

Different characteristic features regarding the productivity increase in the US and the EU in the 1990s

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Abstract

In the 1990's the productivity growth in the USA and in the EU changed in opposite sense: until it was decelerating in Europe, till it was accelerating significantly in the USA. In this essay I am going to search for the explanation of these opposite tendencies studying the sectoral differences and analysing structure of the investments, capital formation and the marginal productivity of capital. The sectoral differences in productivity growth highlight the major differences in terms of the growth experienced in the two regions. This is evidence for the structural rigidity of the European economy, which is much less flexible in comparison with its American counterpart. I reveal that the fixed capital stock in the USA expanded in a structure and to a degree that promotes growth to a much higher extent. The data analysed below convincingly show how much less of an impact the ICT revolution had on the economy and society of the EU than in USA, and how much less capable these leaps and bounds in technological development were to transform and dynamize the European Union than the United States.

Keywords

productivity growth · sectoral analysis · capital formation · capital stocks

1 Introduction

A technological shift of particularly great effect took place in the 1990s in the economy of developed countries. This technological shift, which could fundamentally be characterized as a revolutionary development and transformation of information and communication technologies (ICT), was partly the cause and partly a consequence of two other processes simultaneously taking place: *globalization* and the emergence of the *information society*.

As will be shown later, the development of information and communication technologies became the primary scene of the research and development efforts in this period, and as a result of these achievements, the growth in productivity in the fields of both production and use became the most important component of overall productivity.

2 A Sectoral Study of the Difference in the Growth of Productivity in the USA and the EU

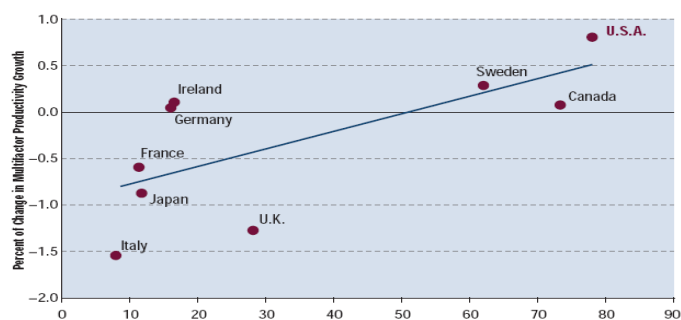
Fig. 1 indicates that in the period under review there was a positive correlation between the use of information technologies and the acceleration of the growth of total factor productivity (TFP), which is the most sensitive to technological development within productivity growth. Therefore, when examining the productivity growth of the past decades, it is particularly important to examine the productivity growth data in such a distribution that considers ICT-related and non-ICT areas separately.

The sectoral differences in productivity growth highlight the major differences in terms of the growth experienced in the two regions. Table 1 divides the entirety of the economy into three major areas: ICT producing, ICT-using and non-ICT industries¹. Within each of these we can differentiate between manufacturing and service industries. The table clearly shows that, in this grouping, the advantage of the USA in terms of productivity growth in is not distributed evenly at all; in fact, there are some areas where a higher productivity growth can be identified in the EU.

¹ For further details on the exact definitions and the sectoral taxonomies, cf. O'Mahony, M – van Ark, B (ed.) (2003). The study is also a major source of the description of the measurement methodology [1, 3].

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Internet Hosts Per 1,000 Inhabitants, 1998 Source: Porter, M. E. – van Opstal, D. (2005)

Fig. 1. Higher IT Usage Correlated with Higher Productivity Growth Percent Change in Multifactor Productivity Growth (using average growth rates in 1981–95 and 1996–98) and Number of Internet Hosts, 1998

From the table it can be seen that, even though the EU productivity growth was somewhat faster (by 0.7% per year) in the first half of the period examined, but in the second half of the 1990s it was the USA that achieved a higher rate of productivity growth. The difference by this time was 1.1% per year in favour of the USA. The overall 1.9% improvement of the position of the USA in comparison with the EU can be attributed to a smaller extent (0.5%) to the decelerating productivity growth of the EU, and to a greater extent (1.4%) to the accelerating productivity growth of the USA, which more than doubled.

3 The Tendencies of Decelerating Productivity Growth in the EU

In the first half of the 1990s, the highest rate of productivity growth in the EU, much above all other sectors, was experienced in the ICT industries, and specifically in ICT manufacturing, but the other ICT-related industry, i.e. ICT services was also close behind occupying the second position.

The deceleration of productivity growth in the second of the 1990s in the EU was decisively due to the large-scale (-0.9%) decline in the productivity growth on non-ICT industries. This (has) had serious consequences for two reasons: on the one hand, non-ICT industries still accounted for more than two-thirds of the entire EU economy in 2000. On the other hand, in the EU the two other sectors were not able to exercise a significant counterbalancing effect either. Even in case of ICT use, which has a share of 27% in the economy of the EU, a slight (-0.1%) decrease in the rate of productivity growth was measured, and it was only the ICT manufacturing industries, representing a mere 5.9%, that registered a 2% acceleration in the productivity growth (from 6.7% to 8.7%).

If the available data are analysed in a distribution of manufacturing vs. services, we find that the rate of productivity growth decreased both in the field of production and in services. Much more significant, however, is the effect of the decrease of productivity growth in the field of manufacturing (in the combined change of productivity growth rate, the deceleration in the field of manufacturing causes a decrease of -0.29%, while the decel-

Tab. 1. Productivity growth and GDP shares of ICT-producing, ICT-using and non-ICT industries in the EU and the U.S.

	Productivity growth				GDP share	
	1990-1995		1995-2000		2000	
	EU	USA	EU	USA	EU	USA
Total Economy	1.9	1.1	1.4	2.5	100	100
<i>ICT Producing Industries</i>	6.7	8.1	8.7	10.1	5.9	7.3
ICT Producing Manufacturing	11.1	15.1	13.8	23.7	1.6	2.6
ICT Producing Services	4.4	3.1	6.5	1.8	4.3	4.7
<i>ICT Using Industries</i>	1.7	1.5	1.6	4.7	27.0	30.6
ICT Using Manufacturing	3.1	-0.3	2.1	1.2	5.9	4.3
ICT Using Services	1.1	1.9	1.4	5.4	21.1	26.3
<i>Non-ICT Industries</i>	1.6	0.2	0.7	0.5	67.1	62.1
Non-ICT Manufacturing	3.8	3.0	1.5	1.4	11.9	9.3
Non-ICT Services	0.6	-0.4	0.2	0.4	44.7	43.0
Non-ICT Other	2.7	0.7	1.9	0.6	10.5	9.8

Source: Ark, B. van, R. Inklaar és R.H. McGuckin (2003a)

eration in the field of services produces only one-tenth of this effect, a deceleration of -0.026%).

Within the productivity decrease of 0.9% related to non-ICT industries that played a primary role in the deceleration of the productivity growth of the EU in the second half of the 1990s, the biggest factor was the decrease of the productivity growth of non-ICT manufacturing to less than two-fifths of its former level (from 3.8% to 1.5% per year). This is what the decrease in the field of manufacturing, discussed in the previous paragraph, is fundamentally due to. Behind the relatively stable overall productivity growth rate of ICT-using industries, at the same time, there are opposite tendencies. While the productivity growth rate significantly decreased in case of ICT-using manufacturing (from 3.1% to 2.1%), ICT-using services actually registered a slight (0.3%) increase in the productivity growth rate.

On the whole we can highlight two sectors from among the other sectors that each had a smaller impact on the overall change and almost exactly cancelling out each other's effects: the non-ICT manufacturing and the non-ICT services sectors, which had a fundamental effect and determined the decline of the productivity growth rate that took place in the EU. The 0.5% decrease of the productivity growth rate in the EU was due in 60% to the 0.4% decrease (from 0.6% to 0.2%) of the rate of productivity growth of non-ICT services, which represent 44.7% in the EU economy, and in approximately 40% to the decrease of 2.3% (from 3.8% to 1.5%) registered in non-ICT manufacturing, which has a 11.9% share in the European economy.

It is worth paying particular attention to these data, which suggest that the deceleration of productivity growth rate experienced in the EU practically happened independently from the ICT revolution taking place in a parallel way.

4 Doubling Productivity Growth Rate in the USA

As shown before, the acceleration of the productivity growth rate in the USA is mostly due to the shift in the proportions that took place. The annual acceleration rate of 1.4% can be considered as very significant, as the use was thus able to more than double its rate of productivity growth rate. All of the sectors contributed to this productivity growth rate, but by far not to the same extent. The main accelerator of productivity growth was the increase of the productivity growth rate measured in the ICT-using industries from 1.5% to 4.7%. The more than tripled productivity rate growth (3.2%) of these sectors itself, representing a 30.6% share in the economy of the USA, increased by almost 1% the overall productivity growth rate of the American economy. The 2% and 0.3% acceleration of the productivity growth rate in the other two sectors (ICT manufacturing, representing a 7.3%, and non-ICT industries, accounting for a 62.1% share in the economy, respectively) only contributed the remaining, approximately 0.4% increase in the rate of growth.

A deeper analysis shows that, although there were also processes of opposite directions within the ICT and non-ICT industries, and the productivity growth rate actually decreased in altogether 3 sub-sectors (ICT services, non-ICT manufacturing, non-ICT other), the effect of these on the overall increase of productivity was slight (the combined effect of the above three sub-sectors also caused a decrease of -0.22% in the productivity growth rate). The opposite effect of basically any of the other four sectors showing an accelerating productivity growth rate would compensate this slight adverse effect.

If the primary division is not made into categories of ICT producing, ICT-using and non-ICT categories, but rather according to manufacturing and service areas, we can see that even though the effect of both areas is positive on the change of the combined productivity growth rate, still the effect of the changes in the service areas (0.938%) is much more significant than that of the manufacturing areas (0.225%). The main reason for this is the much bigger economic weight of services, rather than a most significant acceleration in the given area or a higher level of productivity growth rate.

Overall, the biggest role in the 1.4% acceleration of the productivity growth rate of the American economy in the second half of the 1990s was played by the 3.5% acceleration of the growth rate in the ICT-using service sector. Since this area had a 26.3% share in the entire economy, the acceleration experienced here was able in itself to exercise a 0.921% positive effect on the increasing of the productivity of the USA. Fundamentally due to its proportion in the overall economy (43%), the effect of the 0.8% acceleration of the productivity growth rate of non-ICT services can also be considered as significant (0.344%), similarly to ICT producing manufacturing (0.224), which only has a very low share in the economy (2.6%), but registered an extraordinary acceleration of growth rate (8.6%).

If we examine the proportions represented in the overall increase of economic productivity by ICT-related sectors and non-

ICT related sectors respectively, we will find major differences between the two. In the second half of the 1990s, a mere 12.5% of the productivity growth of USA was due to the acceleration of the productivity growth rate of non-ICT sectors. By contrast, in the EU approximately one-third of the productivity growth took place in the non-ICT sectors.

The more detailed breakdown is also interesting: while the proportion of ICT-related productivity growth in the USA is 2/3 to 1/3 for ICT use and ICT production, respectively, the same proportion in the EU is 46:54. The production increasing effect of ICT in the USA, therefore, carried over to the users much more in the USA than in the EU.

5 The Relative Changes of the Productivity Growth Rates

My findings with respect to the relative productivity growth rate position changes are summarized in Table 2. The first and the second columns of the table show the differences between the productivity growth rates achieved in the two areas for the two time periods examined. The USA productivity growth rate figures are shown as with positive signs, and the EU data with negative signs. Where the resulting difference was a negative number, the productivity growth rate of the EU was faster, while in areas where the difference was a positive number, the productivity growth rate was higher in the USA. The third column shows the relative changes that took place in the productivity growth rate of the two regions in the different areas. The column contains the difference between the data of the first and the second columns; in other words, data with a positive sign indicate how much the USA productivity growth position changed in the second half of the 1990s over the first half of the decade, while figures preceded by a minus sign indicate the more favourable changes in the productivity growth position of the EU in the given area.

As can be seen in the table, the increase in the productivity of EU countries was still higher in the majority of the sectors in the period between 1990 and 1995. It can also be noticed however already in these data that the advantage of the European Union is typical in those non-ICT industries that another distribution, prioritizing technological progress would, in all certainty, not place in the first position. The results in ICT-related industries are more varied across the two continents already in this period; in fact, we can safely say that (given the great economic weight of ICT-using services in the USA) the United States is slightly in the lead.

As far as the deeper distribution is concerned, the biggest advantage of the EU in terms of productivity growth rate in the period between 1990 and 1995 was in the field of ICT-using manufacturing, while the biggest shortfall was in ICT producing manufacturing. The productivity growth advantage of the EU was higher in five of the seven sectors than the average advantage of the EU, and there were only two sectors where the advantage is lower than average. At the same time, in case of

these two sectors (ICT producing manufacturing and ICT-using services) it was already the USA that led in terms of the productivity growth rate.

Tab. 2. Changes in the relative productivity growth of the EU and the USA in the 1990s

	Productivity growth rate difference USA – EU		The change of rate difference (3) = (2)-(1)
	1990-1995	1995-2000	
	(1)	(2)	
Total Economy	-0.8	1.1	1.9
<i>ICT Producing Industries</i>	1.4	1.4	0.0
ICT Producing Manufacturing	4.0	9.9	5.9
ICT Producing Services	-1.3	-4.7	-3.4
<i>ICT Using Industries</i>	-0.2	3.1	3.3
ICT Using Manufacturing	-3.4	-0.9	2.5
ICT Using Services	0.8	4.0	3.2
<i>Non-ICT Industries</i>	-1.4	-0.2	1.2
Non-ICT Manufacturing	-0.8	-0.1	0.7
Non-ICT Services	-1.0	0.2	1.2
Non-ICT Other	-2.0	-1.3	0.9

Source: Own calculations from the data of Table 1.

Even in the period between 1995 and 2000, the productivity growth rate was higher in the EU in the majority of the sectors (four out of the seven). The USA, therefore, was only able to increase the rate of productivity growth in one area, non-ICT services, which earlier increased slower than in the EU to a level higher than in Europe. The earlier -1% disadvantage of the USA was reversed into an advantage of 0.2%. Still, even in case of the non-ICT industries the productivity growth rates more or less equalled out, and even though the advantage of the USA productivity growth rate did not register an overall increase in ICT producing industries, the earlier, slight disadvantage that was in place for ICT-using industries was turned into a significant advantage. ICT producing services emerged by this period as having the biggest productivity growth advantage of the EU, while in the United States ICT producing manufacturing remained the area with the highest advantage.

Changes of similar direction took place in productivity growth rates in most of the areas in the two regions. In three of the four areas related to ICT, the productivity growth rate increased, while in two of the three non-ICT areas a decrease was registered in both regions. Changes of opposite directions took place partly in ICT-using manufacturing where, contrary to the acceleration of the productivity growth rate in the USA, corresponds to the acceleration typical of the ICT industries, a deceleration was measured in the EU (nevertheless, it was still this area where productivity increased the fastest). The other area where changes of opposite directions were registered was the area of non-ICT services, where the decrease in the productivity growth rate in the EU was more in line with the general non-ICT tendencies, in contrast with the USA where an increase of growth rate was experienced.

The second of the two changes mentioned above not in compliance with the general directions of changes had a much stronger impact on the overall productivity growth rates of the two economies. This is because in case the above tendency had not taken place in the field of non-ICT services, which represents a very significant proportion of the economy (43% in the USA in 2000), but rather the productivity growth rate of the USA had remained unchanged (or especially if the difference had remained unchanged between the productivity growth rates of the non-ICT service sectors of the EU and the USA), then the entire productivity growth rate of the US economy would have been some 0.4 to 0.6% lower in the second half of the 1990s.

In the last column of Table 2 we can only find one negative number, what means that in the second half of the 1990s the EU was only able to accelerate its production growth rate in comparison with the USA in a single sector. This sector was ICT producing services where, as a result of the basically opposite tendencies that took place in the two regions (2.1% increase in the EU and 1.3% decrease in the EU in the respective rates of growth), the EU improved its relative productivity growth position by an annual rate of 3.4%. Due to this, and also to the 1.3% rate difference that had already been in place in the first half of the 1990s in favour of the EU, the situation arose in the second half of the decade, whereby the EU was able to increase its level of productivity in ICT producing services 4.7% faster per year than the US.

By contrast, in all other sectors, the USA improved its relative productivity growth rate increase positions. From among these, in absolute value, the 5.9% increase in relative productivity growth rate in case of ICT producing manufacturing was the highest, but the most significant in terms of their effects on the increase of the productivity growth of the entirety of the two regions, the 3.2% improvement in relative position in case of ICT-using services and the 1.2% improvement in case of non-ICT services were the most significant. On the whole, therefore, the relative acceleration of the productivity growth rate of the US in comparison with the EU in the second half of the 1990s was mostly due to the improvement of its position in the productivity growth rate in the field of services. This, however, is fundamentally true due to the major weight of the service sector in the economy.

In an even more detailed sectoral breakdown² of the productivity growth rate of certain sectors of the economy of the EU and the USA, a very high and even increasing correlation was found (cf. Table 3).

Still, if we browse through the list containing 56 sectors, we find as many as five sectors in the period between 1995 and 2001 where the productivity growth rate achieved by the USA was more than 5% higher than the productivity growth rate of the EU. At the same time, there was only one sector where the op-

² See the tables in the volume edited by O'Mahony, M and van Ark, B (2003).

Tab. 3. The correlation between the sectoral productivity growth rates of the EU and the US (correlation with the productivity growth of USA sectors)

	1979-1990	1990-1995	1995-2001
EU-15	0.84	0.87	0.93

Source: O'Mahony, M - vanArk, B (ed.) (2003)

posite was true. It is worth noting that the five sectors mentioned above include both wholesale trade and retailing. In addition to these two trade sectors, it was due mainly to the higher growth rate achieved on the market of insurance services that the improvement of the relative position in the field of non-ICT services in the USA was due to.

From the above findings we can come to the conclusion that the improvement of the productivity growth rate position of the USA in comparison with the EU was, in a large part, due to factors such as satisfying and adjusting to the demands of the consumers and users in the definition of the character, and development objectives of the new technologies (in our reports, the production of ICT-related sectors) much better than in Europe. On the other hand, we can also draw the conclusion that users in the USA were also much more receptive to new technologies.

6 Capital Formation, Capital Stock

It was shown above how closely the higher productivity growth rate and increase of the GDP in the US is related to the earlier and more successful development, as well as the more extensive application of ICT technologies. Let us now consider how this hypothesis is supported by the data on the structural composition of the capital stock and its growth.

Table 4 presents the data related to the gross fixed capital formation and fixed capital stock increase from the early 1980s in the EU and the USA. Since the ICT areas underwent a particularly quick technological development, and a significant drop in prices was consequently experienced, it is worth looking at these changes in both current and constant prices.

It can be seen from the table that even though some differences can be found between the two regions with respect to the capital formation and the increase of capital stock, however, these do not show any clear, uniform tendencies that could explain why the ICT-related sectors of the USA experienced a growth so significantly faster both in individual areas and on the whole, as discussed above. As soon as we insert the starting data of the growth, the lines showing the basic figures, we will see that over the entire period, the volume of ICT capital formation and ICT capital stock in the USA was 1.5 to 2.5 times the comparable values of the EU.

We can also see that ICT formation in 1980 was only a fraction of the volume of other, non-ICT capital formation in both regions. This is even more characteristic of capital stock figures. In the light of the above it is even less evident why, over the period of almost a quarter of a century, the EU was unable to devote a role to ICT capital in a way similar to the USA, despite

the fact the role of the ICT sectors in economic development has been regarded of fundamental importance for decades, and the productivity growth rate differences between the individual sectors would also have amply justified even faster structural changes. Once again, this is evidence for the structural rigidity of the European economy, which is much less flexible in comparison with its American counterpart.

It is worth staying with this table for another moment, as it also shows that the fixed capital stock in the USA expanded in a structure and to a degree that promotes growth to a much higher extent. The data related to combine fixed capital formation indicate that, while the rate of fixed capital formation was slightly higher in the EU during the 1980s, the USA accumulated capital at a much higher rate in the 1990s and the early years of the new millennium. From the middle of the 1990s, the expansion rate of whole of the capital stock was higher in the USA than in Europe.

7 Comparison of Marginal Products of Capital

Important conclusions can be drawn on the basis of comparing estimates of the marginal products of capital. The marginal product of capital usually decreases as the level of development in a country increases; in other words, it is lower in developed countries than in less developed ones. This statement is traceable³ in Table 5, even though only the more developed countries are shown here. Nevertheless, the differences of development between countries should also be reflected in the data in this table. With respect to the USA, however, the above statement is not true at all. As we can see in the figures, with the exception of one country (not accidentally, this country is Ireland, which carried out something of an economic miracle) the marginal product of capital data are higher for each of the EU countries.

³ This conclusion also follows from the point of view of economic theory, whereby better capital supply results in lower marginal product of capital, and vice versa.

Tab. 4. Capital Formation and Capital Stocks in the Eu and the US (growth rate, %)

	Gross fixed capital formation				Gross fixed capital stock	
	in constent 2000 prices		(in current prices)		(in constent 2000 prices)	
	EU	USA	EU	USA	EU	USA
IT equipment						
1980-1990	19.2	15.6	12.7	8.8	19.8	19.1
1990-1995	11.4	17.4	1.8	7.4	10.8	12.1
1995-2000	33.4	27.5	9.8	5.3	28.2	25.5
2000-2004	8.4	16.3	-4.4	3.1	16.5	17.4
1980 bill €	1.29	2.86	13	28.5	2.9	5.9
Communication equipment						
1980-1990	6.2	4.6	9.1	7.1	6.0	7.7
1990-1995	3.5	6.3	3.4	5.4	5.6	4.7
1995-2000	12.5	16.1	9.1	12.8	7.4	9.4
2000-2004	-3.1	-1.8	-4.5	-4.5	5.9	7.4
1980 bill € or \$	15	28.9	13.4	27.6	83.8	128.2
Software						
1980-1990	17.5	16.5	18.4	16.5	17.2	16.3
1990-1995	8.9	10.0	7.3	7.6	10.2	12.8
1995-2000	11.3	17.2	11.3	16.5	11.8	15.6
2000-2004	1.2	2.8	0.6	1.6	4.8	5.4
1980 bill € or \$	5.5	9.7	5.5	11.3	9.9	16.6
Non-ICT equipment						
1980-1990	2.7	2.0	7.6	5.9	2.0	2.3
1990-1995	-2.9	1.3	0.3	3.8	1.5	1.5
1995-2000	2.5	3.4	5.9	4.4	1.1	2.7
2000-2004	-4.2	2.5	-0.6	3.4	-0.4	2.2
1980 bill € or \$	306.9	255.8	136.3	144.8	1933.8	1602.2
Transport equipment						
1980-1990	2.0	0.5	8.2	4.2	1.3	0.9
1990-1995	-2.6	7.6	1.1	11.0	0.5	2.8
1995-2000	6.8	5.3	8.6	6.1	3.0	6.1
2000-2004	-0.3	-4.4	0.5	-2.4	2.9	0.0
1980 bill € or \$	117.1	89.7	48.1	50.7	554.8	457.7
Non residential structures						
1980-1990	2.3	1.3	7.1	4.9	3.4	3.0
1990-1995	-1.6	-1.0	1.1	1.5	3.0	1.9
1995-2000	2.0	4.2	3.9	7.8	2.2	2.2
2000-2004	3.0	-2.6	4.3	0.9	2.4	1.9
1980 bill € or \$	405.3	371.9	197.7	190.2	5608.3	5816.0
Total						
1980-1990	2.8	2.1	7.9	6.1	3.1	2.9
1990-1995	-1.5	2.2	1.2	4.5	2.7	2.1
1995-2000	4.8	7.6	6.1	7.7	2.4	3.2
2000-2004	0.6	1.5	1.3	1.0	2.2	2.6
1980 bill € or \$	851.2	759.0	414.0	453.2	8193.6	8026.6

Source: Own calculations from the data of Groningen Gross and Development Center, *Total Economy Database*. www.ggdc.net

Where:

- y :the income (GDP) per one employee
- k :the capital stock per one employee
- α :the share of the capital stock in the GDP
- P_y :prices of output goods
- P_k :prices of capital goods
- P_y/P_k :the price ratio of output and capital goods
- MPK :the marginal product of capital
- PMPK:marginal product of capital corrected with relative prices

With respect to the USA, the Table 5 indicates two more remarkable facts: on the one hand, the prices of capital goods were relatively low in comparison with the general prices of products, and so the data for the USA in the fourth column of the table indicating the proportion of prices of output and capital goods shows a value that is higher for any of the EU countries, and the only country in the table that has an even higher figure is Hong Kong.

The price ratios of the USA and Europe are, therefore, different: while in the USA the capital goods are relatively inex-

Tab. 5. Estimates for the marginal product of capital data

	y	k	α	Py/Pk	MPK	PMPK
AUT	45822	135769	0.30	1.06	0.10	0.11
BEL	50600	141919	0.26	1.15	0.09	0.11
DEN	45147	122320	0.29	1.13	0.11	0.12
ESP	39034	110024	0.33	1.06	0.12	0.12
FIN	39611	124132	0.29	1.23	0.09	0.11
FRA	45152	134979	0.26	1.20	0.09	0.10
GBR	40620	87778	0.25	1.07	0.12	0.12
GRE	31329	88186	0.21	1.03	0.07	0.08
IRL	47977	85133	0.27	1.05	0.15	0.16
ITA	51060	139033	0.29	1.08	0.11	0.11
NLD	45940	122476	0.33	1.03	0.12	0.13
SWE	40125	109414	0.23	1.19	0.08	0.10
PRT	30086	71045	0.28	0.97	0.12	0.12
USA	57259	125583	0.26	1.16	0.12	0.14
AUS	46436	118831	0.32	1.07	0.13	0.13
NZL	37566	95965	0.33	1.04	0.13	0.13
CAN	45304	122326	0.32	1.26	0.12	0.15
HKG	51678	114351	0.43	0.90	0.19	0.18
NOR	50275	161986	0.39	1.14	0.12	0.14
KOR	34 382	98055	0.35	1.09	0.12	0.13
JAP	37962	132953	0.32	1.12	0.09	0.10

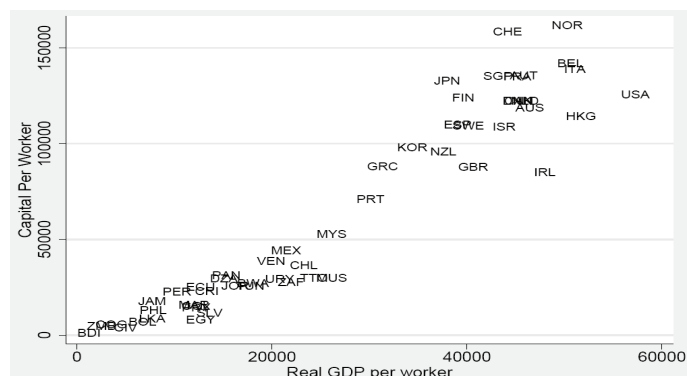
Source: Caselli, F. – Freyer, J. (2005)

pensive and the consumer goods are relatively expensive, in the EU it is the other way round, as the capital goods are relatively expensive and the consumer goods are relatively cheap. These proportions encourage investment and keep back consumption in the USA, while in Europe they motivate people to consume and restrain investments. As we can see in Table 5, as a consequence of this encouragement, the USA carried out a more significant capital accumulation in the past decade.

On the other hand, the other surprising fact that can be seen here is that in the USA the capital share in the GDP is relatively low. Among the member-states of the EU this proportion is only lower in Sweden, while in the majority of the countries included in the table the share of capital stock in the GDP is 10 to 20% higher. These proportions actually correspond to the differences in the price ratios discussed above.

Fig. 2 was prepared from the data of the first two columns of the table. The situation of the USA in this figure shows how much more efficiently the capital stock is utilized in the USA than in the other developed countries, since the income per employee is much higher there despite the fact that the capital stock per employee is more or less the same (in the data measured on the vertical axis, the USA is not high above the other developed countries). While in terms of expenditures the “investments” made by the USA and the other developed countries is quite similar, when we consider the output (data), the USA is high above the general level of the developed countries, due to its higher efficiency.

From the figures of Table 6 we can see that in the field of capital formation – considering the share of ICT capital formation



Source: Caselli, F. – Freyer, J. (2005)

Fig. 2. Capital supply and productivity

in comparison with the total of capital formation – even after two decades, in the early years of the new millennium, the EU hardly reached the proportions achieved by the USA already in the eighties. The situation is similar in terms of IT investments, too.

Tab. 6. Proportions of gross fixed capital formation and IT investments in a percentage of the GDP

	1980	1985	1990	1995	2001
<i>Office and Computer Equipment</i>					
EU	3.1	5.4	5.1	5.1	5.7
US	6.2	9.3	8.2	9.6	6.8
<i>Communication Equipment</i>					
EU	2.9	3.7	3.6	4.1	4.4
US	6.6	7.3	7.1	6.7	7.0
<i>Software</i>					
EU	1.2	3.0	3.9	5.3	7.1
US	2.7	4.7	7.5	9.3	13.9
Total ICT					
EU	7.2	12.0	12.6	14.5	17.2
US	21.3	22.8	25.6	27.7	
<i>Non-ICT Equipment</i>					
EU	33.9	33.7	32.2	30.5	29.7
US	31.8	28.2	31.0	30.3	27.5
<i>Transport Equipment</i>					
EU	11.3	11.5	11.8	11.7	13.3
US	10.8	10.7	8.9	12.4	10.7
<i>Non-Residential Buildings</i>					
EU	47.6	42.8	43.4	43.3	39.7
US	41.9	39.8	37.3	31.7	34.1
Total Non-ICT					
EU	92.8	88.0	87.4	85.5	82.8
US	84.5	78.7	77.2	74.4	72.3
IT Investment as % of GDP					
EU	1.2	1.9	2.2	2.1	2.6
US	2.5	3.4	3.3	3.7	4.2

Source: Groningen Growth and Development Center, Total Economy Database. www.ggdcc.net

If we examine how the share of the ICT capital income relates to either the GDP or to the total capital income (Table 7), we can see that in this respect the EU never reached and (in view

of the downward tendency that is since characteristic in both regions) is not even likely ever to reach the 1.5 to 2 times higher proportions that the USA featured already at the beginning of the period examined.

Tab. 7. The proportion of the ICT capital income in comparison with the GDP (1) and with the total capital income (2)

	(1)	(2)
1980		
USA	4.3	15.2
EU	2.5	8.9
1990		
USA	5.3	18.0
EU	3.4	10.6
2000		
USA	6.2	21.2
EU	.6	0.6
2004		
USA	5.8	18.9
EU	3.4	9.9

Source: Own calculations from the Groningen

Gross and Development Center, *Total Economy Database*. www.ggdc.net

I also examined one other proportion in connection with ICT, which is the volume of ICT capital stock per one working hour (Table 8). The figures of both regions are given in 2000 constant prices. The figures of the EU are given in EUR, while those of the USA are provided in USD. Since the EUR/USD exchange rate in 2000 was 1.085 (cf. www.oanda.com), in other words, even if we multiply the results calculated in EUR with this exchange rate, this would not cause any material change in the significant differences in favour of the USA, which can be clearly seen in the table. In the USA, the proportion of ICT capital income in comparison with both the GDP and with the total capital income was 1.5 to 2 times higher than in Europe throughout the entire quarter-century period, and the European Union did not succeed in catching up with the United States at all.

Tab. 8. ICT capital stock per one working hour (at 2000 constant prices). Source: Own calculations from the Groningen Gross and Development Center, *Total Economy Database*. www.ggdc.net

	EU (€)	USA (\$)
1980	0.398 (0.43)	0.818
1990	0.905 (0.98)	1.832
2000	2.395 (2.6)	4.536
2004	3.337 (3.62)	6.728

8 Summary

The data analysed above convincingly show how much less of an impact the ICT revolution had on the economy and society of the EU than in the USA, and how much less capable these leaps and bounds in technological development were to transform and

³The figures in brackets are the figures of the EU per one working our, given in USD, calculated at the average 1.085 exchange rate valid in 2000.

dynamize the European Union than the United States. In comparison with the USA, the European Union was characterized in the period examined by structural rigidity, inflexibility and insufficient adjustment to the demands of consumers and users.

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