

Tax Shields in Colombia and their Effect on Leverage and Investments

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Abstract:

Investment tax incentives may reduce firm leverage if there is indeed an optimal leverage. To test this hypothesis this article assembles a panel database of non-listed Colombian firms from 1995 to 2012, to study the determinants of leverage and investment and the effect of 863 Act of 2003 (An investment tax incentive law) on this firm policy. The results support the hypothesis of a reduction of financial leverage, and the existence of an optimum level of financial leverage, with the advent of the 863 Act, but are less conclusive with respect to an increase in the investment levels. The effect of explanatory variables of financial leverage, according to the theories of financial structure, is unequivocally reduced, as expected, during the life of 863 Act.

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1. Introduction

Financial literature often deals with the issue of capital structure decisions at the companies. Different circumstances affect the amount of debt a particular firm wishes to maintain, being one of the most important the tax consequences of financial and investment decisions. This paper deals with the tax shield that Colombian firms were able to exploit during the life of 863 and 1111 Acts, which allowed a one-time deduction of 30% (and 40%) of productive investments from its net income tax bill, and what consequences the tax shield had on firm leverage and its investments. Regarding leverage, classical financial theories examine two lines of thought that influence financing decisions. The Trade-Off theory (Baxter, 1967; Kraus and Litzenberger, 1973) weighs the costs and benefits associated with financial leverage. This theory poses the existence of an optimum financing level given the growing tax benefits for financial leverage which, along with moderation of agency costs, are gradually offset by the growing bankruptcy costs associated with higher financial leverage; under this perspective an investment tax shield clearly influences optimal leverage by shifting up the level of leverage after bankruptcy costs become significant, due to the larger cash flows available from the operations. The second set of theories addresses the effect on financial leverage of the costs of issuance of different funding options. The costs of using different sources of finance are mainly, in this case, the result of information asymmetries between issuers and investors. As a result, it sets a hierarchy or a preference of sources, which determines the financing decisions made by companies (Myers and Majluff, 1984); this so-called pecking order theory is silent about the effect of a tax incentive on firm's debt levels. A third assumption, partially in line with the preceding one, posits that the relation between operational cash flow and investment indicates that the internal financing costs are lesser than

external. This difference arises from the additional costs imposed by external financing, resulting from increased agency conflicts, incentives for sub-investment, or, as in the abovementioned case, the adverse selection of companies, similarly to the pecking order this view does not have a priory prediction about the impact of tax shields on financing choices. DeAngelo and Masulis (1980), henceforth DAM, take Miller's irrelevance model (1977) of capital structure and postulate that the existence of debt-unrelated tax shields, such as tax benefits or depreciation, create optimum financing conditions, even without considering debt-related bankruptcy costs. The existence of these shields reduces the optimum level of financial leverage. In line with the argument of DAM, Graham and Tucker (2006) document a reduction in financial leverage when companies make use of tax shelters and report fictitious losses. Velez and Benavides (2011) propose the hypothesis that increased levels of taxation give rise to higher levels of optimum financial leverage; a hypothesis also advanced by Miller and Scholes (1978).

The empirical implications of the preceding arguments (DAM and Trade-off theory) suggest that the approval of tax incentives for investment will cause companies to adjust their levels of financial leverage. Given that a law to such an effect was passed in Colombia in 2003, such circumstances may be used to see whether or not DAM's theories hold for Colombian companies. Colombia has a rich history of changes in tax rates and tax incentives for investment. Economic stimulus policies in the last decade have created an arsenal of tools that companies can use to cut back on tax payments (see Appendix 1). This article studies the tax benefits introduced by the Act 863 of 2003 which allowed a one-time 30% tax deduction on productive investments, irrespective of other additional deductions. This deduction was increased to 40% in early 2007 (Act 1111 of 2006) and was reduced back to 30% in 2010; the stimulus finally disappeared in 2011. This exogenous event allows for studying whether or not the response of Colombian companies to tax related investment fiscal is adequately

explained by DAM's theories, which imply that companies would look to adjust to a new optimum level of debt.

Another hypothesis considered in this study has to do with interest rate levels. Upon constructing a model used for finding explicit solutions for optimum capital structures, Leland (1994) posits that his results imply that increases in the risk-free rate increase the optimum level of financial leverage¹, for both protected and unprotected debt. This is contrary to what one may have first thought given that this would make debt more expensive and thus less desirable. Leland's argument (1994) establishes that the increase in tax shields imposes more debt despite its higher cost.

Additionally, the government's purpose with tax incentives is to increase productive investments in order to generate employment and foster economic development. This hypothesis is tested using our structured database, by setting up a set of regressions where the dependent variable is the investment level.

The sample universe consists of real-sector Colombian companies that report their financial information to the Colombian Superintendence of Corporations (*SSC*²). The years included in the data panel go from 1995 to 2012, which is the entire period available for analysis. Although the database includes listed companies, trading shares and/or debt at the Colombian Exchange, virtually all observations are from non-listed companies.

The article makes progress on three fronts. First, it looks to corroborate the capital structure theories advanced by DAM and Leland (1994) in response to an external shock, addressing the problem of endogeneity in the results. Second, upon focusing on privately held companies, it sheds light on whether or not the theories advanced by corporate finance also apply for circumstances in which probable access to capital is limited, given the lesser

¹ A result also reported by Hull (2008).

² Superintendencia de Sociedades de Colombia.

development with respect to capital markets that characterizes emerging countries as Colombia, and the opacity of these companies to external investors, including banks. Given the fact that most of the tests performed using capital structure theories are applied to companies listed on the stock market and for developed countries (Frank and Goyal, 2003;), the contribution is not negligible. Third, the article evaluates the efficiency of a government policy for investment. From this point of view, incentives may be used as means to reduce financial leverage rather than to increase relative investment. Following this track of thought, investment tax shields and debt tax shields could, to some extent, be considered possible substitutes. Additionally to refuting the irrelevance of capital structure arising from personal taxes (Miller, 1977), DAM's results posits that the existence of non-debt tax shields will negatively affect the firm's debt levels.

The results corroborate DAM's hypothesis that the introduction of this type of investment incentive reduces the level of financial leverage of Colombian companies in a figure close to 1.4% after the financial stimulus was introduced. An increase in this incentive by 10% in 2007 reduced debt additionally in 0.6%. However, this last result is weaker given that inflation adjustments on financial statements were simultaneously eliminated; inflation adjustments can increase or decrease taxable income, making difficult to draw conclusions about the size and sign of its impact. Additionally, our tests also confirmed a weaker effect of leverage explanatory variables during the life of the tax incentive, which is consistent with our main hypothesis. With respect to investment, our tests do not yield conclusive relationships, however the signs of the shift in the intercepts are mostly positive and the interactions with relevant variables are negative, which is consistent with the government purpose. The overall effect of interest rates on debt is also positive, in agreement with the result advanced by Leland (1994).

In general, it could be argued that even under circumstances with relatively less developed financial markets and limited access to outside financing, firms respond in a similar way to their counterparties in more developed markets and with access to outside financing. Articles by Hernadi and Ormos (2012), focusing on small and medium enterprises from Central and Eastern Europe, and Crnigoj and Mramor (2009), studying Slovenian firms, also finds support for the mainstream capital structure financial theories. The article is structured as follows: this first section introduces and discusses the literature, the second presents the database, the third describes the results, and the fourth provides the conclusions.

2. Database

The database was constructed using the information reported by companies to the *SSC*. Every year, registered corporations must report their balance sheets, profit-and-loss statements, and cash flow statements. The *SSC* has this information available from 1995 onward. The basic variables are obtained from balance sheets and profit-and-loss statements. One variable, investment in fixed assets, is taken from cash flow statements. From a total of 252,424 firm-year observations (1995-2012), the database was reduced to 64,314 reports upon eliminating extreme values and assuring that only firms with at least 8 years' worth of data were studied. The final results are summarized in Table 1.

In order to establish whether or not the results are robust³ for different specifications, five different types of regressions were performed: 1. Standardized variables in terms of standard deviations from the mean for each type of industry and robust errors; 2. Lagged and standardized variables to eliminate the possibility of an endogeneity bias, with total investment as main control variable; 3. Lagged and standardized variables with net investment

³ In the sake of brevity, not all regressions are included. Nevertheless, they are available for the interested reader.

as control variable; and 4. Lagged and standardized variables and autocorrelation correction; and 5. A dynamic model of leverage with standardized contemporary and lagged variables. As the regressions are performed with industry standardized variables, industry dummies are not considered. Year dummies are neither considered because the regression approach uses year dummy variables to uncover the tax shield impact. Additionally, controls for effective tax rate, interest rates, devaluation, and gross domestic product (GDP) growth, that account for unobserved year effects, and affect the yearly financing and investment decisions of companies, are included. Although the sample is large and random effects could allow for a generalization of conclusions, Hausman tests reject the suitability of such effects. Nevertheless, regressions with random effects, similar to those reported below, do not give rise to important differences in the conclusions of this study⁴. The definitions of variables are found in Table 2.

Table 1
Company Sample

⁴ With sufficiently large samples, the difference between fixed and random effects disappears.

Year	Firms	Sample	Cumulative		
			Year	Firms	Sample
1995	9,284	2,588	9,284	2,588	27.90%
1996	9,159	2,770	18,443	5,358	29.10%
1997	9,597	3,070	28,040	8,428	30.10%
1998	9,384	3,252	37,424	11,680	31.20%
1999	9,747	3,440	47,171	15,120	32.10%
2000	10,717	3,835	57,888	18,955	32.70%
2001	3,470	2,227	61,358	21,182	34.50%
2002	9,445	4,128	70,803	25,310	35.70%
2003	9,441	4,355	80,244	29,665	37.00%
2004	10,102	4,560	90,346	34,225	37.90%
2005	19,728	4,649	110,074	38,874	35.30%
2006	22,827	4,548	132,901	43,422	32.70%
2007	21,734	4,428	154,635	47,850	30.90%
2008	22,343	4,318	176,978	52,168	29.50%
2009	24,674	4,257	201,652	56,425	28.00%
2010	24,637	4,087	226,289	60,512	26.70%
2011	27,130	3,921	228,782	60,346	26.40%
2012	26,135	3,802	252,424	64,314	25.50%

Companies in the sample. Column 2 presents the annual total of companies reporting their information to the Superintendencia of Corporations (SSC), column 3 companies in the final sample, column 4 the total aggregate, column 5 the sample aggregate, and column 6 the sample's aggregate percentage.
Sources: *Author's calculations and the SSC.*

In 2007, inflation adjustments were no longer required in Colombian financial statements. This means that from 2008 onward net investments had to be adjusted for inflation to minimize the effect of the accounting modification. Income and the size proxy are inflation-adjusted before calculating the respective logarithm. With the exception of net investment, no other variables are affected by inflation given that all of them are contemporaneous ratios.

Table 2
Definition of Variables

Variable	Definition
Financial leverage	Debt on Debt plus equity
Size	Natural logarithm of revenue (thousands of Colombian pesos), inflation adjusted
ROA	Profit after taxes on financial obligations and equity
Gross margin	Gross profit on operational income
Tangibles	Property, plant, and equipment on non-current assets
Investment	a. Changes in the % of net property, plant, and equipment b. Investments in fixed assets on total assets
Dummy EF	1 as of 2003-2010; 0 otherwise
Dummy EF(30%)	1 as of 2003-2006 and 2010; 0 otherwise
Dummy EF(40%)	1 as of 2007-2009; 0 otherwise
Effective tax rate	Taxes paid on profits before taxes and monetary correction
Interest rate	Current market interest rate
Devaluation	Average devaluation
GDP (Growth)	Growth in the actual gross domestic product

Dummy variables refer to the effective date of Law 863 of 2001. Dummy EF30% is related to the introduction of the 30% tax deduction from 2003 onward, and dummy EF40% is a later increase to a 40% tax deduction from 2007 onward. Accelerated depreciation along with a large number of other deductions (Appendix 1) negatively affects outstanding taxes and reduces the value of the debt tax shield. To control for this factor, the effective tax rate is calculated as the ratio between outstanding taxes and profits before taxes plus monetary correction. A possible alternative is the income tax rate, but the modifications experienced during the period in review gave rise to a very high correlation with the dummy variables of interest (Table 3), thus affecting the regressions. Moreover, the effective tax rate includes additional adjustments that are not considered in the plain tax rate.

Table 3
Income Tax Rate vs. Dummies

Year	%Tax	Dummy EF(30%)	Dummy EF(40%)
1995	30.00%	0	0
1996	35.00%	0	0
1997	35.00%	0	0
1998	35.00%	0	0
1999	35.00%	0	0
2000	35.00%	0	0
2001	35.00%	0	0
2002	35.00%	0	0
2003	38.50%	1	0
2004	38.50%	1	0
2005	38.50%	1	0
2006	38.50%	1	0
2007	34.00%	0	1
2008	33.00%	0	1
2009	33.00%	0	1
2010	33.00%	1	0
2011	33.00%	0	0
2012	33.00%	0	0
Correlation		0.68	-0.3

Changes in the income tax rate and dummy variables of interest

Sources: Author's calculations and the SSC.

2.1 Standardization

The *SSC* classifies companies using a Uniform Industrial Classification method (*CIU*). Given that the effect that industry types have on financing decisions is well-known, the variables for each company are standardized in terms of the mean and standard deviation for each corresponding industrial sector, as such: $Z_{st} = \frac{X_{or} - \mu_i}{\sigma_i}$. Standardization by industry and by year is omitted given that it would eliminate the annual variability under study. The net investment variable is adjusted for inflation starting in 2007, when inflation adjustments disappear, in the following way:

$$\text{Investments} = [\text{PPE}_{t+1} \cdot (1 + \text{inf}) - \text{PPE}_t] / \text{PPE}_t$$

Paradoxically, given that the most recent variable is affected by inflation, this adjustment reduces, but does not eliminate, the difference in investment before and after inflation adjustments.

2.2 Descriptive Statistics

Table 4 presents descriptive statistics and correlations between the variables used in this study. Observations for all variables are higher than 60,000. Financial leverage has an average of 23.39%, showing some recovery in the last years (Graphic 1b). The average revenue is close to COL\$ 11,000 million (inflation adjusted, 2009 is the base year); 68% of the revenue observations are in the COL\$ 2,841-44,013 million range; 95% are in the COL\$ 722-173,207 million range. Sales turnover average is 1.57 (for the database), then the average firm assets is COL\$ 7,100 million. Per the Colombian classification of firm's size, the average firm in the

database is a medium size enterprise⁵, but such an average firm is certainly a small firm per the international standards.

As would be expected for a large and diverse database, high correlations are not observed except between different investment measures. Size and total investment are positively correlated (0.30) as well as financial leverage and size (0.18); while financial leverage and return on assets (-0.25), and financial leverage and the gross margin (-0.14) are negatively correlated, which is expected under the pecking order theory, although not under the trade-off theory. Economy wide variables, such as interest rates, devaluation, and GDP growth, are highly correlated; interest rate and devaluation are positively correlated (0.62), while GDP growth is negatively correlated with interest rate (-0.42) and devaluation (-0.55).

Table 4
A. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.
Financial leverage	68235	23.39%	21.99%
Size	68235	16.23	1.37
ROA	68235	5.62%	10.71%
Gross margin	68235	29.12%	18.44%
Tangibles	68068	54.89%	32.49%
Net investment	60958	22.55%	89.44%
Total investment	68062	993,117	5,015,549
Tot. Inv./Total Assets	68119	3.21%	7.38%
Interest rate	68235	19.85%	10.49%
Devaluation	68235	3.84%	11.88%
GDP (Gwth)	68235	4.12%	1.74%
Dummy EF(30%)	68235	32.53%	46.85%
Dummy EF(40%)	68235	19.06%	39.27%
Effective Tax Rate	68225	35.70%	353.62%

⁵ This classification is based on the legal minimum wage, a medium size firm should has assets between 5,000 and 30,000 minimum wages. For 2,009, the base year, the range is COL\$ 2,485-14,900 million. Under an exchange rate of COL\$ 2,000 per dollar, this range is US\$ 1.24-7.45 million.

B.2 Correlations

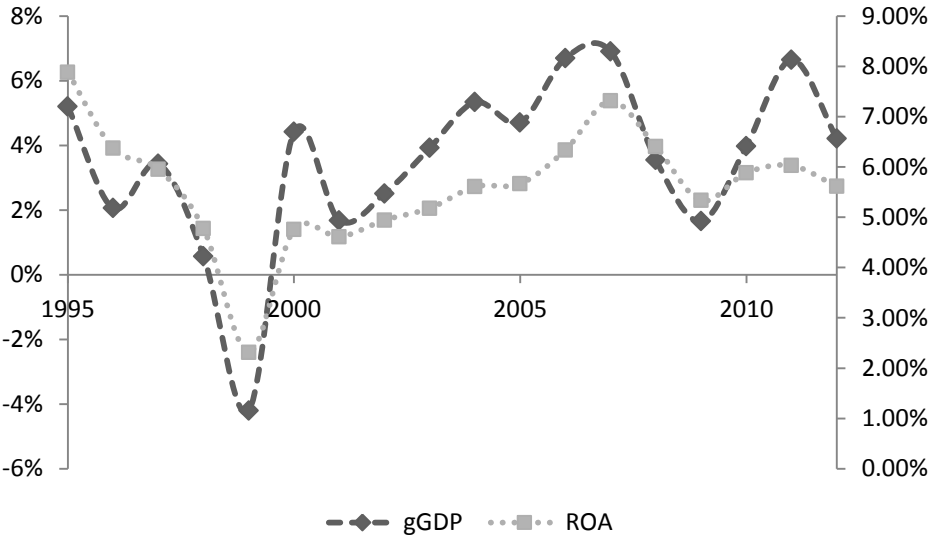
	Financial leverage	Size	ROA	Gross margin	Tangibles	Net investment	Total investment	Tot. Inv./Total Assets	Interest rate	Devaluation	GDP (Gwth)	Dummy EF(30%)	Dummy EF(40%)
Size	0.18 ***												
ROA	-0.25 ***	0.09 ***											
Gross margin	-0.14 ***	-0.19 ***	0.14 ***										
Tangibles	0.09 ***	-0.14 ***	0.12 ***	-0.05 ***									
Net investment	0.02 ***	0.01 ***	0.02 ***	-0.01 ***	0.03 ***								
Total investment	0.06 ***	0.06 ***	0.04 ***	0.00 ***	0.09 ***	0.09 ***							
Tot. Inv./Total Assets	0.05 ***	0.30 ***	0.02 ***	0.01 ***	-0.02 ***	0.04 ***	0.36 ***						
Interest rate	0.06 ***	-0.03 ***	0.00 ***	-0.01 *	0.12 ***	0.01 ***	0.03 ***	-0.05 ***					
Devaluation	0.01 **	-0.04 ***	-0.05 ***	0.01 *	0.08 ***	-0.01 **	0.00 ***	-0.05 ***	0.62 ***				
GDP (Gwth)	0.00 ***	0.01 ***	0.04 ***	0.00 ***	-0.02 ***	0.01 ***	0.01 *	0.02 ***	-0.42 ***	-0.55 ***			
Dummy EF(30%)	-0.04 ***	-0.01 ***	0.00 ***	-0.02 ***	0.00 ***	0.00 ***	-0.02 ***	-0.01 **	-0.42 ***	-0.41 ***	0.33 ***		
Dummy EF(40%)	0.00 ***	0.04 ***	0.03 ***	0.01 ***	-0.04 ***	0.01 **	0.02 ***	0.05 ***	-0.21 ***	-0.27 ***	-0.01 ***	-0.34 ***	
Effective Tax Rate	0.00 ***	0.00 ***	0.01 **	0.00 ***	0.00 ***	0.00 ***	0.00 ***	0.00 ***	-0.01 *	-0.01 **	0.01 *	0.01 *	0.00 ***

Correlations between standardized variables

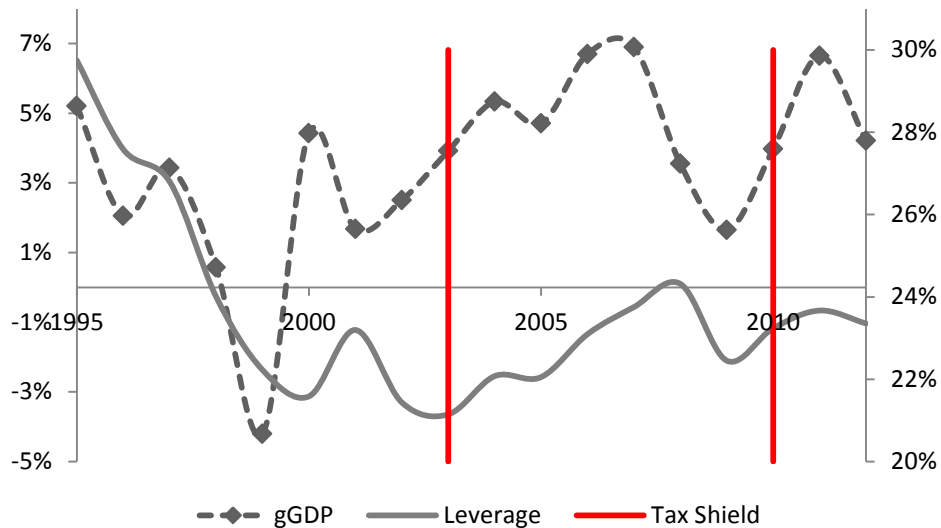
Source: Author's calculations and the SSC.

Graphic 1 shows the evolution of GDP growth, average return on assets and financial leverage. Graphic 1a depicts the close association between GDP growth and ROA, as is expected. The lowest ROA corresponds to the lowest GDP growth in the entire period (1999). The sharp decline in GDP growth and ROA, reflecting the economic crisis of the late nineties, is followed by a continuous improvement until the shock of the financial crisis of 2008 and 2009 affects the country and its firms. Financial leverage (graphic 1b) also responds to economic crisis, firms reduce its financial exposure when facing hard times. The speed of adjustment, however, is non-symmetrical, the speed of deleverage is much higher than the speed of releverage. Firms slowly go back the pre-crisis leverage levels, perhaps due to risk concerns and bank restrictions. Additionally, the government introduced the investment stimulus in 2003 (ended in 2010), which, as argued in this research, also retards the use of additional debt given the substitution effect with the tax shield.

Graphic 1
GDP growth, profitability and leverage



1a. Evolution of GDP growth and ROA



1b. Evolution of GDP growth and leverage

Source: Author's calculations based on SCC information and World Bank Indicators

3. Tests

The purpose of this study is twofold. The first one is to study whether or not changes to the investment tax shield cause changes in the capital structure of companies, and if so, by what means. The second purpose is to evaluate whether or not a policy of tax incentives for investment by the Colombian government has given rise to increased investments or whether companies have simply adjusted their capital structures.

3.1 Determinants of Leverage

Firstly, the effects of various variables which, under the theories outlined above, are expected to have an impact on financial leverage are studied. Specifications 1, 2 and 3 reported in Table 5 differ by the type of investment that is incorporated as a control variable and whether or not the considered variables include a lag to control for endogeneity. All specifications include robust errors. Additionally, the results of Hausman tests for the reported specifications

and equivalent specifications with random effects are presented. In all instances, the test unequivocally points to fixed effects as the consistent specification. The fourth specification, carried out using a generalized least squares equation model (GLS), involves an autocorrelation correction; allow the variances to differ for each of the firms and, in general, that does not change the results. The adjusted R^2 , when applicable, is not very high in any of the specifications, but all regressions as a whole are significant. The variability and heterogeneity of the companies in the sample are very high, even after deparating it, which makes difficult to obtain regressions with a large explanatory power. However, most of variables that theoretically impact capital structure are significant and have the expected sign. Given that our purposes aren't normative, we'll go so far as to make general conclusions about capital structure and investment.

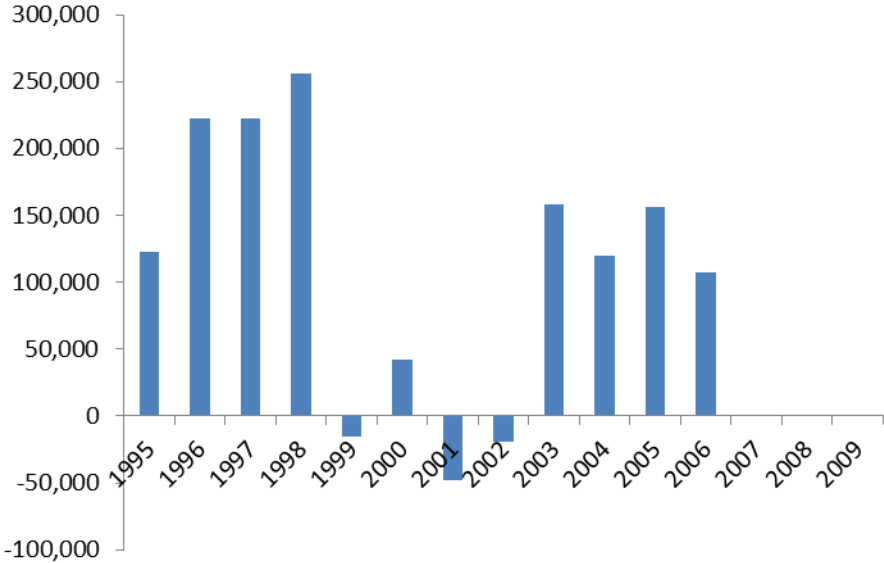
The coefficients for the first three specifications coincide, except the effect of taxes, which is very small and not significant. In non-reported regressions with random effects, the signs and significance of the coefficients are completely consistent with those of the first three specifications. The fourth specification differs in one aspect, the gross margin coefficient becomes negative (and significant), smaller in size though.

3.1.1 Intercepts

Incorporating the effects of 30% tax shield on investment starting in 2003, dummy variable EF(30%) corroborates expectations for lower financial leverage as theorized by DAM (1980) given that their application reduces financial leverage for contemporary and lagged variables by 4.16% (Spec. 1) and 3.4% (Spec. 2 & 3); for the GLS regression the reduction, still significant, is 1.38%. Incidentally, this result supports the trade-off theory, which predicts that

these benefits substitute for debt levels. When the deduction increased to 40% the result is not as clear, contrary to the initial expectations, dummy variable EF(40%) does not have a larger coefficient in specifications 1 to 3, the coefficient is not significant in specification 3; however, after correcting for autocorrelation, the result stands and a larger coefficient of 1.97% (compared to 1.38%) for the period, when the tax shield was larger, is reported. The result is not as strong as the first one, because this dummy additionally captures another very important tax factor in the case of Colombian companies, given that at the same time that a 40% increase on tax incentives for investment was approved, inflation adjustments disappeared (monetary correction) from Colombian financial statements. Monetary correction was either positive or negative depending on whether inflation affected assets more than equity. In general terms, this correction was positive for companies in the years prior to its disappearance, averaging \$110 million Colombian pesos (COP) between 1995 and 2006 (see Graphic 2), which implied more tax payments.

Graphic 2: Monetary Correction



Annual average for monetary correction in thousands of Colombian pesos (COP).
Source: Author's calculations using SCC information

Since it was said that the disappearance of monetary correction would cause an increase in tax payments (assuming it was mostly negative), the government reduced the income tax rate in one percentage; at the same time a temporary 3.5% surtax on pretax income was coming to an end. As shown in our calculations, this wasn't true, monetary correction was mostly positive, implying higher taxes when the inflation adjustment of financial statements was in place. Thus, it can be said that this relief of company cash flows in fiscal burden would allow for an increase in financial leverage, in particular for taking advantage of tax incentives for investment. Additionally, leverage was increasing until 2007, associated to the GDP growth (Graphic 1b). That the tests be able of capturing the fast deleverage (and slow releverage) effect of the tax shield, can be hypothesized as the result of including financial data from years after the law expired.

3.1.2 Firm specific variables

The tests include proxies for the factors that according to the Trade-off and Pecking Order theories impact leverage. The first is size, a proxy for volatility of cash flows (Fama and French, 2002). The effect of size on financial leverage is positive⁶. Both the pecking order and trade-off predict this positive relationship. Volatility has a negative impact on financial leverage given that in the first case, financing costs increase (transaction), and in the latter, bankruptcy costs increase. Control for endogeneity (specifications 2 to 4) reduces the impact of size.

Table 5. Explaining Financial leverage

The dependent variable for all specifications is financial leverage. The sample is a panel of Colombian firms from years 1995 to 2012 (18 years less 1 year when lagged variables are used). Regressors are from three types: a) Intercept and dummy variables, b) Firm specific variables, and c) Country wide variables. All firm specific variables are industry standardized and inflation adjusted when appropriate. A fixed effects model is reported in specifications 1 to 3, with robust errors; results from a Hausman test to choose between fixed or random errors is reported in the statistics section. They differ by the use of contemporaneous (Spec 1) or lagged (Specs 2 & 3) firm specific variables, and total (Specs 1 & 2) or net (Spec 3) investments. Specification 4 corrects for AR1, under a GLS approach; it assumes a heteroskedastic error structure with no cross-sectional correlation. Variables definition is found in Table 2. The values shown in parentheses below the coefficients are t statistics. Observations, firms, adjusted R², and results from F, Wald and Hausman tests are reported at the bottom. Asterisks are associated with p-values.

Specification	(1)	(2)	(3)	(4)
Type	FE	FE	FE	GLS-ar1 H
Regressors	Contemp.	Lagged	Lagged	Lagged
Investment type	Total	Total	Net	Total
a.) Intercepts				
Constant	-0.2252 (14.67)***	-0.1657 (9.45)***	-0.1411 (8.42)***	-0.3354 (29.17)***
Dummy EF(30%)	-0.0416 (5.43)***	-0.0340 (4.01)***	-0.0345 (4.15)***	-0.0138 (2.76)***
Dummy EF(40%)	-0.0156 (1.88)*	-0.0143 (1.58)	-0.0092 (1.01)	-0.0197 (3.04)***

⁶ Hernadi and Ormos (2012) report similar results for size, profitability and tangibility for a sample of non-listed Central and Eastern European firms. For tests of listed companies in emerging markets, Booth, et al. (2001) also report similar results.

Specification	(1)	(2)	(3)	(4)
b.) Firm specific variables				
Size	0.3412 (23.07)***	0.2949 (18.56)***	0.3070 (18.28)***	0.1836 (40.74)***
ROA	-0.2240 (39.45)***	-0.1542 (25.96)***	-0.1544 (24.87)***	-0.0381 (17.16)***
Gross margin	0.0504 (5.27)***	0.0436 (4.29)***	0.0462 (4.33)***	-0.0253 (7.29)***
Tangibles	0.0842 (5.85)***	0.0557 (4.28)***	0.0576 (7.15)***	0.0328 (10.72)***
Investment	0.0263 (2.57)**	0.0336 (2.41)**	0.0294 (9.32)***	0.0111 (6.04)***
% Taxes	-2.243E-04 (0.31)	2.606E-05 (0.04)	7.697E-05 (0.11)	-2.555E-04 (0.60)

Specification	(1)	(2)	(3)	(4)
c.) Country wide variables				
Interest Rate	1.0606 (19.74)***	0.8401 (14.24)***	0.6080 (10.30)***	0.4946 (15.19)***
Devaluation	-0.3292 (10.52)***	-0.2803 (9.06)***	-0.2174 (7.00)***	-0.0864 (5.30)***
GDP (growth)	1.0577 (8.13)***	0.4174 (2.71)***	0.4726 (3.09)***	0.7038 (6.65)***
Obs.	68058	59455	52917	59454
Firms	4902	4902	4887	4901
Adjusted R-sqr	0.123	0.069	0.064	
F stat	212.40***	110.26***	103.92***	
Chi sqr.				2602.91***
Hausman	499.05***	502.53***	645.12***	

* p<0.1 ** p<0.05 *** p<0.01

Profitability has a negative effect on financial leverage, an effect that is reduced when lagged variables are considered. In this case, the results support pecking order predictions while trade-off predictions are rejected. Given the costs that owners must bear to take on debt, high profitability allows them to reduce financial leverage, concentrating on financing using their own internal resources instead. Trade-off theory claims that higher profitability reduces bankruptcy costs, thus allowing greater financial leverage, which is not consistent with the results.

A proxy variable for market power, the gross margin positively affects financial leverage. Both theories predict this result given that transaction costs and bankruptcy costs simultaneously wane when a company has market power. However, the strongest regression (4) yields a negative result; two additional regressions⁷ did not produce a change of sign. The results confirm the negative sign, additional analysis is performed with interactions term in table 6. Asset tangibility works in the same way that size, and yields the same sign, reducing information asymmetries (for the pecking order theory) and serving as suitable collateral to reduce bankruptcy costs (for the trade-off theory). As with preceding variables, its effect attenuates when lagged variables are considered.

As long as contemporary or lagged investments are proxies for investment opportunities, the positive coefficient of this variable only supports the simple pecking order theory that postulates that profitable investment opportunities should be taken. Because profitability mitigates the transaction costs involved with higher levels of debt, this implies a positive relationship with financial leverage. A more complex version of the pecking order theory (Fama and French, 2002; Myers, 1984), under which companies balance present and

⁷ Not shown but available from the author. The first one included an additional lag for market power, which also yielded a negative and significant coefficient; the second one, modeled market power as function of the residuals of a GLS regression of market power as function of profitability and the intercept of the same regression, to isolate the effect of profitability from market power. No changes in the sign of market power were observed. Also in the sake of brevity, the result of regressions unifying the dummies are skipped, the results

future financing costs, suggests a negative investment ratio given that companies reduce actual costs based on their expectation of future profits. As mentioned above, this prediction was not backed by the results. A sort of trade-off theory (Jensen, 1986), which posits that agency problems are weakened with higher levels of debt and a negative sign for the investment coefficient, when firms have excessive cash flows and non-profitable investment opportunities, is not supported either.

Interestingly the effective tax rate paid by Colombian firms is not related with leverage, given the complex tax code and various tax investment incentives (See Appendix 1) that at different times have been enacted, the effective tax rate seems meaningless.

3.1.3 Country wide variables

Three country wide variables affect leverage: interest rates, the currency value and economic growth. Leverage is positively affected by the interest rate. The 1:0.49 sensitivity of financial leverage with respect to the interest rate (Spec. 4) implies that a single percentage point increase in the interest rate corresponds to a half percentage point increase in financial leverage. Simply put, an increased tax debt shield compensates for the additional debt costs and an increased probability of bankruptcy (Leland, 1994).

The peso devaluation and the gross domestic product (GDP) growth significantly affect debt. Devaluation makes it more expensive, directly by making loans in dollars more costly and indirectly when the local rate is adjusted to the expected devaluation. GDP positively affects debt, one percent of GDP growth increases debt levels in 1.06 percent for the regression with contemporaneous variables, and around 0.7 percent for the lagged growth. As is apparent from Graphic 1b leverage closely follows the GDP growth, sharply declining

when growth reduces and slowly increasing when the opposite happens. In terms of capital structure theory, GDP growth means increased investment opportunities, which complements the results obtained with the investment variable.

3.2 Interaction Effects

To test whether the tax shield reduces or not the impact of firm specific variables on leverage, Table 6 explores the interaction between the tax shield in place from 2003 to 2010 and the explanatory variables from Table 5. The hypothesis being that the interaction effect would have an opposite sign to the single variable, signaling the diminishing effect of the tax shield on leverage by reducing the impact of the several variables that explain it. To this end, all firm specific variables are interacted with the dummies that represent the tax shield. Specification 1 and 3 use Dummy EF, which takes the value of 1 for the entire period the tax shield was valid; specifications 2 and 4 use dummies EF30% and EF40%, which separate the periods when the tax shield had different tax deductions. Regarding the econometric approach, specifications 1 and 2 report the results of a fixed effects regression, while specification 3 and 4 involves a GLS model with AR1 correction and heteroskedastic panels. Corroborating the prior results, which were restricted to shifts in the intercept, the enactment of the tax shield reduces the impact of all variables, being significant for most of them.

Table 6. Financial leverage and Interactions

The dependent variable for all specifications is financial leverage. The sample is a panel of Colombian firms from years 1995 to 2012 (18 years less 1 year (lagged explanatory variables)). Regressors are from three types: a) Intercept and dummy variables, b) Firm specific variables with interactions, and c) Country wide variables. All firm specific variables are industry standardized and inflation adjusted when appropriate. A fixed effects model is reported in specifications 1 and 2, with robust errors; specification 1 uses a dummy for the entire life of the tax shield, specification 2 uses 2 dummies: 30% and 40% discount. Specification 3 and 4 replicate the specifications 1 and 2, respectively, correcting for AR1, under a GLS approach; it assumes a heteroskedastic error structure with no cross-sectional correlation. Variables definition is found in Table 2. The values shown in parentheses below the coefficients are t statistics. Observations, firms, adjusted R², and results from F, and Wald tests are reported at the bottom. Asterisks are associated with p-values.

Specification	(1)	(2)	(3)	(4)
Type	FE	FE	GLS-ar1 H	GLS-ar1 H
a.) Intercepts				
Constant	-0.1598 (9.29)***	-0.1615 (9.55)***	-0.3353 (29.14)***	-0.3332 (28.88)***
Dummy EF	-0.0272 (3.45)***		-0.0203 (4.02)***	
Dummy EF(30%)		-0.0343 (4.1)***		-0.0193 (3.79)***
Dummy EF(40%)		-0.0117 (1.27)		-0.0266 (4.03)***
b.) Firm specific variables				
Investment	0.0512 (6.11)***	0.0516 (6.15)***	0.0137 (4.57)***	0.0139 (4.64)***
EF-Investment	-0.0254 (1.54)		-0.0047 (1.27)	
EF(30%)-Investment		-0.0001 (0.01)		0.0019 (0.4)
EF(40%)-Investment		-0.0348 (2.34)**		-0.0084 (2.24)**
Gross margin	0.0590 (5.23)***	0.0580 (5.15)***	-0.0272 (6.6)***	-0.0276 (6.65)***
EF-Gross margin	-0.0300 (3.42)***		0.0044 (1.02)	
EF(30%)-Gross margin		-0.0306 (3.45)***		0.0040 (0.9)
EF(40%)-Gross margin		-0.0290 (2.78)***		0.0062 (1.06)

ROA	-0.1676 (21.27)***	-0.1671 (21.18)***	-0.0485 (15.9)***	-0.0492 (16.02)***
EF-ROA	0.0253 (2.9)***		0.0190 (4.87)***	
EF(30%)-ROA		0.0291 (3.16)***		0.0187 (4.54)***
EF(40%)-ROA		0.0151 (1.4)		0.0213 (3.99)***
Size	0.3233 (19.76)***	0.3198 (19.46)***	0.1905 (37.5)***	0.1922 (37.63)***
EF-Size	-0.0384 (4.28)***		-0.0132 (2.84)***	
EF(30%)-Size		-0.0360 (3.98)***		-0.0126 (2.7)***
EF(40%)-Size		-0.0447 (4.27)***		-0.0203 (3.3)***
Tangibles	0.0790 (7.86)***	0.0800 (8.17)***	0.0478 (12.14)***	0.0487 (12.28)***
EF-Tangibles	-0.0393 (3.61)***		-0.0275 (6.46)***	
EF(30%)-Tangibles		-0.0467 (4.01)***		-0.0276 (6.37)***
EF(40%)-Tangibles		-0.0230 (2.18)**		-0.0296 (5.07)***
Specification	(1)	(2)	(3)	(4)
c.) Country wide variables				
Interest Rate	0.8243 (14.58)***	0.8140 (14.41)***	0.4925 (15.13)***	0.4973 (15.2)***
Devaluation	-0.2882 (9.31)***	-0.2812 (9.25)***	-0.0851 (5.23)***	-0.0851 (5.2)***
GDP (growth)	0.3318 (2.11)**	0.4163 (2.72)***	0.7450 (7.07)***	0.7351 (6.92)***
Obs.	59465	59465	59464	59464
Firms	4902	4902	4901	4901
Adjusted R-sqr	0.080	0.081		
F stat	95.58***	70.04***		
Chi sqr.			2672.38***	2713.94***

* p<0.1 ** p<0.05 *** p<0.01

Table 7 shows the effects of interaction in absolute and relative terms. Panel A presents the variable coefficients, out of and during the tax incentive validity. Panel B presents the percentage of change. The intercept is shifted further down in both specifications during the life of the tax shield, going down in a 17% and 6% for the FE and GLS specifications, respectively. Coefficients of all firm specific variables have less weight during the tax incentive life, regardless of their significance (only three are not significant) and their sign. Positive coefficients are less positive and negative coefficients are less negative. Even in the only variable where both specifications differ, Gross margin, the hypothesized effect of the tax incentive is consistent; being less positive for the FE approach and less negative for the GLS approach. The interaction effect for investment for both specifications fails to be significant, granting further tests. The effect of tangible assets is the most affected, in excess of 49% and 57% for FE and GLS, respectively.

Results for specifications b and d mirror the previous results, but shed light on the differential effects of the 30% and 40% levels of the tax incentive. Of all interactions just one fails to have the expected sign, but the coefficient is not significant, the interaction of investment with the 30% incentive for the GLS approach; the correspondent term for the FE approach is also non-significant. However, both interaction terms between investment and the 40% incentive are significant and have the expected sign, signaling that just a very high incentive is able to shift the effect of investment on leverage, result that is backed by the non-significant results of the interaction terms for investment in specifications 1 and 3.

Is important to notice that, for the FE approach, just the interactions for investment and size are stronger for the 40% level of tax incentive, while that for the GLS approach all interactions are stronger for the 40% level, as was expected. The modeling options for the error terms characteristic of the GLS approach seems to pay handsomely. Continuing with the

difference in results (and signs) for the gross margin just the interactions for the FE approach are significant. As in specifications 1 and 3 the most important effect of interaction is for the tangible assets, rivaled by investment (for the 40% incentive). Taking together, all the results are strong evidence of the diminishing effect of tax incentives on leverage as hypothesized by DAM (1980) and suggest the existence of an optimal leverage, even for firms not listed in public exchanges and, because of that, with restricted access to capital markets. This allows for affirming that the effect of the shield is not trivial and has a direct impact on corporate debt in Colombia.

Table 7. Marginal effects on Leverage

The table reports the effect of investment incentive dummies interacted with the firm specific explanatory variables. Panel A shows the coefficients for the period with no incentive and the period with incentive (Specs 1 and 3, Table 6), panel B calculates the percent of change. Panels C and D do the same calculations, respectively; the tax incentive is separated in two dummies one for the 30% deduction and one for the 40% deduction (Specs 2 and 4, Table 6).

a.) Coefficients for relevant variables.

Dummy for the whole period when tax incentive was in place

Tax investment incentive	FE		GLS	
	Not approved	In place	Not approved	In place
Intercept	-0.1598	-0.1870	-0.3353	-0.3556
Investment	0.0512	<u>0.0258</u>	0.0137	<u>0.0090</u>
Gross margin	0.0590	0.0291	-0.0272	<u>-0.0228</u>
ROA	-0.1676	-0.1423	-0.0485	-0.0295
Size	0.3233	0.2849	0.1905	0.1773
Tangibles	0.0790	0.0396	0.0478	0.0202

b.) Percentage of change

Dummy for the whole period

	FE	GLS
	Diff. Effect	Diff. Effect
Intercept	17.01%	6.06%
Investment	<u>- 49.63%</u>	<u>- 34.04%</u>
Gross margin	- 50.76%	<u>- 16.35%</u>
ROA	- 15.09%	- 39.10%
Size	- 11.87%	- 6.91%
Tangibles	- 49.80%	- 57.68%

c.) Coefficients for relevant variables.

Dummies for 30% and 40% levels of tax incentive

Tax investment incentive	FE			GLS		
	Not approved	In place		Not approved	In place	
		30%	40%		30%	40%
Intercept	-0.1615	-0.1958	<u>-0.1732</u>	-0.3332	-0.3525	-0.3597
Investment	0.0516	<u>0.0515</u>	0.0168	0.0139	<u>0.0158</u>	0.0056
Gross margin	0.0580	0.0275	0.0291	-0.0276	<u>-0.0236</u>	<u>-0.0214</u>
ROA	-0.1671	-0.1379	-0.1519	-0.0492	-0.0305	-0.0279
Size	0.3198	0.2838	0.2750	0.1922	0.1795	0.1719
Tangibles	0.0800	0.0333	0.0570	0.0487	0.0210	0.0190

d.) Percentage of change

Dummies for 30% and 40% levels of tax incentive

	FE		GLS	
	Differential Effect		Differential Effect	
	30%	40%	30%	40%
Intercept	21.24%	<u>7.24%</u>	5.80%	7.97%
Investment	<u>- 0.28%</u>	- 67.41%	<u>13.48%</u>	- 60.19%
Gross margin	- 52.67%	- 49.93%	<u>- 14.42%</u>	<u>- 22.62%</u>
ROA	- 17.44%	- 9.05%	- 38.01%	- 43.34%
Size	- 11.24%	- 13.99%	- 6.58%	- 10.58%
Tangibles	- 58.41%	- 28.77%	- 56.77%	- 60.91%

Note: Underscored numbers imply non-significant interactions

3.3 Investment and Tax Incentive

Table 8 presents the results of the analysis of the effect of the investment tax shield on investment. Specifications 1 and 2 report a fixed effects approach, while specifications 2 and 3 replicate specifications 1 and 2, respectively, under the GLS approach. While specifications 1 and 3 apply a single dummy for the fiscal incentive and the interacted explanatory variables, specifications 2 and 4 work with two dummies aimed for the two levels of deductions that were in place during the law's life. Regrettably, the results are much less conclusive in this case. Coefficients in the GLS regressions are consistently smaller than coefficients for the FE regressions, reducing the economic impact of the findings; however, given the additional

controls included in the GLS approach those results carry more weight. Adjusted R^2 is very low for the FE approach, although each regression as a whole, including the GLS approach, is significant. All single explanatory variables are also significant, and their interpretation is straightforward. Less leverage causes more investment, while higher gross profit, profitability, size and tangible assets allow more investment. Under limited access to, or undeveloped, capital markets, the impact of leverage for investment should be important, resulting in a negative sign. On the other hand, proxies for excess of cash flow such as profitability or gross profit should ease investment. Additionally, controlling for firm leverage, size and tangible assets, which proxies for volatility, also support more investment, given the less likelihood of funds shortage to pay for those investments. Country wide variables are also significant; the effect of interest rates is positive, which is counterintuitive, perhaps working in the same way that for leverage. Leland (1994)⁸ posits that interest rates are positively related with leverage because produces larger tax shields, compensating for debt and bankruptcy costs; if investments are mainly funded with debt, then a positive relationship should be expected. Devaluation works in the opposite way, less devaluation causes more investment; which is logical because a strong currency eases the purchase of imported capital goods. Economic growth in turn is positively associated with investment; as expected, firms invest to meet the demand of higher economic activity, or alternatively, economic activity reflects more investment from firms. However, for the country wide variables it is difficult to determine causality.

The encouraging results of the single variables, however, are not replicated by the interacted variables. The hypothesis being that explanatory variables or firm conditions (restrictions) are less important for investment decisions, when a tax deduction is in place.

⁸ See section Determinants of Leverage.

Apart from a positive shift in the intercept, the expectation is that the coefficients for the interacted variables have an opposite sign of the single variables.

The positive and significant shift in the intercept in specification 1 is non-significant for its counterpart in specification 3. When the dummies for 30% and 40% deductions are considered, a non-significant coefficient for the 30% level, even negative for specification 4, is reported. However the coefficient for 40% is positive and significant, close to 1% for the GLS approach, suggesting that just very sizable tax deductions move firms to invest higher. None interactions for leverage are significant and the negative signs of the FE approach is reverted for the GLS one. The interactions of Gross margin have the right sign, but just one of them is significant: Gross margin and the 30% dummy (Spec. 2). ROA interactions behave opposite between FE and GLS, while for specifications 1 and 2 are negative and significant for the 30% deduction, they are positive⁹ for specifications 3 and 4, yet significant for single dummy and the 40% deduction (EF-ROA in Spec. 3)). Size interactions for specifications 1 and 2 are significant and have the hypothesized signs. The corresponding coefficients for specifications 3 and 4, have the same sign, but fail to be significant. None interactions for Tangible assets are significant and, worst, are positive for the 40% deduction. Overall it is difficult to conclude from the interaction results in Table 8 that the tax incentive from Law 863 increases the pace of investment in an important way.

⁹ An alternative hypothesis of more importance of firm characteristics during the tax deduction life, is contrary to the government expectations. Nevertheless, most interacted variables have opposite signs to the single variables.

Table 8. Investment and Interactions

The dependent variable for all specifications is Investment. The sample is a panel of Colombian firms from years 1995 to 2012 (18 years less 1 year (lagged explanatory variables). Regressors are from three types: a) Intercept and dummy variables, b) Firm specific variables with interactions, and c) Country wide variables. All firm specific variables are industry standardized and inflation adjusted when appropriate. A fixed effects model is reported in specifications 1 and 2, with robust errors; specification 1 uses a dummy for the entire life of the tax shield, specification 2 uses 2 dummies: 30% and 40% discount. Specification 3 and 4 replicate the specifications 1 and 2, respectively, correcting for AR1, under a GLS approach; it assumes a heteroskedastic error structure with no cross-sectional correlation. Variables definition is found in Table 2. The values shown in parentheses below the coefficients are t statistics. Observations, firms, adjusted R², and results from F, and Wald tests are reported at the bottom. Asterisks are associated with p-values.

Specification	(1)	(2)	(3)	(4)
Type	FE	FE	GLS-ar1 H	GLS-ar1 H
a.) Intercepts				
Constant	-0.1488 (4.95)***	-0.1579 (5.06)***	-0.0400 (11.58)***	-0.0424 (11.52)***
Dummy EF	0.0350 (3.47)***		0.0018 (1.07)	
Dummy EF(30%)		0.0062 (0.65)		-0.0014 (0.76)
Dummy EF(40%)		0.0795 (4.51)***		0.0093 (4.22)***

Specification	(1)	(2)	(3)	(4)
b.) Firm specific variables				
Leverage	-0.0277 (3.13)***	-0.0275 (3.10)***	-0.0025 (2.09)**	-0.0025 (2.04)**
EF-Leverage	-0.0072 (0.81)		0.0013 (0.86)	
EF(30%)-Leverage		-0.0101 (1.15)		0.0005 (0.32)
EF(40%)-Leverage		-0.0076 (0.53)		0.0011 (0.54)
Gross margin	0.0271 (2.76)***	0.0255 (2.60)***	0.0042 (3.50)***	0.0045 (3.57)***
EF-Gross margin	-0.0128 (1.65)		-0.0015 (1.01)	
EF(30%)-Gross margin		-0.0139 (1.69)*		-0.0017 (1.01)
EF(40%)-Gross margin		-0.0125 (0.97)		-0.0018 (0.87)
ROA	0.0522 (7.94)***	0.0536 (8.14)***	0.0093 (8.24)***	0.0089 (7.63)***
EF-ROA	-0.0078 (0.93)		0.0033 (2.15)**	
EF(30%)-ROA		-0.0167 (1.76)*		0.0024 (1.36)
EF(40%)-ROA		-0.0001 (0.01)		0.0055 (2.41)**
Size	0.0470 (3.65)***	0.0356 (2.84)***	0.0172 (12.78)***	0.0176 (12.49)***
EF-Size	-0.0178 (2.05)**		-0.0018 (1.08)	
EF(30%)-Size		-0.0162 (1.96)*		-0.0012 (0.66)
EF(40%)-Size		-0.0255 (1.66)*		-0.0035 (1.53)
Tangibles	0.0335 (4.40)***	0.0352 (4.74)***	0.0117 (10.00)***	0.0120 (9.85)***
EF-Tangibles	-0.0087 (0.98)		-0.0008 (0.56)	
EF(30%)-Tangibles		-0.0123 (1.40)		-0.0009 (0.56)
EF(40%)-Tangibles		0.0031 (0.18)		0.0010 (0.47)

Specification	(1)	(2)	(3)	(4)
c.) Country wide variables				
Interest Rate	0.4877 (6.30)***	0.4649 (6.29)***	0.0573 (5.69)***	0.0575 (5.42)***
Devaluation	-0.0979 (2.44)**	-0.0795 (1.99)**	-0.0371 (5.43)***	-0.0354 (4.88)***
GDP (growth)	0.7162 (2.09)**	1.0454 (2.67)***	0.0867 (2.11)**	0.1281 (2.90)***
Obs.	59465	59465	59464	59464
Firms	4902	4902	4901	4901
Adjusted R-sqr	0.01	0.01		
F stat	25.81***	20.09***		
Chi sqr.			771.00***	775.72***

* p<0.1 ** p<0.05 *** p<0.01

4. Conclusions

This article explores the relation between debt and its determinants over an 18-year period using a database of non-listed firms reporting financial statements to the SSC, which had not been previously studied in this regard. The results allow us to suggest that capital structure theories explaining the firm choices in other regions and different stages of financial development can also explain the financing and investment decisions of Colombian companies. Our contribution to the financial discipline involves a study of a relatively large sample of companies that react to exogenous factors that affect their choices regarding capital structure in a stage of relatively low development, supporting the suggestions of DAM (1980) of an optimal structure even in the absence of bankruptcy costs.

Table 9 presents a summary of the hypothesized signs, which theories or authors advanced the result and the results. Our work tends to support the pecking order theory, although our fundamental hypothesis, the effect of the investment tax incentive on leverage, fits better under the body of theories contained in the so-called trade-off theory. Leland (1994) advanced the positive sign of interest rate on leverage.

Table 9. Hypothesized Results

The table presents the expected and reported signs of all hypotheses. Panel A presents the results for Leverage, Panel B does the corresponding for Investment

Characteristic	a. Expected impact on Leverage					Result	Backed Theory
	Pecking Order	Trade Off	Leland	DAM	This paper		
Volatility	+	+				+	Both
Profitability	-	+				-	P.O.
Market Power	+	+				+/- (GLS)	Puzzle
Tangibles	+	+				+	Both
Investments	+	-				+	P.O.
Tax incentive				-		-	DAM
Interest Rate			+			+	Leland
Devaluation					-	-	This paper
GDP					+	+	This paper

Characteristic	b. Expected impact on Investment				Result	Backed Theory
	Leland	Government	This paper			
Volatility			+		+	This paper
Profitability			+		+	This paper
Market Power			+		+	This paper
Tangibles			+		+	This paper
Leverage			-		-	This paper
Tax incentive		+			¿?	None
Interest Rate	+				+	Leland
Devaluation			-		-	This paper
GDP			+		+	This paper

Results having to do with business investment and its determinants are less encouraging and require further study. There is little evidence from our study of increased investment in response to a tax stimulus. One possible reason is the huge diversity of tax stimuli available to Colombian companies (Appendix 1) which complicate the analysis of measures on an individual basis. Even without formal theories relating leverage and investment, apart from the expected independence when capital markets are perfect, all hypothesized signs for the explanatory variables of investment were backed by the results.

It is possible, moreover, to study a simultaneous decision-making process in which companies endogenously determine both financial leverage and investment in order to find the conditions that truly stimulate investment. I will leave this work to future research.

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Appendix 1

Investment Deductions (taken from the Colombian Tax Code) valid at 2010

General Deductions	Laws or Decrees	Description
Deductions on investments in new plantations, irrigation systems, wells, and silos	Art. 157 t	Individuals or corporations that make direct investments in reforestation, coconut, palm, rubber, cocoa, and orchard plantations or wells, among others, shall be entitled to deducting the value of said investments occurring in the preceding tax year from their income. This deduction shall not exceed 10% of the liquid income of the taxpayer making the investment.
Deductions on amortizations in the agricultural sector	Art. 158	Investments in the construction and repair of field housing for workers, among others, will be deductible from income tax payments across all amortization installments.
Deductions on investments in scientific and technological developments	Art. 158-1 modified by Law 633 of 2000, Art. 12	Individuals who directly or through research centers make investments in research or technological development centers, constituted as non-profit entities among others, shall have the right to deduct 125% of the value invested for the tax year in which the investment occurred. This deduction shall not exceed 20% of a taxpayer's liquid income before subtraction of the investment amount.
Deductions on investments in environmental control and improvements	Art 158-2 modified by Law 788 of 2002, Art. 78	Corporations that make direct investments in environmental control and improvements shall have the right to deduct said investments occurring in a given tax year from their income. The deduction shall not exceed 20% of the taxpayer's liquid income.
Fixed-asset investments and leasing	Art. 158-3, Tax Code Law 863 of 2003, Art. 68	Individuals and corporations that pay income taxes may make 30% deductions for investments in real, productive fixed assets even under financial leasing with irrevocable purchase options in agreement with the regulations issued by the Colombian government.

Fixed-asset investments and leasing	Art 158-3, Law 1111 of 2006, Art. 8	Starting on January 1, 2007, natural and legal persons that pay income taxes may make 40% deductions for investments in real, productive, fixed assets even under financial leasing with irrevocable purchase options in agreement with regulations issued by the Colombian government.
Deduction as a result of depletion of an operation of hydrocarbons extraction	Art. 161	The percentage permitted as an annual deduction as a result of normal depletion shall not exceed 35% of the total of the taxpayer's taxable liquid income, computed before making the depletion deduction.
New investments in air transport in rural areas in Colombia	Art. 97, Law 633 of 2000	The deductible sum shall not exceed 15% of a taxpayer's annual liquid income.
Investments in incarceration centers	Art. 90, Law 633 of 2000	The deductible sum shall not exceed 15% of a taxpayer's annual liquid income.

Leasing & Depreciation

General Deductions	Laws or Decrees	Description
Leasing contracts	Art. 127-1, Law 223 of 1995, Art. 88	Financial leasing agreements with a purchase option shall be registered as an expense that is deductible from total rent accrued without an effect to the assets or liabilities. If no purchase is made, adjustments shall be made to net worth and liabilities, to the deduction for the statement of income for the year in which the contract terminated, and to the totality of the balance to be depreciated of the non-monetary asset registered as a lease.
Depreciation deductions	Art. 128 Tax Code	Reasonable amounts because of depreciation from normal use and deterioration, or obsolescence of goods used in business or income-producing activities are deductible, equal to the necessary aliquot or sum for amortizing 100% of their cost over the useful life of said goods provided that they have been put into use in the tax year or taxable period in question.

Duty-Free Zones

General Deductions	Laws or Decrees	Description
The Industrial and Commercial Duty-Free Zone of Barranquilla	Law 105 of 1958, Art. 4	Shall be exempt from the payment of national, departmental, and municipal taxes, contributions, and encumbrances.
All raw materials or goods that enter the Duty-Free Zone	Law 105 of 1958, Art. 22	Exempt from the payment of national, departmental, or municipal taxes, encumbrances, and any other kinds of tax contributions, including consular fees, etc., that may arise in the Duty-Free Zone in agreement with the regulations and fees issued by the Board of Directors with the approval of the National Government.
Staff working for the Duty-Free Zone and all individuals or corporations that operate at the Industrial and Commercial Duty-Free Zone of Barranquilla	Law 105 of 1958, Art. 23	Shall be obligated to pay the income tax and all other associated taxes according to law.
Industrial Duty-Free Zone	Decree 2131 of 1991, Art. 34	Exemption of customs fees and sales taxes for capital goods, equipment, materials, and spare parts coming from abroad that are to be used within the Duty-Free Zone.
Operating users, goods industries, or industrial service users	Law 1004 of 2005, Art. 1	Regardless of the origin of their income, as of the 2007 tax year a fifteen percent (15%) income tax fee and 7% tax on remittances will be levied on industrial service users in the Duty-Free Zone.

Sales abroad or to other companies located in Colombia outside of Duty-Free Zones.	Art. 392-4 to 396 of the Customs Code, modified by Articles 21 to 23 of Decree 4051 dated October 2007	Considered to be a VAT-exempt export.
	Art. 158-3, Law 1111 of 2006, Art. 8	40% of investments in fixed assets.

Other Taxes

General Deductions	Laws or Decrees	Description
Deductions on paid taxes	Art. 115 Tax Code	80% of industry, commerce, and property taxes that have been paid during the tax year or period are deductible provided that they relate to the taxpayer's main economic activity. This deduction is not treated as a cost or expense for the respective company.
	Law 1111 of 2006 Art. 4, Addition	100% of industry, commercial, advertising, billboard, and property taxes that have been paid during the tax year or period provided that they relate to the taxpayer's main economic activity. This deduction is not treated as a cost or expense for the respective company. 25% of the financial encumbrances paid in the respective year shall also be deductible, regardless of whether or not they relate the taxpayer's main activity provided they are tax withholding agents.
Deduction of taxes, royalties, and contributions paid by decentralized organizations	Art. 116 Tax Code	Shall be deductible from the raw income of the respective taxpayer provided that they meet the deduction requirements as stated in the current legislation.