Pretty Cruddy Investments Brought To You by Stimulus Depreciation

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The tax stimulus package Congress passed late last week adopts depreciation deductions that would induce a business to make some pretty cruddy investments. The stimulus package will allow a business to deduct 50 percent of the cost of machinery and equipment as soon as the equipment is ready to run.[1] Under reasonable assumptions, the legislation will allow a business to lose a little over a quarter of the interest cost incurred to buy equipment every year as a matter of economics and still do all right thanks to the tax subsidy. Even worse is the $250,000 of immediate write-off allowed for "small businesses." The expensing for equipment justifies investments that lose over a third of their interest costs.

It is not wise to give subsidies for investments in equipment that result in the equipment being unable to cover the going interest costs before tax. The interest rate for capital is the rental cost set by global competitive markets. Savers who supply capital and borrowers who want to use capital meet together in a fluid international market, and the interest cost for the capital is set by supply and demand. The United States now borrows precious capital from abroad and it should not be wasting that capital on cruddy equipment investments.

I suspect the proponents were thinking of the depreciation part of the stimulus package as just another form of rate cut for businesses. But leveraged investments in machinery are tax shelters already because they generate a negative tax or subsidy. The new stimulus depreciation will make the subsidy worse, and therefore worse for the economy. Leveraged equipment is a tax shelter, defined here as an investment that has a higher return after tax than it would have in absence of tax. It makes sense to cut corporate tax rates more generally rather than increase the negative tax of subsidy to equipment tax shelters.

[1]*See* Michael Joe, "Business Incentives Would Offer Modest Stimulus, Orszag Says," *Doc 2008-1559, 2008 TNT 17-2*.

The equipment getting the tax subsidy from the government has no special merit. They are just run-of-the-mill investments. A general subsidy for investments with nothing special to investors just gives the investors incentives to buy equipment not worth its price in a nontax world. Stimulus depreciation violates the first principle of therapy: "First, do no harm." Wasting capital is not the way to return the economy to economic health.

The 50 Percent Immediate Write-Off

Spreadsheet 1 at the end of the article shows that the break-even return from a leveraged investment in equipment that can be leased out for seven years will be about 73 percent of the interest cost of capital. Interest is assumed to be 6 percent and the break-even pretax return from the equipment that will allow it go forward is 4.37 percent. The return is only 73 percent of interest, meaning 27 percent of the interest cost will be lost.

Notes following the spreadsheet explain the assumptions. Variations in the assumptions would yield different results, but not by enough to change the overall conclusion. Increasing the shelter value or negative tax, under any assumptions, is still a bad idea.

Expensed Investments

The stimulus package will also allow $250,000 of equipment to be deducted, doubling the amount allowed under current law.[2]

Within a system that allows a deduction of interest, expensing as enacted in the stimulus package creates a shelter or negative tax that is worth as much as 35 percent of interest. Given the negative tax, a taxpayer can go forward with a return from the investment that is 35 percent less than the interest cost. If interest is assumed at 6 percent, the equipment must have a return of only 3.9 percent, that is, 35 percent less. Over a third of the interest cost can be lost as a matter of economics. Spreadsheet 2, also at the end of this article, shows the same results, using the same assumptions as for Spreadsheet 1.

The point can also be shown with an algebraic model.[3] Assume a taxpayer borrows amount B. Expensing allows the taxpayer to count on an immediate tax savings at rate T of the amount invested. The savings is like a reimbursement of T multiplied by the amount invested if the taxpayer can use the deduction of the amount invested within the T tax rate. The investor can invest x, such that

(1) $x - T^*x = B$

[2]*Id*.

[3]The model is explained more fully in Calvin Johnson, "Tax Shelter Gain: The Mismatch of Debt and Supply Side Depreciation," 61 *Texas L. Rev*. 1013 (1983).

counting on the reimbursement by tax savings of $T*x$. It follows from (1) that borrowing of B will support investment x of

(2) $x = B/(1\text{-}T)$ [factoring out x in equation (1) and dividing by (1-T)]

A borrowing of B, equation (2) says, will allow an investment of $B/(1\text{-}T)$.

Assume interest must be paid at rate I, but only on the amount borrowed. Revenue will come in at annualized rate R on larger amount invested $B/(1\text{-}T)$, for an annual profit before tax of

(3) $B/(1\text{-}T) * R - B * I$.

Then tax must be paid every year, assume at constant rate T, leaving (1-T) times expression (3) after tax:

(4) $[B/(1\text{-}T) * R - B * I] - T * [(B/ (1\text{-}T) * R - B * I] = [B/(1\text{-}T) * R - B * I] * (1\text{-}T) = B * R - B * I\ (1\text{-}T) =$

(5) $BR\text{-}BI + B * I * T$.

which is the annual after-tax return. The deduction of interest has added $B * I * T$ to the taxpayer's after-tax profit.

The point of indifference when the return is just enough to justify the borrowing is when expression (5) is just zero and hence when

(6) $B * R = B * I\ (1\text{-}T)$ [expression (5) with revenue and costs equal].

Equation (6), applied to a 35 percent tax bracket, says that the return can be 35 percent below the interest cost. If interest is 6 percent, the return from the investment can be 3.9 percent.

The algebraic model funnels the analysis of the tax into the annualized return and interest cost. There is no cash flow at either investing and borrowing or a liquidation of the investment and repayment of the loan. When the investment is sold at cost,[4] the taxpayer receives $B/(1 - T)$ before tax and has no remaining basis, and therefore pays tax on the full $B/(1 - T)$, leaving $B/(1 - T) * (1 - T)$ after tax, or simply B, which the taxpayer returns to the borrower.

(Spreadsheets begin on the next page.)

[4] If the investment is sold below cost, that would be reflected in a reduced R.

Spreadsheet (1): Leveraged Investment in 50% Write-Off Equipment Will Allow 4.37% Return, For Loss of 27% of Interest

Pretax revenue annuity rate (derived) = 4.37%	Pretax interest = 6%			Tax rate = 35%		After-tax discount rate = 3.90%		
1. Year	0	1	2	3	4	5	6	7
2. Unit cost	(100.00)							
3. Pretax revenue (annuity derived)		16.89	16.89	16.89	16.89	16.89	16.89	16.89
4. Debt [constant payment at 6%]	100.00	(17.91)	(17.91)	(17.91)	(17.91)	(17.91)	(17.91)	(17.91)
5. Pretax net [row 3-4]		(1.03)	(1.03)	(1.03)	(1.03)	(1.03)	(1.03)	(1.03)
Interest calculation								
6. Interest [@6% of prior row 8]		$6.00	$5.29	$4.53	$3.72	$2.87	$1.97	$1.01
7. Reduction of debt [row 4 - row 6]		($11.91)	($12.63)	($13.39)	($14.19)	($15.04)	($15.94)	($16.90)
8. New debt outst [prior row 8 - row 7]	$100.00	88.09	75.46	62.07	47.88	32.84	16.90	0
Depreciation calculation								
9. 50% off, then DDB, then SL	$50.00	$20.00	$12.00	$7.20	$5.40	$5.40		
10. Basis calculation (for DDB)		$50.00	$30.00	$18.00	$10.80	$5.33		
11. Half-year shift [1/2 next col. row 9]	$60.00	$16.00	$9.60	$6.30	$5.40	$2.70		
12. Taxable income [row 3 - row 6 & row 11]	($60.00)	($5.11)	$2.00	$6.06	$7.76	$11.31	$14.92	$15.87
13. Tax @ 35% [row 12] [negative tax is -]	-$21.00	-$1.79	$0.70	$2.12	$2.72	$3.96	$5.22	$5.56
14. After tax [row 5 - row 13]	$21.00	$0.76	-$1.73	-$3.15	-$3.74	-$4.99	-$6.25	-$6.58
15. Present value of row 14 at 3.9%	$21.00	$0.73	-$1.60	-$2.81	-$3.21	-$4.12	-$4.97	-$5.04
16. Sum present value [sum row 15]	$0.00							

Notes to Spreadsheet (1) : Description of logic and assumptions

The derived and assumed variables are set up at the beginning of the spreadsheet.

The derived variable of 4.37% is the return rate necessary to give the investor a net present value of zero at the end (row 16). The Excel goal seek program finds the 4.37% by trial and error once the other assumptions are set up.

I assume 6% to finance equipment, with the risk and economic life of this equipment. The tax rate assumed is the 35% maximum tax rate. The discount rate is the after tax cost of interest, that is, 6%*(1-35%) or 3.9%.

Row 1. By convention, the start of investment is called year 0 and all cash flows come at the end of the year.

Row 2. The $100 cost of the equipment is just a unit assumption. All the cost is borrowed, so there is no net cash flow in year 0.

Row 3. It is assumed that the equipment will generate an annuity, or constant payment per year, such as we might see with a seven-year lease of the equipment. The constant rent "*A*" is derived from the annuity present formula, $\$100 = A^* (1-(1+i)^{-10} / i)$, where *i* is the derived interest rate, calculated by goal seek that will make net present value of zero.

Row 4. It is assumed that debt will be repaid in constant annual amounts. The constant deby payment per year is the amount needed to repay $100 loan over seven years paying the 6% borrowing rate on the loan amount outstanding.

Row 5. Pretax net. The pretax net is negative because an investor would reach net present value of zero, given the tax shelter, even with net out-of-pocket payments each year. Row 5 is just the derived revenue stream of row 3, less the constant debt repayments.

Rows 6-8. Each debt payment is partially interest and partially reduction of the debt, and as the debt goes down, less of each payment is interest. Row 8 shows how much of the original $100 is owned at year beginning. Row 6 is the given 6% interest times row 8. Row 7 shows how much of each year's constant payment goes to repay the debt after interest is paid. The final constant payment reduces the debt to zero.

Rows 9-11. Depreciation deductions are allowed under both current law and the stimulus package that exceed loss in value of the equipment.

(1) Tax lives are shorter than useful lives. It is assumed here that equipment that can be leased out for 7 years is given a 5-year useful life, for a piece of equipment that has a commercial or lease life of 7 years. The short tax life is available under current law and is not affected by the stimulus package.

(2) Half of the $100 cost basis may be deducted as soon as the equipment is placed in service, which is added by the stimulus package.

(3) The remaining $50 is deducted under a depreciation schedule called double declining balance, or DDB depreciation. The first step is to find the percentage of basis that would be deducted in a year under straight-line, that is, if one-fifth of the cost were deducted in each of the five years of the tax life. Then double the percentage from 20% to 40%. DDB depreciation uses the fixed 40% DDB percentage against an ever decreasing basis, so that, e.g., the second year depreciation is 40% of $30, or $12. The fixed DDB percentage used against a decreasing balance of basis can never reach zero, allowing all the cost to be deducted, so that the taxpayer is allowed to amortize remaining basis straight-line over remaining life when that yields a bigger deduction. Because DDB depreciation is 40% of the declining adjusted basis, not the original $100 cost, row 10 gives the adjusted basis to aid in the next year's depreciation calculation.

Spreadsheet (1): Leveraged Investment in 50% Write-Off Equipment Will Allow 4.37% Return, For Loss of 27% of Interest

(4) All depreciation is shifted one-half year early, under a half-year convention. Thus, the year 0 deduction is $50 (half of basis) allowed by stimulus depreciation plus one-half the second year deprecation as calculated in row 9.
Row 12. Taxable income is the (derived) revenue in row 3, less the deductions allowed for interest and depreciation.
Row 13 is the tax rate of 35% times row 12 taxable income. The table assumes that the taxpayer can use negative taxable income (that is, tax losses or shelter) against unrelated income to save tax otherwise due in the 35% tax bracket. Use of losses by an individual assumes that the taxpayer is in the business of the equipment so that the passive activity loss limitations of section 469 do not defer use of the losses, and assumes that the taxpayer has unrelated income in the 35% bracket it can use the losses against.
Row 14. After tax cash flow is the pretax cash flow in row 5 less the tax from row 13.
Row 15 is the discounted present value of row 14 cash flows. The discount rate used is the borrowing rate of 6% less tax savings from paying the interest or 6%*(1-35%) =3.9%. Discounting means that each cash flow of row 14 is divided by the compound growth factor $(1+d)^n$, where d is the discount rate and n is the number of years from year zero to the year of the cash flow.
It should be noted that the investment in the spreadsheet is a borrowing pattern or transaction to the taxpayer: Positive cash flow comes early and negative cash flow in the nature of repayment occurs later. Higher discount rates will improve the value of this investment and allow the taxpayer to tolerate worse revenue.
Row 16 sums the discounted present values of row 15. A net present value of zero means that one has identified the internal rate of return or interest rate for this investment. With a net present value of zero, the investment gives the necessary 3.9% internal rate of return necessary to justify the investment, but no more.

Spreadsheet (2): Leveraged Investment in Expensed Equipment Will Allow 3.9% Return, Losing 35% of Interest Cost

Pretax revenue annuity rate (derived) = 4.90%	Pretax cost of capital			Tax rate =35%		After-tax discount rate= 3.90%		
1. Year	0	1	2	3	4	5	6	7
2. Unit cost	(100.00)							
3. Pretax revenue (annuity derived)		16.60	16.60	16.60	16.60	16.60	16.60	16.60
4. Debt [constant payment at 6%]	100.00	(17.91)	(17.91)	(17.91)	(17.91)	(17.91)	(17.91)	(17.91)
5. Pretax net [row 3-4]	0.00	(1.31)	(1.31)	(1.31)	(1.31)	(1.31)	(1.31)	(1.31)
Interest calculation								
6. Interest [@6% of prior row 8]		$6.00	$5.29	$4.53	$3.72	$2.87	$1.97	$1.01
7. Reduction of debt [row 4 - row 6]		($11.91)	($12.63)	($13.39)	($14.19)	($15.04)	($15.94)	($16.90)
8. New debt outstanding [prior row 8 - row 7]	100.00	88.09	75.46	62.07	47.88	32.84	16.90	0.00
Depreciation calculation								
9. Full expensing	$100.00							
10. Taxable income [row 3 - row 6 & row 9]	($100.00)	$10.60	$11.31	$12.07	$12.88	$13.73	$14.63	$15.59
11. Tax @ 35% [negative tax is -]	-$35.00	$3.71	$3.96	$4.23	$4.51	$4.80	$5.12	$5.45
12. After tax [row 5 - row 11]	$35.00	-$5.02	-$5.27	-$5.54	-$5.82	-$6.12	-$6.43	-$6.77
13. Present value of row 12 at 3.9%	$35.00	-$4.84	-$4.89	-$4.94	-$4.99	-$5.05	-$5.11	$5.18
14. Sum present value [sum row 13]	$0.00							