What factors may affect companies paying dividends?

Tobit model analysis

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Introduction

The purpose of this thesis is to explain what factors may affect companies paying dividends. Investors normally view the dividend payments as a sign that the management's confidence in future earnings growth. On the other hand, some companies choose not to pay dividends to its shareholders so that they can reinvest the earnings to increase the value of company. Among the dividends payout companies, the amount of dividends yields are also different to each other. To illustrate are there any factors have impact on companies' dividends paying decisions, a Tobit model is used including the following five variables: industry, size, growth rate, D/E ratio, and profit margin.

The distinctive characteristics of each industry can explain companies' dividends paying policy. According to the North American Industry Classification System (NAICS) 2017, industries are divided into six categories: Information, Finance& Insurance, Manufacturing, Real Estate& Rental& Leasing, Wholesale& Trade and others.

[Table 1 is about here]

The size of a company is also considered a factor. Typically, small companies can have more growth opportunities, while large companies are more likely to dominate the market. It is therefore difficult to interpret the effect of a company's size on its dividend payout policy. The market capitalization is used as a proxy of the company size, which is calculated as the number of shares outstanding at the end of each month multiply by the monthly closing price.

A company with more growth opportunity usually choose to retain its earnings so as to reinvest its earing as much as possible. The revenue growth rate is used as a proxy of the company's growth rate. A higher growth rate indicates that a firm has relatively more potential growth opportunity. The revenue growth rate is calculated as following:

$$g_t = \frac{Rev_t}{Rev_{t-1}} - 1$$

The debt-equity ratio, to some extent, reflects a company's ability to pay dividends payout. A relatively low debt to equity ratio indicates that a firm is in a sound financial position and is not burdened by its interest payment.

A relatively high profit margin ratio indicates that a firm's strong ability to generate a steady cash flow stream from operations to make a dividend payment. The profit margin is calculated as following:

$$ProfitM_t = \frac{NI_t}{Rev_t} * 100$$

Data

The data is obtained from the COMPUTESTAT database via the WRDS database. The initial sample is composed of quarterly data of all available companies included in the COMPUSTAT database over the period from the first quarter of 2001 to the last quarter of 2016.

First, the COMPUTSTAT database does not provide data of shareholder's equity of most companies preceding 2009. Secondly, the financial crisis happened in 2008 may have an influence on a company's dividend payment decision. Thirdly, a large number of companies have not released their financial information for the last quarter of 2016. Hence, the final sample period is from the first quarter of 2010 to the third quarter of 2016.

To be included in the final sample, a company is required to have no missing values on any variables included in the Tobit model. In addition, I calculate the total cash dividend payment of each company over the sample period, to define whether a company is dividend-paying company. A company is considered a dividend-paying company if the total cash dividends payment is greater than zero.

As a result, the final sample is composed of the quarterly data of 566 companies over the period from the first quarter of 2010 to the third quarter of 2016, of which 468 are dividend-paying companies and 98 are non-dividend-paying companies.

Methodology & Results

The Tobit model is used to estimate the probability of each observation with specific characteristic will fall into each of the binary dependent variable (observable dividends yield or zero). y_i is a latent variable and the model is defined as following:

$$y_i = X'\beta + \varepsilon_i \; where \; \varepsilon_i \to N(0, \delta)$$

$$if \; yi = \begin{Bmatrix} \widehat{yi} & if & y_i > 0 \\ 0 & & < 0 \end{Bmatrix}$$

$$Pr(y = \widehat{yi}) = \Phi\left(-\frac{X'\beta}{\delta}\right)$$

$$Pr(Y = 0) = 1 - \Phi\left(-\frac{X'\beta}{\delta}\right)$$

The dependent variable, yi, is equal to the observed $\widehat{yi}$ if the company is a dividend-paying company, where $\widehat{yi}$ is the dividend yield ,which is calculated by dividends per share /share price; otherwise it equals to zero (i.e. The company is a non-dividend paying company). Using the Maximum Loglikelihood Estimation, I obtained the β parameters and P-Value. The β coefficient estimates illustrate the marginal effect of independent variables on the probability of a company pays dividend. Using a 5% significance level, the results are shown in Table2.

[Table 2 is about here]

I construct the following hypothesis tests to examine if the dependent variable, a company's dividend yield, can be explained by each independent variable, factor *i*.

$$H_0: \beta_i = 0$$

$$H_1: \beta_i \neq 0$$

The P-value of industry is less than 0.0001, I reject the null hypothesis, and conclude that the β estimate of industry is significantly different from zero at 5% significance level. As $\beta = -825.387$, it indicates a negative marginal effect.

The P-value of size is less than 0.0001. Again, I reject the null hypothesis and conclude that the β estimate of size is significantly different from zero at 5% significance level. It indicates a positive marginal effect on company paying dividends.

The P-value of growth rate equals 0.816, which is greater than 0.05. I fail to reject the null hypothesis and conclude that the β estimate of growth rate is not significantly different from zero at 5% significance level.

The P-value of D/E ratio equals 0.402, which is greater than 0.05. I fail to reject the null hypothesis and conclude that the β estimate of D/E ratio is significantly different from zero at 5% significance level.

The P-value of profit margin is less than 0.0001. I fail to reject the null hypothesis, and conclude that the β estimate of profit margin is significantly different from zero at 5% significance level.

Since the intercept is significantly different from 0 at 5% significance level, indicating that there are other factors (except the independent variables included in the model) that might affect a company's dividend payout policy.

Conclusion

In this paper, I use a Tobit model to find the factors that can explain dividends payout decisions of companies. It seems that industry and size have an influence on a company's dividend payout decision, while D/E ratio, growth rate and profit margin do not. The intercept is also significantly different from zero, indicating the Tobit model does not capture all the possible factors that can affect a company's dividend payout decision, which the future studies can continue to explore.

Appendix A

Table 1

Category	Industry	NAICS	Number of Observation
1	Information	51	38
2	Finance& Insurance	52	69
3	Manufacturing	31,32,33	257
4	Real Estate& Rental& Leasing	53	32
5	Wholesale& Retail Trade	42,44,45	58
6	Others	Others	112
	Total	NA	566

Table1 illustrates the number of observations in each industry category characterized by NAICS codes.

Table 2

Parameter	Estimate	Standard Error	t-value	Pr>|t|
Intercept	-30394	707.145	-42.98	<0.0001
Industry	-825.387	97.247	-8.49	<0.0001
Size	4998.938	69.156	72.28	<0.0001
Growth Rate	-48.955	209.956	-0.23	0.816
D/E Ratio	-1.998	2.386	-0.84	0.402
Profit Margin	0.368	1.754	0.21	0.834

Table 2 shows the regression results after running the Tobit model by SAS.

Appendix B

SAS Codes:

```
libname Orion 'I:\mscm504ass2';
data begin1 begin2 (keep=GVKEY rename=(GVKEY=ID));
      set Orion.data;
      retain NewID;
      Size = log(CSHOQ*PRCCQ);
      Growth = REVTY/lag1(REVTY) - 1;
      DERatio = DLTTQ/TEQQ;
      ProfitM = NIQ/REVTY*100;
      DivY=DVPSPQ/PRCCQ*100;
      if NewID NE GVKEY then do;
      count = 0;
      NewID = GVKEY;
      end;
      Count + 1;
      output begin1;
      if count = 68 then output begin2;
run;

proc sql;
create table begin3 as
  select a.GVKEY, a.DataDate, a.TIC, a.CONM, a.NAICS, a.Size, a.Growth,
a.DERatio, a.ProfitM, a.count, a.DivY
   from begin1 as a, begin2 as b
    where a.GVKEY=b.ID and 41 LE count LE 67;
quit;

data begin4;
      set begin3;
            if Size = . then delete;
                  else if Growth = . then delete;
                        else if ProfitM =. then delete;
                              else if DERatio = . then delete;
                                    else if DERatio = 0 then delete;
      drop count;
run;

data begin5 begin6(keep=GVKEY TOT_DVY rename=(GVKEY=ID));
      set begin4;
      retain NewID;
      if NewID NE GVKEY then do;
      count = 0;
      TOT_DivY = 0;
      NewID = GVKEY;
      end;
      Count + 1;
      TOT_DivY +DivY;
      output begin5;
      if count = 27 then output begin6;
run;

data begin7;
      set begin6;
            if TOT_DivY = 0 then DividendPay = 0;
```

```
                  else DividendPay=TOT_DivY;
run;

data begin8;
      set begin5;
            Code = substr(NAICS,1,2);
            if Code = '51' then industry = 1; *Information;
            else if Code = '52' then industry = 2; *Finance &
Insurance;
            else if Code in ('31', '32', '33') then industry = 3;
*Manufacturing;
            else if Code = '53' then industry = 4; *Real Estate abd
Rental and Leasing;
            else if Code in ('42', '44', '45') then industry = 5;
*Wholetrade & Retail Trade;
            else industry = 6; *Others;
run;

proc sql;
create table orion.final as
  select a.GVKEY, a.DataDate, a.TIC, a.CONM,a.industry, a.Size,
a.Growth, a.DERatio, a.ProfitM, b.Dividendpay
   from begin8 as a, begin7 as b
    where a.GVKEY=b.ID;
quit;


title '1 for paydidvidend and 0 for nopay';
proc freq data=begin7;
tables dividendpay /nopercent;
run;
title;

title 'The number of firms in each industry category';
proc sort data=orion.final out=industry;
by GVKEY;
run;

data industry;
      set industry;
            by GVKEY;
            if last.GVKEY;
run;

proc freq data=industry;
      tables industry /nopercent;
run;
title;

/*tobit model*/
title1 'Estimating a Tobit model';

proc qlim data=orion.final;
    model Dividendpay= industry Size Growth DERatio ProfitM;
      endogenous Dividendpay~censored(lb=0);
run;
```