Testing the Pecking Order Theory:
Comparative Evidence between two differentiated countries

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***Abstract*—This paper analyses the financial if the behavior of the Canadian and Colombian companies follow the pecking order theory, using a sample of firms of several sectors in those countries. The study is conducted over a net sample of 74 Colombian firms and 104 Canadian firms, for the years 2006 to 2010, using the creative Shyam-Sunder and Myers (1999) model. As a general result, we observe that Canadian's firm finance their deficit using long term debt while Colombian companies do not. Moreover other important results were obtained from subdivide samples by company size.**

Keywords—Capital structure, Pecking order theory, Firm financing.

I. INTRODUCTION

For the actual problem of the firm financial strategy, two competing theories offer the explanation for the way that companies follow on their financing decision; the trade off theory and the pecking order theory. The former theory suggests that a value maximizing firm will pursue an optimal debt-to-value ratio by a trade off of the tax benefits of the debts and the cost of financial distress. Following this theory, Marsch (1982) [1] and Taggart (1977) [2] provided evidence that firms adjust toward a target debt to value ratio. On the other hand, Myers and Majluf (1999) [3] proposed the second framework, the pecking order theory. Based on asymmetric information between new and old investors and transaction costs, this theory suggests that there is no an optimal debt-to-value ratio and firms prefer debt to equity if external financing is required, they really prefer always the internal financing, because it is free of transaction costs due to asymmetric information.

The purpose of this study is to examine firms of Canada, a developed country, and firms of Colombia, a developing country, in order to determine if they follow the above pecking order theory in their financing decision, and if which are the meanly comparative differences.

Generally, the prevailing view, for example Myers (1990) [4], seems to be that financial decisions in developing country are different from the one in developed countries.

In the following sections we will discuss the literature review, the data base and the methodology, and then the results of the investigation and finally we will present the conclusions and final comments.

II. INITIAL DISCUSSION AND SCOPE

Various authors have tried to the test the empirical implications of the pecking order theory. Confirmatory evidence was found by Mukherjee and Mahakud (2010) [5], from Indian's manufacturing companies, confirming that their financing behavior is best explained by the pecking order theory. David (2007) [6] in the same light, concentrate his study on Brazilians firms using indebtedness and payout variables and finding that the payout is negatively related with the investment opportunities and the profitability: the most profitable companies are less indebted, which suggests that they are financed mainly with internal funds, confirming the pecking order theory. Frank and Goyal (2003) [7] studied the way in which companies finance their deficit in the fund flows, finding evidence to support the pecking order theory against the target debt to ratio . Other instruments also confirmed the theory: Holmes and Kent (1991) [8] and Ang and Jung (1992) [9] used a mail survey to try to discern typical companies financial policies. Both investigation works found that company managers follow a hierarchy of funding choices similar to the one describe by the pecking order theory. In their work, Holmes and Kent [8] find a stricter pecking order in place at small than at larger companies.

Partially confirmatory evidence was published in the work of Leary and Roberts (2005) [10], who found evidence that firms are less likely to use external capital markets when they have sufficient internal funds, but are more likely to use it when they have large investments needs. In this same light, Buenaventura (2006) [11] tests the pecking order theory on Colombian clothing's industry in small and medium size firm and confirming partially the pecking order on medium size firms. Fama and French (2002) [12] used structural equation to construct a regression model between leverage and dividend payout as dependant variables on several explanatory variables according to the pecking order theory and other according to the trade off theory; they found no conclusive evidence in support of one specific theory. Manova analysis was used by López-Gracía and Aybar-Arias (2000) [13] to examine the relationship between variables proposed by the pecking order theory and financial constraints in the Spanish markets. They found that the significance of internal financing varies according to the company size.

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In summary, the literature is really numerous and concludes with a tendency toward the proof of financing practice according to the pecking order theory.

This work will contribute to contrast the theory, comparing how firms of two much differentiated countries in America evidence their financing conformation to the pecking order use of funds. We select Canada and Colombia, developed and developing countries respectively. Although firm information is available for both countries, there is a limitation in the number of firms studied, caused by the reliable information disposable. In fact, economies with large number of firms will be desirable, but the objective of this work is not to repeat the past studies, but do analyze new and non studied cases.

Moreover, it's interesting to know if the pecking order theory is applied in the similar way in these two different countries, in general, and in specific by small, medium and large firms.

Positive results may encourage to a more extended study, i. e. several American countries, and possible comparison between grouping firms for Latina America and for North America, for example.

III. Data and Methodology

The data set was collected from 2007-2011 consolidated annual financial reports of 77 Colombian firms and from 2006-2011 consolidated financial reports of Canadian firms. Out of the 77 Colombian firms, two were excluded and four also were excluded from Canadian firm due to lack of information. According with Lasfer (1995) [14], banks and financial institution was excluded, because those institutions have specific characteristics of capital structure and their tax follow a special treatment, in front of the other firms. Also Rajan and Zingales (1995) [15] exclude the financial firms because the financial firms leverage is highly affected by implicit or explicit insurance scheme such as deposit insurance; financial institutions include banks, savings deposits agencies of post offices, housing saving banks, urban credit cooperative banks, foreign –funded banks, financial trust investment agencies and financial companies.

Furthermore we drop three more firms due to negative ownership equity, remaining 74 Colombian and 104 Canadian companies.

We use a Thompson Reuter database for Canada firm information and the Benchmark database for Colombian companies to collect information. Firms must be either private limited or public limited and must not be in the banking or insurance sector. Also firms were excluded if 1) total asset were not equal to total liabilities and equity, 2) total assets increase more than 400% each year or decline 75% or more one year to another, and 3) firms do not have a positive equity figures. As companies financing may be influenced by size, we divided the samples into subsamples by size. The Colombian law 905 of 2004 classifies companies according to the total number of employees and the total assets; due to lack of information we use the total assets criteria and not the number of employees' criteria to classify firms in Colombia. Canada classifies firms according to the total number of employees and total assets so we use these criteria to classify firm. Tables 1 and 2 below illustrate the classification criteria, and table 3 shows the industry involve in this study for each type of country.

Table 1 - Classification of Colombian companies

Type of companies	Employees	Total assets (SMLMV)
Micro	1-10	Below 501
Small	11-50	500-5.000
Medium	51-200	5.001-30.000
Large	More than 200	More than 30.000

SMLMV: Current legal monthly minimum wage

Table 2 - Classification of Canadian firms

Types of companies	Employees	Total assets (CAD)
Small	Less than 100	CAD 100.000 to 3.000.000
Medium	100-500	3.000.000 to 15.000.000
Large	More than 500	Above 15.000.000

CAD: Canadian Dollar

Our empirical model to evidence is similar to that of Shyam-Sunder and Myers (1999) [16], derived from the pecking order theory. Considering that firms finance their funds flow deficit using retained earnings, debt and equity, the pecking order predicts that firms will finance their projects using retained earning first, then use debt if retained earnings are inadequate and turn to equity financing if they have to do it when no more debt is available and costs of financing distress are high. Some firms included in the sample have a deficit, while some have a surplus. Regarding firms with surplus, this means that firms become lenders rather than borrower.

The pecking order theory establishes that such firms are likely to pay back debt first and then they re-buy their stocks from the market. That is the same order as financing the deficit.

According to the theory the pecking order hypothesis is to test the following model:

$$\Delta D = \alpha + \beta\, DEF + \varepsilon \qquad (1)$$

ΔD denotes long term debt outstanding by firms.

We define ΔD as change in total liabilities (the change in total liabilities at the end of the year minus total liability at the beginning of the year).

DEF is the flow of fund deficit defined as follows[3]:

$$DEF = DIV + X + \Delta W - C \qquad (2)$$

DIV = cash payment for dividend.

[3]Shyam-Sunder and Myers (1999) claimed that simple pecking order predictions do not depend on the sign of the variable DEF. In principle the firms could become a net lender if surplus fund persist.

C = cash flow, from operating activities after taxes, for the firm.

X= capital expenditure for the firm, which is the summation of the amount of increase in long term investment, the amount of increased in fixed assets and the amount of increase in intangible assets and other assets; the amount of increase is defined as the amount of assets at the end of the year minus the amount of assets at the beginning of the year.

ΔW = increase in working capital.

ε = statistical error.

Table 3 - Industry classification for firms included in the study

Industry classification	Colombia	Canada
Mining	13	7
Manufacturing	7	20
Electricity, gas and water supply	8	
Construction	5	11
Wholesale and retail	9	
Transport and communication	11	
Petroleum	4	
Energy	19	
Agriculture and foresting		1
Wholesale trade		13
Oil and gas extraction		19
Transportation		10
Food services		17
Retail trade		10
Total	74	104

The regression analyses of the model are conducted in the following section. If the firm's capital structure follows the pecking order, then we expect to see $\alpha = 0$ and $\beta = 1$. In other words, the firm will tend to use debt to meet financing deficit, and equity issue or repurchased is treated as a last record. On the contrary if β is closed to 0, it implies that listed companies would prefer equity rather than debt.

As Frank and Goyal (2003) [7] suggested, small firms confronting relatively worse adverse selection problems should be more likely to match the pecking order predictions, firstly we break the whole sample by size (really Frank and Goyal found that the information in the financial deficit appears to be a factor along with many other factors that firms take into account in capital structure decisions).

Secondly we take year by year, and thirdly, we contrast the model on each partition and then we contrast a regression for the total firms of the sample, by country.

IV. Results and Analysis

We conduct ordinary least square regression on our 104 Canadians' companies and 74 Colombians' companies.

In tables 4 and 5 we have the summary of the result for Canada and Colombia companies, which signification levels of 1%, 5% and 10% for the beta and alpha estimated values, and also shows results for non significant cases (NS).

Tables in annex, show the results year by year from 2006 to 2011 for Canada and from 2007 to 2011 for Colombia.

Table 4 – Results for Canada

Country	**CANADA**							
Firm Size	Small		Medium		Large		Whole sample	
Intercept, α	0,435	NS	0,254	NS	0,088	***	0,117	***
Financial Deficit, β	0,007	**	0,165	***	0,014	**	0,015	**
R^2	0,755		0,223		0,547		0,472	

*** 1 % level of signification,
** 5 % level of signification,
* 10 % level of signification,
NS: no signification.

The result from the Canadian companies globally shows that the deficit is statically significant at 5%; although the β coefficients are not equal to one, they do are positives, which implies that the firms use debt to finance their deficit. Here, we can observe than the intercept is closed to zero and insignificant in most of the cases which support the pecking order. With Canadian companies, the small companies follow very well the pecking order with deficit coefficient significant at 5% and the intercept non significant for most of the years.

Table 5 – Results for Colombia

Country	**COLOMBIA**							
Firm Size	Small		Medium		Large		Whole sample	
Intercept, α	0,556	NS	-0,042	NS	0,519	NS	0,519	NS
Financial Deficit, β	0,434	NS	0,322	NS	0,054	***	0,359	NS
R^2	0,287		0,287		0,288		0.111	

*** 1% level of signification,
** 5 % level of signification,
* 10 % level of signification,
NS: no signification.

Coming to Colombian case, we find that only large companies follow the pecking order theory. In fact, table 5 presenting the result for small, medium and large companies, shows that the deficit variable is statically significant at 1% for this large firm, althoughand this coefficient is different from one. The intercept is insignificant in most of the years. This is comparable with the result of Shyam-Sunder and Myers (1999) for 157 companies and Frank and Goyal (2003) for large companies. The F-tests of our jointly hypothesis indicate that large companies match well with the pecking order predictions in Colombia case. This result in Colombia companies are consistent with Frank and Goyal (2003) who found that only large firm do follow the pecking order where as the entire sample (including the small one) does not. This however contradicts the pecking order theory that smalls firms will follow the best because small firms confront more serious asymmetric information than the large one.

In summary, in Colombia (developing country) only large firms present a significant relationship between the yearly deficit and the long term new debt, other kind of companies do not; while in Canada (developed country) it occurs in all firms, which confirm the presence of the Pecking Order Theory in the financial strategy of the Canadian Companies, while Colombia no evidence this behavior.

CONCLUSION

We examine whether Colombian and Canadian companies follow the pecking order using a sample of 104 Canadians companies and 74 Colombian companies, founding no evidence that Colombian companies globally follow the pecking order theory from retained earnings and debt to equity. Large companies in Colombia do follow the pecking order while small firm do not. In Canada all firms, but mainly small companies follow the pecking order. It shows that asymmetric information is verify for small firms in a developed country while in a developing country it is not.

These results suggest that Colombian's capital market is still no developed, in the sense of that large firms have a flexible financial environment, but not the small ones.

These findings with Colombia enterprises are generally not consistent with those of prior studies in the developed markets (Chen (2004) [17], Shyam-Sunder and Myers (1999), Zoppa and McMahon (2001) [18]). The main reason may be due to the growing stage of Colombia capital market: small and medium size enterprises do not access to capital market in developing countries while in developed countries this companies do access.

Other explanative factor may be the confidence of the financial reports of the small firms in Colombia. It is possible that some external sources of financing money, as illegal lends, are not registered in the financial information.

In the end, by one or other reason, the Pecking Order Theory in firm financing decision does not have evidence in medium and small firms of a developing country as Colombia, while it evidence in large firms of a developing country, and in all sizes of firms in a developed country as Canada.

It is interesting to continue investigate in firms of the American continent. Further investigation for American counties must be oriented to analyze other several countries, in order to extend the sample, and may compare the conformation to the theory by firms of developed North-American countries with developing Latin-American countries.

It will be useful to analyze if non confomrating firms follow other theory, as the trade-off theory, or the irrelevance theory of Modigliani and Miller (1958) [19], and try to get good reasons for that.

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ANNEX

Summary of intermediate Tables

Regression Result for Canada									
Year /type of Companies		Small (13)		Medium(17)		Large(74)		Whole sample	
Year		intercept	deficit	intercept	deficit	intercept	deficit	intercept	deficit
2006	value	0,66	0,00	0,31	0,35	0,08	0,05	0,27	0,10
	t value	0,46	12.449	1.059	0,98	2.057	2.415	1.107	0
	standarized coef(beta)	0,98		0,30		-0,63		-0,36	
	R²	0,97		0,09		0,42		0,21	
2007	value	0,36	0,00	-0,23	0,82	0,005	0,000	0,005	0,000
	t value	-0,99	12.426	3.434	0,01	2.883	6.933	2,91	7.971
	standarized coef(beta)	0,97		-0,70		0,636		0,635	
	R²	0,95		0,01		0,40		0,40	
2008	value	0,88	0,00	0,91	0,01	0,06	0,04	0,00	0,00
	t value	1.869	-7.066	-121	2.983	2.303	2.358	3.093	6.617
	standarized coef(beta)	-0,91		0,64		0,58		0,44	
	R²	0,82		0,41		0,34		0,20	
2009	value	0,58	0,00	0,11	0,02	0,21	0,00	0,24	0,00
	t value	-0,573	9.203	1.718	2.561	1.275	6.617	1.174	7,91
	standarized coef(beta)	0,94		0,55		0,62		0,62	
	R²	0,89		0,30		0,38		0,38	
2010	value	0,05	0,04	0,42	0,99	0,17	0,00	0,18	0,00
	t value	2.178	2.323	1	0	1.392	51.436	1.367	58.269
	standarized coef(beta)	0,574		-0,002		0,987		0,985	
	R²	**0,455**		**0**		**0,974**		**0,971**	
2011	value	0,08	0,05	0,02	0,00	0,01	0,00	0,01	0,00
	t value	2,09	2.416	2.728	3.893	2.541	15.792	2.705	14.216
	standarized coef(beta)	-0,68		0,73		0,88		0,82	
	R²	0,45		0,54		0,77		0,67	

Regression Result for Colombia									
Year /type of Companies		Small (11)		Medium(17)		Large(47)		Whole sample	
Year		intercept	deficit	intercept	deficit	intercept	deficit	intercept	deficit
2006	value	0,02	0,85	0,00	0,00	0,15	0,07	0,15	0,03
	t value	2,68	0,19	-0,53	9.278	1.467	1.882	1.467	2.241
	standarized coef(beta)	0,05		0,94		0,31		0,29	
	R²	0,00		0,88		0,09		0,09	
2007	value	0,31	0,28	0,02	0,85	0,99	0,08	0,96	0,76
	t value	1.106	-1.183	2,68	0,19	0,01	-0,25	0,06	-0,31
	standarized coef(beta)	-0,41		0,05		1.036		-0,04	
	R²	0,00		0,00		0,51		0,00	
2008	value	0,31	0,28	0,03	0,57	0,39	0,01	0,34	0,00
	t value	1.106	-1.183	2.333	1	0,869	-2.543	0,967	0
	standarized coef(beta)	-0,41		0,14		0,35		-0,35	
	R²	0,17		0,02		0,12		0,12	
2009	value	1,00	0,55	0,01	0,00	0,62	0,02	0,48	0,09
	t value	0,00	0,66	2.843	4.343	0,50	-1.399	0,71	-0,17
	standarized coef(beta)	0,311		0,725		1.202		-0,199	
	R²	0,10		0,53		0,41		0,04	
2010	value	0,51	0,33	-0,27	0,20	0,69	0,09	0,67	0,91
	t value	-0,98	-1.757	0,80	0,86	-0,41	-1.974	-0,43	-2.786
	standarized coef(beta)	-0,87		0,11		-0,55		-0,56	
	R²	0,76		0,12		0,31		0,31	

SUMMARY OF RESULTS FOR CANADA												
Type of company	Small			Medium			Large			Whole sa mple		
Year	R^2	Intercept	Fin. Deficit	R^2	Intercept	Fin. Deficit	R^2	Intercept	Fin. Deficit	R^2	Intercept	Fin. Deficit
2006	0,97	NS	**	0,09	NS	NS	0,415	***	***	0,21	NS	***
2007	0,95	NS	**	0,01	NS	NS	0,404	***	**	0,40	***	**
2008	0,82	NS	**	0,41	NS	***	0,341	***	***	0,20	***	**
2009	0,89	***	**	0,30	***	***	0,378	NS	**	0,38	NS	**
2010	0,46	***	***	0,00	NS	NS	0,974	***	**	0,97	NS	**
2011	0,46	***	***	0,54	***	***	0,773	***	*	0,67	***	**

SUMMARY OF RESULTS FOR COLOMBIA												
Type of company	Small			Medium			Large			Whole sa mple		
Year	R^2	Intercept	Fin. Deficit	R^2	Intercept	Fin. Deficit	R^2	Intercept	Fin. Deficit	R^2	Intercept	Fin. Deficit
2007	0,42	NS	NS	0,878	NS	***	0,094	***	***	0,09	NS	***
2008	0,00	**	NS	0,002	***	NS	0,51	NS	***	0,00	NS	NS
2009	0,17	NS	NS	0,02	***	NS	0,123	NS	***	0,12	NS	***
2010	0,10	NS	NS	0,526	***	***	0,41	NS	***	0,04	NS	NS
2011	0,76	NS	NS	0,012	NS	NS	0,305	NS	***	0,31	NS	NS