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APPENDIX E

EFFECT OF ACCELERATED DEPRECIATION ON CORPORATIONS' CAPITAL OUTLAYS IN 1959

In estimating the additional capital outlays in 1959 attributable to the use of accelerated depreciation, we have represented the demand for capital goods and the supply of investable funds in the corporate sector by linear functions of the form:

$$r_d = a_d + b_d Q_d \text{ (demand), and}$$

$$Q_s = a_s + b_s r_s \text{ (supply).[1]}$$

These functions are presumed to include the effects of the use of accelerated depreciation: in the demand function, this effect is represented as a higher rate of return with respect to any given amount of capital outlays than would be obtained by using the straight-line method; and in the supply function, the effect is represented as an increase in the amount of investable funds available at any given rate of interest.[2]

In equilibrium, of course,

$$r_s = r_d \text{ and } Q_s = Q_d = \frac{a_s + a_d b_s}{1 - b_s b_d},$$

which is the estimated volume of corporate expenditures for depreciable facilities in 1959. According to a preliminary estimate by the Office of Business Economics, these outlays amounted to $33.8 billion.

Had accelerated depreciation not been available, the functions would have been

$$r'_d = a_d - X + b_d Q'_d \text{ (demand), and}$$

$$Q'_s = a_s - Y + b_s r'_s \text{ (supply),}$$

[1] We wish to emphasize the obvious fact that these equations do not imply specific theories of the demand for capital goods nor of the supply of saving. They are consistent, however, with the reasoning advanced to explain the effects of accelerated depreciation on investment, as discussed in Chapter 1.

[2] See Chapter 1 above for a discussion of these effects.

where X and Y are the shifts in the respective functions due to use of accelerated depreciation. In equilibrium, of course, $r'_s = r'_d$ and

$$Q'_s = Q'_d = \frac{a_s - Y + b_s(a_d - X)}{1 - b_s b_d},$$

which is the estimated volume of capital outlays without accelerated depreciation. The difference between this amount and observed outlays for the year is our estimate of the additional outlays attributable to the use of the declining-balance and SYD depreciation methods. This difference may be represented as $Q - Q' = \frac{Y + b_s X}{1 - b_s b_d}$.

Determination of $Q - Q'$ in the above equation quite obviously depends on the values of the shift parameters, X and Y, as well as on the slopes b_s and b_d of the supply and demand functions, respectively. We have estimated the shift in the supply function as $Y = \$1.265$ billion, i.e., the reduction in tax liabilities, hence the increase in cash flow, for corporations in 1959 from the use of accelerated depreciation methods. In estimating X, the shift in the demand function, we referred to Table 2, showing percentage point increases in rates of return realized by shifting from straight-line to accelerated depreciation at various service lives and at various rates of return under straight-line depreciation. We assumed an average service life of ten years for corporate depreciable property acquisitions in 1959. If we assume a 10 per cent after-tax rate of return under straight-line for such property, Table 2 shows a 1.1 percentage point increase in rate of return in shifting from straight-line to declining-balance depreciation and a 1.4 percentage point increase in shifting to SYD. The table also shows noticeably lower percentage point increases with respect to ten-year property if the straight-line rate of return were 5 per cent and noticeably higher increases if the corresponding rate of return were 15 per cent. Properly, therefore, the value of X should change with the assumed straight-line rate of return. In the interests of ease of computation, however, we assumed an average increase of 1.2 percentage points in the rate of return on the property added to accelerated method accounts in 1959. Little violence is done by this simplifying assumption, since we are concerned only with a small section of the demand schedule, within which the range of variation in r is likely to be small. We estimate that roughly two-thirds of 1959's property additions were added to accelerated method accounts and one-third to straight-line. Accordingly, with respect to the function representing aggregate corporate demand for depreciable facilities in 1959, we have assumed the shift parameter $X = 0.008$.

Determination of $Q - Q'$ also requires that we find the slopes of the respective functions, i.e., b_s and b_d, which in turn depend on the assumed values of r and the assumed elasticities for the respective functions, given the actual Q observed in 1959. By experiment, we determined that given $Q_{1959} = \$33.81$ billion, we could vary the assumed value of r over a wide range without significant effect on the solution of the equation incorporating the shift parameters. With a given value for Q, differences in r, of course, result in differences in the values of b in the respective functions, for any assumed elasticity, since the elasticities of the functions may be expressed as

$$\eta_d = \frac{r_d}{b_d Q_d} \text{ (demand), and}$$

$$\eta_s = \frac{b_s r_s}{Q_s} \text{ (supply).}$$

In other words, specification of the actual value of r makes relatively little difference for the outcome, given Q_{1959} and the assumed elasticities of the functions.

This is evident in Table E-1. With a demand elasticity of $-.5$, for example, the computed value of $Q - Q'$ (the estimated volume of additional capital outlays due to accelerated depreciation) varies narrowly over a wide range of assumed values of r, for any given elasticity of supply. With a demand elasticity of -1.0, a narrow range of estimate of $Q - Q'$ is also observable. The spread between computed values of $Q - Q'$ from one r to another tends to increase as the demand and supply elasticities increase.

The more significant variance in $Q - Q'$ appears in respect to differences in the assumed elasticities of the demand and supply functions, with any given r. With a low elasticity of demand, the difference in $Q - Q'$ is quite small from one supply elasticity to another. With $\eta_d = -2.5$, however, an appreciable difference appears.

Accordingly, we concluded that precise determination of r would not materially increase the reliability of our estimates. We have, therefore, based these estimates on the assumption that the \$33.81 billion of capital outlays in 1959 involved an after-tax rate of return of 10.0

per cent. As shown in Table E-1, depending on the assumed elasticities of the supply and demand functions, these capital outlays were between \$1.3 billion and \$5.7 billion more than would have been forthcoming in the absence of accelerated depreciation.

The shift in the demand function resulting from use of accelerated depreciation accounts for a substantial part of the estimated increase in outlays, as seen in Table E-2. Only when the elasticity of supply is very low, e.g., 0.5, is the increase in outlays due to the shift in the supply of investable funds of about the same magnitude as that resulting from the demand shift. Moreover, the greater the elasticity of supply, the greater is the proportion of the total estimated increase attributable to the shift in the demand function.

TABLE E-1

Estimated Additional Corporate Outlays for Depreciable Facilities, 1959, Attributable to the Use of Accelerated Depreciation, at Selected Rates of Return (r) and Elasticities

(billion dollars)

Elasticity of Supply	Elasticity of Demand		
	–0.5	–1.0	–2.5
		$r = .05$	
0.5	1.43	1.90	2.38
1.0	1.48	2.22	3.17
2.5	1.54	2.63	4.61
5.0	1.56	2.86	5.72
10.0	1.57	3.00	6.61
		$r = .10$	
0.5	1.31	1.75	2.17
1.0	1.32	1.99	2.84
2.5	1.34	2.29	4.01
5.0	1.34	2.47	4.93
10.0	1.35	2.57	5.66
		$r = .15$	
0.5	1.24	1.65	2.06
1.0	1.23	1.84	2.63
2.5	1.22	2.08	3.65
5.0	1.21	2.20	4.44
10.0	1.21	2.31	5.08

TABLE E-2

Estimated Additional Corporate Outlays for Depreciable Facilities, 1959, Attributable to the Shift in the Demand and Supply Functions, at Selected Elasticities[a]

(billion dollars)

Elasticity of Supply	Elasticity of Demand		
	–0.5	–1.0	–2.5
Supply Shift Only			
0.5	0.63	0.84	1.05
1.0	0.42	0.63	0.90
2.5	0.21	0.36	0.63
5.0	0.12	0.21	0.42
10.0	0.06	0.12	0.25
Demand Shift Only			
0.5	0.68	0.90	1.13
1.0	0.90	1.35	1.93
2.5	1.13	1.93	3.38
5.0	1.23	2.25	4.51
10.0	1.29	2.46	5.41

[a] $r = .10$.