Corporate Tax Policy - Classic Papers

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02/23/2018

On the Design and Reform of Capital-Gains Taxation

Rationale

A lot of attention has been given to capital-gains taxation over the second half of the XXth century

This paper :

- surveys the main results of this literature
- gives additional insights with a model simulation

Survey

Tax upon *realization* vs *accrual* → "lock-in" effect caused by the former

Two problems for accrual taxation : *liquidity* and *valuation*

A "retrospective taxation" approach might solve both problems (Auerbach (1991)) : it is a combination of the "cumulative averaging" proposed by Vickrey (1939) and of an imputation of the investor's gains

However accrual taxation still causes consumption distortions...

Model

A household has a first-period endowment, and finances consumption on 3 periods with it.

Period 1 : household consumes, and saves the rest in a **safe** asset yielding r.

Period 2 : household sells some of the asset to consume, realizing taxable capital gains ; the rest of the existing asset can be used either as it is, yielding a **risky** return of $\{g_1, g_2\}$ with equal probability, with $g_1 > r > g_2$, or some portion can be reallocated to another **safe** asset.

Period 3 : household consumes its entire wealth and pays taxes on the total accumulated appreciation of the first asset, and on the appreciation of the safe asset bought in period 2.

Parametrization

Periods last 25 years ; safe rate of 4% per year.
The second-period tax rate is 0.6 ; third-period tax rate is 0.45 (to account for the fact that some gains are never taxed).
$\{g_1, g_2\} = \{2.9, -0.1\}$, leading to an annual mean return of 6%, and a standard deviation of 0.28 (twice as large as what is observed by Poterba and Summers (1986)).
Assumes utility of the form :

$$U(c_1, c_2, c_3^1, c_3^2) = \left[c_1^{-\beta} + c_2^{-\beta} + \left(\frac{1}{2}(c_3^1)^{-\alpha} + \frac{1}{2}(c_3^2)^{-\alpha} \right)^{\beta/\alpha} \right]^{-(1/\beta)}$$

with $\sigma = 1/(1+\beta)$ and $\delta = 1/(1+\alpha)$ the elasticities of substitution across states and dates, respectively.

Results

- The tax rate on accrual leaving household utility unchanged is higher (at most 14 points higher) than the rate on accrual giving the same tax payments.
- The move towards a tax on accrual raises utility in every case.
- A tax cut in period 2 decreases the tax revenue in the short run, but even more in the long run because of portfolio rebalancing.
- A prospective tax cut leads to more saving than an immediate tax cut, but is not necessarily more efficient.

Tax Policy and Investment Behavior

Rationale

Tax devices to stimulate investment have been really popular in the 50s and 60s, but the belief in their efficiency has not been investigated empirically.

This paper provides evidence about the relationship between tax policy and investment decisions, within the neoclassical framework.

Model

The firm wants to maximize its current profit, that is its gross revenue less the cost of current imputs and the rental value of capital. The firm can either buy or rent the capital, therefore the rental rate and price of capital can be linked (Jorgenson (1967) discusses it).

The price of capital goods, q, can be expressed as :

$$q(t) = \int_t^{\infty} e^{-r(s-t)} c(s) e^{-\delta(s-t)} ds \tag{1}$$

where r is the discount rate, c the cost of capital services, and δ the rate of replacement (or depreciation). The good is acquired in t and supplies services in s.
By differenciating w.r.t. t we get : $c = q(r + \delta) - \dot{q}$.

Upon the introduction of taxation, (1) becomes :

$$q(t) = \int_t^{\infty} \Big[(1-u)c(s)e^{-\delta(s-t)} + u(1-k)q(t)D(s)\Big] ds + kq(t)$$

with u the constant tax rate on business income. We assumed that tax authorities prescribe a depreciation formula $D(s)$, giving the proportion of the original cost of an asset to be **deducted** from income. We also assume a **tax credit** at rate k (on investment expenditure) ; the depreciation base is reduced by the amount of tax credit.

The present value of depreciation deduction on 1$ of investment (net of tax credit) is then :

$$z = \int_0^{\infty} e^{-rs} D(s) ds.$$

And the rental value of capital under static expectations ($\dot{q} = 0$) :

$$c = (r + \delta) \frac{(1 - k)(1 - uz)}{1 - u}$$

With competitive markets and a Cobb-Douglas production function, the desired level of capital, K^+, writes :

$$K^+ = \alpha \frac{pQ}{c} \tag{2}$$

with p and Q the price and quantity of output, and α the elasticity of output w.r.t capital.

We now need to link capital with investment decisions ; we assume that :

- after a change in K^+, a proportion of the investments necessary takes place over each time interval
- a proportion of the investment is replaced over each period

These proportions are **independent of time**.
Under these assumptions we have :

$$I_t = \sum_{s=0}^{\infty} \mu_s \Delta K^+_{t-s} + \delta K_t$$

where I_t is gross investment in t, ΔK^+_{t-s} is the desired change in $t-s$ and μ_s the proportion associated to this change in $t-s$ that results in investment in t.
Net investment is thus $N_t = I_t - \delta K^+ = \sum_{s=0}^{\infty} \mu_s \Delta K^+_{t-s}$.

Estimation

We need to restrict the sequence $\{\mu_s\}$: we assume the first two coefficients to be arbitrary, witht the rest declining in a geometric series ; this gives us the investment :

$$N_t = \gamma_0 \Delta K_t^+ + \gamma_1 \Delta K_{t-1}^+ - \omega N_{t-1}$$

where γ_0, γ_1 and ω characterize $\{\mu_s\}$.
Adding a random term and using (2) we get the regression function :

$$N_t = \alpha\gamma_0 \Delta \frac{p_t Q_t}{c_t} + \alpha\gamma_1 \Delta \frac{p_{t-1} Q_{t-1}}{c_{t-1}} - \omega N_{t-1} + \varepsilon_t. \qquad (3)$$

The coefficients α, ω, γ_0, and γ_1 are to be estimated in the empirical analysis.

Estimating the investment function

Data from the Capital Goods Study of the Office of business Economics, over 1929-1963.
First, the capital stock for each period is estimated with this relation :

$$K_t = I_{t-1} + \delta K_{t-1}.$$

where I_t is investment in current prices, deflated by an investment goods price index.

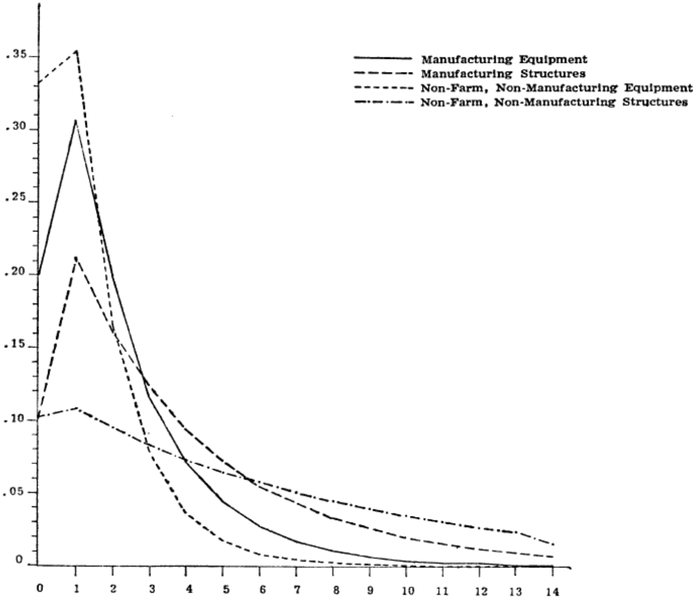
Estimating the investment function (2)

TABLE 2—INVESTMENT FUNCTIONS FOR MANUFACTURING AND NON-FARM, NON-MANUFACTURING EQUIPMENT AND STRUCTURES FOR 1931–41, 1950–63

	$\Delta(pQ/c)_t$	$\Delta(pQ/c)_{t-1}$	N_{t-1}	$\hat{\alpha}$	Mean Lag	R_N^2	R_I^2	d
Manufacturing equipment	.01419 (.00372)	.01242 (.00442)	.6152 (.1001)	.0691 (.0156)	2.065 (.258)	.7219	.9566	2.036
Manufacturing structures	.00396 (.00131)	.00526 (.00145)	.7658 (.0790)	.0394 (.0126)	3.840 (.343)	.8475	.9208	2.474
Non-farm, non-manufacturing equipment	.02452 (.00844)	.01460 (.01038)	.4692 (.1342)	.0737 (.0141)	1.257 (.261)	.6899	.9616	1.738
Non-farm, non-manufacturing structures	.01296 (.00197)	.00227 (.00223)	.8801 (.0322)	.1269 (.0250)	7.488 (.239)	.9830	.9908	1.435

From left to right, the coefficients associated with the columns are : $\alpha\gamma_0$, $\alpha\gamma_1$, $-\omega$, and the elasticity of output to capital.
Mean Lag is the lag between desired change in capital and actual investment.
R^2 for both gross and net investment are displayed.

Estimating the timing of investment



Predicting Investment

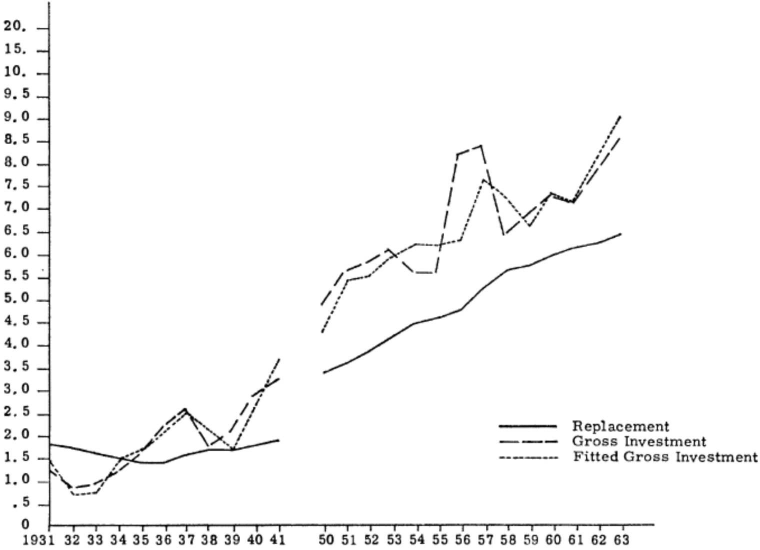


FIGURE 2a. MANUFACTURING EQUIPMENT

Predicting Investment (2)

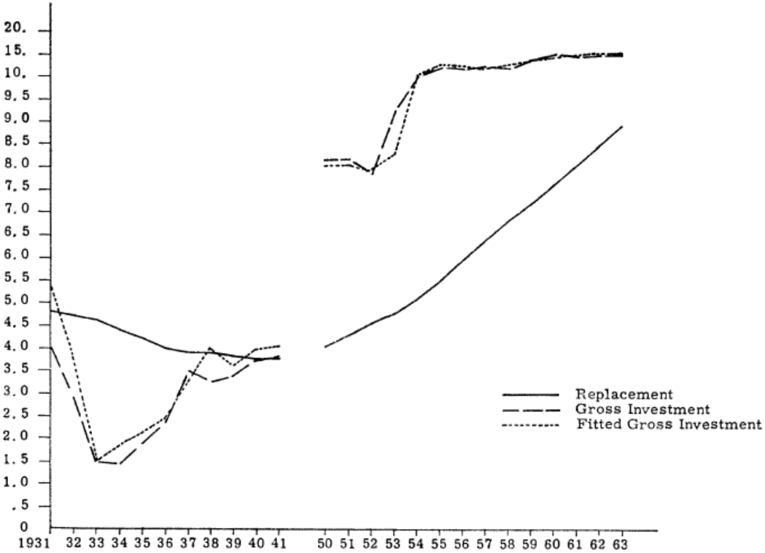


FIGURE 2d. NON-FARM, NON-MANUFACTURING STRUCTURES

Tax policy Effects

- Without the reduction of lifetimes used to compute depreciation on equipment in 1962, the model predicts a moderate but significant rise in both net and gross investment ; it is however limited to equipment investment.
- The implementation of a 7% tax credit in 1962 causes investment to skyrocket ; 40.9% of net investment in 1963 in manufacturing equipment can be attributed to the tax credit.

TABLE 5—CHANGE IN NET INVESTMENT, GROSS INVESTMENT, AND CAPITAL STOCK RESULTING FROM 1962 DEPRECIATION GUIDELINES AND THE INVESTMENT TAX CREDIT, 1962–63 (billions of 1954 dollars)

Year	1962 Depreciation Guidelines						Investment Tax Credit					
	Manufacturing Equipment			Non-Farm Non-Manufacturing Equipment			Manufacturing Equipment			Non-Farm Non-Manufacturing Equipment		
	N	I	K	N	I	K	N	I	K	N	I	K
1962	.185	.185	0	.504	.504	0	.509	.509	0	1.388	1.388	0
1963	.287	.315	.185	.559	.656	.504	.792	.867	.509	1.541	1.808	1.388

Counterfactual

Hypothetical adoption of a first-year writeoff in investment expenditures :

TABLE 6—CHANGE IN NET INVESTMENT, GROSS INVESTMENT, AND CAPITAL STOCK RESULTING FROM HYPOTHETICAL ADOPTION OF FIRST-YEAR WRITEOFF OF INVESTMENT EXPENDITURES, 1954–63
(billions of 1954 dollars)

Year	Manufacturing Equipment			Manufacturing Structures			Non-Farm Non-Manufacturing Equipment			Non-Farm Non-Manufacturing Structures		
	N	*I*	*K*	*N*	*I*	*K*	*N*	*I*	*K*	*N*	*I*	*K*
1954	1.606	1.606	0	.937	.937	0	4.071	4.071	0	5.168	5.168	0
1955	2.555	2.791	1.606	2.085	2.144	.937	4.519	5.302	4.071	5.842	6.201	5.168
1956	1.692	2.304	4.161	1.633	1.822	3.023	2.310	3.962	8.591	4.691	5.455	11.011
1957	1.023	1.884	5.853	1.072	1.363	4.657	1.233	3.329	10.901	4.106	5.196	15.702
1958	.508	1.520	6.877	.769	1.127	5.730	.719	3.053	12.134	3.858	5.233	19.809
1959	.417	1.504	7.385	.706	1.112	6.499	.691	3.163	12.854	4.126	5.768	23.668
1960	.463	1.611	7.803	.807	1.258	7.205	.708	3.313	13.546	4.157	6.086	27.794
1961	.311	1.527	8.267	.656	1.157	8.013	.685	3.426	14.254	3.921	6.138	31.952
1962	.328	1.590	8.578	.544	1.086	8.670	.642	3.515	14.940	3.617	6.107	35.873
1963	.447	1.757	8.906	.538	1.114	9.214	.656	3.652	15.582	3.325	6.066	39.491