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Volume Author/Editor: John W. Kendrick

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Chapter Author: John W. Kendrick

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Total Capital Formation and Saving, by Type and Sector, Relative to Income and Product

Although unequal at the sector level, saving and investment are equal at the national level. Note, therefore, that our description of the movements of total investment in relation to (adjusted) GNP in the initial section applies equally to saving. In the sector discussions, of course, investment and saving are treated separately.

Trends in Total Gross and Net Investment

Between 1929 and 1969 growth rates in total investment were higher than those in national product according to all four measures shown in Table 3-1. In current dollars, both gross and net total investment measures showed much the same growth rates as GNP and NNP, respectively, from 1929 to 1948 and then accelerated relatively between 1948 and 1969. In constant prices, both investment measures grew somewhat less rapidly than the corresponding product measures over the 1929–1948 period due to relative increases in the investment price deflators, but from 1948 to 1969 the real investment measures also showed distinctly higher growth rates than the real product measures.

The results of the relative trends in investment and product in

Table 3-1. *Total Investment and Product* (billions of current and 1958 dollars and average annual percentage rates of change)

Line No.		1929	1948	1969
	A. Billions of Dollars			
	Current dollars			
1.	Gross National Product	127.3	327.7	1,247.9
2.	Total gross investment	55.7	141.8	617.1
3.	Net National Product	92.3	236.4	897.6
4.	Total net investment	20.6	50.5	266.8
	Constant (1958) dollars			
5.	Real Gross National Product	252.4	420.6	957.2
6.	Real gross investment	119.0	185.6	474.7
7.	Real Net National Product	177.2	297.6	680.6
8.	Real net investment	43.9	62.7	198.1
	B. Average Annual Percentage Rates of Change			
		1929–69	1929–48	1948–69
	Current dollars			
1.	Gross National Product	5.9	5.1	6.6
2.	Total gross investment	6.2	5.0	7.3
3.	Net National Product	5.9	5.1	6.6
4.	Total net investment	6.6	4.8	8.2
	Constant (1958) dollars			
5.	Real Gross National Product	3.4	2.7	4.0
6.	Real gross investment	3.5	2.4	4.6
7.	Real Net National Product	3.4	2.8	4.0
8.	Real net investment	3.8	1.9	5.6

Table 3-2. *Total Investment as Percentage of National Product*

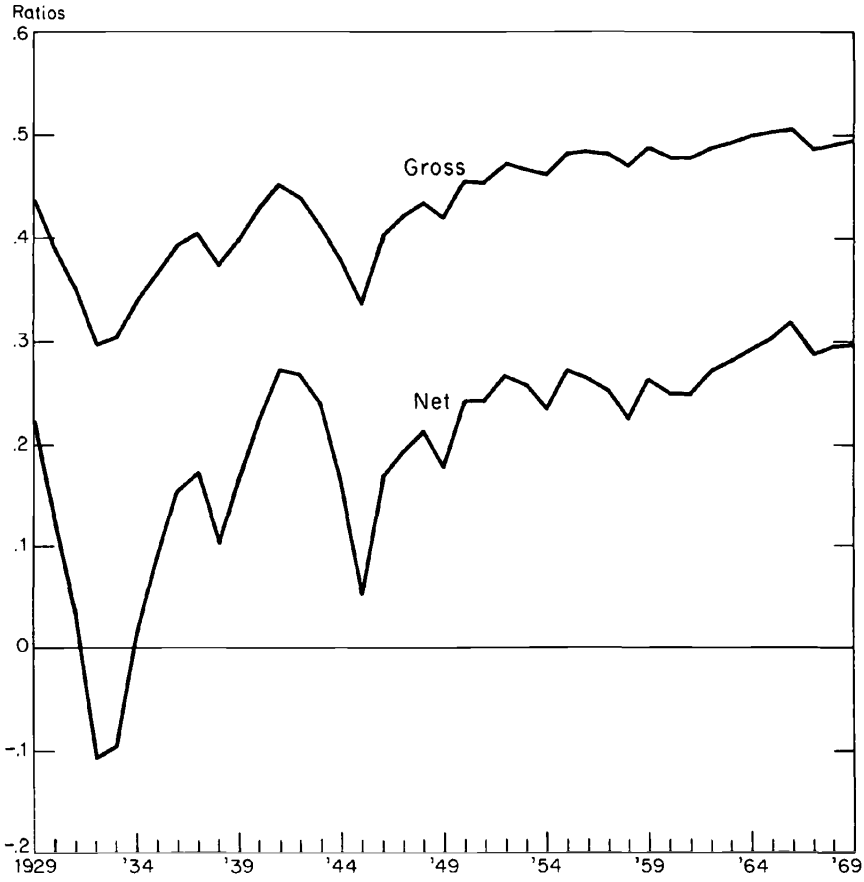
Line No.		1929	1948	1969
	Current dollars			
1.	Total gross investment/GNP	43.7	43.3	49.5
2.	Total net investment/NNP	22.3	21.4	29.7
	Constant dollars			
3.	Total gross investment/GNP	47.2	44.1	49.6
4.	Total net investment/NNP	24.8	21.1	29.1

terms of the percentages of national product saved and invested, according to our definitions, are shown in Table 3-2. Two major conclusions emerge from studying that table. The first is the high proportion of adjusted GNP devoted to gross saving and investment reached by 1969. In that year almost half of GNP represented total investment (according to our definition), compared with a less than 15 per cent ratio of gross private domestic (tangible) plus net foreign investment to GNP (according to official Commerce Department definitions and estimates).

The second major finding is the significant increase in the share of total investment in adjusted GNP—from around 43 per cent in both 1929 and 1948 to 49.5 per cent in 1969. This contrasts with some decline in the ratio of gross private domestic plus net foreign investment to GNP as conventionally defined—from 16.5 per cent in 1929 and 18.6 per cent in 1948 to 14.2 per cent in 1969.

The increase of net saving and investment in relation to adjusted NNP is even more pronounced—from a bit over and under 21 per cent in 1929 and 1948, respectively, to almost 30 per cent in 1969 (see Chart 3-1). Actually, the growth of capital consumption allowances closely parallels the growth of GNP. As a fraction of GNP, NNP remained relatively stable, at 72.5 per cent in 1929 and approximately 72.0 per cent in both 1948 and 1969. But since gross investment was growing faster than GNP after 1948, the ratio of capital consumption allowances to gross investment fell, and the ratio of net to gross investment rose—from 36 per cent in 1948 to 43 per cent in 1969. The drop in the capital consumption-gross investment ratio occurred entirely in the intangibles, reflecting their more rapid growth and the time lags between investment and the beginning of depreciation following maturation of the capital, particularly in the education category. The ratio of capital consumption to gross intangible investment also fell somewhat

Chart 3-1. *Gross and Net Investment-Product Ratios Based on Current Dollars, 1929–1969*



between 1929 and 1948, but this was more than counterbalanced by a rise in the ratio for tangibles, which subsequently stabilized.

The net increase in the ratio of saving (investment) to national product between 1929 and 1969 is considerably reduced when both variables are expressed in terms of constant 1958 dollars. The relative increase is almost as great, however, in constant as in current dollars from 1948 to 1969. This reflects a significantly greater increase in the implicit price deflator for total investment than in the deflator for national product, particularly between 1937 and 1948. The ratio of the former to the latter (on a gross basis) rose from 92.7 per cent in both 1929 and 1937 to 98.1 per cent in 1948, and after 1955 stayed within ±0.5 per cent of 100.0.

Reflecting the divergent movement of the deflators, the ratio of total real gross investment to real GNP dropped from 47.2 per cent in 1929 to 44.1 per cent in 1948, and thereafter climbed to 49.6 per cent in 1969. Although the net increase in the ratio to 1969 was about 5 per cent of the 1929 base, this was much less than in current prices. The ratio of total net investment to real NNP dropped from 24.8 per cent in 1929 to 21.1 per cent in 1948, and then rose sharply to 29.1 per cent in 1969. As in the case of current dollars, the increase in the real net ratio was considerably greater than in the real gross ratio between 1929 and 1969, but again relatively smaller in constant than in current dollars. From 1948 to 1969, however, the relative increases in both gross and net ratios were almost as great in constant as in current dollars because by 1948 the divergence between the investment and product deflators had narrowed greatly.

A word of caution is in order regarding the constant dollar results. As noted in the appendixes, the price deflators for investment are of uncertain quality.[1] Many of the component price indexes, particularly for intangible investment, are basically unit cost indexes which do not reflect productivity increases. Productivity may not have risen much in certain investment activities, such as education, but to the extent that it has, the deflators would tend to have an upward bias. This, in turn, would impart some downward bias to the trend in the real investment-to-product ratios. For this reason, more weight should be given to the current dollar estimates in evaluating the relative movements of total investment.

In summary, all the available measures point to a significant increase in the fraction of national income and product that was saved and invested between 1929 and 1969, particularly after 1948, when investment is defined broadly as including intangible as well as tangible investments in all sectors. The increase is most pronounced in what is probably the most significant measure—total net investment as a fraction of NNP, in current dollars—assuming reasonable depreciation estimates. The increase is smallest in what is, in our judgment, the least significant measure—total real gross investment as a fraction of real GNP. But even the latter measure shows a small net increase from 1929 to 1969, and a significant rise in the 1948–1969 period.

These estimates suggest that as per capita real income and wealth increase, the fraction of income saved and devoted to the total investment tends to rise. Keynes had theorized that the saving ratio might tend to rise in advanced countries, but the statistics did not show this in

1. This view is documented in a study now in progress by Robert J. Gordon for the National Bureau, tentatively entitled "The Measurement of Durable Goods Prices."

terms of his narrow definition of investment (consisting largely of business tangibles).[2] But the broadening of the investment definition produces estimates that seem to support his hunch. Certainly, as per capita income grows, individuals and the community can afford to save a larger fraction of additional income than the average proportion of income saved in the past, and apparently they have done so in the United States, at least since World War II.

Formulation of a general, dynamic "law" in respect to saving and investment behavior must, however, await further studies of the economy of the United States and other countries. With regard to the United States, it is probable that the ratio of total investment to income and product was rising for several decades prior to 1929, since available statistics show a marked rise in the intangible investment ratio and little change for the tangible investment ratio.[3] Also, the stability or decline of the total investment ratio between 1929 and the post-World War II period can be attributed to the effects of the Great Depression and the war, with the subsequent rise representing a "catching-up" and resumption of the longer-run trend. But further work is needed before confident generalizations can be made.

Trends in Total Investments, by Type

First we look at total gross investment in current dollars, by major type (see Table 3-3), and then indicate generally any difference in patterns of movement in net investment or in the constant dollar series. The major conclusion that emerges is that all of the relative increase in total investment over 1929–1969 has been due to a sharp increase in the proportion of GNP devoted to intangible investment, particularly after 1948 (see Chart 3-2). The tangible investment share sagged a bit, and the ratio of gross intangible to tangible investment rose from about 40 per cent in 1929 to over 75 per cent in 1969. In fact, total intangible investment in 1969, at $268 billion, was almost as large as tangible nonhuman investment, at $286 billion.

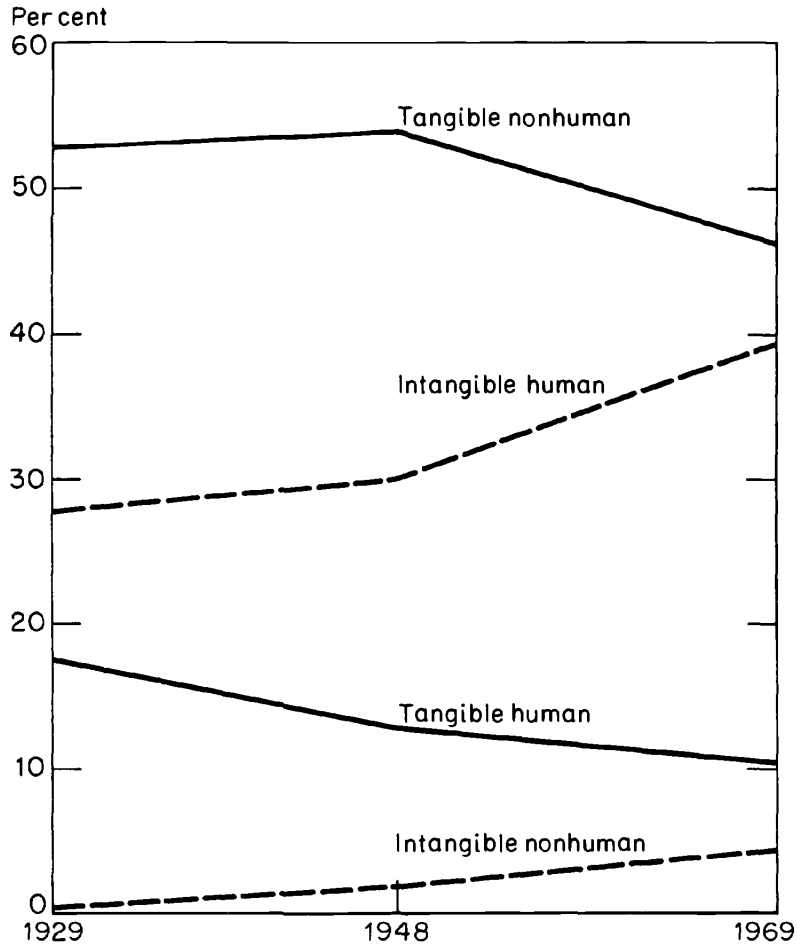
2. The narrow definition of investment is useful for business cycle analysis, of course; a much higher percentage of business tangible investment is financed through financial intermediaries than in the case of nonbusiness and intangible investments.

3. My earlier study presented figures showing that intangible investments (R&D, education, and health) tripled between 1909 and 1929 when GNP had less than doubled. See my *Productivity Trends in the United States*, Princeton, Princeton University Press for NBER, 1961, Table 21, p. 105; Table 24, p. 109; and Table A-IIb, pp. 296–297.

Table 3-3. *Total Gross and Net Investment, by Type (Current Prices), as Percentages of National Product*

Line No.		Total Gross Investment/GNP			Total Net Investment/NNP		
		1929	1948	1969	1929	1948	1969
1.	Domestic investment	43.1	42.7	49.5	21.5	20.6	29.8
2.	Tangible	30.8	29.0	28.1	14.9	12.5	13.8
3.	Human	7.7	5.6	5.1	5.1	3.6	4.8
4.	Nonhuman	23.1	23.4	22.9	9.9	8.9	9.1
5.	Structures	9.0	8.5	7.6	4.8	5.0	3.8
6.	Equipment	12.1	13.4	14.3	2.3	1.8	3.9
7.	Inventory	2.0	1.5	1.0	2.7	2.1	1.3
8.	Intangible	12.3	13.7	21.5	6.6	8.1	16.0
9.	Human	12.1	13.0	19.4	6.5	7.6	15.2
10.	Education and training	8.6	9.4	15.4	6.2	6.4	13.6
11.	Health	1.5	1.6	2.2	.7	.9	1.1
12.	Mobility	2.0	2.0	1.7	−.5	.2	.5
13.	Nonhuman	.2	.7	2.1	.1	.5	.8
14.	Basic research	.03	.1	.3	0	.1	.4
15.	Applied R & D	.17	.7	1.8	.1	.4	.4
16.	Net foreign investment	.6	.6	−.1	.8	.8	−.1
17.	Total investment	43.7	43.3	49.4	22.3	21.4	29.7

Chart 3-2. *Gross Investment-Product Ratios, by Major Type, Based on Current Dollars, 1929, 1948, 1969*



The relative decline in gross tangible investment from 30.8 per cent of GNP in 1929 to 28.1 per cent in 1969 was almost entirely due to a decline in the tangible human (rearing cost) proportion—from 7.7 to 5.1 per cent. Tangible nonhuman investment was close to 23 per cent in both years, after a slight relative increase in 1948. On a net basis, there was only a small relative decline in the rearing cost proportion, due to a smaller proportionate deduction for tangible human capital consumption at the end of the period than at the beginning. There was, however, a more pronounced decline in net tangible nonhuman investment than in the gross figure due to the increased proportion of depreciation noted earlier. In constant prices, the relative decline in tangible nonhuman

investment is a bit larger than in current prices. But for real human investment, the relative drop becomes smaller on a gross basis and is transformed into an increase on a net basis. This is so because the deflator for rearing costs, which comprise the goods and services consumed by children, rises less than the deflators for other types of investment.

Within the tangible nonhuman category, investments in structures and inventories show a relative decline, particularly in constant prices, while equipment and other durable goods outlays show a relative increase.

Intangible investment shows a greater rise on a net than on a gross basis because of the declining depreciation ratio, as explained above. The relative increases in intangible investments on both gross and net bases are distinctly smaller in constant dollars than in current prices due to the significantly higher rate of increase in the intangible deflators than in the implicit price index for total national product. But even in constant dollars, the relative expansion in intangible investment is marked.

Among the various types of intangible investment, by far the most important category is education and training, which comprised over two-thirds of the total on a gross basis and over 90 per cent on a net basis in 1929 and a bit less in 1969. The net proportion is higher because the average life of educational investment is much longer than that of other types of intangibles except health. The ratio of educational and training investment to GNP increased by almost 80 per cent on a gross basis, and more than doubled on a net basis.

The largest proportionate increase (twentyfold on a gross basis from 1929 to 1969) occurred in R&D, although even in 1969 the R&D share of intangible investment was only 10 per cent on a gross basis and 5 per cent on a net basis. The ratio to GNP of investments in health and safety increased by about 50 per cent over the period, and by 1969 comprised about 10 per cent of total intangibles, too.

Mobility outlays, on a gross basis, were the only form of intangibles to show a decline in the ratio to GNP. This came about because mobility outlays are related to the size of the labor force, and the latter experienced significantly less growth than real GNP. It will be noted that in some years net mobility investment is negative due to the very short lives of some of the categories of mobility, such as job search, reflecting high rates of labor turnover. Thus, in some years gross mobility costs were less than the amortization of previous years' mobility investment.

Net foreign investment is a relatively minor category throughout. Its movements are erratic and exhibit no definite trend.

Changes in the percentage distributions of total investment result-

Table 3-4. *Percentage Distribution of Total Gross and Net Investment, by Type*

Line No.		Total Gross Investment		Total Net Investment	
		1929	1969	1929	1969
1.	Domestic investment	98.6	100.1	96.3	100.3
2.	Tangible	70.4	56.8	66.7	46.5
3.	Human	17.5	10.4	22.6	16.0
4.	Nonhuman	52.9	46.4	44.1	30.5
5.	Structures	20.6	15.5	21.5	12.9
6.	Equipment	27.8	29.0	10.4	13.1
7.	Inventory	4.5	1.9	12.3	4.5
8.	Intangible	28.2	43.4	29.5	53.9
9.	Human	27.7	39.2	29.0	51.1
10.	Education and training	19.8	31.2	27.8	45.8
11.	Health	3.4	4.5	3.3	3.8
12.	Mobility	4.5	3.5	−2.1	1.6
13.	Nonhuman	.5	4.2	.6	2.7
14.	Basic research	.1	.6	.2	1.4
15.	Applied R & D	.4	3.6	.4	1.3
16.	Net foreign investment	1.4	−.1	3.7	−.3
17.	Total investment	100.0	100.0	100.0	100.0

ing from the relative trends discussed above are summarized in Table 3-4. Here items whose share of national product remained relatively constant, such as tangible nonhuman investment, show a decline as a percentage of total investment, which rose in relation to product. Even in terms of per cent distributions of total investment, all the intangible categories, except mobility, rose significantly over the forty years.

Subperiod and Recession Behavior of Total Investment

SUBPERIODS

In Table 3-5, we divide the forty-year period 1929–1969 into six subperiods bounded by the seven business-cycle peak years (omitting 1954). Looking at the overall investment-to-product percentages (Part A of the table), we see that all measures show much the same patterns, but in varying degrees. The investment ratios all declined sharply between 1929 and 1937, which is not surprising in view of the fact that the economy was still substantially below full employment even at the peak of the 1933–1937 expansion.

Between 1937 and the full recovery of 1948, the current dollar ratios rose markedly, and in 1948 were less than one percentage point below the 1929 percentages. The recovery in the constant dollar ratios was much weaker, with the 1948 percentages still significantly below 1929. This reflected the relative increase in the investment deflator during the 1937–1948 subperiod, as noted earlier.

The largest proportionate increase in all the investment ratios came in the 1948–1953 subperiod. By 1953, all ratios significantly exceeded those of 1929 except total gross investment in constant dollars, which represented approximately the same percentage of real GNP as in 1929.

From 1953 to 1957, the gross investment ratios rose further, but the net ratios receded somewhat as capital consumption allowances grew faster than gross investment. Between 1957 and 1960, all the ratios receded. It will be remembered that the 1955–1960 period was one of relatively slow growth, reflected in the rising unemployment rates between peak years. The slower growth in investment than in product was a significant aspect of this period. Retardations in growth of gross investment are generally accentuated in the net investment measures.

In the subperiod of strong growth, 1960–1969, total investment

Table 3-5. *Total Investment as Percentage of National Product, in Peak Years*

Line No.		1929	1937	1948	1953	1957	1960	1969
	A. Total Gross and Net Investment in Current and Constant Dollars (billions)							
	Total gross investment/GNP							
1.	Current dollars	43.7	40.6	43.3	46.6	48.2	47.8	49.5
2.	Constant (1958) dollars	47.2	43.7	44.1	47.0	48.0	47.8	49.6
	Total net investment/NNP							
3.	Current dollars	22.3	17.4	21.4	25.8	25.4	24.9	29.7
4.	Constant (1958) dollars	24.8	19.2	21.1	26.1	25.3	24.9	29.1
	B. Total Gross Investment in Current Dollars, by Type							
1.	Gross domestic investment	43.1	40.5	42.7	47.1	47.6	47.5	49.5
2.	Tangible	30.8	27.6	29.0	32.4	31.3	30.0	28.1
3.	Human	7.7	6.0	5.6	5.7	6.1	6.2	5.1
4.	Nonhuman	23.1	21.6	23.4	26.7	25.3	23.8	22.9
5.	Structures	9.0	7.0	8.5	9.1	9.2	8.7	7.6
6.	Equipment	12.1	11.5	13.4	16.4	15.5	14.1	14.3
7.	Inventory	2.0	3.1	1.5	1.2	.5	1.0	1.0
8.	Intangible	12.3	12.9	13.7	14.6	16.2	17.5	21.5
9.	Human	12.1	12.6	13.0	13.5	14.4	15.4	19.4
10.	Education and training	8.6	8.7	9.4	10.0	10.7	11.5	15.4
11.	Health	1.5	1.6	1.6	1.7	1.9	2.0	2.2
12.	Mobility	2.0	2.2	2.0	1.9	1.8	1.9	1.7
13.	Nonhuman	.2	.3	.7	1.2	1.8	2.1	2.1
14.	Basic research	.03	.1	.1	.1	.2	.2	.3
15.	Applied R & D	.17	.3	.7	1.1	1.6	1.9	1.8
16.	Net foreign investment	.6	.1	.6	−.5	.6	.3	−.1

once again grew significantly faster than national product. The increase in the investment ratios was particularly marked on the net basis as capital consumption increased less rapidly than gross investment.

The overall subperiod movements just summarized reflect the net effect of divergent changes in the investment components. Part B of Table 3-5, showing the gross investment to GNP ratios for the peak years, is the focus of our discussion, which will touch upon significant divergences in the movements of the other measures.

Our most important conclusion is that the occasional downward movements in the total investment ratios during the subperiods were caused chiefly by declines in the tangible investment ratios. The total gross intangible investment ratio was in a steady uptrend across all the peak years, whether measured in current or constant prices. Both net intangible investment ratios did drop between 1929 and 1937, and the constant dollar net real intangible investment ratio eased slightly between 1948 and 1953. But the general picture is one of strong growth in the total intangible investment ratios, with most of the subperiod declines in the total investment ratios resulting from declines in the tangible investment ratio during subperiods of retarded growth.

The gross tangible human investment ratios dropped from 1929 through 1937 and 1948, reflecting the relatively low birth rates that prevailed until the early postwar period. By contrast, the relatively high birth rates that followed and characterized most of the 1950s were reflected in rising ratios from 1948 through 1960. The trend was reversed again: the 1969 ratio was below that of 1960 as a result of the declining birth rates of the late 1950s and the 1960s. The net ratios followed the same patterns, except that 1948 was already higher than 1937.

Tangible nonhuman investment fell proportionately more than national product from 1929 to 1937 according to all four measures. The gross current dollar ratio showed recovery between 1937 and 1948, but the constant dollar measure dropped a bit further, and both net measures showed more pronounced declines. Between 1948 and 1953 the ratios for all four measures rose markedly. Thereafter, the ratio of gross nonhuman investment to GNP in current dollars sagged in each succeeding peak year, although in real terms there was a mild reversal in the 1960–1969 period. The net ratios showed an even more pronounced decline than the gross ratio in 1953–1957 and 1957–1960. Finally, between 1960 and 1969 both showed a rise.

As to intangible investments, on a gross current dollar basis all types except mobility showed rising (or, occasionally, stable) ratios over all subperiods. On a constant dollar basis, the human intangible ratios to real GNP showed small decreases between 1948 and 1953—the

subperiod during which the tangible ratios were rising sharply. There were also minor declines in the 1960–1969 period in medical and R&D outlays, while the real education ratio was still rising substantially.

The net intangible investment ratios were more sensitive. Thus, for most of the types, in both current and constant dollars, they dropped between 1929 and 1937. There were also declines in the constant dollar human intangible ratios from 1948 to 1953. And in both current and constant dollars, the net R&D ratio dropped between 1960 and 1969 (most of the decline occurring in the latter part of the subperiod).

RECESSIONS

Even on a total investment basis (including intangibles), investment declined more than product between the peak and trough years of the business cycles during the 1929–1969 period, with the exception of the 1960–1961 contraction, when the investment ratios were virtually unchanged. There was a marked contrast between the 1930s and the post-World War II years, as shown in Table 3-6. Total investment fell drastically relative to national product between 1929 and 1933, and substantially (though much more moderately) during 1937–1938. Since 1948, however, recession declines in the investment ratios have been small.

Downturns in the net investment ratios from peaks to troughs have been significantly greater than those in the gross investment ratios. This is to be expected, since capital consumption allowances in recessions continue to grow at rates near those of expansion periods while gross investment either drops or is much retarded in growth. The changes in the ratios are much the same in current and constant dollars, since the time periods involved are too short to permit much divergence between price deflators for investment and for national product.

From a look at the gross investment ratios by type (Part B of Table 3-6), it is apparent that the declines in the total investment ratio between peak and trough years have been entirely due to declines in tangible nonhuman investment relative to national product. Rearing cost ratios have risen in recessions (except from 1929 to 1933) concomitantly with the growing number of children. All of the intangible investment ratios have also gone up or remained stable in recessions, reflecting their strong secular growth or their countercyclical tendencies, as in the case of mobility costs. On a net basis, the intangible investment ratios generally dropped somewhat in the contractions of the 1930s and the first two postwar contractions, but proportionately much less than the net tangible nonhuman investment ratios. In the last

Table 3-6. *Percentage Point Changes in Investment/Product Percentages between Peak and Trough Years of Business Cycles, 1929–1933 to 1960–1961*

Line No.		1929–33	1937–38	1948–49	1953–54	1957–58	1960–61
	A. Aggregate Measures						
	Total gross investment/GNP						
1.	Current dollars	−13.6	−3.3	−1.5	−.7	−1.3	0
2.	Constant (1958) dollars	−13.9	−3.3	−1.5	−.6	−1.1	0
	Total net investment/GNP						
3.	Current dollars	−31.9	−7.3	−3.6	−1.4	−2.9	−.1
4.	Constant (1958) dollars	−35.4	−7.5	−3.3	−1.5	−2.8	−.2
	B. Changes in Percentages of Current Dollar Gross Investments to GNP, by Type						
1.	Gross domestic investment	−13.2	−4.2	−1.1	−1.1	−.6	−.2
2.	Tangible	−15.1	−4.7	−1.1	−1.0	−1.1	−.7
3.	Human	−.2	.2	.2	.3	.2	0
4.	Nonhuman	−14.9	−4.9	−1.3	−1.3	−1.4	−.7
5.	Structures	−4.5	.3	.2	.5	0	0
6.	Equipment	−4.5	−1.8	.3	−1.1	−1.4	−.4
7.	Inventory	−6.0	−3.3	−1.8	−.7	.1	−.3
8.	Intangible	1.8	.5	0	0	.6	.5
9.	Human	1.7	.4	0	−.2	.4	.4
10.	Education and training	.5	.1	−.1	−.3	.3	.3
11.	Health	.5	.2	.1	.1	.1	.1
12.	Mobility	.7	.1	0	0	0	0
13.	Nonhuman	.2	.1	0	.1	.2	.1
14.	Basic research	.1	0	0	0	0	.1
15.	Applied R & D	.1	.1	0	.1	.2	.1
16.	Net foreign investment	−.4	1.0	−.4	.4	−.6	.1

two recessions covered—1957–1958 and 1960–1961—the net intangible investment ratio and most if its components rose slightly.

One may conclude that intangible investments and tangible human investment outlays are much less cyclical than tangible nonhuman investment. They account for the much smaller recession declines in the ratio of total investment to product than in the tangible nonhuman investment ratios alone. In fact, the human and intangible investment outlays play a countercyclical role by helping to cushion recessions on a gross outlay basis, which is what is relevant in cycle analysis.

Trends in Total Investment, by Sector

An examination of the investment trends by sector over the long period and the subperiods reveals that it was the government sector that accounted for all of the growth relative to national product on a gross basis, and for most of it on a net basis. (See Table 3-7.) Looking at the total gross investment ratios of the end-years 1929 and 1969, one sees a slight rise in total gross investment of the personal sector, a slight drop in the business sector, and a jump in the government sector—from 4.6 to 11.3 per cent, in current dollars—that slightly exceeds the 6.5 percentage point increase in the total gross domestic investment ratio.

In constant dollars, the pattern is only moderately different. The real total gross personal investment ratio rises a bit more than in current dollars, chiefly because of the less than average increase in the deflator for rearing costs (which cover consumer products). Contrariwise, the total real gross business investment ratio falls more than in current dollars, and the government investment ratio rises less. Still, the rise in the government ratio exceeds the lesser increase in the real total gross domestic investment ratio by a wider margin than in the current dollar case.

The patterns of the total net domestic investment ratios in the table reveal an important difference. In constant dollars, and even more so in current prices, substantial increases in the total net personal investment ratio as well as in the government ratio contribute significantly to the rise in the total ratio—which is notably larger on a net basis than on a gross basis. In the government sector, the increases in the net investment ratios are about the same as those in the gross ratios, although the net ratios are larger relative to the gross ratios than in the private sectors. In the business sector, net investment ratios fall more than gross ratios, while in the personal sector they rise more than the

Table 3-7. *Total Investment, by Domestic Sector, as Percentage of National Product, Gross and Net, in Current and Constant Dollars*

Line No.		1929	1937	1948	1953	1957	1960	1969
	Gross domestic investment/GNP							
1.	Current dollars, total	43.1	40.5	42.7	47.1	47.5	47.5	49.6
2.	Personal	26.1	22.3	24.8	24.9	25.5	25.8	26.5
3.	Business	12.4	11.5	12.6	10.6	11.1	10.8	11.8
4.	Government	4.6	6.7	5.3	11.6	10.9	10.9	11.3
5.	Constant dollars, total	46.4	43.6	43.6	47.4	47.4	47.6	49.6
6.	Personal	26.0	23.0	24.5	24.3	25.5	25.9	27.1
7.	Business	14.5	12.3	13.3	11.0	11.0	10.8	12.1
8.	Government	5.9	8.3	5.8	12.1	10.9	10.9	10.4
	Total net investment/NNP							
9.	Current dollars, total	21.5	17.4	20.6	26.5	24.6	24.6	29.9
10.	Personal	9.7	4.0	11.3	10.1	9.7	10.1	12.8
11.	Business	7.3	6.6	9.2	5.5	5.3	4.8	5.8
12.	Government	4.5	6.8	.1	10.9	9.6	9.7	11.3
13.	Constant dollars, total	23.9	19.1	20.2	26.7	24.4	24.5	29.2
14.	Personal	9.4	3.7	10.9	9.5	9.6	10.2	13.2
15.	Business	8.5	6.6	9.5	5.7	5.2	4.8	5.9
16.	Government	6.0	8.8	−.2	11.5	9.6	9.5	10.1

corresponding gross ratios because of the relative decline in capital consumption allowances (due to the greater importance of intangibles in the personal sector). The similar relative movements of government investment, both gross and net, suggest that the proportions of tangible and intangible investments were similar to those in total domestic investment.

It is evident from the subperiod estimates shown in Table 3-7 that the trends in the ratio were not linear. Turning first to the gross investment sector of general government, note that there was already a significant increase in its investment ratio by 1937, reflecting expanded New Deal public works programs in the context of a slack overall economy. The ratio receded somewhat in 1948, when the economy was fully employed. Between 1948 and 1953, given the impetus of the Korean engagement, the government total gross investment ratio more than doubled, whether measured in current or constant dollars. The ratio was somewhat lower in both 1957 and 1960 than in 1953. By 1969 it rose a bit in current dollars, but dropped somewhat in constant dollars.

The general pattern for government is much the same in terms of the net investment-product ratios, except that the ratio fell almost to zero in 1948, reflecting high capital consumption allowances on the still large (but declining) stock of military capital goods coupled with reduced new gross investment. Also, in net terms both the current and constant dollar ratios rose between 1960 and 1969.

In the personal sector, the total gross investment ratio, based on both current and constant dollars, remained relatively stable over all the peak years, except for a drop in 1937, followed by recovery in the postwar period, and a noticeable increase between 1960 and 1969. The pattern was essentially the same on a net basis, except that the drop in the 1930s and the rise in the 1960s were much more marked.

Business sector gross investment in relation to GNP varied only a little between peak years, around a mild downward trend, which is more noticeable in the constant than in the current dollar estimates. On a net basis, the current and constant dollar estimates for 1948 were noticeably higher than in the previous peak years, particularly 1937. But the ratios for the peak years in the subsequent two decades varied moderately around a distinctly lower level.

SECTOR TOTAL INVESTMENT AND SAVING RELATIVE TO DISPOSABLE INCOME

The trends of total investment by sector relative to national product become more meaningful if we first examine the movement of each

sector's disposable income relative to national product, and then look at the proportions of sector disposable incomes saved and invested (see Chart 3-3). The disposable income of each sector basically equals its income earned from current production plus transfers received from other sectors (and tax receipts, in the case of government) less transfer payments (including taxes paid by the private sectors). The computations are analogous to those prepared by the Council of Economic Advisers (see Appendix A). Total gross disposable income of the sectors equals GNP less statistical discrepancy. The saving of each sector (disposable income less current consumption) may exceed or fall short of its tangible plus intangible investment total, yielding a residual net financial investment (which, if negative, reflects net borrowing from other sectors).

Table 3-8 gives a quick picture of the sectoral distribution of total gross disposable income in peak years over 1929–1969. The outstanding trends are a drop in the share of disposable personal income from almost four-fifths in 1929 to two-thirds in 1969, and a counterbalancing increase in the share of disposable government income from little more than one-tenth in 1929 to over 23 per cent in 1969. Disposable business income (gross "cash flow" less dividends) held around 10 per cent throughout the period, while net transfers to the rest of the world were generally of only fractional magnitude, except during the early post-World War II period.

On a net basis, the relative trends in sector ratios of disposable income to total income were much the same. In the personal and governmental sectors the ratios were higher on a net than on a gross basis, however, reflecting the much lower ratio of business disposable income on the former basis (since depreciation comprises more than half of cash flow less dividends) and a somewhat rising fraction, as noted earlier. Net foreign transfers, unaffected by depreciation, are obviously higher in relation to NNP than to GNP, but still relatively unimportant.

PERSONAL SECTOR. As the ratio of gross disposable personal income gradually declined from almost 79 per cent of adjusted GNP in 1929 to 67 per cent in 1969, the proportion of DPI invested rose from about one-third in 1929 to almost 40 per cent in 1969. As a result, personal sector gross investment remained a relatively stable fraction of GNP at around one-fourth in good years (see Table 3-9). Thus, the average investment propensity was rising during these four decades not only in the total economy, as noted earlier, but also in the personal sector. This is also true of saving, for the personal sector generally showed a small excess of saving over total investment, with net lending amounting to about 2 per cent of DPI in 1929 and 1 per cent in 1960.

Chart 3-3. *Ratios of Gross Investment to GNP and Disposable Income, by Sector, with Ratios of Sector Disposable Incomes to GNP, Based on Current Dollars, 1929, 1948, 1969*

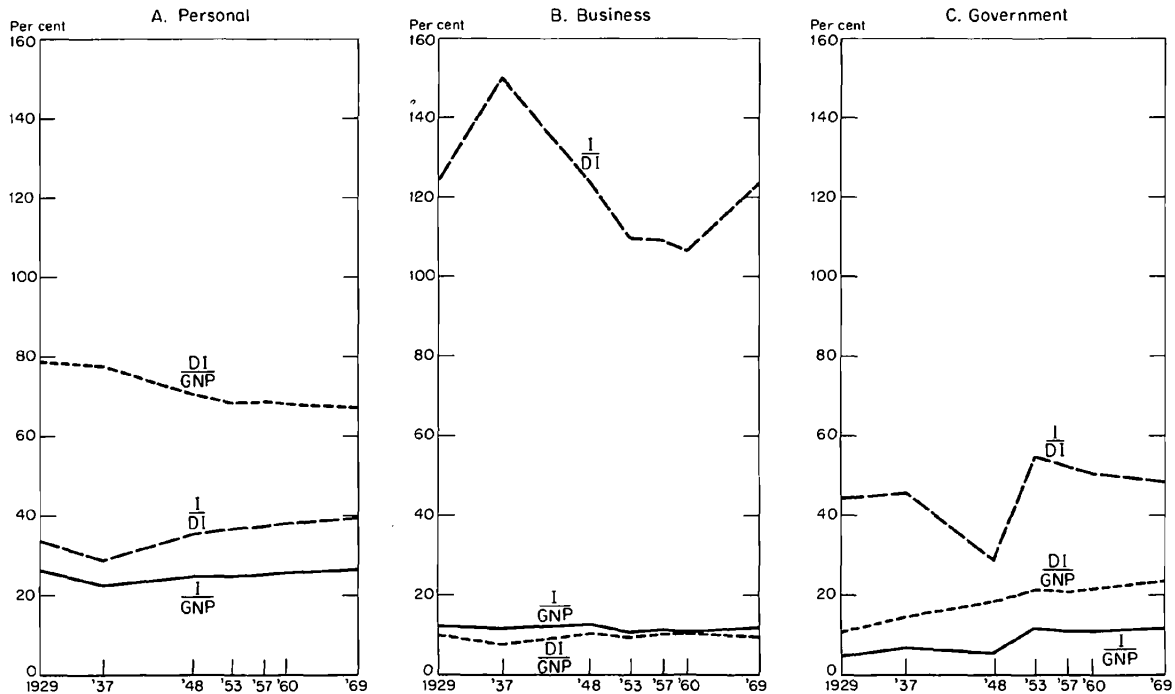


Table 3-8. *Total Gross Disposable Income, by Sector, Percentage Distribution*

Line No.		1929	1937	1948	1953	1957	1960	1969
1.	Total gross disposable income	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2.	Persons	79.2	77.6	70.0	68.5	68.5	67.8	67.0
3.	Business	10.0	7.7	10.1	9.7	10.1	10.1	9.5
4.	Government	10.5	14.5	18.5	21.2	20.9	21.7	23.3
5.	Rest of world	.3	.2	1.4	.5	.4	.4	.2

Table 3-9. *Gross Investment and Saving, by Sector, Relative to Gross Product and Disposable Income*

Line No.		1929		1937	
		% of GNP	% of DI	% of GNP	% of DI
	Personal sector				
1.	Disposable income	78.8	100.0	77.6	100.0
2.	Total gross investment	26.1	33.2	22.3	28.8
3.	Net financial investment	1.7	2.2	3.5	4.5
4.	Total gross saving	27.8	35.8	25.8	33.2
	Business sector				
5.	Disposable income	10.0	100.0	7.7	100.0
6.	Total gross investment	12.4	124.4	11.5	150.1
7.	Net financial investment	−2.4	−24.5	−3.9	−50.2
8.	Total gross saving	10.0	100.0	7.7	99.9
	Government sector				
9.	Disposable income	10.4	100.0	14.5	100.0
10.	Total gross investment	4.6	44.3	6.7	45.9
11.	Net financial investment	.8	7.4	.4	3.0
12.	Total gross saving	5.4	51.7	7.1	48.9

(We lacked final estimates of current consumption and saving for 1969 at the time our estimates were completed in 1970.)

Note that by our broader definitions, personal saving is a much larger fraction of sector disposable personal income, near 40 per cent in 1969, than by the official definitions, which placed it at 6 per cent.

On a net basis (see Table 3-10), the personal saving and investment trends were similar, except that from 1929 to 1969 investment had risen proportionately more in relation to disposable income on the net than on the gross basis—from near 12 to over 18 per cent. So, despite the virtually identical proportionate drop of the disposable income-product ratio on a net and gross basis, the ratio of personal net investment to NNP rose from less than 10 per cent to almost 13 per cent in 1969. Almost all of this relative increase took place after 1960, however. Since net financial investment is the same in the net as in the gross calculations, the relative net saving trends parallel the relative net investment trends, although at a somewhat higher level.

BUSINESS SECTOR. Table 3-8 showed the remarkable stability of gross business disposable income in good years at around 10 per cent of GNP. Note that by definition (since consumption of intermediate goods and dividend payments are already out), gross disposable income is

1948		1953		1957		1960		1969	
% of GNP	% of DI	% of GNP	% of DI	% of GNP	% of DI	% of GNP	% of DI	% of GNP	% of DI
70.4	100.0	68.1	100.0	68.5	100.0	68.0	100.0	67.0	100.0
24.8	35.2	24.9	36.6	25.5	37.3	25.8	38.0	26.5	39.4
1.0	1.5	1.4	2.1	1.6	2.3	.6	.9	(.6)	(.9)
25.8	36.7	26.3	38.7	27.1	39.6	26.5	39.0	(27.4)	(40.3)
10.2	100.0	9.6	100.0	10.1	100.0	10.1	100.0	9.5	100.0
12.6	123.8	10.6	109.9	11.1	109.5	10.8	106.6	11.8	123.9
−2.4	−23.8	−1.0	−9.9	−1.0	−9.5	−.7	−6.6	−2.3	−23.9
10.2	100.0	9.6	100.0	10.1	100.0	10.1	100.0	9.5	100.0
18.7	100.0	21.1	100.0	20.9	100.0	21.7	100.0	23.4	100.0
5.3	28.6	11.6	55.0	10.9	52.2	10.9	50.3	11.3	48.1
2.6	13.7	−1.6	−7.5	0	−.1	.4	2.0	(.4)	(2.0)
7.9	42.3	10.0	47.5	10.9	52.1	11.4	52.3	(11.7)	(50.1)

equal to the gross saving of the sector. In good years, the business sector typically invests more than its internally generated disposable income (or saving). The resulting negative net financial investment (or net borrowing) was a bit above and below 24 per cent of disposable income in 1929 and 1969, respectively (see Table 3-9). Since disposable income relative to GNP was also fractionally lower in 1969 than in 1929, the business gross investment ratio to GNP fell slightly from 12.4 per cent to 11.8 per cent. In good years, the ratio varied between 10.5 and 12.5 per cent. There was no real trend in any of the three key ratios—disposable income to product, investment to income, and investment to product.

On a net basis, disposable business income represents a much smaller and shrinking proportion of national product. Although net business investment rose from 185 per cent of disposable income (net saving) in 1929 to 221 per cent in 1969 (see Table 3-10), the ratio of net investment to NNP still declined from over 7 per cent to under 6 per cent. Vis-à-vis the relative stability of the gross investment ratio, this reflects the growth of depreciation allowances as calculated in relation to retained earnings.

GOVERNMENT SECTOR. Here the dramatic rise in the ratio of

Table 3-10. *Net Investment and Saving, by Domestic Sector, Relative to Net Product and Disposable Income*

Line No.		1929		1969[a]	
		% of NNP	% of Net DI	% of NNP	% of Net DI
	Personal Sector				
1.	Disposable income	82.3	100.0	69.3	100.0
2.	Total net investment	9.7	11.8	12.8	18.4
3.	Net financial investment	2.4	2.9	(.9)	(1.3)
4.	Total net saving	12.1	14.6	(13.7)	(19.7)
	Business Sector				
5.	Disposable income	4.0	100.0	2.6	100.0
6.	Total net investment	7.3	185.0	5.8	221.3
7.	Net financial investment	−3.3	−85.0	−3.2	−121.3
8.	Total net saving	4.0	100.0	2.6	100.0
	Government Sector				
9.	Disposable income	12.6	100.0	28.2	100.0
10.	Total net investment	4.5	36.0	11.3	40.1
11.	Net financial investment	1.1	8.5	(.6)	(2.5)
12.	Total net saving	5.6	44.4	(11.9)	(42.6)

[a]Because of the absence of net financial investment estimates for the government and personal sectors for 1969, we have entered the estimates for the previous peak year, 1960, in parentheses, and derived the net saving estimate, also shown in parentheses.

disposable income to GNP plus a moderate expansion in the share of income devoted to total investment accounted for the increase in total gross investment from 4.6 per cent in 1929 to 11.3 per cent in 1969 (see Table 3-9). Since the public sector has tended to generate positive net financial investment in peak cycle years, by our definition, the trend of the gross saving ratio has paralleled that of gross investment. The net investment picture exhibits much the same trends (see Table 3-10). Note that, while the fraction of gross disposable income invested by governments was below average in 1948, in the peak years 1953, 1957, and 1960 it exceeded 50 per cent, before declining to 48 per cent in 1969 (compared with 44 per cent in 1929). It is not commonly realized that governments devote around half of their disposable income to investment, counting intangibles along with tangibles—an even higher fraction than that allotted by persons. Thus, the relative shift of income from persons to government has contributed to the rise in the national investment ratio on top of the rising trend of the investment ratio in both sectors.

DIFFERENCES IN SECTORAL INVESTMENT MIX, 1929–1969

Differences in the composition of sectoral investment and changes from 1929 to 1969 are shown in Table 3-11. Note that rearing costs are ascribed solely to the personal sector, where its share of total gross investment dropped from 29 to 19 per cent between 1929 and 1969. Tangible nonhuman investment constituted a smaller proportion of total gross investment in the personal sector than in the others but declined only modestly between 1929 and 1969, while it dropped much more in the other two domestic sectors due, chiefly, to significant declines in the nonresidential construction ratios. Equipment outlay ratios rose in both business and government sectors, but not enough to offset relative declines in construction (and in inventory accumulation in the business sector). Note that, even after its relative downturn, nonhuman tangible investment still accounted for over three-fourths of business investment in 1969, while it comprised less than 40 per cent in the other sectors.

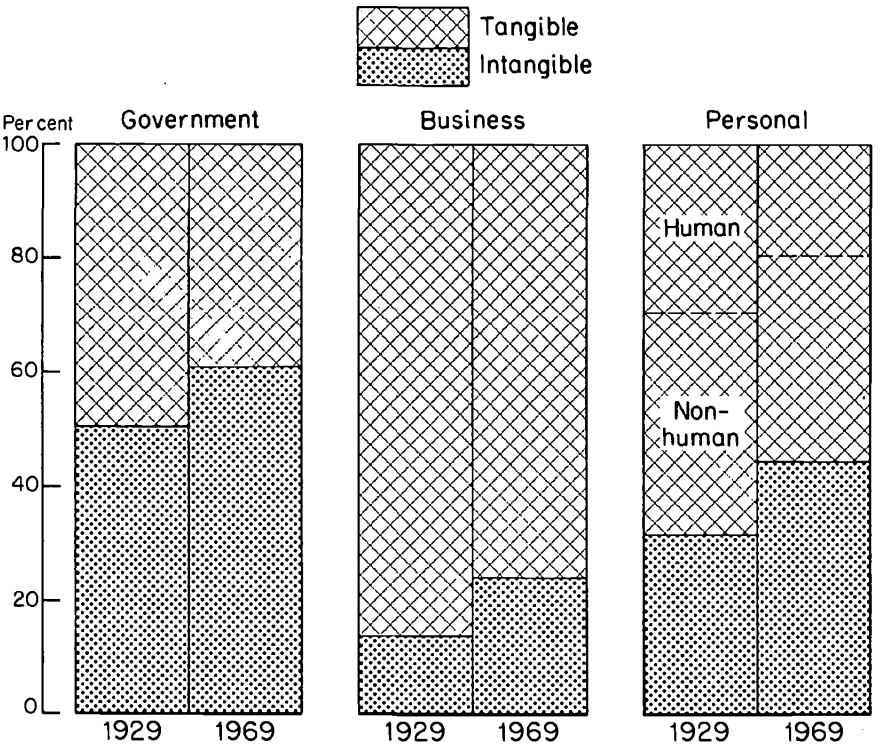
Intangible investment rose sharply in all sectors in relation to total gross investment. Its ratio was markedly higher in the public sector—at around 50 per cent in 1929 and 61 per cent in 1969—than in the private sectors. It was lowest in business, but showed the sharpest rise in that sector, from 14 to 24 per cent over the period under review.

Within the intangibles area, almost all of the relative increase in the public sector was due to R&D. In the private sectors there were

Table 3-11. *Gross Domestic Investment in Current Dollars, Percent Distribution by Type and Sector*

Line No.		Personal Sector		Business Sector		Government Sector	
		1929	1969	1929	1969	1929	1969
1.	Gross sector investment	100.0	100.0	100.0	100.0	100.0	100.0
2.	Tangible investment	68.3	55.5	86.1	76.0	49.6	39.1
3.	Human	29.4	19.4	0.0	0.0	0.0	0.0
4.	Nonhuman	38.9	36.2	86.1	76.0	49.6	39.1
5.	Structures	7.9	8.4	39.7	26.4	43.6	20.5
6.	Equipment	28.5	27.6	35.5	43.9	6.1	16.6
7.	Inventories	2.5	0.8	10.8	5.7	0.0	0.5
8.	Intangible investment	31.7	44.5	13.9	24.0	50.4	60.9
9.	Human	31.6	44.1	12.8	17.3	49.2	50.1
10.	Education and training	20.6	32.5	10.4	15.3	42.7	44.4
11.	Health	4.4	6.0	0.4	0.5	6.2	5.2
12.	Mobility	6.6	5.6	2.0	1.5	0.3	0.5
13.	Nonhuman	0.1	0.3	1.0	6.8	1.2	10.8
14.	Basic research	0.1	0.2	0.1	0.3	0.2	1.7
15.	Applied R & D	0.0	0.1	1.0	6.4	1.0	9.0

Chart 3-4. *Composition of Gross Domestic Investment, by Type of Sector, Percentage, Based on Current Dollars, 1929 and 1969*



significant relative increases in human intangible investment (except mobility) as well. Yet, even in 1969 the public sector still devoted a substantially higher proportion of its total gross investment to human intangibles (particularly education) than did the personal sector. The business sector, understandably, brought up the rear in this department, but showed as high a relative increase as did the personal sector. (See Chart 3-4.)

SECTORAL INVESTMENT BEHAVIOR IN CONTRACTIONS

Declines in the ratio of total investment to product are typical in recessions, as noted earlier, although they have been moderate since the 1930s. When we study the sectoral picture in Table 3-12, we see that declining gross investment ratios occur invariably only in the

Table 3-12. *Sector Changes in Gross Disposable Income, Investment, and Saving as Percentages of GNP between Cycle Peaks and Troughs* (percentage points)

Line No.		1929–33	1937–38	1948–49	1953–54	1957–58	1960–61
	Personal Sector						
1.	Disposable income/GNP	2.2	−1.2	.7	.9	1.1	.5
2.	Investment/disposable income	−8.5	−.6	.7	.2	−.8	−.8
3.	Investment/GNP	−6.1	−.8	.7	.5	−.1	−.3
4.	Saving/GNP	−7.4	−3.6	−.2	−.2	0	.3
5.	Financial investment/GNP	−1.3	−2.9	−1.0	−.7	.1	.7
	Business Sector						
6.	Disposable income/GNP	−5.9	.7	.3	.2	−.4	0
7.	Investment/disposable income	−46.6	−69.0	−34.0	−12.2	−13.2	−7.0
8.	Investment/GNP	−9.2	−4.7	−3.2	−1.0	−1.7	−.8
9.	Financial investment/GNP	3.3	5.5	3.5	1.2	1.3	.8
	Government Sector						
10.	Disposable investment/GNP	3.3	0	−2.1	−1.0	−.9	−.6
11.	Investment/disposable income	4.6	8.8	11.5	−.3	8.7	5.5
12.	Investment/GNP	2.1	1.2	1.3	−.6	1.3	.9
13.	Saving/GNP	−.7	−.9	−2.3	−.6	−1.0	−.4
14.	Financial investment/GNP	−2.8	−2.1	−3.6	0	−2.3	−1.2

business sector. In the personal sector the picture is mixed, while in the public sector the ratio of total gross investment to GNP has risen in all contractions, with the minor exception of 1953–1954.

The related disposable income data help us to analyze cyclical investment behavior more fully. In the personal sector, DPI rose relative to GNP in all recessions except 1937–1938, reflecting the operation of built-in stabilizers. Investment was reduced as a proportion of DPI in all contractions except 1948–1949 and 1953–1954, which were affected by backlogs of durable goods demand. The net result was a shrinking investment-product ratio in all contractions except the two noted above. The declines in the investment ratios, particularly vis-à-vis GNP, were modest, however, except in the Great Depression of 1929–1933. It is interesting that in all recessions through 1954, net financial investment was reduced, so that the ratio of gross saving to GNP fell more than the investment ratio, or declined when the investment ratio rose. In the subsequent two recession years, however, net lending rose, so that the gross saving ratio did not drop, although the gross investment ratio did decline slightly in both years.

In the business sector, except for a marked drop in 1929–1933, the ratio of disposable income (gross saving) to GNP did not change much during contractions. However, the proportion of disposable income invested did drop significantly, although the declines have tended to become smaller in recessions since 1937–1938. This has meant significant declines in the business gross investment-GNP ratio during contractions, although these, too, have tended to become smaller. It is noteworthy that the investment cuts were used to strengthen financial structure. In every contraction net financial investment rose, going from minus to plus without exception.

Finally, the public sector exhibits a downtrend in the ratio of gross disposable income to GNP since the 1930s, reflecting an effect of built-in stabilizers which is the reverse of that operating in the personal sector. Further, the proportion of disposable income devoted to investment rose significantly in all contractions except that of 1953–1954, when there was a small decline due to the post-Korean cutbacks. The net result was a significant increase in the gross government investment-GNP ratio in all contractions (except 1953–1954). It is interesting that in the government sector, net financial investment was reduced in all contractions except 1953–1954, when there was no change: that is, general governments as a whole went from surpluses on current account in peak years to deficits in contraction years. As a result, the ratio of gross public saving to GNP declined in all cyclical contractions, which, together with the investment increases, exerted an important countercyclical influence.