When Do Firms Pay Deferred Income Taxes?

Derek K. Oler
Texas Tech University

Mitchell J. Oler
University of Wyoming

Deferred tax expense reflects temporary timing differences based on differences between when an item is recognized for accounting purposes and when the same item is recognized for tax purposes. Although in theory temporary differences will reverse, the timing of the reversals are uncertain. On average, deferred income tax expense for most firms is associated with relatively small future cash payments over the two years following deferred tax expense recognition, and a large portion of deferred tax expense does not result in future tax payments in a systematic manner. Firms with high growth in property, plant, and equipment are able to defer income tax indefinitely.

Keywords: current income tax, deferred income tax, tax reversals

INTRODUCTION

This study investigates the timing of deferred tax reversals in the form of cash payments. Under ASC 740 (legacy SFAS 109), an entity is required to recognize tax expense in the period the related underlying economic activity occurs, which is not necessarily in the same period as the tax payment. When the cash paid for taxes is not in the same period as the recognition of tax expense on the income statement (and the difference is not considered permanent), a temporary difference occurs which will result in either a deferred tax liability or asset being recognized on the balance sheet. Because these effects are temporary, the differences between book and tax will theoretically reverse at some point in the future and the deferred tax liability or asset will be derecognized.

Although in theory these temporary differences will eventually reverse, the timing is uncertain because of different recognition criteria between financial and tax accounting. For example, fixed assets are depreciated for tax purposes using the Modified Accelerated Cost Recovery System (MACRS) depreciation schedules, but firms are given more flexibility for financial reporting and may use any reasonable and systematic method; in most cases MACRS depreciation is accelerated relative to accounting depreciation and results in the recognition of deferred tax expense and a deferred tax liability. Net operating losses are recognized immediately for book purposes but can be carried forward for tax purposes and will not reverse until the firm experiences positive taxable income. In both examples, the timing of reversals will be ambiguous for outside users and, in the case of the loss carryforward, also unknown to the firm managers. In addition to timing differences reversals are, in aggregate, also a function of the growth pattern of the firm

(Cheung, Krishnan and Min, 1997). For example, a firm with continuous growth would never show a reversal of timing differences for fixed assets.

Notwithstanding uncertainty, timing differences are important for firms and investors to understand as these differences can influence the related cash flows from taxes and therefore the value of the firm as a whole (Amir, Kirscheneiter, and Willard, 1997; Guenther and Sansing, 2000). This paper provides additional information regarding the timing of taxes paid relative to the tax expense recognition by empirically examining the timing of cash outflows related to deferred tax expense. Specifically, we regress actual taxes paid in the current period on current and prior years' deferred tax expense. We find that, on average, the coefficients on deferred tax expense in prior years are much smaller than expected, suggesting that most deferred taxes are not paid in a systematically measurable way. The payment of deferred taxes is reduced by growth in property, plant, and equipment (PPE), as expected, because PPE growth consists mostly of increases in depreciable assets that provide the firm with additional dollars that the firm can deduct under MACRS. After controlling for PPE growth we find that firms with higher sales growth pay more taxes. We test our methodology by regressing taxes paid on current tax expense, expecting to find that current taxes paid are strongly associated with current tax expense, and we find results consistent with our expectations.

These findings provide additional information regarding the reversal of deferred taxes. Although on average the ratio of net deferred tax position reported on the balance sheet (the net of deferred tax assets and liabilities) to total assets is only 0.3 percent from 1988 to 2022, gross deferred tax assets and liabilities to total assets make up 13.4 and 13.7 percent respectively and total tax expense to pretax income is 24.6 percent over the same period, suggesting that taxes reflect a significant portion of a firm's activities (Poterba, Rao, Seidman, 2011), and therefore have an important role in the overall valuation of the firm.

This study may also be of interest to policy makers as they debate the usefulness of the interperiod allocation of taxes. If the reversals are difficult to predict, this calls into question the rationale for interperiod tax allocation. This study provides additional context for classroom accounting instruction. A natural question that flows from seeing a deferred tax liability (asset) is: when will this deferred tax cost be paid (tax benefit be realized)? – a question that most textbooks leave unanswered.[1]We hope to provide clarification in the timing for those reversals.

Our second section discusses the prior research and develops our hypothesis. The third section provides our research methodology and data. Section four contains our results, and the last section provides our conclusions. We are not aware of any prior papers that have empirically investigated the timing of payments for deferred tax expense.

PRIOR RESEARCH AND HYPOTHESIS DEVELOPMENT

Tax expense is the recognition of using up resources to satisfy taxing authorities. Under ASC §740-10-50-9, tax expense is split into current and deferred portions, with the current portion reflecting the amount of income taxes paid to authorities based on current *taxable* income (as defined by the Income Tax Act). Deferred tax expense is more nuanced, as it reflects the amount of tax expense that is not related to current taxable income, but instead reflects expected future taxes that will become payable when temporary differences reverse. An increase in deferred tax expense represents either an expectation of an increase in future taxes paid, creating a deferred tax liability, or the using up of a deferred tax asset. Alternatively, a credit to deferred tax expense occurs when a deferred tax liability is decreased or a deferred tax asset is increased.

Deferred tax liabilities (assets) are estimates of the future income taxes that a firm will likely need to pay (or be reduced) when temporary timing differences reverse, leading to the firm reporting higher (lower) taxable income. ASC 740-10-10-3 of the codification explains:

Conceptually, a deferred tax liability or asset represents the increase or decrease in taxes payable or refundable in future years as a result of temporary differences and carryforwards at the end of the current year. That concept is an incremental concept. A literal application of that concept would result in measurement of the incremental tax effect as the difference between the following two measurements:

a. The amount of taxes that will be payable or refundable in future years inclusive of reversing temporary differences and carryforwards.
b. The amount of taxes that would be payable or refundable in future years exclusive of reversing temporary differences and carryforwards.

This standard implies that when a firm recognizes depreciation deductions for tax purposes at a faster rate than for book purposes, a deferred tax liability is created. Similarly, deferred tax assets are estimates of reductions in future income taxes to be paid. For example, contingent liabilities are recorded on the income statement as a loss when the payment probable and estimable, but the tax deduction associated with the loss will not be recognized for tax purposes until the related cash flow occurs. Net operating loss carry forwards also are considered deferred tax assets because they will reduce future taxes paid.

A simple example, consistent with most intermediate accounting textbooks, illustrates the concepts of deferred tax – in this case deferred tax liability:

Chopin Inc. has net income for both tax and financial reporting purposes of $300,000 per year before depreciation and has a combined state and federal income tax rate of 20%. Chopin has one capital asset, purchased on January 1, 2025, for $500,000. For financial reporting purposes Chopin depreciates their assets over a 5-year useful life with no salvage value and uses the MACRS for tax purposes, as depicted in Table 1 below:

TABLE 1
TAX TIMING DIFFERENCE EXAMPLE

Year	Accounting depreciation	MACRS depreciation	Temporary difference	Cumulative temporary difference	Tax rate	Deferred tax liability	Deferred tax exp/ (benefit)
2025	100,000	180,000	(80,000)	(80,000)	20%	(16,000)	16,000
2026	100,000	140,000	(40,000)	(120,000)	20%	(24,000)	8,000
2027	100,000	90,000	10,000	(110,000)	20%	(22,000)	(2,000)
2028	100,000	60,000	40,000	(70,000)	20%	(14,000)	(8,000)
2029	100,000	30,000	70,000	-	20%	-	(14,000)
Total	500,000	500,000					

At fiscal year-end 2025 Chopin would show deferred tax expense of $16,000 and a deferred tax liability (DTL) of $16,000 as a long-term liability on the balance sheet. 2026 deferred tax expense is $8,000, and the deferred tax liability increased to $24,000. In 2027 the timing difference between accounting depreciation and tax depreciation begins to reverse, and Chopin would show a deferred tax benefit of $2,000 with the DTL decreasing to $22,000 by year-end. More of the timing difference reverses in 2028, and by the end of 2029 the difference between accounting and tax depreciation has completely reversed and $500,000 total cost has been deducted for accounting and tax purposes over the 5 years of the asset's useful life.

Chopin would show the following for current and deferred income tax, and shown in Table 2:

TABLE 2
DEFERRED TAX LIABILITY EXAMPLE

Year	Taxable income before MACRS	Less MACRS	Taxable income	Tax rate	Current tax exp.	Deferred tax exp/ (benefit)	Total tax exp.	Deferred tax liability
2025	300,000	180,000	120,000	20%	24,000	16,000	40,000	16,000
2026	300,000	140,000	160,000	20%	32,000	8,000	40,000	24,000
2027	300,000	90,000	210,000	20%	42,000	(2,000)	40,000	22,000
2028	300,000	60,000	240,000	20%	48,000	(8,000)	40,000	14,000
2029	300,000	30,000	270,000	20%	54,000	(14,000)	40,000	0

Chopin would show combined income tax expense for each year of $40,000. In 2025 Chopin would pay $24,000 of current income tax plus deferred tax expense of $16,000, suggesting that Chopin had "deferred" or temporarily avoided income tax of $16,000 but would have to pay this income tax in future years when the timing differences reverse. Our example shows these reversals occurring from 2027 to 2029 as MACRS drops but straight-line accounting depreciation remains the same at $100,000 per year. The journal entries Chopin would record for the provision for taxes are below:

2025		**2028**	
Dr. current tax expense	24,000	Dr. current tax expense	48,000
Dr. deferred tax expense	16,000	Dr. deferred tax expense	8,000
Cr. deferred tax liability	16,000	Cr. deferred tax liability	8,000
Cr. tax payable / cash	24,000	Cr. tax payable / cash	48,000
2026		**2029**	
Dr. current tax expense	32,000	Dr. current tax expense	54,000
Dr. deferred tax expense	8,000	Dr. deferred tax expense	14,000
Cr. deferred tax liability	8,000	Cr. deferred tax liability	14,000
Cr. tax payable / cash	32,000	Cr. tax payable / cash	54,000
2027			
Dr. current tax expense	42,000		
Dr. deferred tax expense	2,000		
Cr. deferred tax liability	2,000		
Cr. tax payable / cash	42,000		

In the example above we can observe how the deferred tax liability is first created by the difference in recognition criteria between financial and tax reporting and its ultimate reversal.

Even though temporary differences reverse out and the related deferred tax liability is derecognized in a predictable manner in this example, Chludek (2011) and Cheun, Krishnan, Min (1997) find that the timing for derecognition of deferred taxes on the balance sheet tends to be difficult to predict and that there is little association between deferred liabilities and future payments (Laux, 2013). This is due not only to the underlying factors of the asset or liability that caused the temporary differences but also because of operating decisions and firm growth. For example, a deferred tax asset resulting from a warranty liability is derecognized when the warranty is ultimately satisfied. In a simple setting, the warranty liability would likely be reversed within the next operating cycle when the firm pays for the repairs / replaces defective products, causing the deferred tax asset to also reverse out. However, if the firm has increasing warranty liabilities because of an increase in sales, then the reversal of the warranty liability in the following year would likely be surpassed by the creation of new warranty liabilities, resulting in a forever increasing

deferred tax asset. Thus, it can be unclear when deferred tax liabilities (assets) will be reflected in higher (lower) current income tax and calls into question the value relevance of deferred tax expense.

Some literature has found that the deferrals contain information useful for decision makers. For example, Givoly and Hayn (1992) find that financial statement users consider deferred tax liabilities as providing relevant information and discount them based on expected growth rates. Amir et al. (1997, 2001), using the Feltham Ohlson (1995) model, also find evidence consistent with the notion that deferred tax assets and liabilities are relevant. On the other hand, Guenther and Sansing (2000, 2004) show analytically that some deferred taxes on the balance sheet have value that is independent of the timing of reversals. Our hypothesis, stated in alternative form:

H1: *Current taxes paid are associated with prior years' deferred tax expense.*

We have no prior theory to draw upon regarding the exact timing of deferred tax reversals, and therefore we do not hypothesize on any particular year. Rather, we examine prior years over 5, 10, and 20 year lags, as described in our data and methodology section.

DATA AND METHODOLOGY

To test the reversing of temporary differences, we regress current year cash taxes paid from the statement of cash flows (Compustat *TXPD*) on lagged deferred tax expense (Compustat *TXDC*) using the following model:

$$TXPD_{it} = \alpha + \beta_1 TXPD_{it-1} + \beta_2 TXP_{it-1} + \sum_{z=3}^{8} \beta_z \sum_{y=0}^{5} TXDC_{it-y} + \sum_{z=9}^{14} \beta_z \sum_{y=0}^{5} NOL_{it-y} + \beta_{15} PPEgrowth + \beta_{16} Salesgrowth_{it} + \beta_{17} LOGCAP_{it} + \beta_{18} BTM_{it} + \varepsilon_{it} \quad (1)$$

PPE growth suggests that the firm can claim more MACRS in the current and future years, reducing taxable income and income taxes paid. After controlling for PPE growth we suspect that sales growth will result in higher taxable income and higher taxes paid.

We first allow for 5 lagged years of deferred tax expense in our model, but then extend the analysis to include 10 and 20 years. A significant coefficient on the prior deferred tax expenses (β_3 through β_8 for our 5-lag model) would be consistent with prior taxes reversing into current taxes paid; for example, an estimated coefficient of 0.5 on deferred tax expense for year t-1 suggests that 50% of deferred tax expense in year t-1 are paid in year t.

To isolate the relationship between deferred tax expense and future taxes paid we also include several control variables. Firms that lose money do not automatically get a tax refund, but losses prior to 2021 could generally be carried back 2 years for a refund of prior taxes paid. Losses from 2021 onward may not be carried back, but can be carried forward indefinitely.[2] To control for this, we use a dummy variable, NOL, set to 1 if Compustat item tax-loss carryforward (TLCF) at the end of the previous year increases from the prior year (Dyreng, Hanlon, Maydew, and Thornock, 2017). We include the current year dummy plus dummies for the 5 prior years because loss carryforwards from prior years will reduce future income taxes paid.

Second, we include income taxes payable to distinguish between the liability from the current tax assessment that will be paid in the near future and deferred taxes. Because there will be time dependence across observations in terms of taxes paid, we also include the lag of taxes paid. For example, a firm might make installment tax payments of $100,000 over year t, and once its taxable income is finalized in year t+1 its total current tax is $110,000, resulting in an additional payment of $10,000 in year t+1. To control for firm size, we use the log of the market capitalization (*LOGCAP*). Because growth is a factor that will influence the timing of reversals (Givoly and Hayn, 1992), we include the book to market ratio (*BTM*). Specific calculations for the variables used is shown in the Appendix.

To control for differences in firm size we scale both deferred income tax and current income tax expense by year-end common shares outstanding (Barth and Clinch 2009 and Mear et al 2021). Because tax rates

vary by year and events such as the passage of the Tax Cuts and Jobs Act of 2018, we control for year fixed effects. Tax rates also vary by industry (Dyreng et al, 2008) because certain industries can face different tax incentives, and therefore we control for industry by using 4-digit GICS.

We draw our sample from 1988 to 2022, because 1988 (starting at July 15) was the first year that the cash paid for taxes was included the statement of cash flows in the financial statements. SFAS 96, Accounting for Income Taxes, instituted a balance sheet approach that required the recognition of deferred tax assets and liabilities (effective December 15, 1988). This was later updated by SFAS 109 (now ASC 740), effective on December 12, 1992 that reduced some of the requirements for deferred tax asset recognition. Because of the different regulatory environment, we exclude observations from the banking and utilities industries.

Descriptive univariate statistics are included in Table 3. Taxes paid (*TXPD*), deferred tax expense (*TXDC*), taxes payable (*TXP*) and current income tax expense (*TXC*) are all scaled by common shares outstanding (*CSHO*). We see that the average taxes paid per share is $0.415. Table 4 provides univariate correlations between our variables.

TABLE 3
DESCRIPTIVE STATISTICS

Variable	N	Mean	Std Dev	25th Pctl	Median	75th Pctl
Taxes paid	118,758	0.4147	0.6669	0.0045	0.1362	0.5835
Deferred tax expense	118,758	0.0119	0.3849	(0.0360)	-	0.0565
Accrued taxes payable	116,461	0.1428	0.3168	-	0.0002	0.1315
Current tax expense	118,758	0.4270	0.6906	0.0009	0.1484	0.6242
NOL Dummy	118,758	0.2555	0.4361	-	-	1.0000
PPE growth	101,552	0.1628	0.3959	0.0151	0.0762	0.1936
Sales growth	104,937	0.1504	0.4509	(0.0281)	0.0739	0.2124
Log of market cap	118,758	5.5503	2.3651	3.8514	5.5331	7.1959
Book-to-market	118,674	0.6129	0.7413	0.2602	0.4865	0.8158

Table 3 shows our univariate statistics for the variables in our later regressions. Data is from years 1988 to 2022. We exclude firms with missing outstanding shares, stock price, assets, revenues, income before tax, current federal tax, and deferred federal tax reported. We replace missing values for state or foreign income tax with 0. Taxes paid, deferred tax expense, and current tax expense are scaled by common shares outstanding ("csho"). All variables except for the log of market capitalization are winsorized at the top and bottom 1%, by year.

TABLE 4
CORRELATION COEFFICIENTS

		1	2	3	4	5	6	7	8	9
1	Taxes paid		0	**0.43**	**0.84**	**(0.18)**	**0.10**	**0.10**	**0.47**	**-0.07**
2	Deferred tax expense	**(0.04)**		**(0.03)**	**(0.02)**	**(0.05)**	**0.03**	**0.02**	**0.06**	**0.01**
3	Accrued tax payable	0.42	**(0.01)**		**0.47**	**(0.11)**	(0.00)	**0.04**	**0.32**	**(0.03)**
4	Current tax expense	0.89	**(0.06)**	**0.47**		**(0.18)**	**0.12**	**0.18**	**0.48**	**(0.13)**
5	NOL dummy	**(0.11)**	**(0.04)**	**(0.08)**	**(0.12)**		**(0.05)**	**(0.08)**	**(0.01)**	**(0.06)**
6	PPE growth	**(0.03)**	0.00	**(0.05)**	**(0.02)**	(0.00)		**0.48**	**0.11**	**(0.12)**
7	Sales growth	**(0.03)**	0.00	**(0.03)**	*0.01*	**(0.02)**	**0.49**		**0.14**	**(0.19)**
8	Log of market cap	0.40	**0.05**	**0.28**	**0.43**	**(0.01)**	**0.05**	**0.05**		**(0.34)**
9	Book-to-market	**(0.08)**	**(0.02)**	**(0.02)**	**(0.10)**	**(0.02)**	**(0.05)**	**(0.08)**	**(0.28)**	

Table 4 shows our univariate correlations for the variables in our later regressions. Pearson correlations are in the lower triangle and Spearman in the upper. Data is from years 1988 to 2022. All variables except for the log of market capitalization are winsorized at the top and bottom 1%, by year. Bold correlations are significant at p<0.01 and italics figures are significant at 0.01<p<0.05.

RESULTS

Table 5 contains our results from regressing taxes paid on lagged deferred tax expense. Panel A uses 5 year lags for deferred tax expense. As expected, prior year taxes paid ($TXPD_{it-1}$) and the prior year tax accrual (TXP_{it-1}) both have positive coefficients, 0.691 ($p < 0.001$) and 0.306 ($p < 0.001$) respectively. The coefficient on deferred tax expense in the current period is negative (-0.072, $p < 0.001$). This is consistent with current period taxes paid decreasing when contemporaneous deferred tax expense increases (that is, when more taxes are deferred to a future year). Lagged deferred tax expense is significant and positive for prior years 1 and 2 (0.045, $p < 0.001$ and 0.042, $p < 0.001$ respectively). These results are consistent with some reversals occurring and resulting in higher in current taxes paid from prior deferred tax expenses, although the coefficients are small. If the reversals were complete we would have expected the coefficients on all the lagged deferred tax expenses for prior years to sum to 1. Lagged deferred tax for years 3 to 5 are not statistically different from zero.

TABLE 5
OLS REGRESSION USING DEFERRED TAX EXPENSE

Dep var: Taxes paid (from the SCF)

	Panel A - 5 lags			**Panel B - 10 lags**			**Panel C - 20 lags**		
	est. coeff	t-stat	p	est. coeff	t-stat	p	est. coeff	t-stat	p
Intercept	-0.074	-3.160	0.002	-0.101	-2.930	0.003	-0.120	-1.570	0.117
Prior year taxes pd	0.691	114.890	<0.001	0.696	95.840	<0.001	0.706	62.180	<0.001
Prior year tax accrl	0.306	27.560	<0.001	0.312	21.960	<0.001	0.367	14.580	<0.001
Deferred tax exp	-0.072	-9.690	<0.001	-0.061	-6.820	<0.001	-0.040	-3.090	0.002
Lag 1 - Def Tax Exp	0.045	6.270	<0.001	0.048	5.400	<0.001	0.042	3.150	0.002
Lag 2 - Def Tax Exp	0.042	6.020	<0.001	0.049	5.720	<0.001	0.050	3.880	0.000
Lag 3 - Def Tax Exp	0.003	0.490	0.624	-0.001	-0.160	0.870	0.003	0.220	0.828
Lag 4 - Def Tax Exp	-0.006	-0.780	0.434	-0.009	-1.050	0.296	-0.005	-0.380	0.703
Lag 5 - Def Tax Exp	0.000	-0.060	0.955	-0.001	-0.090	0.925	0.013	0.970	0.334
Lag 6 - Def Tax Exp				0.006	0.600	0.551	0.006	0.400	0.690
Lag 7 - Def Tax Exp				-0.011	-1.200	0.230	-0.027	-2.020	0.043
Lag 8 - Def Tax Exp				-0.005	-0.510	0.612	-0.020	-1.350	0.176
Lag 9 - Def Tax Exp				0.005	0.480	0.631	0.002	0.120	0.907
Lg 10 - Def Tax Exp				-0.009	-0.860	0.388	-0.010	-0.630	0.527
Lg 11 - Def Tax Exp							-0.007	-0.450	0.650
Lg 12 - Def Tax Exp							0.011	0.670	0.503
Lg 13 - Def Tax Exp							-0.024	-1.450	0.148
Lg 14 - Def Tax Exp							0.010	0.550	0.586
Lg 15 - Def Tax Exp							-0.021	-1.250	0.212
Lg 16 - Def Tax Exp							0.005	0.290	0.774

Dep var: Taxes paid (from the SCF)	Panel A - 5 lags			Panel B - 10 lags			Panel C - 20 lags		
Lg 17 - Def Tax Exp							0.032	1.910	0.056
Lg 18 - Def Tax Exp							-0.014	-0.790	0.428
Lg 19 - Def Tax Exp							0.033	1.910	0.056
Lg 20 - Def Tax Exp							-0.027	-1.330	0.185
NOL Dummy	-0.033	-7.710	<0.001	-0.033	-5.620	<0.001	-0.041	-3.730	0.000
Lag 1 - NOL Dummy	-0.025	-5.530	<0.001	-0.030	-4.880	<0.001	-0.015	-1.360	0.173
Lag 2 - NOL Dummy	0.013	2.910	0.004	0.021	3.410	0.001	0.026	2.300	0.021
Lag 3 - NOL Dummy	-0.003	-0.550	0.582	-0.002	-0.300	0.764	-0.007	-0.650	0.518
Lag 4 - NOL Dummy	0.004	0.780	0.434	0.010	1.470	0.143	0.016	1.370	0.170
Lag 5 - NOL Dummy	-0.009	-1.940	0.052	-0.003	-0.490	0.621	-0.003	-0.260	0.798
PPE growth	-0.058	-8.450	<0.001	-0.058	-4.680	<0.001	-0.100	-4.070	<0.001
Sales growth	0.123	19.480	<0.001	0.192	15.700	<0.001	0.347	10.750	<0.001
Log of market cap	0.029	24.400	<0.001	0.030	20.060	<0.001	0.039	14.880	<0.001
Book-to-market	-0.017	-5.960	<0.001	-0.024	-5.730	<0.001	-0.033	-3.840	0.000
Industry dummies	included			included			included		
Year dummies	included			included			included		
N	61,971			35,355			11,512		
Adj R-square	63.6%			63.6%			67.1%		

Table 5 shows our OLS regression of taxes paid in year t on total deferred tax expense in year t and lagged deferred tax. Panel A shows 5 lags, Panel B shows 10 lags, and Panel C shows 20 lags. Data is from years 1988 to 2022. All variables except for the log of market capitalization are winsorized at the top and bottom 1%, by year. t-statistics and p-values reflect heteroscedasticity-adjusted values.

Extending the lagged window to 10 years (Panel B), we see a similar pattern emerge regarding the relationship between taxes paid in the current period and lagged deferred tax expense. Lags for years 1 and 2 are significant and positive (0.048, $p < 0.001$ and 0.049, $p < 0.001$ respectively), and none of the years thereafter are significant. Similarly, using 20 lagged years, we see lagged years 1 and 2 are significant (0.042, $p = 0.0016$ and 0.050, $p = 0.0001$ respectively). Using 20 years, we do observe a smattering of other significant coefficients, years 7 (-0.027, $p = 0.043$), 17 (0.032, $p=0.06$), and 19 (0.033, $p = 0.056$), but these appear to be random noise. Also, our "N" drops as our lags increase, from 61,971 firm-years for 5 lags to 11,512 for 20 lags because the number of firms with a 20-year earnings history is much lower than the number of firms with a 5-year earnings history.

As expected, firms with losses in the current year reduce their taxes paid, because estimated coefficients on our loss dummy (i.e., "NOL dummy") is significantly negative. For our 5- and 10-year deferred tax regressions the loss dummy for year -1 is also significantly negative; the loss dummy for year -1 for our 20-year lag regression is negative but not statistically significant. Interestingly, the loss dummy for year -2 is significantly positive for all our regressions in Table 5, suggesting that a firm suffering a loss 2 years ago that continues operating pays *more* tax in the future. Loss dummies for years -3 to -5 do not have statistically significant estimated coefficients. PPE growth also reduces taxes paid (the estimated coefficient is -0.06, $p<0.001$, for Panel A). After controlling for PPE growth, sales growth increases taxes paid (0.12, $p<0.001$). Larger firms pay more tax (the estimated coefficient on our variable "log of market cap" is 0.03, $p<0.001$) and high book-to-market firms (that is, value firms) pay less tax (-0.02, $p<0.001$).

Results from Table 5 suggest that, on average, firms pay a small portion of their deferred taxes within 2 years of their recognition of the related deferred tax expense. Prior work **(**e.g., Cheung, Krishnan, and Min, 1997) suggests that firm growth can increase the ability of the firm to indefinitely defer taxes because new PPE increases the pool from which future MACRS can be deducted. Accordingly, we look at specific groupings of firms based on PPE growth and sales growth to check if higher PPE-growth or sales growth firms are better able to defer tax. Our results are shown in Table 6.

TABLE 6
OLS REGRESSION USING DEFERRED TAX EXPENSE FOR FIRM SUBGROUPS

Dep var: Taxes paid (from the SCF)						
	Panel A - High PPE Growth Firms			**Panel B – Med PPE Grwth Frms**		
	est. coeff	t-stat	p	est. coeff	t-stat	p
Intercept	(0.072)	(1.060)	0.291	(0.071)	(1.250)	0.211
Prior year taxes paid	0.696	38.720	0.001	0.686	45.610	<0.001
Prior year tax accrual	0.358	9.850	<0.001	0.339	11.040	<0.001
Deferred tax expense	(0.063)	(2.730)	0.006	(0.144)	(7.290)	<0.001
Lag 1 - Def Tax Exp	0.019	0.780	0.438	0.058	2.770	0.006
Lag 2 - Def Tax Exp	0.007	0.370	0.710	0.081	3.700	0.000
Lag 3 - Def Tax Exp	(0.014)	(0.660)	0.512	(0.013)	(0.630)	0.529
Lag 4 - Def Tax Exp	0.012	0.500	0.618	0.012	0.560	0.576
Lag 5 - Def Tax Exp	0.004	0.150	0.879	(0.010)	(0.410)	0.685
NOL Dummy	(0.047)	(4.470)	<0.001	(0.031)	(2.610)	0.009
Lag 1 - NOL Dummy	(0.016)	(1.440)	0.150	(0.037)	(3.090)	0.002
Lag 2 - NOL Dummy	0.014	1.170	0.243	0.012	0.960	0.338
Lag 3 - NOL Dummy	0.006	0.480	0.634	(0.003)	(0.250)	0.805
Lag 4 - NOL Dummy	(0.033)	(2.910)	0.004	0.019	1.380	0.169
Lag 5 - NOL Dummy	(0.009)	(0.880)	0.380	(0.036)	(3.000)	0.003
PPE growth	(0.033)	(3.130)	0.002	(0.342)	(2.920)	0.004
Sales growth	0.049	5.070	<0.001	0.201	8.900	<0.001
Log of market cap	0.022	6.620	<0.001	0.031	10.350	<0.001
Book-to-market	(0.000)	(0.010)	0.995	(0.035)	(4.140)	<0.001
Industry dummies	included			included		
Year dummies	included			included		
N	8,329			8,216		
Adj R-square	61.4%			66.1%		

Dep var: Taxes paid (from the SCF)	Panel C High Sales Growth Firms		
	est. coeff	t-stat	P
Intercept	(0.146)	(2.520)	0.012
Prior year taxes paid	0.723	31.700	<0.001
Prior year tax accrual	0.457	9.640	<0.001
Deferred tax expense	(0.100)	(4.490)	<0.001
Lag 1 - Def Tax Exp	0.086	3.530	<0.001
Lag 2 - Def Tax Exp	0.021	0.950	0.344
Lag 3 - Def Tax Exp	(0.019)	(0.790)	0.429
Lag 4 - Def Tax Exp	0.010	0.390	0.696
Lag 5 - Def Tax Exp	0.004	0.150	0.883
NOL Dummy	(0.068)	(5.550)	<0.001
Lag 1 - NOL Dummy	(0.031)	(2.420)	0.016
Lag 2 - NOL Dummy	0.014	1.000	0.318
Lag 3 - NOL Dummy	(0.001)	(0.090)	0.930
Lag 4 - NOL Dummy	(0.006)	(0.480)	0.635
Lag 5 - NOL Dummy	(0.016)	(1.260)	0.208
PPE growth	(0.043)	(4.130)	<0.001
Sales growth	(0.000)	(0.020)	0.982
Log of market cap	0.031	8.680	<0.001
Book-to-market	0.014	1.040	0.299
Industry dummies	included		
Year dummies	included		
N	7,622		
Adj R-square	55.1%		

Table 6 shows our OLS regression of taxes paid in year t on total deferred tax expense in year t and 5 years of lagged deferred tax for certain subgroups. Panel A shows results for a subgroup of firm-years at the 75th percentile for PPE growth and higher (i.e., high-PPE-growth firms). Panel B shows comparative results for firm-years within the 50th and 75th percentile for PPE growth, randomly selected to have a similar number of observations as Panel A. Panel C shows results for firm-years in the 75th percentile or higher for sales growth (i.e., high sales-growth firms). Data is from years 1987 to 2022. All variables except for the log of market capitalization are winsorized at the top and bottom 1%, by year. T-statistics and p-values reflect heteroscedasticity-adjusted values.

First, in Table 6 Panel A, we break out firms in the 75th percentile of PPE growth over all our firm-years as "high PPE growth firms." When we run the same regression model as Table 5, Panel A, for only high PPE growth firms, we find that lagged deferred tax for years -1 and -2 no longer load with significant estimated coefficients. This suggests that firms with significant increases in PPE can more easily defer taxes, effectively deferring them to some indefinite future period. However, when we examine medium-growth PPE firms (that is, firms with PPE growth within the 50th and 75th percentile, we find that lagged deferred tax for years -1 and -2 have significantly positive coefficients. This suggests that firms with more moderate growth in PPE are not able to defer taxes as much as high-growth PPE firms. Finally, high sales-growth firms (that is, firms above the 75th percentile for sales growth) have a significantly positive estimated

coefficient for deferred tax expense in year -1 but not year -2. We suspect this result is because high sales growth firms tend to fall into the high PPE growth "bucket:" our correlations table (Table 4) shows that the correlation between sales growth and PPE growth is 0.492 (Pearson), highly significant at p<0.001.

We check our analysis by regressing current taxes paid (*TXPD*) on lagged *current* tax expense (as compared to Tables 5 and 6 where we use deferred tax expense). We expect that current taxes paid is highly correlated with prior current tax expense. In Table 7 we see that the coefficient on current tax expense is 0.61 ($p < 0.001$), consistent with our expectations. The one-year lag of current tax expense is also significant with a coefficient of 0.24 ($p < 0.001$). A similar pattern holds for both the 10- and 20-year analyses.

TABLE 7
OLS REGRESSION USING CURRENT TAX EXPENSE

Dep var: Taxes paid (from the SCF)

	Panel A - 5 lags			**Panel B - 10 lags**			**Panel C - 20 lags**		
	est. coeff	t-stat	p	est. coeff	t-stat	p	est. coeff	t-stat	p
Intercept	0.052	3.230	0.001	0.081	3.300	0.001	0.164	2.590	0.010
Prior year taxes paid	0.076	6.430	<0.001	0.076	4.980	<0.001	0.082	3.040	0.002
Prior year tax accrual	0.155	17.760	<0.001	0.167	14.570	<0.001	0.195	9.040	<0.001
Current tax expense	0.611	90.510	<0.001	0.597	70.200	<0.001	0.562	39.460	<0.001
Lag 1 - Curr Tax Exp	0.241	22.260	<0.001	0.250	18.370	<0.001	0.266	11.890	<0.001
Lag 2 - Curr Tax Exp	(0.014)	(2.180)	0.029	(0.008)	(0.910)	0.360	0.002	0.150	0.882
Lag 3 - Curr Tax Exp	(0.003)	(0.540)	0.589	(0.005)	(0.740)	0.457	(0.004)	(0.370)	0.708
Lag 4 - Curr Tax Exp	0.011	2.070	0.039	0.014	2.060	0.039	0.017	1.640	0.102
Lag 5 - Curr Tax Exp	0.005	1.110	0.269	(0.003)	(0.390)	0.699	(0.009)	(0.810)	0.416
Lag 6 - Curr Tax Exp				0.009	1.450	0.146	0.016	1.380	0.167
Lag 7 - Curr Tax Exp				(0.002)	(0.290)	0.775	(0.003)	(0.280)	0.778
Lag 8 - Curr Tax Exp				(0.001)	(0.200)	0.842	(0.010)	(0.830)	0.407
Lag 9 - Curr Tax Exp				0.002	0.310	0.754	0.007	0.560	0.572
Lag 10 Curr Tax Exp				0.000	0.060	0.956	0.003	0.250	0.805
Lag 11 Curr Tax Exp							(0.007)	(0.670)	0.500
Lag 12 Curr Tax Exp							(0.001)	(0.130)	0.897
Lag 13 Curr Tax Exp							0.002	0.170	0.863
Lag 14 Curr Tax Exp							(0.001)	(0.080)	0.932
Lag 15 Curr Tax Exp							(0.005)	(0.540)	0.586
Lag 16 Curr Tax Exp							0.019	1.720	0.085
Lag 17 Curr Tax Exp							0.004	0.310	0.757
Lag 18 Curr Tax Exp							0.004	0.320	0.747
Lag 19 Curr Tax Exp							0.004	0.360	0.716
Lag 20 Curr Tax Exp							(0.008)	(0.920)	0.360
NOL Dummy	0.004	1.280	0.200	0.004	0.940	0.349	(0.008)	(0.990)	0.324
Lag 1 - NOL Dummy	(0.011)	(3.570)	0.000	(0.013)	(3.110)	0.002	(0.003)	(0.430)	0.664
Lag 2 - NOL Dummy	0.005	1.490	0.136	0.007	1.650	0.098	0.005	0.660	0.507
Lag 3 - NOL Dummy	(0.000)	(0.010)	0.992	0.001	0.320	0.747	(0.007)	(0.880)	0.379
Lag 4 - NOL Dummy	0.003	0.930	0.351	0.004	0.810	0.415	0.004	0.490	0.624
Lag 5 - NOL Dummy	(0.003)	(1.110)	0.269	(0.003)	(0.620)	0.533	(0.005)	(0.700)	0.484

Dep var: Taxes paid (from the SCF)

	Panel A - 5 lags			Panel B - 10 lags			Panel C - 20 lags		
PPE growth	(0.018)	(3.790)	0.000	(0.027)	(3.140)	0.002	(0.049)	(3.110)	0.002
Sales growth	0.005	1.510	0.131	0.021	3.260	0.001	0.038	2.000	0.046
Log of market cap	(0.008)	(9.310)	<0.001	(0.007)	(6.360)	<0.001	(0.002)	(0.810)	0.416
Book-to-market	0.009	4.400	0.001	0.006	1.920	0.056	0.005	0.720	0.470
Industry dummies	included			included			included		
Year dummies	included			included			included		
N	61,971			35,355			11,512		
Adj R-square	83.9%			83.6%			84.0%		

Table 7 shows our OLS regression of taxes paid in year t on total current tax expense in year t and lagged current tax. Panel A shows 5 lags, Panel B shows 10 lags, and Panel C shows 20 lags. Data is from years 1988 to 2022. All variables except for the log of market capitalization are winsorized at the top and bottom 1%, by year. t-statistics and p-values reflect heteroscedasticity-adjusted values.

Our intuition that the sum of the estimated coefficients for current year and lagged years expense should sum to 1 is confirmed by Table 7. Using Panel A coefficients, the sum of the coefficients for current year income tax expense (0.61) and the prior year current tax expense (0.24) is 0.85, and when we add the prior year tax accrual (0.15) the sum is very close to 1. In comparison, the sum of parallel coefficients from Table 5 (where we use deferred tax expense instead of current tax expense) is not close to 1: contemporaneous deferred tax expense (-0.072) plus prior year deferred tax expense (0.045) is -0.027. If we aggregate all estimated coefficients on lagged deferred tax expense in Table 5, Panel C, the sum is only 0.0512. This suggests that, even though the estimated deferred tax expense for years 1 and 2 are significantly positive (in all panels of Table 5), only a small proportion of deferred tax expense is paid over a 20 year window.

CONCLUSION

We examine whether (and when) deferred income tax expense is paid. Using only income statement values for deferred tax expense, we find that only a small proportion of deferred tax expense appears to be paid over the following 20 years. This is consistent with the findings of Cheung et al (1997), Chludek (2011), and Laux (2013); however, our paper adds to our understanding of deferred tax expense by examining only income statement items related to tax over a 20 year period.

Our results call into question the classification of deferred tax as an expense. An expense is defined as a "using up of assets" or "incurrence of…liabilities" (SFAC 8, paragraph E81), and although deferred tax expense does result in the creation of a deferred tax liability (or the reduction of a deferred tax asset), there does not appear to be a commensurate amount of cash paid (at least over the following 20 years).

Our work does not examine balance sheet items related to taxes, or footnote disclosures (which are detailed and complex), because our focus is on what most financial statement users will quickly absorb from reading a firm's financial statements. Most people focus on the income statement alone (for example, the findings of Sloan 1996 suggest that most financial statement users do not distinguish between the cash portion of net income, that is, they do not incorporate information from the balance sheet or statement of cash flows to augment income statement information). Our results suggest that deferred tax expense by itself offers little information on actual future cash outflows for income tax.

ENDNOTES

1. Deferred tax assets and liabilities are not discounted to present value, also implying that timing of their eventual reversal is unknown.
2. The Coronavirus Aid, Relief, and Economic Security (CARES) Act of 2020 temporarily lifted some of these tax changes, but those special exceptions have now expired.

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APPENDIX: VARIABLE DEFINITIONS

TXPD	Income taxes paid scaled by common stock outstanding at year-end (compustat txpd / csho)
TXP	Income taxes payable scaled by common stock outstanding at year-end (txp / csho)
TXDC	Deferred income tax expense scaled by common stock outstanding at year-end (txdc / csho)
TXCC	Current income tax expense scaled by common stock outstanding at year-end, where current income tax is the sum of current federal tax (txfed), current state tax (txs), and current foreign tax (txfo), (compustat (txfed + txs + txfo) / csho)
NOL Dummy	Dummy variable set to 1 if the firm reports an increase in their tax loss carryforward (TLCF) from the prior year to the current year
PPEgrowth	Net PPE, ppent, less prior year net PPE, scaled by prior year net PPE
Salesgrowth	Sales, sale, less prior year sales, scaled by prior year sales
Log of market cap	The natural log of the market capitalization (compustat log(mcap), where mcap = prcc_f x csho)
Book-to-market	The book to market ratio, calculated as common equity divided by market capitalization (compustat ceq / mcap)