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Article

Europe's path towards innovation and technology

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Panel 3**EUROPE'S PATH TOWARDS
INNOVATION AND TECHNOLOGY****DALE W. JORGENSON**Frederic E. Abbe Professor of Economics,
Harvard University, Cambridge, Massachusetts**PRODUCTIVITY GROWTH IN THE
INFORMATION AGE***

The resurgence of the American economy from 1995 to 2000 outran all but the most optimistic expectations. It is not surprising that the unusual combination of rapid growth and low inflation touched off a strenuous debate about whether improvements in America's economic performance could be sustained. This debate has intensified with the recession beginning in March 2001 and has come to focus on how best to regain economic momentum.

The investment boom of the later 1990's was not sustainable, since it depended on growth in hours worked substantially in excess of labor force growth. Nevertheless, more rapid productivity growth has enhanced the prospects for the US economy considerably. Understanding the well-springs of this surge in productivity is crucial for the design of policies to revive economic growth and exploit the opportunities created by better economic performance.

A consensus is emerging that the remarkable decline in information technology (IT) prices provides the key to the American productivity resurgence. The IT price decline is rooted in developments in semiconductor technology. This technology has found its broadest applications in computing and communications equipment, but has

reduced the cost and improved the performance of automobiles, aircraft, scientific instruments, and a host of other products.

A substantial acceleration in the IT price decline occurred in 1995, triggered by a much sharper acceleration in the price decline of semiconductors. This can be traced to a shift in the product cycle for semiconductors in 1995 from three years to two years as the consequence of intensifying competition. Although the fall in semiconductor prices has been projected to continue for at least another decade, the recent acceleration may be temporary.

Although prices have declined and product performance has improved in many sectors of the American economy, our picture of these developments is incomplete. The problem is that prices are difficult to track when performance is advancing so rapidly. This year's computer, cell phone, and design software are different from last year's. Fortunately, statistical agencies are now focusing intensive efforts on filling in the gaps in our information.

Price indexes for IT that hold performance constant are necessary to separate the change in performance of IT equipment from the change in price. Accurate and timely computer prices have been part of the US National Income and Product Accounts (NIPA) since 1985. Software investment was added to the NIPA in 1999. Unfortunately, important information gaps remain, especially on price trends for investments in software and communications equipment.

Knowing how much the nation spends on IT is only the first step. We must also consider the dynamics of investment in IT and its impact on our national output. The gross domestic product includes IT equipment as part of the output of investment goods. A measure of capital services is also required for capturing the impacts of rapidly growing stocks of computers, communications equipment, and software on the output of the US economy.



* This is an updated but abbreviated version of "American Economic Growth in the Information Age," CESifo Forum, Autumn 2001, pp. 14ff.

Faster, better, cheaper

Modern information technology begins with the invention of the *transistor*, a semiconductor device that acts as an electrical switch and encodes information in binary form. The first transistor, made of the semiconductor germanium, was constructed at Bell Labs in 1947.

The next major milestone in information technology was the invention, in 1959, of the *integrated circuit*, consisting of many, even millions of transistors that store and manipulate data in binary form. These semiconductor devices are known as *memory chips*.

In 1965 Gordon E. Moore, then Research Director at Fairchild Semiconductor, made a prescient observation, later known as *Moore's Law*. Plotting data on memory chips, he observed that each new chip contained roughly twice as many transistors as the previous chip and was released within 18–24 months of its predecessor. This implied exponential growth of chip capacity at 35–45 percent per year!

Integrated circuits gave rise to *microprocessors* or *logic chips* with functions that can be programmed. Intel's first general-purpose microprocessor was released commercially in 1971.

The rapidly rising capacities of microprocessors and storage devices illustrate the exponential growth predicted by Moore's Law. The first logic chip, introduced in 1971, had 2,300 transistors, while the Pentium 4, released by Intel on November 20, 2000, had 42 million! Over this 29-year period the number of transistors increased by thirty-four percent per year, tracking Moore's Law with astonishing accuracy.

This relentless improvement, continuing for three decades, makes the role of information technology in the American economy unique. Memory and logic chips have become *cheaper* at a truly staggering rate! Prices of memory chips *fell* by a factor of 27,270 times or 40.9 percent per year between 1974 and 1996. Similarly, prices of logic chips available for the shorter period 1985 to 1996, *declined* by a factor of 1,938 or 54.1 percent per year. The microprocessor price decline leapt to more than ninety percent per year as the semiconductor industry

shifted from a three-year product cycle to a greatly accelerated two-year cycle.

The introduction of the Personal Computer (PC) by IBM in 1981 was a watershed event in the deployment of information technology. As semiconductors account for less than half of computer costs, computer prices have fallen much less rapidly than semiconductor prices. Precise measures of computer prices were introduced into the US National Income and Product Accounts in 1985.

Communications technology is crucial for the rapid development and diffusion of the Internet. Much communications investment takes the form of transmission gear, connecting data, voice, and video terminals to switching equipment. Technologies for transmission, such as fiber optics, microwave broadcasting, and communications satellites, have progressed at rates that outrun even the dramatic pace of semiconductor development. Thus installation of DWDM¹ equipment, beginning in 1997, has doubled the transmission capacity of fiber optic cables every 6–12 months.

The productivity resurgence

The American economy has undergone a remarkable resurgence since the mid-1990's with accelerating growth in output and productivity. Although the decline in semiconductor prices is the driving force, the impact of this price decline is transmitted through the prices of computers, communications equipment, and software. These products appear in the NIPA as investments by businesses, governments, and households along with net exports to the rest of the world.

A most striking feature is the rapid price decline for computer investment, 15.8 percent per year from 1990 to 1995. Since 1995 this decline has almost doubled to 28.8 percent. By contrast the relative price of software fell only 1.62 percent per year from 1990 to 1995 and 1.54 percent after 1995. The price of communications equipment behaves similarly to the software price.

In response to continuing price declines, firms, households, and governments have accumulated computers, software, and communications equip-

¹ Dense wavelength division multiplexing.

ment much more rapidly than other forms of capital. Growth of IT capital services jumped from 11.5 percent per year in 1990-5 to 19.0 percent in 1995-2000, while growth of non-IT capital services increased from 1.78 percent to 3.04 percent.

The rapid increase in the importance of IT capital services reflects the impact of growing stocks of computers, communications equipment, and software on the output of the US economy. In 1995-2000 the capital service price for computers fell 28.3 percent per year, compared to an increase of 35.8 percent in capital input from computers. As a consequence, the value of computer services grew substantially. However, in 2000 the current dollar value of computers was only 1.41 percent of gross domestic income.

Although the price decline for communications equipment during the period 1995-2000 is comparable to that of software, investment in this equipment is more in line with prices. However, constant performance price indexes are unavailable for transmission gear, such as fiber-optic cables. This leads to an underestimate of the growth rates of investment, capital services, and the GDP, as well as an overestimate of the rate of inflation.

Sources of growth

A look at the US economy before and after 1973 reveals familiar features of the historical record. After strong output and TFP growth in the 1950's, 1960's and early 1970's, the US economy slowed markedly during 1973-90, with output growth falling from 3.99 percent for 1948-73 to 2.87 percent for 1973-90 and TFP growth declining from 0.93 percent to 0.24 percent. The contribution of capital inputs also slowed from 1.94 percent to 1.48 percent.

Although the contribution of IT has increased steadily throughout the period 1948-2000, there was a sharp and easily recognizable response to the acceleration in the IT price decline in 1995. Relative to the early 1990's, output growth increased by 1.69 percent in 1995-2000. The contribution of IT production almost doubled, but still accounted for only 26.9 percent of the increased growth of output. Almost three-quarters of the increased output growth can be attributed to non-IT products.

Between 1990-1995 and 1995-2000 the contribution of capital input jumped by 0.97 percentage points, the contribution of labor input rose by 0.20 percent, and TFP accelerated by 0.52 percent. The contribution of capital input reflects the investment boom of the late 1990's. Businesses, households, and governments poured resources into plant and equipment, especially computers, software, and communications equipment. The jump in the contribution of capital input since 1995 has boosted growth by nearly a full percentage point and IT accounts for more than half this increase.

After maintaining an average rate of 0.25 percent for the period 1973-90, TFP growth continued at 0.20 percent for 1990-1995 and then vaulted to 0.72 percent per year for 1995-2000. This increase in output per unit of input is an important source of growth in output of the US economy. While TFP growth for 1995-2000 is lower than the rate of 1948-73, the US economy is definitely recuperating from the anemic productivity growth of the previous two decades.

The accelerating decline of IT prices signals faster productivity growth in IT-producing industries. In fact, these industries have been the source of most productivity growth throughout the 1990's. Before 1995 this was due to the decline of productivity growth elsewhere in the economy. The IT-producing industries have accounted for about half the surge in productivity growth since 1995, far greater than the 6.52 percent share of IT in the 2000 GDP. Faster growth is not limited to these industries and there is evidence of a productivity revival in the rest of the economy.

Output growth is the sum of growth in hours and average labor productivity. Accelerating output growth during 1995-2000 reflects growth in labor hours and ALP almost equally. Growth in ALP rose 0.88 as more rapid capital deepening and growth in TFP offset slower improvement in labor quality. Growth in hours worked accelerated as unemployment fell to a 30-year low. Labor markets have tightened considerably, even as labor force participation rates increased.

The acceleration in ALP growth is due to capital deepening as well as faster TFP growth. Capital deepening contributed 0.59 percentage points, off-

setting a negative contribution of labor quality of 0.25 percent. The acceleration in TFP added 0.52 percentage points.

The acceleration in US economic growth after 1995 is unmistakable and its relationship to information technology is now transparent. The most important contribution of IT is through faster growth of capital input, reflecting higher rates of investment. More rapid growth of output per unit of input also captures an important component of the contribution of IT. The issue that remains is whether these trends in economic growth are sustainable.

What happens next?

Falling IT prices will continue to provide incentives for the substitution of IT for other productive inputs. The decline in IT prices will also serve as an indicator of ongoing productivity growth in IT-producing industries. However, it would be premature to extrapolate the recent acceleration in productivity growth into the indefinite future, since this depends on the persistence of a two-year product cycle for semiconductors.

The economic forces that underlie the two-year product cycle for semiconductors reflect intensifying competition among semiconductor producers in the US and around the world. Over the next decade persistence of this rapid rate of technological progress will require exploitation of new technologies. This is already generating a massive research and development effort that will strain the financial capacities of the semiconductor industry and its equipment suppliers.

The 2001 Edition of the International Technology Roadmap for Semiconductors projects a two-year product cycle through 2005 and a three-year product cycle thereafter. This seems to be a reasonable basis for projecting growth of the US economy. Continuation of a two-year cycle provides an upper bound for growth projections, while reversion to a three-year cycle gives a lower bound. The range of projections is useful in suggesting the uncertainties associated with intermediate-term projections of US economic growth.

The key assumption for intermediate-term projections of a decade or so is that output and capital stock grow at the same rate. This is characteristic of

the US and most industrialized economies over periods longer than a typical business cycle. Under this assumption the growth of output is the sum of the growth rates of hours worked and labor quality and the contributions of capital quality growth and TFP growth. A projection of US economic growth depends on the outlook for each of these four components.

During the period 1995–2000 hours worked grew at an unsustainable rate of nearly two percent per year, almost double that of the labor force. Future growth of the labor force, which depends on population demographics and is highly predictable, will average only 1.1 percent per year for the next decade. This is the best assumption for the growth of hours worked as well. Growth of labor quality during 1995–2000 dropped to 0.26 percent per year and will revive, modestly, to 0.3 percent per year, reflecting ongoing improvements in the productivity of individual workers.

The overall growth rate of labor input over the next decade will average 1.4 percent per year. This is the starting point for an intermediate-term projection of US economic growth. By contrast the growth rate of labor input from 1995–2000 was 2.24 percent, showing that the boom of the late 1990's was unsustainable. The growth of hours worked during this period reflected nonrecurring declines in the rate of unemployment and one-time increases in rates of labor force participation.

The second part of a growth projection requires assumptions about the growth of TFP and capital quality. These assumptions are subject to considerable uncertainty. So long as the two-year product cycle for semiconductors continues, the growth of TFP is likely to average 0.72 percent per year, the rate during 1995–2000. With a three-year product cycle the growth of TFP might drop as low as 0.20 percent per year, the rate during 1990–5, reflecting the slower pace of technological change.

The rapid substitution of IT assets for non-IT assets in response to declining IT prices is reflected in the contribution of capital quality. The growth of capital quality will continue at the recent rate of 2.3 percent per year, so long as the two-year product cycle for semiconductors persists. However, growth of capital quality will drop to 1.0 percent per year under the assumption of a three-year

product cycle, generating considerable uncertainty about future growth.

Assuming continuation of a two-year product cycle for semiconductors through 2005 and a three-year product cycle after that, the intermediate-term growth rate of the US economy will be 3.4 percent per year. The upper bound on this growth rate associated with continuation of a two-year product cycle is 3.8 percent per year, while the lower bound associated with a two-year product cycle is 2.4 percent per year. Obviously, this is a very wide range of possibilities, reflecting the substantial fluctuations in the growth rate of the US economy over the past several decades.

Resumption of the growth rate of 4.1 percent per year during the resurgence of 1995–2000 is extremely unlikely, given reasonable assumptions about the future growth of the labor force. However, it is important to emphasize that US growth prospects have improved considerably. The average growth rate from 1973–90 was 2.9 percent per year and the growth rate from 1990–1995 was only 2.4 percent per year, the lower bound of estimates consistent with more recent experience.

The performance of the IT industries has become crucial to future growth prospects. We must give close attention to the uncertainties that surround the future development and diffusion of IT. Highest priority must be given to a better understanding of markets for semiconductors and, especially, the determinants of the product cycle. Improved data on the prices of telecommunications and software are essential for understanding the links between semiconductor technology and the growth of the American economy.

The semiconductor industry and the information technology industries are global in their scope with an elaborate international division of labor.² This poses important questions about the American growth resurgence. Where is the evidence the impact of information technology in other leading industrialized countries? Another question is the future role of important participants in information technology – Korea, Malaysia, Singapore, and Taiwan – all “newly industrializing” economies. What will be the

economic impact of information technology in developing countries like China and India?

Information technology is altering product markets and business organizations, as attested by the huge and rapidly growing business literature³, but a fully satisfactory model of the semiconductor industry remains to be developed. Such a model would have to derive the demand for semiconductors from investment in information technology and determine the product cycle for successive generations of new semiconductors.

As policy-makers attempt to fill the widening gaps between the information required for sound policy and the available data, the traditional division of labor between statistical agencies and policy-making bodies is breaking down. For example, the Federal Reserve Board has recently undertaken a major research program on constant performance IT price indexes. In the mean time monetary policy-makers must set policies without accurate measures of price change. Similarly, fiscal policy-makers confront on-going revisions of growth projections that drastically affect the outlook for future tax revenues and government spending.

The unanticipated American growth revival of the 1990's has considerable potential for altering economic perspectives. In fact, this is already foreshadowed in a steady stream of excellent books on the economics of information technology.⁴ Economists are the fortunate beneficiaries of a new agenda for research that could refresh their thinking and revitalize their discipline. Their insights will be essential to reshaping economic policy to enable all Americans to take advantage of the opportunities that lie ahead.

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² The role of information technology in US economic growth is discussed by the Economics and Statistics Administration (2002); comparisons among OECD countries are given by Colecchia and Schreyer (2002).

³ See, for example, Grove (1996) on the market for computers and semiconductors and Christensen (1997) on the market for storage devices.

⁴ See, for example, Shapiro and Varian (1999), Brynjolfsson and Kahin (2000), and Choi and Whinston (2000).

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ERKKI LIIKANEN

Member of the European Commission
Enterprise and Information Society

Ladies and gentlemen,

Introduction

Since the beginning of 2000, the European economic and competitiveness landscapes have been changing in radical ways.

First, the euro has become a reality, and the common currency is used by the majority of citizens on our continent.

Secondly, the Lisbon agenda of structural reforms is an ambitious project aiming to put Europe at the top in international competitiveness.

And, third, with enlargement, the Europe of the immediate future will be a larger one embracing nations that until a decade ago were thought to have been lost to us behind the Iron Curtain.

Let me also suggest some crucial background to these events. Recent data indicate that Europe's productivity performance has worsened compared to earlier years. I believe that this is a dramatic development. I shall concentrate my remarks on how this has come about and, more to the point, how Europe must respond to regain the lead in productivity growth.

In contrast to the EU, productivity growth in the US continued at a steady pace during 2001, a year of recession, and has accelerated in the first quarter of this year. Irrespective of whether this rapid pace is sustainable or not, the US is reaping the benefits of past investments, in particular, investments in ICT and innovation assets, in the form of high productivity growth.

ICT is an enabling technology that provides a powerful set of instruments that can be used by producers and consumers alike. As an enabling technology, ICT has transformed in fundamental ways

the characteristics of economic life. It has also enhanced our possibilities to innovate further. A future without ICT is clearly inconceivable.

For my remarks today I shall draw primarily upon ideas from recent work presented in the Commission's 2001 and 2002 *European Competitiveness Reports*. Let me also note that the analysis of the *Competitiveness Reports* is entirely consistent with the work that has been presented in the *CESifo Forum of Autumn 2001* and in the *CESifo Report on the European Economy 2002*.

Europe's recent productivity under-performance

Historically, Europe's economic growth has depended predominantly on productivity growth and less on employment growth. In contrast, economic growth in the US has depended primarily on employment growth and less on productivity growth. Europe has been able to raise its standards of living by employing a virtually constant share of its labour force but also recording high labour productivity growth.

However, things have changed in the period since 1995. The rate of growth of labour productivity in the EU slowed down while in the US it has accelerated. Consequently, the gap between the EU and the US standards of living, measured by GDP per capita, has widened throughout the 1990s. The slowdown in our productivity growth and our low employment rate are at the origin of this development.

Today, I shall stress the former factor.

Europe's ability to generate robust employment growth cannot be relied upon in the short run to contribute to a sustained increase in economic growth. There are many factors that explain this. The crucial point here is that only through a recovery of productivity growth will Europe's ambitions be realised.

Europe's yet to be realised technological possibilities

Professor Dale Jorgensen has done remarkable work on the particular role of ICT in driving productivity



growth in the second half of the 1990s in the US. The *2001 Competitiveness Report* stressed that Europe's poor record in ICT investment and diffusion and in innovation could be the source of the weak productivity growth in the second half of the 1990s.

ICT expenditure in the EU has been declining relative to US expenditure from a little over 90% in the beginning of the 1990s to around 75% in 1999. The average share in GDP over the period 1992–1999 was 5.6% whereas in the US it was 8.1%. The US has made great advances in spending on and use of ICT during the past decade while Europe has lagged behind. It should not be surprising that our productivity growth has also slowed down.

Yet, if one were to look at Europe today, one would be struck by the diversity of technological advancement. In some Member States ICT investment and diffusion is comparable to what one finds in the US. Here also productivity and employment growth have been comparable if not better in some cases than the US record in the second half of the 1990s.

Clearly, it is essential to achieve comparable and high rates of ICT use across the Member States. The present diversity cannot be acceptable. The new technological opportunities must be available to and used by all citizens of Europe wherever they reside and choose to exercise their economic interests.

ICT and innovation in our economies

Why is this ICT technological revolution so important? The short answer is that it plays a critical role in supporting productivity growth.

Productivity growth depends on both the value of goods and services our economies produce and on the way our economies use capital and labour to produce these goods. Both these factors are centrally dependent upon the technological possibilities offered by ICT. Today, product and process innovation cannot be developed efficiently without the use of ICT.

There is now considerable evidence that the productivity resurgence of the second half of the 1990s reflects innovation in the organisation and work that have been introduced at the work place and that affect white-collar workers. Apparently, little of this revolution has affected the traditional shop floor. This is not surprising since ICT and innova-

tion depend on the availability of specialised knowledge and are intensive in human capital.

Europe's challenges in the transition to the "new economy"

What is the "new economy"? In the Autumn 2001 *CESifo Forum* several authors discussed the character and implications of the "new economy".

Among the various meanings, my preference is for one that stresses the transformation of traditional business models into ones based on the extensive use of ICT. The availability of ICT is at the centre of the process by which enterprises re-engineer their business models and practices. This transformation is essential for enterprises to remain competitive and this applies not just to new enterprises but equally well to traditional ones.

Economists since Robert Solow have been unable to attribute all economic growth to the supplies of factor inputs – capital and labour – leaving a residual, called total factor productivity, as an unaccounted element in economic growth.

I believe this does not reflect mismeasurement of factor inputs but, rather, it represents a successful economy where knowledge, science, technology and the organisation of economic life based on knowledge cannot be directly attributed to a narrow definition of factor supplies. This new economy can be characterised as a rise in the importance of total factor productivity in economic growth.

In many parts of our economies, we are still at the beginning of the extensive use of ICT. At the same time, however, it is urgent to begin the process of making possible the deployment of ICT infrastructure across all Member States and to begin initiating the required changes in our administrative and legislative framework to facilitate the diffusion of ICT.

The Lisbon strategy is a decisive step in this direction. Unless the programme of modernisation and reform of the Lisbon strategy is pursued urgently, the final objectives will simply not be reached.

Let me now turn to some crucial challenges that Europe must confront in the transition to the "new economy".

- Europe must *increase its spending on ICT and on R&D*. While it is not necessary to produce

ICT goods to reap the benefits from new technologies, but one can simply buy ICT services, there are nevertheless important externalities associated with technological advancements and breakthroughs. Take, for example, the case of *biotechnology*. Biotechnology and life sciences constitute the most promising innovations for coming years. Europe cannot miss the opportunity to take a leading role in this area. Yet, without more vigorous ICT exploitation, one of the crucial set of conditions, European biotechnology will continue to be second to that of the US.

- *ICT diffusion* must intrude in all aspects of economic life. The use of computing for a variety of tasks, from school teaching to inventory management, is essential to guarantee that the opportunities are fully taken advantage of. Lessons can be learned from the experience of those Member States that have successfully seen the introduction and diffusion of ICT in recent years.
- *Obstacles to ICT diffusion* must be removed. A recent OECD Working Paper reports that industry productivity performance is affected negatively by a variety of product and labour market regulations. Furthermore, while surviving new firms in the US, which tend to be smaller and have lower than average productivity, expand quickly, in the EU firms with the opposite characteristics do not expand significantly.

A key obstacle appears to be the *availability of human capital* and of skilled professionals. Some European countries have experienced the problem of being unable to fill high-skill jobs while having notably high unemployment. This suggests that there is something wrong with the supply of such professionals or a problem of the allocation of such professionals to jobs or both.

Europe has seen a remarkable transition in the type of skills demanded at work, with fewer and fewer jobs requiring only the basic level of education. Throughout the late 1990s, the number of low-skill jobs – or jobs which require at most lower secondary education – in the EU declined at an average annual rate of 3%. By 2000, the share of low-skill jobs in EU's total employment had fallen to less than one third.

In contrast, the demand for higher skills has increased rapidly. The number of jobs requiring upper secondary education rose by almost 4 per cent per year in the late 1990s, and net job creation at the tertiary education level was even faster, with

a growth rate of close to 5 per cent per year. In 2000, nearly one out of every four jobs in the EU required tertiary education, and the relative share of tertiary education jobs increased in every sector.

The process of supplying skills must be secured through the educational system and through the more efficient allocation in the labour market.

ICT and innovation are leading to *important organisational changes in the work place*. The most successful examples of ICT use are industries where new technologies have been accompanied by major reforms in working methods and where the labour force possessed the necessary ICT skills.

The expansion of information technology in economic life does not mean that enterprises can dispense with strategic decisions. On the contrary, because the Internet helps to enhance competition and to reduce industry profitability without conferring any proprietary advantages, firms must innovate by distinguishing themselves through specific strategies.

While the Internet will force enterprises to converge in certain key areas of their activities, they must also develop strategies to suit their individual identification. The Internet must be seen as a complement of traditional business strategies conferring a powerful advantage to those that employ it wisely.

It is clear that a degree of flexibility in the use of ICT is essential for ultimately establishing a successful business model. Such flexibility will also be crucial in determining Europe's transition to a technologically sophisticated economy and society.

Services in Europe have also been characterised by low productivity growth. The critical issue here is whether conditions are right for the expansion of the service sector to its potential. Administrative and legal rules in the individual Member States abound that play an inhibiting role in the growth of this sector.

The creation of a genuine *internal market in services* must also become reality. The Commission has stressed the importance of this ambition and is determined to exert pressure to attain it within the timetable of the Lisbon strategy.

Market liberalisation is a key factor to strengthen the growth of the service sector. Many service sectors, such as telecommunications and transport,

were traditionally strongly regulated, but have undergone a series of liberalisation measures during the past two decades. Available evidence for various sectors strongly suggests that the liberalisation and regulatory reform have had a beneficial impact on the economic performance.

The eEurope 2005 Action Plan

Last March, at the Barcelona Summit, EU leaders invited the Commission to draw up a comprehensive eEurope 2005 Action Plan, which was adopted on 28 May.

It comes in the wake of the eEurope 2002 Action Plan, which was a wake-up call for Europe to catch up in the information age. eEurope 2002 aimed at enhancing Internet connectivity. Much progress has been achieved. About 40% of homes are now connected and over 70% of companies have Web access.

On this basis of much improved connectivity eEurope 2005 aims at realising more of the benefits of information society in Europe in terms of increased productivity, employment and inclusion.

eEurope 2005 addresses both demand and supply side. It is built on two strands of actions that reinforce each other, namely:

1. First, promoting services, applications and content that are attractive to users, save them time, and have day-to-day relevance. The focus in eEurope 2005 is on eGovernment, eLearning, eHealth and eBusiness;
2. Secondly, stimulating the widespread availability and use of the underlying broadband infrastructure and of platforms next to the PC such as interactive digital TV and 3G mobile to let many more people take part in the information society.

By addressing at the same time content and infrastructure, eEurope 2005 aims to help solving the chicken-and-egg dilemma. Content, services and applications will stimulate broadband roll-out; secure broadband and multi-platform will stimulate new content and services.

Of course, the larger part of content and infrastructure will come from the private sector. eEurope 2005 aims at creating a more favourable environment for private investment.

eEurope 2005 focuses on those actions where public policy and the public sector can make a difference and where there is a justified role to play in relation to the market.

Enlargement

Finally, I shall say a few words about the “new economy” challenges associated with *enlargement*. Europe’s eastern enlargement is a project of vast possibilities and of risks, one dimension of which is the technological modernisation of these economies. The acceding nations are not well versed at this stage in the intricacies of deploying information technologies in economic life. Yet, it is urgent to prepare for the diffusion of ICT and adapt their institutional framework and business practices accordingly to take full advantage and put their human resources to most productive use.

Closing remarks

Let me close my intervention with some optimistic remarks. The recent experience of the US during the 2001 recession is very instructive. Productivity growth has made possible the increase in real incomes, thus supporting economic activity and mitigating the contractionary effects of the recession. Yet, the burst of the stock market, dot.com, bubble has raised questions about the permanence of the productivity gains experienced in recent years. I believe that bubbles such as the Internet one are consistent with historical experience in that they are common when new technological breakthroughs are developed and introduced.

I believe, as many observers do, that the technological modernisation of our economies and the associated productivity gains will be with us for some time. There has been a structural break in the path of productivity growth. Trend growth in productivity has shifted upwards and potential output growth has also increased. The objective for Europe is to position itself in a way that the full benefits of the “new, new economy” also become a reality here.

Thank you for your attention.

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FINANCIAL REPORTING AND CAPITAL MARKET REGULATION IN AN ENLARGED EUROPE

The new economy

Driven by years of strong, low inflationary, productivity-driven growth with high investment in information and communication technology, a fundamental change has taken place in the US economy. It is here to stay – the recession, the events of September 11 and even the implications of Enron will not alter its course.

The New Economy is not about the rise or fall of the stock market or the valuation of securities, it is about a new way of doing business – directly impacted by information and communication technology – labelled by some the “networked” or “knowledge” economy.

This economy is changing the world – propelled by the growing power of global capital markets (which are eager for capital) and the influence of global investors (which are eager to diversify). Companies seek the advantages of globalising their businesses, production and distribution channels. Why not? When it comes to sharing information – or ideas or software – geographic borders are growing increasingly meaningless. This provides both tremendous opportunity as well as tremendous pressure to compete in a global framework.

The New Economy is characterized by technology, innovation, and collaboration.

Technology: Only think back 5, 10 years to remember how far we have come. New technologies are rapidly disrupting existing business models and established markets. This does not suggest that only new industries will survive – witness the bursting of the dot-com bubble – but rather the applica-

tion of new technologies is altering the way traditional industries operate and is making them more competitive.

Innovation: Great ideas are the currency of the New Economy. While process innovations like agile manufacturing and supply-chain management are important, these do not address the core issue of value innovation. Newer technologies in communication and information technology are empowering buyers – across borders – to find the best product/value. There is constant pressure to rethink the basis for business success. (At PwC we have witnessed the speed with which our clients are able to innovate around a product.)

Finally, collaboration: Before you could only collaborate if you were in the plant – now you are networked all over the world. This capability is taken for granted. Alliances are key to innovation: different companies combine to create/distribute or offer a product/service and then disband.

Implications for an enlarged Europe

The dynamics and drivers of the New Economy are applicable in Europe and on a global basis, even though the results in economic terms, like employment, GDP growth, etc. may differ for countries depending upon their economic structure and policy.

The neoclassical idea of creating wealth through free trade or by lowering the cost of trade is gaining new momentum in Europe through integration on the one side but also through continued innovation, technology spending, and the all important consumer demand. As Ludwig Erhard said: “I cannot imagine a human being who isn’t always encountering new desires or needs.” To successfully compete, companies and countries in an enlarged Europe will gravitate to special fields where they enjoy a comparative advantage such as low-cost production or high value-added engineering. The accession countries will have to capitalise on the opportunities presented by the rapid emer-



gence of the new, knowledge-based economy – an area where rapid further growth can be anticipated in the next few years.

According to a PwC survey, the strategic benefits of enlargement appear greater for smaller international businesses, especially those from the EU. For these companies, investment in the candidate countries is now seen as more attractive than in regions further afield, such as Latin America and the Far East. Already German firms account for the largest proportion of the stock of inward investment in the Czech Republic, Hungary and Poland.

To reap the benefits of the single market and the single currency, an enlarged Europe needs enhanced market integration. Our PricewaterhouseCoopers Eurofirm Structure is such an example. PwC firms in over a dozen European countries have joined together to improve cross-border coordination, eliminate internal barriers and thereby create a competitive advantage. Similar to the EU, this structure allows us to better understand the respective viewpoints of each country. PwC Eurofirm leaders already work closely with their colleagues in Central Europe and it is foreseeable that further expansion will occur as the markets continue to integrate.

Market regulations and financial reporting standards

Developing common financial reporting standards and accepted capital market regulations is critical to successfully integrating an enlarged Europe. Companies and potential investors demand reliable business information – now more than ever – in this post-Enron world. The old economy may have been about processes; but the New Economy is about standards – with transparency as the ultimate goal.

No amount of market regulation can eliminate the possibility of loss. What market regulation can and should do, however, is to make sure that investors have a solid platform of reliable information for use in analysis, including information about the analysis itself. Internationally, capital market regulation needs to converge on the basis of reciprocity of acceptance of transparent principles. An example might be to agree on the principles of dis-

closure for an IPO, while the details of the requirements might differ from country to country. Progress is already being made in Europe on a common “passport” to global cross-border listings – presently proposed as an annual prospectus.

We think that one of the biggest challenges facing the global capital markets is ensuring the same standards of financial reporting quality are applied worldwide. Global accounting standards are complicated by 215 sets of national laws and the profession’s “Alphabet Soup” of standardising bodies. The benefits of global GAAP are many:

- Increasing the availability and reducing the cost of capital through globally competitive capital markets;
- reducing companies’ cost of compliance with different accounting rules;
- raising all national standards of accounting to “world class”;
- encouraging foreign investment; and
- facilitating the provision of low cost capital to developing nations.

The introduction of a globally recognized financial reporting framework, based on International Accounting Standards, for businesses across the European Union will, we believe, make life more straightforward for most companies.

The European Commission has set a target date of 2005 for the adoption of IAS. We support the EC plan for a single capital market – an accounting and auditing strategy based on convergence around global standards (IAS and ISA). We urge other countries, not least the US, to do likewise. When Europe moves to IAS, it will be far more difficult for others to abstain.

The biggest part of this puzzle, however, is enforcement. It is important to avoid a situation where interpretations at a national level, including those by the US SEC, conflict with one another. Reconciling this will involve some concessions on national sovereignty by all countries.

For companies themselves, now is the time to begin putting the issue of IAS conversion on the boardroom agenda. Some of the standards are complex and conversion is a not simple push-button exercise. In a recent PwC survey of 16 European countries, 79% of the 700 European CFOs polled said

they were aware of the EC's plans to introduce IAS by 2005, but had yet to make it a key issue for their boards of directors.

The corporate reporting future

There is a need not only to create uniform global standards but standards with a propensity for innovation, transparency and competition that assess information relevant to the New Economy. Our current system, based primarily on historical cost information, is constrained by antiquated laws, rigid rules, and punitive legal systems that chill innovation in corporate reporting. This challenge – to produce financial information more relevant to the New Economy – is the subject of a new PwC book entitled: “Building Public Trust: The Future of Corporate Reporting.”

We think a principle-based approach to accounting is the best foundation for making financial reporting more relevant to investors and other stakeholders. This framework assigns responsibility to management to select the most appropriate accounting methods that reflect the economics of the transaction, not just those accounting methods dictated by narrow rules. Principles allow management scope to explain in appropriate detail how the principles have been interpreted and why. Principles also require that auditors exercise more judgment as well.

One of the central propositions of the book is that when investors have access to more reliable and more timely information about company performance – in large measure, the same information that executives use to run their businesses – better investment decisions will be possible.

The migration of corporate reporting onto the Internet will continue to increase the speed and frequency with which information can be reported, both internally and externally. We see Extensible Business Reporting Language – known as XBRL – as the reporting technology of the future. XBRL exchanges data between different software applications through the use of information tags that self-describe what a piece of information is. The information delivered is more meaningful than ever before – more complete, higher quality, more useful, more quickly received and ready for reuse. When a company adopts XBRL, it not only

reduces its own costs (as much as 60 percent over traditional publishing methods), but also levels the playing field for the entire stakeholder community by offering everyone, from elite analysts to individual investors, the full picture of its financial condition.

Where might this all lead? Let's take a quick look perhaps ten years into the future. Enlarged Europe stands at over thirty countries with more on the threshold. Global GAAP has been crafted by some of the most brilliant minds in several professions and from many different countries. It is supported institutionally by a strong interpretative function that collaborates on a global basis and is enforced by empowered market regulators. XBRL has been universally adopted by all listed companies and has proven to greatly simplify the corporate reporting supply chain while channelling much more useful information free of potential conflicts of interest. As a result, capital is being allocated more efficiently all over the world, to the benefit of wealth creation for society as a whole.

This is the future of corporate reporting for an enlarged Europe and the world. This is the kind of transparency I think the public will demand.

Thank you.