ESSAYS ON INTERNATIONAL
CORPORATE DIVIDEND
POLICY

by

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ABSTRACT

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This dissertation is comprised of two essays on dividend policy. In the first part of the first essay, I ascertain whether the outcome, the substitution, or the predation model explains the relationship between dividend payouts and product market competition in each of the Group of Seven (G7) countries for the period from 1995 through 2010. I find that the substitution model explains dividend policy in Canada, France, Germany, the United Kingdom, and the United States, and the outcome model describes it in Japan, while in Italy, the results are inconclusive. In the second part of the same essay, I pool the sample across the G7 countries and examine whether the outcome or the substitution model explains the relationship between payouts and product market competition. Additionally, I study the impact of various country characteristics—legal origin, religion, presence of corruption, and gross national income—on the relationship between payouts and industry competition. The results show that the substitution model explains dividend policy across the G7 nations. In addition, in countries with better investor rights dividend policy is explained by the substitution model, while in countries

with poor investor protections the outcome agency model explains dividend policy. Thus, this essay first tests the three theories on dividend policy, and then it addresses how dividend policy responds to changes in external environments—country characteristics—in the presence of changing levels of competition.

In the second essay, I explore whether managers utilize behavioral finance such as the convenience hypothesis, the attraction hypothesis, and the left digit effect in establishing dividend policy. Specifically, I examine whether clustering and rigidity exist in dividends per share (DPS) ending in zero and five. The study is conducted using Compustat dividend-per-share data for Canada and the United States for the period from 1995 through 2010, and for France, Germany, and Italy for the period from 1999 through 2010. I find that clustering (frequency) and rigidity (duration of DPS and number of DPS changes) are prevalent in DPS ending in zero and five, as hypothesized. Moreover, clustering and rigidity in zero-ending DPS are more prevalent than in those ending in five, as predicted. Finally, clustering and rigidity are nonexistent in DPS ending in nine in all countries tested. These findings would suggest that managers are utilizing behavioral finance in establishing dividend policy.

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CHAPTER 1

DIVIDEND POLICY, PRODUCT MARKET COMPETITION, AND COUNTRY CHARACTERISTICS

1.1 Introduction

In the first part of this essay, building on the work of Grullon and Michaely (2008), I ascertain whether the relation between dividends and industry competition in each of the G7 countries—Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States—is explained by the outcome, the substitution, or the predation model. Theoretically, while the substitution model is expected to predict a negative relationship between payouts and industry competition, both the outcome and the predation models predict a positive relationship. To disentangle the outcome model from the predation model, I analyze the impact of dominant and nondominant firms on the relationship between dividends and competition. Whereas the outcome model predicts that the dominant firms will have the greater positive impact on the relationship between payouts and competition, the predation model predicts that the nondominant firms will have the stronger positive impact. In the second part of this essay, building on the works of La Porta et al. (2000) and Grullon and Michaely, I pool the sample across the seven countries and test the relationship between dividends and competition in the context of the outcome and the substitution models. Moreover, I assess whether the relationship between payouts and competition described by the outcome and the substitution models is similar or dissimilar for firms operating in countries with different characteristics. Stated differently, I assess whether the relationship between payouts and industry competition is similar in civil law and common law countries, non-Protestant and Protestant countries, countries with high and low levels of corruption, and countries with high and low Gross National Income (GNI).

According to the substitution agency model, firms pay dividends to establish a reputation for treating minority shareholders well. A good reputation is needed for raising new capital on preferable terms in the future. Firms operating in low-competition industries have the greatest need to establish such a good reputation because of the lack of competitive pressure to monitor the management. Hence, firms operating in low-competition markets distribute more cash to shareholders. Thus, the substitution model predicts a negative relationship between product market competition and payouts. On the other hand, according to the outcome agency model, investors pressure managers to distribute cash to preclude financial mismanagement, and firms operating in high-competition industries come under greater pressure from investors. Hence, firms operating in high-competition industries distribute more cash to shareholders. Thus, the outcome model predicts a positive relationship between industry competition and payouts. However, according to the predation hypothesis, firms pay lower dividends or hoard cash to fend off potential predatory actions from competitors (Bolton and Scharfstein, 1990). Firms operating in low-competition industries are at greater risk of facing predatory attacks. Hence, firms in low-competition industries distribute less cash or hoard cash to fend off predatory attacks. Alternatively, firms operating in high-competition industries, where the likelihood of predatory attacks is low, distribute more cash to shareholders. Thus, the predation hypothesis predicts a positive relationship between industry competition and payouts.

Both the outcome model and predation model predict a positive relationship between payouts and industry competition, although the reasoning behind such statistical prediction is different. Thus, to distinguish the outcome from the predation model, I test the impact of dominance on the relationship between competition and payouts. According to the outcome model, dominant firms have higher agency costs associated with free cash flows than do nondominant firms; hence, investors put heavy pressure on dominant firms to distribute cash, and as competition increases the pressure increases as well. This suggests that dominant firms have a higher impact on the relationship between competition and payouts. On the other hand, according to the predation hypothesis, predatory attack is more likely on nondominant firms than on dominant firms. Therefore, nondominant firms are likely to pay lower dividends and conserve cash to fend off predatory attacks, in comparison to dominant firms. This means that nondominant firms have greater impact on the relationship between competition and payouts. Whereas the outcome model claims that dominant firms have a higher impact on the relationship between payouts and competition, the predation model claims that nondominant firms have the higher impact. Thus, testing the relationship between payouts and competition separately for dominant firms and nondominant firms will help distinguish between the outcome and predation models.

This study is important for a number of reasons. First, the study is important because it tests three alternative corporate finance theories—that is, I attempt to understand which of the three major models, outcome, substitution, or predation, explains dividend policy. Second, this study adds to an important and highly discussed topic in corporate finance literature, the connection between competition and corporate governance, by testing the relationship between competition and dividend payouts. Third, it is important to find out whether the results found for the United States can be extended to other developed countries with different economic and corporate governmental structures. Most dividend studies have examined dividend policy in the United States, and only a relatively small number of studies have addressed other countries. This study, therefore, examines the Group of Seven countries individually in order to ascertain their dividend policies. Fourth, I examine cross-country data using country characteristics to explain dividend policy. Several studies have noted the importance of incorporating country characteristics in studying dividend policy. La Porta et al. (2000) note that "[t]he reason for looking around the world is that the severity of agency problems to which minority shareholders are exposed differs greatly across countries, in part because legal protection [country characteristics or investor rights] of these shareholders varies." Furthermore, Shiller (1984) notes, "Current models of corporate dividend policy by and large ignore … socioeconomic influences [country characteristics or investor rights] on managerial and shareholder activities. Unless these influences are incorporated into future models, dividend preference is difficult to explain…." Moreover, no other paper has considered the interaction of competition and country characteristics on dividend payouts. The results of this paper indicate that the interaction of country characteristics and competition affects dividend payouts and is an important aspect, previously omitted, of the study of international dividend policy. This study, therefore, is important in explaining dividend policy for both the individual countries and across multiple countries.

This paper is organized as follows: in section 2, I provide a review of relevant theoretical and empirical literature. In section 3, I describe the data selection process and define the variables. In section 4, I explain the hypotheses and the empirical models. In section 5, I present the empirical test results, and in section 6, I offer some concluding remarks.

1.2 Literature Review

Myron Gordon (1959) demonstrates that the value of a firm can be derived using the dividend discount model. A major implication of the dividend discount model is that the wealth of the shareholders can be increased or decreased by increasing or decreasing dividend payouts. However, in their seminal work on dividend policy, Miller and Modigliani (1961) demonstrate that in an ideal world of perfect, frictionless, and efficient capital markets, when a firm's investment policy is held constant, changing the proportion of dividends and retained earnings does not alter the shareholder wealth. Larger dividend payouts should result in lower retained earnings and lower stock prices, while lower dividend payouts should lead to higher retained earnings and higher stock prices. Thus, shareholder wealth remains unaffected by the dividend policy of a firm in an ideal world, according to Miller and Modigliani's (M&M's) dividend irrelevance theorem. Since shareholder wealth or value of the firm is unaffected by dividend policy, dividend policy should not be of any significant consideration to corporate policy makers. However, contrary to the implication of M&M, corporate dividend policies are established neither brand-new each quarter nor arbitrarily, but instead managers set dividend policy strategically with a long-term view. Economists have observed that there are discernible patterns in dividend policy, and changing dividend policy does affect the value of the firm, contrary to the assertion of M&M. Therefore, the theoretical need to explain how corporations set dividend policy became vital, and several researchers have provided explanations as to why firms set strategic dividend policies. Existing studies have documented various factors, such as clientele effect, signaling, bird-in-the-hand, agency cost, life cycle, and catering theories, that influence dividend payments. I will here provide a brief overview of some of the major theoretical literature on dividend policy.

The dividend policy explanation based on the clientele effect states that companies set dividends to attract the type of investors who prefer their dividend policy. For example, younger investors prefer capital gains and seek out growth-oriented companies that reinvest their profits. However, older investors who are on fixed incomes prefer regular, stable dividends. Similarly, institutional investors such as pension funds must invest in dividend-paying securities, while growth-oriented funds do not. Moreover, prior to 2003, dividends were taxed at the generally higher personal income tax bracket, while capital gains were taxed at a lower rate. Consequently, clientele in the higher tax bracket preferred capital gains. In sum, because investors have unique preferences for various dividend policies, firms set dividend policies to attract the type of clientele they like (Miller and Modigliani, 1961; Black and Scholes, 1974). Empirical evidence on clientele effect is inconclusive.

The dividend signaling theory relaxes the M&M assumption of the absence of information asymmetry. The theory is predicated on the premise that managers know more about the future financial outlook of their firms than outside shareholders do. Therefore, dividend initiation or increase is considered as a signal to the market that the managers are expecting good financial prospects. Conversely, dividend elimination or decrease is interpreted as a signal that the corporation is expecting poor financial prospects. Influential papers on the signaling model were written by Bhattacharya (1979), John and Williams (1985), and Miller and Rock (1985). Empirical evidence regarding the dividend-signaling hypothesis is mixed. Michaely, Thaler, and Womack (1995), and Grullon, Michaely, and Swaminathan (2002) observe that stock prices rise due to increase in or initiation of dividends and decrease due to decrease in or omission of dividend payouts. Aharony and Swary (1980) report that dividend cuts generate stock price decline. These findings support the signaling hypothesis. Contrary to the dividend-signaling hypothesis, DeAngelo, DeAngelo, and Skinner (1996) and Benartzi, Michaely, and Thaler (1997) note that changes in dividends do not convey information about future earnings prospects. Thus, the overall empirical conclusion is that dividends at best provide noisy signals of the future financial outlook of the firm.

John Lintner (1962) and Myron Gordon's (1963) bird-in-the-hand theory of dividend policy states that investors prefer the certainty of dividends to the uncertainty of future capital gains. The certainty of cash in hand received through dividends is safer than the uncertainty of future earnings. Implicit in this argument is the notion that preference for dividends is higher when uncertainty of earnings is greater. The theory has virtually no empirical support. However, intuitively the theory is sound, and some investors are known to follow the tenet of the bird-in-the-hand theory.

The agency cost explanation of dividend policy is based on the conflict of interest between managers and outside shareholders arising from the separation of ownership and control (Jensen and Meckling, 1976). When managers own less than 100 percent of the firm, agency cost arises because managers are prone to maximizing their personal wealth instead of maximizing the shareholder wealth. Managers could divert discretionary cash for personal benefits, invest in negative net present value (NPV) projects, engage in outright theft, indulge in empire building, and the like, instead of utilizing the resources in the best interest of the shareholders. Easterbrook (1984) advances the view that dividend payments mitigate the agency cost of free cash flows. Dividend payments naturally reduce the cash on hand; hence, managers are forced to raise funds for new projects in the external markets, subjecting the firm to examination and monitoring by accountants, corporate lawyers, investment bankers, and others. Since such regular scrutiny of the managers by market professionals is expected to reduce agency conflict, shareholders are likely to demand regular dividend payments in order to force the firm to return to the capital markets repeatedly to raise funds. Empirical evidence documents that dividend payouts reduce agency cost of free cash flows (Rozeff, 1982; Harford, 1999; Officer, 2007).

A recent explanation of dividend policy is the life cycle theory of dividend policy, which is partly derived from the maturity hypothesis. The maturity hypothesis, which states that firm maturity dictates dividend policy, is alluded to by Fama and French (2001) and Grullon, Michaely, and Swaminathan (2002). DeAngelo, DeAngelo, and Stulz (2006) formally propose the life cycle theory predicated on the mix of earned versus contributed capital in a firm's equity capital in explaining dividend policy. The basic argument is that young firms have high amounts of contributed capital and low amounts of retained earnings in their equity capital mix. These firms also have high growth opportunity, and therefore a high need to retain earnings or cash for reinvestment. Moreover, flotation costs and underpricing costs associated with issuing new securities are very high, while agency costs associated with free cash flows are low. Hence, these young firms pay no or low dividends. However, as the firm matures, it faces largely the opposite conditions. Mature firms have high amounts of retained earnings and low amounts of contributed capital in their equity capital mix. These mature firms also have fewer investment opportunities and face higher agency cost associated with free cash flows, while costs associated with floatation and underpricing become relatively low. Empirical evidence on the life cycle hypothesis shows a positive relationship between higher retained earnings and total equity (mature firms) and dividend payouts, providing evidence in support of the life cycle view (DeAngelo, DeAngelo, and Stulz, 2006).

Baker and Wurgler (2004a, b) explain the dividend policy of U.S firms by introducing a catering theory of dividends. When dividend-paying firms outperform non-dividend-paying firms, as measured by average market to book ratio, this suggests that investors place a premium on dividend-paying firms. This theory, therefore, argues that the managers of previously non-dividend-paying firms cater to the demands of the investors by offering cash dividends when dividend-paying firms outperform nonpaying firms. The authors, along with Li and Lei (2006), Bulan et al. (2007), and Ferris et al. (2009), find empirical support for the catering theory.

In addition to the various theoretical explanations of dividend policy summarized above, I will now review some of the relevant recent empirical contributions in the area of dividend policy research. Fama and French (2001) report a sharp decline in the percentage of U.S. firms paying cash dividends, from 67 percent in 1978 to 21 percent of exchange-listed firms in 1999. One of the two explanations advanced for this decline in dividends is that many newly listed firms are small, growth-oriented firms with low current profits that typically do not pay dividends. However, even after controlling for these factors, they find a declining propensity for all firms to pay dividends. Sill and Weston (2003) show a significant increase in the total amount of dividends U.S. firms pay, however, from a dividend payout ratio of 40 percent in 1971 to 81 percent in 2001. Thus, the findings have been that fewer and fewer corporations are paying dividends, but larger and larger amounts of dividends are being paid over the same period. DeAngelo, DeAngelo, and Skinner (2004) explain the above findings by showing that dividends in the United States are increasingly concentrated among a small number of high-dividend-paying corporations in the past twenty-five years. In fact, just twenty-five firms are responsible for paying 50 percent of the industrial dividends in the United States. Finally, Julio and Ikenberry (2004) report a general increase in the proportion of firms paying dividends since 2001. Specifically, they document a 5 percent increase in the percentage of U.S. industrial firms paying dividends.

1.3 Data and Variable Construction

1.3.1 Data

The data is mainly obtained from Compustat via Wharton Research Data Services (WRDS). The sample for this study covers firms from multiple countries over the period from 1995 through 2010. The annual financial accounting (SALE, AT, CEQ, OIBDP, DLTT, and DD1) and dividend (DVC) data in millions of local currency have been obtained from the Compustat North America Fundamentals Annual file for Canada and the United States and from the Compustat Global Fundamentals Annual file for France, Germany, Great Britain, Italy, and Japan. The prices and returns for North America are collected from Compustat North America Security Monthly. The price and return information for the remaining countries have been collected from Compustat Global Security Daily. The exchange rates are from Pacific Exchange Rate Services (http://fx.sauder.ubc.ca/data.html). Finally, country characteristics variables are obtained from various sources and are described below.

The sample was selected using the standard filtering process as follows. The initial sample includes all firms from 1995 through 2010 from Compustat North America Fundamentals Annual and Compustat Global Fundamentals Annual that are incorporated in any of the G7 nations. I eliminated firms operating in financial, real estate, and utilities (SIC codes 6000–6999 and 4000–4999) industries and companies with multiple issues of common stock. Firm year observations for which book equity, sales, total assets, long-term debt, long-term portion of the debt in current assets, or dividend declared were negative were eliminated. I further eliminated firm year observations that had dividends greater than total assets, market value, or sales. I deleted American Depository Receipts (ADR) and duplicate observations from the sample. If a firm was observed more than once in each period (i.e., year, if yearly data or month, if monthly data), all occurrences subsequent to the first were deleted. For each country, the data had to be in the local currency(s), and any data observed in a currency other than the local currency(s) of the country were dropped from the sample; for example, observations recorded in currencies other than the German Mark or Euro were dropped for firms incorporated in Germany. After these eliminations, I matched firms in the Fundamentals file with those in the Security file.

1.3.2 Definition of Variables

Following Grullon and Michaely (2008), I constructed the following three measures of dividend payouts for the dependent variable: DVC/AT, DVC/MV, and DVC/SALE. DVC/AT is total cash dividend declared on common shares (DVC) divided by total assets (AT) of a firm, both in millions of local currency. DVC/MV is dividend as defined above divided by the market value (MV) of the firm. Computation of MV is described below. DVC/SALE is dividend divided by total sales (SALE) in millions of local currency. In a cross-country analysis, scaling payouts by sales is a useful additional measure because sales are less contingent upon the different accounting standards prevalent in different countries and are thus less subject to manipulation by accounting tricks (La Porta et al., 2000).

The explanatory variable, competition (COMP), is measured using the reverse scale of the sales-based Herfindahl-Hirschman Index (HHI). For pooled data, HHI is computed under the assumption that the product markets across countries are segmented. It is not news that product markets around the world are more segmented than integrated due to natural and political barriers, shipping costs, tariffs, nontariff barriers, other trade costs, wage differences, exchange rate variability, geographical distance, anti-dumping rules, and the like. Prices of similar goods in different markets (Law of One Price) around the world are dispersed (Goldberg and Verboven, 2005; Engel and Rogers, 1996; Parsley and Wei, 2001; Knetter and Slaughter, 2001). The HHI for segmented markets is computed as the sum of the squared market share of all firms in the industry within each country. Formulae for the calculation of HHI and COMP are given below.

$$HHI_{jt} = \sum_{i=1}^{N_j} s_{ijt}^2 \qquad (1)$$

$$COMP = 1 - HHI_{jt} \qquad (2)$$

HHI is the sum of the squared market shares, and s is the sales-based market share of firm i in industry j in year t. Market shares are calculated using sales data (SALE) and industries are classified based on the four-digit historical standard industrial classification (SICH) from Compustat North America Fundamentals Annual or Compustat Global Fundamentals Annual. In Compustat, the SIC, Standard Industrial Classification, is the current SIC code, whereas the SICH is the historical SIC code. I use the historical SIC code (SICH) when available for calculating HHI. When a firm's historical SIC code is unavailable for a particular year, the next available historical SIC code is used. When a firm's historical SIC code for a particular year and all the years thereafter is unavailable, the current SIC code is utilized. Finally, competition (COMP) is computed as one minus the Herfindahl-Hirschman Index (HHI) of industry concentration and it ranges from zero to one, with a higher value reflecting greater competition. Next, an exposition of the construction of the control variables—maturity, profitability, leverage, investment opportunity, and risk—is given.

For the individual country analyses, firm maturity (size) is proxied by the total market value (MV) of the common stock of a firm. Market value is the product of the number of common shares outstanding and the closing stock price at the end of the fiscal year. I obtained the number (in millions) of common shares outstanding (CSHO for the United States and Canada and CSHOI for the remaining countries) for each firm-year from Compustat North America Fundamentals Annual or Compustat Global Fundamentals Annual file. Simultaneously, the closing fiscal year-end stock price (PRCC_F for the United States and Canada; PRCCD for the rest of the countries) in local currency was obtained from Compustat North America Security Monthly or Compustat Global Security Daily file. MV is in the local currency of the respective country and is used as a control variable for the individual country analysis. Market value is log transformed for regression analysis. As an example, the formula for calculating the market values of firms in the United States is given:

$$\mathrm{MV} = \mathrm{CSHO} * \mathrm{PRCC\_F} \tag{3}$$

For the pooled sample, however, using market capitalization (MV), in U.S. dollars, of individual firms from different countries may result in disproportionate distribution of firm size. For example, a large firm in Italy may be deemed a medium-sized firm according to the U.S. standard or pooled sample standard. To resolve this issue, I measure "the size of a firm in a given year as the percentage of all sample firms that year that have a smaller market capitalization than the firm in question. Stated differently, [I] use the market capitalization percentile ranking of a firm in a given year among all sample firms that year as the proxy for firm size" (Ferris et al. 2009). Since the ranked size of a firm (MVRANK) now ranges from zero to one, any effect of unequal size distribution in different countries is removed.

Profitability of the firms is measured by Return on Assets (ROA), which measures how profitable the firm is relative to the assets of the firm, with a higher value reflecting greater profitability. It is computed as the operating income before depreciation divided by the total assets at the end of the year. Operating income before depreciation (OIBDP) and total assets (AT) are in millions of local currency and were obtained from the Compustat North America Fundamentals Annual file and the Compustat Global Fundamentals Annual file. The variable has been winsorized at 1 percent and 99 percent to mitigate the effect of outliers. Formula for ROA is given below:

$$\mathrm{ROA} = \frac{\mathrm{OIBDP}}{\mathrm{AT}} \tag{4}$$

Leverage of the firm is proxied by debt-to-assets (DEBT/AT) and is calculated as the sum of the long-term debt and the long-term debt due in one year divided by the book value of assets. Long-term debt (DLTT), long-term debt due in one year (DD1), and book value of assets (AT) are in millions of local currency and were obtained from the Compustat North America Fundamentals Annual file or the Compustat Global Fundamentals Annual file.

$$\frac{\mathrm{DEBT}}{\mathrm{AT}} = \frac{\mathrm{DLTT+DD1}}{\mathrm{AT}} \tag{5}$$

Investment opportunity is proxied by the annual rate of sales growth (GS) and the market-to-book (MTB) ratio. The first proxy, sales (SALE), is the total sales in millions of local currency. The variable has been winsorized at 1 percent and 99 percent to mitigate the effect of outliers. GS is calculated as follows:

$$\mathrm{GS_{to}} = \frac{\mathrm{SALE_{t1}} - \mathrm{SALE_{t0}}}{\mathrm{SALE_{to}}} \qquad (6)$$

Market-to-book (MTB) ratio—computed as the book value of assets (AT) plus market value of equity (CSHO*PRCC_F for North America and CSHOI*PRCCD for the rest of the countries) minus book value of equity (CEQ), all divided by the book value of assets (AT)—serves as the second proxy for investment opportunity. As an example, the formula for calculating MTB ratio for the U.S. firms is as follows:

$$\mathrm{MTB} = \frac{\mathrm{AT} + (\mathrm{CSHO} * \mathrm{PRCC\_F}) - \mathrm{CEQ}}{\mathrm{AT}} \qquad (7)$$

The risk of the firm is proxied by the standard deviations (STD) of monthly returns over the previous three years. For the United States and Canada, total monthly returns (TRT1M) were obtained from the Compustat North America Security Monthly file. For the countries other than the United States and Canada, first, I extracted month-end prices from daily prices. Subsequently, total monthly returns were computed by multiplying the current month adjusted close price (PRCCD/AJEXDI) by the current month total return factor (TRFD) and dividing the result by the product of the adjusted close price (PRCCD[-1m]/AJEXDI[-1m]) multiplied by the Total Return Factor (TRFD[-1m] from the prior month. The closing stock price in local currency (PRCCD), adjustment factor (AJEXDI), and total return factor (TRFD) were obtained from the Compustat Global Security Daily. Standard deviations of monthly returns are calculated the usual way using the data over the previous three years.

Having explained the dependent, the explanatory, and the control variables for both the individual and pooled sample, I will now address the additional explanatory variables used exclusively for the pooled sample. To ascertain whether the relationship between dividend payouts and product market competition is alike or not in countries with different external environments, the following country characteristics are interacted with the said relationship: legal origin, religion, presence of corruption, and per capita GNI. The first country characteristic, legal origin, identifies each country in terms of common law or civil law. If a country's legal system originated from the Roman law (British law), the country is classified as a civil law (common law) origin country. Legal origins were obtained from La Porta et al. (1998). The second characteristic, religion, serves as a proxy for the primary religion of each country. Primary religion of a country is defined as the religion followed by the largest percentage of the people. Religion was obtained from Stulz and Williamson (2003). The third characteristic, per capita GNI, is the 2009 per capita gross national income (GNI, formerly GNP) in U.S. dollars, Atlas method, obtained from the World Development Indicators database of the World Bank. Finally, corruption is computed from the Corruption Perception Index (CPI) compiled by Transparency International on an annual basis, measuring the perceived corruption in a country. The CPI ranges from zero, representing the most corrupt country, to ten, the least corrupt country. The annual CPI index was obtained from www.transparency.org. First, average CPI for the period from 1995 through 2010 was computed from the annual CPI. Then, the coding was reversed for clarity—that is, corruption for a country was computed as ten minus the average CPI. Thus, corruption values range from zero (extremely clean) to 10 (extremely corrupt).

1.4 Hypotheses

1.4.1 The Relationship between Payouts and Competition in Individual G7 Countries

In this subsection, I will explain the hypotheses and the models employed to examine the relationship between industry competition and payouts in each of the G7 countries in order to determine whether the relationship can be explained by the outcome, the substitution, or the predation model.

The first hypothesis is that the substitution model predicts a negative relationship between payouts and competition. The second hypothesis states that the outcome model predicts a positive relationship between industry competition and payouts. The third hypothesis states that the predation model also predicts a positive relationship between payouts and competition. I will discuss disentangling the outcome model from the predation model in the next subsection. The following regression is estimated to test these hypotheses.

$$\mathrm{Payout} = \beta_o + \beta1(\mathrm{COMP}) + \beta2(\mathrm{logMV}) + \beta3(\mathrm{ROA}) + \beta4\left(\frac{\mathrm{DEBT}}{\mathrm{AT}}\right) + \beta5(\mathrm{GS}) + \beta6(\mathrm{logMTB}) + \beta7(\mathrm{STD}) \quad (8)$$

According to the first hypothesis, the substitution model is predicated on the assertion that firms will have to create and maintain a reputation for treating minority shareholders well or not expropriating outside shareholders so that when these firms need to raise capital in the market, they can do so on favorable terms. Firms establish and maintain a reputation for treating shareholders well by distributing cash to them, which leaves the companies with less profit for expropriation. Firms in low-competition industries, which lack the market pressure to regulate management, have the greatest need to establish a reputation for treating minority shareholders well. Thus, firms in low-competition industries are more likely to pay higher dividends, in order to maintain such a reputation. However, firms in high-competition industries are already subject to disciplinary market forces; hence, management does not need to establish such a reputation by using dividends. That is, firms in high-competition industries do not pay dividends as a method of establishing a good reputation under the substitution model. Thus, according to the substitution model, firms in low-competition industries are expected to pay higher dividends. Specifically, as competition decreases, higher payouts are expected. Statistically, a negative relationship between payouts and competition is expected, or the coefficient of competition would be negative and significant.

According to the second hypothesis, the outcome model, competition generates market pressure, forcing managers to distribute cash to the shareholders. Such market pressure is high in high-competition industries and low in low-competition industries. Firms in high-competition industries are under intense and timely comparative scrutiny by analysts and rating agencies among others, to determine how cash is utilized. Therefore, firms in competitive industries cannot readily invest in nonprofitable projects, give the managers excessive salary, or engage in outright theft or other financial mismanagement and remain competitive. However, firms in low-competition industries do not feel the intense and timely market pressure and have some slack in investing in negative NPV projects or engaging in other financial mismanagement. Therefore, as competition increases, payouts are expected to increase as well, due to the heightened market pressure to disgorge cash. Statistically, a positive relationship between competition and payouts is expected, or the coefficient of competition would be positive and significant.

According to the third hypothesis, the predation model claims that firms will hoard cash or pay lower dividends to fend off potential predatory actions from competitors (Bolton and Scharfstein, 1990). Predatory behavior is unlikely to be successful in competitive markets because prices are equal to marginal costs and there is no significant benefit from reducing the number of firms by one in an already crowded or competitive market. However, firms operating in less competitive industries have more slack in operating inefficiently and these firms are at higher risk of being the target of predatory attacks such as hostile takeover. Thus, predatory risk is lower in competitive markets, but higher in less competitive markets. This suggests that according to the predation hypothesis, firms in competitive industries, which are unlikely to be targets of predatory behavior will not have to hoard cash; thus, they will pay higher dividends. Conversely, firms in low-competition industries are more likely to be targets of predatory behavior from competitors; hence, they will pay lower dividends. Therefore, as competition increases, payouts should increase, according to the predation hypothesis. Statistically, a positive relationship between payouts and competition is expected, or the coefficient of competition will be positive and significant.

In summary, while the substitution model predicts a negative relationship between competition and dividend payouts, the outcome and the predation models predict a positive relationship.

1.4.2 Disentangling Outcome and Predation Hypotheses in Individual G7 Countries

Both the outcome and the predation models predict a positive relationship between competition and payouts. Therefore, to disentangle the outcome model from the predation hypothesis, I examine the relationship between payouts and competition in dominant versus nondominant firms. The outcome model predicts that dominant firms will have a stronger positive impact on the relationship between industry competition and payouts. On the other hand, the predation hypothesis predicts that nondominant firms will have a stronger positive impact on the relationship between industry competition and payouts.

The fourth hypothesis is that dominant firms have a stronger impact on the relationship between competition and payouts, according to the outcome model. The fifth hypothesis is that nondominant firms have a stronger impact on the relationship between competition and payouts, according to the predation model. The following regression is estimated to test these hypotheses:

$$\mathrm{Payout} = \beta_o + \beta 1(\mathrm{COMP}) + \beta 2(\mathrm{DOM}) + \beta 3(\mathrm{COMP} * \mathrm{DOM}) + \beta 4(\mathrm{logMV}) + \beta 5(\mathrm{ROA}) + \beta 6\left(\frac{\mathrm{DEBT}}{\mathrm{AT}}\right) + \beta 7(\mathrm{GS}) + \beta 8(logMTB) + \beta 9(STD) \quad (9)$$

Dominant: $\mathrm{Payout} = (\mathrm{Bo} + \mathrm{B2}) + (\mathrm{B1} + \mathrm{B3})\mathrm{COMP} + \mathrm{controls}$ (9a)

Nondominant: $\mathrm{Payout} = \mathrm{Bo} + \mathrm{B1}(\mathrm{COMP}) + \mathrm{controls}$ (9b)

According to the outcome model (fourth hypothesis), market pressure is greater on dominant (mature) firms than it is on nondominant (growth) firms to distribute excess cash to the shareholders. The market correctly understands that the dominant (mature) firms do not have many profitable investment opportunities; thus, the excess cash left at the discretion of the managers will likely be expropriated or mismanaged. On the other hand, nondominant (growth) firms need the cash to grow, and the market correctly understands this; therefore, the market participants are willing to wait and let these companies reinvest the profits. Due to this reasoning, the outcome model predicts that competition will exert greater pressure on dominant firms to pay higher dividends than it will on nondominant firms. Dominant firms are mature firms and they take on the value one (DOM=1), and nondominant firms are growth firms and they take on the value zero (DOM=0) in the regressions. If the coefficient of the interaction between competition and dominance is positive, it suggests that dominant firms have a stronger impact on the relationship between industry competition and payouts, providing support for the outcome model. Statistically, the coefficient of the interaction between competition and dominant firms is expected to be positive for the outcome model to be true.

With respect to the fifth hypothesis, while the outcome model asserts that the dominant firms will have a stronger relationship between competition and payouts, the predation hypothesis, on the other hand, claims that nondominant firms will have the stronger relationship between these two variables. According to the predation hypothesis, firms hoard cash to fend off predatory behavior. Dominant firms are unlikely to be targets of predation behavior because they have sufficient market power and resources to fend off any adversarial initiatives. Hence, they do not worry about hoarding cash or paying fewer dividends in order to retain cash for fending off predatory attacks. Said differently, dominant firms are largely unaffected by the predation hypothesis scenario. However, nondominant firms are likely to be targets of predatory behavior from competitors because they have little market power and low cash reserves to fend off any adversarial moves; thus, these firms are likely to hoard cash or pay fewer dividends in order to retain cash for the purpose of fending off predatory attacks. Moreover, predatory behavior is more likely to occur in less competitive industries. Thus, nondominant firms in less competitive markets have the greatest risk of being targets of predatory attacks, hence they will tend to hoard the most cash or pay the least amount of dividends. That is, nondominant firms are expected to pay lower dividends than their dominant counterparts would at every level of competition, but they will pay even lower dividends as competition decreases. Thus, nondominant firms will have a stronger positive relationship between competition and payouts than dominant firms will. Statistically, the coefficient of the interaction between competition and dominant firms is expected to be negative.

It is worth mentioning that the substitution model is unclear about the impact of dominance on the relationship between competition and payouts. According to the substitution model, firms that are likely to require new capital in the future need to establish a reputation for treating outside minority shareholders well, or not expropriating them, so that these firms will be able to access capital markets on favorable terms in the future. Not expropriating profits, or treating shareholders well, is accomplished in this context by the mechanism of cash payouts. Dominant (mature) firms with low investment opportunities are less likely to have the need to access capital markets for funding of new projects; thus, they do not necessarily need to use dividend payments as a mechanism for establishing a good reputation. However, nondominant (growth) firms with high investment opportunities are more likely to frequent capital markets for funds; hence, they are likely to use the dividend payout mechanism to establish a reputation for treating shareholders well. This implies that nondominant or growth firms pay higher dividends than dominant or mature firms do. However, growth firms have the higher need for retained earnings, and they can use all of their profits for positive NPV investments. This would suggest that growth firms will pay no or low dividends, compared to mature firms. Thus, the substitution model is ambiguous about the impact of dominance on the relationship between competition and payouts.

In summary, since a positive relationship between payouts and competition describes either the outcome or the predation model, dominant and nondominant firms are used to disentangle one model from the other. If dominant firms have the stronger positive impact on the relationship between dividend payouts and competition, then dividend policy in that country is explained by the outcome model. On the other hand, if nondominant firms have the stronger positive impact, then it denotes the predation model.

1.4.3 The Relationship between Payouts and Competition across the G7 Countries

In subsection 1.4.1, I explained in detail the hypotheses and models employed to examine the relationship between industry competition and payouts within each of the G7 nations. In this subsection, I present the hypotheses and models employed to examine the relationship between industry competition and payouts across the Group of Seven nations in a pooled sample to determine whether the outcome or the substitution model explains the relationship.

The sixth hypothesis is that a negative relationship between payouts and competition is expected for the substitution model. The seventh hypothesis is that a positive relationship between payouts and competition is expected for the outcome model. The following regression is estimated to test these hypotheses:

$$\text{Payout} = \beta_o + \beta1(\text{COMP}) + \beta2(\text{MVRANK}) + \beta3(\text{ROA}) + \beta4\left(\frac{\text{DEBT}}{\text{AT}}\right) + \beta5(\text{GS}) + \beta6(logMTB) + \beta7(\text{STD}) \quad (10)$$

Under the substitution model, firms operating in low-competition environments pay dividends to establish a reputation for treating shareholders well; therefore, $\beta1$ is expected to have a negative sign. Detailed explanation of this hypothesis and model is given in section 1.4.1, as this hypothesis is the same as hypothesis one, except that this is for the pooled sample, whereas hypothesis one is for the individual countries.

Under the outcome model, as competition increases investors pressure managers to pay out more dividends; therefore, $\beta1$ is expected to be positive. Detailed explanation of this hypothesis and model is given in section 1.4.1, as this hypothesis is the same as hypothesis two, except that this is for the pooled sample, whereas hypothesis two is for the individual countries.

1.4.4 The Influence of Country Characteristics on the Relationship between Payouts and Competition across the G7 Countries

Tests conducted in the previous section will reveal whether the outcome or the substitution model explains the relationship between industry competition and payouts. In this section, I attempt to ascertain whether the result of the previous analysis is similar irrespective of country characteristics. Said differently, is the relationship between product market competition and payouts similar or dissimilar in (a) civil law and common law countries, (b) non-Protestant and Protestant countries, (c) countries with high and low levels of corruption, and (d) high-GNI and low-GNI countries? It has been shown that common law countries provide better legal protection than civil law countries and high-GNI countries provide better investor protection than low-GNI countries (La Porta et al., 1998). In addition, Protestant countries provide better shareholder rights than do Catholic countries (Stulz and Williamson, 2003), and low-corruption countries are better for shareholders than high-corruption countries. Firms operating in countries with poor shareholder rights are less accountable to investors and may be more likely to engage in expropriation of cash, outright theft, granting of excessive salary, and other financial mismanagement; hence, firms in these countries may not distribute excess cash to shareholders. Firms operating in countries with better shareholder rights are more accountable to investors and may be less prone to widespread financial mismanagement; hence, they will be more likely to distribute excess cash to shareholders. Thus, it is reasonable to expect that these country characteristics have an impact on the relationship between competition and payouts. The hypotheses and models for testing the impact of country characteristics on the relationship between competition and payouts are given below.

The eighth hypothesis is that the relationship between payouts and competition is dissimilar in common law and civil law countries. The following model is regressed to test this hypothesis:

$$\mathrm{Payout} = \beta_o + \beta 1(\mathrm{COMP}) + \beta 2(\mathrm{COMMON}) + \beta 3(\mathrm{COMP} * \mathrm{COMMON}) + \beta 4(\mathrm{MVRANK}) + \beta 5(\mathrm{ROA}) + \beta 6\left(\frac{\mathrm{DEBT}}{\mathrm{AT}}\right) + \beta 7(\mathrm{GS}) + \beta 8(logMTB) + \beta 9(STD) \quad (11)$$

Common: $\mathrm{Payout} = (\mathrm{Bo} + \mathrm{B2}) + (\mathrm{B1} + \mathrm{B3})\mathrm{COMP} + \text{ controls}$ (11a)

Civil: $\mathrm{Payout} = \mathrm{Bo} + \mathrm{B1}(\mathrm{COMP}) + \text{ controls}$ (11b)

According to the outcome agency model, investors in common law countries can use the better legal protection available to them to pressure management to distribute more cash. Thus, firms in common law countries will pay higher dividends, compared to firms in civil law countries.

However, according to the substitution agency model, under civil law, due to its weak legal protection, firms will distribute more cash in order to generate a reputation for treating minority shareholders well, so as to increase the opportunity to raise capital on favorable terms. Thus, firms in civil law countries will pay higher dividends, compared to firms in common law countries. Therefore, under the outcome and substitution models, legal origin likely has an impact on the relationship between competition and payouts, and the aforementioned model should capture it. In the model above, indicator variable COMMON takes on the value one if the firm is registered in a common law country and zero otherwise (civil law). If the coefficient (β3) of interaction between COMP and COMMON is significant, then it can be inferred that the relationship between industry competition and payouts is dissimilar in common law and civil law countries. Hypotheses and models for the remaining country characteristics are similar and are given below.

The ninth hypothesis is that the relationship between payouts and competition is dissimilar in non-Protestant and Protestant countries. The following model is regressed to test this hypothesis:

$$\mathrm{Payout} = \beta_o + \beta1(\mathrm{COMP}) + \beta2(\mathrm{PROTESTANT}) + \beta3(\mathrm{COMP} * \mathrm{PROTESTANT}) + \beta4(\mathrm{MVRANK}) + \beta5(\mathrm{ROA}) + \beta6\left(\frac{\mathrm{DEBT}}{\mathrm{AT}}\right) + \beta7(\mathrm{GS}) + \beta8(logMTB) + \beta9(\mathrm{STD}) \quad (12)$$

Protestant: $\mathrm{Payout} = (\mathrm{Bo} + \mathrm{B2}) + (\mathrm{B1} + \mathrm{B3})\mathrm{COMP} + \mathrm{controls}$ (12a)

Non-Protestant: $\mathrm{Payout} = \mathrm{Bo} + \mathrm{B1}(\mathrm{COMP}) + \mathrm{controls}$ (12b)

Protestant countries provide better shareholder rights (Stulz and Williamson, 2003); therefore, according to the outcome agency model, investors can use these rights to pressure management to distribute more cash. Thus, firms in Protestant countries will pay higher dividends, compared to firms in non-Protestant countries. However, according to the substitution model, firms in non-Protestant countries, due to their poor shareholder rights, distribute more cash to generate a reputation for treating minority shareholders well in order to increase opportunities to raise capital in the future on favorable terms. Thus, firms in non-

Protestant countries will pay higher dividends, compared to firms in Protestant countries. Therefore, under the outcome and substitution models, religion likely has an impact on the relationship between competition and payouts, and the aforementioned model should capture it. In the model above, indicator variable PROTESTANT takes on the value one if the firm is registered in a Protestant country and zero otherwise. If the coefficient (β3) of interaction between COMP and PROTESTANT is significant, then it can be inferred that the relationship between industry competition and payouts is dissimilar in Protestant and non-Protestant countries.

The tenth hypothesis is that the relationship between competition and payouts is dissimilar in high-corruption and low-corruption countries. The following model is regressed to test this hypothesis:

$$\text{Payout} = \beta_o + \beta1(\text{COMP}) + \beta2(\text{HIGH\_CORRUPTION}) + \beta3(\text{COMP} * \text{HIGH\_CORRUPTION}) + \beta4(\text{MVRANK}) + \beta5(\text{ROA}) + \beta6\left(\frac{\text{DEBT}}{\text{AT}}\right) + \beta7(\text{GS}) + \beta8(logMTB) + \beta9(\text{STD}) \quad (13)$$

High Corruption: $\text{Payout} = (\text{Bo} + \text{B2}) + (\text{B1} + \text{B3})\text{COMP} + \text{controls}$ (13a)

Low Corruption: $\text{Payout} = \text{Bo} + \text{B1}(\text{COMP}) + \text{controls}$ (13b)

Low levels of corruption provide a better investor environment; therefore, according to the outcome agency model, firms in low-corruption countries are more likely to distribute excess cash to shareholders than expropriate it through financial mismanagement or outright theft. Thus, firms in low-corruption countries will pay higher dividends, compared to firms in high-corruption countries. However, in high-corruption countries, investors may perceive that managers are more likely to expropriate shareholders through financial mismanagement or outright theft. Hence, according to the substitution agency model, firms in these countries are likely to distribute more cash to generate a reputation for treating minority shareholders well in order to increase the opportunity to raise capital in the future on favorable terms. Thus, firms in high-corruption countries will pay higher dividends, compared to firms in low-corruption countries. Therefore, under the outcome and substitution models, corruption likely has an impact on the relationship between competition and payouts, and the aforementioned model should capture it. In the model above, indicator variable HIGH_CORRUPTION takes on the value one if the firm belongs to a country that ranks above the sample median, and otherwise zero. If the coefficient (β3) of interaction between COMP and HIGH_CORRUPTION is significant, then it can be inferred that the relationship between industry competition and payouts is dissimilar in low-corruption and high-corruption countries.

The eleventh hypothesis is that the relationship between competition and payouts is dissimilar in high-GNI and low-GNI countries. The following model is regressed to test this hypothesis:

$$\text{Payout} = \beta_o + \beta 1(\text{COMP}) + \beta 2(\text{HIGH\_GNI}) + \beta 3(\text{COMP} * \text{HIGH\_GNI}) + \beta 4(\text{MVRANK}) + \beta 5(\text{ROA}) + \beta 6\left(\frac{\text{DEBT}}{\text{AT}}\right) + \beta 7(\text{GS}) + \beta 8(logMTB) + \beta 9(\text{STD}) \quad (14)$$

High GNI: $\text{Payout} = (\text{Bo} + \text{B2}) + (\text{B1} + \text{B3})\text{COMP} + \text{controls}$ (14a)

Low GNI: $\text{Payout} = \text{Bo} + \text{B1}(\text{COMP}) + \text{controls}$ (14b)

According to La Porta et al. (1998), rich countries provide better investor protection; therefore, according to the outcome agency model, investors can use those rights to pressure management to distribute more cash. Thus, firms in high–gross national income (GNI) or rich countries will pay higher dividends, compared to firms in low-GNI or poor countries. However, according to the substitution model, in poor countries, due to their weak investor protection, firms will distribute more cash to generate a reputation for treating minority shareholders well in order to increase opportunities to raise capital on favorable terms in the future. Thus, firms in poor countries will pay higher dividends, compared to firms in rich countries. Therefore, under the outcome and substitution models, GNI likely has an impact on the relationship between competition and payouts, and the aforementioned model should capture it. In the model above, indicator variable HIGH_GNI takes on the value one if the firm belongs to a country whose GNI is greater than the median value of the sample GNI, and zero otherwise. If the coefficient (β3) of interaction between COMP and HIGH_GNI is significant, then it can be inferred that the relationship between industry competition and payouts is dissimilar in high-GNI and low-GNI countries.

Testing the above hypotheses will show whether these country characteristics have a significant impact on the relationship between competition and dividend payouts. Stated differently, these tests will show whether the relationship between competition and payouts remains similar or changes due to the differences in country characteristics.

1.5 Results

1.5.1 Individual Country Analyses

1.5.1.1 Summary Statistics

Tables 1.1 through 1.7 present summary statistics for the individual G7 nations—Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States—in that order for the sample period from 1995 to 2010. DVC is the total amount, in local currency, of dividends declared on the common stock of the firm. AT, MV, and SALE are the total book value of assets reported on the balance sheet of the firm, the total market value of the common stock outstanding, and the total sales for the firm from the income statement for the period, respectively. GS is the annual growth rate in sales, and MTB is the market-to-book ratio. DEBT/AT is the total long-term debt—debts with maturity of more than one year plus the portion of the long-term debt in current liabilities—divided by total assets. ROA is the operating income before depreciation divided by total assets. STD is the standard deviation of monthly stock returns. MTB and ROA have been winsorized at the 1 percent and the 99 percent distribution. GS has been winsorized at the 1 percent and the 99 percent distribution for all countries except Italy, where it has been winsorized at the 3 percent and the 97 percent distribution.

Table 1.1 Canada: Summary Statistics

	Obs.	Mean	Std. Dev.	Min	Max
Dividend Payouts					
DVC/AT	9628	1.20%	3.81%	0.00%	92.63%
DVC/MV	9628	1.49%	4.83%	0.00%	99.44%
DVC/SALE	9628	1.90%	7.09%	0.00%	99.60%

Table 1.1 – Continued

Firm Characteristics					
MV	9628	682.93	2697.73	0.00	59926.92
AT	9628	771.36	2713.38	0.02	70169.00
ROA	9597	0.03	0.27	-1.62	0.42
DEBT/AT	9536	0.15	0.16	0.00	0.89
MTB	9624	1.82	1.66	0.36	12.61
GS	8423	0.45	1.58	-1.00	11.62
STD	8116	0.19	0.21	0.03	7.66

Table 1.1 shows that the average firm in Canada has a dividend to assets (DVC/AT) value of 1.20 percent, a dividend yield (DVC/MV) of 1.49 percent, and a dividend to sale (DVC/SALE) value of 1.90 percent. Moreover, the average firm has a maturity value, proxied by market value (MV), of C$683 million. The mean value of the firm profitability, return on assets (ROA), is 3 percent, and the mean value of the leverage, debt divided by assets (DEBT/AT), is 15 percent. The average investment opportunities, proxied by annual sales growth (GS) and market-to-book (MTB) ratio, are 45 percent and 1.82, respectively. Finally, the risk of the average firm measured by the standard deviation of returns is 0.19. The table also shows that there is sizable dispersion in both the dividend payout ratios and the firm characteristics. For example, the standard deviations of dividend payout ratios, DVC/AT, DVC/MV, and DVC/SALE, are 3.81 percent, 4.83 percent, and 7.09 percent, respectively.

Table 1.2 France: Summary Statistics

	Obs.	Mean	Std. Dev.	Min	Max
Dividend Payouts					
DVC/AT	6713	0.49%	1.81%	0.00%	68.92%
DVC/MV	6713	1.02%	3.83%	0.00%	96.61%
DVC/SALE	6713	0.56%	2.18%	0.00%	61.41%
Firm Characteristics					
MV	6713	2023.05	17925.19	0.06	1158203.00
AT	6713	2807.34	10999.65	0.70	304509.00
ROA	6699	0.10	0.09	-0.26	0.35
DEBT/AT	6709	0.14	0.13	0.00	0.82
MTB	6711	1.44	0.90	0.52	6.35
GS	6064	0.32	1.34	-0.86	7.04
STD	5073	3.67	126.99	0.01	6499.56

Table 1.2 documents that the average firm in France has a dividend to assets (DVC/AT) value of 0.49 percent, a dividend yield (DVC/MV) of 1.02 percent, and a dividend to sale (DVC/SALE) of 0.56 percent. Moreover, the average firm has a maturity, proxied by market value (MV), of €2,023 million. The mean value of the firm profitability, return on assets (ROA), is 10 percent, and the mean value of the leverage, debt divided by assets (DEBT/AT), is 14 percent. The average investment opportunities, proxied by annual sales growth (GS) and market-to-book (MTB) ratio, are 32 percent and 1.44, respectively. Finally, the risk of the average firm measured by the standard deviation of returns is 3.67. The table also shows that there is sizable dispersion in both the dividend payout ratios and the firm characteristics. For example, the standard deviations of dividend payout ratios, DVC/AT, DVC/MV, and DVC/SALE, are 1.81 percent, 3.83 percent, and 2.18 percent, respectively.

Table 1.3 Germany: Summary Statistics

	Obs.	Mean	Std. Dev.	Min	Max
Dividend Payouts					
DVC/AT	6744	1.03%	2.67%	0.00%	86.51%
DVC/MV	6744	2.20%	5.40%	0.00%	98.04%
DVC/SALE	6744	0.90%	2.69%	0.00%	88.85%
Firm Characteristics					
MV	6744	1236.36	5808.23	0.07	118343.20
AT	6744	2432.32	13130.47	0.51	213565.00
ROA	6737	0.08	0.14	-0.55	0.38
DEBT/AT	6738	0.12	0.13	0.00	0.82
MTB	6741	1.49	1.05	0.53	7.54
GS	6120	0.11	0.48	-0.82	2.84
STD	5168	0.17	0.52	0.01	15.99

Table 1.3 details that the average firm in Germany has a dividend to assets (DVC/AT) value of 1.03 percent, a dividend yield (DVC/MV) of 2.20 percent, and a dividend to sale (DVC/SALE) of 0.90 percent. Moreover, the average firm has a maturity, proxied by market value (MV), of €1,236 million. The mean value of the firm profitability, return on assets (ROA), is 8 percent, and the mean value of the leverage, debt divided by assets (DEBT/AT), is 12 percent. The average investment opportunities, proxied by annual sales growth (GS) and

market-to-book (MTB) ratio, are 11 percent and 1.49, respectively. Finally, the risk of the average firm measured by the standard deviation of returns is 0.17. The table also shows that there is sizable dispersion in both the dividend payout ratios and the firm characteristics. For example, the standard deviations of dividend payout ratios, DVC/AT, DVC/MV, and DVC/SALE, are 2.67 percent, 5.40 percent, and 2.69 percent, respectively.

Table 1.4 Italy: Summary Statistics

	Obs.	Mean	Std. Dev.	Min	Max
Dividend Payouts					
DVC/AT	1917	0.55%	1.39%	0.00%	17.21%
DVC/MV	1917	0.99%	3.97%	0.00%	90.07%
DVC/SALE	1917	0.85%	2.46%	0.00%	38.57%
Firm Characteristics					
MV	1917	1089.76	5686.25	3.80	93776.56
AT	1917	164206.60	1773714.00	4.59	44000000.00
ROA	1916	0.08	0.08	-0.21	0.32
DEBT/AT	1917	0.15	0.13	0.00	0.76
MTB	1916	1.24	0.54	0.28	3.91
GS	1742	0.09	0.71	-1.00	3.29
STD	1533	0.27	0.81	0.03	11.62

Table 1.4 reports that the average firm in Italy has a dividend to assets (DVC/AT) value of 0.55 percent, a dividend yield (DVC/MV) of about 1 percent, and a dividend to sale (DVC/SALE) of 0.85 percent. Moreover, the average firm has a maturity, proxied by market value (MV), of €1,090 million. The mean value of the firm profitability, return on assets (ROA), is 8 percent, and the mean value of the leverage, debt divided by assets (DEBT/AT), is 15 percent. The average investment opportunities, proxied by annual sales growth (GS) and market-to-book (MTB) ratio, are 9 percent and 1.24, respectively. Finally, the risk of the average firm measured by the standard deviation of returns is 0.27. The table also shows that there is sizable dispersion in both the dividend payout ratios and the firm characteristics. For example, the standard deviations of dividend payout ratios, DVC/AT, DVC/MV, and DVC/SALE, are 1.39 percent, 3.97 percent, and 2.46 percent, respectively.

Table 1.5 Japan: Summary Statistics

	Obs.	Mean	Std. Dev.	Min	Max
Dividend Payouts					
DVC/AT	37602	0.69%	0.72%	0.00%	15.18%
DVC/MV	37602	1.56%	1.46%	0.00%	59.61%
DVC/SALE	37602	0.76%	1.02%	0.00%	35.10%
Firm Characteristics					
MV	37602	102,419.80	467,475.30	135.41	24,100,000.00
AT	37602	191,917.60	798,146.90	158.00	32,600,000.00
ROA	37601	0.07	0.06	-0.10	0.25
DEBT/AT	37503	0.12	0.12	0.00	0.89
MTB	37602	1.15	0.58	0.50	4.41
GS	35215	0.02	0.16	-0.41	0.79
STD	33359	0.12	0.39	0.01	34.65

Table 1.5 displays that the average firm in Japan has a dividend to assets (DVC/AT) value of 0.69 percent, a dividend yield (DVC/MV) of 1.56 percent, and a dividend to sale (DVC/SALE) of 0.76 percent. Moreover, the average firm has a maturity, proxied by market value (MV), of about ¥102,420 million. The mean value of the firm profitability, return on assets (ROA), is 7 percent, and the mean value of the leverage, debt divided by assets (DEBT/AT), is 12 percent. The average investment opportunities, proxied by annual sales growth (GS) and market-to-book (MTB) ratio, are 2 percent and 1.15, respectively. Finally, the risk of the average firm measured by the standard deviation of returns is 0.12. The table also shows that there is sizable dispersion in both the dividend payout ratios and the firm characteristics. For example, the standard deviations of dividend payout ratios, DVC/AT, DVC/MV, and DVC/SALE, are 0.72 percent, 1.46 percent, and 1.02 percent, respectively.

Table 1.6 United Kingdom: Summary Statistics

	Obs.	Mean	Std. Dev.	Min	Max
Dividend Payouts					
DVC/AT	15126	1.92%	2.66%	0.00%	66.55%
DVC/MV	15126	2.40%	3.83%	0.00%	98.88%
DVC/SALE	15126	1.85%	3.75%	0.00%	95.33%
Firm Characteristics					
MV	15126	531.45	3391.28	0.07	180,958.00
AT	15126	495.17	1969.72	0.02	46,053.00

Table 1.6 – Continued

ROA	15123	0.06	0.21	-1.00	0.39
DEBT/AT	15064	0.11	0.14	0.00	2.23
MTB	15126	1.82	1.49	0.46	9.99
GS	13568	0.25	0.83	-0.89	5.87
STD	12183	0.53	11.26	0.00	623.10

Table 1.6 records that the average firm in UK has a dividend to assets (DVC/AT) value of 1.92 percent, a dividend yield (DVC/MV) of 2.40 percent, and a dividend to sale (DVC/SALE) of 1.85 percent. Moreover, the average firm has a maturity, proxied by market value (MV), of about £531 million. The mean value of the firm profitability, return on assets (ROA), is 6 percent, and the mean value of the leverage, debt divided by assets (DEBT/AT), is 11 percent. The average investment opportunities, proxied by annual sales growth (GS) and market-to-book (MTB) ratio, are 25 percent and 1.82, respectively. Finally, the risk of the average firm measured by the standard deviation of returns is 0.53. The table also shows that there is sizable dispersion in both the dividend payout ratios and the firm characteristics. For example, the standard deviations of dividend payout ratios, DVC/AT, DVC/MV, and DVC/SALE, are 2.66 percent, 3.83 percent, and 3.75 percent, respectively.

Table 1.7 United States: Summary Statistics

	Obs.	Mean	Std. Dev.	Min	Max
Dividend Payouts					
DVC/AT	66110	0.64%	2.67%	0.00%	93.85%
DVC/MV	66110	0.61%	2.50%	0.00%	99.59%
DVC/SALE	66110	0.66%	2.99%	0.00%	98.36%
Firm Characteristics					
MV	66110	2067.87	12963.32	0.00	508329.50
AT	66110	1661.15	13069.12	0.00	797769.00
ROA	65979	0.02	0.27	-1.32	0.40
DEBT/AT	64909	0.16	0.18	0.00	0.96
MTB	66105	2.26	2.23	0.54	14.87
GS	60949	0.24	0.76	-0.87	5.10
STD	54259	0.80	47.93	0.00	5768.62

Table 1.7 presents that the average firm in the United States has a dividend to assets (DVC/AT) value of 0.64 percent, a dividend yield (DVC/MV) of 0.61 percent, and a dividend to

sale (DVC/SALE) of 0.66 percent. Moreover, the average firm has a maturity, proxied by market value (MV), of $2,068 million. The mean value of the firm profitability, return on assets (ROA), is 2 percent, and the mean value of the leverage, debt divided by assets (DEBT/AT), is 16 percent. The average investment opportunities, proxied by annual sales growth (GS) and market-to-book (MTB) ratio, are 24 percent and 2.26, respectively. Finally, the risk of the average firm measured by the standard deviation of returns is 0.8. The table also shows that there is sizable dispersion in both the dividend payout ratios and the firm characteristics. For example, the standard deviations of dividend payout ratios DVC/AT, DVC/MV, and DVC/SALE are 2.67 percent, 2.50 percent, and 2.99 percent, respectively.

In summary, most notably, the descriptive statistics tables (1.1 through 1.7) show that the standard deviations associated with both the dependent and the independent variables are large, which increases the power of the regression. Thus, there is a high probability that the test will reject the null hypothesis when the null is actually false.

1.5.1.2 Univariate Analyses

Tables 1.8 through 1.14 present univariate analysis of the relationship between dividend payouts and competition for each of the G7 countries. The tables show the average dividend payouts in three different ratio formats for different quintiles of competition derived from the sales-based Herfindahl-Hirschman Index (HHI). The ratios are as defined previously.

Table 1.8 Canada: The Relation between Competition and Payout Ratios—Univariate Analysis

	Competition Quintiles					
	Lowest	2	3	4	Highest	Highest-Lowest
DVC/AT	1.81%	1.53%	1.27%	1.78%	1.25%	-0.52%*** (-4.0426)
DVC/MV	1.92%	1.74%	1.15%	1.51%	1.09%	-0.83%*** -5.5491
DVC/SALE	1.71%	1.21%	1.00%	2.26%	3.37%	1.65%*** (5.7288)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For Canada, table 1.8 shows that DVC/AT, DVC/MV, and DVC/SALE for the highest-competition quintile are 1.25 percent, 1.09 percent, and 3.37 percent, respectively, but for the lowest-competition quintile, the ratios are 1.81 percent, 1.92 percent, and 1.71 percent, respectively. That is, in two out of the three specifications, firms in the highest-competition quintile pay lower average dividend ratios, while firms in the lowest-competition quintile pay higher average dividend ratios. Moreover, the differences in the average dividend ratios between the highest and the lowest quintile are negative and statistically significant at the 1 percent level in two of the three specifications. This negative relationship between dividend payouts and competition provides support for the substitution model.

Table 1.9 France: The Relation between Competition and Payout Ratios—Univariate Analysis

Competition Quintiles						
	Lowest	2	3	4	Highest	Highest-Lowest
DVC/AT	0.62%	0.61%	0.38%	0.43%	0.42%	-0.20%** (-2.4630)
DVC/MV	1.15%	1.17%	1.07%	0.96%	0.75%	-0.40%** (-2.6873)
DVC/SALE	0.73%	0.69%	0.42%	0.43%	0.51%	-0.22%** (-2.2019)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For France, table 1.9 shows that DVC/AT, DVC/MV, and DVC/SALE for the highest-competition quintile are 0.42 percent, 0.75 percent, and 0.51 percent, respectively, but for the lowest-competition quintile, the ratios are 0.62 percent, 1.15 percent, and 0.73 percent, respectively. That is, firms in the highest-competition quintile pay lower average dividend ratios, and firms in the lowest-competition quintile pay higher average dividend ratios. Moreover, the differences in the average dividend ratios between the highest and the lowest quintile are negative and statistically significant at the 5 percent level for all three specifications. This negative relationship between dividend payouts and competition provides support for the substitution model.

Table 1.10 Germany: The Relation between Competition and Payout Ratios—Univariate Analysis

Competition Quintiles						
	Lowest	2	3	4	Highest	Highest-Lowest
DVC/AT	1.17%	0.94%	1.26%	1.06%	0.70%	-0.47%*** (-4.3648)
DVC/MV	2.89%	1.96%	2.61%	2.29%	1.15%	-1.74%*** (-8.2073)
DVC/SALE	0.92%	0.88%	1.06%	0.99%	0.64%	-0.27%** (-2.8464)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For Germany, table 1.10 shows that DVC/AT, DVC/MV, and DVC/SALE for the highest-competition quintile are 0.70 percent, 1.15 percent, and 0.64 percent, respectively, but for the lowest-competition quintile, the ratios are 1.17 percent, 2.89 percent, and 0.92 percent, respectively. That is, firms in the highest-competition quintile pay lower average dividend ratios, and firms in the lowest-competition quintile pay higher average dividend ratios. Moreover, the differences in the average dividend ratios between the highest and the lowest quintile are negative and statistically significant for all three specifications. This negative relationship between dividend payouts and competition provides support for the substitution model.

Table 1.11 Italy: The Relation between Competition and Payout Ratios—Univariate Analysis

Competition Quintiles						
	Lowest	2	3	4	Highest	Highest-Lowest
DVC/AT	0.57%	n/a	0.56%	0.56%	0.51%	-0.06% (-0.6590)
DVC/MV	0.87%	n/a	0.84%	1.42%	0.94%	0.07% (0.4648)
DVC/SALE	0.86%	n/a	1.01%	0.67%	0.87%	0.01% (0.0649)

Similar to all the other countries, in Italy also, I coded the competition data to be divided into five groups, but Stata automatically categorized them into only four groups. This occurred because a large number of uncompetitive industries in Italy preclude Stata from dividing the sales based competition (1-HHI) into quintiles, which requires approximate equality. Nevertheless, since the data are conducive for quartile-based division, Stata reflexively generated it.

For Italy, table 1.11 shows that DVC/AT, DVC/MV, and DVC/SALE for the highest-competition quintile are 0.51 percent, 0.94 percent, and 0.87 percent, respectively, but for the lowest-competition quintile, the ratios are 0.57 percent, 0.87 percent, and 0.86 percent, respectively. The differences in the average dividend ratios between the highest and the lowest quintile are not statistically significant, however. The result, therefore, does not provide support for the outcome, the predation, or the substitution model.

Table 1.12 Japan: The Relation between Competition and Payout Ratios—Univariate Analysis

	Competition Quintiles					
	Lowest	2	3	4	Highest	Highest-Lowest
DVC/AT	0.67%	0.72%	0.69%	0.66%	0.73%	0.06%*** (4.6994)
DVC/MV	1.41%	1.55%	1.60%	1.51%	1.72%	0.31%*** (12.6713)
DVC/SALE	0.75%	0.85%	0.74%	0.72%	0.75%	0.00% (0.1961)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For Japan, table 1.12 shows that DVC/AT, DVC/MV, and DVC/SALE for the highest-competition quintile are 0.73 percent, 1.72 percent, and 0.75 percent, respectively, but for the lowest-competition quintile, the ratios are 0.67 percent, 1.41 percent, and 0.75 percent, respectively. That is, firms in the highest-competition quintile pay higher average dividend ratios, and firms in the lowest-competition quintile pay lower average dividend ratios for two of the three specifications. The differences in the average dividend ratios between the highest and the lowest quintile are positive and statistically significant at the 1 percent level for two of the ratios. This positive relationship between dividend payouts and competition provides support for the outcome or the predation model.

Table 1.13 United Kingdom: The Relation between Competition and Payout Ratios—Univariate Analysis

	Competition Quintiles					
	Lowest	2	3	4	Highest	Highest-Lowest
DVC/AT	2.07%	2.28%	1.85%	1.84%	1.55%	-0.52%*** (- 8.0788)
DVC/MV	2.54%	2.79%	2.42%	2.24%	1.99%	-0.55%*** (-6.1494)
DVC/SALE	2.00%	2.15%	2.07%	1.60%	1.44%	-0.56%*** (- 5.7602)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For the United Kingdom, table 1.13 shows that DVC/AT, DVC/MV, and DVC/SALE for the highest-competition quintile are 1.55 percent, 1.99 percent, and 1.44 percent, respectively, but for the lowest-competition quintile, the ratios are 2.07 percent, 2.54 percent, and 2.00 percent, respectively. That is, firms in the highest-competition quintile pay lower average dividend ratios, and firms in the lowest-competition quintile pay higher average dividend ratios. The differences in the average dividend ratios between the highest and the lowest quintile are negative and statistically significant at the 1 percent level for all three ratios. This negative relationship between dividend payouts and competition provides support for the substitution model.

Table 1.14 United States: The Relation between Competition and Payout Ratios—Univariate Analysis

	Competition Quintiles					
	Lowest	2	3	4	Highest	Highest-Lowest
DVC/AT	0.83%	0.72%	0.62%	0.56%	0.47%	-0.36%*** (-10.8959)
DVC/MV	0.82%	0.67%	0.65%	0.50%	0.41%	-0.41%*** (-13.6593)
DVC/SALE	0.85%	0.70%	0.57%	0.57%	0.61%	-0.24%*** (-5.6803)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For the United States, table 1.14 shows that DVC/AT, DVC/MV, and DVC/SALE for the highest-competition quintile are 0.47 percent, 0.41 percent, and 0.61 percent, respectively, but for the lowest-competition quintile, the ratios are 0.83 percent, 0.82 percent, and 0.85 percent, respectively. That is, firms in the highest-competition quintile pay lower average dividend ratios, and firms in the lowest-competition quintile pay higher average dividend ratios. Moreover, the difference in the average dividend ratios between the highest and lowest quintile is negative and statistically significant at the 1 percent level for all three ratios. This suggests a negative relationship between dividend payouts and competition, providing support for the substitution model.

In conclusion, the univariate analyses indicate a negative relationship between dividend payout ratios and competition for Canada, France, Germany, the United Kingdom, and the United States, providing evidence for the substitution model. Data on Italy do not support any of the models tested. Finally, the analysis of Japanese firms reveals a positive relationship between payout ratios and product market competition, providing evidence for either the outcome or the predation model. Next, I conduct similar analyses in a multivariate setting.

1.5.1.3 Multivariate Analyses

Tables 1.15 through 1.21 present multivariate analysis of the relationship between dividend payouts and competition for each of the G7 countries. The variables are as described previously. The dependent variables are censored at zero and one. Since running OLS regressions on censored data generates biased results, a two-sided Tobit model is employed for this analysis. To control for possible heteroscedasticity, robust standard errors are used. Coefficient estimates—along with the superscripts *** and **, denoting significant difference from zero at the 1 percent and 5 percent levels, respectively—are reported with t-statistics in parentheses below.

Table 1.15 Canada: The Relation between Industry Competition and Payouts

	$\frac{DVC}{AT}$	$\frac{DVC}{MV}$	$\frac{DVC}{SALE}$
Intercept	-0.0795*** (-4.09)	-0.108*** (-4.02)	-0.204*** (-5.79)
COMP	-0.0282*** (-5.42)	-0.0410*** (-5.84)	-0.00520 (-0.55)
log (MV)	0.0115*** (7.32)	0.0178*** (7.87)	0.0291*** (9.87)
ROA	0.308*** (13.26)	0.325*** (12.10)	0.443*** (12.96)

Table 1.15 – Continued

DEBT/AT	-0.0120 (-1.44)	-0.00486 (-0.46)	0.00236 (0.16)
log (MTB)	-0.00419 (-1.06)	-0.0529*** (-8.97)	-0.0318*** (-4.62)
GS	-0.0358*** (-8.47)	-0.0365*** (-7.59)	-0.0527*** (-7.40)
STD	-0.242** (-2.48)	-0.249 (-1.92)	-0.440** (-2.43)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For Canada, table 1.15 shows that the coefficient of competition (COMP) is negative for all three specifications and significant at the 1 percent level for two of the specifications after controlling for various firm characteristics. The negative relationship between competition and dividend payout ratios—as competition increases, payouts decrease—supports the substitution model explanation of dividend policy, confirming the results found in the univariate analysis. Incidentally, the coefficients of all of the control variables except one have the expected signs and are significant.

Table 1.16 France: The Relation between Industry Competition and Payouts

	$\frac{DVC}{AT}$	$\frac{DVC}{MV}$	$\frac{DVC}{SALE}$
Intercept	-0.0669*** (-6.90)	-0.124*** (-12.88)	-0.0817*** (-9.77)
COMP	-0.0113*** (-3.56)	-0.0205*** (-3.20)	-0.0143*** (-3.48)
log (MV)	0.00316*** (6.11)	0.00789*** (8.16)	0.00470*** (8.00)
ROA	0.186*** (7.22)	0.260*** (10.03)	0.180*** (8.21)
DEBT/AT	0.00139 (0.19)	0.00396 (0.31)	0.00926 (1.12)
log (MTB)	0.00397 (1.66)	-0.0276*** (-5.76)	0.00263 (0.95)
GS	-0.0000540 (-0.10)	0.00531*** (3.12)	-0.000346 (-0.51)
STD	-0.00422** (-2.36)	-0.00808** (-2.40)	-0.00543** (-2.40)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For France, table 1.16 shows that the coefficient of competition (COMP) is negative and significant at the 1 percent level for all three measures of dividend payouts after controlling for various firm characteristics. The negative relationship between competition and dividend payout ratios—as competition increases, payouts decrease—supports the substitution model explanation of dividend policy, confirming the results found in the univariate analysis. Incidentally, the coefficients of most of the control variables have the expected signs and are significant.

Table 1.17 Germany: The Relation between Industry Competition and Payouts

	$\frac{DVC}{AT}$	$\frac{DVC}{MV}$	$\frac{DVC}{SALE}$
Intercept	-0.0615*** (-10.87)	-0.106*** (-13.80)	-0.0593*** (-9.73)
COMP	-0.00984*** (-4.00)	-0.0248*** (-4.69)	-0.00661*** (-2.94)
log (MV)	0.00640*** (9.53)	0.0131*** (14.54)	0.00653*** (8.84)
ROA	0.234*** (12.43)	0.460*** (12.02)	0.179*** (13.07)
DEBT/AT	-0.0305*** (-5.34)	-0.0513*** (-4.35)	-0.0183*** (-3.12)
log (MTB)	-0.00666*** (-2.67)	-0.0884*** (-14.12)	-0.00538** (-2.13)
GS	-0.00197 (-0.96)	0.00538 (1.22)	-0.00267 (-1.38)
STD	-0.00418*** (-3.96)	-0.00576*** (-2.59)	-0.00335*** (-3.48)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For Germany, table 1.17 shows that the coefficient of competition (COMP) is negative and significant at the 1 percent level for all three measures of dividend payouts after controlling for various firm characteristics. The negative relationship between competition and dividend payout ratios—as competition increases, payouts decrease—supports the substitution model explanation of dividend policy, confirming the results found in the univariate analysis. Incidentally, the coefficients of all of the control variables except GS have the expected signs and are significant.

Table 1.18 Italy: The Relation between Industry Competition and Payouts

	$\frac{DVC}{AT}$	$\frac{DVC}{MV}$	$\frac{DVC}{SALE}$
Intercept	-0.0436*** (-9.34)	-0.141*** (-4.40)	-0.0727*** (-8.53)
COMP	0.00541 (1.71)	0.0214 (1.82)	0.00535 (0.88)
log (MV)	0.00310*** (5.08)	0.0105*** (3.66)	0.00648*** (5.33)
ROA	0.203*** (8.21)	0.467*** (5.06)	0.235*** (6.96)
DEBT/AT	-0.0380*** (-4.89)	-0.0773*** (-3.02)	-0.0721*** (-4.15)
log (MTB)	0.000175 (0.05)	-0.0550*** (-3.11)	-0.00495 (-0.73)
GS	-0.00663*** (-3.82)	-0.0204*** (-3.19)	-0.0135*** (-3.55)
STD	-0.00364 (-1.89)	-0.0124 (-1.95)	-0.00904** (-2.16)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For Italy, table 1.18 shows that the coefficient of competition (COMP) is positive, but not significant at the 5 percent level for all measures of dividend payouts after controlling for various firm characteristics. Thus, dividend policy in Italy cannot be explained by any of the models tested, confirming the results found in the univariate analysis. Incidentally, the coefficients of most of the control variables have the expected signs and are significant.

Table 1.19 Japan: The Relation between Industry Competition and Payouts

	$\frac{DVC}{AT}$	$\frac{DVC}{MV}$	$\frac{DVC}{SALE}$
Intercept	-0.000996*** (-3.04)	0.00784*** (11.01)	-0.00833*** (-14.37)
COMP	0.000739*** (4.22)	0.00296*** (7.47)	0.000614** (2.34)
log (MV)	0.000393*** (13.05)	0.0000303 (0.51)	0.00124*** (23.57)
ROA	0.0709*** (52.24)	0.0934*** (37.76)	0.0697*** (39.42)
DEBT/AT	-0.0168*** (-44.90)	-0.00985*** (-11.33)	-0.0211*** (-33.54)
log (MTB)	0.000697*** (3.75)	-0.0224*** (-70.02)	-0.00122*** (-3.89)

Table 1.19 – Continued

GS	-0.00460*** (-13.25)	-0.00617*** (-8.25)	-0.00652*** (-11.21)
STD	-0.000391** (-2.33)	-0.000732** (-2.06)	-0.000572** (-2.56)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For Japan, table 1.19 shows that the coefficient of competition (COMP) is positive and significant for all three measures of dividend payouts after controlling for various firm characteristics. The positive relationship between competition and dividend payout ratios—as competition increases, payouts increase—supports the outcome or the predation model explanation of dividend policy, confirming the results found in the univariate analysis. Incidentally, the coefficients of all of the control variables, except MTB in the first regression, have the expected signs and are significant.

Table 1.20 United Kingdom: The Relation between Industry Competition and Payouts

	$\frac{DVC}{AT}$	$\frac{DVC}{MV}$	$\frac{DVC}{SALE}$
Intercept	-0.0178*** (-11.80)	-0.0194*** (-8.38)	-0.0342*** (-15.33)
COMP	-0.00475*** (-5.01)	-0.00307 (-1.77)	-0.00333** (-1.97)
log (MV)	0.00442*** (20.56)	0.00663*** (19.70)	0.00780*** (19.30)
ROA	0.194*** (24.65)	0.263*** (18.61)	0.177*** (21.89)
DEBT/AT	-0.0391*** (-16.47)	-0.0318*** (-7.68)	-0.0319*** (-7.21)
log (MTB)	-0.000102 (-0.11)	-0.0524*** (-21.93)	-0.0122*** (-7.35)
GS	-0.00930*** (-9.67)	-0.0101*** (-8.75)	-0.00986*** (-7.43)
STD	-0.0000599*** (-3.27)	-0.0000379 (-1.58)	-0.0000607** (-2.10)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For the United Kingdom, table 1.20 shows that the coefficient of competition (COMP) is negative for all three measures and negative and significant for two out of the three measures of dividend payouts after controlling for various firm characteristics. The negative relationship between competition and dividend payout ratios—as competition increases, payouts decrease—supports the substitution model explanation of dividend policy, confirming the results found in the univariate analysis. Incidentally, the coefficients of all of the control variables have the expected signs and are significant.

Table 1.21 United States: The Relation between Industry Competition and Payouts

	$\frac{DVC}{AT}$	$\frac{DVC}{MV}$	$\frac{DVC}{SALE}$
Intercept	-0.0823*** (-24.99)	-0.0812*** (-20.44)	-0.0959*** (-27.09)
COMP	-0.0264*** (-15.83)	-0.0247*** (-14.02)	-0.0261*** (-12.95)
log (MV)	0.00998*** (30.39)	0.0108*** (26.41)	0.0119*** (30.02)
ROA	0.187*** (18.75)	0.162*** (17.56)	0.170*** (16.92)
DEBT/AT	-0.0136*** (-6.72)	-0.00253 (-1.01)	-0.00728*** (-3.00)
log (MTB)	-0.0164*** (-12.99)	-0.0344*** (-21.18)	-0.0199*** (-13.56)
GS	-0.0255*** (-9.32)	-0.0211*** (-9.01)	-0.0248*** (-7.60)
STD	-0.000475 (-0.73)	-0.000587 (-0.78)	-0.000606 (-0.81)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For the United States, table 1.21 shows that the coefficient of competition (COMP) is negative and significant at the 1 percent level for all three measures of dividend payouts after controlling for various firm characteristics. The negative relationship between competition and dividend payout ratios—as competition increases, payouts decrease—supports the substitution model explanation of dividend policy, confirming the results found in the univariate analysis. Incidentally, the coefficients of essentially all of the control variables except STD have the expected signs and are significant at the 1 percent level.

In summary, the substitution model, which predicts that the higher the product market competition, the lower the dividend payouts will be, explains the dividend policies in Canada, France, Germany, the United Kingdom, and the United States. In Italy, the results are inconclusive. Either the outcome model or the predation model explains dividend policy in Japan. Further tests are conducted below to differentiate the outcome model from the predation model. In addition, with only a few exceptions, the signs and significance of the coefficients of the control variables are consistent with expectations: The positive relationship between dividend payouts and MV (firm size or maturity) suggests that larger firms pay more dividends. The positive relationship between dividend payouts and ROA (profitability) indicates that firms that are more profitable, as opposed to startup or young firms, tend to pay more dividends, as expected. The negative relationship between dividend payouts and MTB and GS (investment opportunity) indicates that firms with few investment opportunities pay more dividends. Finally, the negative relationship between dividend payouts and standard deviation (risk) suggests that firms that are more volatile pay lower dividends, while stable firms (lower STD) pay more dividends. Next, I present the characteristics of dominant firms and nondominant firms for Japan as a preliminary step in determining whether the outcome or the predation model best explains dividend policy in that country.

1.5.1.4 Dominant vs. Nondominant: Distinguishing Outcome from Predation

Table 1.22 presents characteristics of dominant and nondominant firms for Japan. Out of the Group of Seven countries, only Japan has a significant positive relationship between dividend payout ratios and competition, as presented in table 1.19, necessitating further analysis—by separating the firms into dominant and nondominant firms—to determine whether the positive relationship is indicative of the outcome or the predation hypothesis. Dominant firms have been designated as those four firms that have a combination of the highest market value quartile and the lowest market-to-book ratio in their respective four-digit SIC industry, provided that there are more than ten firms in the industry. If there are fewer than ten firms in an industry, then the dominant firm is defined as the one firm that has the highest market value quartile and the lowest market-to-book combination. The remaining firms are classified as nondominant firms.

Table 1.22 Japan: Characteristics of Dominant and Nondominant Firms

	Dominant	Nondominant	Dom—Nondominant
MV	170,473	99,987	70487*** (5.34)
AT	458,901	182,372	276529*** (12.29)
ROA	0.08	0.07	0.01*** (4.46)
DEBT/AT	0.12	0.12	.00 (0.47)
MTB	1.06	1.16	-0.10*** (-6.12)
GS	0.01	0.02	-0.01*** (-2.63)
STD	0.10	0.12	-0.02** (-1.96)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

Table 1.22 shows that dominant firms have higher market value, higher return on assets, higher assets, lower sales growth (GS), lower market-to-book ratio, and lower standard deviation of returns compared to nondominant firms and that the differences between those characteristics in dominant and nondominant firms are significant. To put it differently, dominant firms are larger and more profitable and have fewer investment opportunities and lower risk, as expected—this indicates that dominant and nondominant firms are correctly defined.

Table 1.23 presents regression results showing that the relationship between competition and payouts is different for dominant and nondominant firms in Japan. Recall the previous finding that in Japan, higher competition indicates higher dividend payouts, but lower competition indicates lower payouts: a positive relationship. This significant positive relationship between dividend payouts and competition in Japan may be due to either the outcome or the predation model. If predation risk is the basis for the positive relationship, then nondominant firms should have the stronger positive relationship because nondominant firms are more susceptible to predatory takeovers than are dominant firms. On the contrary, if outcome explanation is the basis for the positive relationship, then dominant firms should have the stronger positive relationship because dominant firms have higher agency cost for free cash flows.

Table 1.23 Japan: The Relation between Competition and Payouts for Dominant and Nondominant Firms

	$\frac{DVC}{AT}$	$\frac{DVC}{MV}$	$\frac{DVC}{SALE}$
Intercept	-0.000809** (-2.42)	0.00802*** (11.13)	-0.00797*** (-13.50)
DOMINANT	-0.000508 (-1.43)	0.000667 (0.94)	-0.00177*** (-3.44)
COMP	0.000691*** (3.69)	0.00307*** (7.19)	0.000410 (1.47)
COMP*DOMINANT	0.00216*** (3.76)	0.00120 (0.98)	0.00471*** (5.10)
log (MV)	0.000375*** (12.17)	-0.000000289 (-0.00)	0.00121*** (22.59)
ROA	0.0708*** (52.23)	0.0932*** (37.73)	0.0697*** (39.40)
DEBT/AT	-0.0168*** (-44.83)	-0.00984*** (-11.31)	-0.0211*** (-33.46)
log (MTB)	0.000776*** (4.13)	-0.0223*** (-69.14)	-0.00110*** (-3.46)
GS	-0.00458*** (-13.21)	-0.00614*** (-8.21)	-0.00650*** (-11.17)
STD	-0.000391** (-2.33)	-0.000732** (-2.06)	-0.000573** (-2.56)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

Table 1.23 shows that the relationship between dividend payout ratios and competition is positive for nondominant firms, notated by the coefficient of COMP. For dominant firms, the positive relationship is higher, notated by the positive coefficient of COMP*DOMINANT for all three specifications, and is significant for two of the specifications. This indicates that the relationship between payouts and dominant firms is stronger, providing evidence for the outcome model, not the predation model. The positive coefficient of the interaction term suggests that as competition increases, dominant (strong) firms pay more cash than nondominant (weaker) firms do, providing support for the outcome model.

The results thus far are as follows for each of the G7 countries. The substitution model explains the dividend policies in Canada, France, Germany, the United Kingdom, and the

United States. The outcome model explains the dividend policy in Japan, but dividend policy in Italy is inconclusive. Having completed the analysis for each of the G7 countries, I next present the results for the pooled sample of G7 countries. I pool the data for all the seven countries and first examine whether the outcome or the substitution model explains the dividend policy across the G7 countries, and then, more importantly, I examine whether country characteristics affect dividend policy. Pursuant to that, I next present the summary statistics for the pooled sample of the G7 countries.

1.5.2 Pooled Sample Analyses

1.5.2.1 Outcome vs. Substitution

Table 1.24 presents summary statistics for the pooled sample of the G7 countries from 1995 to 2010. DVC is the total U.S. dollar amount of dividends declared on the common stock of the firm. AT, MV, and SALE are the total book value of assets reported on the balance sheet of the firm, total market value of the common stock outstanding, and the total sales for the firm from the income statement for the period, respectively. GS is the annual growth rate in sales and MTB is the market-to-book ratio. DEBT/AT is the total long-term debt—debts with maturity of more than one year plus the portion of the long-term debt in current liabilities—divided by total assets. ROA is the operating income before depreciation divided by total assets. STD is the three-year standard deviation of monthly stock returns. Dividend payouts have been truncated at one. MTB, ROA, and GS have been winsorized at the 1 percent and the 99 percent distribution.

Table 1.24 G7 Countries: Summary Statistics

	Obs.	Mean	Std. Dev.	Min	Max
Dividend Payouts					
DVC/AT	143,840	0.84%	2.41%	0.00%	93.85%
DVC/MV	143,840	1.20%	3.03%	0.00%	99.59%
DVC/SALE	143,840	0.90%	3.17%	0.00%	99.60%
Firm Characteristics					
MV_USD	143,840	1,526.90	10,677.80	0.00	1,529,894.00
AT_USD	143,840	3,708.28	192,597.90	0.00	41,300,000.00
ROA	143,652	0.05	0.22	-1.62	0.42
DEBT/AT	142,376	0.14	0.16	0.00	2.23
MTB	143,825	1.81	1.77	0.28	14.87
GS	132,283	0.20	0.71	-0.78	5.00
STD	119,691	0.63	41.69	0.00	6499.56

Table 1.24 shows that the average firm in the G7 nations has a dividend to assets (DVC/AT) value of 0.84 percent, a dividend yield (DVC/MV) of 1.20 percent, and a dividend to sale (DVC/SALE) of 0.90 percent. Moreover, the average firm has a maturity, proxied by market value (MV), of about $1,527 million. The average investment opportunities, proxied by annual sales growth (GS) and market-to-book (MTB) ratio, are 20 percent and 1.81, respectively. The mean value of the leverage, debt divided by assets (DEBT/AT), is 14 percent, and the mean value of the firm profitability, return on assets (ROA), is 5 percent. Finally, the risk of the average firm, measured by the standard deviation of returns, is 0.63. The table also shows that there is sizable dispersion in both the dividend payout ratios and the firm characteristics. For example, the standard deviations of dividend payout ratios, DVC/AT, DVC/MV, and DVC/SALE, are 2.41 percent, 3.03 percent, and 3.17 percent, respectively.

The following table presents the characteristics of each of the seven countries that are used to separate the sample into groups: legal origin, primary religion, corruption, and per capita GNI (U.S. dollars). Of the seven countries in the sample, three are common law origin and the remaining four are civil law origin; four are Protestant and three are non-Protestant. Corruption varies from a low of 1.15 for Canada to a high of 5.36 (more corrupt) for Italy. Per capita GNI spans from a low of $35,110 for Italy to a high of $46,360 for the United States.

Table 1.25 Country Characteristics

Country	Legal Origin	Primary Religion	Corruption	Per Capita GNI (US$)
Canada	Common	Protestant	1.15	41,980
France	Civil	Catholic	3.10	42,620
Germany	Civil	Protestant	2.10	42,450
Italy	Civil	Catholic	5.36	35,110
Japan	Civil	Other	3.01	38,080
UK	Common	Protestant	2.49	41,370
USA	Common	Protestant	1.62	46,360

Table 1.26 presents univariate analysis of the relationship between dividend payouts and competition for the pooled sample of the G7 countries. The table shows the average dividend payouts in three different ratio formats for different quintiles of competition (COMP) derived from the sales-based Herfindahl-Hirschman Index (HHI). It also shows the difference between the dividend payouts for the highest and the lowest levels of competition, along with the t-statistics in parentheses. The dividend ratios are as defined previously.

Table 1.26 G7 Countries: The Relation between Competition and Payout Ratios—Univariate Analysis

Competition Quintiles						
	Lowest	2	3	4	Highest	Highest-Lowest
DVC/AT	1.14%	0.92%	0.81%	0.69%	0.63%	-0.51%*** (-24.5397)
DVC/MV	1.64%	1.29%	1.16%	0.99%	0.92%	-0.72%*** (-26.3610)
DVC/SALE	1.15%	0.96%	0.80%	0.72%	0.89%	-0.26%*** (-8.1479)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For the pooled sample, table 1.26 shows that DVC/AT, DVC/MV, and DVC/SALE for the highest-competition quintile are 0.63 percent, 0.92 percent, and 0.89 percent, respectively, but for the lowest-competition quintile, the ratios are 1.14 percent, 1.64 percent, and 1.15 percent, respectively. That is, firms in the highest-competition quintile pay lower average dividend ratios, and firms in the lowest-competition quintile pay higher average dividend ratios.

Moreover, the differences in the average dividend ratios between the highest and the lowest quintile are negative and statistically significant at the 1 percent level for all three specifications. This negative relationship between dividend payouts and competition provides support for the substitution model. Next, I conduct a similar analysis in a multivariate setting.

Table 1.27 presents multivariate analysis of the relationship between dividend payouts and competition for the pooled sample of the G7 countries. The variables are as described previously. The dependent variable is censored at zero and one. Since running OLS regression on censored data generates biased results, a two-sided Tobit model is employed for this analysis. To control for possible heteroscedasticity, robust standard errors are used. Coefficient estimates—along with the superscripts *** and **, denoting significant difference from zero at the 1 percent and 5 percent levels, respectively—are reported with t-statistics in parentheses below.

Table 1.27 G7 Countries: The Relation between Competition and Payouts

	$\frac{DVC}{AT}$	$\frac{DVC}{MV}$	$\frac{DVC}{SALE}$
Intercept	-0.0244*** (-29.29)	-0.0252*** (-25.25)	-0.0395*** (-33.25)
COMP	-0.00732*** (-15.98)	-0.0101*** (-15.14)	-0.00423*** (-6.56)
MVRANK	0.0333*** (44.92)	0.0470*** (46.65)	0.0515*** (44.16)
ROA	0.140*** (38.06)	0.160*** (38.83)	0.142*** (33.86)
DEBT/AT	-0.0346*** (-33.12)	-0.0361*** (-25.53)	-0.0347*** (-26.05)
log (MTB)	-0.0128*** (-27.24)	-0.0445*** (-49.94)	-0.0213*** (-29.85)
GS	-0.0102*** (-20.66)	-0.00897*** (-13.17)	-0.0109*** (-15.96)
STD	-0.0000888** (-2.17)	-0.0000930** (-2.05)	-0.0000941 (-1.81)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

For the pooled sample, table 1.27 shows that the coefficient of competition (COMP) is negative and significant at the 1 percent level for all three regressions after controlling for various firm characteristics. The negative relationship between competition and dividend payout ratios—as competition increases, payouts decrease—supports the substitution model explanation of dividend policy, confirming the results found in the univariate analysis.

Finally, the control variables have the expected signs and are significant: The coefficients of market value (MVRANK) and profitability (ROA) are positive and significant as expected, and the coefficients of investment opportunities (MTB and GS) are negative and significant as expected as well. The risk (STD) is negative for all three specifications and significant for two specifications.

1.5.2.2 Country Characteristics

Tables 1.28–1.31 present the results of the multivariate regressions, testing the relationship between dividend payouts and the interaction of various country characteristics: legal origin, religion, corruption, and gross national income. The overall tenor of the hypotheses is that firms incorporated in countries with greater investor empowerments—common law, Protestant religion, low levels of corruption, and high GNI —have a significantly different dividend policy, in terms of the size of the payout ratio, compared to countries with fewer investor empowerments—civil law, non-Protestant religion, high levels of corruption, and low GNI. The dummy variable COMMON takes the value one if the firm is incorporated in a common law country, and otherwise zero. Similarly, the indicator variable PROTESTANT assumes the value one if the firm is incorporated in a Protestant country, otherwise zero. Likewise, dummy variables HIGH_CORR (high corruption) and HIGH_GNI have been assigned the value one if they are above their respective sample median, and zero otherwise. All other variables are as defined previously.

Table 1.28 Common Law vs. Civil Law: The Relation between Payouts and the Interaction of Industry Competition and Legal Origin

	$\frac{DVC}{AT}$	$\frac{DVC}{MV}$	$\frac{DVC}{SALE}$
Intercept	-0.0354*** (-35.24)	-0.0360*** (-29.63)	-0.0510*** (-37.51)
COMMON	0.0176*** (26.67)	0.0169*** (17.26)	0.0178*** (20.07)
COMP	0.0164*** (24.50)	0.0178*** (18.96)	0.0222*** (26.62)
COMP*COMMON	-0.0467*** (-37.28)	-0.0556*** (-35.42)	-0.0523*** (-35.01)
MVRANK	0.0305*** (43.91)	0.0424*** (44.41)	0.0481*** (42.34)
ROA	0.152*** (36.72)	0.174*** (37.69)	0.154*** (33.02)
DEBT/AT	-0.0254*** (-26.29)	-0.0227*** (-16.30)	-0.0233*** (-17.54)
log(MTB)	-0.00728*** (-16.40)	-0.0368*** (-45.15)	-0.0143*** (-20.81)
GS	-0.00955*** (-19.08)	-0.00797*** (-11.55)	-0.0101*** (-14.43)
STD	-0.0000793** (-2.17)	-0.0000727 (-1.87)	-0.0000807 (-1.75)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

Table 1.28 shows that the coefficient of competition (COMP) is positive and significant for all three specifications, providing evidence for the outcome model for firms incorporated in civil law countries. That is, higher the competition, the higher the dividend payouts in civil law countries. However, the coefficient of interaction (COMP*COMMON) is negative and significant for all specifications, suggesting that the relationship between competition and payouts is different in common and civil law countries. Because the magnitude of the interaction term is larger than the coefficient of competition in absolute value in all specifications, the relationship between payouts and competition for common law countries becomes negative—indicating the substitution model—suggesting that as competition increases, firms in common law countries pay lower amount of dividends as compared to those in civil law countries. In sum, the outcome model explains dividend policy in civil law countries, while the substitution model explains it in common law countries. Thus, the relationship between dividend payouts and competition is different for common law countries and civil law countries, as postulated in hypothesis number eight, to wit, legal origin does influence dividend policy.

Additionally, the control variables for all three specifications have the expected signs and are mostly significant: The coefficients of market value (MVRANK) and profitability (ROA) are positive and significant, as expected, and the coefficients of investment opportunities (MTB and GS) are negative and significant, as expected, as well. Finally, the risk (STD) is negative for all three specifications and significant for two specifications.

Table 1.29 Protestant vs. non-Protestant: The Relation between Payouts and the Interaction of Industry Competition and Religion

	$\frac{DVC}{AT}$	$\frac{DVC}{MV}$	$\frac{DVC}{SALE}$
Intercept	-0.0358*** (-36.29)	-0.0399*** (-32.07)	-0.0501*** (-36.93)
PROTESTANT	0.0156*** (25.12)	0.0210*** (21.80)	0.0137*** (16.14)
COMP	0.0177*** (26.35)	0.0235*** (24.86)	0.0222*** (24.97)
COMP*PROTESTANT	-0.0450*** (-38.42)	-0.0606*** (-38.52)	-0.0486*** (-34.40)
MVRANK	0.0303*** (43.60)	0.0425*** (44.39)	0.0477*** (42.20)
ROA	0.153*** (36.47)	0.175*** (37.65)	0.156*** (32.88)
DEBT/AT	-0.0253*** (-26.01)	-0.0235*** (-16.79)	-0.0229*** (-17.27)
log(MTB)	-0.00705*** (-15.95)	-0.0370*** (-45.29)	-0.0139*** (-20.40)
GS	-0.00955*** (-18.99)	-0.00787*** (-11.38)	-0.0101*** (-14.41)
STD	-0.0000771** (-2.12)	-0.0000739 (-1.89)	-0.0000776 (-1.69)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

Table 1.29 shows that the coefficient of competition (COMP) is positive and significant for all three specifications, providing evidence for the outcome model for firms incorporated in non-Protestant countries—that is, higher the competition, the higher the dividend payouts are in non-Protestant countries. However, the coefficient of interaction (COMP*COMMON) is negative, significant, and of greater magnitude in absolute terms for all specifications, suggesting that the relationship between competition and payouts is different in Protestant and non-Protestant countries. Because the magnitude of the interaction term is larger than the coefficient of competition in absolute value in all specifications, the relationship between payouts and competition for Protestant countries becomes negative—indicating the substitution model—suggesting that as competition increases, firms in Protestant countries pay lower dividends compared to those in non-Protestant countries. In sum, the outcome model explains the dividend policy in non-Protestant countries, while the substitution model explains it in Protestant countries. Thus, the relationship between dividend payouts and competition is different for Protestant countries and non-Protestant countries, as postulated in hypothesis nine, to wit, dominant religion has an influence on dividend policy.

In addition, the control variables of all three regressions have the expected signs and are significant: the coefficients of market value (MVRANK) and profitability (ROA) are positive and significant, as expected, and the coefficients of investment opportunities (MTB and GS) are negative and significant, as expected, as well. The risk (STD) is negative for all three specifications and significant at the 5 percent level for one of the specifications.

Table 1.30 High vs. Low Corruption: The Relation between Payouts and the Interaction of Industry Competition and Corruption

	$\frac{DVC}{AT}$	$\frac{DVC}{MV}$	$\frac{DVC}{SALE}$
Intercept	-0.0294*** (-27.56)	-0.0356*** (-25.77)	-0.0476*** (-29.83)
HIGH_CORR	0.00109 (1.38)	0.00802*** (7.52)	0.00443*** (4.25)
COMP	-0.0238*** (-21.11)	-0.0273*** (-20.11)	-0.0209*** (-14.73)
COMP*HIGH_CORR	0.0320*** (23.15)	0.0361*** (22.06)	0.0338*** (21.01)
MVRANK	0.0288*** (41.82)	0.0399*** (42.37)	0.0465*** (41.36)
ROA	0.156*** (36.89)	0.179*** (37.47)	0.157*** (32.75)
DEBT/AT	-0.0180*** (-19.02)	-0.0120*** (-8.73)	-0.0148*** (-11.40)

Table 1.30 -- Continued

log(MTB)	-0.00457*** (-10.29)	-0.0334*** (-42.39)	-0.0114*** (-16.87)
GS	-0.00994*** (-19.52)	-0.00840*** (-11.96)	-0.0106*** (-14.78)
STD	-0.0000888** (-2.39)	-0.0000896** (-2.30)	-0.0000961** (-2.02)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

Table 1.30 shows that the coefficient of COMP is negative and significant for all three specifications, providing evidence for the substitution model for firms incorporated in countries with low levels of corruption. That is, higher the competition, lower the dividend payouts in low-corruption countries. However, the coefficient of interaction (COMP*HIGH_CORR) is positive, significant, and larger for all specifications, turning the relationship between competition and dividend payouts positive in countries with high levels of corruption. This positive relationship provides evidence for the outcome model, which states that as competition increases, firms in high-corruption countries pay higher dividends. In sum, the outcome model explains the dividend policy in countries with high levels of corruption, whereas the substitution model explains the dividend policy in countries with low levels of corruption. Thus, the relationship between dividend payouts and competition is different for countries with high and low levels of corruption, as postulated in hypothesis ten, to wit, a country's level of corruption does influence its dividend policy.

Finally, the control variables of all three regressions have the expected signs and are significant: The coefficients of market value (MVRANK) and profitability (ROA) are positive and significant, as expected, and the coefficients of investment opportunities (MTB and GS) and risk (STD) are negative and significant, as expected, as well.

Table 1.31 High GNI vs. Low GNI: The Relation between Payouts and the Interaction of Industry Competition and GNI

	$\frac{DVC}{AT}$	$\frac{DVC}{MV}$	$\frac{DVC}{SALE}$
Intercept	-0.0274*** (-29.78)	-0.0272*** (-25.22)	-0.0436*** (-33.29)
HIGH_GNI	-0.00255*** (-2.88)	-0.00955*** (-8.53)	-0.00238** (-2.05)
COMP	0.00644*** (11.73)	0.00682*** (9.07)	0.0142*** (16.29)
COMP*HIGH_GNI	-0.0290*** (-20.59)	-0.0316*** (-19.10)	-0.0398*** (-20.51)
MVRANK	0.0285*** (41.57)	0.0398*** (42.60)	0.0453*** (42.64)
ROA	0.152*** (37.23)	0.173*** (37.73)	0.154*** (32.73)
DEBT/AT	-0.0191*** (-19.83)	-0.0142*** (-10.33)	-0.0141*** (-10.71)
log(MTB)	-0.00451*** (-10.32)	-0.0334*** (-43.02)	-0.0102*** (-16.48)
GS	-0.0108*** (-20.60)	-0.00952*** (-13.35)	-0.0116*** (-16.04)
STD	-0.0000856** (-2.34)	-0.0000843** (-2.21)	-0.0000906** (-1.96)

***, ** Represent significance levels at the 1% and 5% levels, respectively.

Table 1.31 shows that the coefficient of COMP is positive and significant, but relatively small in magnitude, for all three specifications, providing evidence for the outcome model for firms incorporated in countries with low Gross National Income (GNI). That is, greater the competition, the higher the dividend payouts in low-GNI countries. However, the coefficient of interaction (COMP*HIGH_GNI) is negative, significant, and larger in absolute value for all specifications, rendering the relationship between competition and dividend payouts negative in high-GNI countries. This negative relationship provides evidence for the substitution model, which predicts that as competition increases, firms in high-GNI countries pay lower dividends. In sum, the outcome model explains the dividend policy in low-GNI countries, whereas the substitution model explains it in high-GNI countries. Thus, the relationship between dividend payouts and competition is different for high-GNI and low-GNI countries, as postulated in hypothesis eleven, to wit, national wealth does influence dividend policy.

Finally, the control variables of all three regressions have the expected signs and are significant: The coefficients of market value (MVRANK) and profitability (ROA) are positive and significant, as expected, and the coefficients of investment opportunities (MTB and GS) and risk (STD) are negative and significant, as expected, as well.

The results thus far for the pooled sample tests are as follows. The substitution model explains the dividend policy across the Group of Seven industrialized nations—that is, as product market competition increases, dividend payment decreases. Respecting country characteristics influencing the relationship between competition and payouts, the findings are as follows. The relationship between product market competition and dividend payouts is different in each of the four pairs of country characteristics--common law vs. civil law, Protestant vs. non-Protestant, high vs. low levels of corruption, and high vs. low Gross National Income—tested. First, the outcome model explains the relationship between competition and dividend payouts in civil law countries, whereas the substitution model explains the relationship in common law countries. Second, the outcome model explains the relationship between competition and dividend payouts in non-Protestant countries, whereas the substitution model explains the relationship in Protestant countries. Third, the substitution model explains the relationship between competition and dividend payouts in countries with low levels of corruption, whereas the outcome model explains the relationship in countries with high levels of corruption. Finally, the outcome model explains the relationship between competition and dividend payouts in low-GNI countries, whereas the substitution model explains the relationship in high-GNI countries. In other words, the outcome model explains the dividend policy in civil law, non-Protestant, high-corruption, and low-GNI countries, and the substitution model explains the dividend policy in common law, Protestant, low-corruption, and high-GNI countries.

1.6 Conclusion

In the first part of the essay where I test the relationship between dividend payouts and competition in individual countries, the substitution model explains the dividend policy in five out of the seven countries tested—Canada, France, Germany, the United Kingdom, and the United States. That is, in these countries, the higher the level of competition is, the lower the dividend payouts are. The policy implication is that in corporations operating in high-competition industries, where corporate governance is considered good, managers do not have to rely on distributing dividends to create a good reputation. However, in corporations operating in low-competition environments, where corporate governance is deemed inferior, managers must rely on paying dividends to engender a reputation for treating outside shareholders well in order to increase opportunities to raise capital on favorable terms in the future.

While the results for Italy are inconclusive, in Japan the outcome model explains the dividend policy. That is, the higher the level of competition is, the higher the dividend payouts are. The implication of this finding in Japan is that corporations operating in high-competition industries—with good corporate governance—cannot easily hoard excess cash, invest in negative NPV projects, or engage in other financial mismanagement because the competitive market enforces managerial discipline by forcing managers to disgorge excess cash. However, respecting corporations operating in low-competition environments, the managers have much more latitude in engaging in financial mismanagement because of the lack of market pressure, resulting in managerial slack.

In the second part of this essay, I pool the data and address the question of how dividend policy responds to changes in external environments (country characteristics) in the presence of changing competition. The results show that in countries with better investor rights, the relationship between competition and payouts is negative, suggesting a substitution effect—the higher the level of competition, the lower the dividend payouts. However, in countries with poor investor rights, the relationship between competition and payouts is positive, suggesting an outcome effect—the higher the level of competition, the higher the dividend payouts.

Therefore, the policy implication is that in countries with better investor rights, where the substitution model prevails, managers do not have to rely on paying dividends in high-competition—good governance—industries to reduce agency cost and to create a good reputation. However, in low-competition—poor corporate governance—industries, managers must rely on dividends to reduce agency costs and to create a good reputation. Alternatively, in countries with poor investor rights, where the outcome model accounts for the dividend policy, managers must rely on paying dividends in high-competition industries, due to the demand from market forces, to reduce agency costs. However, in low-competition industries, managers do not have to rely on dividends to reduce agency costs because investors do not have the mechanism of high competition or improved investor rights to force managers to disgorge excess cash.

CHAPTER 2

DPS-END CLUSTERING AND RIGIDITY IN DIVIDEND POLICY

2.1 Introduction

Corporate dividend policy has been extensively studied in the context of traditional finance, which assumes that the markets are perfect and its participants are rational. Perfect financial market denotes that there is no transaction cost, no asymmetric information, no taxes, and no inefficiency. Rationality denotes that the market participants have the capability to assess volumes of available and relevant information quickly to maximize the total wealth of their portfolios using laws of probability and statistics in an unbiased fashion. However, recent growth in behavioral finance literature has confirmed that the markets and the participating agents, such as the investors, institutional managers, and corporate managers, do not behave in accordance with the assumptions and assertions of a traditional finance paradigm in a purely rational manner. Instead, the market participants are heavily influenced by the various cognitive biases or errors in the way they think. Market participants are subject to a variety of systematic cognitive biases, including the convenience hypothesis, the attraction hypothesis, the left digit effect, conservatism, heuristics, mental accounting, framing, representativeness, and the disposition effect, among others. The insights gleaned from the various cognitive biases studied in the behavioral finance literature have not been adequately applied in the context of dividend policy. Explaining dividend policy by incorporating psychological biases already studied in behavioral finance literature can provide valuable insights. Pursuant to this view, this chapter examines whether corporate managers exhibit clustering and rigidity in dividend policy decisions.

In order to ascertain whether dividend policy is influenced by the cognitive bias of clustering and rigidity of digit-ends, I start by defining what clustering and rigidity are, and then determine what causes them. What is clustering? Clustering occurs when some numbers are observed more frequently than expected. Price-endings of zero and five occur more frequently than any other digits in stock prices (Harris, 1991). Thus, it can be said that clustering around price-ends of zero and five has been observed in stock prices. What is rigidity? Rigidity refers to the condition of being inflexible or sticky. If salient DPS-ends such as zero and five change more slowly in comparison to the average change of all digit-ends, they are considered rigid. In retail markets, prices ending in nine are considered sticky, for they inhibit price changes. The study on the link between price points and rigidity is very limited and there is no previous study on the connection between DPS-points and rigidity.

What are the causes of clustering and rigidity? Among other things, clustering and rigidity can be caused by the convenience hypothesis, the attraction hypothesis, and the left digit effect (Monroe and Lee, 1999; Goodhart and Curcio, 1991; Stiving and Winer, 1997). First, according to the convenience hypothesis, clustering and rigidity can be attributed to people's preference for convenient numbers. Numbers ending in zero are the most convenient numbers, while numbers ending in five are the second-most convenient ones. People prefer these numbers because of the computational simplicity associated with numbers ending in zero and five. For example, it is much easier and faster to multiply 238 by 10 than to multiply it by a nonconvenient number such as seven or nine. Second, clustering and rigidity can be attributed to people's natural attraction to prominent numbers. According to the attraction hypothesis, numbers ending in zero are the most preferred, numbers ending in five are the second-most preferred, and numbers ending in nine are the least preferred. Third, clustering and rigidity occur because of the left digit effect. People read from left to right; hence, we tend to place more importance on the leftmost digit and overlook the remaining digits (Stiving and Winer, 1997). For example, the difference between $1.99 and $2.00 is one cent; however, since humans are susceptible to the left digit effect, we tend to anchor on the leftmost digit and approximate the difference as $1.00. Therefore, those preferring to establish the perception that retail prices are low will set the prices at nine-ending digits (e.g., $1.99), whereas those preferring to establish the perception that DPS are high will set them at a zero-ending digit (e.g., $2.00). Thus, clustering and rigidity on digit-ends can be attributed to the attraction hypothesis, the convenient numbers hypothesis, and the left digit effect.

In the previous paragraphs, I defined clustering and rigidity and provided theoretical backgrounds for them in general. In the following paragraphs, I specifically address dividend clustering and rigidity associated with dividends per share at digit-ends of zero, five, and nine. As explained previously, clustering and rigidity in DPS-ends are primarily attributed to the convenience hypothesis, the attraction hypothesis, and the left digit effect.

First, with respect to the cognitive bias of preferring convenient numbers (Monroe and Lee, 1999; Mitchell, 2001), managers may prefer to fix DPS at digits ending in zero or five due to the convenience or simplicity of calculation associated with these numbers. For example, if a company has ten million shares outstanding and dividend is $0.10 per share, it is easy to compute the total dividend payout to be $1,000,000. Similarly, an investor who owns eight hundred shares can easily compute that the total dividend to be received is $80.00. Similarly, if DPS ends in the digit five, the second most prominent number, such as $0.05, the total dividend may be computed as half of the previously calculated total amounts. This requires slightly more effort than in the previous case, but is relatively easy compared to the computational difficulty associated with nonconvenient numbers. To be complete, if DPS ends in any nonprominent number, it becomes rather difficult to make the necessary computation quickly and effortlessly. Therefore, humans prefer numbers ending in zero and five or prominent (convenient) numbers, which contributes to clustering and rigidity in dividend policy.

The second reason for clustering and rigidity in DPS-ends is the attraction hypothesis, asserted by Goodhart and Curcio (1991) and Aitken et al. (1996). The attraction hypothesis states that people have a natural order of attraction or preference for digit-ends in the decimal system. According to the attraction hypothesis, zero, the foremost salient number, has the greatest attraction, five, the second most salient number, has the second-greatest attraction, and nine, the least salient number, is preferred the least in the decimal numeration system. Therefore, zero is expected to be the most common final digit, five is expected to be the second most commonly observed final digit, and nine is predicted to be the least common final digit. In addition, a DPS-end of zero is predicted to be kept the longest, five is expected to be maintained the second longest, and nine the shortest number of months. Thus, the attraction hypothesis also explains the tendency to cluster and be rigid on digit-ends of zero and five.

The third reason for DPS clustering and rigidity of digit-end of zero (not five) is the left digit effect. The left-digit effect is the psychological tendency to anchor on the leftmost digit of a value and overlook the remaining digits. The reason people tend to anchor on the leftmost digit is that we read from left to right and possess limited memory and information-processing ability. For example, a DPS of $1.99 is perceived as one something, whereas a DPS of $2.00 is perceived as two. Due to the left digit effect, investors perceive that there is a $1 difference between the two dividends, while the actual difference is only one cent. Thus, if managers understand that investors tend to fixate on the leftmost digit and perceive the zero-ending dividends to be significantly larger than the nine-ending dividends that are one cent lower, there should be more zero-ending dividends (e.g. $2.00) and very few nine-ending dividends (e.g. $1.99). Further, DPS last digit of zero is likely to be kept longer, while DPS last digit of nine is unlikely to remain unchanged longer than the average. That is, clustering and rigidity are expected in zero-ending digits and the exact opposite is expected in nine-ending DPS.

In conclusion, the convenience and attraction hypotheses have the greatest influence on DPS ending in zero, the second-greatest effect on DPS with a terminal digit of five, and no effect on DPS ending in nine. The left digit effect influences DPS with a terminal digit of zero or nine, but not five. Therefore, if clustering exists in dividend policy, I should observe DPS ending in zero to have the highest frequency due to the combined effect of the convenience hypothesis, the attraction hypothesis, and the left digit effect. DPS with a terminal digit of five should have the second-highest frequency, as five is the second most prominent digit according to the convenience and attraction hypotheses. Finally, nine-ending DPS are expected to have the lowest frequency, due to the left digit effect and the nonpreferred status accorded to them by the convenience and the attraction hypotheses. Additionally, if rigidity caused by DPS-ends exists in dividend policy, I should observe the following. First, DPS terminal digits of zero and five should have a lower number of changes, while nine-ending digits should have a higher number of changes. Second, DPS-ends of zero and five should remain the same for substantially longer amount of time, in comparison to the average duration of all digits, while nine-ending DPS should remain unchanged for a shorter than the average amount of time.

The importance of this study—incorporating behavioral finance into the study of dividend policy—has been cogently explained by a number of prominent authors. Frankfurter and Wood (2002:128) explain it as follows.

> Current models of corporate dividend policy by and large ignore behavioral and socioeconomic influences on managerial and shareholder activities. Unless these influences are incorporated into future models, dividend preference is difficult to explain, other than as an irrational desire by investors for dividends (Shiller, 1984). The exclusion of these motivations from financial models severely limits their application to corporate activities and policy determination. Dividend policy is influenced by the same fads and fashions that affect stock prices because the managers who determine dividend policy are motivated by behavioral and socioeconomic influences (Shiller, 1990). As Shiller (1986) argues, a model incorporating a combination of modern financial theories and behavioral and psychological influences might best explain corporate dividend policy. Until such model is developed, tests of dividend policy theories will remain both inconclusive and inconsistent.

Similarly, Miller (1986) concludes that behavioral/cognitive elements are part of dividend policy study and cannot be ignored. Pursuantly, I incorporate behavioral finance concepts such as the attraction, convenience, and left digit effect hypotheses, among others, in studying the role of DPS terminal digit clustering and rigidity in dividend policy decisions. Moreover, Blinder, et al. (1998) and Hall, Walsh, and Yates (2000) state that psychological pricing points is one of the theories explaining price rigidity. I test this theory in the context of dividend policy by examining whether certain DPS-ends contribute to rigidity in dividend policy. Next, I discuss the contribution of this research.

With respect to clustering, the link between DPS-ends and clustering has been addressed only once in prior literature, as far as I am aware. Aerts, Campenhout, and Caneghem (2008) document dividend clustering by examining the second digit of DPS for the United States using Benford's Law. I add to the literature by studying clustering in DPS cent digits using the grand mean for comparative purposes, which is rather different from the second digit examined by Aerts et al. using Benford's Law. Moreover, I expand the study to four countries other than the United States, for it is important to examine whether the digit-end clustering observed for the United States is applicable in other countries as well. Researchers have observed that some of the digit-ends of numbers have slightly different meaning in different countries. For example, while nine-ending prices are popular in North American and some European countries (Konieczny and Skryzypacz 2003, 2004), eight-ending prices are especially favored in some Asian countries (Heeler and Nguyen, 2001).

With respect to DPS digit-end rigidity, prior studies have documented that dividends are generally inflexible (Lintner, 1956; Miller and Modigliani, 1961); however, the contribution of DPS terminal digits to changes or the lack thereof in dividends has not yet been assessed in the finance literature. I address rigidity in dividend policy by examining the frequency of changes in DPS digit-ends and the duration or the length of time DPS digit-ends remain unchanged. Thus, this essay fills a gap in the literature by assessing whether DPS terminal digits contribute to dividend policy decisions by inhibiting changes in dividends. In order to assess whether the results found for the United States are applicable to other countries, I expand the study to four countries other than the United States.

In summary, pursuant to the view of Miller (1986), Shiller (1984, 1986, 1990), and Frankfurter and Wood (2002) that elements of behavioral finance need to be incorporated into the study of dividend policy, I contribute to the literature in general by incorporating various behavioral finance concepts in studying dividend policy. Moreover, I contribute to the literature by applying the theory on price rigidity, which states that price-ends contribute to price rigidity, to the study of dividend policy by testing whether DPS-ends contribute to dividend rigidity. Specifically, I find that clustering, a behavioral finance concept, in DPS-ends contributes to dividend policy decisions. In addition, rigidity, another behavioral finance concept, in DPS-ends also contributes to dividend policy decisions.

The remainder of this chapter is organized into the following sections. In section 2, I present a brief review of the pertinent literature. In section 3, I introduce and explain my hypotheses. In section 4, I discuss my data and methodology. In section 5, I report the results. In section 6, I provide a description of the robustness test and its results. In section 7 I summarize my findings and conclusions.

2.2 Literature Review

In this section, I review the theoretical and empirical literature on clustering and rigidity. Digit-end clustering has been explained by the attraction to salient numbers, the left digit effect, the limited memory, and the convenience hypotheses. The theoretical explanations for clustering or bunching of DPS digit-ends can be naturally extended to the rigidity of DPS-ends as well. Moreover, prominent behavioral finance concepts such as mental accounting, conservatism, anchoring, and rules of thumb are additional possible explanations for DPS clustering and rigidity. These behavioral explanations of rigidity and clustering are not mutually exclusive. A brief review of the theoretical literature regarding how these psychological phenomena contribute to clustering and rigidity is provided, followed by a summary of prior relevant empirical findings.

Behavioral finance concepts such as convenience, attraction to salient numbers, limited memory, the left digit effect, mental accounting, conservatism, anchoring, and rules of thumb are some of the possible explanations for DPS clustering and rigidity. According to the convenience hypothesis, clustering and rigidity are a result of using convenient numbers. Numbers ending in zero and five are more convenient and easier for computational processing. Thus, people routinely round numbers to make computations easier (Loomes, 1988; Monroe and Lee, 1999), and rounding of numbers is a human habit (Mitchell, 2001). Clustering and rigidity can also be attributed to investor attraction to salient numbers. According to the attraction hypothesis, humans have a psychological attraction to salient numbers such as zero and five (Goodhart and Curcio, 1991; Aitken et al., 1996). Numbers ending in zero function as cognitive reference points (Rosch, 1975). A third explanation of clustering and rigidity on salient numbers could be attributed to the limited memory humans possess. Because of limited memory, investors find it easier to remember round numbers (Schindler and Wiman, 1989). Moreover, investors give more importance to the first digit and lower importance to the remaining digits of a price because of limited memory (Brenner and Brenner, 1982). Clustering and rigidity can also be ascribed to the left digit effect, where humans focus on the first digit and truncate the remaining digits. Retail prices are dominated by prices that are one cent lower ($1.99) than round numbers ($2.00) (Stiving and Winer, 1997). Due to the left digit effect, a nine-ending price ($1.99) will be perceived as significantly lower than a round number one cent higher ($2.00). This left digit effect can be observed in many other measurements as well, including years. The passage of year from 1999 to 2000 was considered more important than the passage of year from say, 1998 to 1999, partly because of the change in the left digit. Mental accounting is another possible explanation for clustering and rigidity. If managers are susceptible to the behavioral finance concept of mental accounting (Thaler, 1999) or believe that the investors are susceptible to mental accounting, they are likely to set dividends at the psychological points and will be reluctant to change them. For example, firms that pay DPS at or above the cognitive reference points, such as those ending in zero, may be mentally accounted (segregated) into high-DPS-paying stocks, while firms with DPS one cent below the cognitive reference point may be mentally segregated into low- dividend-paying stocks. Conservatism (Shiller, 2000) is another possible explanation for clustering and particularly rigidity. The theory suggests that these attractive terminal digits of DPS will be sticky. That is, the theory of conservatism predicts that managers will be too slow or too conservative in changing the dividends when the DPS digit-ends are at the cognitive reference points of zero and five. Similarly anchoring is another possible explanation for clustering and rigidity. The concept of anchoring (Kahneman and Tversky, 1974) suggests that managers will particularly want to maintain the rigidity of cognitive DPS points. For example, cognitive reference points may be used as anchors for establishing and maintaining dividend policy, and managers will make adjustments too slowly from the anchor, which will contribute to rigidity. Finally, the use of rules of thumb to make decision-making easier (Ritter, 2003) could be another possible explanation for clustering and rigidity. Thus, managers may set DPS at the cognitive reference points, since people may formulate and use rules of thumb in quickly making a decision that a firm paying DPS at a cognitive reference point is worth more than a firm paying DPS one cent lower. As I have shown, all of these behavioral-based theories are possible explanations for DPS digit-end clustering and rigidity. Next, I will review some of the relevant empirical and survey studies regarding clustering and rigidity individually.

The seminal work on price clustering in the U.S. equity markets was conducted by Osborne (1962), followed by Niederhoffer (1965). Osborne showed that high, low, and closing equity prices on the New York Stock Exchange (NYSE) clustered on whole numbers, halves, quarters, and odd eights, from highest clustering to lowest, respectively. Niederhoffer documented that NYSE buy and sell limit orders cluster on familiar price-ends such as 10, 25, 50, 75, and 100. Harris (1991), using NYSE daily closing prices, also documented that clustering persists in stock prices ending in whole numbers, halves, quarters, and odd eights. Clustering on price ends has been documented in international markets as well. Aitken et al. (1996) find clustering on prices ending in zero and five for the Australian equity market. Hameed and Terry (1998) document clustering on price ends for the equity market in Singapore, and Grossman et al. (1997) show clustering for the London equity market. Other studies indicate the presence of clustering in foreign exchange rates (Goodhart and Curcio, 1991) and initial public offering (IPO) bids in Israel (Kandel, Sarig, and Wohl, 2001). Moreover, clustering on price-ends has been documented in bank deposit rates (Kahn, Pennacchi, and Sopranzetti, 1999), gold market prices (Ball, Torous, and Tschoegl, 1985), earnings forecasts (Herrmann and Thomas, 2005), real estate prices (Palmon, Smith, and Sopranzetti, 2004), retail markets (Stiving and Winer, 1997), and S&P futures (Schwartz, Van Ness, and Van Ness, 2004). While the literature on price-end is growing, studies documenting digital analysis in dividends are limited to Aerts, Campenhout, and Caneghem (2008). They examine the second digit of the DPS of U.S. firms from 1995 to 2004 and find that there are significantly more zeros and fives in the second from the left position (second digit) of the DPS than expected based on Benford's Law. They also find significantly fewer occurrences of six, seven, eight, and nine than expected. Additionally, they document that more than expected number of firms keep zero and five as the second digit of DPS for the entire duration of the sample period. This suggests that managers set dividend policy at the cognitive reference points to make the dividend appear more attractive.

To my knowledge, prior literature has not explicitly examined DPS digit-end rigidity. Thus, a brief overview of related literature is provided. Blinder et al. (1998) survey approximately 200 U.S. companies regarding pricing practices and discuss twelve theories on price rigidity, and psychological pricing points is listed as one of the important theories explaining price rigidity from a practitioner's perspective. Hall, Walsh, and Yates (2000) rank psychological pricing points as the fourth most important factor out of eleven theories on price rigidity. Thus, the psychological impact of attractive terminal digits is widely recognized and is considered very important to price rigidity. Kashyap (1995) analyzes catalog prices from 1953 to 1987 and finds weak evidence in support of price rigidity caused by psychological pricing points. Levy, et al. (2008) examine two retail datasets and conclude that price points constitute a substantial source of price rigidity. Moreover, the literature on dividends documents the inherent rigidity in dividend policy. Lintner's survey (1956) notes that managers are reluctant to change dividends, and they will alter dividends only if they anticipated a permanent, not temporary, change in earnings. Miller and Modigliani (1961) demonstrate that firms alter dividends if the earnings are expected to change permanently. They further point out that managers do not change dividends if earnings are expected to change only temporarily. DeAngelo, DeAngelo, and Skinner (1992) also document the reluctance of U.S. managers to cut or omit dividends by observing that managers are more inclined to cut dividends if the earnings decline is persistent. Edwards and Mayer (1986), in their survey of large U.K. firms, find that firms reduce dividends only when they believe the earnings drop is permanent. In sum, all of these studies call attention to the rigidity of dividends.

2.3 Hypotheses

In this section, I describe the hypotheses for testing clustering and rigidity on DPS ending digits of zero, five, and nine. The first set of three hypotheses (one through three) tests whether clustering and rigidity exist on DPS terminal digits of zero and five. The second set of three hypotheses (four through six) ascertains whether clustering and rigidity in DPS ending in zero are greater as compared to clustering and rigidity in those ending in five. Finally, the third set of three hypotheses (seven through nine) predicts that clustering and rigidity do not exist in DPS ending in nine. Hypotheses and detailed explanations follow.

2.3.1 Clustering and Rigidity of DPS Ending in Zero and Five

The following three hypotheses predict that clustering and rigidity exist in DPS ending in zero and five. The first hypothesis is that greater-than-expected frequency is associated with DPS ending in zero and five. Greater-than-average frequency indicates clustering in those DPS-ends. The second hypothesis is that a lower-than-expected number of changes is associated with DPS-ends of zero and five. A lower-than-expected number of changes indicates rigidity in those DPS-ends. The third hypothesis is that greater-than-expected duration (number of months a DPS digit-end remains unchanged) is associated with DPS-ends of zero and five. Greater-than-average duration indicates rigidity in those DPS-ends.

One of the factors contributing to dividend clustering and rigidity at DPS terminal digits of zero and five is the intrinsic attraction people have toward these prominent numbers (Goodhart and Curcio, 1991; Aitken et al., 1996). Another factor contributing to dividend clustering and rigidity at DPS-ends of zero and five is the computational simplicity (convenience) associated with such numbers. Thus, people prefer DPS ending in zero and five more than they prefer those ending in other nonprominent digits. The higher preference for DPS ending in zero and five suggests that there will be clustering and rigidity in these digit ends. Therefore, consistent with the first hypothesis, I expect higher numbers of DPS with digits ending in zero and five in comparison to the average frequency of all DPS-ends. Moreover, according to these theories, managers will be unlikely to change DPS-ends of zero and five as frequently as they will the nonprominent terminal digits. This should lead me to observe fewer changes in DPS terminal digits of zero and five in comparison to the average number of changes of all the DPS-ends, which is consistent with hypothesis two. Finally, management is expected to maintain DPS with terminal digits of zero and five longer than the average duration of all DPS digits, which is consistent with the third hypothesis

2.3.2 Clustering and Rigidity of DPS Ending in Zero Greater than That of DPS Ending in Five

The second set of three hypotheses (four through six) predicts that clustering and rigidity are greater in DPS ending in zero than in those ending in five. The fourth hypothesis is that the frequency of DPS ending in zero exceeds the frequency of DPS ending in five. In other words, clustering on DPS ending in zero is expected to exceed clustering in those ending in five. The fifth hypothesis is that the number of changes associated with DPS with a last digit of zero will be lower than the number of changes associated with DPS with a final digit of five. This lower frequency of changes indicates that the DPS ending in zero are more rigid, or stickier, than those ending in five. The sixth hypothesis is that the duration of DPS ending in zero will exceed the duration of DPS ending in five. The longer duration associated with DPS ending in zero denotes that they remain unchanged longer or are more rigid in comparison to those ending in five.

According to the attraction hypotheses, zero-ending digits are preferred to five-ending digits. Additionally, according to the convenience hypothesis, zero- and five-ending digits make computations simple, but zero-ending digits are the easiest numbers to work with. Thus, investors and managers prefer numbers ending in zero more so than they prefer digits ending in five. Besides the convenience and attraction hypotheses, another factor contributing to dividend clustering around zero (not five) is the left digit effect. For DPS ending in zero, a one-cent increase from below (from $1.99 to $2.00) changes the left digit, whereas a DPS ending in five is not susceptible to the left digit effect. This gives the perception that DPS ending in zero (e.g. $2.00) are significantly higher than DPS ending in nine (e.g. $1.99), though they are only one cent lower. Therefore, managers have a strong incentive to set and keep DPS at the terminal digit of zero rather than five. That is, the combined influence of the left digit effect and the convenience and attraction hypotheses tends to result in more clustering and rigidity on DPS ending in zero compared to DPS ending in five. Specifically, DPS ending in zero are expected to occur more frequently than

DPS ending in five, supporting hypothesis four. Moreover, DPS ending in zero are expected to have on average a lower number of changes in comparison to DPS ending in five, supporting hypothesis five, because managers will be more resistant to altering DPS ending in zero in comparison to DPS ending in five. Finally, the duration of DPS ending in zero is expected to be longer than that of those ending in five, supporting hypothesis six.

2.3.3 No Clustering and Rigidity in DPS Ending in Nine

The third and final set of three hypotheses (seven through nine) predicts that clustering and rigidity are not expected in DPS ending in nine. The seventh hypothesis is that a lower-than-expected frequency is associated with DPS ending in nine. A lower-than-average frequency suggests an absence of clustering. The eighth hypothesis is that a greater-than-expected frequency of change is associated with DPS terminal digit nine. A higher-than-average frequency of change indicates an absence of rigidity. Finally, the ninth hypothesis is that a lower-than-expected duration is associated with DPS ending in digit nine. A shorter duration also indicates an absence of rigidity.

Nine is the least preferred number in the decimal system according to the attraction hypothesis, and nine is not a prominent number according to the convenience hypothesis; thus, managers do not have a cognitive preference for it. In addition, people exhibit a cognitive bias called the left digit effect in perceiving zero-ending amounts (e.g., $2.00) to be substantially higher than nine-ending amounts (e.g., $1.99). In this example, the leftmost digit changes from $1 to $2, which results in a perception that the DPS with a terminal digit of zero is $1 higher than the DPS with a terminal digit of nine, although the actual difference is only one cent. Therefore, managers are less likely to set DPS with a terminal digit of nine. Because DPS ending in nine are nonprominent numbers according to the convenience, the attraction, and the left digit effect hypotheses, I expect nine-ending DPS to have a lower-than-average frequency, perhaps the lowest frequency of all of the digit-ends, which supports hypothesis seven. This left digit effect would be a strong incentive for managers to change those DPS with nine-ending digits quickly. Thus, due to the left digit effect and the lack of attraction and convenience associated with numbers ending in nine, one should observe a higher frequency of changes for DPS with terminal digit of nine, which supports hypothesis eight. Finally, it is expected that DPS with terminal digit of nine will have a lower duration (be less rigid) than the average duration of all DPS-ends, which supports hypothesis nine.

2.4 Data and Methodology

2.4.1 Data

The sample is initially comprised of the G7 financial markets: Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States. I then eliminate the currencies where the majority of the dividends per share change in increments other than cents. DPS denominated in French francs, German marks, Italian lira, and Japanese yen do not increment in low denominations of one cent. They change in larger denominations only, which make these currencies unsuitable for a study focused on the cent digits of DPS. Moreover, most of the dividends denominated in British pounds increment at the tiny denomination of ten-thousandth decimal place (fourth digit after the decimal). This suggests that the managers may not be focusing on the pence digit as much because of the high value of the currency. Therefore, the French franc, German mark, Italian lira, Japanese yen, and British pound are omitted from the study, resulting in the retention of the following currencies: United States dollar, Canadian dollar, and euro. In terms of countries, the Unite States, Canada, France, Germany, and Italy—two North American and three European countries—are retained for analyses. Common dividends per share (DVPSXM) of firms incorporated in the United States and Canada are obtained from the Compustat North America Security Monthly database via WRDS interface for the period from 1995 to 2010. Common dividends per share (DIV) for the remaining countries (Germany, France, and Italy) are collected from the Compustat Global Security Daily database for the period from 1999 to 2010, because the euro was adopted by these countries as their official currency on January 1, 1999. Consistent with Aerts, Campenhout, and Caneghem (2008) and because including DPS of .01 through .09 would bias the results against the digit zero, I eliminate DPS below ten cents. Finally, I eliminate firms with multiple issues of common stocks.

2.4.2 Methodology

First, I compute the frequencies of the terminal digits of DPS and plot them on a histogram. The frequencies of the cent digits are expected to be approximately 10 percent each, based on uniform distribution of possible digits from zero to nine. If instead we observe the frequencies of DPS ending in zero and five to exceed the equal distribution, it will denote clustering around those prominent digits. Moreover, if nine-ending digits show a lower-than-expected frequency of occurrence on the histogram, this will provide further support for clustering caused by the left digit effect, the convenience, and the attraction hypotheses. While the histogram is expected to provide prima facie evidence in support of clustering, appropriate statistical techniques are essential for drawing statistical conclusions. Because the digit-ends are categorical variables, suitable categorical coding schemes are employed. Following Aerts, Campenhout, and Caneghem (2008), I use the z-test defined by the following formula:

$$Z = \frac{P - P_O}{\sqrt{\frac{P_O(1-P_O)}{n}}}, \qquad (1)$$

where P is the sample proportion, P_o is the hypothesized or expected value of the population proportion, which in this case is the mean of the sample proportions, and n is the number of observations or sample size.

However, where the z-test is not appropriate, pursuant to Bitta et al. (2006), deviation coding, which compares deviation from the grand mean, is utilized. The z-test, applied in the analysis of clustering, is used to test the observed counts versus the set of expected counts, whereas the deviation coding, a specific form of indicator variable coding scheme, used in rigidity analysis, is a regression, requiring both a dependent variable and a set of independent variables. The deviation coding regression model is specified as follows:

$$Y = \alpha + \beta o Do + \beta 1 D1 + \cdots + \beta 9 D9 \qquad (2)$$

The dependent variable is the number of changes associated with each digit or the duration associated with each digit, depending on the regression. The indicator variable Do corresponds to DPS ending in zero, the indicator variable $D1$orresponds to DPS ending in one, and so on. The coefficient βo is the difference between the mean for DPS ending in zero and the overall mean, the coefficient $\beta 1$ is the difference between the mean for DPS ending in one and the overall mean, and so on. In other words, the deviation coding system first compares the mean value associated with a digit-end of zero to the grand mean value of all ten digit-ends. Then it compares the mean associated with digit-end five to the mean value of all ten digit-ends; finally, it compares the mean value of digit-end nine to the mean value of all ten digit-ends. The deviation coding regression and histogram described earlier are utilized for evaluating rigidity associated with duration and changes in DPS terminal digits. In conclusion, histograms and z-tests are utilized for testing DPS clustering, whereas histograms and deviation coding tests are utilized for evaluating DPS rigidity. Results are presented next.

2.5 Results

2.5.1 Clustering: Frequency of DPS-ends

Figures 2.1 through 2.5 plot histograms for DPS last digits for the five countries: France, Germany, Italy, Canada, and the United States. The figures show the frequency of DPS last digits in percentage on the vertical axis and the DPS last digits on the horizontal axis. DPS last digits are the cent digits of dividends per share. DPS last digits frequency is the frequency of each DPS last digit in percentage for a given country. For example, if there are two hundred DPS observations and fifty of these have a last digit of zero, then DPS last digit of zero has a frequency of 25 percent. DPS last digits range from zero to nine; therefore, based on uniform distribution, each of the ten bins should contain approximately 10 percent of the dividends. However, if clustering is present in prominent digit-ends, then the frequency of dividends ending in zero and five should be higher than 10 percent. The histograms reveal that the frequencies of DPS ending in zero and five are greater than the expected uniform frequency of 10 percent in all five countries, visually confirming hypothesis one. The histograms further reveal that the frequency of DPS ending in zero exceeds the frequency of DPS ending in five in all five countries, visually confirming the fourth hypothesis. Finally, the histograms reveal that the frequency associated with DPS ending in digit nine is less than the expected uniform frequency of 10 percent in all five countries, visually confirming the seventh hypothesis. It is noteworthy that the histograms generally show that the highest percentage frequency of dividends occurs at the digit-end of zero, and the second-largest percentage frequency of DPS occurs at the digit-end of five, while the lowest frequency occurs at DPS ending in nine. Thus, Figures 2.1 through 2.5 provide visual verification that clustering exists in DPS digit-ends of zero and five in all countries due to the convenience, the attraction, and the left digit effect hypotheses. Next, a z-test is applied for further analysis of the same hypotheses.

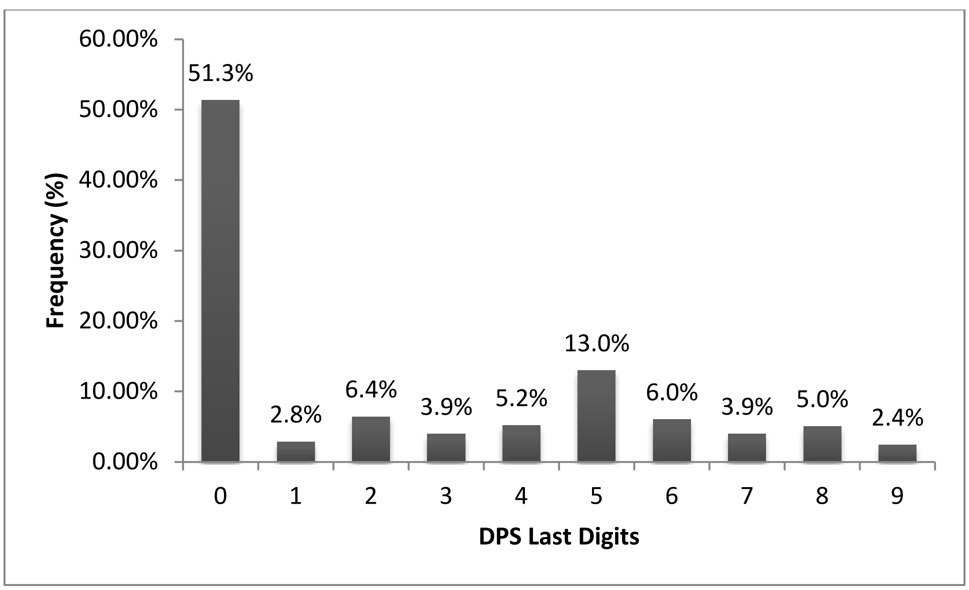

Figure 2.1 Frequency of DPS Last Digits in France

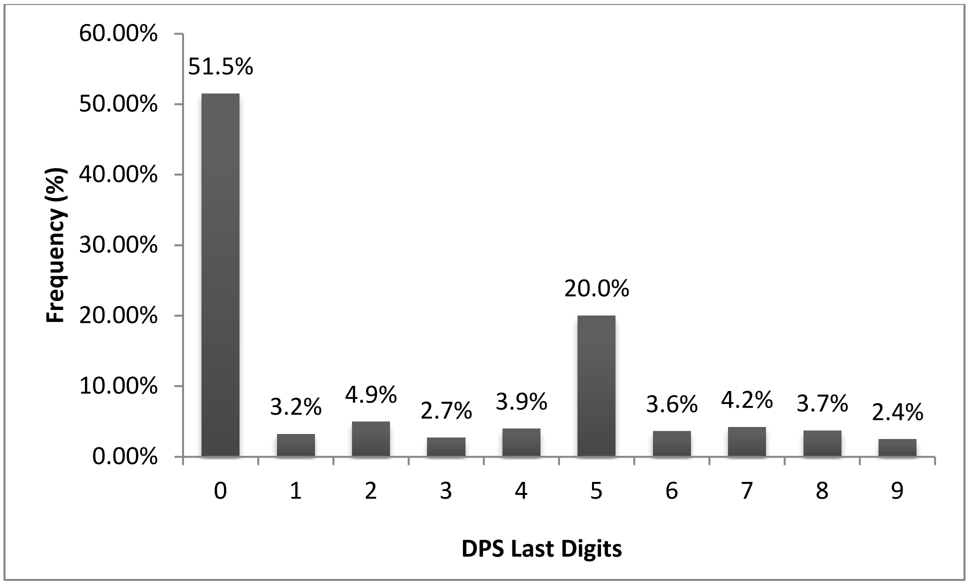

Figure 2.2 Frequency of DPS Last Digits in Germany

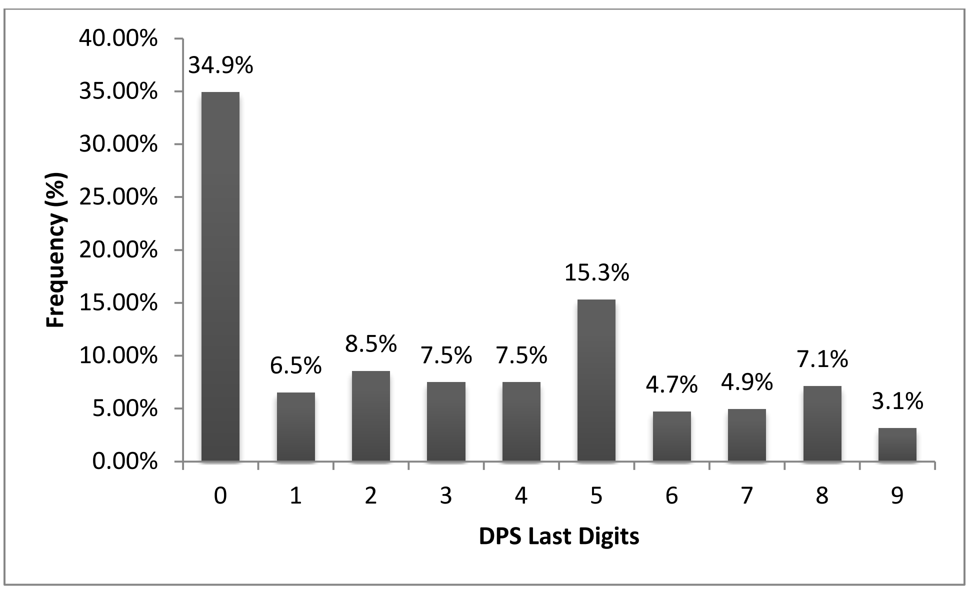

Figure 2.3 Frequency of DPS Last Digits in Italy

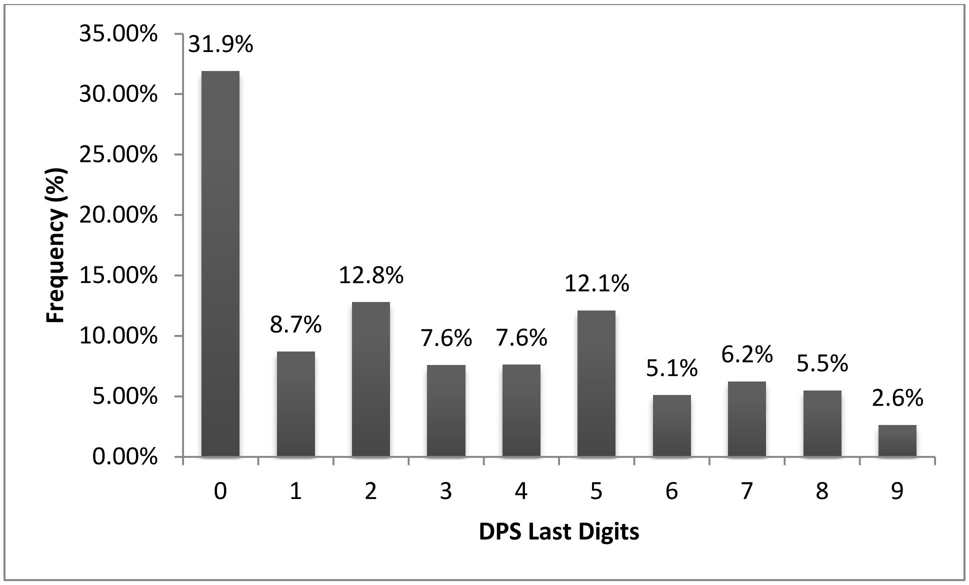

Figure 2.4 Frequency of DPS Last Digits in Canada

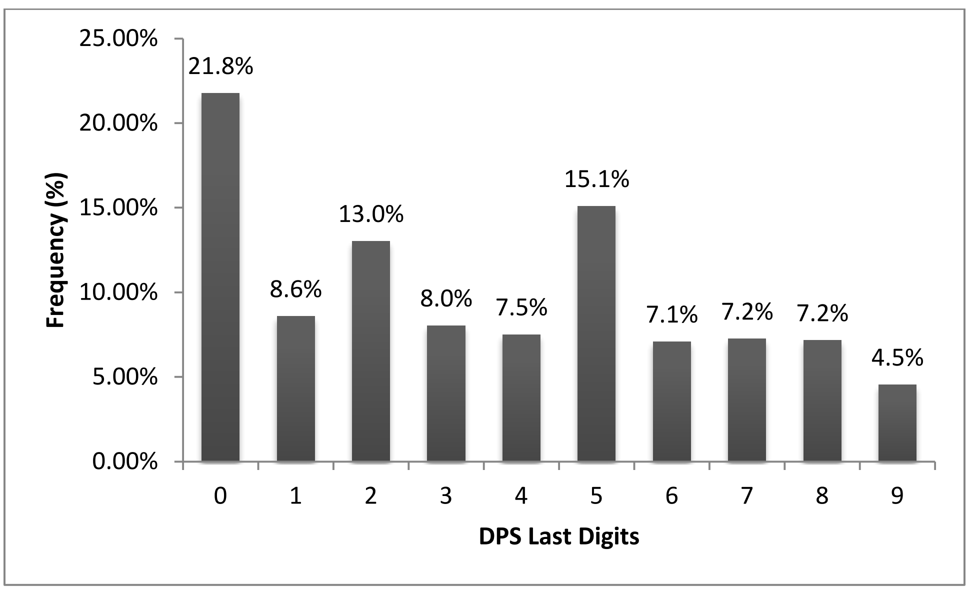

Figure 2.5 Frequency of DPS Last Digits in the United States

Tables 2.1 through 2.5 present the coefficient estimates and corresponding t-statistics associated with each of the DPS last digits in France, Germany, Italy, Canada, and the United States, in that order. Each table displays the cent digit of dividend per share, the coefficient estimate associated with each of the DPS-ends, and the corresponding z-statistics, respectively. The coefficient estimates are calculated by subtracting the expected (average) frequency of all digits from the frequency associated with each DPS-end. The tables reveal that the coefficient estimates of dividends ending in zero and five are positive and significant in all five countries. This indicates that the frequencies of DPS ending in zero and five are significantly greater than the expected frequency, providing evidence for hypothesis one, that clustering exists in DPS ending in zero and five. The tables further reveal that the coefficient estimate of DPS ending in zero exceeds the coefficient estimate of DPS ending in five in all five countries, further confirming the fourth hypothesis, that clustering in digit end of zero is greater than that in digit end of five. Finally, the tables reveal that the coefficient estimate associated with DPS ending in digit nine is negative and significant at the 1 percent level—that is, the frequency associated with DPS ending in digit nine is significantly less than the expected frequency—in all five countries, confirming the seventh hypothesis, that clustering does not exist in DPS ending in nine. Thus, Tables 2.1 through 2.5 provide statistical confirmation that clustering exists in DPS digit-ends of zero and five in all countries due to the convenience, the attraction, and the left digit effect hypotheses. The evidence further suggests that managers set DPS at the cognitive reference point to give the perception that dividends are significantly larger than the perceived value would have been, had the dividend been set one cent below the cognitive reference point.

Table 2.1 Frequency of DPS Last Digits in France

Digit	Estimate	z-score
0	41.32%	90.89
1	-7.15%	-15.73
2	-3.59%	-7.90
3	-6.07%	-13.36
4	-4.83%	-10.63
5	2.95%	6.49
6	-4.01%	-8.81
7	-6.05%	-13.31
8	-4.97%	-10.94
9	-7.59%	-16.69
Average = 10% N = 4,355		

Table 2.2 Frequency of DPS Last Digits in Germany

Digit	Estimate	z-score
0	41.47%	72.51
1	-6.80%	-11.89
2	-5.09%	-8.9
3	-7.35%	-12.86
4	-6.07%	-10.62
5	9.99%	17.47
6	-6.44%	-11.26
7	-5.82%	-10.17
8	-6.33%	-11.06
9	-7.56%	-13.23
Average = 10% N = 2,751		

Table 2.3 Frequency of DPS Last Digits in Italy

Digit	Estimate	z-score
0	24.90%	23.92
1	-3.50%	-3.36
2	-1.46%	-1.40
3	-2.54%	-2.44
4	-2.54%	-2.44
5	5.28%	5.08
6	-5.31%	-5.10
7	-5.07%	-4.87
8	-2.90%	-2.79
9	-6.87%	-6.60
Average = 10% N = 831		

Table 2.4 Frequency of DPS Last Digits in Canada

Digit	Estimate	z-score
0	21.89%	87.71
1	-1.31%	-5.27
2	2.77%	11.10
3	-2.43%	-9.73
4	-2.40%	-9.62
5	2.09%	8.38
6	-4.92%	-19.71
7	-3.78%	-15.14
8	-4.53%	-18.13
9	-7.38%	-29.59
Average = 10% N = 14,449		

Table 2.5 Frequency of DPS Last Digits in the United States

Digit	Estimate	z-score
0	11.76%	115.06
1	-1.42%	-13.90
2	3.02%	29.54
3	-1.97%	-19.28
4	-2.50%	-24.43
5	5.09%	49.74
6	-2.92%	-28.57
7	-2.75%	-26.90
8	-2.84%	-27.78
9	-5.47%	-53.47
Average = 10% N = 86,098		

2.5.2 Rigidity: Frequency of Changes in DPS Ends

Figures 2.6 through 2.10 display histograms of DPS last digits changes for France, Germany, Italy, Canada, and the United States, respectively. These figures show the average number of changes associated with each of the DPS last digits in percentage on the vertical axis and the corresponding DPS last digits on the horizontal axis. Average DPS change is the average number of changes in percentage for each of the DPS last digits for a given country, which is calculated as follows. First, the number of changes associated with each of the DPS last digits per firm is calculated; for example, a change from a DPS of 1.10 to 1.12 denotes that digit-end zero has changed once. Second, the average number of changes for each of the digit-ends is computed. Note that changes that involve a change in the digit-end are examined, while changes not involving a change in the digit-end (e.g., $1.10 to $1.20) are not. If prominent DPS digit-ends are rigid, then lower-than-expected (average) number of changes is associated with digit-ends of zero and five. The histograms reveal that the percentage of changes associated with DPS ending in zero and five is less than the overall average percentage of changes for all digit-ends, which provides support for hypothesis two. The histograms further show that the number of changes associated with digit zero is substantially lower than the number of changes associated with digit five, providing support for hypothesis five. Finally, the number of changes associated with digit nine appears to be greater than the overall average frequency of changes, providing support for hypothesis eight. It is noteworthy that the tables show that the lowest percentage frequency of DPS terminal digit changes occur at zero in all five countries and the highest number of dividend changes occurs at the digit-end of nine for all countries but one. The evidence provided in Figures 2.6 through 2.10 suggests that dividend rigidity emanates partly from rigidity in prominent DPS cent digits. Next, deviation-coding regression is employed to confirm the results with statistical rigor.

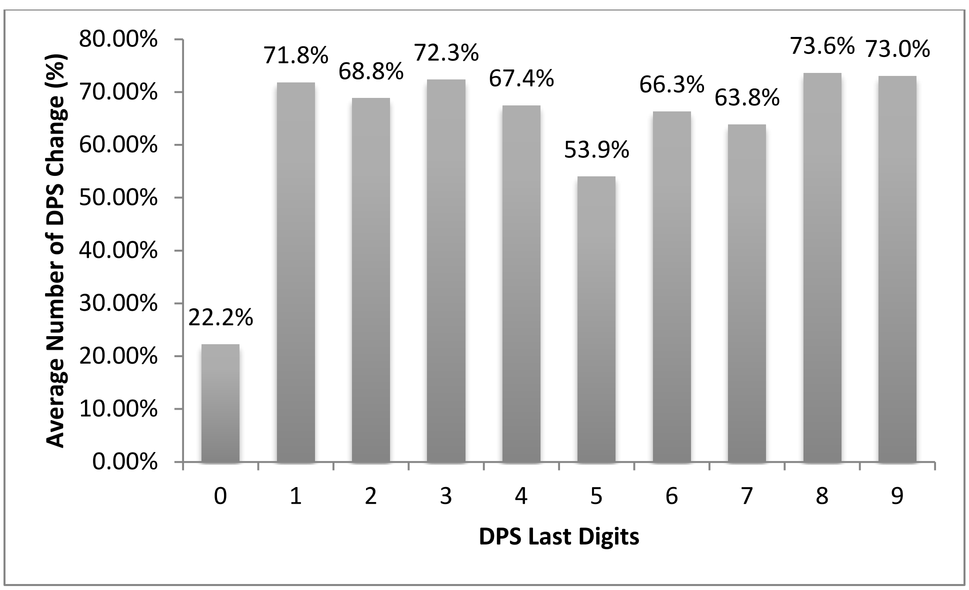

Figure 2.6 Average Number of DPS Last-Digit Changes in France

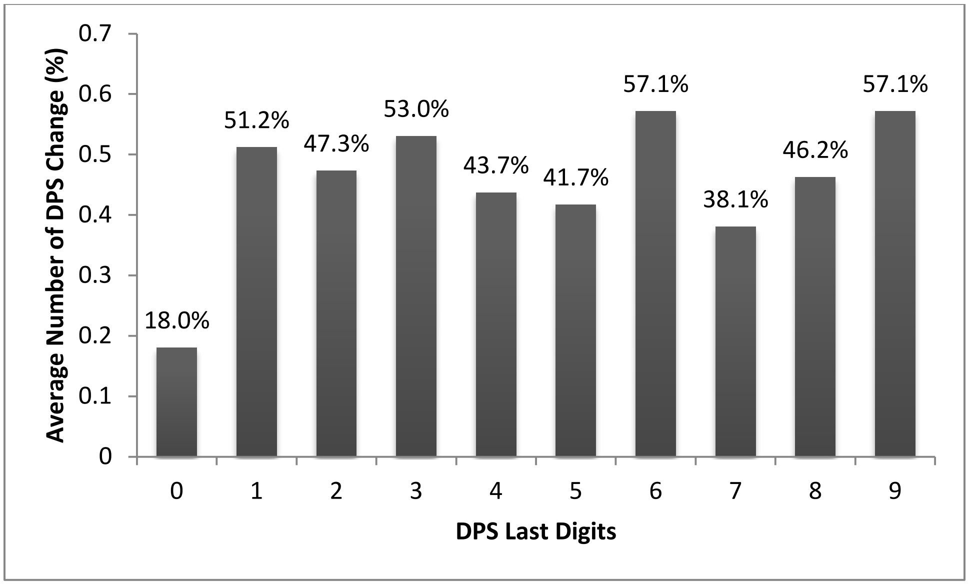

Figure 2.7 Average Number of DPS Last-Digit Changes in Germany

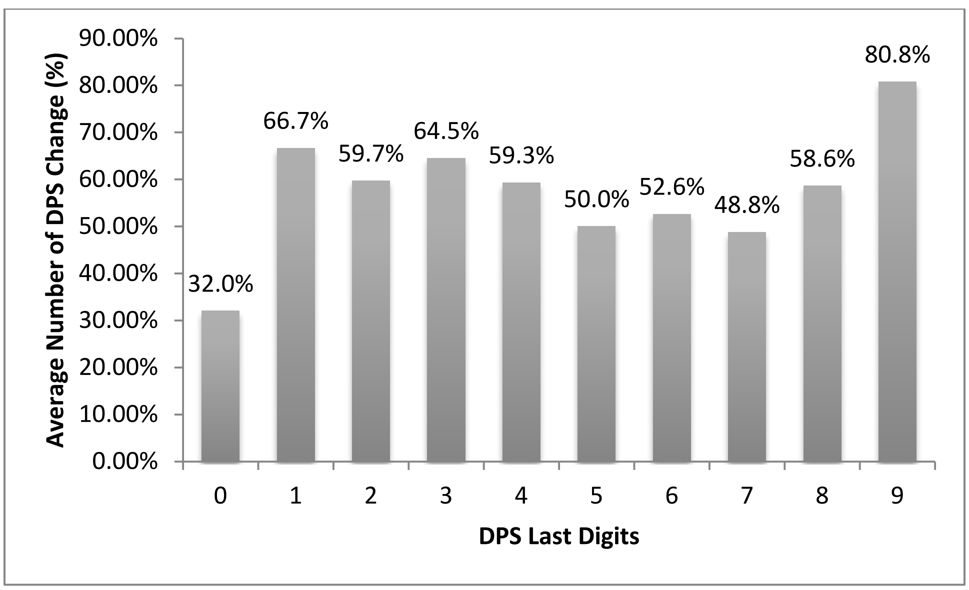

Figure 2.8 Average Number of DPS Last-Digit Changes in Italy

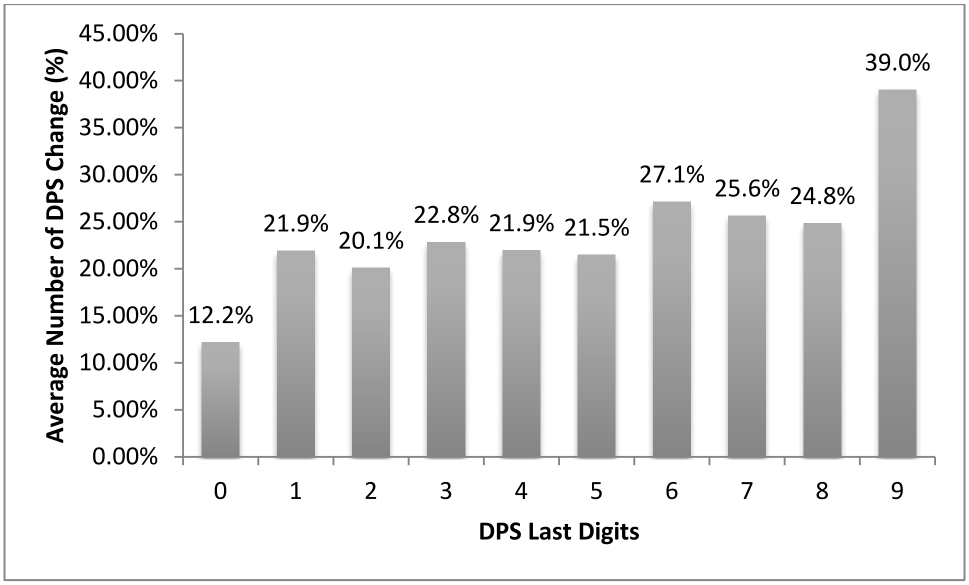

Figure 2.9 Average Number of DPS Last-Digit Changes in Canada

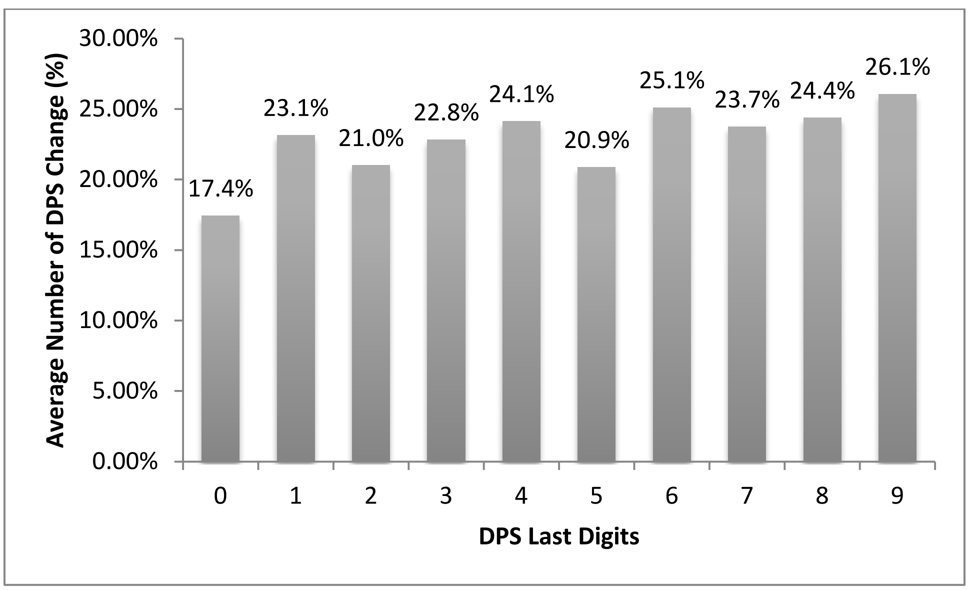

Figure 2.10 Average Number of DPS Last-Digit Changes in the United States

Tables 2.6 through 2.10 report the coefficient estimates and the corresponding t-statistics associated with (average frequency or the number of changes in percentage for) each of the DPS-ends for France, Germany, Italy, Canada, and the United States, in that order. Each table displays the cent digit of dividend per share, the coefficient estimate associated with each of the DPS-ends, and the associated t-statistics, respectively. The coefficient estimates are calculated by subtracting the average (expected) frequency of all digit-end changes from the frequency associated with each digit-end change. Consistent with hypothesis four, the tables reveal that the coefficient estimates of dividends ending in zero and five are negative and significant in all five countries. This indicates that the percentage of changes associated with DPS ending in zero and five is significantly lower than the overall average number of changes for all DPS-ends, which provides support for hypothesis two, that rigidity exists in DPS ending in zero and five. The tables further reveal that the coefficient estimate of DPS ending in zero is substantially lower than the coefficient estimate of DPS ending in five in all countries, further confirming hypothesis five, that the DPS ending in zero are more rigid compared to those ending in five. In other words, the number of changes associated with digit-end zero is substantially lower than the number of changes associated with digit-end five, providing support for hypothesis five. Finally, the tables reveal that the coefficient estimate associated with DPS ending in nine is positive and significant—that is, the number of changes associated with digit nine is significantly greater than the grand mean—in all five countries, confirming the eighth hypothesis, that rigidity does not exist in DPS ending in nine. Thus, Tables 2.6 through 2.10 provide statistical confirmation that rigidity in dividend policy in all five countries is partly induced by the rigidity in DPS digit-ends of zero and five.

Table 2.6 Average Number of DPS Last-Digit Changes in France

Digit	Estimate	t-stat
0	-41.12%	-31.51
1	8.49%	2.23
2	5.47%	2.09
3	8.98%	2.78
4	4.12%	1.44
5	-9.38%	-4.77
6	2.97%	1.11
7	0.50%	0.15
8	10.28%	3.54
9	9.69%	2.37
Grand mean = 63.31% N = 4,237		

Table 2.7 Average Number of DPS Last-Digit Changes in Germany

Digit	Estimate	t-stat
0	-27.32%	-15.83
1	5.82%	1.3
2	1.94%	0.52
3	7.69%	1.52
4	-1.66%	-0.4
5	-3.66%	-1.67
6	11.80%	2.71
7	-7.29%	-1.84
8	0.89%	0.21
9	11.80%	2.29
Grand mean = 45.34% N = 2,621		

Table 2.8 Average Number of DPS Last-Digit Changes in Italy

Digit	Estimate	t-stat
0	-25.30%	-7.59
1	9.37%	1.46
2	2.40%	0.42
3	7.22%	1.23
4	2.02%	0.34
5	-7.30%	-1.67
6	-4.67%	-0.64
7	-8.52%	-1.21
8	1.32%	0.22
9	23.47%	2.69
Grand mean = 57.30% N = 803		

Table 2.9 Average Number of DPS Last-Digit Changes in Canada

Digit	Estimate	t-stat
0	-11.54%	-17.51
1	-1.79%	-1.66
2	-3.62%	-3.95
3	-0.87%	-0.77
4	-1.76%	-1.55
5	-2.23%	-2.37
6	3.43%	2.51
7	1.93%	1.56
8	1.13%	0.86
9	15.33%	8.23
Grand mean = 23.71% N = 14,272		

Table 2.10 Average Number of DPS Last-Digit Changes in the United States

Digit	Estimate	t-stat
0	-5.44%	-17.43
1	0.28%	0.6
2	-1.86%	-4.86
3	-0.04%	-0.09
4	1.26%	2.59
5	-2.00%	-5.56
6	2.24%	4.5
7	0.87%	1.77
8	1.51%	3.04
9	3.19%	5.23
Grand mean = 22.87% N = 85,247		

2.5.3 Rigidity: Duration of DPS-ends

Figures 2.11 through 2.15 display durations of DPS last digits for France, Germany, Italy, Canada, and the United States, respectively. These figures show the average number of months each DPS last digit is kept on the vertical axis and the corresponding DPS last digits on the horizontal axis. Average months DPS last digit kept is the average number of months in percentage each DPS last digit was kept. It is calculated as follows: first, number of months each firm kept each of their DPS last digits is calculated, and then the average for each of the digits is calculated for the whole sample for a given country. The histograms reveal that the last digits zero and five are kept substantially longer than the other digit-ends, which provides support for hypothesis three. The number of months associated with digit zero is substantially higher than the number of months associated with digit five, providing support for hypothesis six. Finally, the number of months associated with digit nine is very low or the lowest, providing support for hypothesis nine. Additionally, it is noteworthy that the tables show that DPS-end zero has the highest duration (number of months a DPS digit-end remains unchanged) in all five countries, DPS-end of five has the second-highest duration in four of the five countries, and digit-end of nine has the lowest duration in four of the five countries as well. This evidence also suggests that rigidity in prominent DPS-ends contributes to rigidity in dividend policy. Next, regressions with deviation coding are employed to confirm the results with statistical rigor.

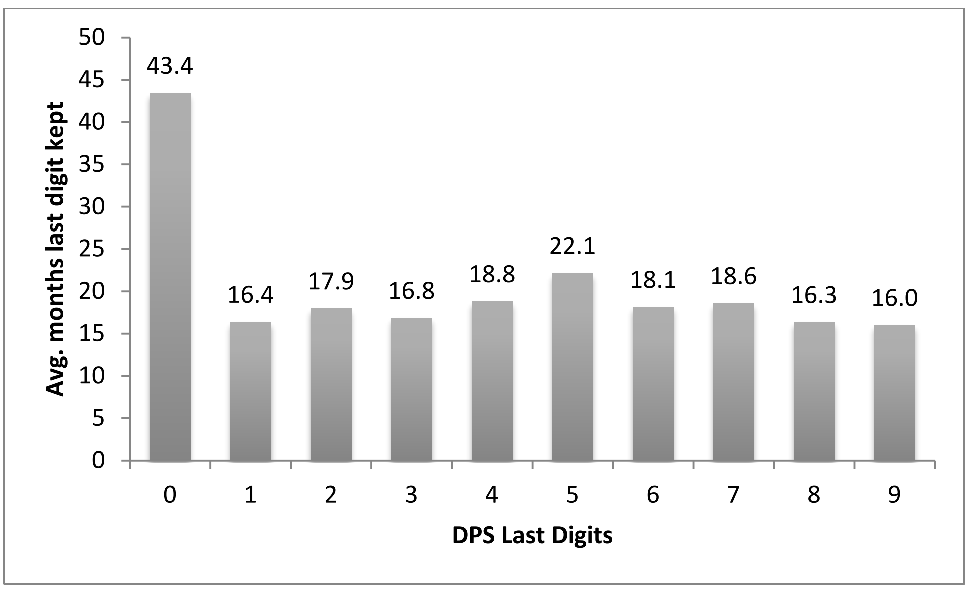

Figure 2.11 Average Duration of DPS Last Digits in France

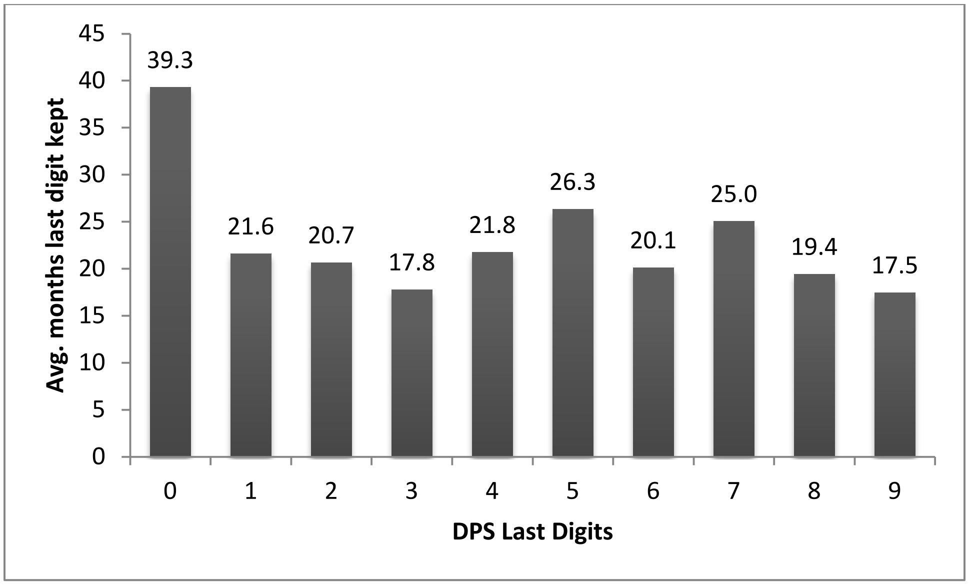

Figure 2.12 Average Duration of DPS Last Digits in Germany

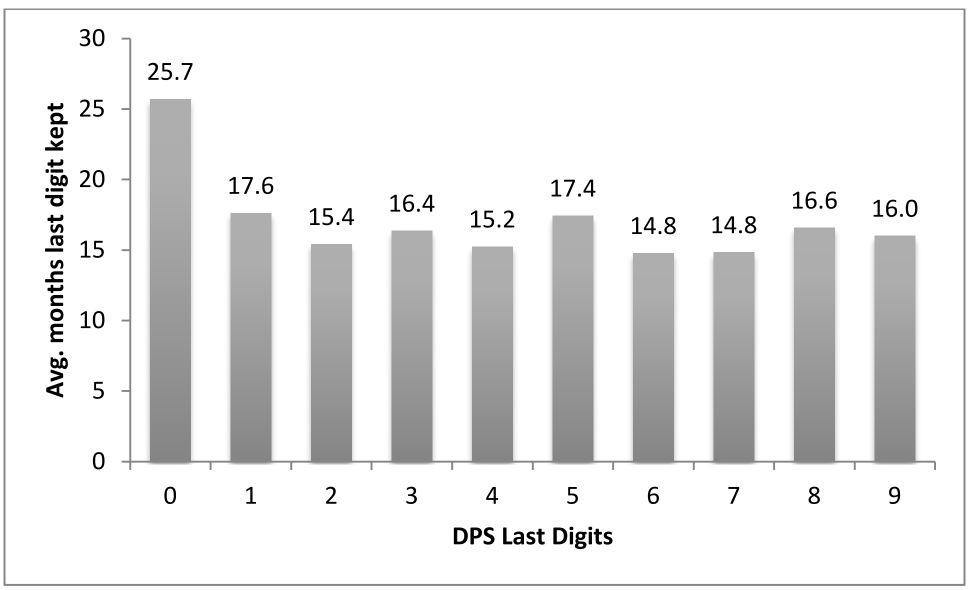

Figure 2.13 Average Duration of DPS Last Digits in Italy

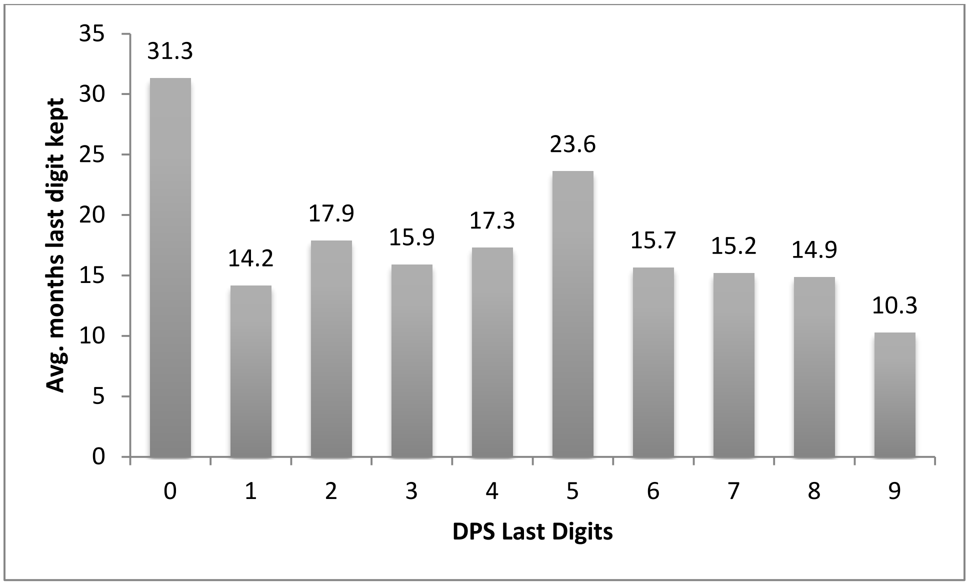

Figure 2.14 Average Duration of DPS Last Digits in Canada

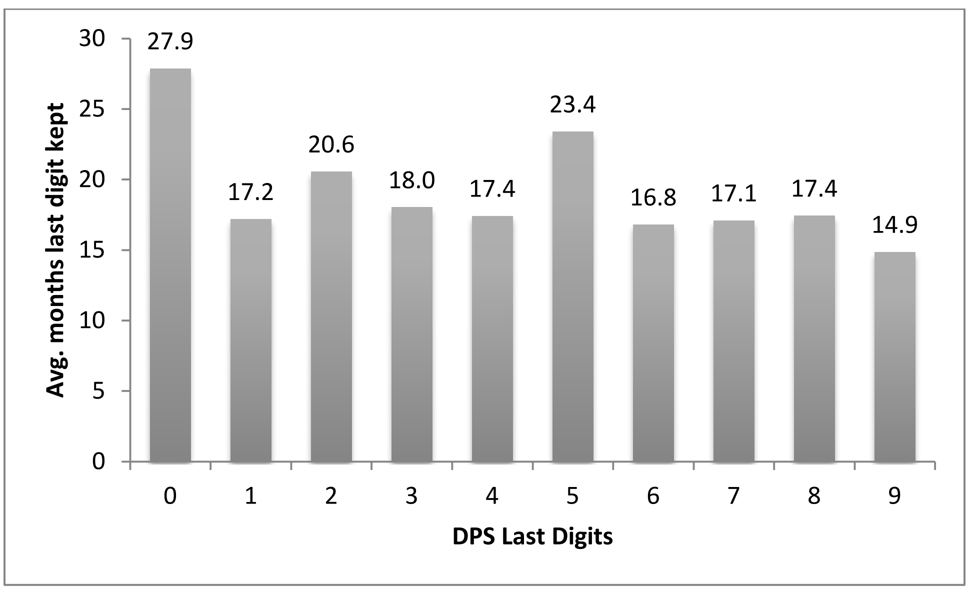

Figure 2.15 Average Duration of DPS Last Digits in the United States

Tables 2.11 through 2.15 report the coefficient estimates and the corresponding t-statistics associated with (the average number of months—duration—DPS remains unchanged for) each of the DPS-ends for France, Germany, Italy, Canada, and the United

States, in that order. Each table displays the cent digit of dividend per share, the coefficient estimate associated with each of the DPS-ends, and the associated t-statistics, respectively. Because deviation-coding regression is utilized, the dependent variable is the average number of months DPS-ends remain unchanged for each of the last digits, and the independent variables are the last digits of DPS; therefore, the coefficient estimates are the deviations from the grand mean. In other words, the coefficient estimates are calculated by subtracting the grand mean duration from the duration associated with each digit. The tables reveal that the coefficient estimates of dividends ending in zero are significantly positive in all five countries. Moreover, while the estimates of dividends ending in five are positive in all five countries, they are significantly positive in three countries. Stated differently, the tables reveal that the average number of months DPS-end zero remains unchanged is significantly higher than the grand mean of all DPS-ends in all countries, which provides support for hypothesis three. Moreover, while the average number of months DPS ending in five remain unchanged is higher than the grand mean of all DPS-ends in all countries, they are significantly higher in three countries. Overall this indicates that greater-than-expected (average) number of months duration is associated with digit-ends of zero and five—that is, dividends with terminal digits of zero and five are kept longer than the average, providing support for hypothesis three, that rigidity exists in DPS ending in zero and five. The tables further reveal that the coefficient estimate of DPS ending in zero is substantially higher than the coefficient estimate of DPS ending in five in all countries, further confirming hypothesis six, that the DPS ending in zero are more rigid compared to those ending in five. In other words, the table further shows that the average number of months digit zero is kept is substantially higher than the number of months digit five is kept, providing support for hypothesis six. Finally, the tables reveal that the coefficient estimate associated with DPS ending in nine is negative in all five countries and significantly negative in three countries. In other words, while in all five countries the DPS-end of nine remains fixed fewer months than the overall average, in three countries it (duration of nine-ending DPS) remains significantly shorter than the average, confirming the sixth hypothesis, that rigidity does not exist in DPS ending in nine. Thus, Tables 2.11 through 2.15 provide statistical confirmation that rigidity is prevalent in DPS-ends of zero and five and that rigidity in dividend policy in all five countries is partly induced by the rigidity in DPS digit-ends of zero and five.

Table 2.11 Average Duration of DPS Last Digits in France

Digit	Estimate	t-stat
0	22.98	23.28
1	-4.08	-1.90
2	-2.50	-1.64
3	-3.62	-2.02
4	-1.66	-1.00
5	1.67	1.31
6	-2.32	-1.51
7	-1.89	-0.98
8	-4.12	-2.52
9	-4.46	-2.02
Grand mean = 20.45 N = 1,693		

Table 2.12 Average Duration of DPS Last Digits in Germany

Digit	Estimate	t-stat
0	16.34	11.8
1	-1.35	-0.44
2	-2.29	-0.88
3	-5.17	-1.52
4	-1.19	-0.4
5	3.39	2.05
6	-2.83	-0.97
7	2.10	0.69
8	-3.52	-1.17
9	-5.49	-1.63
Grand mean = 22.95 N = 959		

Table 2.13 Average Duration of DPS Last Digits in Italy

Digit	Estimate	t-stat
0	8.71	6.71
1	0.63	0.29
2	-1.58	-0.82
3	-0.64	-0.33
4	-1.76	-0.9
5	0.44	0.27
6	-2.22	-0.89
7	-2.16	-0.9
8	-0.42	-0.2
9	-0.99	-0.36
Grand mean = 16.99 N = 407		

Table 2.14 Average Duration of DPS Last Digits in Canada

Digit	Estimate	t-stat
0	13.65	11.9
1	-2.96	-1.94
2	0.21	0.15
3	-1.76	-1.11
4	-0.39	-0.23
5	5.94	4.23
6	-2.01	-1.15
7	-2.48	-1.45
8	-2.80	-1.56
9	-7.40	-3.62
Grand mean = 17.61 N = 1,884		

Table 2.15 Average Duration of DPS Last Digits in the United States

Digit	Estimate	t-stat
0	8.81	20.88
1	-1.88	-3.44
2	1.49	3.1
3	-1.04	-1.82
4	-1.65	-2.86
5	4.33	9.21
6	-2.26	-3.9
7	-1.97	-3.37
8	-1.63	-2.77
9	-4.20	-6.1
Grand mean = 19.06 N = 14,045		

2.6 Robustness

Hypotheses two, five, and eight, which address the rigidity associated with changes in DPS terminal digits, lend themselves to additional robustness tests using a binomial logistic model. Recall hypotheses two, five, and eight: The second hypothesis is that a lower-than-expected number of changes is associated with DPS-ends of zero and five. Lower than the expected number of changes indicates rigidity in these DPS-ends. The fifth hypothesis is that the number of changes associated with DPS with a last digit of zero is less than the number of changes associated with DPS with a final digit of five. This lower frequency of changes indicates that DPS ending in zero are more rigid, or stickier, than those ending in five. The eighth hypothesis is that a greater-than-expected frequency of changes is associated with DPS with a terminal digit of nine. A higher-than-average frequency of change indicates an absence of rigidity.

In this section, I test the robustness of the DPS terminal digit rigidity—hypothesis two, five, and eight—by employing a slightly more sophisticated methodology than the ones used thus far. The following binomial logistic regression model is estimated using the maximum likelihood iterative method (Levy et al., 2010):

$$\ln\left(\frac{p}{1-p}\right) = a + \beta o Do + \beta 1 D1 + \cdots + \beta 9 D9, \qquad (3)$$

where p is the probability of DPS-end change and takes the value one if there is a change in the terminal value of DPS and zero otherwise. The indicator variable Do equals one if the DPS terminal digit is zero and zero otherwise, $D1$ equals one if the DPS ends in one and zero otherwise, and so on. The results are presented below.

Tables 2.16 through 2.20 report the mean predicted probabilities of observing a change in each of the DPS-ends and the corresponding t-statistics for France, Germany, Italy, Canada, and the United States, in that order. Each table displays the DPS cent digits, the average predicted probability of observing a change associated with each of the DPS-ends, and the associated t-statistics, respectively. Consistent with hypothesis two, the tables reveal that the predicted probabilities of observing a change in DPS ending in zero and five are very small (with the smallest probability for DPS ending in zero and the second- or third-smallest probability for DPS ending in five) and significant in all five countries. For example, the predicted probability of observing a change in DPS ending in zero (five) in the United States is 0.17 (0.208), which is the smallest (second-smallest) probability out of all the digit ends, suggesting that DPS ending in zero (five) are extremely rigid. The tables further reveal that the predicted probability of observing a change in DPS ending in zero is substantially lower than the predicted probability of observing a change in DPS ending in five in all countries, further confirming hypothesis five, that DPS ending in zero are more rigid than those ending in five. For example, in the United States, the predicted probability of observing a change in DPS ending in zero, 0.17, is less than that of observing a change in DPS ending in five, 0.208, supporting hypothesis five that zero-ending DPS are more rigid than five-ending ones. Finally, the tables reveal that the predicted probability of observing a change in DPS ending in nine is the highest or very high and significant at the 1 percent level in all five countries, confirming the eighth hypothesis, that rigidity does not exist in DPS ending in nine. For example, the predicted probability of observing a change in DPS ending in nine in the United States is 0.261, which is the highest predicted probability out of all the digit ends; hence there is no rigidity in DPS ending in nine, as stated in the eighth hypothesis. In summary, the robustness tests demonstrate that rigidity exists in DPS ending in zero and five, but not nine. Thus, tables 2.16 through 2.20 provide additional statistical confirmation that rigidity in dividend policy in all five countries is partly the result of rigidity in DPS digit-ends of zero and five.

Table 2.16 Predicted Probability of DPS-end Change in France

Digit	Estimate	z-score
0	0.22	24.99
1	0.72	17.26
2	0.69	24.34
3	0.72	20.81
4	0.67	21.24
5	0.54	25.30
6	0.66	22.38
7	0.64	16.95
8	0.74	24.30
9	0.73	16.44

Table 2.17 Predicted Probability of DPS-end Change in Germany

Digit	Estimate	z-score
0	0.18	17.25
1	0.51	9.49
2	0.47	10.76
3	0.53	8.63
4	0.44	8.94
5	0.42	19.33
6	0.57	11.01
7	0.38	8.33
8	0.46	8.94
9	0.57	9.16

Table 2.18 Predicted Probability of DPS-end Change in Italy

Digit	Estimate	z-score
0	0.32	11.37
1	0.67	10.09
2	0.60	9.96
3	0.65	10.61
4	0.59	9.27
5	0.50	11.22
6	0.53	6.49
7	0.49	6.24
8	0.59	9.06
9	0.81	10.44

Table 2.19 Predicted Probability of DPS-end Change in Canada

Digit	Estimate	z-score
0	0.12	25.07
1	0.22	18.66
2	0.20	21.43
3	0.23	17.93
4	0.22	17.50
5	0.21	21.68
6	0.27	16.44
7	0.26	17.55
8	0.25	16.07
9	0.39	15.47

Table 2.20 Predicted Probability of DPS-end Change in the United States

Digit	Estimate	z-score
0	0.17	62.43
1	0.23	47.02
2	0.21	54.22
3	0.23	45.10
4	0.24	45.18
5	0.21	58.15
6	0.25	45.11
7	0.24	43.95
8	0.24	44.37
9	0.26	37.01

2.7 Conclusion

In this chapter, I attempt to ascertain whether dividend policy is influenced by the behavioral finance concepts of clustering and rigidity. Specifically, I examine clustering and rigidity on DPS-endings. Clustering and rigidity are said to occur on certain digit-ends due to the convenience, the attraction, and the left digit effect hypotheses. I find that zero-ending DPS have the highest frequency, while five-ending DPS have the second-highest frequency and nine-ending digits have the lowest frequency. This finding shows that clustering on DPS cent digits exists, and provides support for the assertion that corporations persistently and deliberately utilize behavioral finance to make the dividends appear more attractive. Moreover, the following two findings provide support for the existence of rigidity in DPS-ends, which translates into rigidity in DPS policy. First, the lower (higher) average frequency of changes in DPS-ends of zero and five (nine) provides evidence in support of dividend rigidity arising from prominent DPS cent digits. Second, the higher (lower) average duration of DPS terminal digits of zero and five (nine) also provides strong evidence for dividend rigidity arising from DPS cent digits. The evidence presented in support of clustering and rigidity associated with prominent numbers suggests that managers set dividend policy by utilizing cognitive biases that make DPS appear more attractive. The prevalence of clustering and rigidity in DPS digit-ends provides evidence that dividend policy cannot be studied solely under the assumption that agents are rational, and behavioral finance needs to be incorporated into dividend policy study.

In addition to advancing our understanding of the crucial role of behavioral finance in dividend policy decisions, the results of this study give rise to a few important questions for future inquiry. Are DPS forecasts clustered on digit-ends of zero and five? Is the clustering on actual DPS-ends similar to the clustering, if any, on forecasted DPS-ends? Should the clustering on forecasted and actual DPS-ends differ, forecasters can use such knowledge to adjust their forecasts.

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