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Analyzing the Link Between Accounting Sensitive Non-Debt Tax Shields and Investment Opportunity Set

SUMMARY: The term depreciation refers to an estimate made in accordance to depreciation policies of the firms that also provides companies with tax shelter benefits (most commonly income taxes) and positive changes in investment opportunities. However, with the passage of time, provisions on depreciation relating to income taxes have been liberalized as an inducement directed by tax policies. This study aims to provide empirical evidence of cross-sectional relationship among accounting policy changes, investment opportunities, accounting policy sensitive non-debt tax shields, financial leverage, size and profitability of the firms listed on Pakistan stock exchange thus providing implications regarding size and leverage hypotheses. We adopt price-based proxies to represent investment opportunities by using large cross-sectional sample of firms. Results of the study suggest that these variables share significant relationship and influence managerial discretion in changing the depreciation and inventory valuation policies in response to variations in such dimensions.

KEYWORDS: Investment opportunity set; non-debt tax shields
JEL CODES: H21, G32, C39

The subject of accounting policy changes has been thoroughly discussed with the addition of different variables in which these studies exasperated the elaboration of such addition of non-conventional variables (i.e. different from which were used by preceding studies). This study attempts to employ a fundamental locus shared by previous studies like *Skinner* (1993), *Keating and Zimmerman* (1999) and *Dhaliwal, Heninger, and Hughes* (1999). We tend to contribute towards the understanding of changes in accounting policies, firm size, profitability, financial leverage, accounting policy sensitive non-debt tax shields and underlying investment opportunities. Previous studies can be divided into two dimensions. First set includes the consideration of individual accounting policy or sets (see Skinner, 1993; Keating and Zimmerman, 1999; Dhaliwal, Heninger, and Hughes, 1999; Godfrey and Koh, 2009). Second set includes the analysis of discretionary accruals (Chaibi, Omri, and Trabelsi, 2013) however majority

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of the studies emphasize the examination of accounting policies in specific form (e.g. individual accounting policies like depreciation, amortization and inventory valuation) . In our study, we empirically examine the changes in depreciation and inventory valuation due to their significant explanatory nature.

The term investment opportunity set, was first tossed by *Myers* (1977) and since then, different studies identify appropriate proxies for it and examine its relationship with the opportunistic measures of the firm. The idea was to measure the non-visible operations of firms by using appropriate proxies. Some studies discuss investment based proxies as more appropriate tool for capturing the non-visible investment opportunities of the firm however few researcher oppose the acceptance of such proxies (see Kallapur and Trombley, 1999). According to them, such proxies reflect low explanatory powers with much broader range of measurement.

Studies on the subject of investment opportunities under Pakistan's corporate sector are quite inadequate mainly because of data scarcity for capturing the investment opportunity set based on different proxies like investment-based proxies etc. In this study we aim to empirically test the relationship between accounting policy changes, investment opportunities, non-debt tax shields, financial leverage, size and profitability.

According to *Huang* (2006), non-debt tax shield accounts for deduction in depreciation and investment taxes. This study tends to explore the exploitation of these NTDS by firm managers with respect to investment opportunities. If managers do exploit depreciation and inventory policy changes keeping various variables into consideration i.e. firm's profitability, size, leverage and investment opportunities, etc. then it is likely that these policy changes help managers to exploit non-debt tax shields. We also consider the link between NTDS and investment opportunities to investigate such claims. *Deangelo and Masulis* (1980) provide an argument that NDTS are commonly used to achieve tax benefits and the firms with larger NTDS has lower probability of using debt which further results in lowering its financial leverage (i.e. expected). *Bradley* (1984) support the link between NDTS and firm's leverage and concludes that financial leverage of the firm is positively related to NTDS. On the other hand, *Chaplinsky and Niehaus* (1993) and *Wald* (1999) employ same measure (i.e. ratio of depreciation / total assets) as measurement for NDTS, and reports that this measure of NTDS is negatively related to financial leverage of the firm (also see Jensen, 1986; Stulz, 1990; Jung et al., 1996). They also provide rationale that if managers pursuits their managerial objectives, conflict between managers and shareholders can arise, especially for firms with strong investment opportunities.

Our contribution in this paper is as follows. First, this study tends to explore depreciation expense charged by firms, which acts as non-debt tax shields. Preceding studies describe link between firms both long and short term financing with firm size, profitability, non-debt tax shields and growth opportunities. Second, we test Myer's predictions concerning the link between firms leverage ratios, business risk, growth rate and firm sizes. *Fama and French* (2000) and *Baker and Wurgler* (2002) also use power of same NDTS variable (i.e. depreciation divided by total assets) as a proxy for non-debt tax shields which we also use for NDTS. Third, this study empirically examines the effects of IOS, on management's decisions to choose various depreciation and inventory valuation methods. For this, we utilize logit model to examine the respective subject under 'likelihood' situation, in order to establish a direct link between accounting policies and IOS of a firm. Finally, existing

literature emphasize that growth opportunities of the firms in terms of investment based and variance based proxies (i.e. as proposed by Myers) however, we use price-based proxies to evaluate the IOS of the firms.

Rest of the paper is structured as follows. Section 2 presents review of past literature. Section 3 discusses methodology followed by section 4 presenting findings of the study with implications.

LITERATURE REVIEW

There is limited discussion on whether the firm's Investment opportunity Set (thereafter IOS) is directly associated with accounting choices. Current literature discusses different proxy variables providing some explanations about the relationship. *Lys and Vincent* (2001) used integrated approach by analysing a firm's IOS and accounting procedural choices with respect to other variables for incentives. *Gupta* (2005) reports weak evidence for the view that firm's partial or comprehensive income tax allocations reflect its IOS. However, his results provide general support for the managerial opportunism concerning contracting perspective. Although discussion on managerial opportunities concerning accounting policies changes is reported in current literature, the theoretical evidences lack clarity. Our paper in the context of IOS is based on Pakistan's corporate environment and strives to contribute to existing literature of accounting and finance on the subject of changes in accounting policies under IOS effect by utilizing the power of pure price-based proxy variables.

According to prior studies, IOS affect accounting procedure choices. *Zimmer* (1986) mentions relationship between IOS and accounting procedure choices and examines whether Australian real estate developers capitalize interest costs. He describes proxy accounting procedure choice as the function of manager's incentives for responding opportunistically to already placed contracts. He regressed the measures of accounting choices of the firms' debit/equity ratios that helped to clarify the reasons behind accounting procedure choices. Skinner (1993) presented two types of relationships between IOS and accounting procedure choices. First relationship refers towards a direct whereas second one deals with an indirect association between IOS and accepted accounting choices.

Watts and Zimmerman (1986) identify two primary forces driving choices for accounting procedure of a firm. The first force relates with an evolution of the accepted accounting procedures that evolves within a firm through time. It transforms into the best practice thus becoming cost-effective and also reduces agency conflict (also see Hoithausen, 1990 and Watts, 1977). *Leftwich* (1983) provides evidence that accounting choices that evolve as best practices in private lending agreements are procedures that reduce the cost of agency relationship between firm's and its private lenders. The second force relate to the cost of restricting manager's accounting procedure choices. However, restricting manager's choices can sometimes prove costly for the firms. This also refers towards the manager's behaviour as being opportunistic but not always because incentives for restricting the accounting procedure may vary, depending on nature and type of firm and the use of a more descriptive approach in defining the relationship between IOS and accounting procedure choices.

A particular accounting procedure depends on the choice made by managers and regulates the mechanism for allocating revenues and expenses in different accounting periods by considering an aggregate income. Large firms tend to choose income-decreasing depreciation procedures whereas highly lever-

aged firms tend to choose income-increasing depreciation procedures (see Hagerman and Zmijewski, 1979; Zmijewski and Hagerman, 1981; Salamon and Smith, 1982) because firms employing more assets possess larger incentives depending on the nature of accounting depreciation policies. There are studies also highlighting an indirect effect of IOS on accounting procedure choices by affecting the nature of incentives.

Some past papers consider account specific measures like changes in policies, discretionary behaviour, accrual analysis, earnings management etc. whereas others use a mixture of analysis for example *Jones* (1991) and *Cahan* (1992) conduct analysis on discretionary accruals to investigate the potential relationship between growth opportunities and total accruals of the firm. The selected accrual measures represented the accounting policy management choices therefore the tests were less biased and noisy. *Gaver* (1993) and *Smith and Watts* (1992) define and use three appropriate proxy variables for the measurement of investment opportunity set *i)* market-to-book value of assets, *ii)* market-to-book value of equity and *iii)* earnings/price ratio.

Smith and Watts (1992) argue that managers of high growth firms possess more powers to choose satisfactory income increasing measures because of more information. Similarly, it is also argued that firms' managers with high debt-to-equity ratio are more likely to choose accounting procedures that shifts future cash flows to current period. By using only debt to equity ratio for measuring income increasing accounting procedure might not be beneficial. According to *Chaibi* et al. (2013), firms exposed towards high IOS tends to have more information asymmetry due to which managers engage in income-increasing earnings management to signal firm's financial performance. Managers use to signal performance of the firms as higher the information asymmetry, more the benefits from signalling the firm's performance. *Godfrey and Koh* (2009) report association between goodwill impairment write-offs and applied leverage, firm size and ROA variables (i.e. initially adopted by Skinner, 1993). They highlight significant but weak relationship between managerial policy choices and goodwill impairment write-offs. *Beatty and Weber* (2006) operating earnings are capitalized into share prices at a much greater rate. This gives a chance that mangers will overstate the transitional non-operating goodwill impairment losses, to evade future impairment realizations providing evidence that firm's earning capabilities influence manager's discretion. Under the findings of Bens (2006), high rates of earning capitalization are related to firm's high P/E ratio and are exposed to high investment opportunities.

Various accounting theories and critics indicates that managers use depreciation as key element for the subject of debt financing and tax shielding High leveraged firms use various measures including both debt and non-debt tax shields. Among non-debt shield, depreciation and amortization charges are most commonly used by managers to adjust the level of long-term financing. One common reason for using of depreciation as a non-debt tax shield is due to its nature of influencing the firms reported earnings and in some cases also facilitates to reduce value of interest tax shields. *Fosberg* (2012) reports that more available non-debt tax shields increase growth prospects and employ less short-term debt financing. This supports the rationale that nature of depreciation expenses help in reducing value of interest tax shields generated by the short-term debts and also influence short-term financing of firms. The term DEPTA (depreciation expense per year / total assets) is often used to measure the non-debt tax shield for exploiting the depreciation reported in firm's financial statement. Theoretically speaking,

the non-debt tax shields can influence the employed debt-financing and expected interest tax shields thereby affecting firm's investment opportunities.

Core et al. (2006) investigate the relationship between poor governance and the associated returns for firms and reported that market is not surprised by the poor returns of firms with poor operating performance and weak governance structure. However, their results do not support the strong relationship between weak governance and poor stock returns. In addition, *Barber and Lyon* (1996) support the rationale that operating income before depreciation (a measure of firm's profitability) is not affected by managerial desecration in depreciation policy. Thus, using the operating income after depreciation is more appropriate measure, in order to account for the managerial discretionary measures concerning depreciation policy. *Kim and Sorensen* (1986) report that firms with high growth opportunities and less operating risk tends to use less debt. They also find that firm size is uncorrelated with the level its debt. This rationale is useful in predicting the firm utilization of NDTS, because if the firm is using less debt, then it is using less debt related tax shields and then exploit the opportunity to gain benefits from non-debt tax shields like depreciation. Firms giving preference to investment in growth opportunities and assets in place mostly utilize long-term debt. Therefore, utilizing long-term debt indicates more availability of debt and investment related tax shield. *De Angelo and Masulis* (1980), *Bowen* et al. (1982) and *Boquist and Moore* (1984) provide crucial findings on testing the relationship between firms leverage ratios and tax shelters. Their findings stated a negative association between industrial leverage ratios and industry tax shelter ratios. Kim and Sorensen (1986) use similar variable to capture non-debt tax shield effect indicate a negative association between NDTS and firm leverage ratios supporting the rationale that firms with high level of depreciation reduce the need for tax shields.

Considering the current literature on the link between investment opportunity set and accounting procedure choices, we conclude that accounting procedure discretion is exercised by the managers to support the interests of lenders, stockholders and management of the firm (Watts, 1977; Zimmer, 1986; Godfrey and Koh, 2009). On other hand, theory of financial economics states that larger firms usually have high information asymmetry and thus leads towards reducing firm's value (Merton, 1987). It further creates incentives for equity holding managers to reduce such information asymmetries. According to *Beidleman* (1973), financial analysts also become more focused on those firms that reduce their income variances, leading towards appropriate forecasting of firm's earnings and result in greater confidence of investors. Being consistent with argument that firms with high growth not only have high earning variances but they also tend to increase reported earnings (by means of discretionary measures such as accounting policies) support the justification for existing link between managerial opportunism and changes in accounting policies.

METHODOLOGY

Data Sources and Description

One of the main objectives of this study is to fill a gap in literature regarding the link between accounting policy changes, accounting sensitive non debt tax shields and investment opportunity set in emerging and developing markets. Because of the Pakistani financial markets being in an emerging state, data unavailability remains an issue as

reported by many other emerging countries accounting practices. However, in order to substantiate the empirical link in lights of developed markets' practices, we have to select only those firms in compliance with the respective companies ordinance act and Securities and Exchange Commission of the respective county i.e. Pakistan. Therefore, the sampled firms are based on the incorporation according to Pakistan rules and regulation provided by companies' ordinance act of 1984 and the Security and Exchange Commission of Pakistan (SECP) in order to generalize the findings of this study.

We sampled 271 firms on sectoral basis regulated on Pakistan Stock Exchange (PSE) operational from 2000–2013 from a population of 580 firms.

Table 1 provides a summary of selected companies and sectors. Each sample is ex-

Table 1

SUMMARY OF SELECTED SAMPLE

Sector	Code	Population	Sample
Automobile assembler	801	12	10
Automobile parts & accessories	802	9	8
Cable & electrical goods	803	8	6
Cement	804	22	5
Chemical	805	28	12
Fertilizer	809	7	4
Food & personal care products	810	22	17
Glass & ceramics	811	10	6
Jute	814	3	2
Leather & tanneries	816	5	5
Paper & board	822	9	8
Pharmaceuticals	823	9	8
Power generation & distribution	824	19	13
Sugar & allied industries	826	35	26
Synthetic & rayon	827	11	8
Technology & communication	828	10	3
Textile composite	829	56	41
Textile spinning	830	87	72
Textile weaving	831	14	8
Tobacco	832	3	2
Transport	833	5	2
Vanaspati & allied industries	834	5	3
Woolen	835	2	2
Total		**391**	**271**

Source: own edited

tracted from three-digit industrial sector code provided by Pakistan Stock Exchange. Data is extracted from industry analysis reports provided by State Bank of Pakistan (SBP), annual reports published by sampled firms and stock price and market capitalization data from Pakistan Stock Exchange (PSE). Data for accounting policies, depreciation method changes and estimate revision is mined from financial statements and annual reports published by respective firms.[1] *(See Table 2)*

Depreciation and inventory valuation policies are qualitative in nature. Therefore, they are quantified by adopting categorical quantification and by assigning score on the scale from 0 to 2, also used and proposed by Skinner (1992) and Zimmerman (1999).[2] First, the respective policies are categorized; income-increasing, income-decreasing and income-neutral. The income-increasing polices includes First-in-first out inventory valuation procedure (FIFO), straight line depreciation method and we assign them a score of [2]. The income decreasing category contains last in-first out inventory valuation procedure (LIFO), accelerated depreciation procedure and we assigned them a score of [0]. Average cost or mixture of FIFO and LIFO, unit of production method for depreciation are categorized as income-neutral policies and are assigned with score [1]. *(See Table 3)*

Data Analysis

Table 4 provides summary on cross-sectional correlation of all variables. Correlation test is applied in three sets. First, we test for collinearity between IOS proxies. Second, we report the collinearity between independent variables because of the presence of skewness and to verify that these variables are measuring the similar construct. Third, we report collinearity between each independent and dependent variable. According to Skinner (1993), all independent variables including IOS proxies should show collinearity that provide assurance that they measure the same underlying construct. This association should

Table 2

EXCLUDED FIRMS

Sector	Code	Population
Close - end mutual fund	806	9
Commercial banks	807	24
Real estate investment trust	836	1
Refinery	825	4
Miscellaneous	818	21
Modarabas	819	29
Oil & gas exploration companies	820	4
Oil & gas marketing companies	821	7
Insurance	812	32
Inv. Banks / inv. Cos. / securities Cos.	813	27
Leasing companies	815	13

Source: own edited

Table 3

QUANTIFICATION OF DEPRECIATION AND INVENTORY VALUATION POLICIES

Accounting Policy Choices	Code
Inventory Valuation Choices	
FIFO (first in-first out)	2
AC/FIFO (average cost & FIFO)	1.5
AC or Mix (Average cost & average of FIFO & LIFO)	1
AC/LIFO (average cost & LIFO)	0.5
LIFO (last in-first-out)	0
Depreciation Method Choices	
SL (Straight line)	2
UP/SL (unit of production & straight line)	1.5
UP or Mix (unit of production and average of SL & ACC)	1
Up/Acc (unit of production & ACC)	0.5
Acc (accelerated depreciation)	0

Source: own edited

Table 4

SUMMARY OF CORRELATION TESTS

Collinearity Test Set	Variables
1. (IOS)	*[MBVE],[MBVA],[EPS],[DEP/Value]*
2. (IVs)	*[IOS],[SIZE],[LEV],[ROA]*
3. (IVs and Dv's)	*[IOS],[SIZE],[LEV],[ROA] → Dep* *[IOS],[SIZE],[LEV],[ROA] → Inv*

Note: The table represent statistical summary for both independent and dependent variables (i.e. model 2). 'Dep' represents Depreciation choices and 'Inv' represents Inventory method choices. The above-mentioned variables are defined as follows.

Book-to-Market value of Assets [BMA] = book value of assets / market value of assets

Book-to-Market value of Equity [BMVE] = Book value of equity / market value of equity

Debt-Equity Ratio [DE] = book value of debt / book value of equity

Depreciation-to-total assets [DEPTA] = deprecation of firm deflated by total assets

Debt-Assets ratio [Lev1] = book value of debt / total assets

Market value-Size [Lev2] = Market value of equity / firm size

Return on Assets [ROA] = operating income before depreciation / market value of the firm

Source: own edited

be consistent with Myer's prediction that firms with more assets in place are more highly leveraged than other firms. Therefore, this test provides significant evidence on relationship between variables of interest.

Table 5 report descriptive statistics in which among five investment opportunity set proxies, Tobin q ratio show maximum value for mean, i.e. 58.512. with maximum standard deviation. Leverage variables show moderate standard deviation with LEV1 of max deviation i.e. 0.603. Each of the five investment opportunity set variables are positively skewed indicating positive normal distribution (i.e. towards right) however one of the financial leverage variables (i.e. LEV2) was negatively skewed (–0.429) with remaining non-IOS variables being positively skewed. This type of normal distribution is ordinary and consistent with the results reported by Skinner (1992).

Results presented above indicate that most of the variables are positively skewed and have a positive normal distribution therefore we also report cross-sectional spearman Rank correlation for both dependent and independent variables in panel *b* of *Table 6*. The correlation results indicate that most of the investment opportunity set variables are significantly correlated with each other suggesting that these variables are capturing the same underlying construct. Assets in place are negatively correlate with both leverage variables which rules out the rationale indicating that highly levered firm employ more assets in place. Both financial leverage variables are negatively correlated with each other (i.e. with a value of –0.512). Assets in place showed negative correlation with Tobin *q* ratio (i.e. value of –0.617) consistent with the relationship reported by preceding studies.

Results also indicate a strong correlation between firm's financial leverage and IOS proxies. Although, this relationship rejects Myer's notion that firms with more assets in pace are highly levered firms (e.g. AP is negatively correlated with both leverage variables and Tobin *q* ratio with a value of –0.617). Overall results show that financial leverage is positively related to IOS proxies other than AP and Tobin's *q* ratio. According to Skinner (1992), this correlation is crucial is providing adequate assurance of these variables constructing and measuring the same underlying opportunity

Table 5

DESCRIPTIVE STATISTICS FOR INDEPENDENT AND DEPENDENT VARIABLE

	AP	BMA	BMVE	D/E-ratio	DEPTA	LEV1	LEV2	ROA	Size	Tobin Q
Mean	0.448	0.819	3.150	3.249	2.188	0.777	0.460	0.802	15.014	58.512
Median	0.371	0.719	0.280	1.293	0.038	0.660	0.444	0.083	15.266	1.215
Maximum	5.323	97.359	548.248	1043.087	263.959	8.583	2.555	39.437	19.217	11286.980
Minimum	–1.047	–23.715	–3.916	–51.579	0.000	0.015	–2.703	–1.180	4.367	–22.682
Std. Dev.	0.392	3.930	30.806	42.297	16.942	0.603	0.336	4.396	2.028	674.537
Skewness	3.318	21.775	15.323	22.647	11.458	5.383	–0.430	6.263	–1.116	12.979

Source: own edited

Table 6

SPEARMAN RANK CORRELATION

DEPTA	BMVE	BMA	AP	D_E ratio	LEV1	LEV2	Size	ROA	Tobin Q
1									
0.0589	1								
–0.1296*	0.7136*	1							
0.0600	0.6302*	0.6376*	1						
–0.1451*	–0.0290	0.0549	0.0135	1					
0.2316*	0.2800*	0.1279*	–0.0823*	0.1615*	1				
–0.0049	–0.7035*	–0.7709*	–0.5176*	–0.1360*	–0.5121*	1			
–0.2628*	–0.1978*	–0.0371	0.0046	0.1832*	–0.2386*	0.1345*	1		
0.1074*	–0.3947*	–0.25189*	–0.1133*	–0.0955*	–0.4757*	0.3656*	0.0702	1	
0.2632*	–0.3633*	–0.6297*	–0.6160*	–0.1481*	0.3730*	0.4269*	–0.1028*	–0.0349	1

Source: own edited

paradigm. The variable SIZE is correlated with three of the five IOS variables indicating negative association between firm size and IOS proxy variables which may support a rationale that firms with smaller size seek more investment opportunities than larger firms. Finally, the variable for firm profitability ROA is correlated with all variables except firm size showing that firm's profitability is negatively associated with assets-in-place. This suggests that firms with high profitability tends to employ less assets. Non-debt tax shield variable (DEPTA) is negatively correlated with 2 out of five IOS measures supporting the rationale that firms with more investment opportunities tend to decrease the availability of non-debt tax shields (NTDS). In addition, NTDS is negatively correlated with firm size (–0.267) and positively related to firm's profitability (0.104). Results also indicate strong relationship between three investment opportunity measures, firm's profitability (ROA) and size. This analysis also provides evidence of relationship between firm's leverage, profitability measure (ROA) and its size. As most of the variables are significantly correlated with each other, we apply Variance Inflation Factor (VIF) analysis. *Table 7* highlights results indicating no multicollinearity issues.

Estimated Coefficient from Multivariate test for linear relationship between DEPTA and other variables. The variables have been generated from 50 PSE listed firm, period 2000–2013. *(See Table 8)*

A positive slope coefficient indicates more probability that variable is influencing dependent variable (i.e. DEPTA).

Multinomial Logit Regression (Inventory evaluation Choices), Estimated coefficient from Multivariate test for inventory valuation choices and other variables. *(See table 9)* The variables have been generated from 50 PSE listed firm, period 2000–2013. A positive slope coefficient indicates more probability that variable is influencing dependent variable (i.e. DEPTA)

Table 7

VARIANCE INFLATION FACTOR

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
D/E RATIO	0.0001	1.0088	1.0030
BMVE	0.0002	1.0313	1.0207
BMA	0.0019	1.0754	1.0317
AP	0.2857	3.2888	1.4515
LEV1	0.2356	7.6563	2.9064
LEV2	0.4540	5.0154	1.6523
ROA	0.0015	1.0716	1.0366
SIZE	0.0109	83.6554	1.4593
TOBINQ	0.0001	2.3601	2.3419
C	3.6402	120.6627	NA

Note: Above results are generated for all variables. Centered VIF levels <5 indicates moderate collinearity and VIF < 2 indicates minimum multicollinearity between variables

Source: own edited

Dichotomous logit model

We use logit regression[3] proposed by Dhaliwal (1999) expression of which is presented below.

$$ln[p_{dep,i}/(1-p_{dep,i})]=\beta_0+\beta_1\ (MKBE)+\beta_2\ (MKBA)+\beta_3\ (EPS)+\beta_4\ (Dep.value)+\beta_5\ (Size)+\beta_6\ (ROA)$$

In the above equation, MKBE, MKBA and EPS represent IOS composites. This model is adapted on the intuition based upon maximum likelihood of choosing income-increasing or decreasing accounting policies. The primary function of this model involves regressing the accounting policy choices on IOS, firm size and return on asset variables. We use this dichotomous logit model for estimating likelihood of managers choosing income-increasing procedures and in examine explanatory powers of IOS concerning accounting choice. We report *p*-values from chi-square tests of the joint null hypothesis that all coefficients of IOS variables are equal to zero.

For analysis of depreciation and inventory method choices, we use procedure followed by Skinner (1993) by creating multiple ordinary-logit regressions. First, regression includes only SIZE and Leverage variables (in contrast to preceding studies SIZE is considerably negative and Leverage insignificant. Second regression involves ROA along with Leverage and Size (in which negative coefficient reflects poor-performing firms making income increasing accounting choices. Under third regression, only IOS proxies are included). Fourth regression includes IOS measures along with Leverage variable. Fifth regression includes ROA and SIZE variables in regression.[4] The operational hypotheses of the study are as follows:

Hypothesis 1: Link between accounting policy choices, non-debts tax shield (DEPTA), profitability, size and financial leverage of the firm.

Table 8

MULTIVARIATE RESULTS

	IOS Variables					Leverage		Firm Size	Profit-ability	Overall Model						
	BMVE	BMA	AP	DE	Tobin's q	LEV1	LEV2	SIZE	ROA	C (Constant)	R-Square	Adj.R-Square	R-Square Predicted*	F-Statistic	Probability (F-Statistic)	S.D Dependent Variable
1						17.302*		–0.707*	1.258*	–1.626	0.517	0.514	0.421	237.543	0.000	16.979
2						18.291*	11.643*	–0.695*	1.230*	–7.955*	0.569	0.566	0.478	219.079	0.000	16.991
3	–0.012					18.511*	11.961*	–0.621*	1.235*	–9.446*	0.570	0.567	0.480	172.355	0.000	17.182
4	–0.012	–0.170				18.498*	12.290*	–0.630*	1.232*	–9.324*	0.572	0.568	0.459	144.297	0.000	17.182
5	–0.010	–0.160	9.714*			20.438*	17.634*	–0.390	1.289*	–21.312*	0.609	0.605	0.505	143.803	0.000	17.182
6	–0.010	–0.160	9.712*	0.001		20.437*	17.641*	–0.391	1.289*	–21.304*	0.609	0.604	0.495	125.640	0.000	17.182
7	0.000	–0.004	1.109*	0.000	0.022*	2.015*	1.638*	0.016	1.146*	–3.078	0.934	0.933	0.913	1013.944	0.000	17.182

Note: The table represents statistical summary for both independent and dependent variables (i.e. model 2). For the period 2000-2013. The data has been obtained from 50 PSE listed companies. The data has been collected from fewer observations because most of the firms have missing data for a at least one or more variables. The above-mentioned variables are defined as following:

Assets-in-Place [AP] = operating fixed assets / firm value [market value of equity + book value of debt]

Book-to-Market value of Assets [BMA] = book value of assets / market value of assets

Book-to-Market value of Equity [BMVE] = Book value of equity / market value of equity

Debt-Equity Ratio [DE] = book value of debt / book value of equity

Depreciation-to-total assets [DEPTA] = deprecation of firm deflated by total assets

Debt-Assets ratio [Lev1] = book value of debt / total assets

Firm Size [SIZE] = ln Total Assets

Return on Assets [ROA] = operating income before depreciation / market value of the firm

Source: own edited

Hypothesis 2: Link between Non-debts tax shield (DEPTA), Profitability, Size and financial leverage of the firm.

Link between accounting policy choices, non-debts tax shield (DEPTA), profitability, size and financial leverage of the firm.

Our study deals with two accounting policy choices including depreciation policy for property, plant and equipment and inventory evaluation method. The policies are categorized in accordance to income-increasing and income-decreasing behaviour. First, we categorize these policies as *1)* income-increasing, *2)* income-decreasing and *3)* income-neutral. The income-increasing polices include First-in-first out (FIFO) inventory valuation procedure and straight line depreciation method and we assign them a score of [2]. The income decreasing category contain last in-first out (LIFO) inventory valuation procedure and accelerated depreciation procedure and we assign this a score of [0]. Average cost or mixture of FIFO and LIFO unit of production method for depreciation are categorized as income-neutral policies and are assigned a score of [1]. The purpose of this type of categorization is to identify and evaluate the allocation of revenues and expenses to different accounting periods.

Our preliminary analysis indicates that among defined industrial sample, 28.5 percent of the firms use LIFO, 34.3 percent use FIFO and 37.2 percent use average costing method. On the other hand, for depreciation method

Table 9

MULTINOMIAL LOGIT REGRESSION (INVENTORY EVALUATION CHOICES)

	IOS Variables					Leverage
	BMVE	BMA	AP	DE	Tobin *q*	LEV1
1						0.001*
2						0.040*
3	–0.780					18.511*
4	–0.070	–0.700				18.498*
5	0.011	–0.690	–1.300*			20.438*
6	–0.010	–0.160	–0.690*	0.001*		20.437*
7	0.001	–0.004	–0.578*	0.000*	–0.060*	2.015*

Note: The table represents statistical summary for both independent and dependent variables (i.e. model 2). For the period 2000–2013. The data has been obtained from 50 PSE listed companies. The data has been collected from fewer observations because most of the firms have missing data for a at least one or more variables. The above-mentioned variables are defined as following:

Assets-in-Place [AP] = operating fixed assets / firm value [market value of equity + book value of debt]

Book-to-Market value of Assets [BMA] = book value of assets / market value of assets

Book-to-Market value of Equity [BMVE] = Book value of equity / market value of equity

Debt-Equity Ratio [DE] = book value of debt / book value of equity

Depreciation-to-total assets [DEPTA] = deprecation of firm deflated by total assets

Debt-Assets ratio [Lev1] = book value of debt / total assets

Return on Assets [ROA] = operating income before depreciation / market value of the firm

Source: own edited

choices, 67.8 percent firms use straight-line depreciation method, 13.4 percent use reducing balance and 18.8 percent use mixed or other depreciation methods for property, plant and equipment. Upon aggregation of these choices into income increasing and decreasing categories, 58 percent of the firms on average, tend to choose income increasing accounting policies, whereas remaining 42 percent firms choose income reducing or income neutral accounting policy choices (income neutral refer to those policies not falling in income increasing or income decreasing accounting policies).

Tables 8–9 specify results generated from ordinal-level logit models as these models provide maximum likelihood estimation of depreciation and inventory evaluation methods. The positive coefficients of logit regression specify high probability by the management of firms choosing income increasing accounting procedures as compared to income decreasing and/or income neutral accounting policy choices. Table 8 present results for depreciation method choices. The first regression panel, includes only non IOS proxies (i.e. financial leverage, SIZE and ROA). The coefficients are significant and have negative values for SIZE but positive values for financial leverage and ROA. This indicates that firms are likely to choose more income increasing accounting procedures along with addition of financial leverage variables. By adding second leverage variable to regression 2, ROA becomes insignificant suggesting more predicting powers of financial leverage variable than firm's profitability. These finding are consistent with our previously stated leverage and debt/equity hypothesis according to which financial leverage variables act as a proxy for managerial incentives in choosing income increasing accounting procedures that facilitate in losing up availability of non-debt tax shields. Results from regression 4 indicate insignificance of four IOS proxies on adding other non IOS variables. In addition, negative coefficients indicate management selection of income-decreasing accounting procedures. Our analysis highlight that non IOS variables are more important than IOS proxies.

Table 9 report results for inventory evaluation methods. The first regression includes only non IOS proxies and its results are consistent with size hypothesis (as the coefficient for firm size is negative) however, financial leverage and ROA are significantly positive which provide assurance of being consistent with debt/equity hypothesis (however, most of the studies report inconsistency with debt/equity hypothesis). Second regression include more non IOS variables for financial leverage and results show increased model stability however on adding more IOS proxies to regression 6, coefficients for leverage, ROA and SIZE become negative. The coefficient for assets in place is also negative, indicating that firms with more assets in place tends to choose income decreasing accounting policy choices. Our results also highlight that firms comprising of more assets in place usually choose FIFO inventory evaluation method categorized as income increasing accounting procedure. In order to examine relationship between non-debt tax shield, DEPTA is also included in regression model. Our analysis indicates positive relationship between assets in place and availability of non-debt tax shield to firms suggesting that more the firm chooses an income increasing accounting procedures, more it has the availability to exploit non-debt tax shield.

Link between Non-debts tax shield (DEPTA), Profitability, Size and financial leverage of the firm

Table 9 provide results for multivariate analysis by using DEPTA (NDTS variable) as dependent variable. Results comprise of seven multivariate regressions, each regression covering a set of variable. The dependent

variable is computed as annual depreciation charged in firm's financial reports divided by total assets owned by the firm. The DEPTA ratio represent non-debt tax shield available to the firm. The depreciation amount used for this variable comprise of sum of depreciation charged by the firm against specified depreciation method like straight-line, accelerated method etc. Results are displayed for seven regression models with each regression testing the link between dependent (DEPTA) and other variables.

Regression 1, test change in dependent variable against book value of debt/ total assets of the firm, firm size and profitability measure. The leverage variable tends to show strong association with NDTS variable. In addition, it may support the rationale that firms with high leverage (i.e. debt/total asset ratio) seeks and exploit more non-debt tax shields due to tax benefits enjoyed by the firms against debt, depreciation and investment taxes as they are tax deductibles. The results are computed using least square method with the maximum coefficient value for LEV1 (LEV1 applies more change in dependent variable i.e. value of 17.302 compared to the SIZE value of –0.707 and ROA value of 1.258). The value for *R*-Square (0.517) and *R*-Square adjusted (0.514) indicate that model possess reasonable significance but on other hand *R*-Square predicted (0.421) drop, which specifies overfitting issues in regression model however overall regression model is significant.

Regression 2, include second leverage variable increasing the coefficient value for LEV1. This is simply because addition of LEV2 increases an overall significance of leverage variables in the model. In addition, inclusion of LEV2 decreases the coefficient values for firm size (–0.695) and profitability (1.230) which reduces the ability of SIZE and ROA to cause change on NDTS variable. The coefficient value for SIZE remains negative, indicating that availability of non-debt tax shields both to the firm and firm size move in opposite direction which rejects the null hypothesis initially not rejected (also see Skinner, 1992). This model increases *R*-square value (0.569), is followed by an increase in *R*-square adjusted value (0.566) indicating that explanatory power of the existing model has increased.[5]

Regression 3–7 include each IOS proxy in regression 2. As book-to-market value of equity is included in regression 3, coefficients for firm's financial leverage increases for ROA on average but on other hand, coefficient reduces for firm size indicating that firm size cause less impact on NDTS with availability of BMVE. With addition of second IOS proxy (BMA) to regression 3, results for regression 4 show negative coefficients indicating that NDTS and book to market measure moves in different directions. However, value for predicted *R*-square decreases indicating a drop in predicting power of the model. On addition of assets in place to preceding regression model, the AP exhibit positive coefficient (9.714), which supports the rationale that firms with more assets in place, have more availability of non-debt tax shield and this addition increases the coefficient value for profitability of the firm (1.289). The variable assets in place show positive coefficient at 7.81 supporting that more assets employed by the firm results in more non-debt tax shield. In other words, the more assets the firms utilize, more it has the availability to exploit depreciation as NDTS. In addition, the more firm has investment opportunities, more it has the availability of NDTS. On other hand, the fourth IOS proxy, debt-equity show negative coefficient and the value is similar to firm size (non-IOS). Overall status of this model indicates that by addition of IOS variables, the model becomes more stable than the preceding one. Regression 7 introduce Tobin *q* ratio to regression 6 (i.e. after the addition of D/E ratio). The coeffi-

cient value for AP and leverage variables drops however this model show highest recorded values for *r*-square and predicted *R*-square i.e. 0.934 and 0.933 respectively.

CONCLUSION

We provide empirical evidence on the relationship between accounting policy changes, non-debt tax shields and investment opportunities of the firms, in addition to firm's size, profitability and financial leverage. We summarize our results as follows.

First, firms with larger size tend to choose income decreasing accounting choices. However, empirical evidence between firm size and depreciation choices are less robust. In addition, firms with high financial leverage tends to choose income increasing inventory valuation and depreciation accounting policies. Second, firms choosing income increasing accounting procedures tend to have more availability of non-debt tax shields than other firms. The firms with high financial leverage tends to choose more income increasing procedures and exploit more non-debt tax shields. In the similar case, relationship between IOS proxies and NDTS variable is indirect. On other hand, evidence suggest that depreciation and inventory valuation policy choices are correlated with IOS proxies. However, correlation is moderate in nature and consistent with preceding studies. Other findings suggest that firms with higher assets in place ratio tend to choose income decreasing accounting procedures, which rejects that hypothesis presented by Skinner (1992). Overall results of this study enhance the understanding of relationship between accounting policy choices and investment opportunities of the firms and how such changes affect exploitation of tax shields of the firms.

Our study adds to the existing literature by providing an understanding of current accounting practices. Existing studies cite speculations and uncertainty about the effect of IOS however we provide empirical evidence based on a large sample of firms. Our findings suggest that the investment opportunity set is an important aspect contrary to previous findings suggesting that size, leverage and return on assets cannot be explained with the IOS and can therefore results in variable omission bias. The investment opportunity set also has the power to systematically affect the nature of firms in selecting any particular accounting procedure.

Notes

[1] Excluding industries are due to their unique accounting treatment, procedures for their fixed assets that might create an inconsistency and because of operations not falling under sampled period. On other hand, Commercial Banks are excluded because they normally do not maintain inventories and material PP&E.

[2] In addition, the coding of policies is flexible and similar to [Skinner, (1992)] and also assigns scores between 2–1 and 0–1 depending upon nature of policies e.g. LIFO and straight line depreciation method is assigned with score of 1.5.

[3] Dhaliwal et. al, (1999) suggest that these models are useful with large sample size and asymptotic properties. On the other hand, Stone and Rasp (1991) report miscalculations using only t-tests and validates the use of logit models with small sample size. In similar contrast, Skinner (1992)

also approves the use of logit models for measuring likelihood of methodologies. He estimated various n-probit models with similar findings reported by Zmijewski and Hagerman (1981).

[4] Skinner (1992) estimated regressions 6–10 to account for tax effects. In addition to multivariate test, we report results as per the following regression equation to produce additional observation for depreciation charge per year: $DEP/yr = \beta_0 + \beta_1(MKBE) + \beta_2(MKBA) + \beta_3(EPS) + \beta_4(Dep.value) + \beta_5(Size) + \beta_6(ROA)$

[5] Although it is logical that by addition of variables to the model, *R*-square increases but *R*-square adjusted should decrease upon addition of variable to the model. The results for regression 4, indicates the *R*-square adjusted also stabilizes at 0.93, which increases the degree of freedom in the model.

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