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The Relationship between Dividend Policy and Stock Price Volatility —

A Canadian Study

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Abstract

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By

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The objective of this study is to explore the relationship between the stock price volatility and dividend policy (dividend yield and dividend payout ratio) for the Canadian stock market. According to the studies of Baskin (1989) and Allen and Rachim (1996), the multiple least squares regression model is applied in this paper. The sample of data is composed of 100 public firms which are listed on the Toronto Stock Exchange and paid dividends continuously from 2001 to 2011.

The results indicate that the dividend yield and the dividend payout ratio both have significantly negative relationship with the stock price volatility. In addition, earnings volatility is positively related to the stock price volatility and it is a statistically significant relationship. As a result, managers can partly control the stocks' risks and thus affect investors' investment decisions through a firm's dividend policies.

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Chapter 1: Introduction

1.1 Background

Dividend policy is defined as the policy that a company uses to determine how much of its earnings it will pay out to shareholders in dividends (Lee, 2009). In other words, it is the division of earnings between payments to shareholders and reinvestment in the firm. Dividends can be divided into many types. Cash dividends are the most common way; others include stock dividends, property dividends, scrip dividends and liquidating dividends. As well, stock split and stock repurchase can sometimes be regarded as two additional kinds of dividends.

With the appearance of dividend policy, a controversy has always remained among researchers. In 1976, Black published his paper "The Dividend Puzzle." In this paper, he argued it was hard to explicitly answer why corporations paid dividends and why investors paid attention to dividends. The reason was that the analysis to these two questions didn't fit with each other. Different authors have had different opinions. Miller and Modigliani (1961) stated that dividend policy was irrelevant to firms' equity value under a fully efficient capital markets. No matter what the dividend policy was, it couldn't affect firms' share price or investors' investment return. In contrast to the dividend irrelevance theory, DeAngelo (1996) showed that dividend policy was relevant to firms' equity value. Share prices and investors' decisions were related to dividend policy because dividend policy contained some potential information which made signals

to capital markets and investors.

Apart from the above debates, there also exist lots of other discussions about dividend policy, such as agency cost theory (Moh'd, et al, 1995), signaling theory (Bhattachary, 1979) and so on. Dividend policy can have significant effects not only on firms' long-term investment and financing decisions, but also on investors' investment decisions. In recent decades, more and more people are exploring the concept of stock price volatility and wonder if dividend policy has some effect on it.

Stock price volatility is defined as the risks that investors face during their common stock investment. As is well known, most investors are risk averse and always try their best to obtain the most profit with the least risk. Obviously, the risk of their investment is of importance for investors. In statistical analysis, stock price volatility can be viewed as the variation of a stock's returns from their mean (Kotze, 2005). According to Black & Scholes's research (1974), stock prices are lognormally distributed. This means that if we take the logarithm of the beginning and end prices of a stock in one period, the differences between these two logarithmic prices are normally distributed. Therefore, stock price volatility can be explained by the standard deviation of stock prices. For example, on the condition that the mean of logarithmic returns is zero, a 10% stock price volatility means there is a probability of 68.3%(1 standard deviation from the mean) for stock prices to go up 10% or go down 10% (as cited in Kotze, 2005).

Nowadays, stock price volatility is always referred to as systematic risk not total risk. This is because investors can diversify the total risk by investing in different kinds

of stocks all over the world. As a result, the systematic risk is the only risk that investors will care about. In CAPM model, systematic risk of stock i is equal to β_i of the equation: $E(R_i) = R_f + \beta_i[E(R_m) - R_f]$(Sharpe, 1964).

1.2 Purpose of Study

From the discussion above, it is evident that dividend policy and stock price volatility are both important issues for firms and investors. This paper will explore the relationship between dividend policy and the stock price volatility on the Canadian stock market. Canada is a developed country and thus the Canadian stock market is a more mature market. Therefore, most public companies on the TSE are mature companies. Considering this, the great majority of investors will likely pay attention to dividend payments. Under the same situation, the more cash flow, the better. If the relationship between the dividend policy and stock price volatility really exists, managers can use the dividend policy to control stock price volatility and thus affect investors' investment decisions, especially for a mature stock market such as that of Canada.

This study will randomly choose 100 public firms which are listed on the Toronto Stock Exchange (TSE). These firms cover a variety of business areas, such as utilities, industries, financial institutions, wholesale, services, etc. All the data are selected from 2001 to 2011. Multiple least squares regression method will be used to evaluate the relationship between dividend policy and stock price volatility. On the basis of Baskin's (1989) research, some control variables will be included in the regression

equation to examine whether there are relationships between control variables and stock price volatility.

1.3 Organization of Study

There are five chapters in this paper. This current chapter is an introduction discusses the background and purpose of study. Chapter 2 is the literature review. It mainly discusses some related research about dividend policy and stock price volatility. Chapter 3 explains the methodology of this paper and some limitations in data collection. Chapter 4 discusses the results of the model which include the sign of the coefficients and the related statistical significance. Chapter 5 summarizes the results from the discussion of the model and provides some recommendations for future studies.

Chapter 2: Literature Review

2.1 The Gordon Model

Although Gordon is not the first person to put forward the topic of dividend policy and stock price volatility, he made a great contribution to this area and laid a solid foundation for the research that followed. In 1959, Gordon published his paper which discussed the relationship among dividends, earnings and stock prices. In his opinion, there were three possible purposes for investors to buy common stock: (1) both the dividends and earnings, (2) the dividends, and (3) the earnings. Cross-section sample data were used to do the regression test and people could obtain some guidance to buy or sell particular stocks. During the processing, several important values could be obtained and compared among different stocks, such as dividend yield, growth in sales and management ability.

Gordon (1959) used elementary theory to evaluate whether the dividends and earnings would affect stock prices. For the first purpose, he used the equation $P = a_0 + a_1 D + a_2 Y$ to do the regression where P = the year-end price, D = the year's dividend, and Y = the year's income. However, the results from this regression were not ideal. This was not only because the income only represented one of the dividends and earnings, but also because the coefficient value's range was too wide to get a good conclusion. As a result, the model for the first purpose was relatively weak and even inappropriate. For the second purpose, Gordon (1959) added a concept of the expected growth in the dividend

into the model. According to Gordon and Shapiro's (1956) study, the rate of growth could be calculated as $g = br = \left(\frac{Y-D}{Y}\right)\left(\frac{Y}{B}\right) = \frac{Y-D}{B}$ where g = the rate of growth, b = the retention ratio, r = rate of return on investment and B = book value per share for common stocks. For the regression model, however, growth rather than growth rate was used as an independent variable. Equation $P = \alpha_0 + \alpha_1 D + \alpha_2(Y - D)$ showed that investors bought the stocks for their dividends. This statement seems relatively strong because the standard error of the coefficient of the dividends in this equation was lower than that of the first purpose equation. Futhermore, the coefficient range is only half of the range of the first purpose equation. As to the third purpose, Gordon (1959) didn't create new equation models. He thought it could be tested using the result of the second purpose model because it was indifferent for investors to know the fraction of the earnings distributed.

In addition, a mathematical formulation was developed to examine the validity of the earnings purpose. This formulation was called dividend discount model (DDM) and it became one of the most important models in finance history and literature.

$$P_0 = \frac{1-b}{k-br} Y_0 = \frac{D}{k-g} \qquad \text{.....2.1}$$

where

P_0 = the stock price in current period

b = the retention ratio; 1-b = payout ratio

k = cost of equity

r = required rate of return on investment

Y_0= the income (earnings per share) in current year

$g = br$ = growth rate of firm

D = $(1 - b)Y_0$= dividend per share

The equation above is the general formulation which will be used to calculate the stock price with constant growth rate. There are some conditions related to this model. Firstly, the firm grows at a constant rate or earnings (dividends) grow at a constant rate; secondly, cost of equity k is independent of retention ratio b; thirdly, cost of equity k must be larger than the growth rate g i.e. k > g. If these conditions are not met, the DDM model with constant growth will be meaningless.

From the DDM model, it is obvious that there must be some relationship between the stock price, payout ratio, rate of return and cost of equity. Dividend policy will affect firms' growth opportunities. If firms want to expand their business, more earnings will be retained and thus there will be lower dividend payout ratio. Even under this situation, stock prices may still be relatively stable. However, if the prediction of profit from growth opportunities is less reliable than that of returns on assets, the firm with the low dividend payout ratio may have more volatile stock prices. In short, stock price valuation is related to dividend policy and it further raises the question whether there is a relationship between dividend policy and stock price volatility.

2.2 Baskin's research

In 1989, Baskin published his paper "Dividend policy and the volatility of common stocks." This is an empirical study. If the relationship really exists, financial workers and investors can use the dividend policy to predict the volatility of common stocks and the risks of investment. In other words, stock price volatility can be controlled through changing the dividend policy. As Baskin (1989, p.19) said, "Dividend yield is not a mere proxy—dividends per se may influence stock market risk."

Four kinds of effects were discussed to explain the main topic in his study.

(1) Duration effect: Duration measures the time of continuance of an event. Baskin (1989) thought that the firm with a high dividend yield would have shorter duration than the firm with a low dividend yield if the dividend policy for these two firms was stable. The DDM model was used to examine the duration effect. Through taking the derivative to cost of equity k, it could be shown that dividend yield was inversely correlated with the elasticity of stock price. Therefore, low dividend yield resulted in high stock price elasticity and thus high stock price volatility.

(2) Rate of return effect: Rate of return, also called rate of investment, is defined as the ratio of the profit gained on the investment relative to the amount of money invested. For a firm, the rate of return has something to do with the growth opportunities which will affect the dividend policy. Empirical analysis was also based on the DDM model. By taking the derivative to the rate of return r, it is evident that dividend yield and dividend payout ratio were both inversely correlated with the elasticity of stock price.

(3) Arbitrage realization effect: It cannot be denied that the financial market is

not always efficient. Sometimes, the profit obtained from the stock cannot be reflected in the stock price. Under this situation, people can make money from the difference between the underestimate price and the correct price which is called arbitrage opportunity. However, if the capital market needs more time to correct the price, it is possible that investors cannot make any profit from the underpriced stocks. Baskin (1989) took the equation $K_e = D/P^* + g$ and $P = (1 - A)P^*$ to test the arbitrage realization effect where K_e = the discount rate, D = the expected dividend, P = the stock price, P^* = the present value of future dividends and A = the discount from intrinsic value. By transformation, he got that $K_a = D/P + g = K_e + A(D/P)$ where K_a was the expected rate of return for investors. As a result, the amount of $A(D/P)$ which could be seen as the excess return determined the profit investors could gain from the underpriced stocks. The dividend yield was positively related with the excess return. High dividend yield may result in high excess return.

(4) Information effect: The mechanism here was similar to that of the arbitrage realization effect. Firms give some potential information to the investors through paying dividends. If the information means good signals, investors will be more confident with the relative stocks and thus stock prices will be more stable. "The information effect implies that managers may be able to reduce volatility by increasing the target payout ratio," Baskin (1989,p.21) summarized in his paper.

As to the specific relationship between the dividend policy and common stock volatility, Baskin (1989) applied the multiple least squared regression models to perform

the test. Common stock volatility was the dependent variable; dividend yield and dividend payout ratio were the two main independent variables. In addition, several control variables were also included in the model, such as earnings volatility, logarithm of market value, long-term debt and growth in assets. There were 2344 U.S. public firms selected to collect the data from 1967 to 1986. These firms came from many kinds of business. After controlling the multicollinearity, the results showed that dividend yield was negatively correlated with the stock price volatility and earnings volatility was positively correlated with the stock price volatility. In conclusion, stock price volatility was affected by the dividend policy directly and managers could utilize this relationship to adjust the risks of stocks to attract more investors.

2.3 Cases in Different Countries

2.3.1 Developed countries.

Allen and Rachim (1996) examined the relationship between the dividend policy and stock price volatility on the Australian stock market. They selected 173 companies which were listed from 1972 to 1985. These firms which came from 24 industry categories were divided into 5 groups for analysis needs. As well, the stock prices were adjusted for stock split or stock issues. Similar to the study of Baskin (1989), Allen and Rachim (1996) used a cross-sectional ordinary least squares regression model to do the empirical analysis. Stock price volatility was the only dependent variable; dividend yield and dividend payout ratio were two independent variables. Additionally, some control

variables were also introduced in the test, such as firm size, debt ratio, earnings volatility and asset growth. In order to eliminate the effect of broad industry patterns, four dummy variables which represent four industry groups were added into the regression equation. Results from the experiment showed that there was a significant negative relationship between the dividend payout ratio and the stock price volatility. In contrast with the result of Baskin (1989), the correlation between dividend yield and stock price volatility was very low. Dividend yield was dropped from the regression equation later because of multicollinearity. For the other control variables, earnings volatility and debt ratio were two main factors which could determine the stock price volatility. Last but not least, the duration effect, arbitrage effect and rate of return effect were not evident; information effect was supported by the test.

In 2011, Hussainey, et al studied the relationship between dividend policy and share price volatility for the United Kingdom capital market. As the UK is a developed country and thus its stock market is also relatively mature, similar to the Australian stock market, in comparing their research with that of Allen and Rachim, there were two improvements in the UK case. First of all, this study used more recent data which covered 10 years from 1998 to 2007; secondly, financial industry firms were not included in the data. With the same methodology, Hussainey, et al (2011) drew some important conclusions. The dividend payout ratio was inversely related to the stock price volatility and the dividend yield was positively related to the stock price volatility. In other words, lower payout ratio and higher dividend yield would result in higher volatility of stock

price. Furthermore, the firm size was negatively related to the share price volatility and the debt ratio was positively related to the share price volatility. It was easy to understand that large firms had more ability to bear risks, thus making the stock price more stable. Firms with more debt had to meet more risks and thus had more volatile stock prices. Through this study, managers and investors developed a good understanding of the UK stock market and can now take different measures to adjust their portfolio investment to make more stable profit.

2.3.2 Developing countries.

Recently, there have been an increasing number of empirical analyses to explore the relationship between dividend policy and the volatility of stock price for developing countries. This is because developing countries are gradually becoming the focus of the global economy and most investors are interested in the financial markets of these countries. As a result, a lot of researchers are paying attention to the financial systems of developing countries.

Rashid and Rahman (2008) performed research in Bangladesh. A hundred and four nonfinancial firms which were listed in the Dhaka Stock Exchange were considered in the sample data during the period between 1999 and 2006. Similarly, the data involved many different kinds of industries, such as paper, chemicals, service, food and so on. Two regression models were employed by the authors. One was ordinary least square model and the other was 2 stages least squares. The results were surprising because only the

payout ratio and firm size had a significant negative relationship with stock price volatility. From another point of view, dividend policy had little effect on the volatility of stock price and thus managers couldn't utilize the dividend policy to control the risk of common stocks. It seemed that the national conditions of Bangladesh were responsible for these results. In Bangladesh, most of the common shares were held by a few shareholders who could control the companies. As a result, stock prices were not affected much by the dividend policy. Meanwhile, dividend policy didn't have signaling effect in Bangladesh.

However, some researchers found different results. Nishat & Irfan (2004) and Jecheche (2012) did the same research in Pakistan and Zimbabwe respectively using the same method. According to their studies, both dividend yield and dividend payout ratio had a significant relationship with stock price volatility, although the significance level for the payment ratio was sometimes low. There was no doubt that managers' decisions of the dividend policy could affect the movement of stock price. As well, the duration, arbitrage and information effects were supported by the analysis. In addition, firm size and debt ratio were positively related to the volatility of share price which were partly opposite to the former research in developed countries.

In 2011, Okafor, et al also studied the dividend policy and stock price volatility on the Nigerian stock market. Different from the above methodology, this study applied the time-series least square regression model. The sample data of a 8-year period from 1998 to 2005 was regressed for each year. Therefore, 8 regression tables were obtained.

From these tables, we could get the annual effect of dividend policy on the volatility of stock price. Although with different methods, the conclusion from the study in Nigerian partly coincided with the conclusion of Baskin (1989). Dividend yield had a significant negative relationship with stock price volatility, whereas dividend payout ratio had a positive relationship with stock price volatility at a low significance level. In short, dividend policy itself could influence the stock price volatility. As to other variables, firm size, earnings volatility and assets growth would more or less affect the volatility of stock price.

From the discussion of this literature review, it is evident that different countries have different results. The relationship between dividend policy and stock price volatility is determined by the nature of the stock market, national conditions, the global economic situation and other factors. In addition, more experiments will be needed to improve the conclusions because some limitations still exist which cause some deviations to the research results presented before.

Chapter 3: Methodology

3.1 Variable Definition

In order to determine the exact relationship between stock price volatility and dividend policy, three basic variables must be included in the research model. These include stock price volatility, dividend yield and the dividend payout ratio. However, stock price volatility is not only affected by the dividend policy of the firms. There are some other factors which may simultaneously influence the stock price volatility or have some effect on the dividend yield and the dividend payout ratio. As a result, this study will put a few control variables into the model to eliminate some potential problems, such as multicollinearity (Baskin, 1989). All the variables used in the model are defined as follows:

1. Stock Price Volatility (SPV). This variable measures the risk of stock price moves up and down for a given security. It is calculated from the standard deviation of day to day logarithmic historical price changes. The 360-day stock price volatility is referred to as the annualized standard deviation of the relative price change for the 360 most recent trading days' closing price. The stock price volatility is expressed as a percentage. Most importantly, all the data should be averaged for all available years.
2. Dividend Yield (DY). In short, it is expressed as a percentage of dividends per share divided by the share price. In this research, dividend yield is equal to the gross

dividend, annualized by the dividend frequency and then divided by the current market price. Note that if the stock is paying an interim/final dividend, then the dividend yield is calculated by adding the gross amount of interim/final dividend, and then dividing the sum by the market price. Similarly, all the figures should be averaged for all available years.

3. Dividend Payout Ratio (DP). This is the fraction of net income a firm pays to its stockholders in dividends. In other words, it can also be expressed as the dividends per share as a percentage of the earnings per share. For this study, total common dividends and total net income of all available years are used to calculate the ratio. The main purpose of this procedure is to eliminate the effects of extreme values on individual years' data.
4. Firm Size (FS). Firm size can also be seen as the market value of the common stocks. It is the share price multiplied by the number of outstanding common shares. For every sample firm, average market value should be obtained from all available years. What's more, the results should be transformed using the base 10 logarithm to obtain a new variable which reflects orders of magnitude.
5. Earnings Volatility (EV). This paper uses earnings before interest and taxes to calculate the volatility. According to the research of Baskin (1989), the ratio of total EBIT to total asset for all available years should be obtained at first. Next, the ratio will be averaged and then be used to get the squared deviation which should be averaged again. Finally, a square root transformation is applied to achieve the

standard deviation of the return on assets which also refers to earnings volatility.

6. Long-term debt (LTD). Actually, the ratio of long-term debt to total assets is utilized in this paper. Long-term debt includes debentures, mortgages and loans with maturity greater than one year. Also, an average is applied for all available years.
7. Growth in Assets (GROWTH). For each available year, the asset growth is calculated as the change between the beginning of the year and the end of year divided by the total assets at the beginning of the year. Obviously, the average over all available years is utilized.

3.2 Sample Data Selection

This study randomly chooses 100 firms which are listed on the Toronto Stock Exchange. In order to explore the relationship between the stock price volatility and dividend policy, these firms must pay dividends continuously from 2001 to 2011. As a result, all the records about the seven variables (stock price volatility, dividend payout ratio, dividend yield, firm size, earnings volatility, long-term debt, growth of asset) of these firms were collected from 2001 to 2011.

It is important to note that these 100 firms cover a lot of industry categories, including finance, manufacturers, energy, utilities, wholesale or retail and so on. Therefore, in the model established later, the influence of the industry sector should be considered by adding the dummy variable into the model.

All the original data were gathered from Bloomberg. Some data can be used

directly, but some data had to be calculated to obtain the variable the paper needs. All the final data are presented in Appendix A and Appendix B.

3.3 Procedure

This study uses cross-sectional ordinary least squares regression model to find out the relationship between the stock price volatility and dividend policy.

Firstly, only three variables are used to do the regression. The stock price volatility is regarded as the dependent variable, dividend yield and dividend payout ratios are the two independent variables. The regression equation is expressed as follows:

$$SPV = \alpha_1 + \alpha_2 DY + \alpha_3 DP + e \quad \cdots\cdots 3.1$$

where:

SPV = stock price volatility

DY = dividend yield

DP = dividend payout ratio

However, this is just a very crude test with some potential problems which cannot explain the relationship between the stock price volatility and dividend policy accurately. So next, control variables will be included in the regression equation:

$$SPV = \alpha_1 + \alpha_2 DY + \alpha_3 DP + \alpha_4 FS + \alpha_5 EV + \alpha_6 LTD + \alpha_7 GROWTH + e$$

$$\cdots\cdots 3.2$$

where:

SPV = stock price volatility

DY = dividend yield

DP = dividend payout ratio

FS = firm size

EV = earnings volatility

LTD = long-term debt to total asset

GROWTH = growth of asset

At last, dummy variables will be added into the regression equation. As mentioned before, the use of various industry categories may have different effects on the relationship between stock price volatility and dividend policy. As a result, the industry sector effect should be eliminated. In this study, all the firms are divided into six groups: resources, utilities, industries, consumptions, financials and telecommunication services. Equation 3.3 is presented below:

$$SPV = \alpha_1 + \alpha_2 DY + \alpha_3 DP + \alpha_4 FS + \alpha_5 EV + \alpha_6 LTD + \alpha_7 GROWTH + \alpha_8 D_1 + \alpha_9 D_2 + \alpha_{10} D_3 + \alpha_{11} D_4 + a_{12} D_5 + e$$

.....3.3

It should be noted that dummy variable one (D_6) is absent here because it is the base of the other five dummy variables. The effect of D_6 is already captured in the intercept. In this paper, D_6 represents the telecommunication services group.

Chapter 4: Analysis of Results

4.1 Regressions only with Dividend Policy

Table4.1 Summary of the results

Variable	Obs	Mean	Std. Dev.	Min	Max
TICKER	0				
SPV	100	.4757966	.118996	.2685828	.7982904
DY	100	.0330398	.0280545	.0041573	.127651
DP	100	.417574	.286874	.0050798	1
EV	100	.0316447	.0275089	.0011723	.1694335
FS	100	3.463938	.7433022	1.626619	4.75776
LTD	100	.1848018	.150562	0	.5354102
GROWTH	100	.1351343	.1334184	.0007016	.9695992
SECTOR	0				

Table 4.1 shows a general description of all the variables with the mean, standard deviation, the maximum and minimum values. This permits people to have an overall understanding of the Canadian sample firms. If the stock prices follow a normal distribution and the effects of dividend payout are ignored, the standard deviation of stock returns, which is just the stock price volatility in the paper, can be estimated. It can be done by multiplying the mean of stock price volatility of 0.4757966 by 0.6008 (Parkinson, 1980). The result is 28.59% which is similar to Allen and Rachim's (1996) result of 29.42%.

Table 4.2 shows the basic regression result between stock price volatility and dividend policy. It is evident that there is a positive relationship between stock price volatility and dividend yield, but a negative relationship between stock price volatility

and dividend payout ratio. However, the p-value of the coefficient of the dividend yield is 0.551 which is much more than 5%. It means the relationship between stock price volatility and dividend yield is not significant. One explanation for this consequence is the existence of multicollinearity which is mentioned before. As a result, some control variables are supposed to be included in the regression and the correlations among these variables should be tested.

Table 4.2 Result of regression $SPV = \alpha_1 + \alpha_2 DY + \alpha_3 DP + e$ (Equation 3.1)

Source	SS	df	MS	Number of obs =	100
				F(2, 97) =	3.52
Model	.094838794	2	.047419397	Prob > F =	0.0335
Residual	1.30700485	97	.013474277	R-squared =	0.0677
				Adj R-squared =	0.0484
Total	1.40184365	99	.014160037	Root MSE =	.11608

SPV	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DY	.4207288	.7028177	0.60	0.551	-.9741699	1.815627
DP	-.1382779	.0687313	-2.01	0.047	-.2746904	-.0018654
_cons	.519637	.02057	25.26	0.000	.4788114	.5604627

4.2 Regression with Control Variables

Before adding the control variables into the regression model, the correlations among all the variables should be examined first. Table 4.3 reports the correlation results of the variables related to this study. From this, it can be seen that the correlation between the stock price volatility and dividend yield is – 0.1696. This result is in accordance with Baskin's (1989) US result of – 0.643, but is contrary to Allen and Rachim's (1996) Australian result of 0.006. The correlation between the stock price volatility and dividend

payout ratio is negative (– 0.2534) which is in line with Baskin's (1989) US result of – 0.542 and Allen and Rachim's (1996) Australian result of – 0.210. Besides, it is important to note that the correlation between dividend yield and dividend payout ratio is pretty high (80.62%). It further indicates that the multicollinearity is a crucial potential problem. Therefore, the inclusion of control variables in the regression model is very necessary.

The second highest correlation is between the stock price volatility and earnings volatility (0.4154). It is easy to understand that if a company doesn't have relatively stable profits, investors will have little confidence in this company and thus the stock price will fluctuate more often. As to the other correlations among control variables, all the numbers are less than 30% which means that the multicollinearity problem could be ignored among these variables.

Table 4.3 Cross-correlations among variables

	SPV	DY	DP	EV	FS	LTD	GROWTH
SPV	1.0000						
DY	-0.1696	1.0000					
DP	-0.2534	0.8062	1.0000				
EV	0.4154	0.0634	0.0068	1.0000			
FS	-0.1141	-0.2381	-0.0453	-0.1754	1.0000		
LTD	-0.1928	0.1610	0.2366	-0.0805	0.0686	1.0000	
GROWTH	0.1568	0.0886	0.0820	0.2123	0.0549	-0.0912	1.0000

Table 4.4 presents the regression results with all the control variables (Equation 3.3). Compared with Table 4.2, there is a lot of difference among the coefficients of the variables. Firstly, the coefficient of dividend yield becomes negative (- 0.0491511) which was positive (0.4207288) before. However, the amount of p-value of 0.943 shows that the relationship between stock price volatility and dividend yield is still insignificant.

Secondly, the significant inverse relationship between stock price volatility and dividend payout ratio becomes insignificant now.

For the control variables, earnings volatility and growth rate are positively related to the stock price volatility. Firm size and long-term debt are inversely related to the stock price volatility. Nevertheless, only the positive relationship between stock price volatility and earnings volatility is significant with others all insignificant.

Table 4.4 Results of regression (Equation 3.3)

$$SPV = \alpha_1 + \alpha_2 DY + \alpha_3 DP + \alpha_4 FS + \alpha_5 EV + \alpha_6 DEBT + \alpha_7 GROWTH + e$$

Source	SS	df	MS	Number of obs =	100
				F(6, 93) =	5.40
Model	.362298775	6	.060383129	Prob > F =	0.0001
Residual	1.03954487	93	.011177902	R-squared =	0.2584
				Adj R-squared =	0.2106
Total	1.40184365	99	.014160037	Root MSE =	.10573

SPV	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DY	-.0491511	.6826555	-0.07	0.943	-1.40477	1.306467
DP	-.0974679	.0656311	-1.49	0.141	-.2277983	.0328625
FS	-.0095068	.015536	-0.61	0.542	-.0403581	.0213446
EV	1.64601	.4034077	4.08	0.000	.8449227	2.447098
LTD	-.0729861	.0734944	-0.99	0.323	-.2189314	.0729592
GROWTH	.0813295	.0827712	0.98	0.328	-.0830377	.2456967
_cons	.5014616	.0607792	8.25	0.000	.3807662	.622157

In Table 4.5 and Table 4.6, the dividend yield (DY) and the dividend payout ratio (DP) are dropped out of the regression model respectively to get the regression results. From Table 4.5, it can be seen that there is a significantly negative relationship between the stock price volatility and dividend payout ratio. The relationship between stock price volatility and control variables is the same as before. From Table 4.6, it is evident that there is a significantly negative relationship between the stock price volatility and

dividend yield, which is contrary to the result of Table 4.2 (Equation 3.2). The relationship between stock price volatility and control variables is the same as Table 4.5.

Table 4.5 Results of regression

$$SPV = \alpha_1 + \alpha_2 DP + \alpha_3 FS + \alpha_4 EV + \alpha_5 DEBT + \alpha_6 GROWTH + e$$

Source	SS	df	MS	Number of obs =	100
				F(5, 94) =	6.55
Model	.362240829	5	.072448166	Prob > F =	0.0000
Residual	1.03960282	94	.011059604	R-squared =	0.2584
				Adj R-squared =	0.2190
Total	1.40184365	99	.014160037	Root MSE =	.10516

SPV	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DP	-.101298	.0382356	-2.65	0.009	-.1772157	-.0253804
FS	-.0091352	.014576	-0.63	0.532	-.0380762	.0198058
EV	1.645227	.4011213	4.10	0.000	.8487911	2.441662
LTD	-.0728971	.0730941	-1.00	0.321	-.2180272	.072233
GROWTH	.0810189	.0822202	0.99	0.327	-.0822312	.2442691
_cons	.5002002	.0578907	8.64	0.000	.3852568	.6151436

Table 4.6 Results of regression

$$SPV = \alpha_1 + \alpha_2 DY + \alpha_3 FS + \alpha_4 EV + \alpha_5 DEBT + \alpha_6 GROWTH + e$$

Source	SS	df	MS	Number of obs =	100
				F(5, 94) =	5.96
Model	.337646117	5	.067529223	Prob > F =	0.0001
Residual	1.06419753	94	.01132125	R-squared =	0.2409
				Adj R-squared =	0.2005
Total	1.40184365	99	.014160037	Root MSE =	.1064

SPV	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DY	-.8708734	.4023803	-2.16	0.033	-1.669809	-.0719379
FS	-.014815	.0152158	-0.97	0.333	-.0450264	.0153964
EV	1.662156	.4058387	4.10	0.000	.8563536	2.467958
LTD	-.0904475	.0730115	-1.24	0.218	-.2354135	.0545185
GROWTH	.0785729	.0832793	0.94	0.348	-.0867801	.243926
_cons	.509387	.0609314	8.36	0.000	.3884062	.6303677

At last, the effects of different industry sectors should be included in the model. As a result, dummy variables are created to obtain these effects. Table 4.7 presents the result of the regression which contain dummy variables. D1 stands for financial group,

D2 stands for industrial group, D3 stands for resources group, D4 stands for consumer products, D5 stands for utilities group and D6 stands for telecommunication services group. In Table 4.7, D6 is missing because it is regarded as the base dummy variable. From the results, it can be seen that all the p-values of the dummy variables are more than 5% which means that there is no significant relationship between stock price volatility and industry sectors.

Table 4.7 Result of regression

$$SPV = \alpha_1 + \alpha_2 DY + \alpha_3 FS + \alpha_4 EV + \alpha_5 DEBT + \alpha_6 GROWTH + \alpha_7 D_1 + \alpha_8 D_2 + \alpha_9 D_3 + \alpha_{10} D_4 + a_{11} D_5 + e$$

Source	SS	df	MS	Number of obs =	100
				F(10, 89) =	3.22
Model	.372574118	10	.037257412	Prob > F =	0.0014
Residual	1.02926953	89	.011564826	R-squared =	0.2658
				Adj R-squared =	0.1833
Total	1.40184365	99	.014160037	Root MSE =	.10754

SPV	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DY	-.8743769	.4209766	-2.08	0.041	-1.710849	-.0379053
FS	-.0207753	.0168047	-1.24	0.220	-.054166	.0126153
EV	1.347625	.4558922	2.96	0.004	.4417767	2.253473
LTD	-.0955212	.0764357	-1.25	0.215	-.2473972	.0563549
GROWTH	.0666558	.0881268	0.76	0.451	-.1084503	.2417618
D1	-.0299801	.0798966	-0.38	0.708	-.188733	.1287728
D2	-.0032616	.0827333	-0.04	0.969	-.1676509	.1611276
D3	.0155958	.0804691	0.19	0.847	-.1442946	.1754861
D4	-.0299942	.0814183	-0.37	0.713	-.1917707	.1317822
D5	-.0457529	.0940465	-0.49	0.628	-.2326213	.1411155
_cons	.5561625	.1067913	5.21	0.000	.3439705	.7683546

Chapter 5: Conclusions and Recommendations

The purpose of this study is to determine the relationship between the stock price volatility and dividend policy for the Canadian stock market. The dividend policy is measured by dividend yield and dividend payout ratio. The sample was 100 public firms collected for this research with a period of 11 years from 2001 to 2011. In addition, the relationship between the stock price volatility and other five control variables are also examined through regression analysis.

From the empirical results of the last chapter, it is obvious that dividend yield and dividend payout ratio are both significantly inverse related to the stock price volatility. The higher the dividend yield and dividend payout ratio, the lower the stock price volatility. This conclusion is in line with the findings of Allen and Rachim's (1996). For control variables, only earnings volatility had a significantly positive relationship with the stock price volatility. This result is consistent with the high correlation between the stock price volatility and earnings volatility tested before.

Although Table 4.4 also shows that firm size and long-term debt are negatively related to the stock price volatility, the growth rate is positively related to the stock price volatility, these relationships are not statistically significant. Besides, industry sector doesn't have much effect on the stock price volatility because the relationship between dummy variable and the stock price volatility is also insignificant.

According to the overall conclusion, we can determine that managers can change

the dividend policy to influence the stock price volatility or the risk of the stock. What's more, investors also realize which are the important factors they should consider before they make investment decisions.

In this paper, a lot of questions still remain. For example, the reasons why the relationships between the stock price volatility and firm size, long-term debt, growth rate are not significant are not clear. Besides, maybe there are other factors which can also affect the stock price volatility, but are not included in this paper. Some additional tests are still needed to examine the results of this research. The regression model should be applied with sample data from various countries to explore the relationship between the stock price volatility and dividend policy more generally.

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Appendix A

Sample Data of Stock Price Volatility, Dividend yield And Dividend Payout Ratio

Ticker	SPV	DY	DP
AEM CN Equity	0.632948956	0.00415727	0.833138091
SJR/B CN Equity	0.463205163	0.02023373	0.66496513
WPK CN Equity	0.459520577	0.00896445	0.135029085
GBT/A CN Equity	0.501508574	0.01109464	0.143304375
IMG CN Equity	0.683569753	0.00858218	0.120072264
CAE CN Equity	0.661801782	0.01315636	0.228052038
TLM CN Equity	0.551066801	0.011076	0.125524103
NXY CN Equity	0.576042272	0.00695309	0.079346049
HCG CN Equity	0.636507483	0.01042418	0.140327293
CNQ CN Equity	0.605890149	0.00742273	0.091808279
POT CN Equity	0.647997786	0.007518	0.092630092
GCG/A CN Equity	0.551348218	0.01427455	0.170338124
OCX CN Equity	0.478056034	0.00498164	0.046935882
SAP CN Equity	0.408178058	0.01694782	0.307540737
CCO CN Equity	0.718798056	0.00888355	0.179058494
SU CN Equity	0.567919884	0.00694191	0.119395375
MG CN Equity	0.554331452	0.02039227	0.251350281
CWB CN Equity	0.55137941	0.01589364	0.214315773
SNC CN Equity	0.535370033	0.01026727	0.277557165
ESI CN Equity	0.550043794	0.01721982	0.218868016
FTT CN Equity	0.49226857	0.016178	0.434785117
TCL/A CN Equity	0.56603878	0.01696145	0.229729458
CTU/A CN Equity	0.798290381	0.07201182	0.587288885
RET/A CN Equity	0.585649679	0.03371482	0.489323329
CVG CN Equity	0.323534263	0.01971464	0.143691812
TVA/B CN Equity	0.610949564	0.01655273	0.231030472
G CN Equity	0.608366406	0.01172236	0.179179433
BPO CN Equity	0.57583891	0.02983355	0.321562484
AGU CN Equity	0.610606969	0.00488809	0.045751296
CAS CN Equity	0.711414217	0.01958518	0.323250895
LNR CN Equity	0.792539452	0.01922773	0.205996168
CP CN Equity	0.441369537	0.014547	0.229780194
ECA CN Equity	0.469495198	0.04592373	0.202223982
ACM/A CN Equity	0.3817239	0.01035009	0.21000427

Ticker	SPV	DY	DP
RUS CN Equity	0.554334694	0.05079991	0.637268002
EMP/A CN Equity	0.340748838	0.01421527	0.159915834
CCL/B CN Equity	0.442572386	0.01751727	0.201714042
WFT CN Equity	0.444126619	0.01291764	0.299850929
AKT/A CN Equity	0.568360092	0.02317545	0.227892463
HSE CN Equity	0.448674292	0.03624891	0.416774322
FSZ CN Equity	0.636842118	0.05209336	1
BAM/A CN Equity	0.482283372	0.023641	0.266503875
UNS CN Equity	0.361814018	0.01427536	0.190012651
PFB CN Equity	0.618190858	0.06829809	0.00507978
IAG CN Equity	0.437346474	0.02180291	0.318357746
CGO CN Equity	0.583716974	0.01097718	0.282652371
ADW/A CN Equity	0.358017014	0.03391773	0.415203287
AGF/B CN Equity	0.632510965	0.03834264	0.606000402
ABX CN Equity	0.433839624	0.00996209	0.361877889
LGT/A CN Equity	0.394684136	0.03178545	0.285945886
CBY CN Equity	0.503055521	0.00712855	0.128173046
AQN CN Equity	0.501110252	0.1017125	1
MFC CN Equity	0.536935262	0.026278091	0.562247112
CNR CN Equity	0.381667974	0.01441782	0.225308272
IMO CN Equity	0.414322415	0.01148673	0.139708701
POW CN Equity	0.396274713	0.03001555	0.366903816
ENB CN Equity	0.279326962	0.03066564	0.514551185
GWO CN Equity	0.390570962	0.03570273	0.524119225
COS CN Equity	0.596412255	0.05729355	0.730297416
L CN Equity	0.306561653	0.01677236	0.338523673
CTC/A CN Equity	0.39021192	0.01571264	0.165378195
PWF CN Equity	0.390715814	0.03464545	0.4366052
ELF CN Equity	0.378786803	0.00453018	0.040874736
SLF CN Equity	0.515489006	0.03345682	0.478676048
LIF-U CN Equity	0.557576425	0.07982409	0.834663409
FCR CN Equity	0.364776413	0.06146364	0.844298405
MRC CN Equity	0.513678267	0.01947036	0.123792662
ACO/X CN Equity	0.353078223	0.02125936	0.225878125
MHR CN Equity	0.315955837	0.04771009	0.670414795
T CN Equity	0.598220053	0.03495709	0.532374971
BNS CN Equity	0.365782539	0.033595	0.439049245
MKP CN Equity	0.280198751	0.1028768	0.803456622
RY CN Equity	0.393057976	0.03354809	0.494567741

Ticker	SPV	DY	DP
TRI CN Equity	0.334287617	0.02911082	0.738261224
IGM CN Equity	0.366388989	0.03811345	0.602141157
MBT CN Equity	0.304125392	0.05324209	0.852642815
WN CN Equity	0.343530281	0.02556609	0.421353251
NA CN Equity	0.416578543	0.03695945	0.397760754
TA CN Equity	0.356982243	0.04770755	0.961554693
TRP CN Equity	0.268582811	0.03906809	0.72909794
MRT-U CN Equity	0.352722536	0.08145436	0.716149642
CU CN Equity	0.30688612	0.03152164	0.430002136
ALC CN Equity	0.45982911	0.01929836	0.14749295
LB CN Equity	0.370906638	0.03682564	0.336596403
REI-U CN Equity	0.3637098	0.07031218	0.813200572
TD CN Equity	0.399197467	0.03214764	0.463350092
CUF-U CN Equity	0.32835367	0.07402627	1
BMO CN Equity	0.394441323	0.04185782	0.50765719
SPB CN Equity	0.512971064	0.1265455	1
REF-U CN Equity	0.34113014	0.06078936	1
ARX CN Equity	0.446780848	0.1037578	1
FRU CN Equity	0.503936287	0.127651	1
CM CN Equity	0.415409176	0.03974955	0.624213103
ERF CN Equity	0.477425915	0.1191596	1

Appendix B

Sample Data of Control Variables

Ticker	EV	FS	LTD	GROWTH	Industry sector
AEM CN Equity	0.062335	3.728634	0.154529	0.303043	Resources
SJR/B CN Equity	0.037255	3.87331	0.362459	0.069999	Consumption
WPK CN Equity	0.021405	2.809624	0.094694	0.07603	Resources
GBT/A CN Equity	0.045276	2.776728	0	0.051343	Consumption
IMG CN Equity	0.059524	3.451986	0.020353	0.53404	Resources
CAE CN Equity	0.050789	3.345436	0.209234	0.10134	Industrials
TLM CN Equity	0.039344	4.185769	0.204836	0.111535	Resources
NXY CN Equity	0.022674	4.012483	0.281914	0.138056	Resources
HCG CN Equity	0.003381	3.015975	0.096121	0.332286	Financials
CNQ CN Equity	0.027714	4.427646	0.241281	0.18888	Resources
POT CN Equity	0.102381	4.34367	0.222292	0.108085	Resources
GCG/A CN Equity	0.169433	2.512216	0.030984	0.170262	Financials
OCX CN Equity	0.030596	3.495219	0.230112	0.063365	Financials
SAP CN Equity	0.01524	3.683454	0.139169	0.057746	Consumption
CCO CN Equity	0.036112	3.971719	0.132364	0.101222	Resources
SU CN Equity	0.04289	4.525072	0.210161	0.269405	Resources
MG CN Equity	0.033985	3.941664	0.031005	0.070254	Consumption
CWB CN Equity	0.001504	3.060925	0.027723	0.155931	Financials
SNC CN Equity	0.018144	3.701615	0.312148	0.137406	Industrials
ESI CN Equity	0.047065	3.328558	0.013725	0.166371	Resources
FTT CN Equity	0.016605	3.505398	0.216449	0.070747	Industrials
TCL/A CN Equity	0.036379	3.160326	0.22743	0.050201	Industrials
CTU/A CN Equity	0.059676	2.315379	0.068746	0.124034	Consumption
RET/A CN Equity	0.038637	2.968566	0.053591	0.098707	Consumption
CVG CN Equity	0.048201	2.270279	0.091996	0.090375	Financials
TVA/B CN Equity	0.10918	2.601794	0.146793	0.000702	Consumption
G CN Equity	0.079794	4.253645	0.016681	0.969599	Resources
BPO CN Equity	0.023096	3.84472	0.53541	0.129815	Financials
AGU CN Equity	0.062601	3.809399	0.214497	0.196085	Resources
CAS CN Equity	0.025065	2.923581	0.376252	0.036434	Resources
LNR CN Equity	0.027008	2.961049	0.153313	0.090904	Consumption
CP CN Equity	0.013096	3.902778	0.306746	0.045821	Industrials
ECA CN Equity	0.048557	4.479921	0.221231	0.252412	Resources
ACM/A CN Equity	0.04309	3.257891	0.094665	0.160719	Industrials
GDL CN Equity	0.023281	1.931196	0.003726	0.026461	Industrials

Ticker	EV	FS	LTD	GROWTH	Industry sector
TIH CN Equity	0.0273	3.162117	0.171002	0.084917	Industrials
RUS CN Equity	0.068846	2.991455	0.212045	0.088732	Industrials
EMP/A CN Equity	0.009429	3.426164	0.176334	0.045329	Consumption
CCL/B CN Equity	0.033106	2.926076	0.288018	0.017138	Resources
WFT CN Equity	0.059423	3.191652	0.141915	0.029903	Resources
AKT/A CN Equity	0.047015	2.336089	0.026348	0.117202	Resources
HSE CN Equity	0.045804	4.326087	0.125611	0.126593	Resources
FSZ CN Equity	0.068886	2.144853	0.000345	0.457601	Financials
BAM/A CN Equity	0.018385	4.125983	0.535158	0.298597	Financials
UNS CN Equity	0.018119	2.698818	0.140776	0.173394	Consumption
PFB CN Equity	0.034087	1.626619	0.068419	0.073972	Industrials
IAG CN Equity	0.00254	3.368375	0.015408	0.096694	Financials
CGO CN Equity	0.019449	2.918873	0.381474	0.073548	Consumption
ADW/A CN Equity	0.020187	2.092649	0.172195	0.077477	Consumption
AGF/B CN Equity	0.027373	3.2501	0.043562	0.138751	Financials
ABX CN Equity	0.076547	4.460639	0.192047	0.302389	Resources
LGT/A CN Equity	0.017805	1.973555	0.099572	0.05552	Industrials
CBY CN Equity	0.016221	3.045413	0.072717	0.12208	Consumption
AQN CN Equity	0.018161	2.778017	0.303636	0.146968	utilities
MFC CN Equity	0.005529	4.553516	0.015888	0.159058	Financials
CNR CN Equity	0.021156	4.360981	0.240289	0.053107	Industrials
IMO CN Equity	0.043877	4.506723	0.041547	0.079918	Resources
POW CN Equity	0.003588	4.079854	0.037939	0.1597	Financials
ENB CN Equity	0.010037	4.161657	0.462562	0.115039	Resources
GWO CN Equity	0.001535	4.354797	0.015599	0.101779	Financials
COS CN Equity	0.041271	3.994675	0.251918	0.229215	Resources
L CN Equity	0.026103	4.124438	0.305395	0.062574	Consumption
CTC/A CN Equity	0.008915	3.651109	0.201776	0.116883	Consumption
PWF CN Equity	0.004942	4.307049	0.040015	0.161549	Financials
ELF CN Equity	0.016694	3.217708	0.003929	0.084651	Financials
SLF CN Equity	0.004012	4.306557	0.02235	0.075124	Financials
LIF-U CN Equity	0.108483	3.033963	0.096142	0.029095	Resources
FCR CN Equity	0.025232	3.18069	0.422932	0.173953	Financials
MRC CN Equity	0.028943	2.672709	0.513233	0.08161	Financials
ACO/X CN Equity	0.004202	3.377277	0.404093	0.073544	utilities
MHR CN Equity	0.015247	1.889022	0.000416	0.024403	Consumption
T CN Equity	0.026063	4.104597	0.327806	0.01055	Telecommunication
BNS CN Equity	0.001599	4.631289	0.010873	0.080797	Financials
MKP CN Equity	0.013336	2.131321	0.15391	0.655202	Financials

Ticker	EV	FS	LTD	GROWTH	Industry sector
RY CN Equity	0.001172	4.75776	0.015638	0.093964	Financials
TRI CN Equity	0.053315	4.44752	0.197116	0.077667	Consumption
IGM CN Equity	0.016932	4.012793	0.177678	0.251369	Financials
MBT CN Equity	0.0291	3.390015	0.270416	0.074165	Telecommunication
WN CN Equity	0.013249	4.027753	0.306156	0.063919	Consumption
NA CN Equity	0.001207	3.930693	0.015735	0.070396	Financials
TA CN Equity	0.009057	3.65763	0.327555	0.026668	utilities
TRP CN Equity	0.007669	4.282229	0.46481	0.067909	Resources
MRT-U CN Equity	0.027978	2.795668	0.511896	0.080867	Financials
CU CN Equity	0.006944	3.71128	0.419859	0.075153	utilities
ALC CN Equity	0.02343	2.495389	0.103448	0.087469	Industrials
LB CN Equity	0.001269	2.915762	0.012171	0.049933	Financials
REI-U CN Equity	0.053252	3.606552	0.421108	0.152077	Financials
TD CN Equity	0.003395	4.640373	0.019806	0.094677	Financials
CUF-U CN Equity	0.017544	2.901236	0.43409	0.221078	Financials
BMO CN Equity	0.001538	4.442732	0.013671	0.069179	Financials
SPB CN Equity	0.062484	3.099979	0.349217	0.147863	Industrials
REF-U CN Equity	0.01656	3.14633	0.530449	0.153291	Financials
ARX CN Equity	0.043201	3.623009	0.176143	0.240732	Resources
FRU CN Equity	0.060847	2.85374	0.175936	0.115251	Resources
CM CN Equity	0.004806	4.394513	0.016092	0.026932	Financials
ERF CN Equity	0.057899	3.644409	0.145338	0.138056	Resources