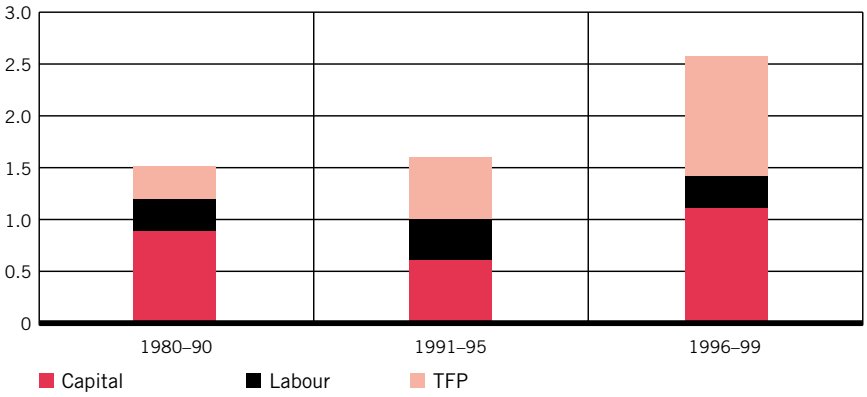
Source: Council of Economic Advisers.

introduction of new technology, especially information technology, has begun to make a breakthrough. According to the Federal Reserve, at least a third of productivity growth since 1995 can be attributed to TFP.[10] This can be compared to the period from 1979 to 1990 when the contribution from TFP was nil and the early 1990s when TFP grew by just over half of one per cent, compared to more than one per cent per annum since 1996 (see, Figure 6).

[10] See Bureau of Labor Statistics (1999) and Greenspan (1999a).

Figure 6. Productivity in the USA (non-farm economy) by factor

Annual percentage change



Sources: Federal Reserve Board of Governors and Bureau of Economic Analysis.

Has the new economy come to the US?

What are the reasons behind the investment boom and acceleration of productivity growth in the US, and is its current performance sustainable?

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There are those who claim that it is essentially a series of chance factors that have fuelled developments in the US. These include the end of the Cold War in the early 1990s, which released resources (from the military sector), and falling import prices for raw materials (oil) and other inputs during the Mexican and Asian crises.[11] These crises also triggered a "flight to quality", with investors transferring capital from emerging markets to the US. Together these factors have helped to curb inflation and avoid the need for the Federal Reserve to tighten monetary policy.

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However, most commentators agree that these phenomena alone are not sufficient to explain the more fundamental changes, such as the increase in productivity growth. Few commentators deny that the new information technology has played an important role, even if it cannot in isolation explain what has been happening.

[11] See, for example, Brinner (1999).

A return to the Golden Age?[12]

One hypothesis is that what we are now seeing is simply a return to the situation seen before US productivity began to flag in the early 1970s.[13] Many attempts have been made to explain the decline in the 1970s and 1980s, but it appears that economists have yet to agree on what really caused it.

The most important factors usually cited include: soaring oil prices, making a substantial proportion of existing capital equipment unprofitable to use on account of excessive oil consumption; various controls introduced in the product and labour markets that undermined the economy's efficiency and ability to recover from negative shocks; less favourable demographics[14]; and, in particular, a macroeconomic policy fuelling high inflation and large budget deficits.

Many of these factors now seem to have reversed. Oil prices have fallen sharply, despite the recent recovery, and the overall dependence on oil has decreased. The demographics have also become more favourable, with the "baby boom" generation now reaching a more productive age.[15] Moreover, the 1980s brought the lifting of some of the *microeconomic controls* from the 1970s, such as the price controls introduced after the oil shocks.

It is above all when it comes to *macroeconomic policy* that there can be talk of a return to the Golden Age. Since the mid-1980s economic policy has successfully centred on price stability rather than the fine-tuning of the economy attempted in the 1970s. Inflation has more than halved since the beginning of the 1990s to a shade over 2 per cent.[16] At the same time, fiscal policy focused on budget consolidation throughout the 1990s, with taxes raised, expenditure cut and the budget process tightened up. All in all, macroeconomic policy has laid stable and increasingly predictable foundations for investment and allocation decisions in a way that, in the US, is associated with the first decades after the Second World War.

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[12] Suggested by US Treasury Secretary Larry Summers, among others, see Financial Times (2000).

[13] For example, patent applications in the USA dropped more than 20 per cent between 1970 and 1983. See OECD Economic Studies (1988).

[14] See, for example, Dornbusch and Fischer (1990).

[15] The demographics will worsen again once the baby boom generation begins to retire. Around 20 per cent of the population is expected to be over the age of 65 in 2029, compared with just over 12 per cent today. See Council of Economic Advisers (1999).

[16] In 1994–95 the Federal Reserve managed to stave off an inflation threat by raising its benchmark interest rate by around three points without tripping the economy into recession. In 1998 the benchmark rate was lowered by three quarters of a point to prevent an excessive drop in prices in the wake of the Asian crisis, which helped to stabilise the rate of inflation.

Something new?

However, the real issue is whether the productivity surge in the USA is more than just a return to the good old days. The world of today is very different to that before the first oil shock in the early 1970s: the snowballing globalisation process now under way, with increasingly intensive information flows, stiffer competition and wave upon wave of technological advances, is in many ways fundamentally different to the industrialisation process seen in the 1950s and 1960s.

Microeconomic policy

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The 1980s heralded the launch of a series of measures to kick-start the US economy's anaemic growth, measures that went beyond simply reversing the controls introduced in the 1970s:

- Deregulation got under way in several sectors, including transport, financial services, energy, telecommunications and health insurance, and monopolies were broken up. Transport costs and health insurance (HMO) costs, for example, have decreased since these sectors were deregulated.
- Successive rounds of trade liberalisation under the auspices of GATT and elsewhere, combined with regional trade agreements (NAFTA and APEC), have rapidly opened up the US domestic market to international competition and increased the international division of labour between the US and the rest of the world. The clearest indication of this is the increase in import penetration in the US manufacturing sector from the equivalent of 10 per cent of output in 1980 to almost 20 per cent in 1998.
- The labour market has been further deregulated, and the social security and tax systems have been reformed to increase the incentive to earn and invest. New rules on the portability of pension plans have increased the mobility of the workforce, time limits have been imposed on social security benefits and tax rebates have been introduced for those on low incomes.

Taken together, these reforms at the microeconomic level have made the already open US economy even more open to competition, triggering a wave of corporate restructuring with cost-cutting programmes and a sharper focus on core businesses.[17]

[17] One way in which businesses have become more efficient is through the rationalisation of human resources, especially middle management.

The technological boost

However, the major new boost to the growth potential and productivity so widely touted by the media is the technological breakthrough spearheaded by the US during the 1990s. A wealth of synergies has arisen between a handful of strategic innovations. The transistor and the microprocessor, lasers, fibre-optics and satellite technology (plus genetic engineering and microbiology in the future) have not only developed at a very rapid pace, as symbolised by the much quoted Moore's Law[18], but also resulted in a multitude of practical applications in a wide variety of areas.

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Particularly impressive in the last decade has been the development of the IT sector, which accounted for just over 6 per cent of total GDP in 1993 but a third of GDP growth in 1995–97 (see Figures 8 and 9).[19] Productivity growth in the sector has been extremely high, averaging 41.7 per cent per annum between 1995 and 1999.[20] IT hardware, which accounted for just over 0.1 per cent of the total capital stock in the eighties, has increased to around 0.5 per cent in just ten years (see Figures 10 and 11). The key contributing factors have been computerisation, computerised and automated processes, and computer networks: expensive physical capital has been replaced with cheaper IT-based capital.[21]

The last few years have seen this increasingly intensive computerisation and connectivity *within* businesses being complemented by the Internet, which, in the form of e-commerce, is creating an integrated system *between* businesses and their customers and suppliers. This transition from the IT economy to the network economy has only just begun, but there are already signs that it has impacted on economic development in the last two years.

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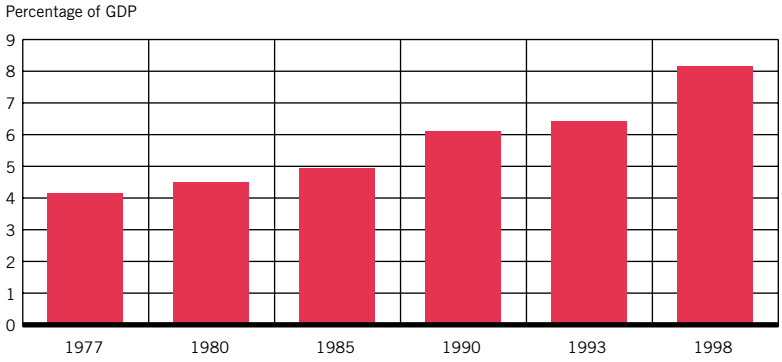
The number of regular Internet users has already tripled in two years, from around 70 million in 1997 to well over 200 million in 1999. According to the US

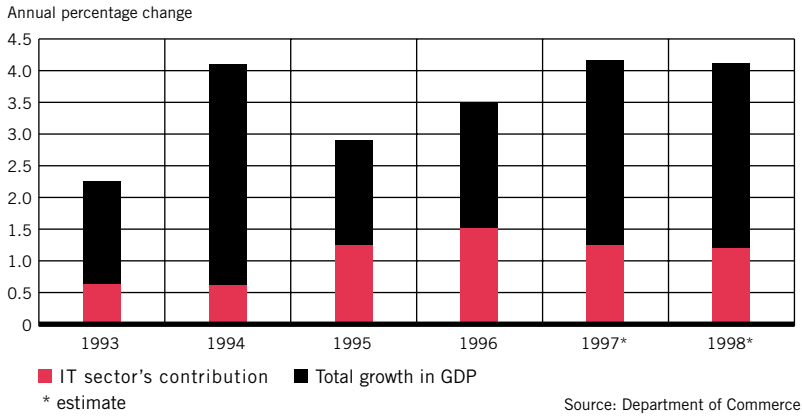
[18] Gordon Moore, founder of microprocessor producer Intel, predicted in 1973 that the capacity of computer processors would double every eighteen months, a prophecy that has proved remarkably accurate.
[19] US Government Working Group on Electronic Commerce (1998) and US Department of Commerce (1999a).
[20] Gordon (1999).
[21] See, for example, Jorgenson and Stiroh (1999).

Figure 7. IT sector's size



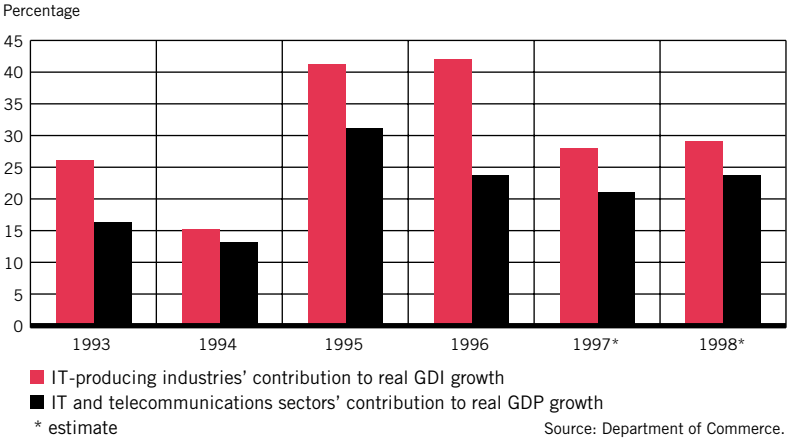
Source: Department of Commerce.

Figure 8. IT sector's contribution to growth in real US GDP



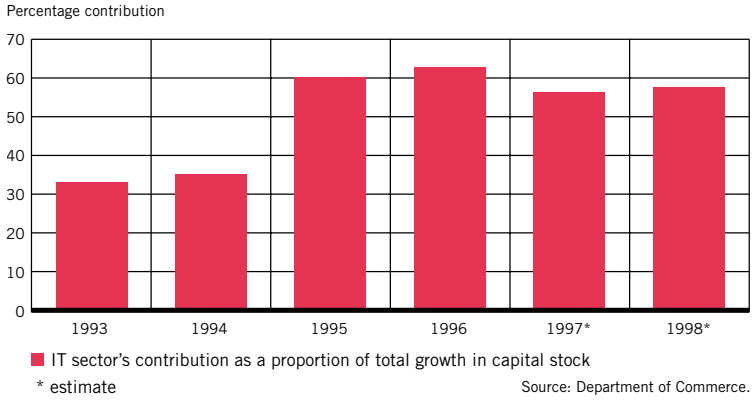
Source: Department of Commerce.

Figure 9. IT sector's contribution to real growth



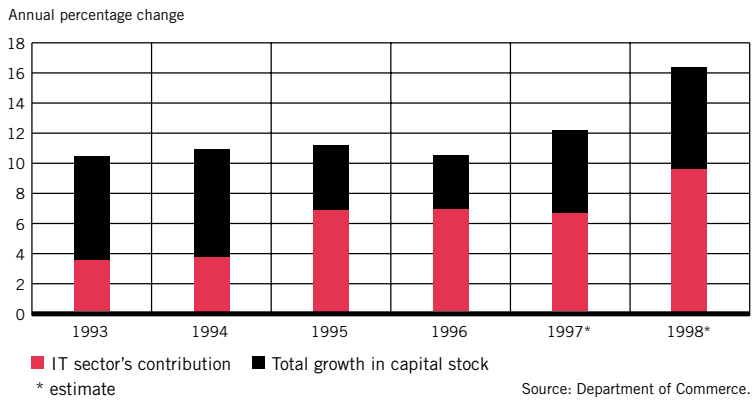
Source: Department of Commerce.

Figure 10. IT sector's contribution to capital investment in the US



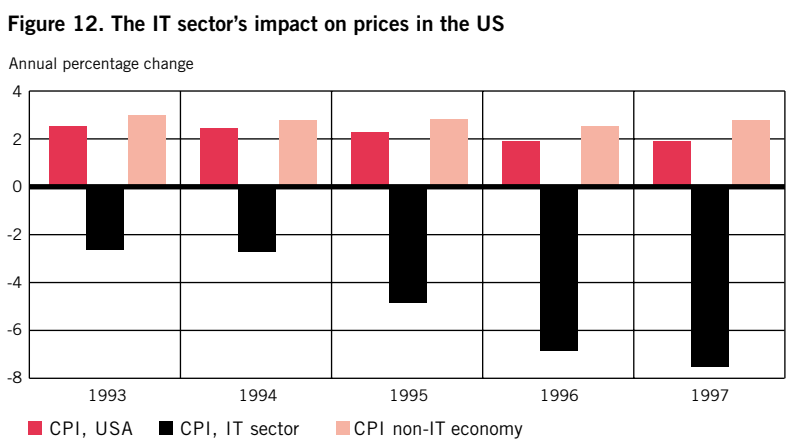
Source: Department of Commerce.

Figure 11. IT sector's contribution to capital investment in the US



Source: Department of Commerce.

Figure 12. The IT sector's impact on prices in the US



Source: Department of Commerce.

body Internet Software Consortium (www.isc.org), the number of Internet domains (websites) increased from 33,000 in 1988 to around 56 million in July 1999 and is forecast to hit 100 million this year. Internet shopping has exploded from just a few billion dollars in 1997 to an estimated USD 26 billion in 1999, and is projected to reach USD 200 billion as early as 2003–05[22], climbing from less than 1 per cent of total retail sales in 1999 to more than 10 per cent in 2003–04 (see Figure 13). According to the OECD, e-commerce could cut costs in the retail trade by between half and two thirds of 1 per cent of GDP in the OECD countries.[23] The OECD's report also predicts a drop in distribution costs in information-intensive sectors of between 50 and 99 per cent. When it comes to the banking sector, consultants Booz Allen och Hamilton have estimated that the cost of the same service provided over the Internet in 1999 was just 12 per cent of the cost at a physical branch, a quarter of the cost over the telephone and half of the cost at an ATM.

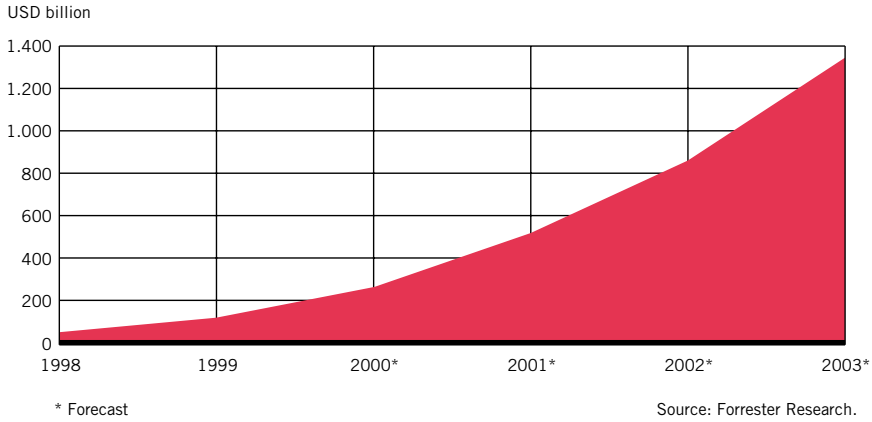
The benefits of this information flow can be divided into two factors: firstly the efficiency gains from customer and producer being able to find each other more easily, and secondly the reduced margins (profits) for producers.

Even where the actual purchase is not made over the Internet, more and more purchasing decisions are being based on information obtained from the Internet, so enhancing the efficiency of the market.[24] The benefits of this information flow can be divided into two factors: firstly the efficiency gains from customer and producer being able to find each other more easily, and secondly the reduced margins (profits) for producers from their being forced by Internet comparisons into a more uniform market where they can no longer dominate sub-markets to the same extent and so command higher prices on the strength of their market power and the insufficient (asymmetrical) information available to consumers. This latter effect impacts primarily on prices (and so also monetary policy) rather than productivity.

These factors are expected to have their greatest economic impact not on trade with consumers but on trade between businesses as they move over to purchasing over the Internet (business-to-business e-commerce). An OECD compilation of forecasts from a variety of IT consultants predicts that the total value of business-to-business e-commerce in the US will increase from around USD 40 billion in 1998 to USD 800–3,200 billion in 2003.[25] According to newly pub-

[22] OECD (1999a).
[23] idem.
[24] For further discussion of the changes in the microeconomic picture for households brought on by the Internet and IT, see Lindbeck and Wikström (1999a och 1999b).
[25] Forrester Research (1999), IDC (1999) and Dataquest (1999). For a detailed discussion of the development of e-commerce, see The Emerging Digital Economy II, US Department of Commerce (1999).

Figure 13. Sales over the Internet



* Forecast

Source: Forrester Research.

lished but as yet highly uncertain calculations, the overall impact of business-to-business e-commerce could boost GDP growth in the leading OECD economies by a quarter of a point over the next ten years.[26] This is expected to lead to more efficient matching of suppliers and producers, both in the US and in the rest of the world.

These factors are expected to have their greatest economic impact not on trade with consumers but on trade between businesses as they move over to purchasing over the Internet (business-to-business e-commerce).

There are already many examples of major changes at corporate level: General Electric's e-commerce system Trading Process Network has cut the duration of the procurement cycle by half, evaluation time by a third and costs by between 5 and 50 per cent.[27] In several sectors we are already seeing the consolidation of electronic marketplaces, the most widely reported being the steel marketplaces like e-steel and the newly merged global marketplace for car components agreed on by US car giants Ford, Daimler-Chrysler and General Motors for their hugely complex network of tens of thousands of suppliers, which accounted for total purchases in excess of USD 240 billion in 1999.[28] According to investment bank Goldman Sachs, e-commerce is expected to reduce supplier costs by between 5 and 40 per cent, depending on the sector.[29]

In this way information technology is bringing about a general reduction in the search costs incurred by businesses in retrieving information, both internally

[26] Brookes and Wahhaj (2000).
[27] The Economist, 26 June 1999.
[28] The Economist (2000b).
[29] Brookes and Wahhaj (2000).

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and externally. Among other things, this has led to more efficient stock management and better matching of supply and demand, so releasing resources and speeding up the production process. New potential is opening up for stock management systems such as the just-in-time (JIT) method that have been slashing stockholding costs and are expected to continue to do so in the future (see Figure 14). The greater availability of information also reduces the need for safety margins and so the amount of capital tied. Internet retailers such as Dell and Amazon that bring the customer and production units together directly over the Internet without any other intermediary have only a fraction of the working capital (in Amazon's case negative working capital) needed by their competitors.[30]

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The Federal Reserve believes that there are clear signs that search costs in the labour market have also fallen now that the Internet has opened up new ways of finding personnel and the recruitment companies have been able to expand their operations with IT support.[31] The technological revolution has brought not only more jobs but also record levels of staff turnover, even if the net impact has been extremely positive. The workforce has therefore become more mobile and job security has diminished, so putting a damper on wage growth.

Moreover, IT has both been the key to the emergence of more extensive, efficient and globalised financial markets and been supported by venture capital from these markets. Rapidly rising wealth in the US during the 1980s and 1990s has also brought broader and stronger venture capital markets, with new phenomena such as "business angels"[32] and "business incubators".[33] The US venture capital market, symbolised by the technology-dominated Nasdaq exchange, increased its capitalisation by more than 850 per cent during the 1990s.[34]

[30] Sahlman (1999).

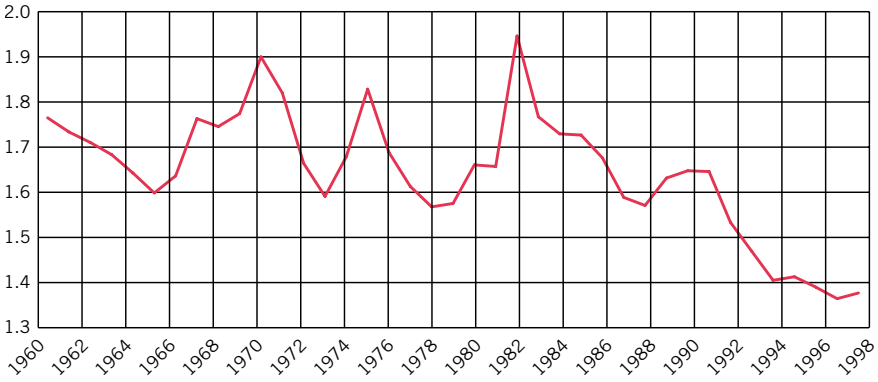
[31] According to one study, 60 per cent of US personnel managers used the Internet for recruitment purposes in 1998, compared with just 13 per cent in 1997. The largest marketplace, America's Job Bank, provided information on 1.5 million job seekers in 1999. See Council of Economic Advisers (2000) and Greenspan (1999b).

[32] Independent or organised wealthy investors contributing both capital (the entrepreneur's stake in the business depends on his or her work input) and a network of contacts.

[33] Businesses that provide office accommodation and other practical infrastructure for innovators.

[34] Lerner (1999) demonstrates that businesses financed through the venture capital market account for a disproportionately large share of technological development in the form of patents, registered pharmaceuticals and industrial innovations.

Figure 14. Industry inventories relative to sales



Source: EcoWin.

Statistical illusion?

In this context it should be noted that several leading experts have long been sceptical about the supposed productivity-enhancing impact of computerisation, particularly given the fact that much of the increase in productivity did not come about until the late 1990s. A favourite quotation that no self-respecting article on the topic can be without is Nobel Prize for Economics laureate Robert Solow's comment: "You can see the computer age everywhere but in the productivity statistics." This scepticism has gone hand-in-hand with images of office workers playing computer games and surfing for pleasure, and office printers repeatedly refusing to print.

One reason often cited for the acceleration of productivity growth is that the statistical basis for putting together the national accounts has been expanded, calculation methods have been modified and various items have been reclassified (for example, business spending on computer software is now counted as an investment rather than an expense, so pushing up GDP). Together these changes have led to historical inflation figures being revised downwards and historical GDP and productivity figures being revised upwards.[35]

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[35] See, for example, The Economist (1999).

Some economists believe that these methodological changes can explain much of the increase in productivity growth. One proponent of this view is Robert J. Gordon, who is convinced that the acceleration of productivity growth can be explained entirely by three factors: changes in statistical methods, rapid productivity increases in computer manufacturing and cyclical GDP growth above the trend rate in recent years. He finds that no acceleration of productivity growth can be seen in the statistics for the 99 per cent of the US economy that does not involve the production of computer hardware.[36] However, Gordon's conclusions are very much dependent on his statistical assumptions.

What the economic literature does currently lend extensive credence to is that the use of IT, and not just IT production, has increased the efficiency of business processes.

What the economic literature does currently lend extensive credence to is that the use of IT, and not just IT production, has increased the efficiency of business processes, with clear indications of a rapid increase in the return on IT investments at company level since the early 1990s.[37] In actual fact, studies show that this is by and large a diffusion phenomenon: the eight sectors of the US manufacturing industry that have used computers most intensively (equivalent to 40 per cent of the total value added in manufacturing) increased their productivity substantially back in the 1970s and 1980s, with productivity then accelerating rapidly between 1990 and 1996 to an annual rate of 5.7 per cent, compared with 2.6 per cent for the rest of the industry.[38]

Others, including the Federal Reserve, believe that problems with measuring productivity and quality improvements in the rapidly expanding service sector have resulted in productivity growth being heavily underestimated.[39] For example, if productivity per man-hour is measured on the basis of income statistics rather than primarily production statistics as is the case today, productivity growth in the US economy has been around 1 percentage point higher over the last two years.[40]

Problems with the data have led some researchers to conclude that productivity can be measured satisfactorily only in the third of the economy that is most heavily involved in physically quantifiable production.[41] Given that there are

[36] Gordon (1999).
[37] See Brynjolfsson och Hitt (1994).
[38] McGuckin and Stiroh (1998).
[39] See, for example, Sichel (1999). A classic example of a service improvement that was not captured by the statistics at all to begin with was the automatic teller machine (ATM), which offered customers basic banking services around the clock without being included in the national accounts as anything other than an expense.
[40] Greenspan (1999b).
[41] Griliches (1994).

equally valid arguments in favour of the statistics both overestimating and underestimating the phenomenon of the new economy, we have chosen for the most part to start from, and rely on, the data that are available.

One fact is clear despite all this uncertainty, namely that the greatest productivity surge came right at the end of the 1990s. This leads us on to the next issue, which is why the productivity surge has arrived now and whether this heralds further productivity growth in the future.

One fact is clear despite all this uncertainty, namely that the greatest productivity surge came right at the end of the 1990s.

Why a breakthrough right now?

Why has the big surge in productivity and growth taken place now when the deregulation and technological processes mentioned earlier as possible underlying causes have been under way for decades, with most of the breakthroughs made back in the mid-1980s?

In a widely cited article, Paul David highlights the striking parallels with previous technological revolutions.[42] David mentions the steam engine and the combustion engine but chooses to concentrate on how the dynamo came to conquer US industry around the turn of the last century. The process took longer than one might imagine: almost half a century.[43] It took time to expand the capacity of the electricity system. It took time to tailor the technology as best possible to its potential applications in industry. And it took time for the organisation of the workplace to adapt to the opportunities opened up by the new technology (in the case of the dynamo, switching from huge steam engines to a series of smaller electrical machines and so making factories more flexible).

It also took time for the workforce to get to grips with the new technology (learning-by-doing, LBD), and in some cases it took time before it became profitable to replace cheap labour with electrically powered machinery. During the early days of electrification, the productivity gains were not particularly large and in some cases productivity

It also took time for the workforce to get to grips with the new technology (learning-by-doing, LBD), and in some cases it took time before it became profitable to replace cheap labour with electrically powered machinery.

[42] David (1990 and 1999).

[43] In 1899, twenty years after Edison's invention of the light bulb in 1879, still only 3 per cent of US households had electric lighting. Although the first electrical power station was built in 1881, it was not until the 1920s that electricity made a sufficient breakthrough in industry for it to have a noticeable impact on US economic growth.

actually dropped.[44] But once the adaptation process gained momentum and higher volumes of electrical power began to push down prices, there was something of a "ketchup effect" (see Figure 15).[45]

A common way of describing a progression of this kind is the S-curve: a slow initial phase followed by a rapid upswing and finally a slowdown as the gains from the new technology are reaped.[46] This builds largely on Schumpeter's groundbreaking works of the 1930s[47] where he describes a process he calls "creative destruction". New technology first squeezes out the old technology, which involves major costs both for the reorganisation and for the old capital destroyed, then come the rewards and finally things level off as more and more simply copy the technology. Figures 15, 16 and 17 illustrate the rise of electrical power and the development of the Internet and e-commerce to date. The Internet as a productivity-enhancing factor may well now be in the S-curve's ascendant phase.

Romer adds to this discussion the need for interaction and synergies between different technologies where a new technology can breathe new life into a number of "dormant" innovations. The microprocessor needed to be supplemented with (established) technologies such as magnetic storage (hard disk) and video displays (monitor) to have its sudden critical breakthrough, which in turn paved the way for the rise of the Internet.[48] In other words, it is not a single innovation that determines how things will develop but the interaction between a number of different innovations. The interaction of technologies in "development blocks" where the real productivity gains are not realised until investments have been made in all of the complementary investments in a block, has been demonstrated empirically by Dahmén, among others.[49]

A complementary explanation of why we are seeing this unique acceleration process right now at the end of the 1990s and dawn of the new millennium is that many of the new innovations are having a breakthrough when reaching a critical number of users. Varian och Shapiro have used theoretical and practical examples demonstrate this "positive feedback" in networks whereby each new user adds value to a network and participants enjoy mutual "positive network exter-

[44] According to some calculations based on historical innovations, it can take two decades simply for productivity to get back to its previous rate of growth.

[45] The shortage of qualified labour is a restrictive factor at the beginning of the process. For a discussion of similar drops in productivity at the start of the industrial revolution in the early 19th century, see Greenwood (2000) and Jovanovic (1997).

[46] For this type of progression, see Kuznets (1930).

[47] Schumpeter (1936 och 1939).

[48] Romer (1996).

[49] For a discussion of Dahmén's theory of development blocks as developed in "Svensk industriell företagarverksamhet. Kausalanalys av den industriella utvecklingen 1919–1939" (1950), see Carlsson and Henrekson (1991).

Figure 15. The S-curve: Proportion of electricity consumers among US households and factories

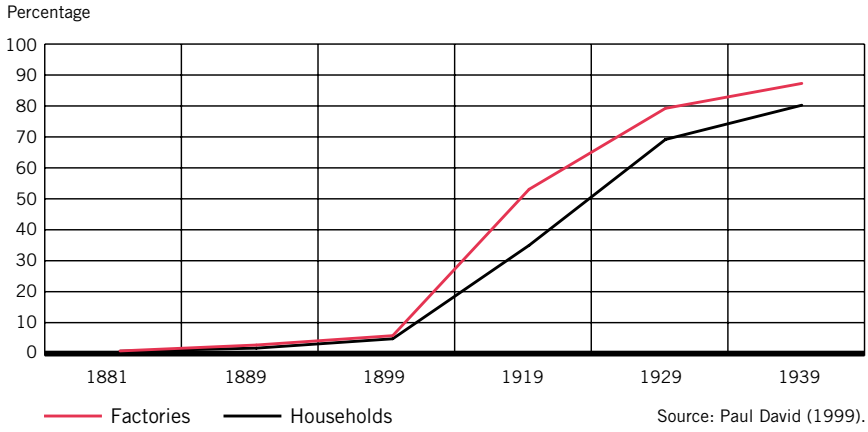
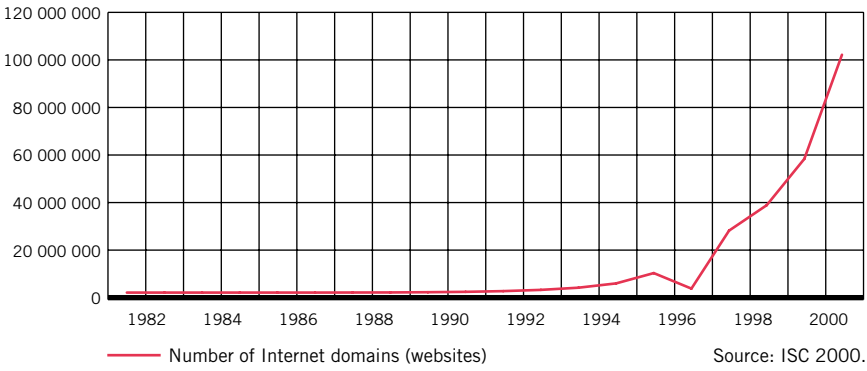


Figure 16. At the start of the S-curve? The rise of the number of Internet domains (websites)

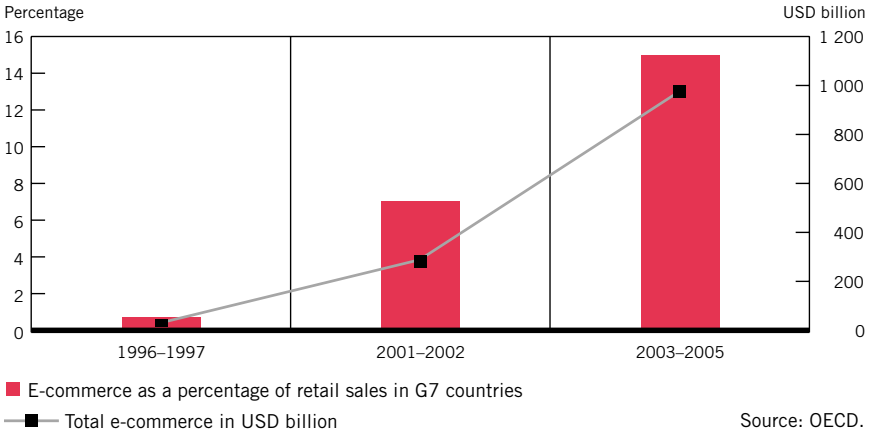


nalities"[50], in other words gains from participating in the same network. A simple example of this is the telephone: the first telephone was expensive to make and complex to use, and the first user of the telephone had only a limited need to call the one other person who had a telephone. However, with each new owner of a telephone, the value of having a telephone that provided access to the others in the network increased. The value of owning one therefore increased exponen-

A complementary explanation of why we are seeing this unique acceleration process right now at the end of the 1990s and dawn of the new millennium is that many of the new innovations are having a greater breakthrough in line with growth in numbers of users.

[50] Varian and Shapiro (1999).

Figure 17. E-commerce, compilation of OECD forecasts



Source: OECD.

tially with the number of users – at the same time as larger production runs reduced the cost of producing each unit.

Exponentially higher values and lower costs result in exponentially higher productivity once a network leaves its slow start behind and finally reaches a critical mass and begins to expand ever more rapidly.

Exponentially higher values and lower costs result in exponentially higher productivity once a network leaves its slow start behind and finally reaches a critical mass and begins to expand ever more rapidly. This naturally calls to mind the Internet, whose use has now become practically free of charge and whose value as a source of information and as a marketplace has increased with the arrival of each new participant.

However, network externalities also have their limitations and follow the same S-curve described above: a slow start followed by sudden acceleration and finally, once the majority of the potential users have been connected to the network, deceleration. Varian och Shapiro cite the fax machine as an example of the slow adaptation to new technology and critical network externalities. The idea behind the fax machine dates right back to 1843 and a fully functioning machine was launched in the US in 1925, but fax machines remained rarities until the 1980s. Then, around 1982, the fax suddenly gained critical mass, with more and more businesses buying one until practically every business had fax facilities by around 1987. Since then fax machines have spread only slowly on to households and private individuals. Similarly, the development of mobile telephony networks and broadband networks for Internet communications reaps major rewards when towns and cities are connect-

ed, but the gains gradually taper off as the networks move out into more sparsely populated areas to tap the last remaining prospective customers.[51]

Standards are important for the development of network externalities. Where there are several competing standards creating competing networks, it is difficult to realise the gains to be had from a broad network.

Standards are important for the development of network externalities. Where there are several competing standards creating competing networks, it is difficult to realise the gains to be had from a broad network. In fact, the use of several networks in parallel during a transition period can create additional costs. This means that the real gains may have to wait until the network participants have agreed on a common standard. Examples of this include the battle between direct and alternating current in the US[52] or, perhaps, between conventional and electronic mail today. An example of the importance of standards even when many of the participants have made a commitment is the changeover process currently under way in the banking sector, where there is still a network of bank branches running parallel to the new Internet functions in which the banks have had to invest heavily but which will in theory be much cheaper to operate once the majority of customers have changed their behaviour.[53]

There is also extensive literature on the "cluster" phenomenon, another type of externality between the know-how of different people in regional networks of innovation businesses, often start-ups. A local entrepreneurial culture is created with synergies between different skills and a mobile workforce moving between existing businesses and over to start-ups. The creation of regional clusters can also trigger sudden advances in productivity, with latter-day examples including Silicon Valley in California and Kista in Sweden.[54]

[51] Krugman (1999) draws a striking historical parallel with the telegraph on the basis of Tom Standage's history of the telegraph.

[52] Varian and Shapiro (1999).

[53] In the case of network externalities, the deceleration at the end of the S-curve may be exacerbated by another factor known as "look in". When a consumer opts to participate in a particular network, he rejects other solutions, and switching networks can be both inconvenient and expensive. Once a network producer has reached a critical mass in terms of numbers of participants, the producer can to some extent lock in many consumers and build such a dominant position that it can make it unattractive for the customer to switch to a competing network that may be more efficient. The network producer can then exploit its market position by charging high prices to locked-in participants and choosing not to allow other players into the network who threaten the position of the network producer. In this way efficiency gains can turn into a monopoly and economic stagnation. However, "closed" systems that do not allow imitation and interaction with other producers entail costs for the consumer, and "open" systems have generally won against closed systems in the battle between networks. Shapiro och Varian (1999) discuss the classic example of the battle between Apple's "closed" software solution that was gradually squeezed out of the market by Microsoft's "open" MS-DOS. Patents are, of course, important here, both rewarding innovation and, in time, opening up a product for imitation.

[54] Jaffe, Tratjenberg och Henderson (1993), Audretsch and Thurik (1999), The Economist (1997).

Is the acceleration of productivity growth temporary or permanent?

All of the new productivity-enhancing factors, whether stemming from technological advances or deregulation, are in principle of a one-off nature, even if they have arrived suddenly and with greater intensity.

All of the new productivity-enhancing factors, whether stemming from technological advances or deregulation, are in principle of a one-off nature, even if they have arrived suddenly and with greater intensity. Many of the gains may prove very long-lasting and impact over a very long period of time – for example, trade liberalisation measures are considered to have already had a growth-enhancing impact over several decades. The examples given by David and Romer illustrate how a group of innovations can boost growth over an extended period of perhaps 30–40 years. However, the S-curve still dictates that once the inefficiencies have disappeared, the technology has been exploited and the welfare gains have been discounted, the ascendant phase is over and deceleration can be anticipated.

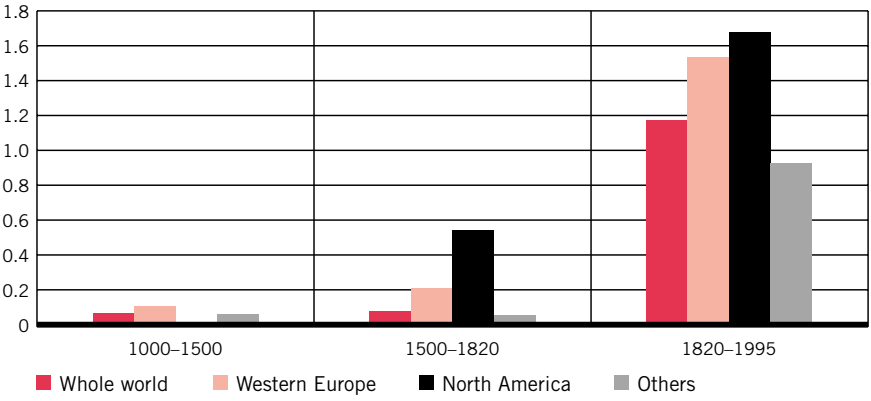
Nevertheless, another possibility is that the new economy is not just a transitory increase in potential growth brought on by the efficiency gains and innovations of the age. It may represent a permanent increase in the actual rate of growth, which, in turn, reflects a more rapid rate of technological development. What the data show depends largely on the timeframe. Looking at the last century, few countries show a clear upward trend in their growth rate, but a longer historical perspective through a variety of economic paradigm shifts reveals that growth in the Western World has not been constant but accelerating.[55]

Traditional growth theory allows for both of these possibilities. As mentioned earlier, high levels of saving and increasing amounts of capital employed per employee are not enough to explain growth in the longer term. If capital is to be employed effectively by the workforce, a technology factor (Solow residual) is needed to offer an ever better way of creating and exploiting capital.[56] The new growth theory (endogenous growth) defines this technology factor as innovations that constantly increase the productivity of both workforce and capital (associated primarily with Paul Romer) or as human capital, comprising all the knowledge that we can accumulate ad infinitum with a view to becoming more efficient and achieving increasingly high standards of welfare (Lucas).[57] According to this argument, growth depends on how many innovations are made, how efficiently they are exploited and

[55] Maddison (1982).
[56] See footnote 9.
[57] Lucas (1988).

Figure 18. Growth in the world GDP per capita over the last millennium

Per cent



Source: Angus Maddison, University of Groningen.

how efficiently individuals accumulate and transfer knowledge.[58] If we believe in a constant rate of growth over the long term, we could imagine a steady, "natural" rate of innovation and knowledge acquisition leading to steady growth.

What then is the reason for the accelerating rate of growth? Whether we view the technology factor driving this growth as accumulated knowledge or innovation, this new information has externalities. Every new bit of knowledge and every new invention can be combined with previous ideas. Even if knowledge and inventions come at a steady rate, each new piece of the puzzle will bring new synergies with all the previous pieces, and growing cross-fertilisation may increase the rate of growth. This is reflected, for example, in Romer's example of the interaction between the transistor and other "old" technologies.

Whether we view the technology factor driving this growth as accumulated knowledge or innovation, this new information has externalities. Every new bit of knowledge and every new invention can be combined with previous ideas.

Some data suggest an exponential growth in the rate of innovation. For example, growth in the number of patents, which stagnated in the 1970s and 1980s[59], was almost 40 per cent higher in the 1990s.[60] Looking back over the last

[58] Several studies (for example, Goldin and Katz (1996) and Nelson (1990)) have cited the US education movements during the 20th century as one of the main reasons for various growth spurts, while Barro and Sala-i-Martin (1995) have cited education as an explanation for the growth gaps between countries.

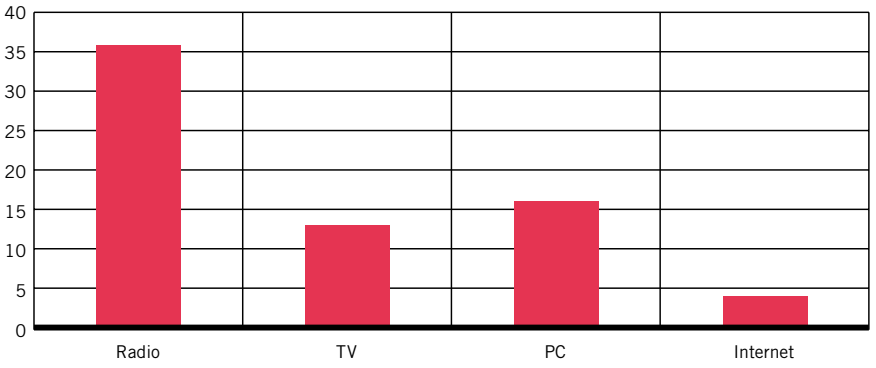
[59] However, this is partly due to new procedures at the US Patent and Trademark Office, see Griliches (1994).

[60] OECD (1999c). The number of patents based on observations in published scientific articles also increased sharply during the 1990s, from 8,600 in 1987 to 47,000 in 1996, which could serve as a measure of increased patent "quality".

century (data from 1880 onwards), the number of patents registered in the US each year has increased far more rapidly than the country's population.[61]

Above all, we can see how new innovations have been integrated into society ever more quickly. Figure 19 shows how each new innovation absorbed has needed less time than its predecessors to secure a broad distribution in the US.

Figure 19. Years taken to reach 50 million users in the US



Source: Department of Commerce.

The other possible cause of a permanent shift in the growth rate is a change in the social and institutional picture.[62] Such changes reflect a kind of improved "social technology" that impacts on the very core of the knowledge and innovation creation process: the behaviour of individual people. By better institutions we might mean a better climate for innovation and a better return on, or better subsidies for, the acquisition of knowledge.[63]

The more open to competition a sector is, the higher its rate of innovation.

Deregulation and market structures also have a role to play. The more open a market is to competition, the greater the incentive to innovate. In a completely open market, innovation is the only means of creating a temporary monopoly that can boost returns, while competition is otherwise squeezing returns down towards nil.

[61] Griliches (1994).

[62] For a discussion of the importance of institutions for growth, see North (1999).

[63] According to Romer (1990), knowledge subsidies can pay off if knowledge is a positive externality for society as a whole, since knowledge gradually spreads and becomes widely known. For example, the USA features one of the world's highest levels of investment in research and development per capita and highest numbers of researchers and patents per employee, yet almost 75 per cent of patents in 1993–94 were based on research that received some form of government subsidy. Even innovations such as the Internet, the modern World Wide Web reader and NMT were developed with government funding.

Empirical studies suggest, not unexpectedly, that the more open to competition a sector is, the higher its rate of innovation.[64]

Purely theoretically, there is therefore a possibility that the rate of growth is permanently stepping up a gear, especially if the institutional picture is changing. However, short and uncertain time series do not lend sufficient credence to this, and so this hypothesis remains purely speculative.

Conclusion: There is a new economy in the USA (with some reservations)

Despite the considerable statistical uncertainty, we have been able to suggest that some form of new economy, in the sense of an increase in growth rate and productivity, has been putting down roots in the US.

Despite the considerable statistical uncertainty, we have been able to suggest that some form of new economy, in the sense of an increase in growth rate and productivity, has been putting down roots in the US.

One explanation is that after the 1970s and 1980s the US has simply returned to a healthier economic policy line that has reduced the risk premiums and increased macroeconomic stability sufficiently for a high rate of growth to return. This in itself would have important implications for a number of economic estimations.[65]

But there seems to be more to it than that. The high productivity growth seen since 1995 is remarkable considering that the US economy is so far into the business cycle and that unemployment has continued to fall during the period, with many of the new jobs created being unskilled, something which would normally tend to drag productivity downwards.

The new economy, with its combination of buoyant productivity and employment, can therefore also be seen as the result of three factors in the late 1980s and 1990s, each of which has played an important role in the scope of the upturn in growth and productivity and which have all gone hand-in-hand with each other: (1) domestic microeconomic deregulation, (2) reduced trade barriers

[64] Including Audretsch and Thurik (1999).

[65] An important implication of the new economy – and it seems that the stagnation during the 1970s and 1980s was the exception rather than the rule – is that the informational value of econometric models estimated on the basis of data from the 1970s and 1980s is limited. The risk is that gradual structural changes under way in the economy are being obscured by the cyclical changes that many economists are focusing on – in other words, a case of not seeing the wood for the trees. Representatives of the Federal Reserve admit that in recent years they have attached relatively little importance to models estimated on the basis of old data. Instead, monetary policy has been guided more by early warning indicators such as movements in monetary conditions, wages and profit margins. See, for example, IMF (1999b). Attempts have also been made to correct the time series. For a discussion of similar regime shifts, see, for example, Blix (1999) and Hamilton (1994).

The new economy, with its combination of buoyant productivity and employment, can therefore also be seen as the result of three factors in the late 1980s and 1990s, each of which has played an important role in the scope of the upturn in growth and productivity and which have all gone hand-in-hand with each other: (1) domestic microeconomic deregulation, (2) reduced trade barriers and globalised division of labour, and (3) technical innovations and faster information flows.

and globalised division of labour, and (3) technical innovations and faster information flows. However, the key factor is the long-standing favourable climate for innovation and risk-taking in the US that has made possible a surge in technological development and productivity, the like of which has perhaps never been seen before. And we may be only at the very beginning of this process.

Macroeconomic stringency and microeconomic change have together transformed the US markets. In a climate of competition and unaccommodating monetary policy, businesses have shied away from hiking up the prices of their goods for fear of losing market share. At the same time, various surveys indicate that employees have not felt a sense of job security despite the high levels of employment.

Should the inflow of capital from abroad relent and the highly valued stock market see a major correction, this would most likely put a damper on the high rate of investment.

It is worth making an important aside here. Many commentators have warned that the extremely high valuation of the US stock market is in fact a financial bubble based on unrealistic earnings forecasts. This would suggest temporary "overinvestment" in US industry, even though the investment boom was built on market-based decisions.[66] History shows that improved economic fundamentals often go hand-in-hand with speculation. Should the inflow of capital from abroad relent and the highly valued stock market see a major correction, this would most likely put a damper on the high rate of investment.[67]

However, it is important to remember that the risk of a bubble in the form of excessive confidence in the US's listed companies and economy does not ultimately impact on the fundamental factors behind the country's growth potential. It is movements in productivity and not Nasdaq's near-term performance that will determine the long-term rate of growth.

[66] Although new information technology has sharply reduced the uncertainty surrounding investment decisions, partly by speeding up information flows, there is still a risk of misguided investments being made. For a discussion of overinvestment, see, for example, IMF (1998) or Krugman (1994).

[67] See IMF (1999c) and Zarnowitz (1999).

Has the new economy come to Europe?

Having established that there are some signs of a new economy (in the sense of a surge in productivity growth) emerging in the US, the next question has to be: What about Europe?[68]

Sweden and the rest of Western Europe are in a phase of strong economic growth.

At the time of writing, Sweden and the rest of Western Europe are in a phase of strong economic growth. At the same time, new technology, especially the Internet and telecommunications, is gaining ground in many European countries. However, this favourable picture cannot hide the fact that the situation in Europe is very different to that in the US:

- The rate of economic growth in Europe during the 1990s was only half that in the US, and continued to lag behind even during the upswing seen towards the end of 1999. Between 1990 and 1998, the EU's 15 member states recorded average annual economic growth of 1.9 per cent and Sweden just 1.1 per cent, compared with 2.9 per cent for the US. Between 1997 and 1999, the EU 15 recorded average annual economic growth of 2.4 per cent and Sweden 2.8 per cent, compared with 4.2 per cent for the US.
- Europe has not seen anything like the same rapid increase in investment witnessed in the USA. While investment levels in Europe and the US largely mirrored each other between 1960 and 1989, investment stagnated in Europe during the 1990s while the US enjoyed its investment boom (see Figure 20). Since 1990 annual investment has increased more than twice as quickly in the US as in the euro area, and between 1990 and 1998 investment increased by 50 per cent in the US and less than 20 per cent in the euro area.[69]
- Almost as clear-cut are the differences in productivity growth. 30 years of faster productivity growth from the beginning of the 1960s helped Europe to gain ground on the US, but since the beginning of the 1990s productivity growth has slowed somewhat in Europe and accelerated in the US (see Figure 21).
- The gap in productivity growth must also be considered in the light of the increase in employment stateside. While employment in the US has continued to rise from an already high level, therefore absorbing new groups of poorly qualified workers, employment stagnated in several European countries in the early 1990s and has recovered only slowly. In contrast to the US, employment

[68] Our comparison is based largely on the 15 EU member states (EU 15).
[69] OECD (1999e).

Figure 20. Fixed private non-residential investment volumes in the US and Europe 1960–1998

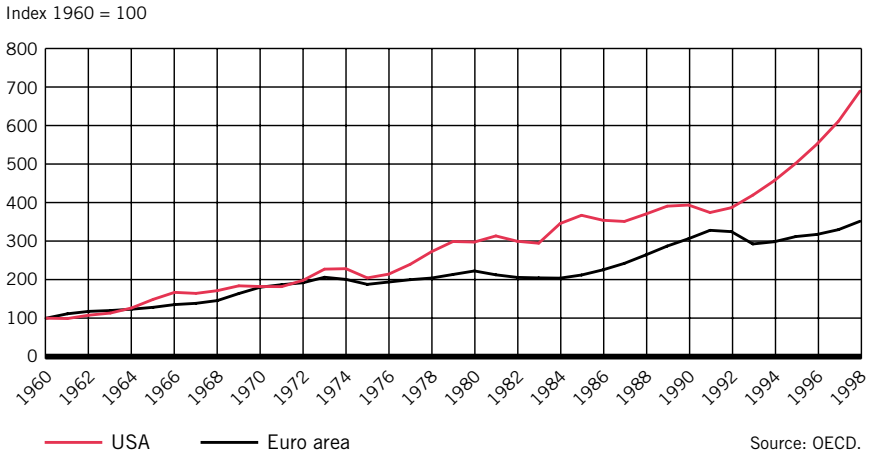
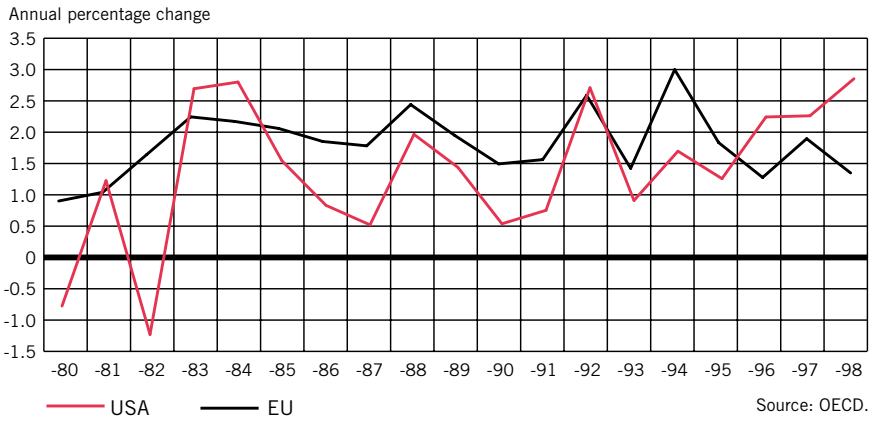


Figure 21. Productivity in the US and Europe



growth in Europe is drawing on a diverse pool of unemployed workers, many of whom are relatively well qualified.

- More mechanical econometric measures of potential GDP growth rates, such as those estimated by the IMF and the OECD, have also been markedly lower in Europe than in the US since the second half of the 1990s. According to the OECD, the potential rate of GDP growth for 1999–2001 is 3.4 per cent for the US and just 2.3 per cent for the EU.[70]

[70] OECD (1999e).

All in all, there are currently few, if any, signs in Europe of the investment boom or productivity surge associated with the new economy. A handful of countries – including the Netherlands, Ireland, the UK and, more recently, Sweden and Finland – have seen strong growth in economic activity and employment, but, with the exception of Ireland, these countries have not enjoyed the same strong productivity growth as the US.[71]

All in all, there are currently few, if any, signs in Europe of the investment boom or productivity surge associated with the new economy.

Where should we try to find the reasons for the growing gap between Europe and the US? Could Europe be lagging behind the US in the technological cycle, and is the stage set for the new economy in the US to give Europe a boost at a later stage? To answer these questions we will now run through the factors cited as underlying the new economy in the US and test them in Europe:

Macroeconomic policy

On one point, conditions in Europe and the US should be relatively similar. Earlier we put forward the hypothesis that a return to a healthier and more stable macroeconomic policy may have contributed to a return to higher growth in the US. In this respect there has been an almost equally striking improvement in Europe. According to the OECD, between 1990 and 1998 inflation dropped from 5.4 to 1.7 per cent, almost identical to developments in the US, and inflation expectations fell almost as sharply. Improvements in fiscal policy were almost as marked during the period, with the EU 15 budget deficit shrinking from 6.3 to 1.6 per cent of GDP. Although budget deficits are on average larger in the EU than in the US, there is less of a gap when it comes to the primary and structural balances.

So both Europe and the US saw greater price stability and a rapid improvement in government finances during the 1990s. It is therefore hard to put forward a less favourable macroeconomic climate as the reason for Europe trailing behind. Nor should monetary and fiscal policy prevent Europe in the future from putting in a performance on a par with that seen in the US.

So both Europe and the USA saw greater price stability and a rapid improvement in government finances during the 1990s.

[71] Ireland is still considered to be in a rapid catch-up phase.

Microeconomic conditions

A review of microeconomic conditions makes the gap between the US and Europe clearer:

Regulated labour markets

When discussing the employment gap between Europe and the USA, reference is often made to the strict regulation of the European labour market in the late 1960s and early 1970s.

When discussing the employment gap between Europe and the US, reference is often made to the strict regulation of the European labour market in the late 1960s and early 1970s, with job security, strong trades unions and regulated working hours. At the same time, unemployment benefits were increased in several countries, reducing the incentive to find work. Although empirical studies are not uniform in their conclusions, most suggest a negative relationship between these labour market controls and growth and employment. With a few exceptions – such as the UK, the Netherlands and Denmark – no major steps have been taken to reduce the regulatory burden. Case studies from some large European companies suggest that even now it is difficult to exploit the gains from new technology when the labour situation is so heavily regulated. For example, the European car component manufacturers' trade association has found in comparative studies that the implementation of technical innovations takes much longer in Europe than in the US on account of labour controls.[72] Against this background, there is a risk that Europe will find it difficult to realise the potential presented by the technological revolution in the form of a more efficient division of labour.

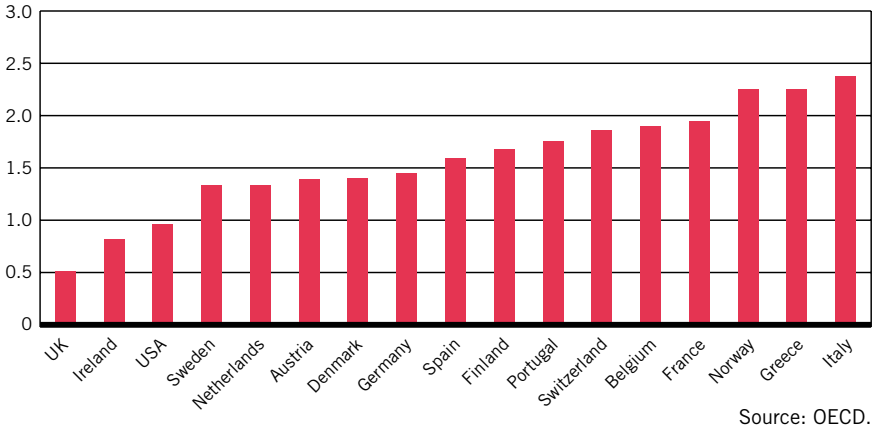
Regulated and fragmented product markets

The OECD's recently published comparison of the regulation of the product markets in the large industrialised nations shows that the US is currently one of those with the lowest regulatory burdens, while some of the large European economies are among those with the greatest, headed by Italy, France and Belgium (see Figure 22).[73] Only the UK is considered to have less extensive regulation than the US in this study. As a result, the potential exploited in the US remains largely untapped in many European countries.

[72] Ferguson (1999).
[73] OECD Review of Regulatory Reform in OECD (1999e).

Figure 22. Product market regulation to entrepreneurship according to OECD (1999)

Index, 6 = fully regulated, 0 = fully liberalised



Source: OECD.

The OECD's recently published comparison of the regulation of the product markets in the large industrialised nations shows that the USA is currently one of those with the lowest regulatory burdens, while some of the large European economies are among those with the greatest.

One example is Europe's still protected and regulated airline industry, where regulation has led not only to a 40 per cent lower cabin factor than in the US but also to lower levels of IT usage.[74] Another clear example is the government subsidisation and protection of the European microprocessor industry, which led to the collapse of Europe's global market share relative to its competitors in the US and Japan in just ten years. Another important factor stressed by the OECD is the high number of major European enterprises in technology-intensive markets that remain government-owned.

Product market regulations have also helped to keep the European market fragmented along traditional national boundaries.

Product market regulations have also helped to keep the European market fragmented along traditional national boundaries. The most obvious signs of this are the price differentials between EU member states of around 20 per cent despite the introduction of the internal market back in 1992. Price differentials are 40 per cent higher in the EU 15 than in the US, and studies have found that neither transport costs nor tax differences are sufficient to explain

[74] Ferguson (1999).

these differentials.[75] This fragmentation may have particular implications for new IT industries with network externalities. The absence of a homogeneous market meant that many European software companies were unable to develop as rapidly as their US competitors during the critical years of the mid-1980s.

December 1999 saw EU ministers agreeing on a new directive to facilitate electronic commerce in Europe.

However, the 1990s did bring major advances in a number of Europe's product markets. Several countries have broken up government monopolies in the telecommunications market, which is of strategic importance to the IT industry, and privatised the state-owned telecom companies.[76] The transport and electricity markets have also been gradually deregulated, most notably in the UK and the Nordic region. Germany has liberalised its postal, telecommunications and railway markets, and Spain has deregulated telecommunications and electricity. In general, there has been greater deregulation in northern Europe than in southern Europe.[77] The launch of the euro is also expected to result in reduced fragmentation of Europe's markets and stiffer price competition. Moreover, the EU is attempting to introduce common regulations to promote a broader IT market: December 1999 saw EU ministers agreeing on a new directive to facilitate electronic commerce in Europe.

Trade liberalisation

However, developments in this area have not been as unambiguous as in the USA.

Like the US, Europe has seen its growth potential enhanced by GATT rounds and the increasing internationalisation of the economy. However, developments in this area have not been as unambiguous as in the US. Import penetration in the EU taken as a single market (excluding internal trade between member states) increased much more slowly than in the US during the 1980s, from just under to just over 10 per cent of manufacturing industry, according to the OECD (seeFigure 23). Furthermore, the sector exposed to international competition is now smaller than in the US (see Figure 24).

Administrative barriers for business start-ups

Competition in the product markets and the rate of innovation in Europe are also affected by the much higher barriers faced by business start-ups. According to the

[75] European Economy (1999a). Prices are particularly high in Denmark, Sweden and Germany and especially in the pharmaceutical, chemical, food and motor industries relative to the EU as a whole.
[76] Idem.
[77] European Economy (1999b).

Figure 23. Import penetration in the manufacturing industry

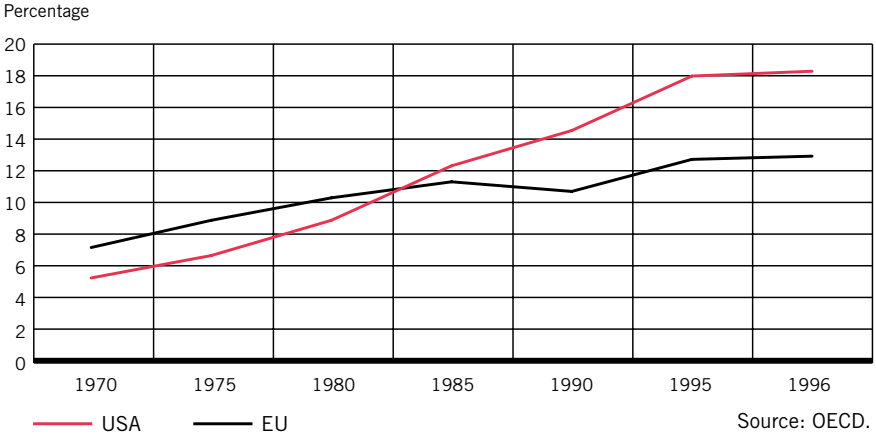
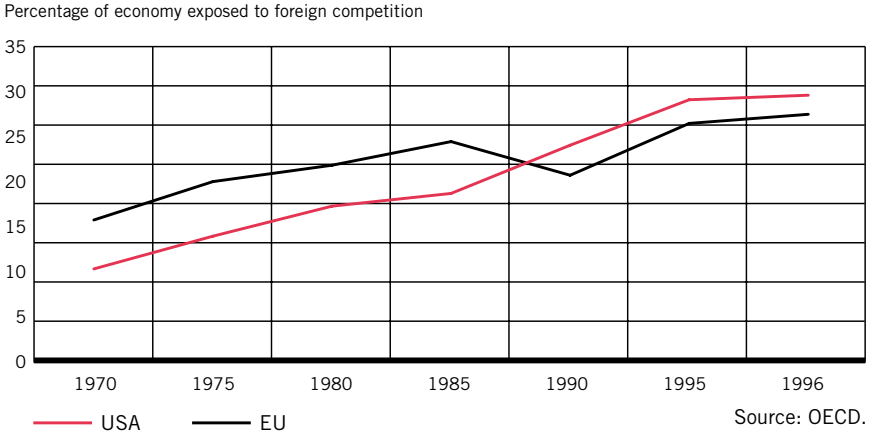


Figure 24. Foreign competition in the US and EU 15



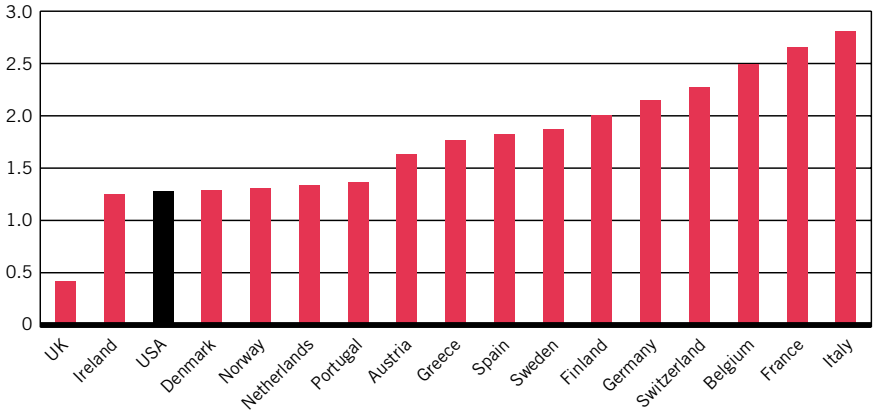
The impact of taxation on incentive structures is an important factor in this context.

OECD, it takes 12 times as long and costs four times as much to start up a new business in Europe than in the US. The main reasons for this lie in the higher administrative barriers for business start-ups (see Figure 25).[78] New small and medium-sized enterprises are also believed to find it harder to grow to the extent seen in the US, a factor christened the crisis of the "Mittelstand" in Germany and "the hourglass waist of industry" in Sweden.[79] From a technological perspective, studies of com-

[78] OECD Review of Regulatory Reform in OECD (1999e).
[79] Henrekson in Calmfors and Persson (1999).

Figure 25. Barriers to entrepreneurship according to OECD (1999)

Index: 5 = fully regulated, 0 = fully liberalised



Source: OECD.

parable clusters of innovation businesses in Sweden and the US[80] have shown that American businesses grow substantially faster than their Scandinavian counterparts in their respective clusters.[81] The impact of taxation on incentive structures is an important factor in this context.[82]

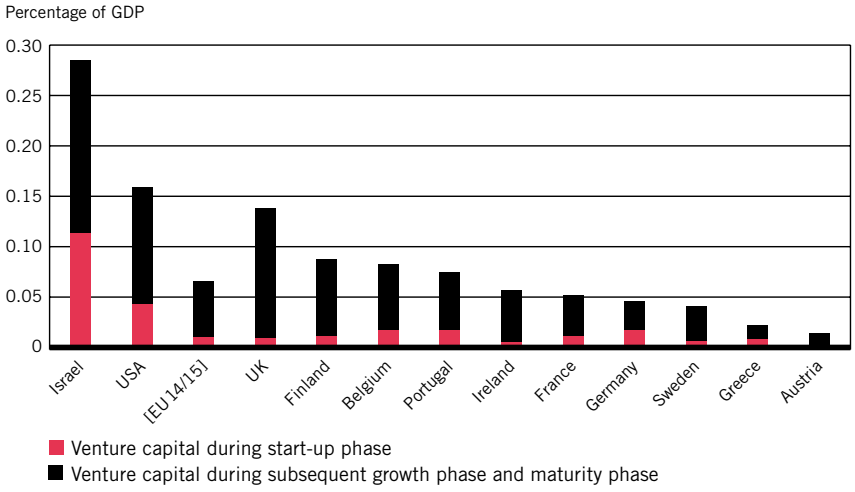
Venture capital

Only in the UK are venture capital investment levels on a par with the USA.

Unlike their US peers, Europe's innovators do not have a large and broad-based venture capital market such as Nasdaq to fall back on. As recently as 1997 the venture capital market as a percentage of GDP was five times bigger in the US than in the EU for business start-ups and twice as big for businesses at a later stage of growth.[83] In 1999 just 2.5 per cent of pension fund assets in the EU were invested in venture capital companies (see Figure 26), compared with three times this figure in the US.[84] Only in the UK are venture capital investment levels on a par with the US, and even then the primary focus is on more mature businesses. The launch of the euro and the harmonisation of Europe's equity and bond markets are expected to

[80] Braunerhjelm (1998).
[81] However, these studies were conducted prior to the sudden eruption of new IT businesses in Sweden's Mälardalen region over the last two years.
[82] For an in-depth discussion of the link between research, innovation and entrepreneurship, see Henrekson and Rosenberg (2000).
[83] Braunerhjelm (2000).
[84] Summers (2000).

Figure 26. Venture capital in various countries



Source: Braunerhjelm (2000).

pave the way for a more extensive European venture capital market. In particular, Germany's Neuer Markt, whose capitalisation quadrupled in 1999 to DEM 112 billion, has emerged as a "European alternative" for venture capital.[85]

Countries like Sweden and Finland have also boasted rapidly expanding venture capital markets over the last two years.

Countries like Sweden and Finland have also boasted rapidly expanding venture capital markets over the last two years, and more and more European innovators are applying directly to Nasdaq.[86] Looking at the IT sector in isolation, the supply of venture capital in Europe increased by 75 per cent in 1998 alone, according to a study by PriceWaterhouseCoopers.[87]

However, both business angels and business incubators remain a rarity in Europe, including Sweden, relative to the USA.[88] Studies indicate that this is not due to the absence of private European wealth as a basis for serving as business angels for innovators so much as a result of tax rules that make it difficult for entrepreneurs to use their own knowledge and labour as starting capital in a partnership with the financier on the basis of, for example, equity options.[89]

[85] Wall Street Journal (1999).
[86] The Economist (2000a).
[87] Connectis (1999).
[88] OECD (1999c).
[89] Henrekson and Rosenberg (2000), Braunerhjelm (2000).

Human capital

Another key growth factor might be access to human capital, in the form of both an educated workforce and research resources.

Another key growth factor might be access to human capital, in the form of both an educated workforce and research resources. Through country comparisons based on historical data, Barro och Sala-i-Martin[90] found a human capital gap between the US and Europe, primarily at higher education level, which may have impacted on long-term growth potential. However, current data does not reveal any major gap in education levels. Mathematics tests suggest approximately the same standard of knowledge among upper secondary school pupils in Europe and the US.[91] The number of pupils entering higher education doubled in the EU between 1975 and 1995 and is now almost on a par with the US as a proportion of the overall population.[92]

However, investment in research and development (R&D) and, above all, the return on R&D remain slightly higher in the US on average than in Europe, according to a newly published OECD study.[93] When it comes to scientific articles and the number of researchers and engineers per employee, the US again outperforms the European average, although the gap is not particularly wide.[94]

All in all, the US may possibly have a slight head-start on Europe in terms of human capital, but the gap is narrowing and does not appear to present any major obstacle to the emergence of a new economy in Europe. More important may be the synergies between universities and the private sector in the form of the clusters that are less widespread in Europe than in the US. However, microeconomic incentives and barriers probably play a greater role here than the actual standard of education.[95]

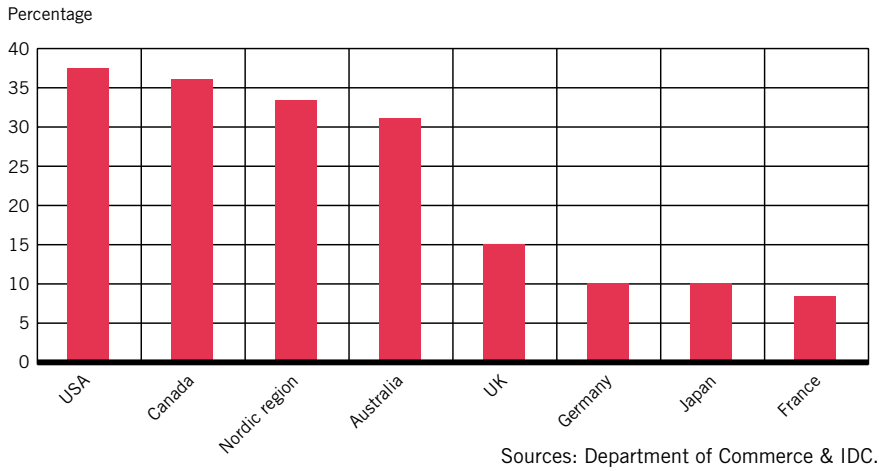
Technological development

The rise of the Internet and e-commerce suggest yet another technological edge for the USA over Europe.

The rise of the Internet and e-commerce suggest yet another technological edge for the US over Europe (see Figures 27 and 28), but at least on this level the European economies already seem to be making up

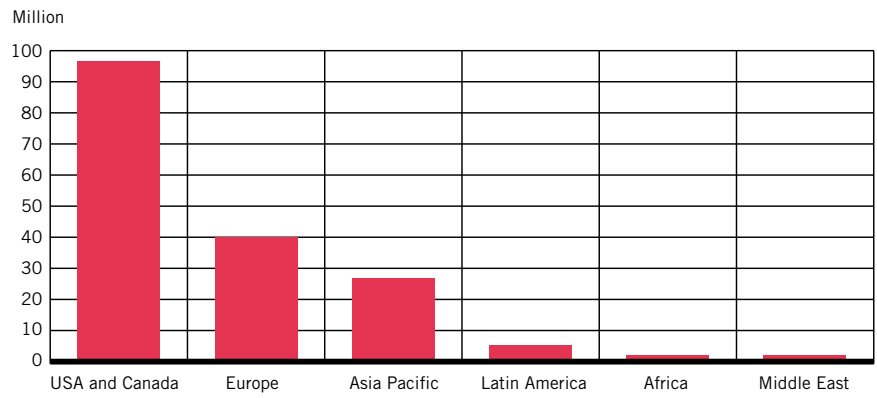
[90] Barro and Sala-i-Martin (1995).
[91] National Science Board (1998).
[92] The proportion of university-educated workers in Sweden is lower than in the leading EU countries, see National Science Board (1998).
[93] The same applies to private R&D expenditure as a proportion of sales. However, Sweden in isolation stands well clear of both the USA and the EU when it comes to RochD expenditure, something which cannot simply be explained away by statistical definitions, see OECD (1999d).
[94] National Science Board (1998).
[95] Braunerhjelm (2000).

Figure 27. Percentage of population with access to the Internet at home or at work in 1998



Sources: Department of Commerce & IDC.

Figure 28. Internet users by region as of May 1999



Source: IDC.

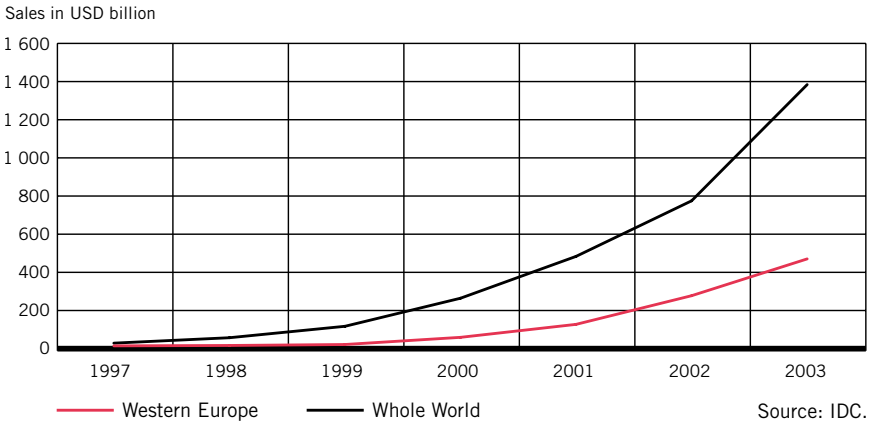
ground on the US. The lag in technological penetration, especially in terms of PC ownership and Internet use, seems to be narrowing gradually.

However, currently only 55.5 per cent of key personnel in European businesses have e-mail facilities and only 60 per cent have access to the Internet. According to various estimates, US customers accounted for as much as 80 per cent of world e-commerce in 1999, compared with just over 15 per cent for Europe. However, the number of Internet users is growing even faster than in the US, with e-commerce forecast to explode from just a few billion US dollars in 1999 to USD 250 billion in

2002 (see Figure 29).[96] Sweden and Finland are at the forefront in Europe and on a par with the US in terms of both Internet penetration and e-commerce, while France, Belgium and Italy seem to be lagging furthest behind.[97]

The next generation of Internet applications is expected to involve mobile solutions, which puts Europe not only on a par with but actually ahead of the US in several respects. The proportion of mobile telephone users is much higher in most EU member states, and the majority of the first commercially significant mobile Internet applications (WAP technology) were launched in Europe before the US.[98]

Figure 29. E-commerce in Western Europe and the World as a whole



Conclusions for Europe

All in all, the outlook for a new economy in Europe is less bright than in the USA. The emergence of a new economy in Europe will probably come later and have a lesser impact.

All in all, the outlook for a new economy in Europe is less bright than in the US. The emergence of a new economy in Europe will probably come later and have a lesser impact.

The macroeconomic climate is just as stable in Europe and investment in education is on a par with the US. More and more clusters of IT businesses are emerging in Europe, and the stage is set for

[96] Andersen Consulting (1999) and IDC (1999).
[97] MORI Research and Intentia (1999).
[98] Financial Times (2000a and 2000b), Finanstidningen (2000).

Europe to benefit from the transfer of technology across the Atlantic and from a catch-up phase relative to the US's higher income levels.

Some commentators believe that the increase in growth in the US trailed the increase in investment by more than five years[99], and even longer when it comes to investment in human capital.[100] According to this argument, the nascent growth in investment in Europe over the last two years could have a positive impact in the future.

Nevertheless, there is much to suggest that Europe will not reap the same rewards of the new wave of technology as the US. Both product and labour markets remain more closely regulated, and the EU as a whole is not yet a sufficiently open economy. As a result, the foundations are not in place for the efficiency gains and reorganisation of production factors that have generated the high rates of growth seen in the US.

There is much to suggest that Europe will not reap the same rewards of the new wave of technology as the USA.

Summary and conclusion

The purpose of this article was to assess whether any signs of a breakthrough of the new economy, defined as *an increase in the economy's growth potential as a result of more rapid productivity growth*, can be discerned in the US and Europe.

- Underlying the upswing in the US economy is an extremely strong growth in investment, primarily in information technology, which has resulted in production capacity being expanded, inflation being kept down and productivity increasing.
- In recent years productivity growth has accelerated in a way that appears to be a trend change away from the productivity slowdown seen in the 1970s and 1980s, even if it is still too early to draw any far-reaching conclusions. Total factor productivity (TFP) has begun to increase, which may be an indication that the new technology has begun to bear fruit. The conclusion here is that there seem to be signs of a new economy emerging in the US.
- To some extent the acceleration of productivity heralds a return to the Golden Age of the early post-war era before the beginning of the 1970s. But there does

[99] Julius (1999).
[1000] Svedberg in Calmfors and Persson (1999).

appear to be something "new" that goes beyond this and is related to new information technology.

- The key contributing factors to the upswing in the US seem to have been *a healthy macroeconomic policy, microeconomic reforms and healthy institutions*, which have created an economic climate that promotes risk-taking and innovation and has provided plenty of scope for a trend of accelerating technological development coupled with the ever more efficient international division of labour and globalisation.
- Although there seem to be signs of a new economy emerging, the US economy is not immune to downturns. There are major imbalances in the US economy, including a substantial current account deficit, which cannot keep on growing indefinitely. There may also be some signs, most notably the highly valued stock market, of a financial bubble building up.
- There are, as yet, few signs of the new economy emerging in Europe. The rate of investment during the 1990s was substantially lower than in the US and there was not the same acceleration of productivity growth.
- Europe has the necessary conditions to exploit the new economy at macroeconomic level but not at microeconomic level. Inflexible labour markets, heavily regulated and fragmented product markets and less mature financial markets mean that the economic climate for risk-taking and innovation is less favourable. However, technological maturity is advancing rapidly in some parts of Europe, notably Sweden.
- There is much to suggest that Europe is lagging slightly behind the US in the technological cycle and that the new economy will probably have a breakthrough in Europe too. Its impact will depend on how well Europe succeeds in reforming microeconomic policy.
- The new economy does not mean that the old laws of economics are in the process of disintegrating. However, it may mean that econometric models estimated on the basis of data from the 1970s and 1980s are now less helpful. It is therefore extremely important that a central bank remains attentive and that traditional models are supplemented up other indicators to create the best possible basis for the formulation of monetary policy.

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