Depression and Capital Formation: The United Kingdom and Germany, 1873-96

Young Goo Park*

Pusan University of Foreign Studies

During the Great Depression 1873-96, most European countries experienced a drastic fall in prices so that the wholesale price indices of major European countries recorded a level of 58.5-60.0 in 1896, taking 100 for the year of 1873.[1] In such a situation, the corporations' efforts to reduce the cost of production brought an increase in productivity in the latter half of the nineteenth century. As a result an increase in industrial production took place in various countries, but the growth rate of production and other economic performances in each country were different. For example, while the rate of increase in industrial production during the Great Depression was around 40.6 per cent for the UK,[2] Germany recorded a 108.3 per cent increase,[3] and while the value of British exports stood still or even decreased,[4] the value of German exports increased by 30 per cent.[5]

Of course, in spite of the criticism of many existing studies which exaggerates the stagnation of the British economy,[6] the UK was still a strong commercial power and Germany trailed behind the UK in the

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1 B. R. Mitchell, *European Historical Statistics 1750-1970* (Macmillan, 2nd edn. 1981), pp. 772-5.

2 The UK refers to the United Kingdom and Germany includes Alsace-Lorraine and is based on the territories of the German Reich after 1871. The same shall apply hereinafter.

3 B. R. Mitchell, *European Historical Statistics, op. cit.* (note 1), p. 375.

4 *Ibid.*, p. 512.

5 This figure for Germany was calculated for 1875-95 because of missing data. D. S. Landes, *The Unbound Prometheus* (Cambridge, 1991), p. 328.

6 About the stagnation of the English economy, there was a controversy between A. E. Musson and A. Levis, D. J. Coppock, and a just criticism by D.N. McCloskey. A.E.

world market even after the Great Depression. The volume of German trade was only three-fifths of that of the UK in 1895.[7] But it was obvious that there appeared a big difference in the growth rate of industrial production and exports between the two countries and Germany made relatively rapid progress[8] during the Great Depression even when we consider the different stages of economic development in which the two countries found themselves.

To explain this, most studies have so far pointed out two reasons: one is the UK's high 'related costs' of adjustments or the UK's comparative disadvantages of priority,[9] and the other is the competition in the international market which led to a sharp decrease in UK's export demands.[10] But as far as the first point is concerned, it is not by large based on measurable or quantitative criteria but rather on abstract and qualitative analyses, and furthermore it ignored the fact that Germany was not the only late-

Musson, "British Industrial Growth during the "Great Depression" (1873-96): Some Comments", *The Economic History Review*, 2nd ser., XV (1963), p. 531; D. J. Coppock, "British Industrial Growth during the 'Great Depression'(1873-96): a Pessimist View", *The Economic History Review*, 2nd ser., XVII, No.2 (1964), pp. 391-3; A. E. Musson, "British Industrial Growth, 1873-96: A Balanced View", *The Economic History Review*, 2nd ser., XVII (1964), pp. 397, 400-1; D. N. McCloskey, 'Did Victorian Britain Fail ?', *The Economic History Review*, 2nd ser., XXIII (1970), pp. 446-59.

7 D. S. Landes, *The Unbound Prometheus, op. cit.* (note 5), p. 328.

8 Of course, the economic development of Germany during the Great Depression had a previous economic foundation. Rostow defined the periods of 1850-70 as the stage of take-off in German economic development. W. W. Rostow, *The World Economy: History & Prospect* (University of Texas Press, Austin & London, 1978), p. 68.

9 M. Frankel, "Obsolescence and Technological Change in a Maturing Economy", *American Economic Review*, XLV (1955), pp. 296-319; W. E. G. Salter, *Productivity and Technical Change* (Cambridge, 1960); C. P. Kindelberger, "Obsolescence and Technical Change", *Oxford University Institute of Statistics Bulletin*, XXIII (1961), pp. 281-97. D. S. Landes, *The Unbound Prometheus, op. cit.* (note 5), pp. 334-7, 353. H. J. Habakkuk, *American and British Technology in the Nineteenth Century: The Search for Labour-Saving Inventions* (Cambridge, 1962); A. E. Musson, "British Industrial Growth during the "Great Depression" (1873-96): Some Comments", *op. cit.* (note 6), pp. 529-33; Y. Yamajaki, "Igirishi"('England'), in: S. Hachie (ed.), *Koja Seiyokeizaishi 3* (*'Lecture, Western Economic History 3'*) (Tobunkan, Tokyo, 1980), p. 78.

10 W. A. Lewis, *Economic Survey, 1919-1939* (George Allen & Unwin, London, 1949), p. 74; J. R. Meyer, "An Input-Output Approach to Evaluating British Industrial Production in the Late 19th Century", *Exploration in Entrepreneurial History*, VIII (1955), pp. 184-92; D. J. Coppock, "The Climacteric of the 1890's: A Critical Note", *The Manchester School of Economic and Social Studies*, XXIV (1956), p. 2.

comer in that period. Regarding the second point, it has been already shown in many studies that there were some methodological problems involved.[11]

This paper intends to focus on the comparison between the UK and Germany, which has been less studied than the comparison between the UK and the U.S.A.,[12] from the perspective of capital formation during the Great Depression.

Ratio and Direction of Capital Formation

A basic difference between the UK and Germany lay in differences over the recognition about economic circumstances and the resultant countermeasures. This is well shown in table 1 which presents capital formation ratios of both countries.[13]

In the 1860s, before the Great Depression, the British ratio of net national capital formation to net national product at constant prices was 11.5 per cent, which was higher than Germany's 10.6 per cent. But in the 1870s, as the Depression started, the net national capital formation ratio of the UK decreased to 10.9 per cent, while German figures rose to 13.0 per cent which is higher

[11] For one example, the input-output analysis by J. R. Meyer(1955) considered the matrix of inter-industry requirements as a matrix of constants. J. R. Meyer, "An Input-Output approach to Evaluating British Industrial Production in the Late 19th Century", *op. cit.* (note 10 D. N. McCloskey, "Did Victorian Britain Fail ?", *op. cit.* (note 6), pp. 447-8.

[12] Comparative studies between the UK and the United States include I.W. McLean, "Anglo-American Engineering Competition, 1870-1914: Some Third-Market Evidence", *The Economic History Review,* 2nd ser., XXIX (1976), pp. 452-64; L. Davis, "The Capital Markets and Industrial Concentration: the U.S. and U.K., A Comparative Study", *The Economic History Review,* 2nd ser., XIX (1966), pp. 255-72;D. L. Burn, "The Genesis of American Engineering Competition, 1850-70", in: S. B. Saul (ed.), *Technological Change: the United States and Britain in the 19th Century* (1970), pp. 77-98; S. B. Saul, "The Market and the Development of the Mechanical Engineering Industries in Britain, 1860-1914", *The Economic History Review,* 2nd ser., XX (1967), pp. 111-30; R. C. Floud, "The Adolescence of American Engineering Competition, 1860-1900", *The Economic History Review,* 2nd ser., XXVII (1974), pp. 57-71.

[13] The estimation of capital formation in the UK by P. Deane and W.A. Cole(1962) was over-estimated for 1865-85 and was underestimated after 1913 because it was derived from income-based estimate of the capital stock. P. Deane and W. A. Cole, *British Economic Growth 1688-1959* (Cambridge, 1964).

TABLE 1- Capital Formation Ratios, UK and Germany, 1860-1904

UK					Germany			
period	NDCF[a]/NDP[b]		NNCF[c]/NNP[d]		period	NDCF[a]/NDP[b]	NNCF[c]/NNP[d]	
	curr[e]	cons[f]	curr[e]	cons[f]		curr[e]	curr[e]	cons[f]
1860-69	7.2	8.6	10.0	11.5	1861-70	8.5	9.7	10.6
1865-74	7.5	7.3	12.1	11.9	1866-75	-	-	12.1
1870-79	8.2	7.3	11.8	10.9	1871-80	11.6	13.5	13.0
1875-84	7.9	6.6	10.7	9.4	1876-85	-	-	13.0
1880-89	6.4	3.4	10.9	8.1	1881-90	11.2	14.0	14.5
1885-94	6.0	2.0	10.6	6.8	1886-95	-	-	14.6
1890-99	7.3	3.0	10.1	6.0	1891-900	13.9	15.4	15.9
1895-904	8.8	4.8	10.5	6.7	1901-13	15.6	16.5	15.9

notes: [a] net domestic capital formation. [b] net domestic product. [c] net national capital formation. [d] net national product. [e] percentages based on current price totals. [f] percentages based on constant price totals.
source: S. Kuznets, "Quantitative Aspects of the Economic Growth of Nations: v1. Long-Term Trends in Capital Formation Proportions", *Economic Development and Cultural Change*, IX, 4, part 11 (July, 1961).

than the UK's. In the 1880s, as the Depression went on, the net national capital formation ratio fell drastically to 8.1 per cent for the UK but rose sharply to 14.5 per cent for Germany.

From the above observations, we may note that capital formation in the UK and Germany moved in opposite directions during the Great Depression. The ratio of capital formation in Germany was not only higher than that of the UK but also in the case of the UK, unlike Germany, the ratio of net domestic capital formation to the net domestic product and the ratio of net national capital formation to the net national product all showed a negative growth rate during the Great Depression. Moreover, in the 1890s during which the business cycle passed its through and entered the recovery phase, the ratio of net national capital formation in Germany increased to 15.9 per cent which is the highest in the second part of nineteenth century while that of the UK dropped to as low as 6.0 per cent which is the lowest. This shows that capital

formation in Germany was very appropriate in timing too.

As far as the British economy is concerned, many studies have explained the above situation from a static standpoint on the basis of what may be called the 'deceleration principle': that is, the slowdown in the rate of capital formation was due to the falling growth rate of the national product. But what is more important is that in the case of the UK, unlike Germany, the drastic fall in capital formation contributed to the decrease in national product in the long run by 'reverse' multiplier effects.

Naturally, aggregate demand pertains not only to investment demand but also to consumption, government expenditure and export demand. However, short-term pure aggregate demand management policy during the Great Depression had some limits in both the UK and in Germany because with the exception of the first half of the 1890s, the unemployment rate was kept low and the increasing rate of growth of the labour force was lower than the aggregate production growth rate.[14] Therefore boosting of the non-labour factors, i.e., capital formation, was the only feasible and important short-term instrument.

Considered from a long-run and dynamic standpoint, the importance of capital formation becomes more obvious. At that time the growth rate of the labour force had appeared as a time-difference dependent variable of the aggregate production growth rate. Consequently if there was any factor which induced an equivalent expansion in the supply and demand side of the commodities market, a bottleneck in the factors market could not be a problem in the long run. This could be most properly accomplished by investment owing to its dual effect.[15]

After all, because the growth in real gross production could be effectively attained only by an increase in capital formation in the short term or long run, it was directly and extremely important for both countries to increase capital formation during the second half of the nineteenth century. Germany, which had relatively more

[14] D. N. McCloskey, "Did Victorian Britain Fail ?", *op. cit.* (note 6), pp. 448-9.

[15] E. D. Domar, *Essays in the Theory of Economic Growth* (Oxford, 1957), Preface.

difficulties than the UK as far as labour supply was concerned, chose to expand capital formation while the UK did not.

As indicated in Figure 1, the fall in the ratio of capital formation in the UK brought a decreasing capital-labour ratio and capital-output ratio in the 1880s and 1890s. As a result, the time-series correlation line between the capital-labour ratio and the capital-output ratio deviated greatly from Kaldor's 'stylized facts of economic growth',[16] which is empirically proved from economic data in developed countries for 70 years.

Moreover, for the UK, as she had already established a firm foothold in the overseas market by that time, much capital flew overseas as domestic industrial production was relatively stagnating during the Depression.[17] Table 2 shows this graphically.

TABLE 2- Incremental Capital-Output Ratios, Successive Long Periods, UK and Germany (Based on Current Price Proportions)

A. UK

period	duration	GDCF[a]/GDP[b]	GNCF[c]/GNP[d]	NDCF[e]/NDP[f]	NNCF[g]/NNP[h]
(1801-11)-(1821-31)	20	-	-	-	2.9
(1821-31)-(1851-61)	30	-	-	3.6	4.3
(1851-61)-(1870-79)	18.5	3.8	5.4	3.1	4.7
(1870-79)-(1890-99)	20	2.8	4.0	2.3	3.5
(1890-99)-(1905-14)	15	8.3	11.8	6.8	10.4

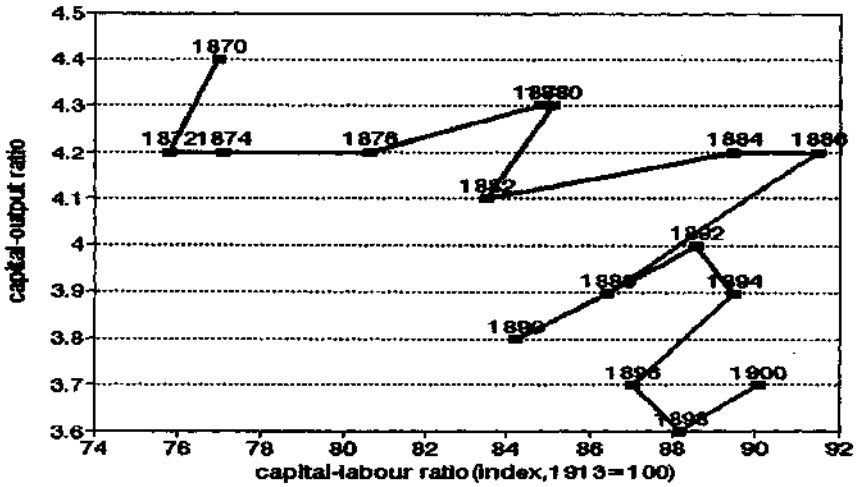
B. Germany

period	duration	GDCF[a]/GDP[b]	GNCF[c]/GNP[d]	NDCF[e]/NDP[f]	NNCF[g]/NNP[h]
(1851-55)-(1866-75)	17.5	4.9	5.2	3.1	3.4
(1866-75)-(1886-95)	20	7.2	8.2	4.7	5.7
(1886-95)-(1911-13)	21.5	7.9	8.2	5.2	5.6

notes: [a] gross domestic capital formation. [b] gross domestic product. [c] gross national capital formation. [d] gross national product. [e] net domestic capital formation. [f] net domestic product. [g] net national capital formation. [h] net national product.
source: S. Kuznets, "Quantitative Aspects of the Economic Growth of Nations", *op. cit.* (table 1).

[16] N. Kaldor, "Capital Accumulation and Economic Growth", in: F.A. Lutz, and D.C. Hague (eds.), *The Theory of Capital,* International Economic Association Conference

FIGURE 1- The Indices of Capital-labour Ratio and the Capital-Output Ratio, UK (at Constant Prices)



notes: Output is a compromise estimate of GDP (gross domestic product) at constant factor costs. The total employed labour force is used as labour. Capital stock uses gross stock of reproducible fixed assets at constant replacement costs.
source: C. H. Feinstein, *National Income, Expenditure and Output of the United Kingdom 1855-1965* (Cambridge, 1972).

During the Great Depression,[18] the ratio of gross national capital formation to gross national product in the UK was 4.0 per cent and that of Germany was 8.2 per cent, which is 2.05 times as large as the UK's. However as far as the ratio of gross domestic capital formation to gross domestic product goes, Germany's is 2.57 times as large as the UK's. The difference is greater. Even when calculated in net terms from the last two columns in Table 2, it has quite similar results.

Table 3 shows the ratio of foreign investment to total net capital

Volumes, number 1-50, number 8 (Stockton, N.Y., 1986), pp. 178-9.

[17] Many studies such as those by D. N. McCloskey, H. W. Richardson showed that the outflow of British capital was based upon the difference in profit rate and profit source etc. But these studies have a problem in that risk was not considered as a variable. D. N. McCloskey, "Did Victorian Britain Fail ?", *op. cit.* (note 6), p. 453; H. W. Richardson, "British Emigration and Overseas Investment, 1870-1914", *The Economic History Review,* 2nd ser., XXV (1972), pp. 397-403.

[18] Of course, there is a periodical difference between the two countries because of statistical limits.

TABLE 3- Foreign Investment as Percentage of Total Net Capital Formation, UK and Germany (at Current Prices)

periods	UK	periods	Germany
1865-74	40.1	(1861-65)-(1871-75)	12.9
1875-84	28.9	(1871-75)-(1881-85)	14.1
1885-94	51.2	(1881-85)-(1891-95)	19.9

source: D. S. Landes, *The unbound Prometheus* (Cambridge, 1991). p. 331.

formation in 3 different periods: 10 years before the Great Depression, the first half and second half of the Great Depression by intervals of 10 years.

Table 3 shows that British foreign investment in the period 1875-84 greatly decreased to 28.9 per cent from 40.1 per cent, the ratio of 10 years before (1865-74). But for 10 years in the second half of the Great Depression, the ratio rose rapidly to 51.2 per cent, which means more than 50 per cent of investment was carried out abroad. It has been generally believed that the outflow of British capital was responsible for the continuation of Britain's depression. From the above observation, however, we can see that there was a tendency for capital inflow at the beginning of the Great Depression[19] and that during domestic stagnation capital left the country in the second half of the Great Depression,[20] which in turn led to a vicious cycle within the British economy. On the other hand, in the case of Germany, foreign investment also increased as the Great Depression grew but it never exceeded 20 per cent of the net national capital formation, even for the last 10 years of the Great Depression.

Many existing studies have concentrated on the effect of investment outflow on British GNP and some of them suggested that the influence was not so significant.[21] But what is more important is

[19] This has been once pointed out by W. W. Rostow but ignored in most studies afterwards. W. W. Rostow, *The British Economy of the Nineteenth Century* (Oxford, 1948), p. 70.

[20] Until now, this dynamic change of British investment flows by period has not been pointed out in most studies.

[21] D. N. McCloskey, "Did Victorian Britain Fail ?", *op. cit.* (note 6), pp. 453-5.

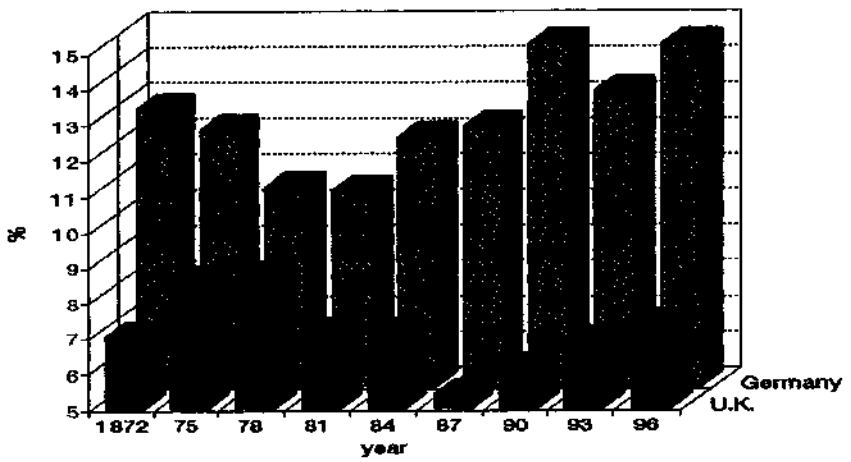
that the outflow of funds during domestic stagnation gave rise to a continuous shrinking of the market by reducing employment in the labour market and reducing the industrial linkage effect in the commodities market. The shrinking of the market, in its turn, made the structure of the British economy weak in the long run. Such different ratios of capital formation and the different trends in investment flows between the two countries, ultimately accounted for the two countries' divergent levels of industrial production and growth rates both during and after the Great Depression.

The Flexibility of Capital Formation: Time lag and distribution

To define some characteristics of capital formation in the UK and Germany during the Great Depression, let us examine the period concerned in more detail and see the ratio of capital formation in both countries. Figure 2 shows this.

As the method of estimation and the standard of data used were different, any direct comparison of both countries cannot be made. However, a relative comparison of both countries by time-serial changes in the respective countries is possible using figure 2. In the case of the UK, for the first three years in the period of Great Depression the ratio of gross capital formation to gross national product at current prices was 12.4 per cent, which is quite high following the prosperity in the 1860s and in the beginning of the 1870s. As the Great Depression went on, the UK simply reduced the level of capital formation in response to the Great Depression. Namely, the investment level in the 1880s was decided on the basis of the depression in the 1870s and the investment level in the first half of the 1890s was decided on the basis of the long-term depression of the 1880s. So, the ratio of gross capital formation in the UK decreased continuously, down to the level of 7 per cent in the 1880s and even to the level of 5-6 per cent at the end of the 1880s and at the beginning of the 1890s, from the level of 8 per cent in the 1870s which was already low enough. In the UK, it was not until after 1897 when the business cycle had already entered the stage of recovery that there

FIGURE 2- The Ratio of Capital Formation by Period, UK and Germany



notes: In the case of the UK, the ratio of capital formation is derived from gross capital formation/gross national product, and in Germany, net capital formation/net national product respectively, at 1900 constant prices for the UK and at 1913 constant prices for Germany. Stocks are not included in gross capital formation for the UK.
source: B. R. Mitchell, *European Historical Statistics 1750-1970* (Macmillan, 2nd edn. 1981).

appeared some signs of reviving capital formation.

Meanwhile, Germany decreased immediately the ratio of capital formation after the coming of the Depression and started to increase the ratio of capital formation again in the 1880s. With the beginning of the 90s, in the case of Germany, the ratio of capital formation passed the pre-1890 peak level because Germany actively increased investment in expectation of a period of expansion in the business cycle. But the ratio of capital formation in the UK in the first half of the 1890s showed much lower figures than in the 1870s.[22]

The above results shows the distinct difference in the flexibility between the two countries during the Great Depression, i.e., the

[22] Feinstein's estimate also shows that during the last four years at the end of the Great Depression, the ratio of gross capital formation in the UK was very low. C. H. Feinstein, *National Income, Expenditure and Output of the United Kingdom 1855-1965* (Cambridge, 1972), T10, T14, T37-8, T85-6.

"time-lag" difference in recognising and in acting upon the need for capital formation adjustment. In the case of Germany, the expectation was formed more rationally. That is to say, while the UK showed an investment pattern centred around the past, Germany showed rational and future-oriented investment activities which embraced the most recent variables and made forecasts for the future.

Underlying this difference between the two countries is the fact that the German government and firms attached great importance to the demand side, which reflected market movement quickly, while British government and firms looked to the supply side.[23] As a result, as the Great Depression advanced, the UK decreased supply and investment, while Germany expanded its capital formation.

In particular, in the case of the UK, the inflexibility in capital formation was more marked in the domestic sector as seen in Table 4. Therefore it had a more negative effect on the British economy.

Net foreign investment fell drastically with the coming of the Depression, but the ratio of gross domestic fixed capital formation to GNP shows a very high 9.2 per cent at constant prices through the 1870s even after the beginning of the Great Depression. In the 1880s, as the depression became protracted, the percentage of foreign investment increased but the ratio of gross domestic fixed capital formation to GNP fell drastically to the level of 6 per cent. The ratio of gross domestic fixed capital formation to GNP which showed such low figures at the end of the Great Depression, stayed at 8.8 per cent even in the latter part of the 1890s after the Great Depression, which was below the levels of the 1870s.

The inflexibility in the UK's capital formation becomes self-evident as we compare both countries' distribution of gross domestic capital formation period by period. First, table 5 shows the distribution of gross domestic capital formation by major categories in the UK.

In the case of the UK, the conversion in the distribution of gross

[25] The UK, at that time, was permeated with supply sided economics which was in vogue after the annulment of the Corn Law in 1846 rather than T. Malthus's effective demand logic.

TABLE 4- The ratio of Gross Domestic Fixed Capital Formation and Net Foreign Investment, UK (%)

	NFI[a]/GNP[b]		GDFCF[c]/GNP[b]	(T. I. /GNP)[d]
period	current prices	current prices	at 1900 prices	current prices
1870-3	6.2	6.5	7.1	12.7
1874-6	4.0	8.4	9.2	12.4
1877-9	1.6	8.2	9.2	9.8
1880-3	3.6	6.9	7.7	10.5
1884-6	5.1	5.9	6.8	11.0
1887-90	6.2	5.3	6.2	11.4
1891-4	3.8	6.1	7.3	9.9
1895-9	2.5	7.7	8.8	10.2
1900-3	1.4	9.4	10.7	10.8

notes: foreign investment is equal to the current balance in the balance of payments accounts.
[a] net foreign investment. [b] gross national product. [c] gross domestic fixed capital formation. [d] T.I./GNP= (NFI/GNP) + (GDFCF/GNP).
source: C. H. Feinstein, *National Income, Expenditure and Output of the United Kingdom 1855-1965, op. cit.* (figure 1).

TABLE 5- Distribution of Gross Domestic Capital Formation by Major Categories, UK (% Based on Current Price Totals)

	R.C.[a]	O.C.[b]	T.C.[c]	M.E.[d]	MFCF[e]	C.I.[f]
1860-69	13.3	7.5	20.9	35.4	23.6	19.9
1865-74	14.8	8.3	23.1	35.9	22.2	18.8
1870-79	16.9	9.6	26.5	34.8	21.7	16.9
1875-84	15.8	8.9	24.7	35.0	23.0	17.2
1880-89	14.6	7.1	21.8	34.4	22.5	21.4
1885-94	14.5	7.1	21.5	32.3	22.7	23.5
1890-99	15.4	8.2	23.5	32.2	23.9	20.4

notes : MFCF includes expenditures of railroads, local authorities, and telephone and telegraph companies.
[a] residential construction. [b] other construction. [c] total construction. [d] machinery and equipment. [e] mixed fixed capital formation. [f] change in inventories.
source: S. Kuznets, "Quantitative Aspects of the Economic Growth of Nations", *op. cit.* (table 1).

domestic capital formation did not occur as in the case of Germany even during the Great Depression and the distribution structure remained the same as it was in the prosperous times of the 1860s. That is, the conversion in the distribution of capital formation into the areas of basic needs such as housing and other construction did not occur during the Great Depression, but on the contrary the proportion of those basic needs decreased in the 1880s and in the first half of the 1890s. On the other hand, machinery and equipment continued to take an overwhelming share of more than 30 per cent of total capital formation. Owing to this inflexibility in the distribution of capital formation, British industrial sectors had to absorb the shocks of the Depression directly and suffered greatly. And also inventories increased during the Great Depression as seen in table 5.

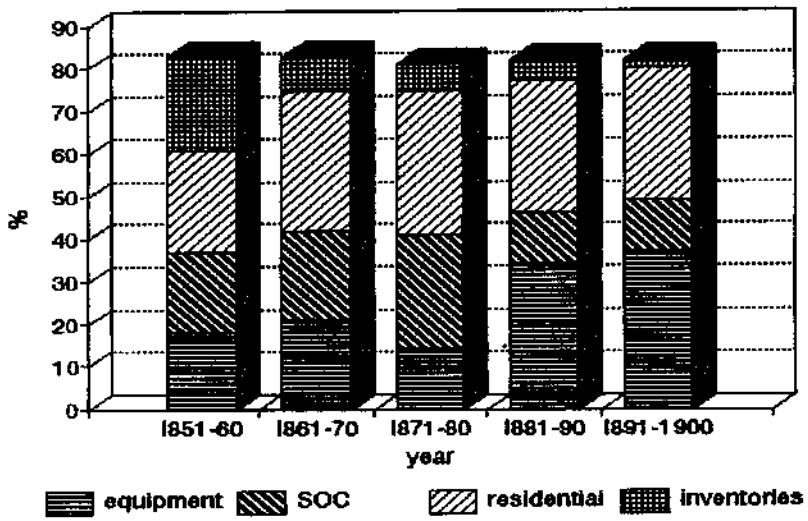
The inflexible nature of capital formation in the UK can be also seen from the fact that capital formation in machinery and equipment was in decline at the end of the Great Depression when it was really needed. The proportion of machinery and equipment was 35 per cent of total capital formation in the period of 1875-84, which was similar to the figure in the prosperous times of the 1860s, and it was in the first half of the 1890s when the proportion of capital formation in machinery and equipment fell sharply.[24] This shows a great contrast to the German pattern of capital formation during the same period. At the same time this meant that eventually, the British economy would suffer a bottleneck on the supply-side.

On the other hand, as figure 3 shows, the periodical distribution of net domestic capital formation in Germany showed clearly a future-oriented investment pattern and high flexibility in the conversion of capital formation.

What shows most clearly the flexibility of conversion in the capital formation of Germany is the time-serial changes in the proportion of social overhead capital and equipment (figure 3). The proportion of capital formation for the equipment sector was 21 per

[24] We can see this from the fact that the proportion of capital formation in machinery and equipment was 35.0% of total capital formation for 1875-84, 34.4% for 1880-9 and 32.3% for 1885-94.

FIGURE 3- Distribution of Net Domestic Capital Formation, Germany. (Based on Current Price Totals)



notes: residential: residential construction. S.O.C: canals, roads, railroads. equipment: equipment. inventories: change in inventories. inventories are given separately for agriculture alone.
source: S. Kuznets, "Quantitative Aspects of the Economic Growth of Nations", *op. cit.* (table 1).

cent of net domestic capital formation in the 1860s. It dropped sharply to 14 per cent at the beginning of the Depression in the 1870s. On the other hand, the proportion of total capital formation for social overhead capital rose sharply to 27 per cent of net domestic capital formation in the 1870s from 21 per cent in the 1860s. Based on this expansion in the proportion of capital formation in social overhead capital in the 1870s during the depression, the proportion of capital formation for equipment rose sharply to 34 per cent in the 1880s and thereafter it stayed above 30 per cent.

Such rapidity and appropriateness in the redistribution of capital formation reflects both the high flexibility and the concentration of capital formation in Germany. These helped the German economy to overcome limitations from the lack of investment funds. In fact, periodically, Germany opted for concentrating investment funds in strategic sectors.

Overall Germany differed from the UK not only in the absolute

ratio of capital formation but also in the concentration and flexibility of capital formation, which helped in maximizing industrial linkage effects and adjusting the business cycle periodically. Germany, having suffered relatively less from the Great Depression, could create indirect markets continuously - including the expansion of supply and demand capacity - and make it possible to expand the new economically-active population in the long-run.[25] The increase in the labour force accompanied by a low unemployment rate naturally led to the creation of additional markets on both the supply and demand side and the expansion of industrial activity.

From the above discussion, we can see that while Britain took the course of static supply-adjustment, Germany created effective demand and expanded industrial supply capacity through the expansion and adjustment of capital formation from a long-run perspective during the Great Depression.

The Capital Formation of Social Overhead Capital and the Role of Government

In the case of the UK, the level of capital formation in social overhead capital was very low in the 1870s. In the 1880s, too, capital formation in social overhead capital for transforming the industrial structure stagnated in spite of its necessity. Table 6 shows the ratios of capital formation in social overhead capital by industry in the UK from 1882, when estimation by detailed categories became possible.

In the UK, capital formation in electrical power, which was a new energy source and was becoming a new proxy variable of capital, hardly existed until the latter part of the 1880s. Even at the end of the Great Depression it stood below 2 per cent of gross domestic fixed capital formation. Capital formation in roads which were becoming a

[25] The annual average growth rate of the labour force was 1.41 % in Germany from 1871 to 1886-95 while 0.81% in the UK from 1871-81 to 1891-901. S. Kuznets, "Quantitative aspects of the economic growth of nations: v1. long-term trends in capital formation proportions", *Economic Development and Cultural Change*, IX, 4, part 11 (July, 1961), p. 34.

new artery for industrial activity, also had a weak 1-3 per cent share in gross domestic fixed capital formation, and moreover the ratio itself was falling. In addition, the capital formation in railways, one of the most important items in social overhead capital at that time, stagnated or decreased during the Great Depression. Capital formation in the post office as a proxy variable for the industrial communication network, was also almost non-existent until the 1880s. Throughout the Great Depression, it remained as low as less than 1 per cent of gross domestic fixed capital formation.

Table 6- The Ratio of Capital Formation in Social Overhead Capital to Gross Domestic Fixed Capital Formation by Industry, UK (at Current Prices, %)

year	electricity	railways	high ways and bridges	post office	gas and water
1882	-	*12.5*	*1.6*	-	*3.1*
1884	-	*17.2*	*3.2*	*0.5*	*3.8*
1886	-	*14.5*	*2.9*	-	*4.3*
1888	*0.7*	*12.2*	*2.0*	-	*4.1*
1890	*0.6*	*13.5*	*1.7*	*0.6*	*3.9*
1892	*0.5*	*13.4*	*1.5*	*1.0*	*4.1*
1894	*1.5*	*12.1*	*2.0*	*0.5*	*4.0*
1896	*2.2*	*12.4*	*1.8*	*0.9*	*4.4*
1898	*2.5*	*10.8*	*1.9*	*0.9*	*4.7*
1900	*3.3*	*9.5*	*2.8*	*0.8*	*4.3*

source: C. H. Feinstein, *National income, expenditure and output of the United Kingdom 1855-1965, op. cit.* (figure 1).

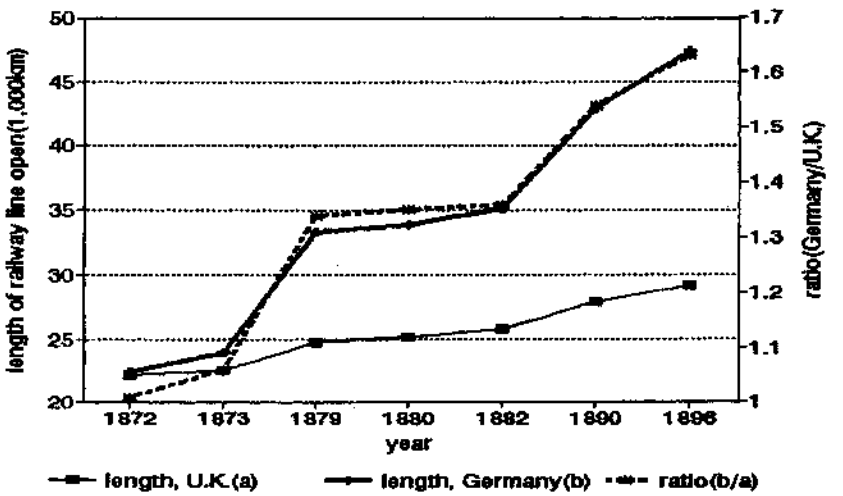
However, in the case of Germany, as observed in figure 3, the rate of capital formation of social overhead capital(SOC) rose sharply at the beginning of the Great Depression in the 1870s, which was a great contrast to the situation in the UK. Any direct quantitative comparison of SOC between Germany and the UK is practically impossible as the British estimates of social overhead capital are not available before 1880 and the classification standards and the method of estimation in the UK are different from Germany's. But, indirect quantitative

comparison of SOC in the two countries is made possible in two ways. First, we can use railroad and telephone communication data as proxies for each country's SOC as far as those two sectors were important components of SOC at that time. Second, for comparison we can use the distribution of capital formation by categories in each country. Let us examine them in turn.

Figure 4 shows the length of railway line in each country.

Compared with that of 1872, immediately before the Great Depression, the growth rate in the length of railway line laid in the UK was only 31.7 per cent up to 1896; in the case of Germany, it was 111.6 per cent or over twice that figure. As a result, while there was no major difference in the total length of railroad between the UK and Germany at the onset of the Great Depression, the latter possessed 63 per cent more railroad than the former in 1896 after the Great Depression. In the 1870s, just after the beginning of the Great Depression, the growth rate in the amount of railway line laid in the UK was 12.2 per cent and in Germany it was 48.7 per cent.

FIGURE 4- Length of Railway Line Open, UK and Germany.



notes: a, b: left Y axis.
ratio(b/a): right Y axis.
source: B. R. Mitchell, *European Historical Statistics 1750-1970, op. cit.* (figure 2).

This means that Germany sharply increased its capital formation in railways as the Great Depression advanced in the 1870s.

Another important proxy variable for social overhead capital was telephone communication, whose importance was growing rapidly. Just after the Great Depression, the UK had a total of 5.9 million telephone calls in 1897, while Germany already had 8 million calls in 1882 and drastically increased the number to 38.2 million calls by 1897.[26] In other words, the number of calls in Germany was 6.5 times as large as that in the UK as of 1897. Considering the fact that in those days telephone calls were mainly for industrial uses, this shows clearly the differences in the formation of social overhead capital between the two countries.

On one hand, the analysis of the distribution of capital formation during the Great Depression shows that Britain used 46.0 per cent of gross domestic capital formation in construction and social overhead capital sectors in the period 1875-94, while Germany employed 70.5 per cent of gross domestic capital formation in these sectors in the period 1871-90. Of course, this could be explained largely by the fact that Germany had exerted much effort in capital formation in the housing and construction sectors after the 1860s. However, in the period even if we excluded those sectors, the net share of social overhead capital in Germany's gross domestic capital formation was on average 7 per cent point higher than that of the UK.[27]

The active formation of social overhead capital primarily created demand and expanded supply in directly-related industries. Furthermore it helped markets to expand by its spin-off effects and by maximizing the industrial linkage effect. So, in a depression it would play a vital role in promoting industrial activities.

While in the UK, capital formation of social overhead capital almost stagnated in the 1870s, in the case of Germany, as soon as the Great Depression began, the proportion of capital formation in equipment greatly decreased and that of social overhead capital increased as shown in figure 3. This enabled Germany to induce

[26] B.R. Mitchell, *European Historical Statistics, op, cit*, pp. 682, 685.

[27] S. Kunzets, "Quantitative Aspects of the Economic Growth of Nations", *op. cit.*, p. 38.

further capital formation among corporations and to augment industrial production greatly in the midst of the Great Depression. Furthermore, the high level of social overhead capital formation during the Great Depression became one of the reasons why the German economy gained such competitive power afterwards.

The problem was how to procure the funds for the formation of SOC. Germany accomplished this in two ways. First, as already seen before, Germany promptly switched financial resources from other sectors, such as equipment, to SOC. This was made possible by the high flexibility in Germany's capital formation. The second method was pioneering the expansion of the public sector's financial resources during the Depression. The time-serial changes of capital formation financing in Germany shows this very well (table 7).

Table 7 shows that the proportion of public saving in net capital formation financing in Germany in the 1870s was 1.92 per cent of NNP which was highest during the second half of the nineteenth century. If we look at the relative share of net savings for net capital formation financing between private and public savings, we may find that the public savings kept relatively high, i.e., 15 per cent, until 1860 and that, thereafter, they fell to 9 per cent in the 1860s and rose again to 15 per cent level at the beginning of the Depression.

Here we may note that the rapid increase of capital formation in social overhead capital in the 1870s was mainly due to the expansion of public savings. The German government induced the private sector to invest by expanding its financing role in capital formation both in the first half of the 'take off' period in economic development[28] and at the beginning of the Depression. Then, from the 1880s, the proportion of public savings in capital formation returned to the level of 8-10 per cent, which meant self-regulation and the stability in capital - formation financing.

The proportion of private savings in net capital-formation financing in Germany was the highest from the second half of the

[28] W.W Rostow, *The World Economy: History & Prospect*, *op. cit.*, p. 68.

TABLE 7- Net Capital Formation Financing, Germany (% Based on Constant Prices)

	% of NNP			% of Net Savings	
	private savings	pubic savings	total	private savings	pubic savings
1851-60	6.73	1.21	7.9	85	15
1856-65	7.82	1.57	9.9	83	17
1861-70	10.15	0.95	10.6	91	9
1866-75	10.63	1.91	12.1	85	15
1871-80	11.09	1.92	13.0	85	15
1876-85	11.91	1.02	13.0	92	8
1881-90	13.06	1.40	14.5	90	10
1886-95	13.21	1.45	14.6	90	10
1891-900	14.30	1.66	15.9	90	10
1896-905	14.90	1.49	16.4	91	9
1901-13	14.67	1.27	15.9	92	8

source: S. Kuznets, "Quantitative Aspects of the Economic Growth of Nations", *op. cit.* (table 1).

1880s to the first half of the 1890s. This implies that the German government successfully raised the private sector's expectations and expanded the private sector's role in capital formation by means of increasing social overhead capital at the beginning of Great Depression.

Conclusion

During the Great Depression(1873-96), the UK took the course of static supply-adjustment, while Germany stimulated effective demand and expanded industrial supply capacity through increasing and adjusting capital formation. In the UK, moreover, the ratio of capital formation declined and foreign investment increased greatly. Such different ratios of capital formation and the different direction of investment flows between the two countries, ultimately accounted for the two countries' divergent levels of

industrial production and growth rates both during and after the Great Depression.

There was a distinct difference in the flexibility of capital formation between the two countries in two ways during the Great Depression. One was the recognition of the need for, and the time lags required capital for formation adjustment. While the UK showed an investment pattern centred around the past, Germany showed rational and future-oriented investment tendencies which embraced the most recent variables and made forecasts for the future. The other was the flexibility in the distribution of gross domestic capital formation period by period. In the case of the UK, adjustments in the distribution of capital formation did not occur even during the Great Depression. So, British industrial sectors had to absorb the shocks of the Depression directly and suffered greatly. The inflexible nature of capital formation in the UK can be also seen clearly from the fact that capital formation in machinery and equipment was declining at the end of the Great Depression when it was really needed. In the case of Germany, the periodical distribution of net domestic capital formation showed clearly a future-oriented investment pattern and high flexibility in the conversion of capital formation. In the case of the UK, as the inflexibility of investment appeared more marked in the domestic sector, it had a more negative effect on industrial activities and the business cycle of the British economy. In addition, the two economies were different in their pattern of capital formation: that is to say, Germany, unlike the UK, concentrated the scarce funds for capital formation in strategic sectors.

From an overall perspective, Germany differed from the UK not only in the absolute ratio of capital formation but also in the concentration and flexibility of capital formation which was necessary for maximizing industrial linkage effects and adjusting the business cycle periodically. Consequently, having suffered relatively less from the Great Depression, Germany could create roundabout markets continuously and expand its supply and demand capacity.

On the other hand, the proportion of capital formation in social overhead capital almost stagnated in the UK during the 1870s, while, in the case of Germany, it increased rapidly as soon as the Great Depression began. The rapid increase in capital formation for social overhead capital in Germany in the 1870s was mainly due to the expansion of public savings. The German government successfully raised the private sector's expectations and expanded the private sector's role in capital formation by means of increasing social overhead capital at the beginning of Great Depression. All this has interesting implications about the role of government and the expectations of the private sector at the beginning of the depression.

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