



# STATISTICS IN FOCUS

## Economy and finance



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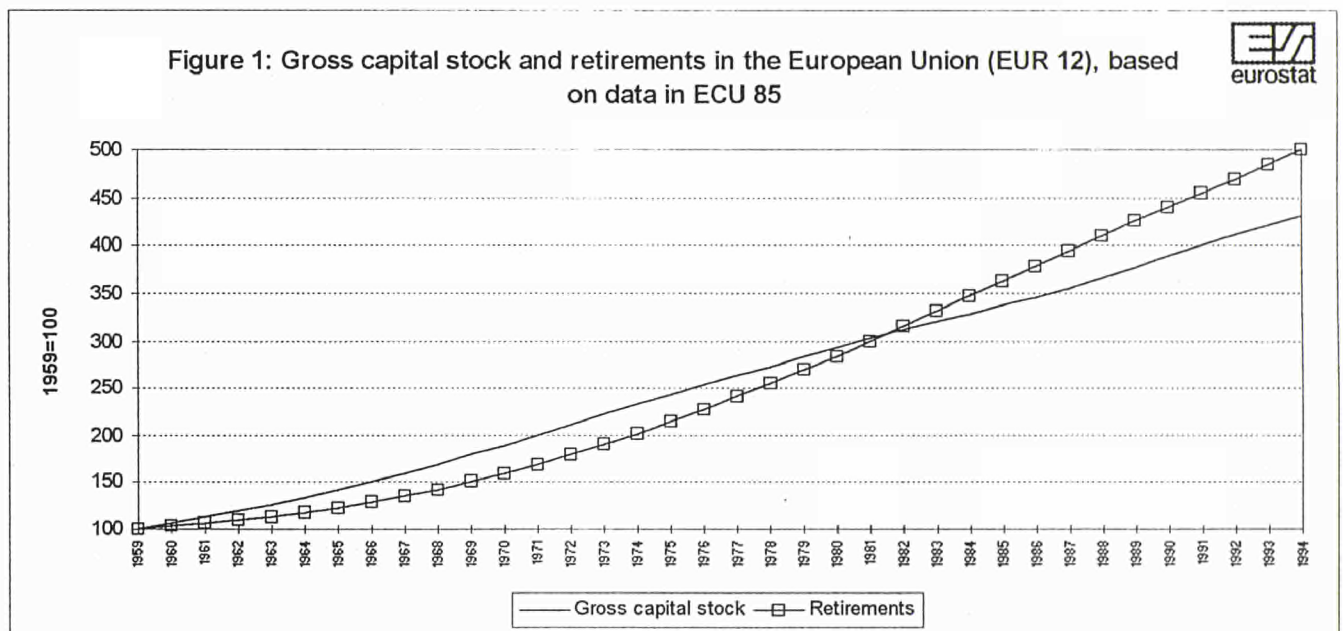
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### The Capital Stock in the European Union

Whereas the statistical information for labour in the European Union in terms of quantity and quality is already available at Eurostat in a broad-based and highly detailed manner, there has been a lack of Union wide comprehensive information on gross capital stock data.

Therefore, as a first step towards closing this information gap, EUROSTAT undertook the calculation of capital stock data for the European Union by using the harmonised data in the

framework of the European System of National accounts and one single calculation method. The resulting data-base allows Eurostat to provide users with harmonised and thus comparable data on capital stock in the European Union. At the current time the data-base covers only the former Union of twelve, but the integration of data for the new Member states Austria, Finland, Sweden and for the new German Länder is already in progress. Some basic results of a detailed report<sup>1</sup> are presented hereafter.



1) See Eurostat publication : "The Capital Stock in the European Union, Structural diagnosis and analytical results", Theme 2: Economy and Finance, Series D: Studies and research, Luxembourg: Office for Official Publications of the European Communities, 1997. For additional information see box on page 8.

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## Size and development of capital stock

In real terms, the gross capital stock (GCS) in the European Union amounts to 18.5 trillion ECU 85 in

Year	Gross capital stock	GFCF	Retirements
1959	4303	265	78
1960	4547	324	80
1961	4820	355	82
1962	5109	374	85
1963	5412	391	88
1964	5749	428	91
1965	6098	444	95
1966	6462	464	100
1967	6838	481	105
1968	7239	511	110
1969	7671	548	117
1970	8119	571	124
1971	8578	590	131
1972	9049	610	139
1973	9546	645	147
1974	10019	629	156
1975	10450	597	166
1976	10883	609	176
1977	11313	617	187
1978	11746	631	198
1979	12188	653	209
1980	12633	665	221
1981	13031	630	233
1982	13401	615	245
1983	13761	616	257
1984	14117	626	269
1985	14476	640	282
1986	14857	676	295
1987	15262	712	307
1988	15712	769	319
1989	16205	824	331
1990	16720	858	342
1991	17230	863	353
1992	17714	848	364
1993	18122	784	376
1994	18528	795	389

1994 (Table 1). That is roughly four times the size at the beginning of the sixties, double that at the beginning of the seventies and one and a half the 1980 value.

The average ratio of gross fixed capital formation (GFCF) to GCS in the sixties was about 7.2%, falling

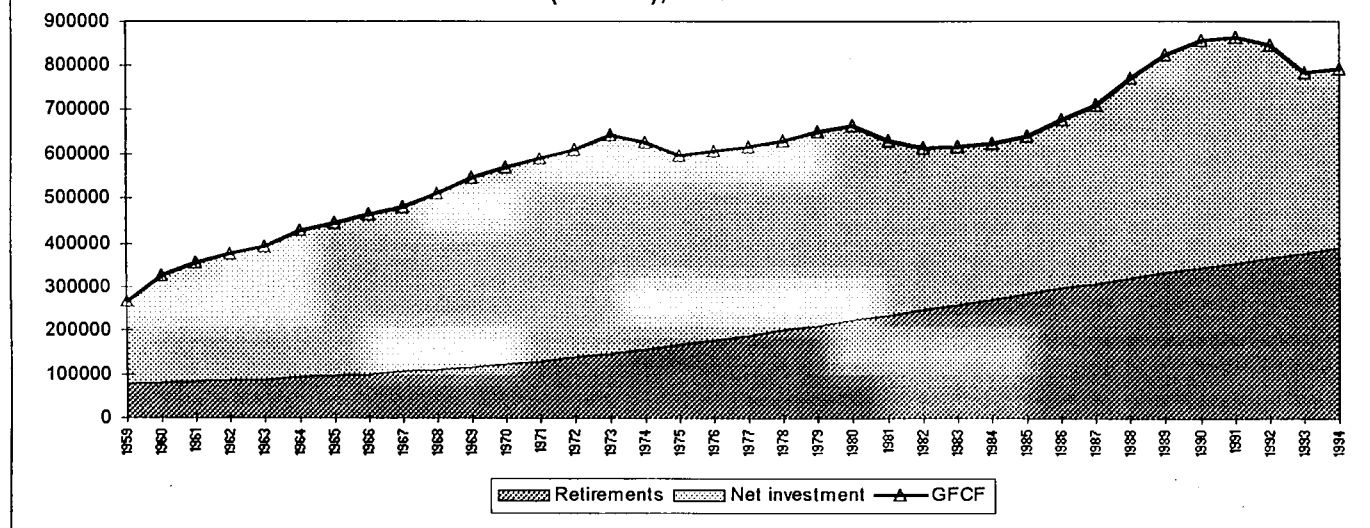
to 6.0% in the seventies and 4.7% in the eighties. Despite the setbacks to GFCF in 1992 and 1993, the average ratio for 1990 to 1994 shows only a further shallow reduction of the ratio of less than 0.03 points.

By comparing the volume development of retirements and GCS (Figure and Table 1) a basic change in expansion speed is highlighted. Whereas the expansion status of capital stock exceeded that of retirements up to 1981, the reverse is true for the rest of the period observed. Up to 1970 the expansion pace of GCS was faster than retirements, whereas for the following years to 1985 the lag in GCS pace widened. Between 1986 and 1990 the GCS expansion pace lag was reduced, but retirements still grew faster. Even the exceptionally strong growth in GFCF in the second half of the eighties did not lead to a catching up of GCS expansion status to retirements. Thus the further expansion in the gap in the early nineties resulted in 1994 with a roughly 70 point higher volume expansion status of retirements than GCS, with GCS at 4.3 times the 1959 volume and retirements five times higher. As a result, the 1994 gross capital stock was only roughly 48 times the retirements, whereas in 1960 the corresponding ratio stood at about 57.

However, 1986 was the first year since 1969 that GFCF grew stronger than retirements (Figure 2, Table 1), and the growth excess of one point widened to 3.5 points in 1989 before falling to 0.7 points in the subsequent year. After turning to negative growth difference between GFCF and retirements in 1991 (-2.7 points) the gap expanded to -4.8 points in 1992 and to -10.8 points in 1993. With an expansion speed differential of -2.0 points in 1994 the growth lag of GFCF to retirements came close to a fairly balanced development of GFCF and retirements again.

Whereas the GFCF in the sixties and the early seventies was between four and five times the retirements, this ratio shrank continually to about two and

Figure 2: Gross fixed capital formation and retirements in the European Union (EUR 12), in Mio ECU 85



a quarter in 1985. The subsequent years of slight improvement lifted the ratio to 2.5 in 1990, but nearly one third of the 150% lead of GFCF over retirements was lost in the early nineties. After four years of declining ratio, the GFCF was only slightly above double the retirements in 1994. However, with around 500 billion ECU 85, the annual net investment in the years 1989 to 1991 reached the highest levels during the period considered. In 1992 and 1993, the net investment dropped to 484 and 408 billion ECU 85 respectively and levelled out at 406 billion ECU 85 in 1994. Even this last figure is considerably higher than those seen in the first half of the eighties.

During the sixties, on average about 57% of GFCF was due to net investment. Dropping by more than

12 points in the seventies, it reached about 32% in the eighties, with minimum values in 1984 and 1985 (27% each). After regaining eleven points during the strong GFCF expansion to 1990, another downturn set in, resulting in the lowest share of net investment in GFCF in the period observed for 1994 (24.4%).

However, when compared with the 1993 ratio (25.0%) the downturn came to a temporarily halt in 1994, after it had dramatically dropped nearly eight points between 1992 and 1993. The average for the first four years of the nineties shows, that about two thirds of GFCF was used to compensate the capital consumption, and in 1993 and 1994 only one out of four ECU spent on capital formation was net investment.

### Modernness of the capital stock

The ratio between the net and gross capital stock gives an indicator for the degree of modernness. During the sixties (*Figure 3 and Table 2*) the strong pace of modernising the capital stock brought the ratio close to 69%, gaining nearly five points in one decade. Levelling out around this ratio in the early seventies, the year 1974 marks the turn-around of the modernisation process. Throughout the rest of

the period, the decline in degree of modernness never abated. Even the strong increase in GFCF during the second half of the eighties only resulted in a deceleration of the downturn. For the early nineties this indicator of modernness reveals a further deceleration in restructuring pace for capital stock, in 1994 dropping more than one point below the level observed in 1960.

Figure 3: Total modernness of capital stock in the European Union (EUR 12), based on data in ECU 85, as a %

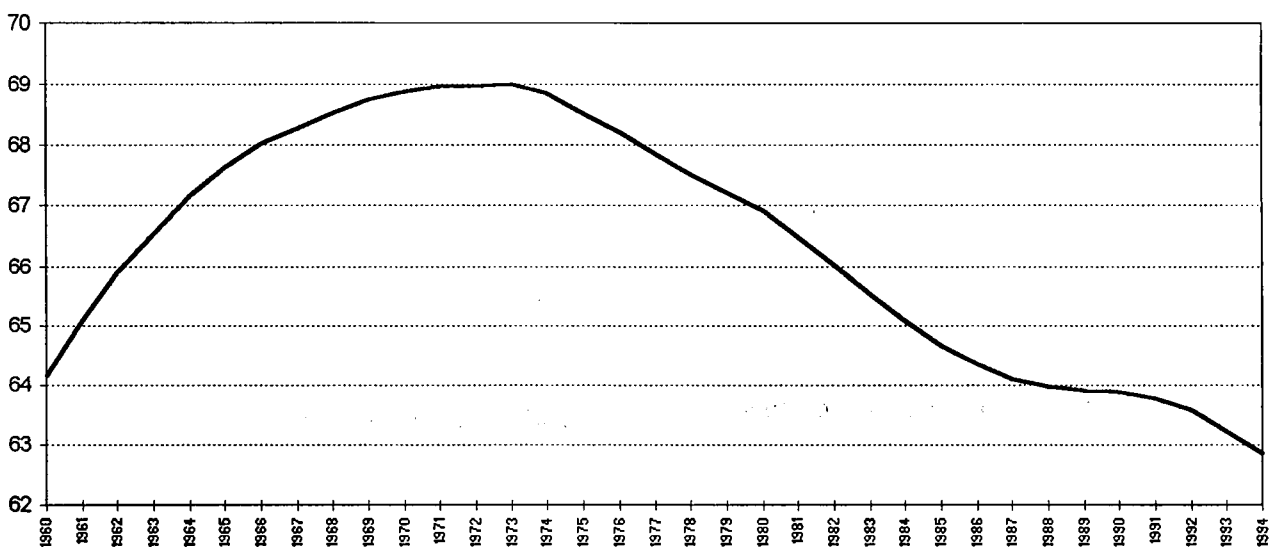
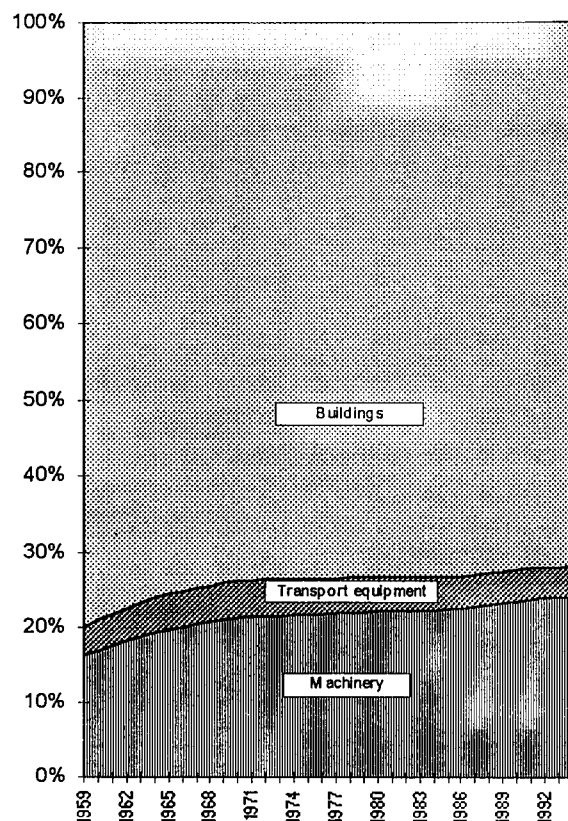


Table 2: Total modernness of capital stock in the European Union (EUR 12), based on data in ECU85, as a %

	Net capital stock/gross capital stock
1959	63.18
1960	64.16
1961	65.10
1962	65.90
1963	66.55
1964	67.18
1965	67.65
1966	68.03
1967	68.29
1968	68.52
1969	68.74
1970	68.89
1971	68.97
1972	68.99
1973	69.01
1974	68.86
1975	68.55
1976	68.22
1977	67.88
1978	67.54
1979	67.23
1980	66.92
1981	66.49
1982	66.00
1983	65.52
1984	65.08
1985	64.67
1986	64.35
1987	64.11
1988	63.97
1989	63.92
1990	63.87
1991	63.77
1992	63.58
1993	63.22
1994	62.87

With 24% of the GCS in 1994 machinery recorded an increasing relative importance of 7.8 points with respect to 1959. Up to the early seventies the expansion speed of machinery's share was slightly slower than the contraction pace in the share of buildings, whereas for the rest of the period the inverse holds true.

Figure 4: Breakdown of gross capital stock in the European Union (EUR 12) by type of capital good, based on data in ECU85



Consequently the portion of **transport equipment** underwent a shallow upturn up to the early seventies, expanding by one percentage point between 1959 and the maximum of 4.9% in 1971. The subsequent years - except 1973 with a marginal increase - are characterised by a structural loss, accelerated during the first half of the eighties. During the late eighties and early nineties the downturn in portion was decelerated and during the years 1989-91 a small gain was realised. However, after the minor losses of 1992-94, and with slightly more than 4.4% in 1994, the share had fallen below the value of the beginning of the sixties.

The restructuring efforts are reflected by the modernness of the capital stock components, as the ratios between net and gross capital stock (Figure 5 and Table 4) show. Being around 63% each in 1959, the degree of modernness for buildings improves for 15 consecutive years before turning to the opposite for the rest of the period observed. However, buildings remain the only component of the capital stock for which the degree of modernness in the early nineties is higher than at the beginning of the

### Capital stock by type of capital good

The structural composition of the gross capital stock in the Union in constant prices (Figure 4 and Table 3) reveals a decline in the share of buildings and an increase in relative importance of machinery. The portion of transport equipment is more constant.

**Buildings** remain by far the biggest part of the GCS in 1994, accounting for around 72% compared with four fifths in 1959. The bulk of this 8 point loss in relative importance is recorded for the sixties (-6 points), whereas by the end of the seventies roughly another half point was lost. During the eighties the buildings share developed to around 73%, and in the early nineties another percentage point was lost.

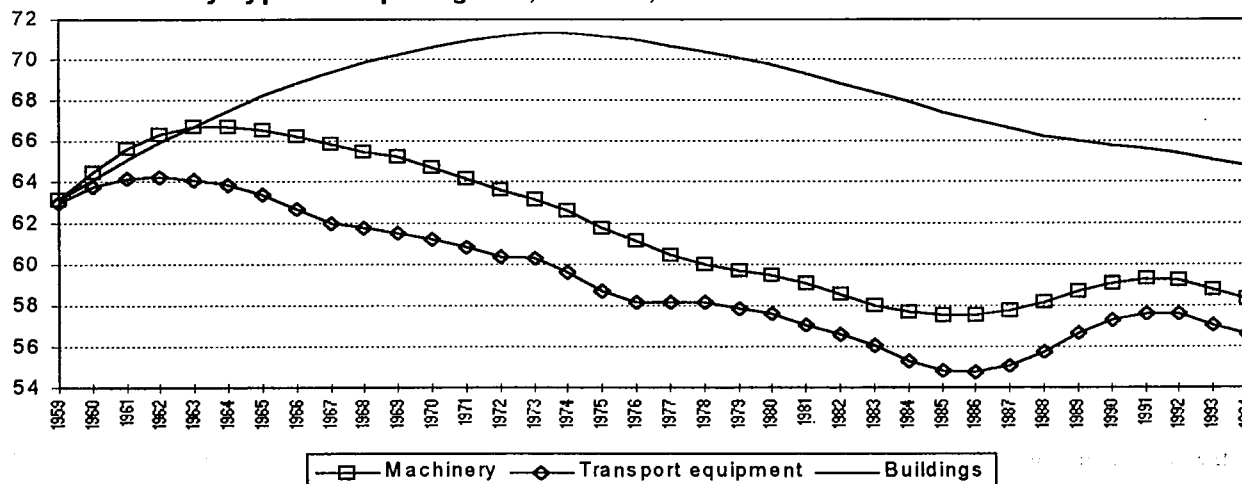
sixties. In addition, due to the huge portion of buildings in the total capital stock, the shape of the curve indicating its modernness (Figure 5) is largely

determined by the buildings component. It covers the early set in and strong decline in the degree of modernness for machinery and transport equipment.


**Table 3: Capital stock in the European Union (EUR 12) by type of capital good in bn ECU85**

Year	Machinery		Transport equipment		Buildings	
	Gross capital stock	Net capital stock	Gross capital stock	Net capital stock	Gross capital stock	Net capital stock
1959	698	441	166	105	3439	2173
1960	768	495	184	117	3596	2305
1961	848	556	202	129	3770	2452
1962	933	618	220	142	3956	2607
1963	1021	680	240	154	4151	2767
1964	1111	741	262	167	4376	2954
1965	1202	799	283	180	4613	3146
1966	1300	861	304	191	4859	3344
1967	1398	921	325	201	5115	3547
1968	1501	982	349	215	5390	3763
1969	1616	1054	373	229	5681	3989
1970	1723	1114	397	243	5999	4236
1971	1833	1175	420	256	6325	4485
1972	1943	1236	442	267	6664	4740
1973	2062	1303	466	281	7018	5004
1974	2174	1361	484	289	7361	5250
1975	2271	1403	497	292	7682	5469
1976	2373	1451	511	298	7999	5677
1977	2472	1496	530	308	8311	5876
1978	2574	1544	547	318	8625	6072
1979	2686	1602	561	324	8944	6269
1980	2801	1666	575	331	9257	6457
1981	2898	1711	584	333	9548	6619
1982	2985	1747	593	336	9823	6763
1983	3067	1780	600	336	10094	6901
1984	3151	1817	602	333	10364	7037
1985	3247	1867	604	331	10625	7163
1986	3355	1930	609	334	10893	7297
1987	3477	2009	619	341	11166	7435
1988	3619	2105	634	354	11459	7592
1989	3776	2215	654	371	11774	7772
1990	3940	2328	675	387	12105	7965
1991	4098	2430	697	401	12435	8157
1992	4242	2513	716	412	12756	8338
1993	4348	2555	730	417	13044	8485
1994	4452	2596	743	421	13333	8631

**Figure 5: Modernness of capital stock in the European Union (EUR 12) by type of capital good, as a %, based on data in ECU 85**



**Table 4: Modernness of capital stock in the European Union (EUR 12) by type of capital good, based on ECU85, as a %**


	Machinery	Transport equipment	Buildings
1959	63.19	62.97	63.18
1960	64.49	63.78	64.11
1961	65.60	64.16	65.04
1962	66.30	64.21	65.90
1963	66.66	64.08	66.66
1964	66.71	63.86	67.49
1965	66.50	63.41	68.22
1966	66.26	62.72	68.83
1967	65.86	62.04	69.35
1968	65.45	61.78	69.81
1969	65.22	61.52	70.22
1970	64.67	61.24	70.61
1971	64.14	60.86	70.91
1972	63.60	60.40	71.13
1973	63.17	60.29	71.30
1974	62.59	59.63	71.32
1975	61.78	58.70	71.18
1976	61.13	58.18	70.97
1977	60.49	58.16	70.70
1978	59.98	58.13	70.40
1979	59.67	57.85	70.09
1980	59.48	57.63	69.75
1981	59.04	57.08	69.32
1982	58.52	56.63	68.84
1983	58.03	56.06	68.37
1984	57.66	55.29	67.90
1985	57.50	54.82	67.42
1986	57.55	54.74	66.98
1987	57.77	55.08	66.58
1988	58.17	55.80	66.26
1989	58.66	56.69	66.00
1990	59.07	57.33	65.80
1991	59.29	57.64	65.59
1992	59.24	57.59	65.36
1993	58.77	57.10	65.04
1994	58.30	56.62	64.74

In the early sixties the modernisation speed in machinery was fairly similar to buildings, but then a downturn set in that lasted up to 1985. The turnaround in 1987 was followed by slight acceleration in modernisation activities in the subsequent years and another shallow decrease in 1992 and 1994. For transport equipment, with the lowest degree of modernness, the gap to machinery first widened during the sixties but narrowed during the seventies to a differential around two points. The strongly accelerated set back in modernisation activities during the subsequent years widened the difference again, to about three points in 1986. However, during the following years strong restructuring efforts brought another reduction in the modernisation lag with respect to machinery. With a 1.7 point lower indicator than machinery, the years 1990-1994 are characterised by a difference similar to that of the late seventies and early eighties.

## The capital stock per occupied person

The GCS per occupied person (*Figure 6 and Table 5*), frequently used as an indicator for capital intensity, gives rough information on average cost for creating a new working place. In 1994, the average GCS for one working place in the Union was about 181 000 ECU.

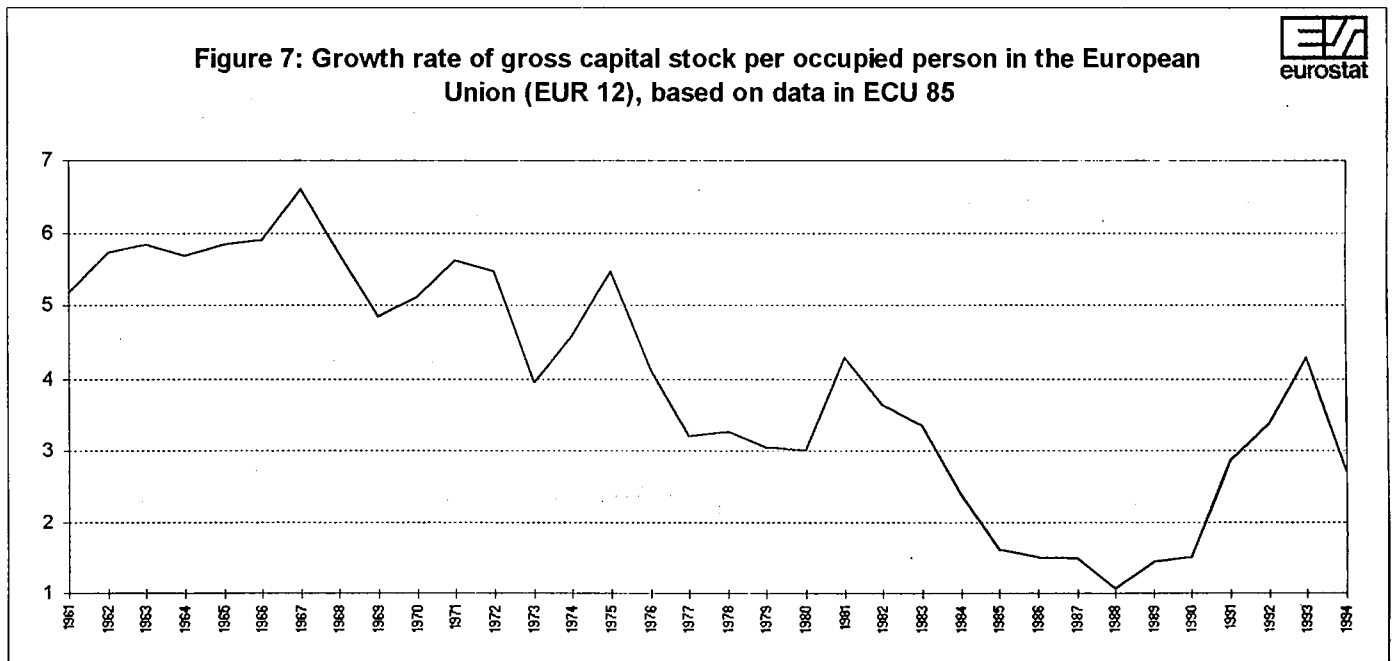
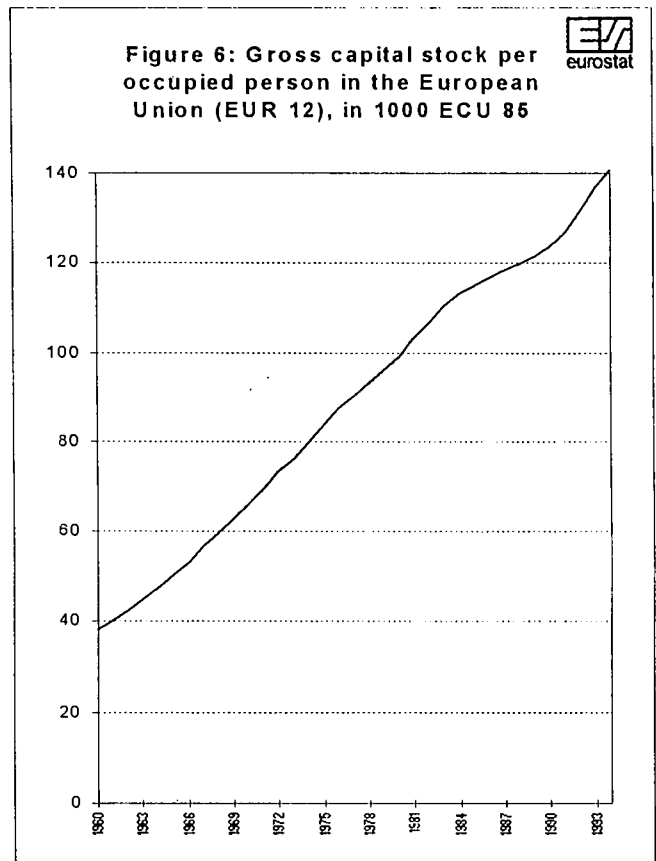
**Table 5: Gross Capital stock in the European Union (EUR 12) per occupied person, in 1000 ECU**

	At prices and exchange rates of 1985	At current replacement cost
1960	38	7
1961	40	7
1962	42	8
1963	45	9
1964	47	10
1965	50	11
1966	53	12
1967	57	13
1968	60	14
1969	63	15
1970	66	19
1971	70	21
1972	73	24
1973	76	27
1974	80	33
1975	84	39
1976	88	45
1977	90	50
1978	93	56
1979	96	63
1980	99	74
1981	103	85
1982	107	95
1983	111	102
1984	113	109
1985	115	115
1986	117	119
1987	119	124
1988	120	131
1989	122	140
1990	123	149
1991	127	159
1992	131	167
1993	137	174
1994	141	181

The increase in real terms of GCS to keep one job competitive rose relentlessly between 1960 and 1994; in total it amounted to 270%. During the sixties the increase was 65%, decelerating in the seventies (+ 46%) and between 1980 and 1989 the rate was 23%. This slowing down in the capital stock growth per working place is replaced in the early nineties by an acceleration, with the increase between 1990 and 1994 already amounting to 14%.

The annual growth rates of GCS per occupied person are depicted in *Figure 7*. The growth underwent a downward trend from 1968 onwards with the minimum rate of just over one percent recorded in 1988, coming down from six and a half percent in 1967. Whereas the first two accelerating periods in the seventies lasted two years, the following two in 1978 and 1981 were single year increases.

The turn-around in downward trend took place in 1989, with strongly accelerated growth in the years 1991 to 1993. With an acceleration in growth of around one and a half points 1991 marks by far the strongest annual upward move in capital stock per occupied person for the period covered. Together with the exceptionally strong increases in GCS per occupied person in 1992 and 1993, the cost of capital endowment per job jumped 11% in real terms between 1990 and 1993.



The Eurostat study: "The Capital Stock in the European Union" can be obtained from the  
**Official Publications Office of the European Communities**  
 2, rue Mercier  
 2985 Luxembourg  
 Tel.: 0035-49928-1  
 Fax: 0035-488573/486817

The capital stock data for the European Union can be obtained from the  
**Eurostat Data-Shop**  
 2, rue Jean Engling  
 L-1466 Luxembourg/Dommeldange  
 Tel.: 0035-433522227  
 Fax: 0035-433522245

### Brief description of the terms used

#### Gross capital stock

The gross capital stock represents the gross value of capital used in production at a given point in time. It represents the cumulative value of past investment less accumulated retirements of capital goods. Thus it is equivalent to the cumulative value of past investment still in use. It is the value of the capital goods still in use at prices as if they were new.

#### Net capital stock

The net capital stock represents the cumulative value of past investment less accumulated capital consumption. It is equivalent to the financial value of the gross capital stock. The value of the capital goods is calculated at prices which they would command if they were put on the market in their present state.

#### Retirements of capital goods

Retirements represent the gross value of capital goods that are physically removed from the capital stock within a period of time. The removal may be determined by technical reasons (technical breakdown, destruction by accidents, fire etc.) or by economic reasons (emergence of new technologies, price changes of technical substitutes, closure of factories etc.). Both have to be considered in the estimation of the lifetime of capital goods.

#### Constant replacement cost

The capital goods are valued at the prices prevailing in a selected base year. The gross capital stock at constant replacement cost represents the value of the capital goods on the assumption that all capital goods were purchased in the base year. The net capital stock at constant replacement cost shows the value of the capital goods on the assumption that all capital goods were purchased in their present state (that means, after depreciation) in the base year.

Gross capital stock at the end of the year (t-1)  
+ gross fixed capital formation during the year (t)  
- retirements during the year (t)  
= gross capital stock at the end of the year (t)

The capital stock at constant replacement cost is often referred to as "real" capital stock. This relies on the assumption that inflationary or deflationary changes in prices of capital goods can be identified and excluded from the calculations. As the valuation is done by deflation of investment series, all difficulties involved in deflation are however present in capital stock figures. As the price series are not able to separate quality determined changes in price from other determinants, this leads to substantial errors in the estimations. (For example, in the case of computers, past figures at constant replacement cost are overestimated.) Nevertheless, capital stock figures at constant replacement cost provide an approximation to inflation or deflation free values of capital.

#### Current replacement cost

All capital goods are valued at the price prevailing in the current year. The gross capital stock shows the value of the capital goods assuming that all goods were purchased new in the year considered. The net capital stock at current replacement cost is the value of the capital stock assuming that all goods were purchased in their current state in the year considered. As the capital goods purchased in previous years have to be revalued year by year, changes in the capital stock value appear as a new booking item in capital stock accounts. The value of the gross capital stock at the end of the year is calculated as:

Gross capital stock at current replacement cost at the end of the year (t-1)  
+ investment during the year (t)  
- retirements during the year (t)  
+ changes in value of gross capital stock during the year (t)  
= gross capital stock at current replacement cost at the end of (t).

The value change item has to be recorded as return or loss on capital investment. This is required to maintain consistency of both wealth and income. The changes in value also affect the definition of capital consumption.

### General information on the study:

#### "The Capital Stock in the European Union"

Together with labour, the size and structure of the capital stock determine the potential output of an economy. As with labour, where skills and knowledge - frequently categorised under human capital - influence the factor productivity, the capital stock contains a quality dimension, described as technical progress or innovation. Combining these two factors in production, with regard to size and quality, leads to the usual terms of productivity and efficiency.

The aim of this study is to present the basic developments of the Union's capital stock in terms of size and structure. By covering more than three decades, these results allow the Union's capital stock in use in the nineties to be put into perspective. The breakdown of capital stock by branch groups, branches and type of capital good may also give an impression of intensity and pace of structural change within the Union's economy.

The examination of capital stock data in this report is kept purely descriptive and favours various types of visualisation techniques to illustrate the results. Only in certain cases where this is inappropriate, are simple tools of descriptive statistical analysis applied, such as average deviations or correlation coefficients. It should be possible to derive basic developments in capital stock structural change and evolution by using these simple instruments, allowing an initial structural diagnosis.

Capital stock estimates can be derived either using survey results relating to the stock directly or using annual investment data and applying the „perpetual inventory method (PIM)". The availability of data relating directly to capital stock is very limited. In addition, these stock data are usually stated at book value. They do not provide detailed information about the different vintages of assets necessary to derive stock estimates at current and constant prices, which are then useful for many kinds of economic analysis. The survey results of EUROSTAT and OECD on methodologies used to calculate capital stock data show that most of the capital stock estimates, which are presently available, are based on the perpetual inventory method.

The perpetual inventory method, which has been used to derive the estimates presented in this report, starts with the investment flows in both current and constant prices. The gross capital stock for a given year is calculated by cumulating past investment and deducting the cumulated value of investment that has been retired, using estimated average service lives and retirement patterns. The net capital stock is obtained in a similar manner, using a depreciation formula to write off the value of assets over their service lives to determine the financial value of the physical capital stock still in use. The main advantage of the perpetual inventory method is that in many countries comprehensive and relatively reliable estimates of investment flows are available. In conclusion, EUROSTAT has developed a harmonised methodology to calculate capital stock data for the member countries using the perpetual inventory method.

In economic analysis, capital stock data are needed to measure the volume and development of the production facilities which determine the production capacities of an economy and contain large parts of technical innovation and efficiency. In this sense the capital stock is a "real" component of economic activity that reflects the physical character of capital in terms of "quantities" of machinery, transport equipment, buildings etc. used in production. Conversely capital is a financial category which measures fixed capital at a given point in time. Capital stock in this sense is a figure that can be found in balance sheets of companies representing substantial parts of their assets. Moreover, reliable capital stock data are needed to calculate capital consumption for national accounts.