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ECONOMIC DEREGULATION AND CORPORATE DIVIDEND POLICY

by

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DISSERTATION

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of Wayne State University,

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1. Introduction and Motivation

Why did firms pay dividends even though dividends were subject to higher taxation than other means of income distribution? This question has been puzzling financial economist for decades. Miller and Modigliani (1961) propose a theory of irrelevance based on the perfect financial world assumptions, in which a firm's value is not affected by its dividend policy. Although a relaxation of the assumptions leads to predictions otherwise, the seminal work of Miller and Modigliani (1961) has inspired a growing academic interest in exploring firms' dividend policy. Voluminous studies have attempted to answer the fundamental question – "why do firms pay dividends" and its accompanying question – "how do firms formulate their dividend policy."

Generally speaking, three theories have been developed around the questions concerning corporate dividends. The information content theory posits that dividends reveal a firm's proprietary information that is unable to be disclosed directly through other means and that dividends also reflect managers' forecast of corporate earnings prospects (see, e.g., Bhattacharya (1979); Miller and Modigliani (1961); Miller and Rock (1985)). Its variant signaling hypothesis further suggests that firms use dividends to signal their quality in order to differentiate themselves from lower quality firms (see, e.g., Healy and Palepu (1988); Lang and Litzenberger (1989)). The agency theory argues that firms distribute cash flows in the form of dividend to shareholders to minimize agency costs to the extent that hoarding cash tacitly encourages managers to overinvest (in projects with negative net present value), facilitates their perquisite

consumption, and insulates them from capital market monitoring and discipline (Jensen and Meckling (1976); Jensen (1986); and Easterbrook (1984)). This function of dividends is all the more important when the market for corporate control is severely constrained by regulations in the regulated industries, and dividends thus serve as an alternative to the threat of takeover as a way of reducing agency costs.[1] The tax-based clientele theory suggests that firms pay out dividends to attract target investor constituencies in different tax brackets. For example, high dividends are used to attract informed institutional investors that are tax-advantaged and can furnish more effective monitoring (see, e.g., Allen, Bernardo and Welch (2000); Redding (1997); Shleifer and Vishny (1986)), and firms may initiate or omit dividends to cater to changing demands of investors (Baker and Wurgler (2004)).

There are two major theories concerning how firms formulate their dividend policy, which have their antecedents in the capital structure literature: the trade-off theory and the pecking order theory. The trade-off theory (see, for example, Fama and French (2002); Kraus and Litzenberger (1973); Myers (1984)) suggests that firms balance the costs and benefits of paying dividends to derive an optimal dividend policy. Specifically, they consider the benefits of reduced agency costs associated with dividend payout and the costs of possible future cash shortage and potential increased conflicts between equity and debt holders. The pecking order theory suggests that firms prefer internal financing to safe debt, safe debt to risky debt, and finally risky debt to equity financing. As such, given profitability, firms like to retain a greater portion of operating income rather than dispense it through dividend payment to shareholders. This theory implies that there is no optimum dividend payout.

Despite intensive research and theoretical development, empirical evidence from testing

[1] It is documented in the literature that corporate takeover activities are significantly restricted in regulated industries, the utilities industry in particular. For details, see, e.g., McLaughlin and Mehran (1995) and Cox and Portes (1998).

predictions of some of these theories appears to be weak or sometimes contradictory. For example, empirical tests indicate that dividend changes are at best poor predictors of future earnings levels or earnings changes (see, for example, Benartzi, Michaely and Thaler (1997); Grullon, Michaely, Benartzi and Thaler (2005)). Also, although empirical evidence is largely consistent with agency explanations that dividends dissipate firms' discretionary cash flows to help reduce agency costs, questions arise as to why the more tax-advantageous share repurchase should not be used completely in lieu of dividend payment, given that repurchase achieves the same goal of disgorging cash without committing the firm to regular cash outlays. As for the clientele theory, contradictory evidence is provided by, among others, Grinstein and Michaely (2005), which shows that although institutions choose to stay away from firms that do not pay dividends, they in fact prefer those firms that pay *fewer* dividends, which is somewhat inconsistent with the tax-based clientele hypothesis. Further, while Michaely, Thaler and Womack (1995) fail to detect any significant institutional clientele migration following dividend omissions, Brav and Heaton (1998) do find pension funds reduce their holdings of dividend-omitting stocks in conformity with the strict "prudent man" rule after the enactment of the Employee Retirement Income Security Act of 1974 (ERISA). Interestingly, Hoberg and Prabhala (2009) challenge the "catering" theory of Baker and Wurgler (2004) by contending that the relation between transient investor fads of dividends and dividend changes disappears after controlling for the risk factor.

Yet making the dividend issue even more puzzling and complicated is the evidence presented by Fama and French (2001). They report strikingly disappearing dividends – that is, during the two decades between 1978 and 1999, cash dividend-paying firms drop from 66.5 percent to 20.8 percent. There is some evidence that this declining propensity to pay dividends

also occurs outside the U.S., although the evidence is not as compelling as in the U.S. (Denis and Osobov (2008)).[2] As such, it appears that dividends have remained largely the same puzzle as described in Black (1976).[3] The mixed evidence has left the most fundamental question of why firms pay dividends largely unanswered.

Economic deregulation, which swept the U.S. from the 1970s to the 1990s, offers a unique setting to study the dividend issue. The deregulation process, hailed as "one of the most important experiments in economic policy of our time" (Winston (1993)), is characterized by governments' withdrawal from active role in governing business decision-making and activities such as pricing, output, entry and exit (Hahn (1990); Winston (1993)). Deregulation opens the door to a competitive operating environment, which is fundamentally different from the one pre-deregulation. The deregulation course has significant effects on the U.S. economy.[4] More importantly, as a major economic shock to firms' operating environments, economic deregulation provides a "natural experiment" to empirically test various predictions of financial theories.[5] For example, previous research documents that the deregulation process has significantly affected deregulated firms' corporate governance mechanisms (Kole and Lehn (1997)), capital structure

[2] Denis and Osobov (2008) extends the study of declining propensity to pay to such developed financial markets as Canada, the United Kingdom, Germany, France and Japan and finds similar trend in those countries. Interestingly, the factors that explain the drop in dividend payment in the U.S. market maintain their explanatory power beyond the U.S. borders.

[3] Black (1976) first used the term "the dividend puzzle" to describe the perplexing nature of firms' dividend payment in his article with this term as its title. "The harder I look at the dividend picture, the more it seems like a puzzle with pieces that just don't fit together," he writes in the essay. Numerous researchers have since tried to find answers to the puzzle; however, the main questions relevant to the puzzle remain unresolved.

[4] A little more than three decades ago, regulated industries produced approximately 17 percent of U.S. economic output; by 2007, however, those industries – entertainment, transportation, telecommunications, petroleum and natural gas, utilities, and financial services, whose large parts are completely deregulated – made up roughly 7 percent of the U.S. gross national product. This figure was first provided by Winston (1993) and used extensively by deregulation researchers subsequently, e.g., Kwoka (2002). For details, see U.S. Bureau of Economic Analysis releases. http://www.bea.gov/.

[5] Deregulation is mainly regarded by researchers as an exogenous shock. See, e.g., Kole and Lehn (1999). However, extant theories about the exogeneity of deregulation is argued against by Ovtchinnikov (2010b), which suggests that deregulation reform was in response to worsening industry conditions and pressures from special interest groups, thus "not unexpected and exogenous."

choices (Ovtchinnikov (2010a)), and investment policies (Ovtchinnikov (2010b)).

In the same vein, economic deregulation should impact firms' dividend policy as well. Since the new competitive environment in which firms are operating is vastly different from the environment when regulations are in place, deregulation touches upon every aspect of the business world, providing a more level playing field and introduces new rules for the game. For example, deregulation tends to increase information asymmetries between insiders and outsiders (e.g., Barclay and Smith (1995); Krishnaswami, Spindt and Subramaniam (1999); Ovtchinnikov (2010a)), reduce agency costs associated with shareholder-regulator conflicts (e.g., Easterbrook (1984); Smith (1986)), and change the composition of clientele (e.g., Baker and Wurgler (2004); Shleifer and Vishny (1986)). These are among the elements believed to be closely associated with firms' dividend policy. As such, the theories regarding information content, agency-principle conflict and shareholder clientele have theoretical predictions with regards to corporate dividend policy for firms whose industry undergoes the deregulation process.

Conspicuously absent from this literature, nevertheless, is whether and to what extent economic deregulation impacts firms' dividend policy. This study aims to fill this gap by examining the evolution of dividend policy in response to the changing operating environment along the economic deregulation process. Specifically, I examine the effects of deregulation on firms' propensity to pay dividends, how deregulation affects the level of dividends paid, whether deregulation makes firms' dividend policy more sensitive to operating income, and how information content of dividend changes in response to deregulation. The new perspective I attempt in this research will shed some insights that can be conducive to a better understanding of the complex "dividend puzzle" and contribute to the effort of demystifying the puzzle.

I begin by investigating whether deregulation impacts firms' propensity to pay dividends.

Smith (1986) argues that firms under regulation pay high dividends to control agency problems between shareholders and managers as well as between shareholders and regulators. Distributing cash in the form of dividend not only reduces cash flows available for spending at the discretion of managers but also creates demands for external financing that helps keep regulated firms in the financial market, which provides monitoring and serves as a reminder of the current cost of capital to regulators and stakeholders alike. Deregulation eventually helps remove the agency problem between shareholders and regulators (regulators are gone, probably forever, for these industries), and the deregulated firms and their non-regulated counterparts are faced with similar situations of agency problems. Therefore, from an agency perspective, I predict a decline in firms' inclination to pay dividends following deregulation. Deregulation also abolishes restrictions on investment so that deregulated firms are faced with an expanded investment opportunity set (see, e.g., Barclay and Smith (1995); Smith and Watts (1992)).[6] In addition, deregulation-induced competition increases operating and earnings uncertainty, raising the possibility of financial distress. Accordingly, the operating environment changes are expected to reduce firms' predilection to pay dividends. On the other hand, the signaling theory suggests that the competitive environment induced by economic deregulation may incentivize quality firms to signal their strength in the face of growing competition, thus making those high performers more willing to pay dividends. Ultimately, the propensity to pay dividends of deregulated firms along the deregulation process is an empirical question.

Next, I examine whether economic deregulation affects the level of dividends paid. The distinctive double agency problems between shareholders and management, and between

[6] Smith and Watts (1992) contend that regulation restricts a firm's investment opportunity set and "makes observation of the manager's actions easier." Empirical evidence is supplied by Barclay and Smith (1995), who find that regulated firms, like large firms, have more long-term debt, consistent with the argument that firms with more investment opportunities have less long-term debt in their capital structure.

shareholders and regulators, encountered by firms in the regulated industries also imply that those firms have higher dividend payout ratio, e.g., paying out the bulk of cash flows to reduce agency costs and create opportunities for market monitoring and discipline. The elimination of agency conflicts between regulators and shareholders makes it less necessary for deregulated firms to maintain high dividend payouts. Similarly, changes in the operating environment, such as expanded investment opportunities, heightened competition, and increased level of cash flow volatility, make internally generated funds more valuable to financing future investment opportunities and hedge against potential cash flow shortfalls. All these, therefore, lead to a prediction of lower dividend payout by deregulated firms along the process of economic deregulation. On the other hand, the clientele theory suggests that in an effort to maintain their tax-based clienteles, firms would avoid drastic dividend policy changes despite fluctuations in earnings and in times of earnings uncertainty (Graham and Kumar (2006); Lewellen, Stanley, Lease and Schlarbaum (1978)). Conversely, changes in the composition of clientele may lead to firms' amending their dividend policy to accommodate new needs (e.g., Becker, Ivković and Weisbenner (2011)). Kole and Lehn (1999) report a concentration of equity ownership by outside block-holders after deregulation. This shift toward higher block-holdings may not give rise to higher dividend payouts since institutional investors favor fewer dividends to more dividends (Grinstein and Michaely (2005); Jain (1999); Strickland (2002)). Meanwhile, the signaling theory predicts that high quality firms would more likely use dividends as a signal to distinguish them from lower quality firms in a competitive environment. Therefore, the impact of the economic deregulation on dividend payout ratio is also an empirical issue.

I proceed to investigate whether firms' dividends are adjusted at greater speed toward target dividend payout ratio in response to deregulation. Lintner (1956) suggests that firms set

target dividend payouts and would adjust their dividends toward the targets based on firms' earnings conditions. Firms under regulation are protected from market competition, and dividends may be a less important component of firms' effort to adjust to the overall risk they are faced with. However, deregulation positions deregulated firms on the same playing field as non-regulated firms and may require firms to react faster to elevated competition and heightened uncertainty. Accordingly, I predict that firms' dividend policy will become more sensitive to changes in earnings and the adjustment toward target dividend payout will occur more quickly, in response to changes in the operating environment induced by economic deregulation.

I then study whether the deregulation process changes the information content of dividends. Economic deregulation is expected to make firm operations less transparent and increase the information asymmetry between insiders and outsiders (Krishnaswami, Spindt and Subramaniam (1999); Ovtchinnikov (2010a)).[7] The theories of information content and signaling argue that the dividend signaling becomes more important in situations of high information asymmetry, thus eliciting greater stock price reactions to financing announcements in this scenario (Smith (1986)). I thus explore the impact of economic deregulation on the information content of dividends by investigating changes in the stock market valuation reaction to announcements of dividend changes along the economic deregulation process and the relation between dividend changes and future earning and changes in earnings.

Lastly, I examine changes in firms' external financing activities during the post-deregulation periods. On the one hand, the argument that regulated firms pay high dividends to dissipate free cash flow to control the double agency problems and to procure capital market

[7] Krishnaswami, Spindt and Subramaniam (1999) examine the proportion of privately placed debt in firm debt structure and find that firms with favorable information about their earnings prospects but subject to great information asymmetry use more private debt. Regulated firms, however, are found to have lower proportions of privately placed debt. Ovtchinnikov (2010a) notes two likely reasons for higher degree of information asymmetry after deregulation: the removal of regulatory monitoring and the firm inclination to keep proprietary information from rivals and the general public in more competitive environments.

monitoring and discipline indicates high frequency of external financing activities of firms under regulation. On the other hand, enhanced competition and expanded growth opportunities in the wake of economic deregulation may increase firms' needs for external capitals, leading to more active external financing activities. Thus, how deregulation impacts firms' external financing behavior is an empirical issue.

My empirical results reveal that economic deregulation does not have significant incremental impact on firms' decisions regarding whether to pay dividends after controlling for the effect of changing firm characteristics and the general trend of declining propensity to pay dividends. However, there is evidence that economic deregulation affects dividend payers' decisions on how much to pay. Using the difference-in-differences approach to control for the effects of time trend, I find that not only firms in the deregulated industries, but also those surviving deregulated firms, lower their dividend payout ratio along the deregulation process. More importantly, empirical evidence shows an upward trend in the speed of adjustment of corporate dividend policy to optimal levels and a declining trend in firms' target payout ratio, indicating that deregulated firms respond to the changing operating environment brought about by economic deregulation by connecting their dividend policies more closely with earnings.

In an attempt to examine whether the changing operating environment brought on by the economic deregulation affects the information content of dividend, I investigate the evolution of cumulative abnormal returns (CARs) around the announcement of dividend changes and the association of dividend changes with future earnings and profitability. The empirical results provide little evidence of an upward trend in CARs or an association between dividend changes and future earnings, rendering little support to the prediction that firms are more likely to signal information using dividends in the post-deregulation periods. In analyzing the changing external

financing activities, I find that deregulated firms increase external financing activities steadily immediately after the deregulation initiatives and accelerate equity and debt issuance as the deregulation process progresses. This pattern mirrors the evidence I document earlier regarding the magnitude of dividend payouts: the further into the deregulation process, the greater the impact of deregulation on corporate dividend policy. The overall evidence indicates that changes in dividend policy along the deregulation process are partly a result of enhanced market monitoring and discipline arising from the more frequent external financing activities of deregulated firms.

The study is related to two lines of literature. The first is the literature on economic deregulation. Economic deregulation puts an end to the government role in controlling price, rates of return, entries or exits, and production, and heralds in an environment of competition which leads to changes in firms' investment opportunity set, earnings volatility, profitability, financing costs and bankruptcy costs, etc. Prior research has documented that firms react to the changing environment by adjusting their financing policy and capital structure (Ovtchinnikov (2010a)) and governance structure (Kole and Lehn (1999)). I complement this line of research by investigating the impact of the economic deregulation on firms' dividend policy. Unlike changes in firm capital structure that occur almost in immediate response to economic deregulation, adjustments in corporate dividend policy are shown to be gradual, which not only is consistent with the notion that dividends are sticky, but also reflects the complexity in formulating checks and balances in mitigating the agency problem. The overall results indicate that economic deregulation has some bearings on corporate dividend policy, as well as on different aspects of corporate financing, investment and operation decisions.

Second, the study adds to the literature on dividend policy and its determinants. As

mentioned earlier, there is a rich body of research on dividend policy; however, the empirical evidence has been mixed and some of the research designs and methodologies suffer from endogeneity. I use the economic deregulation as an exogenous shock to test various theoretical predictions concerning dividends, and contribute to this field of research by showing how firms evolve their dividend policy in response to changes in the operating environment induced by economic deregulation. My evidence provides little support for the information content of dividend hypothesis and the clientele theory of dividend. The overall findings are generally in support of the agency explanation of dividends.

The remainder of this research proceeds as follows. Section 2 presents a brief introduction to industrial regulation and deregulation. Section 3 discusses the related literature on dividend policy and economic deregulation; and Section 4 explains some important methodologies used in the research. Section 5 develops hypotheses. Section 6 outlines the construction of the data. Empirical results are presented in Section 7. Section 8 discusses and concludes.

2. A Brief Introduction to Regulation and Deregulation in the U.S.

In this section, I first present a brief introduction to the regulation and deregulation of the U.S. industries. I then outline what happened to the industries that were gradually relieved of regulatory binds during the deregulation process. The five industries that are of interest in this research are: entertainment, petroleum and natural gas, utilities, telecommunications and transportation.[8]

In the U.S., economic regulation was typically kicked off in the 1870s, as signified by

[8] The outline of the regulation and deregulation of the industries is based mainly on information from Vicsusi, Harrington and Vernon (2005). For details, see their book "Economics of Deregulation and Antitrust".

two important events: a decision by the Supreme Court establishing the legal basis for the regulation of monopolies, and an appeal by the railroad industry for regulation of the industry, which led to it becoming the first major industry subject to economic regulation at the federal level. There had since been three waves of regulatory legislation. The first two waves took place between 1909 and 1916, and between 1933 and 1940, which drastically extended federal regulatory powers to a number of the vital industries in the country. The third peak of legislative activities occurred during the period 1973-1980, resulting in partial or full deregulation of many of the regulated industries.

The question of "why is there regulation" remains open so far. The first theoretical hypothesis, now called the "public interest theory" or the "normative analysis as a positive theory (NPT)", attributes the imposition of regulation to market failures that plagued industries. The theory holds that regulatory moves reflect pressure from the public to correct market failures, as characterized by misallocation of scarce resources by unfettered market forces or mispricing of items such as air, water, and public health and safety. However, NPT is not supported by empirical evidence.[9] Based on observations that regulation benefited producers, a new hypothesis, referred to as the "capture theory" (CT), was developed, which asserts that either legislators or regulators cater to the industry's demands for regulation, thus subject to "capture" by the firms they regulate. Although there is evidence in support of the CT, this hypothesis is also vulnerable to criticisms such as why it was the industry, not one of the other competing interest groups, that captures regulation.[10] The major theoretical breakthrough came in 1971 in

[9] This is illustrated by the argument advanced by Viscusi, Vernon, and Harrington (2005) that "[m]any industries have been regulated that are neither natural monopolies nor plagued by externalities; for example, price and entry regulation in trucking, taxicab, and securities industries". NPT, as a public interest theory, "puts forth the hypothesis that regulation occurs when it should occur because the potential for a net social welfare gain generates a public demand for regulation".

[10] Criticism of the Capture Theory also includes its failure to provide a theoretical explanation of how the regulators are captured, of why the practice of cross-subsidization is common in regulated industries (this is against the

the "economic theory of regulation" (ET), put forth by Nobel laureate George Stigler. The theory has two fundamental premises: First, the basic resource of the state is the power to coerce; and second, agents are rational in choosing utility maximizing actions. According to the ET, regulation is a channel through which an interest group motivates state power to redistribute wealth from other parts of the society to its own benefit.[11]

As time went by, regulation became widely blamed for pervasive economic inefficiency and highlighted the need for deregulation. Deregulation was initiated in the early 1970s to substantially reduce or eliminate government control over the market forces, with the goal of allowing businesses to perform better in a competitive environment, and of strengthening the economy through de-control. The length of the deregulation process varies for different industries, with the shortest being five years for the industry of entertainment, and the longest 20 years for the industry of transportation.

Regulation of the entertainment industry dated back to 1934 when limited spectrum space (radio channels) was required to serve "the public interest, convenience and necessity". Deregulation started in the late 1970s when price controls over pay channels of cable were lifted. The deregulation process completed with the deregulation of basic cable service rates, marked by the passage of the Cable Communication Policy Act of 1984. Deregulation in radio focused on content and entry, initiated in 1981 by the Federal Communication Committee (FCC).

Regulation of petroleum started in 1909 and early regulation of petroleum targeted quantity. The regulation in quantity became extinct by the early 1970s and regulation shifted to

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predication of the Capture Theory that regulated firms in general would earn higher rates of return than their non-regulated counterparts), and of why regulations stipulated by regulatory authorities were opposed by regulated firms.

[11] A natural conclusion of the Economic Theory of Regulation (ET) is that large firms always prevail in their efforts to mobilize the state power to their advantage because of high benefits, small firms do not organize for political strength because of low potential benefits and consumers do not organize because of high costs and low individual benefits. Criticism of this theory includes its main focus on the demand for regulation and little attention to the supply-side story. Modification of the theory looks at the supply-side calculus.

price. Price de-control started from the late 1970s and ended in 1981. Regulation of natural gas began in 1938 on interstate transportation and sale, and then covered Wellhead rates. De-control was called for in 1978 and completed in 1989.

Utilities were regulated mainly by the state governments and regulation focused on entry, rate of return, and service range. The first federal move in deregulating the industry occurred in 1978; in 1996 further deregulatory steps were taken to unbundle the operations of generating, transmitting, distributing and marketing electricity to allow customers more choices.

Regulation of the telecommunications industry started in 1910 with the control of inter-city telecommunications market. The industry was a regulated monopolist until the late 1950s. Regulation on entry and rates was not lifted until the mid-1970s. In January 1982, AT&T agreed to cut connections with its 22 telephone operating companies after a seven-year antitrust lawsuit brought by the U.S. Justice Department. The company broke up on January 1, 1984. The Telecommunications Act of 1996 preempted all state laws that limited competition in the market for local and long-distance telephone services, making a significant step toward deregulating the industry.

Transportation regulation dated back to the second half of the 19th century when railroads were the predominant form of long-range transportation. Regulation was mainly on rail rates, price, entry and exit. Competition arose from the development of alternative modes of transportation such as trucking. The major deregulatory initiatives affecting railroads and trucking came in 1980. Subsequent steps further deregulated the surface transportation industry. Regulation of airlines started in 1934, mainly on rates, routes, entry and exit. Deregulation began in 1977 and ended in 1983.

Table 1 lists major regulatory initiatives leading to deregulation of the industries of

entertainment, petroleum and natural gas, utilities, telecommunications and transportation from the 1970s to the 1990s.

3. Literature Background and Theoretical Predictions

There are three principal theoretical argumentations in the finance literature on why companies pay out dividends: the information content theory and its accompanying signaling hypothesis, the agency theory and its variant free cash flow premise, and the theory of clientele. In this section, I first review previous studies following the three theoretical threads, then discuss dividend policy of firms in regulated industries and theoretical explanations for their particular characteristics. Finally I review prior studies on economic deregulation and its effects on capital structure, corporate governance or other facets at the firm level.

3.1 Information content of dividend and the signaling hypothesis

In the perfect, frictionless financial market of Miller and Modigliani (1961), dividends are irrelevant to firm value – the value of a firm is determined by the rate of return of its assets, i.e., only future cash flows and growth opportunities of the firm are relevant to firm valuation, and the firm value does not change whatever its dividend policy is. However, in the real financial world, it is observable that stock prices do change following announcements of dividend change. To reconcile the empirical evidence with the full information model of Miller and Modigliani (1961), an explanation was advanced suggesting that dividend changes affect stock prices by way of market's perception of firm value – a phenomenon Miller and Modigliani (1961) refer to as the "information content" of dividends.

Dividends carry information content mainly due to the information asymmetry that exists between corporate insiders and outside investors. In a world of *imperfect* information, managers are believed to know more about their firms than outside shareholders, and unexpected changes in dividend payout convey certain private information that has been unknown to the public, which, under the efficient market assumption, is immediately incorporated by the market into stock prices. Hence a firm's dividend policy changes tend to have remarkable signaling effects.

The signaling hypothesis of dividends posits that a firm purposefully makes use of its dividend payments to communicate certain proprietary information to the market. This hypothesis can trace its root to Akerlof's (1970) *Lemon Principle* based on markets of used cars where buyers are unsure about the quality of merchandise. The *Lemon Principle* highlights the importance of quality signaling which enables buyers to tell good commodities from lemons, so that benign markets can survive and rational transactions can go on. Spence (1974) first extends the signaling model into labor markets characterized by uncertainties and asymmetric information. Bhattacharya (1979, 1980) and other financial economists like Talmor (1981) and Hakansson (1982) follow to develop the signaling models of corporate dividend policy, in which dividends are costly signals sent out by firms to communicate quality, and are hard for firms of inferior quality to imitate. Kalay (1979), on the other hand, tests whether dividend cuts are forced reductions due to existing dividend constraints and do not convey managers' expectations of firm earnings prospects, and finds that the hypothesis that there exists information content in dividend reductions cannot be rejected.

The asymmetry in information exists not only between insiders and outsiders, but also between dividend increases and decreases, which is captured by the market reactions to the opposite moves: Denis, Denis and Sarin (1994) report an average stock excess return of 1.25

percent for dividend increase announcements but an average stock excess return of –3.71 percent for dividend decrease announcements. In addition, Michaely, Thaler and Womack (1995) report dividend initiations are associated with an average stock price increase of over 3 percent whereas dividend omissions are associated with a stock price drop of some 7 percent.

The asymmetric positive (negative) market reaction to dividend increases (decreases) may have posed a critical challenge to managers formulating dividend policy. They appear very cautious in setting up dividend payout levels, and take a conservative approach toward increasing dividends unless they are highly confident that a permanent increase in future earnings is going to happen (e.g., DeAngelo, DeAngelo and Skinner (1996)). This partly explains why dividends are relatively "sticky", i.e., dividends do not react to earnings changes rapidly but remain relatively stable over a certain period of time vis-a-vis more volatile corporate earnings in the same period. On the other hand, managers try to avoid making decisions that later have to be reversed (Baker, Farrelly and Edelman (1985); Brav, Graham, Harvey and Michaely (2005)). They are exceptionally concerned about cutting dividends, and, according to Brav, Graham, Harvey and Michaely (2005),[12] would like to pass up some lucrative investment opportunities, raise external funds, or even sell a portion of assets before considering dividend reductions. All these highlight the exorbitant costs of cutting dividends to firm value, image and managers' reputational capital.

Empirical studies on the information content of dividend hypothesis have been attempting to capture the information conveyed to the marketplace by dividends. Fama, Fisher, Jensen and Roll (1969), Pettit (1972), Aharony and Swary (1980), and Asquith and Mullins

[12] For details, see Brav, Graham, Harvey and Michaely (2005). In a survey of financial executives and follow-up interviews with score of them, Brav et al. (2005) document that managers appear to convey the consensus that dividends are of first-order importance for a firm to stay aloof from trouble and they would like to sell assets or even raise external funds before considering a dividend cut.

(1983), among others, find that dividend increases (decrease) convey positive (negative) information, which is used by the market to update its valuation of a firm's future cash flows. Koch and Sun (2004), on the other hand, provide evidence that investors update their expectations regarding the persistence of past earnings changes based on dividend changes. However, Watts (1973), Gonedes (1978) and DeAngelo, DeAngelo and Skinner (1996) document that they fail to find supportive evidence to the hypothesis.

If dividends carry information, then what precisely is the information dividends convey to the market? Using monthly data, Nissim and Ziv (2001) report dividend changes are associated with earnings changes in each of the following two years, and with the level of future profitability. They suggest that the failure of prior research to detect dividend-earnings correlation may have been caused by specification issues, measurement errors and/or omitted variable bias. As a rebuttal, Grullon, Michaely, Benartzi and Thaler (2005) emphasize the non-linear relationship between dividends and future earnings, and empirically demonstrate that as soon as the non-linearity is accounted for in modeling the earnings process, dividend changes are no longer information laden as regards future earnings levels or changes. They thus conclude that the relation (or lack thereof) between dividend changes and future profitability is inconsistent with predictions of the signaling hypothesis, an extension of the information content theory. Guay and Harford (2000), however, show that firms use dividends as a distribution method (as against share repurchase) to reveal the permanence of their "past and contemporary cash flow shocks".

When signaling becomes a component in the corporate strategy toolkit, the use of dividends to convey information turns to be directional. Researchers find managers try their best to avoid reversing dividend policy decisions and would like to exhaust all possible resources to

fulfill their recurring commitment to shareholders (Lintner (1956)), before cutting or omitting dividends. It is thus well documented in the literature that firms widely engage in dividend smoothing against relatively volatile cash flows. More recent papers show that the corporate behavior of stabilizing dividend payment versus varying cash flows observed by Lintner (1956) over half a century ago is in practice in a large number of firms (see, e.g., Brav, Graham, Harvey and Michaely (2005); Michaely and Roberts (2006)).

Given the widespread practice of dividend smoothing, dividends do not "vary one-to-one with the prospects of the firm" (Kumar (1988)), and relations between dividends and anticipation of the firm's earnings appear non-linear. Modeling firm dividend behavior in a world of asymmetric information, Kumar (1988) acknowledges that dividends do have information content, but describes the transmission of information through dividend increases or decreases as "coarse signaling" that reflects the "broad quality" of the firm's earnings prospects. Consistent with Watts (1973), Gonedes (1978) and Brav, Graham, Harvey and Michaely (2005), Kumar (1988) indicates that dividends are poor predictors of future earnings. Another reason he gives for dividends' poor ability in predicting earnings is what can be called the "agency issue of information signaling" – the agency conflicts between managers and shareholders motivate managers to "strategically" refrain from completely revealing their private information. In fact, managers are incentivized to manipulate the disclosure of information, or even misrepresent private information to invoke market reactions that serve their own agenda. As such, it is difficult to imagine a signaling equilibrium in which senders signal honestly and receivers trust the information; only a *partial* signaling equilibrium exists.

Even though signals are reliable, the ways signals are interpreted by receivers (shareholders) vary significantly, conditional on certain circumstances. Kohers (1999)

investigates dividend initiations and omissions and the direction and magnitude of industry responses they evoke, and finds that information content of the two types of events are not "polar opposites" and market reactions to them are distinct. While the information transmitted by dividend initiations is largely perceived by the market as "firm-specific," dividend omissions are more likely to be inferred as representing industry-wide conditions. Empirical results indicate that announcements of dividend omission trigger negative market reactions that ripple through the same industry, demonstrating industry-wide effects. Announcements of dividend initiation, in contrast, induce negative market reactions to their industry competitors while generating positive market reactions to initiators themselves – the more homogenous the industry, the more negative the reactions to the rest of the industry.

3.2 Agency cost theory of dividends and free cash flow hypothesis

Agency problems arise from the separation of ownership and control of modern corporations (Berle and Means (1932); Jensen and Meckling (1976)). The most widely studied agency issues are those between shareholders and managers. Self-interested managers would maximize their own benefit at the expense of shareholders if proper monitoring or interest aligning mechanisms are lacking. To mitigate the agency problems, an internalizing approach is to associate managerial interests more closely with those of shareholders through increased managerial shareholding or the use of equity-based executive compensation. An externalizing approach is to reinforce efficient and effective monitoring by the capital market and through strengthened corporate governance.

This is where dividends can play a constructive role in alleviating the agency problem. Two hypotheses exist in this respect. One is the renowned free cash flow hypothesis of Jensen (1986), which posits that by paying out dividends, firms reduce the free cash flow available to

managers and thus lower agency costs that might result from managerial activities such as overinvestment, stealing, or consumption of perquisites. Free cash flows are the excess cash after firms satisfy their internal needs of financing investments to sustain future growth. An implication of the hypothesis is that dividends remove the extra cash left over from corporate investment policy, and that firm's investment policy takes precedence over dividend policy. This is akin to the description of the so-called "residual dividend" policy.

The other hypothesis is Easterbrook's (1984) "keeping firms in the capital market". This hypothesis argues that the primary function of regular payment of dividends is to force firms to seek external resources to meet their investment needs from the capital market, thus subjecting firms to more frequent market scrutiny by analysts, bankers, investors, debtors, and other capital suppliers. However, disposing of a large fraction of earnings has its downside – it may lead to underinvestment or expose the firm to higher floatation and transaction costs when external capital is raised. Thus the relation between dividend payout and agency problem is within the context of trade-off paradigm. Dividends *per se* can also cause agency problems, that is, agency conflicts between shareholders and bondholders (John and Kalay (1982)), in addition to the underinvestment problem due to the depletion of low-cost capital in the form of dividends (e.g., Myers (1984)). Aware of the possible transfer of wealth from creditors to owners, bondholders use debt covenant to restrict distribution of dividends, which, in turn, may become problematic – a delicate balance has to be stricken so that restrictions on dividend distribution should not result in a firm's investing in negative net present value (NPV) projects and loss of efficiency in decision making that could affect the firm's survival (Fama and Jensen (1983); Myers (1977)).

There has been a series of academic research to test the agency explanation of dividends. For example, Rozeff (1982) provides empirical evidence that firms with higher growth

opportunities, higher firm-specific risks or leverage, and higher inside ownership or smaller number of outside shareholders are more likely to pay less in dividends. The author argues that firms choose dividend payout levels aimed at an "optimal dividend policy" that minimizes total costs – the summation of agency costs and transaction costs of external financing. Easterbrook (1984) emphasizes the monitoring role of intermediaries such as investment bankers, auditors and the media in controlling agency costs and suggests that dividend payment helps create the demand for external financing, thus inviting market monitoring.

Johnson (1995) offers empirical results in support of the agency costs hypothesis – where dividend payments are high, average stock price reactions to debt issues, regarded a substitute to dividends in controlling the agency problem, are shown to be insignificantly different from zero. Jensen, Solberg and Zorn (1992) report lower debt and dividend levels in high inside ownership firms, suggesting high manager-shareholder interest alignment alleviates agency problems, which in turn eases the need for frequent monitoring to be generated by heavy borrowing and/or high dividend payment. A more recent paper, John, Knyazeva and Knyazeva (2011) finds that remotely located firms pay higher dividends, indicating that firms formulate their dividend policies to make up for the deficiency in monitoring and oversight caused by the distance of locations, and to mitigate agency conflicts between shareholders and management. It's no surprise that they report the relation between geography and dividends is more pronounced in firms with high free cash flow but few investment opportunities, which are indicators of severe agency cost problems.

On the other hand, Grinstein and Michaely (2005) indicate dividends are not an increasing function of institutional holdings or concentration of holdings, underlying that the relationship between dividends and institutional holdings is more of a substitutive nature with

regard to corporate monitoring. Noronha, Shome and Morgan (1996) argue that dividends are more effective in mitigating the agency problems when alternative mechanisms are lacking. They show that two substitutes – incentive-based executive compensation that better aligns the interests of managers and shareholders (internalizing approach), and large share ownership by block-holders (externalizing approach) – attenuate the functional effects of dividends. Empirical results provided by Noronha, Shome and Morgan (1996) do not invalidate Easterbrook's (1984) agency motives for dividends as the authors claimed; rather, they extend the premise by identifying alternative agency-controlling mechanisms in place that collaborate to ease the burden borne by dividends in agency problem mitigation. The concurrent existence of multiple mechanisms to monitor and control the agency problems may offer partial explanation for what Fama and French (2001) refer to as "disappearing dividends."

3.3 The clientele theory

The tax-based clientele theory suggests that firms pay out dividends to attract target investors in different tax brackets. A number of studies provide evidence to the existence of dividend clienteles (e.g., Becker, Ivković and Weisbenner (2011); Graham and Kumar (2006); Hotchkiss and Lawrence (2007)); some other studies report that high dividends are designed to attract informed institutional investors (see, e.g., Allen, Bernardo, and Welch (2000); Redding (1997); Shleifer and Vishny (1986)). Specifically, Graham and Kumar (2006) show that retail investors in general like non-dividend paying stocks, but among them the fondness of holding dividend paying stocks increases with age and decreases with income. Grinstein and Michaely (2005) find that institutional investors prefer to hold dividend paying stocks.

The clientele evidence has been two-dimensional. While investors pick stocks with dividend characteristics that fit their needs, firms formulate their dividend policies in response to

demands from clienteles. Becker, Ivković and Weisbenner (2011), for example, find significantly positive association between firms' dividends with the population of seniors in *geographic* areas where the firms are located. More directly, the "catering" theory advanced by Baker and Wurgler (2004) asserts that firms initiate or omit dividends to cater to changing demands of investors. Empirical results from testing various predictions of the theory have shown to be inconclusive. Contradictory evidence is provided by, among others, Grinstein and Michaely (2005), who show that despite their strategies of avoiding non-dividend-paying firms, institutional investors in fact prefer those stocks that pay *fewer* dividends to those that pay more dividends. This indicates that higher institutional holdings or concentration may not lead to higher dividends, or higher total payouts, which is inconsistent with the tax-based clientele hypothesis (Grinstein and Michaely (2005); Jain (1999); Strickland (2002)). While Michaely, Thaler and Womack (1995) fail to detect any significant institutional clientele migration following dividend omissions, Brav and Heaton (1998) do find pension funds reduce their holdings of dividend-omitting stocks in conformity with the strict "prudent man" rule after the enactment of the Employee Retirement Income Security Act of 1974 (ERISA). Hoberg and Prabhala (2009) challenge the "catering" theory by contending that the relation between transient investor fads of dividends and dividend changes disappears after controlling for the risk factor, and providing empirical evidence in support of the argumentation.

3.4 Dividend policy of regulated firms

The literature has documented that in addition to maintaining higher leverage levels, firms under regulation pay out more in dividends than their non-regulated counterparts (Lozano, de Miguel and Pindado (2005); Moyer, Rao and Tripathy (1992); Wansley (2003)). For example, Wansley (2003) reports that during the 21-year period from 1980 through 2000 non-regulated

firms on average pay out a substantially smaller portion of their earnings than do most regulated industries.

The agency theory offers a general explanation for corporate dividend policy, which also applies to firms under regulation. Easterbrook (1984) argues that the primary function of regular payment of dividends is to keep firms in the capital market, where monitoring of the management is more cost-effective. The implicit assumption of this approach is that alternative devices that can mitigate the agency problem, such as higher managerial ownership, block-holder shareholding, or institutional shareholding, are either not as cost-effective, hard to come by, or inclined to give rise to other agency-related problems. By dispensing a major portion of cash flows as dividends to shareholders, firms have to access capital markets for external financing. When issuing debt or common stock to raise capital to finance investments at higher frequencies, firms have more opportunities to be subject to intense market scrutiny by analysts, bankers, investors, debtors, and other capital suppliers. Therefore, high dividend payments by regulated firms tend to reduce the agency costs between shareholders and managers and help maximize the market value of firms.

Obviously, this agency-cost explanation based on the trade-off of costs and benefits does not address the specific problem of why firms under regulation pay higher dividends. High dividend payments are justifiable only when the benefits resulting from such payments more than offset the costs of repeated, and perhaps more frequent, external financing. It is true that for regulated firms, in additional to the universal agency conflict between shareholders and managers, there is another layer of agency problem – the agency conflict between shareholders and the regulator. The shareholder-regulator agency conflict comes into being because regulators, often as appointees with short tenures, may represent the interests of “ratepayers” to keep

economic profits low, thus undermining shareholder interests. There thus arises the need to monitor and discipline regulators. Smith (1986) hypothesizes that the capital market serves as a reminder of financing costs when firms sell equity and that by paying higher dividends, firms under regulation subject themselves and their regulators more frequently to market discipline so that the regulators get clues in the regulatory process such as the determination of rates of return for regulated firms. This implies that high dividends help create more demands for regulated firms to frequent capital markets to experience discipline. Moyer, Rao and Tripathy (1992) examine the high dividend payout ratio and dividend yield of regulated electric utilities and find support for the Smith (1986) hypothesis that regulated firms employ the high dividend policy as a response to regulatory risk and in an effort to control it. Indeed, a regulated firm was allowed a "reasonable rate of return" decided by the regulator. Shareholders thus adopt the strategy of forcing the firm to capital markets regularly to mitigate regulatory opportunism. Hagerman and Ratchford (1978)[13] also argue that if firms' acquisition of more debt to increase the probability of financial distress and the costs of bankruptcy is aimed at raising the rate of equity allowed by regulatory authorities, their frequenting the equity market typically informs the regulator of the market costs of equity financing. Lozano, de Miguel and Pindado (2005) offer Spanish evidence indicating high dividend payments by regulated firms are employed as a means of seeking control of the price level. Unlike non-regulated firms that directly go to capital markets for financing when needed, they note, regulated firms have to use dividend policy to "create" demands for new funds to embrace market monitoring and check regulator's proclivity to keep or even lower prices. They regard high dividend payments as incremental "transaction costs" incurred by regulated firms relative to non-regulated firms in resolving the shareholder-regulator

[13] See Hagerman and Ratchford (1978). By examining a sample of 79 electric utilities in 33 states in the U.S., the authors find that the allowed rate-of-return on equity is increasing in the debt-equity ratio.

agency conflict.

Another explanation for high dividend payments of regulated firms, which can be referred to as “comparable return hypothesis,” is provided by Wansley (2003). He argues that regulated and non-regulated firms differ fundamentally in their dividend policy, and the differences are ascribed to the investment opportunity sets historically available to regulated and non-regulated firms. Regulations limit investment opportunities of regulated firms and thus their capital gains potential for equity investors as compared with non-regulated firms. It is recognized that investment return in equity has two components: the capital gain component and the dividend yield component. To make their equity at least as attractive and lower financing costs in the competitive capital market, regulated firms have to offset the shortfall in capital gain potential by raising the dividend yield component of the return to make their overall risk-adjusted return comparable to that of non-regulated firms.

In summary, firms under regulation appear to use high dividend payouts to mitigate two kinds of agency conflicts: those between shareholders and managers and those between shareholders and regulators. By deciding to pay out a major portion of earnings, shareholders of regulated firms put both the managers and regulators under frequent capital market monitoring and discipline, and seek investment returns comparable to those of holding non-regulated stocks.

3.5 Deregulation effects on different aspect of corporations

Despite voluminous studies of deregulation and corporation policies, academic research on the dynamics of change in firms from the five deregulated industries of entertainment, petroleum and natural gas, utilities, telecommunications and transportation effected by economic deregulation has been limited. Kole and Lehn (1999) investigate deregulation effects on corporate governance of the U.S. airline industry by reporting increased concentration in equity

ownership, increased CEO compensation, increased use of stock options as a component of executive compensation, and decreased board size. Deregulated firms respond to the economic shock by adapting to the new environment in governance structure and become more and more like non-regulated firms. Moreover, the speed and level of adaptation is positively associated with firm survival. Firms that are unable to adapt or do not adapt quickly enough fail due to increased competition and rate cutting induced by deregulation, as indicated in Weiss (1990). Palia (2000) compares education quality levels of CEOs pre- and post-deregulation and finds that regulated business environments attract CEOs with lower-quality education and that deregulation enlivens the labor market so that higher-quality education CEOs join firms in the deregulated industries.

On the other hand, Gaspar and Massa (2006) find that increased competition brought about by deregulation contributes to firms' idiosyncratic volatility of stock returns and that lowered product market power due to elevated competition not only weakens the firms' ability to smooth out idiosyncratic fluctuations, but also raises information uncertainty. Ovtchinnikov (2010a) studies impacts of deregulation on firm leverage and finds that firms reduce leverage in reaction to the significant decline in profitability, asset tangibility and increase in growth opportunities resulting from deregulation. In cross-section, deregulation also significantly alters the sensitivity between leverage and its determinants. His findings offer support to the dynamic trade-off theory.[14] In a follow-up study, the author investigates the dynamics of mergers and acquisitions in the wake of economic deregulation, and finds that inferior industry performance in the regulation era leads to the initiation of economic deregulation to redress regulatory

[14] Ovtchinnikov (2010a) employs the portfolio matching procedure which has in fact a big problem: the portfolios of non-regulated firms are fixed when matched with the deregulated industries; there will be no new entrants into the portfolios, which will wear off through attrition. On the other hand, the deregulated industries experience dynamic changes as new firms joining in and old firms exiting. By comparing the changing deregulated industries with fixed portfolios (fixed in the sense that no new entrants into the portfolio), Ovtchinnikov (2010a) is therefore methodologically flawed. As such, there is reasonable doubt over the validity of its empirical results and inferences.

inefficiency, suggesting deregulation is more of an endogenous than an exogenous occurrence. The market forces unleashed by deregulation drive a wave of mergers and acquisitions in which bidders and targets are on average previous poor performers with excess capacity (Ovtchinnikov (2010b)). Thus post-deregulation mergers and acquisitions offer an avenue for firms to exit from the market, which was virtually non-existent pre-deregulation.

4. Hypotheses Development

In this section, I develop the hypotheses based on theories concerning corporate dividends and dividend policies. I primarily focus on five dimensions of dividend policy: the propensity to pay dividend, the amount of dividend paid, the sensitivity of dividends to earnings, the information content conveyed by dividend changes, and the link between dividends and corporate financing activities.

4.1 Evolution of firms' propensity to pay dividend in response to economic deregulation

The first question I investigate is whether deregulation impacts firms' propensity to pay dividends. Since economic deregulation substantially changes the operating environment as well as the nature of the firms, firms are expected to adjust their dividend policy accordingly. Dividend payment is one of the channels to control agency costs (Easterbrook (1984); Jensen (1986); Smith (1986)). Specifically, Smith (1986) suggests that regulated firms pay dividends to control the double agency problems between shareholders and managers, and between shareholders and the regulator. Distributing cash not only reduces the free cash flow available to managers for spending at their discretion but also creates demands for external financing that helps keep regulated firms in the financial market, which provides monitoring of management

and reminds regulatory authorities of the current cost of capital. If this argument is valid, firms under regulation are expected to be more inclined to pay dividends relative to non-regulated firms. Deregulation eventually removes the agency problem between shareholders and regulators, together with the abolition of the regulatory bodies, leaving the deregulated firms to face similar situation of agency problems as their non-regulated counterparts. Therefore, from an agency perspective, I predict a decline in firms' propensity to pay dividends following deregulation.

Deregulation also eases and gradually lifts restrictions on firms' investment activities so that deregulated firms are faced with an expanded investment opportunity set. To meet greater capital demands engendered by more investment opportunities, the pecking order hypothesis predicts a lower proclivity to pay dividends for deregulated firms if the investment-dividend identity holds. It is rational that firms would finance investment projects first and foremost using internally generated capital, considering the significant transaction and flotation costs associated with external financing (Myers and Majluf (1984)). In addition, deregulation-induced competition increases operating and earnings uncertainty, raising the possibility of financial distress. Therefore, in a dynamic pecking order world, firms are also expected to be more inclined to retain earnings than pay out dividends, in an attempt to prepare for greater uncertainties in earnings brought about by deregulation.

Based on these arguments, I propose the following hypothesis, in alternative format:

H1: The high propensity to pay dividends of firms under regulation will decline along the deregulation process and the determinants of the propensity to pay of deregulated firms will ultimately converge with those of non-regulated firms.

4.2 Evolution of dividend payout in response to economic deregulation

The agency theory not only predicts that firms under regulation are more inclined to pay dividends than non-regulated firms, but also foretells that if they pay, they pay higher dividends. By paying out larger proportions of earnings in cash dividends, regulated firms are in greater need of financing new investments with external funds, thus eliciting more frequent and cost-effective financial market monitoring of the management and updating regulators with current costs of financing to mitigate the double agency problems they are faced with (e.g., Smith (1986)). Since deregulation releases firms from regulatory control, the trade-off model of agency costs suggests reduced benefits of dividend payment. As such, the agency theory predicts that the dividend payout ratio of deregulated firms would decline and the determinants of dividend payout will gradually converge with those of non-regulated firms. The pecking order theory holds out similar prediction, that is, the expanded investment opportunity set and heightened competition lead to lower dividend payouts to conserve the least expensive internally-generated cash flows both out of necessity and as a precautionary action.

The clientele theory, on the other hand, suggests that firms may change their dividend policy in response to demands of their tax-based clienteles. Since deregulation affects the operating environment of the firm, prior literature provides evidence that there exist changes in the clientele after deregulation, characterized by more concentrated inside and outside block-holdings (Kole and Lehn (1999); Rennie (2006)). A migration to more concentrated institutional holdings, however, may not cause firms to increase dividends since high-tax clients prefer fewer dividends (Desai and Jin (2011); Grinstein and Michaely (2005)).

The signaling theory, nevertheless, predicts that higher quality firms are likely to increase their dividend payouts to signal firm quality and distinguish them from lower quality firms in a more competitive environment induced by deregulation; whether the increases will raise the

average dividend payout of deregulated firms is an empirical question. Based on the theoretical predictions discussed above, I propose the following hypotheses, in alternative form:

H2: Deregulation will cause firms to reduce their dividend payout ratios and the determinants of dividend payout will eventually converge with those of non-regulated firms.

4.3 Evolution of speed of adjustment of corporate dividend policy to optimal levels

Firms subject to regulation are protected from competition, and have limited growth opportunities and little operating risk. Their dividend payouts primarily serve to control the double agency problems besetting them (Smith (1986)). Thus the link between investment opportunities, operating earnings and dividends is weak. After the launch of the deregulation process, the firms being deregulated have to consider intensified competition, expanded growth opportunity sets and increased business risk when allocating their funds. All these necessitate the formulation of optimal dividend payouts based on corporate earnings and more speedy adjustment to the target dividend payout ratios in accordance with the trade-off of costs and benefits. Following this line of reasoning, I expect more responsive adjustments of dividends to earnings changes and closer links between dividend payouts and corporate earnings in reaction to economic deregulation. Hence the new hypothesis:

H3: Dividend payouts will be adjusted at greater speed toward optimal levels for firms in deregulated industries relative to when their industries are regulated.

4.4 Evolution of information content of dividend policy changes

As discussed above, firms under regulation use dividends mainly to cope with the double

agency problems, not as a vehicle to signal firm quality in an environment where competition is lacking and managerial discretionary actions are largely restrained. Under regulation, firms are overseen by regulators, whose supervision drastically reduced managements' discretion in investment, financing or operation decisions (Krishnaswami, Spindt and Subramaniam (1999); Ovtchinnikov (2010a)). Deregulation brings the role of regulators to an end and allows managers to take the reins of decision-making. In addition, as deregulation-induced competition comes to a head, firms have rational reasons to conceal information from competitors (Ovtchinnikov (2010a)). The expansion of managerial power and responsibilities and the growing complexity in decision-making in situations of intensified competition may encumber efficient communication of information. Therefore, deregulation increases information asymmetry. Given that increased information asymmetry highlights the need for quality signaling, I expect that following deregulation, firms will be more prone to using dividends as a signaling mechanism. On the other hand, dividends are expected to be more information-laden about earnings changes post-deregulation versus pre-deregulation. Employing the theory of information content of dividends, Guay and Harford (2000) argue that stock price reaction is greater to a firm's dividend increase when the payout decision is contrary to the cash flow permanence perceived by the market. This suggests that the less expected the information content of dividends, the greater the market reaction. Jagannathan, Stephens and Weisbach (2000) distinguish the sources of dividends and share repurchases by stating that dividends are paid with higher *permanent* operating cash flows while repurchases with higher *temporary*, non-operating cash flows. The information content theory thus predicts that market valuation reaction to dividend increase and decrease announcements will be stronger after deregulation than before deregulation. In addition, the relation between dividend changes and future changes in earnings will be stronger post-

deregulation relative to pre-deregulation. Hence I have the following two hypotheses:

H4A: Stock market valuation reaction to announced dividend increases and decreases will be stronger for deregulated firms compared to when they are regulated.

H4B: The relation between dividend changes and future earnings will be stronger when firms are deregulated relative to when they are not.

4.5 Evolution of corporate financing activities in response to deregulation

To mitigate the agency problem appears to be one of the major forces that drive firms' dividend policy. Easterbrook (1984) suggests that regular dividend payments dissipate a sizable portion of firms' cash flows, thus helping keep firms in the capital market. By subjecting management to financial market monitoring and discipline each time a firm issues debt or equity, shareholders benefit from reduced agency costs. Moreover, firms in regulated industries have to cope with an additional agency problem – agency conflicts between shareholders and regulatory authority. Smith (1986) thus argue that the policy of higher dividend payments is employed by firms under regulation because they induce more frequent trips to financial markets, which updates the regulator of current financing costs and help in determining appropriate rate of return for shareholders. Economic deregulation brings about significant changes to the operating environment of firms previously under regulation. For example, deregulation removes restrictions on firms' investments, thus greatly expands their growth opportunity set. In the meantime, deregulation heralds in competition, thus putting into test firms' overall performance, strength and business strategies and increasing uncertainties over their earnings capacity and survivability. All these galvanize the demand for additional capital to meet investment needs to reinforce competitive advantage and maximize their benefits, and prepare for possible ups and downs in operations. Based on this line of reasoning, deregulated firms are expected to be more

active in seeking external financing to secure sufficient funding in coping with competition. This leads to Hypothesis 5:

H5: Firms increase the frequency of external financing activities after deregulation relative to when their industries are regulated.

5. The Industry Matching Method and the Three "Snapshot" Periods

It is well documented that dividend policies exhibit certain time trends. For example, firms are becoming less likely to pay dividends (e.g., Fama and French (2001); Denis and Osobov 2008)) and there is a downward trend in target payout and speed of adjustment of dividends to earnings (Brav, Graham, Harvey and Michaely (2005)). To identify whether the economic deregulation *per se* induces changes in dividend policies, I construct a matched control industry for each deregulated industry and use difference-in-difference approach in empirical analyses to control for the contemporaneous time effects and draw inferences.

Industries are defined based on the Fama-French (1997) 48 industries.[15] There are at least two reasons to follow the Fama and French (1997) classification of industries. First, the Fama and French (1997) approach of categorizing all the NYSE, AMEX and NASDAQ firms into 48 distinct industries groups firms with similar industrial characteristics and at the same time limits the number of industries within a manageable range. Second, Ovtchinnikov (2010a) specifically justifies the use of broad industry definition in studying regulated industries by pointing out that although a deregulation initiative may be directed at only a particular industry segment, it inevitably impacts all firms in an industry since industry segments are closely interrelated.

The industry matching approach is to obtain a control sample that accounts for dynamic

[15] The five deregulated industries based on Fama and French 48 industry classifications are entertainment (7), petroleum and natural gas (31), utilities (32), telecommunications (33), and transportation (41).

changes in the composition of an industry. This method matches each deregulated industries with a non-regulated industry based on the three fundamental factors in dividend decisions. I follow the procedures of the portfolio matching method employed by Ovtchinnikov (2010a) except that, instead of matching a deregulated firm with a fixed portfolio of non-regulated firm, I identify an industry that is closest to a deregulated industry in terms of size, growth opportunities and profitability in the year preceding the year in which the first significant deregulation initiative was undertaken. The reason why I choose the three variables is because they are identified by prior literature as major determinants of the firm's dividend policy (e.g., Denis and Osobov (2008); Fama and French (2001)). The industry matching method takes the following steps: First, I calculate the industry average of size, growth opportunities and profitability of each deregulated industry in our sample – entertainment, petroleum and natural gas, utilities, telecommunications, and transportation in year -1, i.e., the year preceding the launch of the deregulation process; Second, I calculate the industry average of size, growth opportunities and profitability of the remaining 39 industries based on the Fama-French definition of 48 industries (I have already excluded four finance-related industries) in the same year for each deregulated industry; Third, I compute the sum of absolute values of $(MeanValue_{dereg} - MeanValue_{nonreg})/MeanValue_{dereg}$ for each of the variables. The smallest sum indicates that a non-regulated industry is closest to a deregulated industry based on the three attributes. When a non-regulated industry happens to be the match of two deregulated industries, I choose the second best match for one of the two deregulated industries. Thus, for each of the five deregulated industries I find a matched industry of control firms.[16]

This industry matching method has advantages over Ovtchinnikov's (2010a) portfolio

[16] The five matched control industries are business services (35) for entertainment (7), pharmaceutical products (13) for petroleum and natural gas (31), automobiles and trucks (24) for utilities (32), chemicals (14) for telecommunications (33), and aircraft (25) for transportation (41).

match method in that this approach accounts for dynamic changes in the composition of an industry, including occurrences of new entrants, mergers and acquisitions, and delists. The portfolio matching method, however, results in control portfolios whose composition is fixed in year -1 and does not change except through firm attrition.

To facilitate comparison, I follow Ovtchinnikov (2010a) and take three "snapshots", each of five years, of the periods of regulation, partial deregulation and complete deregulation. The regulation period is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The partial deregulation period is defined as the five years starting from the year of the significant deregulatory initiative (0, 4). The complete deregulation period is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5).

To prevent contemporaneous macro-economic factors and time series patterns from contaminating the effects of deregulation on firms' dividend policy,[17] I use the difference-in-differences approach to test whether deregulation significantly affects firms' dividend payout. Specifically I compare changes in deregulated firms' dividend policy with changes in dividend policy of firms in control industries in the periods of regulation, partial deregulation and complete deregulation to draw inferences about the effects of deregulation on the dividend policy of deregulated firms. Since firm behavior in the absence of deregulation is captured by the firms in control industries (i.e., control firms), inferences can thus be drawn that any differences in firm performance between deregulated firms and control firms are primarily attributable to the process of deregulation.

[17] The length of the deregulation process varies for each deregulated industry. For example, it takes the entertainment industry five years to get free from regulation. However, the process lasts two decades for the transportation industry. During the long time interval, many factors, such as business cycle, technological trends, and supply and demand shocks, may have a contributive effect on the change in attributes of deregulated firms (Ovtchinnikov (2010a)).

6. Data, Sample, Variable Definition, and Descriptive Statistics

In this section, I describe sample construction, sample distribution, variable definition and descriptive statistics.

6.1 Data and sample construction

I collect financial data from Compustat and daily stock return data from CRSP for all firms between 1966 and 2008. Since 1976 was the year in which economic deregulation was first introduced into the transportation industry – the first industry that was being deregulated, extending the sample period to 10 years prior to deregulation enables us to calculate earnings volatility and check firm attributes in the state of regulation. The year of 2008 was the last year Compustat financial information was available when this research started. Following previous literature, I exclude financial service firms (SIC codes 6000-6999) because their financing decisions may be driven by factors fundamentally different from those for other deregulated firms in the sample, such as statutory capital requirements. I also exclude cross-listed, non-U.S. firms. To avoid possible data entry errors, observations with negative value on total assets, sales and dividends are excluded. The data requirements result in a sample of 245,029 firm-year observations. Our sub-sample of deregulated firms over the three "snapshot" periods (15 years in total) consists of 17,906 firm-year observations on a total of 2,762 distinctive firms. I construct control industries through industry matching method (all the firms in control industries serve as control firms for firms in their corresponding deregulated industries) following the procedure described in the previous section to obtain a matched control sample of 12,581 firm-year observations on 1,998 distinctive firms.

6.2 Sample distribution and dynamic changes

Panel A of Table 2 reports the number of firms for each of five deregulated industries in each relative year (relative to year 0, the year in which the first major deregulation initiative is undertaken in an industry) of the three "snapshot" periods. The industry of utilities has the largest number of firm-year observations (5,036), followed by petroleum and natural gas (4,744), telecommunications (3,609), transportation (2,641), and entertainment (1,876). The number of firm-year observations increases along the deregulation process from 4,977 in regulation period, to 5,943 in partial deregulation period, and to 6,986 in complete deregulation period, with the industry of telecommunication having the largest increase (from 121 distinctive firms in the regulation period to 384 in the complete deregulation period) and entertainment having the least increase (from 100 to 148).

Panel B tracks the number of surviving deregulated firms along the deregulation process and Panel C presents the percentage of surviving deregulated firms in each year of the deregulation period relative to the number of firms in year -1, the year before the first major deregulation initiative is taken in an industry. A firm is defined as a surviving deregulated firm if it exists in year -1 and any year during the post-deregulation periods. As the data show, the total number of surviving deregulated firms has decreased from 1,071 in year -1 to 889 by the end of period of partial deregulation (year 4) and to 414 in the last year of the period of complete deregulation (year +5), suggesting that some 60 percent of the firms exit along the deregulation process. The industry of transportation has the largest attrition with 172 firms in year -1 and only 36 in year +5 (a survival rate of only about 20 percent), while the industry of utilities has the highest surviving rate of nearly 59 percent, from 353 firms in year -1 and to 208 firms in year +5. The analysis in the next subsection will present whether the disappearance is due to delisting, or merger and acquisition.

Table 3 reports the number of new entrants, exits and surviving firms in each year of the post-deregulation period relative to year -1 in each of the deregulated industries. A firm is defined as a new entrant in year t if it does not exist in year -1 but enters into the sample in year t, an exit if it exists in year -1 but disappears in year t, and a surviving firm if it exists in year -1 and continues to exist in year t. The data show dynamic changes in the composition of the deregulated industries and the changes appear to speed up with the advance of the deregulation process. For example, for all the deregulated industries, there are 410 new entrants (a new entrant rate of 38.28 percent relative to the number of firms in year -1) and 182 exits (an exit rate of 16.99 percent) at the end of the partial deregulation period (year 4) while the corresponding numbers are 942 (87.96 percent) and 657 (61.34 percent) at the end of the complete deregulation period (year +5). Except for the industry of utilities, all other deregulated industries have new entrant rates and exit rate exceeding 60 percent in year +5.

I further present a more aggregated picture for the new entrants, exits and surviving firms for the "snapshot" periods (e.g., partial and complete deregulation periods) in Table 4. The definitions of new entrants, exits and surviving firms are the same as in Table 3 with one exception: the status of a firm is determined based on whether it exists in any year of partial (complete) deregulation period instead of a specific year as in Table 3. Table 4 in general tells a similar story. For example, over the partial deregulation period, there are 450 new entrants, with a new entrant rate of 42.02 percent (450/1,071) and 40 exits, with an exit rate of 3.73 percent (40/1,071). However, during the complete deregulation period, the total number of new entrants increases to 1,297 with the new entrant rate being 121.10 percent and the number of exits climbs to 553 with the exit rate being 51.63 percent. The industry of telecommunications has the highest new entrant rate (298.21 percent), followed by entertainment (133.03 percent), transportation

(131.40 percent), petroleum and gas (118.96 percent), and utilities (29.75 percent). For exit rate, the industry of transportation ranks the first (74.42 percent), followed by petroleum and natural gas (62.45 percent), telecommunications (54.17 percent), entertainment (41.28 percent), and utilities (34.28 percent).

The overall evidence in this subsection presents a picture of dynamic change in the composition of the deregulated industries along the deregulation process, consistent with the findings of Ovtchinnikov (2010b) that economic initiative triggers restructuring activities and cause structural change in the deregulated industries.

6.3 Key variable definitions

In this subsection, I define the key variables. Some variables may be defined in the specific subsections. All the variable definitions are in Appendix A. There are two categories of variables. The first category is about dividend payout ratio and the second category is about firm characteristics that are related to dividend policies.

I use six measures of dividend payout plus dividend yield in analysis. The first measure, *Dividend/Earnings*, is defined as cash dividends divided by earnings before extraordinary items for common shares of the previous fiscal year. The second measure, *Dividend/Asset*, is estimated as cash dividends dividend by total assets in the previous fiscal year and the third measure, *Dividend/Sales*, is calculated as cash dividends divided by revenues in the previous fiscal year. The last two measures, *Dividend/Cash Flow* and *Dividend/Net Income* are computed as cash dividends divided by cash flow (net income + depreciation) and net income, respectively. Since dividend yield is also used by managers as a target in deciding dividend payout[18] and guide by

[18] Brav, Graham, Harvey and Michaely (2005) mention that some chief executive officers interviewed target

Grullon and Michaely (2007), I include this variable in my analysis. As in Grullon and Michaely (2007), *Dividend Yield* is defined as common cash dividends scaled by previous fiscal year-end market value of equity, which, in turn, is computed as common shares outstanding multiplied by fiscal year end stock price.

Following previous research, I compute profitability, *E/AT*, as earnings before extraordinary items plus interest expense plus income statement deferred taxes if available and scaled by total assets. Market-to-book ratio (*MTB*), a proxy for investment opportunity, is estimated as the market value of equity divided by book value of equity. *MV/AT*, the ratio of market value of asset to book value of asset and also a proxy for growth opportunity, is computed as (total assets – book value of equity + market value of equity)/total assets. *dAT/AT* is yearly change in total assets, computed as the difference between total assets scaled by total assets. Earned/contributed equity mix, *RE/BE*, is retained earnings scaled by book value of equity. I compute leverage (*Bklev*) as long-term debt plus short-term debt scaled by book value of total assets. *Volatility* is the volatility of stock returns, computed as the standard deviation of daily stock return in a fiscal year. Operating cash flow, *OCF*, is the ratio of operating income before depreciation to total assets. I measure each year's operating cash flow volatility, *OCF Volatility*, as the standard deviation of operating cash flow of that year and the preceding four years. A firm's age is the time (number of years) from its listing in CRSP.[19] All variables, except firm age and dummy variables, are winsorized at the 1st percentile and 99th percentile to ease the concern of outliers.

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dividend yield in implementing their firms' dividend policy.

[19] For accuracy, I check firm listing information from CRSP against information contained in a data set used in Jovanovich and Rousseau (2001). The dataset also provides information about firms' year of founding and year of incorporation. I obtained the data set from Prof. Jovanovich's website http://www.econ.nyu.edu/user/jovanovi/.

6.4 Descriptive Statistics

Table 5 presents the descriptive statistics of the key variables for deregulated firms over the three "snapshot" periods (15 years). All the statistics are estimated based on the pooled data. The mean (median) *Dividend/Earning*, *Dividend/Asset*, *Dividend/Sales*, *Dividend/Cash Flow*, *Dividend/Net Income*, and *Dividend Yield* are 0.33 (0.13), 0.02 (0.01), 0.03 (0.01), 0.16 (0.04), 0.29 (0.02) and 0.03 (0.01), respectively. The disparity between mean and median values suggests that large dividend payers dominate the dividend payment, consistent with the evidence documented by Denis and Osobov (2008). The positive skewness of dividend payment is also found by Grullon and Michaely (2007).

The mean (median) firm size is $2,211 (228) million in terms of total assets and $3,096 (291) million in terms of market value. The mean (median) profitability and operating cash flow is 0.003 (0.055), 0.093 (0.123), respectively. As to the proxies for growth opportunities, the mean (median) of the ratio of market value of assets to book value of assets, asset growth, and sales growth is 1.758 (1.188), 0.079 (0.068), 0.272 (0.096), respectively. The mean (median) earned/contributed equity mix is 0.170 (0.376), consistent with the median value of 0.341 documented by DeAngelo, DeAngelo and Stulz (2006). The value of book leverage (mean = 0.354, median = 0.346) is in line with the numbers documented by Ovechinnikov (2010a). For the measures of firm risk, the mean (median) stock return volatility and operating cash flow volatility is 0.032 (0.027) and 0.066 (0.029), respectively.

7. Empirical Tests

In this section, I empirically test the hypotheses developed in Section 4. I first investigate changes in the propensity to pay dividends of firms affected by the deregulation process. I then

proceed to examine the evolution of dividend payout ratio, i.e., how much to pay in dividends. Based on Lintner's (1956) partial adjustment model and its variant Fama-Babiak (1968) model, I analyze whether firms' dividend policy becomes more sensitive to the past and current earnings in response to economic deregulation. The test of change in the information content of dividends follows. I finally study the financing activities of deregulated firms.

7.1 Effects of deregulation on firms' propensity to pay dividends

In this subsection, I focus on the effects of deregulation on firms' decision regarding whether or not to pay dividends. As documented by previous research, firms under regulation are more inclined to pay out dividends than non-regulated firms, in an effort to control the agency problems exacerbated by the excess free cash flow and the scarcity of investment opportunities (Easterbrook (1984); Moyer, Rao and Tripathy (1992); Smith (1986)). Given that deregulation changes firms' operating environment by removing government control and direct involvement in business operations and ushering in competition, I expect deregulation to have significant negative effects on deregulated firms' propensity to pay dividends. I also hypothesize that the determinants of deregulated firms' propensity to pay dividends will eventually converge with those of non-regulated firms as a result of the deregulation drive.

7.1.1 Time trends in dividend payment along deregulation process

I begin by investigating dividend behavior of firms in the deregulated industries along the deregulation process. Specifically, I classify any deregulated firm (both surviving firms and new entrants) as a payer if a firm pays dividends in year t and a non-payer otherwise. To identify what drives the change in the number of non-payers—those who fail to initiate dividends and those who abandon dividend payment, I follow Fama and French (2001) and further classify a non-payer as a former payer if the firm pays dividends in any previous year and a never-paid if firm

has never paid dividends since it appears in CRSP. Figure 1 presents the percent of each of these four groups of firms in each year relative to year 0, the year in which the first major deregulation initiative is taken in an industry, in the three "snapshot" periods. As shown in the figure, firms in the deregulated industries become less and less likely to pay dividend over time, with non-payers gradually outnumbering payers along the deregulation process. During the period of regulation, dividend payers account for approximately 70 percent of the sample firms; in the partial deregulation period, the proportion of firms paying dividend slides to about 50 percent; the fraction of dividend payers further drops to below 40 percent in the period of complete deregulation. A closer analysis reveals that while the fraction of former payers registers a minor growth, the percent of firms that never paid dividends increases drastically in the periods of partial deregulation and complete deregulation, suggesting that there is a flow of new entrants into the deregulated industries that never pay dividends.

Overall, the analyses show a conspicuous declining trend of dividend payer in deregulated industries along the deregulation process. While there is some evidence that former payers abandon dividends, the declining trend is primarily driven by firms that have never paid dividends. In fact, I find that firms that enter into the deregulated industries after the launch of economic deregulation account for 85 percent of the never-paid group. This observation necessitates separate analysis of surviving deregulated firms to isolate the effect of new entrants on the overall dividend payment.

7.1.2 Dynamic changes of deregulated firms along deregulation process

Economic deregulation changes the operating environment of all firms in the deregulated industries, which affects firms' performance and behavior. It is conceivable that new entrants would follow the new rules of competition. Of particular interest is how the firms that exist

during the period of regulation adapt their behavior to the new operating environment and how they fare along the deregulation process. To explore this issue, I trace a group of firms that exist in year -1, the year prior to the year in which the first deregulation initiative was undertaken in an industry (year 0), all the way through the five-year partial deregulation and five-year complete deregulation periods.

Table 6 presents the dynamic changes that take place to dividend payers and non-payers in year -1 in each of the ensuing deregulation years. Panel A shows a continual and monotonic attrition of dividend payers along the years of deregulation. In the first year of deregulation, nearly 5 percent of the firms that pay dividend in year -1 lose payer status due to either dividend abandonment, or merger and acquisition, or delisting. By year 4, the last year in our defined partial deregulation period, only 81 percent of the year -1 payers remain steadfast in their dividend payment, nearly 7 percent stop paying, another 7 percent are merged or acquired, and the remaining 5 percent simply disappear because of delisting for various reasons. The ending year of the complete deregulation period sees further erosion of the rank and file of the year -1 dividend payers: nearly 40 percent keep paying dividends, while the other 60 percent dividend payers lose the payer status: 8 percent stop paying, 27 percent are lost to mergers and acquisitions and another 25 percent to delisting from stock exchanges. The evidence that a fair number of firms are lost to merger and acquisition is consistent with the findings of Ovtchinnikov (2010b) that deregulation opens up the market for corporate control in the affected industries and there is a tidal wave of mergers and acquisitions following the deregulation initiatives. The increasing percent of stop-paying firms (from 5 percent in year 0 to 8 percent in year +5) provides some evidence that former regulated payers abandon dividends in the aftermath of deregulation.

Panel B presents a picture of dynamic changes along the deregulation process for non-payers in year -1. Consistent with the notion that dividend payers are in better financial and economic shape than non-payers, non-payers fall victims to delisting faster and in greater magnitudes than payers. Specifically, by year +5, the last year of the period of complete deregulation, nearly 55 percent of the year -1 non-payers disappear because of delisting and another 22 percent are either merged or acquired, while about 16 percent remain avoiding dividend payment. Only 7 percent of the former non-payers start to pay dividends. The evidence that a modest percent of surviving firms maintain non-payer status plus a drastic increase in the percent of never-paid firms documented earlier confirm the previous observation that new entrants play an important role in the declining trend of dividend payment.

There are two possible causes that contribute to the decline in the number of dividend payers each year along the deregulation process: First, the decline in dividend payers may be caused by changing firm characteristics, i.e., deregulated firms shift toward those firms with characteristics typical of non-payers; second, the decline may be caused by a declining propensity to pay dividends, i.e., firms with the characteristics typical of payers become less likely to pay dividends. In the following discussion, I first examine the evolution of firm characteristics along the three "snapshot" periods and then employ out-of-sample analysis to investigate the propensity to pay dividends induced by economic deregulation.

7.1.3 Evolution of deregulated firms' characteristics

Table 7 presents firm characteristics identified to be determinants of whether to pay dividend for all the deregulated firms, dividend payers and non-payers separately. The statistics are estimated based on the pooled data. A firm is classifies as dividend payer (non-payer) if it pays dividend (does not pay dividend) in year t and it is included in the estimation of statistics of

dividend payers (non-payers). Panel A reports descriptive statistics for all deregulated firms. To maintain comparability of the measure over time despite increases in the size of the sample and changes in its distribution by market capitalization, I follow Fama and French (2001) and define a firm's size, *NYP*, as the proportion of NYSE-listed firms with the same or smaller market capitalization than the firm itself. Other variables are as defined previously.

The comparison of firm characteristics between dividend payers and non-payers reveals that dividend payers are larger (*AT*), older (*AGE*) and more profitable (*E/AT*) while non-payers have more volatile return (*Volatility*), higher growth opportunities (*MV/AT*), and higher growth rate (*dAT/AT, Saleg*). Consistent with previous evidence that the company's earned/contributed equity mix estimated as the ratio of retained earnings to the book value of equity (*RE/BE*) is significantly associated with the propensity to pay dividends (DeAngelo, DeAngelo and Stulz (2006)), the data in Table 7 show that the mean (median) value of *RE/BE* is 0.480 (0.472) for dividend payers versus -0.180 (0.136) for non-payers, indicating that dividend payers have higher internally generated capital. Interestingly, the non-payers have negative retained earnings in our sample. The same phenomenon is documented by DeAngelo, DeAngelo and Stulz (2006) and Grullon, Paye, Underwood and Weston (2008) for the Compustat universe non-payers. Collectively, the analysis suggests that the convention that dividend payers tend to be larger, more mature, and more profitable also applies to firms in the formerly regulated industries.

To examine whether deregulated firms shift toward those with characteristics typical of dividend non-payers, I present the evolution of firm characteristics in the three "snapshot" periods of regulation, partial deregulation and complete deregulation in Table 8. Panel A shows the dynamic changes of firm characteristics for all deregulated firms and Panel B show those for surviving deregulated firms. Surviving firms are those that exist in any year during the period of

regulation and continue their existence into the periods of partial deregulation and complete deregulation. Following Denis and Osobov (2008), we report averages of annual medians in the three "snapshot" periods.

The data in Panel A of Table 8 demonstrate a steady decline in profitability along the line of the deregulation process, with *E/AT* starting at 0.067 in the regulation period, dropping to 0.062 during the partial deregulation period and reaching 0.041 in the complete deregulation period. This decline is more pronounced for non-dividend payers as indicated by the numbers (from 0.049 to 0.019 to 0.008). A further analysis suggests that the larger decline for non-payers is induced by firms that never paid dividends. In fact, out of the non-payers, the never-paid firms experience the sharpest decline in profitability, from 0.050 to 0.019 to 0.004 respectively, whereas those that abandon dividend payment (former payers) show much more stable profitability.

As shown in Panel B, surviving deregulated firms also exhibit declining profitability, but the magnitude is smaller. In particular, *E/AT* for all the surviving firms change from 0.067 to 0.066 to 0.050 over the three "snapshot" periods and the corresponding numbers for never paid firms are 0.050, 0.038, and 0.032. Taken together, the evidence indicates that the declining profitability is mostly driven by new entrants that never pay dividends.

Further analysis on the number of observations of dividend payers during the complete deregulation period for all the deregulated firms (2,774) and surviving deregulated firms (1,642) indicates that some new entrants pay dividends. However, the analysis on the number of observations of never-paid firms in the total deregulated firms and the surviving deregulated firms (3,881 vs. 486) shows that a large number of new entrants do not pay dividends and these firms dominant the never-paid subsample.

In support of the argument that the deregulation process brings about the expansion of deregulated firms' investment sets, the ratio of market value of assets to book value of assets (*MV/AT*) grows almost monotonically for all deregulated firms, payers, and former payers. This is also the case for surviving firms. This evidence is unique to deregulated firms, as Denis and Osobov (2008) document a decline in growth opportunities over time for all Worldscope[20] U.S. firms and Fama and French (2001) report a U-shaped change in growth opportunities for all CRSP and Compustat firms. Another interesting observation is that former payers – firms paying dividends in previous years and later abandon dividend payment, have market-to-book asset ratio of less than one during regulation and partial deregulation periods. Possibly because of heightened competition, both sales growth rate (*Saleg*) and asset growth rate (d*AT/AT*) exhibit a declining trend along the deregulation process.

The declining trend also appears in all deregulated firms' proportion of equity that is from retained earnings (*RE /BE*). For example, the retained earnings to equity (*RE /BE*) is 0.419, 0.411, and 0.273 for all the deregulated firms over the three "snapshot" periods, respectively. The decline is more pronounced for non-dividend payers (the corresponding numbers are 0.306, 0.165, and 0.056) and never-paid firms (the corresponding numbers are 0.296, 0.149, and 0.042). However, the earned/contributed equity mix of the surviving deregulated firms has been strikingly stable along the deregulation process, indicating that the new entrants drive the declining trend of *RE/BE*. Consistent with Campbell, Lettau, Malkiel and Xu (2001) that individual stocks have become more volatile, all groups of the deregulated firms exhibit an upward trend on stock return volatility. Surprisingly, surviving firms do not share this trend and

[20] The Worldscope database is a product of Thomson Reuters. The database offers fundamental data on the world's leading public and private companies, which include annual and interim/quarterly data, historical financial statement content, per share data, calculated ratios, pricing and textual information.

there is some evidence that return volatility decreases for the survivors.

In sum, deregulated firms become less profitable and riskier, enjoy higher growth opportunities, and have a reduced rate of internally generated funds along the deregulation process. These trends are much more pronounced for new entrants that never pay dividends. It seems that deregulated firms have shifted toward the type of firms with characteristics typical of non-payers.

7.1.4 Multivariate analysis of determinants of dividend payment

In this part, I investigate the determinants of the firms' probability to pay dividends for deregulated firms and whether the impact of the determinants has changed along the deregulation process. Guided by the previous studies (e.g., DeAngelo, DeAngelo and Stulz (2006); Fama and French (2001); Grullon, Paye, Underwood and Weston (2008)), I estimate the following Fama and French (2001) logit regression model

$$Payer_t = \beta_0 + \beta_1 NYP_t + \beta_2 E_t/AT_t + \beta_3 MV_t/AT_t + \beta_4 dAT_t/AT_t + \beta_5 RE_t/BE_t + \varepsilon_t \qquad (7.1a)$$

and Grullon, Paye, Underwood and Weston (2008) model

$$Payer_t = \beta_0 + \beta_1 NYP_t + \beta_2 E_t/AT_t + \beta_3 MV_t/AT_t + \beta_4 Saleg_t + \beta_5 RE_t/BE_t + \beta_6 LAGE_t + \beta_7 LVolatility_t + \varepsilon_t \qquad (7.1b)$$

The dependent variable, *Payer*, is set to one if a firm pays dividend in year t, and zero otherwise. Relative firm size (*NYP*), profitability (*E/AT*), growth opportunity (*MV/AT*), asset growth (*dAT/AT*), sales growth (*Saleg*), earned/contributed equity mix (*RE/BE*), logarithm of firm age (*LAGE*), and logarithm of stock return volatility (*LVolatility*) are included as explanatory variables to control for heterogeneity in firm size, profitability, growth opportunities, expansions, internally generated funds, maturity, and risk. Follow previous studies, I estimate the logit regressions using Fama and MacBeth (1973) procedure. Specifically, I estimate logit regressions

each year and average the coefficients of each explanatory variable. Fama and MacBeth (1973) approach addresses clusters within cross-section. To account for the possible serial correlation in the data, I estimate the standard errors robust to serial correlations of up to three lags using Newey-West procedure (Newey and West (1987)).

Larger firms are expected to be more likely to pay. Similarly, more profitable firms, more mature firms, and firms with more internally generated funds are more likely to pay. Thus, I expect a positive sign for the coefficients on these variables. In contrast, firms with high growth opportunities, in the fast growing stage, and with high risk are expected to hold funds and accordingly are less likely to pay. Therefore, a negative sign is expected for *MV/AT, dAT/AT, Saleg,* and *Volatility*.

For comparison purposes, I present two sets of results. Following Fama and French (2001) and Denis and Osobov (2008), I first include relative firm size (*NYP*), profitability (*E/AT*), growth opportunity (*MV/AT*), asset growth (*dAT/AT*), and earned/contributed equity mix (*RE/BE*) in Equation (7.1a) and report the results in Panel A of Table 9. This is referred to as the "short specification". Then I follow Grullon, Paye, Underwood and Weston (2008) to replace asset growth with sales growth and add firm age (*LAGE*) and stock return volatility (*LVolatility*) in the regression specification – Equation (7.1b) – and report results in Panel B. This is referred to as the "long specification". Under each set of analysis, separate regressions are estimated for all the deregulated firms, payers and non-payers as well as further for the entire sample period (1 + 2 + 3), regulation period (1), partial deregulation period (2), and complete deregulation period (3) in the table.

Results in Panel A and Panel B of Table 9 reveal that the coefficients on profitability and volatility have the expected positive signs and are significant consistently across all model

specifications, all groups of firms, and all the three periods, consistent with the notion that firms that are more profitable and have lower risk are more likely to pay dividends. The coefficients on firm age, growth opportunities, and earned/contributed equity mix have the expected signs and significant in most cases, providing some evidence that older firms, firms with fewer growth options and more internally generated funds have higher probability to pay dividends. Given that previous research finds that firm size, profitability, earned/contributed equity mix, and firm age have significantly positive impact on the decision to pay dividends and growth opportunities, sales growth, and firm risk have significantly negative impact, it seems that firms in deregulated industries share some common determinants of the probability to pay as non-regulated firms. For the time-series analysis across the three periods, I find that the impact of some determinants has changed over time. For example, the coefficients on earned/contributed equity mix turn from insignificant in the regulation and partial deregulation periods to significant in the complete deregulation period for all the deregulated firms. The coefficients on growth opportunities also change over time in some cases. More importantly, the coefficients on all variables for total deregulated firms in the complete deregulation period (3) turn to the predicted signs and become statistically significant in both model specifications. These changes seem to suggest that deregulated firms are moving towards converging with non-regulated firms in terms of the decision on whether or not to pay dividends along the process of economic deregulation. I will further explore the convergence in a later subsection.

Turning to the coefficients on the intercept, I find a positive intercept for dividend payers and a negative intercept for non-payers in Panel A, suggesting that there appears to be path-dependence in dividend payment, i.e., regardless the effects of firm characteristics, dividend payers in year t-1 exhibit a preference to continue dividend payment in year t while non-payers

in year t-1 are less likely to initiate dividends in year t. Fama and French (2001) and Denis and Osobov (2008) document similar evidence in support of the notion of dividend stickiness. However, after controlling for firm return volatility and firm age, the path-dependence for dividend payers disappears. This seems to suggest that dividend payers refrain from committing to dividend payment when taking risks into account. The finding is in support of previously documented evidence that risks play an important role in the decision to pay (Grullon, Paye, Underwood and Weston (2008); Hoberg and Prabhala (2009)).

To summarize, deregulated firms share some common determinants of the probability to pay as non-regulated firms, but also exhibit certain distinctive attributes. It seems that the differences mostly arise from the regulation period and deregulated firms are moving towards convergence with non-regulated firms along the deregulation process with regard to the decision to pay dividends. Moreover, I provide empirical evidence that the path-dependence of dividend payers found by previous research disappears after accounting for the risk factor.

7.1.5 Out of sample analysis to differentiate deregulation effects on propensity to pay

Although Figure 1 presents a picture of an overall decline in the number of deregulated firms paying dividends along the deregulation process, the decline trend may be due to the changing firm characteristics and/or may just be reflective of the general trend of declining propensity to pay observed by Fama and French (2001) for the universe of CRSP or Compustat firms. In this subsection, I conduct empirical tests to identify the effects of deregulation on firms' propensity to pay dividends. Hypothesis 1 implies that if deregulation is a factor that reduces corporate propensity to pay, deregulated firms should have different footprints than non-regulated firms in the evolution of dividend-paying propensity. To test this hypothesis, I use out of sample analysis to estimate the change in propensity to pay dividends by filtering out the

effect of changing firm characteristics and then compare the changing propensity to pay for deregulated firms and control firms to account for the general trend.

To construct the payout model, I follow Fama and French (2001) and Denis and Osobov (2008) to run logit regression of firms' probability to pay dividends on firm characteristics such as size, profitability and growth opportunities separately for deregulated firms and control firms each year in the regulation period (-5, -1) and average the coefficients from annual regression to obtain the coefficients in the benchmark period (Fama and MacBeth (1973) estimation procedure). I then apply the estimated model for benchmark period to forecast the percent of firms that are expected to pay dividends in each relative year during the partial deregulation and complete deregulation periods. The expected percent of dividend payers each year is calculated as the average of the expected probability to pay dividend in that year, and accounts for changes in firm characteristics. Any difference between expected percent and actual percent of dividend payers is the portion of variations "unexplained" by changing firm characteristics, and reflects "pure" changes in firms' propensity to pay dividends. If the expected percent of payers is greater than the actual percent, referred to as "propensity to pay deficits" in Grullon, Paye, Underwood and Weston (2008), there is a declining propensity to pay dividends, and vice versa.

Parallel to the determinants of payer analysis in Table 9, I first employ explanatory variables used by Fama and French (2001) and Denis and Osobov (2008) in the analysis, including size, profitability, growth opportunities, asset growth and the earned/contributed equity mix. Panel A of Table 10 presents the empirical results for all the deregulated firms and control firms. In the first four years of the deregulation process, deregulated firms exhibit an increasing propensity to pay with the differences between the expected percent of payers and actual percent of payers ranging from -5.5 percent to -0.4 percent. As the deregulation process progresses,

deregulated firms appear to experience accelerated decreases in their propensity to pay. In the first three years of complete deregulation, the differences between the expected percent and the actual percent of payers turn to positive 6.5 percent, 8.9 percent, and 8.6 percent, respectively. The number jumps to 11.4 percent and 11.1 percent in the last two years the complete deregulation period. In comparison, the change in the propensity to pay of control firms is much more moderate with the differences between the expected percent and the actual percent of payers ranging from 3.9 percent to 8.7 percent during the complete deregulation period. However, the differences in the change in the propensity to pay between deregulated firms and control firms are mostly insignificant, suggesting that the declining propensity to pay dividends of deregulated firms is just a reflection of the overall trend found in CRSP or Compustat industrial firms and it appears that it does not bear the mark of the impact of the deregulation undertakings.

I further estimate the change in propensity to pay of surviving deregulated firms which exist from the period of regulation to the periods of partial deregulation and complete deregulation. I compare changes in their propensity to pay dividends with that of the surviving control firms along the line of deregulation process and present the results in Panel B of Table 10. The surviving deregulated firms exhibit an increasing, not a declining, propensity to pay dividends even though the magnitude is getting smaller with the progress of the deregulation process. The propensity to pay dividends remains almost unchanged for surviving control firms for most of the years over the same time interval. Moreover, the differences in the change in propensity to pay between surviving deregulated firms and surviving control firms are not significant. In fact, Denis and Osobov (2008) document similar phenomenon for their constant sample firms (surviving firms). They find that firms existing during the benchmark period and continuing to exist in the later period do not post a significant decline in the propensity to pay

dividends. Surviving firms in some countries such as the U.K., they report, even register an increase in their propensity to pay dividends along the years.

Next, I follow Grullon, Paye, Underwood and Weston (2008) and replicate the above analysis by incorporating two additional variables (the logarithm of firm age and the logarithm of stock return volatility) and replacing asset growth with sales growth and report the results in Panel C of Table 10 for total deregulated firms and total firms in control industries and Panel D for corresponding surviving firms. In general, the results remain qualitatively unchanged but with smaller magnitude for all the deregulated firms and control firms. More specifically, the declining propensity to pay for deregulated firms during the complete deregulation period ranges from 3.8 percent to 6.5 percent while the corresponding number for control firms ranges from 6.5 percent to 9.4 percent. The differences between deregulated firms and control firms are not significant during the complete deregulation period. I find similar evidence for surviving deregulated firms and control firms. By and large, the evidence offers little empirical support to the hypothesis that deregulation initiatives have profound incremental impacts on the propensity to pay dividends of firms in the industries undergoing deregulation.

Since the above estimates are made based on the sample of control firms constructed through the method of industry-matching, I use alternative controls to test the robustness of our results regarding the effect of deregulation on firms' propensity to pay dividends. Drawing on Ovtchinnikov (2010a), I use all non-regulated Compustat firms as control firms and repeat the analysis for each deregulated industry separately. Specifically, I run the Grullon, Paye, Underwood and Weston (2008) regression model using Fama and MacBeth (1973) procedure for all Compustat firms over the period of 1971 to 1975 to obtain the coefficients. Then I apply the coefficients from this benchmark period to deregulated firms and control firms each year over

the partial and complete deregulation periods to obtain expected probability to pay.[21] The results are reported in Table 11. Similar to the data in Table 10, there is no discernible pattern for the change in the propensity to pay dividends for firms in each deregulated industry during the partial and complete deregulation periods, and the difference between the changes in the propensity to pay of deregulated firms and controls are largely insignificant with the exception of the utilities industry only. However, the utilities industry exhibits an increasing propensity to pay relative to total Compustat firms, contrary to the prediction.

As another test, I use the remaining 39 industries as defined in the Fama and French (1997) 48 industries (with the exclusion of five deregulated industries and four financial service industries) and randomly assign eight industries to each deregulated industry (seven industries to the industry of transportation) as controls. The results, reported in Table 12, are qualitatively identical to those in Table 11. Again the propensity deficits for deregulated firms are not significantly higher than those for control firms, suggesting that deregulation does not cause accelerated decline in the propensity to pay dividends for firms previously under regulation.

7.1.6 Which is to blame, dividend abandonment or failure to initiate?

I document that both deregulated firms and control firms experience a decline in the propensity to pay dividends after the deregulation process kicks off and there is no significant difference in this respect between these two groups of firms. To further investigate whether deregulated firms exhibit distinctive features in dividend policies in response to deregulation initiatives, I examine whether the decline is caused by dividend abandonment or/and failure to initiate dividends for both deregulated and control firms in this subsection.

[21] Given that Grullon, Paye, Underwood and Weston (2008) specification which includes two additional variables – the logarithm of firm age and the logarithm of stock return volatility – appears more stringent than the Fama and French (2001) specification, I use GPUW specification in robustness check.

Following Denis and Osobov (2008), I first divide sample firms in year +5, the last year in the five-year period of complete deregulation, into those that exist in the last year of the regulation period (year -1) and those that enter into the sample thereafter. I then segment these two groups further into dividend payers and non-payers. In this way, "Year -1 Payers" are firms that pay dividend as of year -1 and "Year -1 Non-payers" are firms that do not pay dividends as of year -1. Similarly, "Post Year -1 Payers" are those firms that enter into the sample after year -1 and initiate dividends any time between year -1 and year +5 and "Post Year -1 Non-payers" are firms that enter into the sample after year -1 and never pay dividend throughout the deregulation process.

I estimate the shortfall of dividend payers by computing the difference between the expected number of dividend payers and the actual number of dividend payers at year +5 for these four groups of firms. The expected number of dividend payers is estimated by summing the expected probabilities of dividend payment for each individual firm in year +5. Similar to Table 10, I apply the average coefficients estimated from the regulation period (year -5 to year -1) to the values of each individual firm's characteristics in year +5 to calculate the expected probabilities to pay dividends. I present results in Table 13 for both deregulated firms and control firms under two logit specifications as those in Table 10, with "short specification" referring to the regression using Fama and French (2001) variables and "long specification" to the regression using Grullon, Paye, Underwood and Weston (2008) variables.

Similar to Denis and Osobov (2008), Panel A of Table 13 shows that for control firms, the failure to initiate dividend by non-payers is the main contributor to the shortfall of payers in year +5 ((8 + 92 = 100) for the short specification and (14 + 67 = 81) for the long specification) and payers actually exhibit higher propensity to pay than expected ((-11) + (-27) = (-38)) for the short

specification and -13 for the long specification). Deregulated firms have similar situations as control firms. Panel B of Table 13 shows that the shortfall of payers for deregulated industries in year +5 is also mostly caused by non-payers' failure to initiate dividend payment ((10 + 139 = 149) for the short specification and (8 + 62 = 70) for the long specification) and payers actually exhibit higher propensity to pay than expected ((-19) + (-19) = (-38)) for the short specification and (-26) for the long specification). In addition, the dividend shortfall rate for deregulated firms (111/1,001 = 11 percent for the short specification and 46/720 = 6 percent for the long specification) is similar to that for control firms (62/1,029 = 6 percent for the short specification and 71/762 = 9 percent for the long specification). The results further confirm my previous conclusions that economic deregulation *per se* does not induce a declining propensity to pay dividends beyond the secular trend.

7.1.7 Convergence of determinants of whether to pay between deregulated and non-regulated firms

Even though there is little evidence that deregulation induces firms to become less likely to pay dividends, I further investigate whether the determinants of whether to pay dividends for deregulated firms converge with those of control firms. Given that deregulation relieves those firms from government control and major decision-making and place them on the same competition field as non-regulated firms, it is expected that the elements that determine the decision of deregulated firms on whether to pay dividends gradually converge with those of other industrial firms. In this part of analysis, I further explore this issue.

Following Ovtchinnikov (2010a), I estimate the following cross-sectional regression which compares the determinants of whether to pay between regulated firms and firms in control industries over the three "snapshot" periods:

$$Payer_t = \beta_0 + \beta_1 (X_{it}) + \beta_2 (X_{it} * Dereg_{it}) + \beta_3 (X_{it} * Dereg_{it} * Reg_{it}) + \varepsilon_{it} \quad (7.2)$$

where *X* is a vector of explanatory variables, which include firm size (*NYP*), Profitability (*E/AT*), Growth Opportunity (*MV/AT*), sales growth *(Saleg),* earned/contributed equity mix (*RE/BE*), logarithm of firm age (*LAGE*), and logarithm of stock return volatility (*LVolatility*). The dependent variable, *Payer*, is equal to one if a firm pays dividends in a year and zero otherwise. *Dereg* is a dummy variable equal to one if a firm is in one of the five deregulated industries and zero otherwise. *Reg* is a dummy variable equal to one if a firm operates in the period of regulation, and zero otherwise. ε_{it} is the error term.

I make two comparisons: differences between firms in deregulated industries and firms in control industries during the regulation and partial deregulation periods as well as during the regulation and complete deregulation periods. When I compare the regulation period versus the partial (complete) deregulation period, the dummy variable *Reg* is set to one if a firm operates in the regulation period and zero if in the partial (complete) deregulation period. This effectively divides the data into two sets: one is for the regulation and partial deregulation periods and the another for the regulation and complete deregulation periods. The coefficients of interest are β_2 and β_3, which capture differences in the impact of various firm characteristics on corporate decisions of whether to pay dividends between deregulated firms and control firms over the different periods. While β_2 reflects the differences in the decision to pay between deregulated and control firms in the partial (complete) deregulation, β_3 reflects the differences during the regulation period. Given that regulated firms have unique payout policies during the regulation period, I expect that β_3 would be significant to reflect the differences in payout policies between regulated firms and control firms during that period. If economic deregulation induces deregulated firms to converge their dividend polices with those of non-regulated firms, β_2's are expected to be insignificant for most of the variables, especially during the complete deregulated

period.

The comparison between the regulation and partial deregulation periods is reported under "Partial Deregulation" of Table 14 and that between the regulation and complete deregulation periods is presented under "Complete Deregulation". As shown in both models, the coefficient β_1, which captures cross-sectional correlation between a firm's probability of dividend payment and the determining factors for non-regulated firms, is consistent with prior empirical results (e.g., Rozeff (1982); DeAngelo, DeAngelo and Stulz (2006); Denis and Osobov (2008)). In addition, the slope coefficient β_3's, which captures the differences between deregulated firms and control firms during the regulation period, are statistically significant except for the interaction term of NYP_t, MV_t/AT_t and $Saleg_t$ in both models, suggesting a significant difference in dividend policy between regulated firms and non-regulated firms in the period of regulation. This is consistent with the fact that firms under regulation pay higher dividends than their non-regulated counterparts.

More prominent are the coefficient estimates of β_2's in both regression models. In "Partial Deregulation", the β_2's for sales growth, earnings, and volatility are statistically insignificant, while in "Complete Deregulation", the β_2's for four out of the seven variables are statistically insignificant, suggesting only a limited convergence of determinants of the propensity to pay dividends between deregulated firms and non-regulated firms along the deregulation process.

As a robustness check, I use all non-regulated firms as control firms and subgroup the sample into dividend payers and non-payers, and repeat the regression analysis for all firms (deregulated and control firms), surviving firms, payers and non-payers. As in Table 9, the payer subsample consists of dividend payers in year t-1, and non-payer subsample includes those that do not pay dividends in year t-1. All the variables are as previously defined. Table 15 reports the

results. As shown in the first two data columns of Panel A, the determinants of whether to pay dividends for all firms show limited convergence after deregulation with the β_2's for the interaction terms of firm size, profitability, earned/contributed equity mix, age and return volatility being statistically significant, which is qualitatively similar to those in Table 14. For surviving firms, the β_2's for firm size, profitability, earned/contributed equity mix and return volatility remain statistically significant, also suggesting limited convergence in the determinants. However, for dividend payers, there appears a nearly full convergence in the determinants, with the β_2's for intercept and return volatility being statistically significant. This implies that there remains only a little difference between deregulated firms and control firms in terms of the determinants of whether to pay dividends in year t for a dividend payer in year t-1. Specifically, the β_3's on all the interaction terms of explanatory variables are not significant, suggesting that deregulation has virtually no impact on a year t-1 dividend payer's propensity to pay in year t, which appears consistent with the notion that dividends are sticky. For non-payers, however, the estimates show limited convergence. Overall, the empirical evidence indicates limited convergence in the determinants of firms' propensity to pay dividends between deregulated firms and control firms following deregulation.

7.1.8 Summary and discussion

Several inferences can be drawn from the above analyses. First, deregulated firms demonstrate a downward trend in their propensity to pay dividends along the deregulation process, and this declining propensity is more pronounced for firms that newly enter into the deregulated industries and never pay dividends. Second, firm attributes have changed for deregulated firms along the deregulation process. It seems that deregulated firms shift toward the

type of firms with characteristics typical of dividend non-payers. Third, after controlling for the changing firm characteristics, there is little evidence that deregulated firms are less likely to pay dividends than control firms. It seems that the downward trend in the probability to pay dividends for deregulated firms just reflects the general trend of all Compustat/CRSP firms and deregulation initiative *per se* does not bear a significant impact on firms' decisions on whether to pay. Lastly, deregulated firms share some common determinants of the likelihood to pay as non-regulated firms, but exhibit certain distinctive features, although there appears a nearly full convergence of determinants for dividend payers. There is limited evidence that the differences have gradually disappeared with progress of the deregulation process. Overall, I find little evidence in support of the hypothesis that the propensity to pay dividends of firms formerly under regulation is significantly impacted by economic deregulation and there is only limited convergence between deregulated firms and non-regulated firms in the determinants of whether or not to pay dividends in response to deregulation initiatives.

7.2 Evolution of dividend payout ratio in response to deregulation

In this subsection, I examine the evolution (or pattern) of dividend payout ratio in response to the economic deregulation shock and whether the decisions on how much to pay of deregulated firms converge with control firms along the deregulation process.

I use six measures to gauge dividend payout.[22] The first measure, defined as the total dollar amount of dividends scaled by earnings before extraordinary items captures how much of

[22] Researchers differ widely in their use of proxies for dividend payout. For example, Jensen, Solberg and Zorn (1992) calculate the variable as the ratio of dividends to operating income by calculating dividend payouts for the year and preceding four years, eliminating the high and low value and then averaging the remaining three, to mitigate the potential measurement problem. However, this method in computation still results in negative dividend payout ratio, which is undefined. Wansley (2003) calculate dividend payout as the ratio of dividends per share to earnings per share from Compustat. I find that missing values in these two variables lead to loss of observations in my sample.

earnings is paid out to shareholders (Rozeff (1982); Grullon and Michaely (2002)). Similarly, I use cash flow and net income to scale the total dollar amount of dividends to gauge payout ratio (Ang (1975); Bhattacharya (1979); Brittain (1966)). I further measure dividend payout as the ratios of the total dollar amount of dividends over total assets of previous year and total sales of previous year; following Grullon and Michaely (2007), I also use dividend yield as the sixth measure of dividend payout. Consistent with prior literature, I define dividend yield as common cash dividends scaled by previous fiscal year-end market value of equity.

7.2.1 Total deregulated firms

Table 16 reports the dividend payout ratios for total deregulated firms and control firms in the three "snapshot" periods. As shown in the data, there exists a declining trend in dividend payout ratio across the three periods for deregulated firms and this trend accelerates during the complete deregulation period. A similar trend is also observed in firms in control industries. Consistent with the argument that firms under regulation pay out higher proportions of their earnings to control the double agency problems, I find that deregulated firms in the regulation period have significantly higher dividend payout ratios than firms in control industries. With the progress of economic deregulation, this disparity narrows down as the differences in payout ratio between deregulated and control firms move from 0.197, 0.006, 0.026, 0.086, 0.184, and 0.020 in the regulation period to 0.161, 0.006, 0.017, 0.063, 0.150, and 0.007 in the complete deregulation period for *Dividend/Earnings, Dividend/Assets, Dividend/Sales, Dividend/Cash Flow, Dividend/Net Income, Dividend Yield,* respectively.

Figure 2 further shows the dividend payout ratios in each relative year during the three periods of regulation, partial deregulation and complete deregulation. The trend shown in the graphs is similar to what is observed in Table 16. Firms in the regulated industries historically

pay higher dividends than firms in control industries, and the differences still exist throughout the deregulation process. On the other hand, the graphs show some evidence that the differences in dividend payout narrow down during the complete deregulation period, indicating that deregulated firms reduce dividend payouts more than control firms.

7.2.2 New entrants

To investigate whether the declining trend in dividend payout ratios presented in Figure 2 is mainly driven by dividend behavior of new entrants, I present the evolution of payout ratios in Figure 3 for new entrants – firms that do not exist during the regulation period and come into existence after the initiation of deregulation process. Three observations emerge from the graphs in Figure 3. First, new entrants in both deregulated industries and control industries have lower payout ratios than their old peers. Second, new entrants in deregulated industries seems to follow the "tradition" by paying higher dividends than new entrants in control industries even after the initiation of deregulation process. Last, the trend of payout ratios for new firms in control industries is relatively stable while it is more volatile for new entrants in deregulated industries. Given the lower payout ratios of new firms, it appears that the new firms partly drag down the payout ratios for total firms documented previously.

7.2.3 Surviving firms

The above analysis presents an overall picture of how payout ratios have changed along the deregulation process for total firms and new entrants. However, I could not draw a conclusion that the economic deregulation process induces firms to lower their dividend payment since both deregulated firms and control firms exhibit similar declining trends in payout ratio and new entrants might contribute to the overall decreases. To control for contemporaneous macro-

economic factors and time series patterns, I use the difference-in-differences approach to test whether the deregulation *per se* significantly affects firms' payout ratio. To achieve this, I compare changes in deregulated firms' dividend policy with changes in control firms' dividend policy in the periods of partial deregulation and complete deregulation. Following Ovtchinnikov (2010a), the difference-in-differences estimator is computed as follows. For each firms in the deregulated and control samples, I first compute the average value of each payout ratio during the regulation and the partial (complete) deregulation periods. I then calculate the difference between the partial (complete) deregulation average and the regulation average. This difference is then averaged over all deregulated firms and, separately, over all control firms. The difference-in-differences estimator is the difference between the average differences for deregulated firms and the average differences for control firms. This analysis is actually the payout ratio comparison for surviving firms as only surviving firms have data from the regulation period.

Table 17 reports the results from the difference-in-differences analysis of changes in each payout ratio from the regulation period to the partial (complete) deregulation period for deregulated firms compared to control firms. As shown in the table, deregulated firms actually increase their payout ratio in the immediate aftermath of the launch of deregulation (partial deregulation), consistent with the previous findings that the propensity to pay increases over the same period of time. However, as the deregulation process enters into the complete deregulation period, it appears that deregulated firms adjust their dividend policy by reducing dividend payment. This is evidenced by the fact that three out of the six measures of dividend payout decrease markedly. Control firms exhibit a difference scenario. For example, changes in three out of six dividend payout measures from the regulation period to complete deregulation period have the positive sign, even though these changes are not statistically different from zero, suggesting

that surviving control firms do not adjust their dividend payment over the same time period. This finding is consistent with the evidence presented in previous literature that surviving Compustat and Worldscope firms experience no decrease in their dividend payment (e.g., Denis and Osobov (2008)). More importantly, the difference-in-differences estimates in the last two data columns of Table 17 are negative and significant for three out of six dividend payout measures while other measures are not statistically significant, suggesting that deregulated firms decrease payout ratio more drastically than control firms in response to economic deregulation. The results indicate that the economic deregulation induces firms to adjust their dividend payment downward, consistent with the prediction in Hypothesis 2.

To validate the above results, I impose further restrictions on the sample by requiring that firms have non-negative earnings, net income or cash flow and replicate the above difference-in-differences analysis. Table 18 reports the results. The difference-in-differences estimates between the periods of complete deregulation and regulation provide even stronger evidence that deregulated firms adjust their payout ratio downward in greater magnitude: four out of the six measures of dividend payout are negative and statistically significant, while the other two are not significant (one positive and one negative). The estimates between the periods of partial deregulation and regulation are mostly statistically insignificant, suggesting the stickiness nature of corporate dividends.

As a robustness check, I replicate the difference-in-differences analysis using expanded regulation, partial deregulation and complete deregulation periods, instead of the "snapshot" periods. The expanded period of regulation is defined as from the beginning of our sample period (1966) to year -1, the year preceding the year in which the first major deregulation initiative was introduced in each industry (year 0). The expanded period of partial deregulation is defined as

from year 0 to the year in which the last significant deregulatory initiative was taken in each industry. The expanded period of complete deregulation is defined as from year +1, the first year after the last major deregulation initiative to the end of the sample period (2008). Table 19 reports the results from the three expanded periods.

In Table 19, three out of the six difference-in-differences estimators comparing the period of partial deregulation with the period of deregulation are positive and statistically significant at the 5 percent or better level, while the other two are positive but insignificant and dividend yield is negative, consistent with my previous findings that deregulated firms increase their dividend payouts in the partial deregulation period relative to dividend payout changes in control firms. The last two data columns in the table show that three of the six difference-in-differences estimates are negative and statistically significant at better than the 1 percent level, one estimate is negative but not statistically significant, and the other two are positive but not significantly different from zero. These indicate a faster falling-off in dividend payouts for deregulated firms, also confirming my previous findings.

7.2.4 Convergence of determinants of how much to pay between deregulated and non-regulated firms

The above analysis has shown that deregulated firms in the regulation period pay significantly higher dividends than control firms and the differences narrow down along the deregulation process. In the same vein as in the examination of determinants of whether or not to pay dividends, in this subsection I investigate whether the elements believed to determine how much to pay also converge between deregulated firms and control firms during the post-deregulation periods. I estimate the following cross-sectional regression which compares the determinants of dividends payment between regulated firms and firms in control industries over the three “snapshot” periods:

$$Dividend\_Payout_t = \beta_0 + \beta_1 (X_{it}) + \beta_2 (X_{it} * Dereg_{it}) + \beta_3 (X_{it} * Dereg_{it} * Reg_{it}) + \varepsilon_{it} \quad (7.3)$$

where *i* and *t* index firm and year respectively, and *X* is a vector of explanatory variables. Guided by previous research (e.g., Rozeff (1982); Grullon and Michaely (2002)), the explanatory variables include firm leverage (*Bklev*), size (*LNAT*), ownership (*LnCshr*), growth opportunity (*MTB*), earnings volatility (*StdOibdp*), stock return volatility (*Volatility*), profitability (*OCF*), and sales growth (*Saleg*). *Dereg* is a dummy variable equal to one if a firm is in one of the five deregulated industries and zero otherwise. *Reg* is a dummy variable equal to one if a firm operates in the period of regulation, and zero otherwise. I use the six measures of dividend payouts as dependent variables. To account for possible time-series correlation, I adjust the standard errors which are robust to cluster at the firm level (Peterson 2009).

I make two comparisons: differences between firms in deregulated industries and firms in control industries during the regulation and partial deregulation periods, and during the regulation and complete deregulation periods. The coefficients of interest are β_2 and β_3, which capture differences in the impact of various firm characteristics on corporate decisions of how much to pay in dividend between deregulated firms and control firms over different periods. While β_2 reflects the differences in the decision on how much to pay between deregulated and control firms in the partial (complete) deregulation periods, β_3 reflects the differences during the regulation period. Given that deregulated firms have distinctive payout policies during the regulation period, I expect β_3 to be significant to reflect the differences in payout policies between deregulated firms and control firms in that period. If economic deregulation induces deregulated firms to converge their decisions on how much to pay with those of non-regulated firms, β_2 is expected to be insignificant for most of the variables, especially during the complete deregulated period.

The comparison for the regulation and partial deregulation periods is reported in Panel A of Table 20 and that for the regulation and complete deregulation periods in Panel B. The coefficient β_1, which captures cross-sectional correlation between dividend payout and its determinants for non-regulated firms, is largely consistent with prior empirical results (see, e.g., Denis and Osobov (2008); Rozeff (1982); Grullon and Michaely (2002)). That is, dividend payout is positively related to firm size and profitability and negatively related to leverage, sales growth, earnings volatility and stock return volatility.

In addition, the slope coefficient β_3's which capture the difference between deregulated firms and control firms during the regulation period, are statistically significant for most of the explanatory variables except for the interaction term of leverage, growth opportunity, and earnings volatility in both Panel A and Panel B, suggesting a significant difference in policy decisions on how much to pay between regulated firms and non-regulated firms. More prominent are the coefficient estimates of β_2's in regression models for both partial and complete deregulation periods. During the partial deregulation period in Panel A, the β_2's for all variables but earnings volatility are statistically significant, whereas during the complete deregulation period in Panel B, the β_2's for all variables other than sales growth are statistically significant, suggesting that the determinants of how much to pay do not converge between deregulated firms and control firms along with the progress of economic deregulation process. The same story holds for surviving firms. As shown in Panel C and D, the β_2's for all variables other than sales growth and earnings are statistically significant during the deregulation period. The above evidence indicates that deregulated firms reduce their dividend payout in response to deregulation initiatives; however, the determinants of how much to pay in dividend still do not converge between deregulated firms and control firms.

In an effort to check the robustness of the results, I impose restrictions that require firm-year observations to have non-negative earnings, net income and cash flow and replicate the test. Table 21 reports the results. Panel A shows that the β_2's on the interaction terms of firm size, ownership, growth opportunity, and earnings volatility are largely insignificant in the partial deregulation period; however, during the period of complete deregulation, only the β_2's on the interaction terms of ownership, growth opportunity and earnings volatility remain largely insignificant, providing little evidence that the determinants of how much dividends to pay are converging between deregulated firms and non-regulated control firms.

For a further robustness check, I follow Ovtchinnikov (2010a) to use all the non-regulated Compustat firms as controls and extend the analysis to the period of 1966 to 2008. *Reg* is set to one if a firm operates in the years prior to the initiation of deregulation, and zero otherwise. Other variables are as previously defined. Panel A of Table 22 shows the results for all firms and Panel B reports the results for the subsample that excludes observations with negative earnings, net income or cash flow. Results from both panels are qualitatively similar to those of the above tests. For example, in Panel A only the β_2's on the interaction term of firm size are statistically insignificant; in Panel B, only the β_2's on the interaction terms of ownership and growth opportunity are insignificant. Overall the results offer little support to the prediction of a convergence of determinants of dividend payout between deregulated firms and non-regulated controls.

7.2.5 Summary and discussion

As predicted by the agency theory, regulated firms make significantly higher dividend payment during the period of regulation than control firms. After the deregulation is set in motion, surviving deregulated firms first increase their dividend payout and then scale down

their payout ratio while surviving control firms generally keep their payout ratio unchanged, resulting in a narrowing down in the disparity between these two types of firms during the complete deregulation period. My difference-in-differences analysis shows that the paring down on dividend payout ratio for deregulated firms is significantly greater than the change for control firms over the same time period for three out of six measures, providing some evidence that deregulation induces affected firms to reduce their dividend payout ratio.

While I document limited evidence of a trend of deregulated firms moving toward converging their dividend policy with that of non-regulated firms in terms of whether or not to pay dividends along the deregulation process, the convergence does not appear to happen for the decision on how much to pay, a finer component of firm dividend policy. The results seem to be in line with the widely documented dividend stickiness in the literature. Overall, the empirical findings in this subsection support the dividend payout prediction in Hypothesis 2, i.e., firms have higher dividend payout ratio when their industries are regulated and the ratio declines when these firms become deregulated. However, empirical evidence suggests that the determinants of how much to pay for deregulated firms do not converge with those of non-regulated firms.

Combining the evidence on the change in the propensity to pay dividends with that on dividend payout ratio, and comparing it to the findings on capital structure of deregulated firms documented by Ovtchinnikov (2010a), I can draw a few interesting inferences. Ovtchinnikov (2010a) find that firms respond quickly to the operating environment changes induced by economic deregulation and ultimately converge their capital structure policies with those of non-regulated firms. I find that firms do not adjust their dividend policies in terms of whether to pay but seem to adjust their policies on how much to pay in response to economic deregulation. There is no compelling evidence that the determinants of whether to pay dividends and how

much to pay for deregulated firms converge with those for non-regulated firms along the deregulation process. This comparison suggests that footprints of dividend policy change in response to economic deregulation are distinctively different from those of capital structure policy change. While firms can adjust their capital structure policy relatively quickly, dividend policies exhibit certain stickiness.

7.3 Effects of deregulation on speed of adjustment of dividend policy to optimal levels

Ovtchinnikov (2010a) finds that deregulation also impacts firms' speed of adjustment of capital structure toward optimal levels. Since deregulated firms are expected to formulate their dividend policy more closely on permanent, stable corporate earnings in response to economic deregulation, the dynamic trade-off theory predicts deregulated firms will adjust dividend payout at greater speed toward optimal levels in a competitive environment. In this subsection, I use the Lintner (1956) model and its variant, Fama and Babiak (1968) model, to test if firms adjust their dividend payouts faster toward optimal levels in reaction to deregulation.

Lintner (1956) advances an empirical model showing that the firm sets a target dividend payout ratio and adjusts its dividend payment toward that ratio, based on corporate earnings. Having investigated whether economic deregulation impacts firms' propensity to pay dividends and decision on how much to pay in dividends, it is natural, as well as interesting, to inquire if and how economic deregulation affects the speed of adjustment of corporate dividend policy, which suggests the sensitivity of dividend policy to corporate earnings. In this subsection, I make use of the Lintner (1956) model and its variant Fama and Babiak (1968) model to examine progressive changes in dividend policy of deregulated firms during the deregulation process in an effort to test whether the dividend policy of firms undergoing deregulation becomes more sensitive to corporate earnings.

7.3.1 Lintner's (1956) model and Fama and Babiak's (1968) model

Lintner's (1956) partial adjustment model of dividend was the result of a post-World War II survey of more than 600 listed companies and the ensuing interviews with 28 firms selected from them for detailed investigation. The field work led to the conclusion that dividends were basically determined by past dividend levels and current earnings, evolving around a target payout ratio. The target dividends (D^*_{it}) are a portion of the earnings:

$$D^*_{it} = r_t E_{it}$$

where r_i is the target dividend payout ratio. The terse empirical model describes firm i's dividend change from year t-1 to year t as a partial adjustment toward a target dividend payout level, and is given in the following equation:

$$\Delta D_{it} = \alpha_i + c_i (D^*_{it} - D_{i,t-1}) + u_{it}$$

where c_i is the "speed of adjustment" and u_{it} an error term. Combining the above two equations, a new equation for empirical testing is generated after some algebraic manipulations:

$$D_{it} = \alpha_i + \beta_i D_{i,t-1} + \gamma_i E_{it} + e_{it},$$

where E_{it} represents firm i's earnings in year t and e_{it} is an error term. In this context, the "speed of adjustment" $c_i = 1 - \beta_i$ and the "target dividend payout ratio" $r_i = \gamma_i / c_i$.

The central points of this model are: (1) a firm establishes a target dividend level; (2) adjustments to the target dividend level are progressive. The reasons why a firm sets a target (optimal) dividend level may be multiple but the simple idea is to have some measures to benchmark with, in pursuit of a consistent and stable dividend policy. Lintner (1956) reports that dividend payout ratios of firms from the early to the middle of last century were in the range of 20 percent to 80 percent, with most firms setting their targets between 40 percent and 60 percent,

which, from the perspective of the early 21st century, are notably high. Once a dividend decision is made, it cannot be easily changed or revoked. Managements thus adopt a conservative approach and raise dividends cautiously unless a permanent increase in earnings rests assured. As a result, dividend adjustments tend to be gradual and progressive, for the benefit of consistency and stability preferable to investors.

Furthermore, Fama and Babiak (1968) indicate that including the earnings in year *t-1* and suppressing the constant term in the regression works better than the baseline Lintner (1956) model in predicting dividends using out of sample data. The Fama and Babiak (1968) modified model is as follows:

$$D_{it} = \beta_i D_{i,t-1} + \gamma_i E_{i,t} + v_i E_{i,t-1} + \varepsilon_{it}.$$

7.3.2 Regression models to test change in speed of adjustment of dividends

To test whether firms adjust their dividend policy faster toward optimal levels in response to economic deregulation, I estimate the following regressions:

$$\begin{aligned} Divcs_{it} = {} & \beta_0 + \beta_1 Divcs_{i,t-1} + \beta_2 Ibcomcs_{i,t} + \beta_3 Dereg + \beta_4 Divcs_{i,t-1}*Dereg \\ & + \beta_5 * Ibcomcs_{i,t}*Dereg + \beta_6 Dereg*Pdreg + \beta_7 Divcs_{i,t-1}*Dereg*Pdreg \\ & + \beta_8 Ibcomcs_{i,t}*Dereg*Pdreg + \varepsilon_{it}. \end{aligned} \tag{7.4}$$

and

$$\begin{aligned} Divcs_{it} = {} & \beta_1 Divcs_{i,t-1} + \beta_2 Ibcomcs_{i,t} + \beta_3 Ibcomcs_{i,t-1} + \beta_4 Dereg + \beta_5 Divcs_{i,t-1}*Dereg \\ & + \beta_6 Ibcomcs_{i,t}*Dereg + \beta_7 Ibcomcs_{i,t-1}*Dereg + \beta_8 Dereg_{it}*Pdreg \\ & + \beta_9 Divcs_{i,t-1}*Dereg*Pdreg + \beta_{10} Ibcomcs_{i,t}*Dereg*Pdreg \\ & + \beta_{11} Ibcomcs_{i,t-1}*Dereg*Pdreg + \varepsilon_{it} \end{aligned} \tag{7.5}$$

Equation (7.4) is formulated based on the Lintner (1956) model and Equation (7.5) on the Fama and Babiak (1968) modified model. The dependent variable, $Divcs_{it}$, is firm *i*'s annual dividend scaled by number of common shares outstanding. The independent variable, $Ibcomcs_{it}$,

is firm *i*'s earnings per share in year t. The dummy variable, *Dereg*, is equal to 1 if a firm is in one of the five deregulated industries, and 0 otherwise. *Pdreg* takes the value of 1 if a firm operates in the partial (complete) deregulation period, and 0 otherwise. Here I relax the five-year constraint in our "snapshot" periods to use expanded regulation period, partial deregulation and complete deregulation periods in analysis to make greater use of the observations in our sample and present a fuller picture. As in last subsection, the expanded period of regulation is defined as from the beginning of our sample period (1966) to year -1, the year preceding the year in which the first major deregulation initiative was introduced in each industry (year 0). The expanded period of partial deregulation is defined as from year 0 to the year in which the last significant deregulatory initiative was taken in each industry. The expanded period of complete deregulation is defined as from year +1, the first year after the last major deregulation initiative, to the end of the sample period (2008). I estimate the above two models for a sample of deregulated firms and control firms and compare the speed of adjustment of dividends toward optimal levels between regulation period and partial (complete) deregulation period. To control for possible time-series correlation, the calculation of standard errors is adjusted to be robust to cluster at the firm level.

In Equation (7.4), 1- β_1, 1- $(\beta_1 + \beta_4)$, and 1- $(\beta_1 + \beta_4 + \beta_7)$ represent the speed of adjustment for control firms, deregulated firms in the regulation period, and deregulated firms in the partial (complete) deregulation period, respectively. The corresponding numbers for Equation (7.5) are (1- β_1), 1- $(\beta_1 + \beta_5)$, and 1- $(\beta_1 + \beta_5 + \beta_9)$. The "target payout ratio" based on Equation (7.4) is calculated as $\beta_2 / (1-\beta_1)$, $(\beta_2 + \beta_5) / (1- (\beta_1 + \beta_4))$, and $(\beta_2 + \beta_5 + \beta_8) / (1- (\beta_1 + \beta_4 + \beta_7))$ for control firms, deregulated firms in regulation period, and deregulated firms in partial (complete) deregulation period, respectively while the corresponding numbers are estimated for Equation (7.5) are $\beta_2 / (1-\beta_1)$, $(\beta_2 + \beta_6) / (1- (\beta_1 + \beta_5))$, and $(\beta_2 + \beta_6 + \beta_{10}) / (1- (\beta_1 + \beta_5 + \beta_9))$. In

addition, I expect a negative sign on β_7 (β_9) for Equation (7.4) (Equation (7.5)) if deregulation leads the affected firms to be more responsive to earnings when formulating dividend policies.

7.3.3 Empirical results on change in speed of adjustment of dividends toward optimal levels for deregulated firms

The empirical results are presented in Table 23. Panel A reports results for all firms while Panel B for surviving firms. The first two columns of data report the results for the partial deregulation period versus regulation period and the last two columns show the results for the complete deregulation period versus regulation period. Regression specifications for the first and third data columns are based on the Lintner (1956) model while regression specifications for the second and fourth data columns are based on the Fama and Babiak (1968) modified model. In general, I find a good fit of the Lintner model to the data as evidenced by the high R-squareds for both specifications (0.88 and 0.81 in the first two data columns respectively), implying that the overwhelming majority of the variations in dividend change are explained by the model. Consistent with the previous evidence that Fama and Babiak's (1968) model fits data better, I find that R-squareds are even higher for the specifications based on Fama and Babiak's model (0.91 and 0.84 in the last two columns respectively). However, it seems that this model inflates the coefficients on lagged earnings, thus leading to inflated target payout ratios.

Across all model specifications, the speed of adjustment ranges from 0.096 to 0.374, which is within the reasonable range. Previous research on the Lintner (1956) model by Fama and Babiak (1968) and Choe (1990) find that the speed of adjustment is typically far from 1.0, an indication that dividends adjust slowly toward target payouts. Fama and French (2002) again test the Lintner model and report speed of adjustment ranging from 0.27 to 0.33. In contrast, the computed target payout ratios based on regression estimates appear much more volatile with a

range from 0.076 to 0.979.

As shown in the bottom of Panel A, the speed of adjustment has increased substantially for deregulated firms during post-deregulation period. For example, during the partial deregulation period, the speed of adjustment increases from 0.140 to 0.179 for Lintner's (1956) model and from 0.096 to 0.172 for Fama and Babiak's (1968) model. This upward trend accelerates during the complete deregulation period as shown by the data that the speed of adjustment reaches 0.298 for Lintner's (1956) model and 0.311 for Fama and Babiak's (1968) model, more than doubling the speed in regulation period and increasing by 80 percent relative to that in the partial deregulation period. This increase is economically large. Moreover, the coefficients on the interaction term ($Divcs_{t-1}$*Dereg*Pdreg) are significant across all model specifications, indicating that the increases is statistically significant. The results point to an interesting fact that firms adjust their dividend payout toward target ratio at greater speed based on past and current earnings, along with the progress of the deregulation process, suggesting increased sensitivity of firm dividend policy to corporate earnings, which is consistent with the predication in Hypothesis 3.

As firms increase the speed of adjustment of dividend payouts toward optimal levels in response to economic deregulation, they also lower their target payout ratio. Based on the Lintner (1956) model, the target payout ratio decreases from 27.1 percent in the regulation period to 19.6 percent in the partial deregulation period and further to 13.4 percent in the complete deregulation period, which is consistent with my previous findings that firms lower payout ratio along the deregulation process.

Compared to control firms, I find that deregulated firms during the period of regulation have substantially lower speed of adjustment than control firms. It appears that deregulated firms,

when under regulation, are highly inert – they adjusted their dividends much slowly relative to non-regulated firms. One possibility is that economic regulation insulate firms from competition and may have dulled their receptivity of economic signals and shocks; firms in such an environment would keep dividend policies as they are for the benefit of consistency. It is also possible that the firms under regulation do perceive earnings shocks but are not motivated enough to make changes to dividend policies based on trade-off of costs and benefits. If the trade-off hypothesis holds true for this situation, then the benefits brought about by a change in dividend policy may not more than compensate for the costs of effecting the change. As economic deregulation moves along, the disparity in the sensitivity of dividends to earnings between non-regulated firms and deregulated firms narrows down, even though the difference still exists.

In line with the previous findings that regulated firms pay higher dividends, the data in Panel A show that deregulated firms have much higher target payout ratio than non-regulated firms during regulation period. However, the difference decreases along the deregulation process as deregulated firms lower their target payout ratio to accommodate the new operating environment. Overall, the analysis in this subsection confirms my previous findings that firms under regulation make higher dividend payouts than control firms to mitigate the double agency problems and the difference in dividend payouts between deregulated firms and non-regulated firms becomes smaller as the deregulation process progresses.

7.3.4 Empirical results on change in speed of adjustment of dividends to optimal levels for surviving deregulated firms

Previous research document that the changing dividend policies are mostly driven by new entrants. For example, Denis and Osobov (2008) find that the trend of declining propensity to pay dividends is caused by new entrants. To investigate whether the documented increased speed

of adjustment of dividend payouts toward optimal levels based on corporate earnings is due to firms entering into my sample after the initiation of the deregulation drive, I further analyze the change in the speed of adjustment for surviving firms based on the Lintner (1956) and Fama and Babiak (1968) models. The definition of three time periods remains the same as above for all the deregulated and control firms. The surviving firms are defined as firms that exist both in the regulation period and the partial (complete) deregulation period.

Panel B of Table 23 reports the empirical results. The surviving deregulated firms display a similar upward trend in the speed of adjustment as observed in our full sample of deregulated firms. In addition, the magnitude is also close. Under Lintner's (1956) model, for example, the speed of adjustment for surviving deregulated firms shifts from 0.140 in the regulation period, to 0.160 in the partial deregulation period, and to 0.277 in the complete deregulation period while the corresponding numbers are 0.140, 0.179, and 0.298 for total sample firms, indicating that the increased sensitivity of dividends to earnings is not purely driven by new entrants. One exception is that the difference in the speed of adjustment of deregulated firms between the regulation period and the partial deregulation period is not statistically significant under Lintner's (1956) model (coefficient on the interaction term $Divcs_{t-1}$*$Dereg$*$Pdreg$ is not significant in the Lintner (1956) model of partial deregulation period) even though it is significant in the Fama and Babiak's (1968) model.

In the meantime, Panel B shows the decline in target dividend payout ratio for surviving deregulated firms is consistent with the pattern exhibited by the full sample of deregulated firms. The target payout ratio drops from 27.9 percent in the regulation period to 20.6 percent in the partial deregulation period and further to 15.9 percent in the complete deregulation period. For the full sample of deregulated firms, the corresponding numbers are 27.1 percent, 19.6 percent

and 13.4 percent. The evidence indicates that economic deregulation significantly changes the operating environment which affects not only new firms entering into the industries but also "old firms" that come all the way from the regulation period in terms of the sensitivity of dividends to corporate earnings.

7.3.5 Robustness check using three "snapshot" periods

As a robustness check, I replicate the above analysis using three "snapshot" periods and report the results in Table 24. Similar to the above results, both total deregulated firms and surviving deregulated firms still exhibit an upward trend in the speed of adjustment and a downward trend in the target dividend payout ratio along the deregulation process, and these trends accelerate during the complete deregulation period. One exception is that the changes in the speed of adjustment and the target dividend payout ratio are not significant during the partial deregulation period. The findings indicate that unlike capital structure decisions, dividend policies change gradually.

7.3.6 Summary and discussion

Overall estimates based on the Lintner (1956) model and its variant Fama and Babiak (1968) model present explicit dynamics of the evolution of dividend policy of deregulated firms: firms increase their speed of adjustment but decrease their target dividend payout ratio in response to economic deregulation and the changing operating environment. On the one hand, the upward trend in the speed of adjustment shows that firms respond to economic deregulation by orienting their dividend policies more closely toward target payout levels, suggesting increased sensitivity of firm dividend policy to corporate earnings in response to economic deregulation, which is consistent with the findings of Benartzi, Michaely and Thaler (1997) that firms' dividends are closely related to past and current earnings. On the other hand, the declining

target payout ratio is consistent with the previous findings that firms reduce their dividend payout ratio even if they choose to be a dividend payer.

7.4 Effects of deregulation on information content of dividend policy changes

In this subsection, I investigate changes in the information content of dividend policy in response to economic deregulation. The information content theory holds that dividends are information-laden, and dividend policy changes are a costly signaling device to reveal information that cannot be properly conveyed to the public through other means. If the information content theory is valid, I expect that dividends distributed by firms in the period of regulation contain less information about the firms, since they are mainly, according to previous studies, used as a mechanism to control the double agency problems and create the need for subjecting the firms to the monitoring of the financial market and updating the regulators of the cost of financing (Easterbrook (1984); Smith (1986); Smith and Watts (1986)). In the aftermath of the initiation of economic deregulation, the growing competitive operating environment may cause firms to be cautious in disclosing proprietary information to avoid rivals making strategic use of the information to their advantage (Darrough (1993)). In the presence of "proprietary cost", it is conceivable that firms are more likely to use dividends to signal information and convey their prospects of earnings and profitability.

I structure two ways to test the evolution of the information content of dividends. First, I examine the cumulative abnormal returns (CARs) around the dividend changes along the deregulation process. The positive (negative) reaction of stock prices to announcements of dividend increases (decreases) reflects the positive (negative) information about the firm value that these announcements convey (Handjinicolaou and Kalay (1984)). If dividends are more

informative after the launch the economic deregulation, it is expected that the magnitude of positive (negative) stock market reactions to dividend increases (decreases) will be greater and the sensitivity of CARs to the magnitude of dividend changes (dividend response coefficient) will be higher along the deregulation process. Second, given that dividend changes trigger abnormal stock returns due to new information about the firm's future earnings and profitability conveyed by these changes, I examine the evolution of relations between dividend changes and future earnings along the deregulation process. If dividends are more information-laden, the relations are expected to be stronger in the deregulation period.

7.4.1 Evolution of cumulative abnormal returns (CARs) around announcement of dividend changes and dividend responsive coefficients

7.4.1.1 Dividend change sample and data

To empirically test stock market responses to dividend changes, I construct a dividend-increase sample and a dividend-decrease sample for deregulated firms. Following Amihud and Li (2006), Nissim and Ziv (2001), and Grullon, Michaely, Benartzi and Thaler (2005), I use the following screening criteria: (i) the company must pay a quarterly cash dividend (code No. 1232 in the CRSP file) in the current and previous quarter, (ii) the company does not declare other distribution events (code No. other than 1232 in the CRSP file) between the declaration of the previous dividend and 15 days after the declaration of the current dividend, (iii) there are no ex-distribution dates between the ex-distribution dates of the previous and current dividends, and (iv) the company has stock return data for the event window (-1, 1) around the declaration of dividend change. Similarly, I construct the corresponding sample for firms in control industries. After applying these criteria, there are 2,133 and 1,409 dividend increases, and 133 and 98 dividend decreases for deregulated firms and firms in control industries, respectively, over the

three “snapshot” periods. The distribution declaration dates are from the CRSP distribution data file.

As shown in Table 25, for firms that decide to increase dividends, the percentage of dividend increase exhibits a downward trend for both deregulated and control firms along the three “snapshot” periods. Both mean and median percentage increases of dividends during the partial and complete deregulation periods are significantly smaller than those in the regulation period, indicating that firms are less inclined to announce large dividend increases. Interestingly, control firms have greater average percentage dividend increases than deregulated firms over all three periods, possibly because deregulated firms historically pay more and have larger bases in dividend payout. Once firms decide to cut dividends, the percentage of dividend cuts for deregulated firms is relatively stable over the three “snapshot” periods while it is more volatile for firms in control industries. More importantly, I find that more deregulated firms cut dividends after the initiation of economic deregulation whereas control firms go the opposite way. (The number of dividend cuts for control firms in the three “snapshot” periods is 51, 28 and 19, respectively.) Overall, the evidence indicates that both deregulated and control firms are less likely to make decision on large dividend increases over time, and more and more deregulated firms cut dividends in response to economic deregulation.

7.4.1.2 Evolution of cumulative abnormal returns (CARs) around the announcement of dividend changes

I use two approaches to estimate the cumulative abnormal returns (CARs) around the announcement of dividend increases and decreases: market-index adjusted return and size-decile adjusted return. Market-index adjusted return is calculated as the sum of differences between actual return of individual stocks and the contemporaneous return of the value-weighted market

index over the three days around the announcement of dividend changes (event window (-1, 1)). Size-decile adjusted return is estimated as the sum of differences between actual stock return and the contemporaneous return of the size-decile portfolio into which the stock falls over event window (-1, 1). To observe the evolution of stock market response to dividend changes along the economic deregulation process, I calculate the CARs separately for three "snapshot" periods. As documented by Amihud and Li (2006), there exists a declining information content of dividends over time as evidenced by the waning stock price reaction to announcements of dividend increases. To account for this general trend, I also estimate the CARs around dividend changes for firms in control industries over the same time periods. Table 26 presents market-index adjusted CARs in Panel A and size-decile adjusted CARs in Panel B as well as comparisons in CARs between deregulated firms and control firms and comparisons between the regulation period and the deregulation period.

Three observations emerge from Panel A of Table 26. First, the magnitude of CARs around announcements of dividend increases decreases for deregulated firms along the deregulation process with mean (median) value of CARs being 0.012 (0.009), 0.007 (0.004), 0.002 (0.003) for the periods of regulation, partial deregulation and complete deregulation, respectively. The magnitude of CARs is similar to that documented by Amihud and Li (2006). For example, they find that CARs for dividend increases center on 0.010 during the 1960s and 1970s and decline to around 0.005 in the 1980s. In addition, CARs move toward insignificance as deregulation progresses. The changes in CARs in both partial deregulation and complete deregulation periods relative to the regulation period are statistically significant. Second, a similar declining trend in the magnitude of CARs is also observed for dividend decreases even though the time-series change is not significant. For example, mean (median) values of CARs

surrounding dividend decreases are -0.032 (-0.015), -0.022 (-0.011), and -0.014 (0.003) for the three "snapshot" periods, respectively. The insignificant CARs during the complete deregulation period is consistent with the evidence documented by Amihud and Li (2006) that the negative CARs at dividend decrease announcements move toward zero. My findings are generally consistent with those by Amihud and Li (2006) who document that the mean abnormal returns for dividend decreases cluster around -0.020 since the late 1980s and reach -0.010 in certain years. Third, firms in control industries generally mirror what happens to deregulated firms except that the negative CARs during the complete deregulation period is still significant. However, caution should be exercised to interpret this result given the small sample size of dividend decreases during the complete deregulation period (only 19 dividend decrease events). Moreover, the differences in CARs between deregulated firms and control firms are generally not significant. The data in Panel B where size-decile adjusted return is used show a similar picture as in Panel A.

Taken as a whole, these results show a decline in the announcement return of dividend increases and a tapering-off of the negative announcement return of dividend decreases toward zero, consistent with the findings of Amihud and Li (2006). In general, there is no significant difference in the trend between deregulated firms and firms in control industries. The univariate analysis of CARs seems to point to a decrease, rather than an increase, in information content of dividends along the deregulation process. However, the declining magnitude of CARs around dividend changes may be due to the declining magnitude of the percentage dividend changes along the economic deregulation. Before drawing a valid conclusion of the declining information content of dividends, I need further analysis in a multivariate setting to control for the magnitude of dividend changes and other factors affecting CARs.

7.4.1.3 Dividend response coefficient to excess announcement returns along the deregulation process

The finance literature has used the sensitivity of excess announcement return to change in dividend yield to measure the information content of the magnitude of dividend changes. I follow Bernheim and Wantz (1995) and Amihud and Li (2006) by estimate the dividend response coefficient based on the following baseline model:

$$CAR_j = \alpha_0 + \alpha_1 DDIVY_j + \alpha_2 SIZEN_j + \alpha_3 LTYLD_j + \varepsilon_j \quad (7.6)$$

The dependent variable, CAR_j, is the three-day (-1, 1) cumulative abnormal return of stocks in response to dividend increases or decreases. $DDIVY_j$ is annualized change in dividend yield, estimated as 4*(current quarter cash dividends – previous quarter cash dividends)/Price at the end of the month that precedes the month in which the dividend change is announced. If the dividend change is informative, a positive sign for α_1 is expected. Two control variables are included to control for firm size and the effects of factors that affect the level of the firm's dividend yield. *SIZEN* is the logarithm of stock capitalization in the month immediately preceding the dividend announcement month, normalized by the S&P 500 index. Given that large firms receive more attention from analysts and investors, which reduces the incremental information about the firm provided by the dividend change (Christensen and Prabhala (1995)), a negative relation is expected between CARs and *SIZEN*. *LTYLD* is the stock's long-term dividend yield, estimated as the sum of cash dividends paid over a 12-month period ending in the month prior to the dividend announcement month, divided by the average end-of-month price during the three-month period preceding the 12-month period, and deflated by (1+ return on the S&P 500 index) for the same 12-month period to adjust for market-wide stock price movements.

A positive sign is expected for α_3 since dividend changes are more informative in high dividend-paying firms that have lower growth opportunities.

To explore the change in information content of dividends, I extend Equation (7.6) by adding two indicator variables, *Dereg* and *Pdreg*, and their interactions terms with other explanatory variables. The specific model is as follows:

$$CAR_j = \alpha_0 + \alpha_1 DDIVY_j + \alpha_2 SIZEN_j + \alpha_3 LTYLD_j + \alpha_4 Dereg + \alpha_5\, DDIVY_j * Dereg + \alpha_6 SIZEN_j * Dereg + \alpha_7 LTYLD_j * Dereg + \alpha_8 Dereg * Pdreg + \alpha_9\, DDIVY_j * Dereg * Pdreg + \alpha_{10} SIZEN_j * Dereg * Pdreg + \alpha_{11} LTYLD_j * Dereg * Pdreg + \varepsilon_j \quad (7.7)$$

The dummy variable, *Dereg*, is equal to 1 if firm *i* is in one of the five deregulated industries, and 0 otherwise. *Pdreg* takes the value of 1 if firm *i* operates in the partial (complete) deregulation period, and 0 otherwise. The value of α_5 represents the difference in dividend responsive coefficient between deregulated firms and control firms during the regulation period. My primary variable of interest α_9 denotes the change in dividend responsive coefficient in partial (complete) deregulation period relative to the regulation period. If the changing operation environment induced by economic deregulation causes firms to signal information using dividends, I expect a positive sign on α_9.

Table 27 presents the regression results for dividend increases in Panel A and dividend decreases in Panel B. I report the results for the comparisons between the partial deregulation period and the regulation period as well as between the complete deregulation period and the regulation period. The positive and significant coefficients on *DDIVY* in Panel A demonstrate a general positive sensitivity of CARs to the magnitude of dividend increases. However, there is no significant difference in dividend responsive coefficients between control firms and

deregulated firms during the regulation period as evidenced by the coefficients of α_5 (α_5 = -.104, t = 0.824 for the partial deregulation specification; α_5 = 0.348, t = 0.511 for the complete deregulation specification), inconsistent with the prediction that dividends are more informative for firms undergoing deregulation. More importantly, even though the change in the sensitivity of CARs to the magnitude of dividend increases during partial deregulation period is not significant, there exhibits a significant decline in dividend responsive coefficient during the complete deregulation period. The combination of the coefficients of α_5 and α_9 indicates that the dividend responsive coefficient for dividend increases lowers more than half during the complete deregulation period relative to the regulation period. For dividend decreases, an F test of coefficients of α_1 and α_5 reveals that the dividend responsive coefficients are not significant for deregulated firms during the regulation period, indicating that the market reacts negatively to dividend decreases irrespective of the magnitude of dividend decrease. In addition, the coefficients of α_9 are not significant, suggesting no significant changes in the dividend responsive coefficients for dividend decreases during both the partial and complete deregulation periods. In sum, the dividend responsive coefficients of both dividend increases and decreases for deregulated firms do not exhibit a distinctive upward trend as expected. Hence, the overall evidence does not support the hypothesis that firms are more likely to use dividends to signal information during the deregulation periods.

7.4.2 Evolution of relations between dividend changes and future earnings changes

One of the most important propositions of the information content theory is that dividend changes trigger market responses because these changes contain information about future earnings and profitability of the firm. Despite theoretical validity of this proposition, empirical evidence in support of the proposition is limited. As a matter of fact, financial economists have

documented mixed evidence as to whether dividend changes convey information about future earnings and profitability. Nissim and Ziv (2001), for example, find evidence that "dividend changes provide information about the level of profitability in subsequent years, incremental to market and accounting data." On the other hand, Grullon, Michaely, Benartzi and Thaler (2005) state that dividend changes do not signal changes in future profitability, taking note of the non-linear patterns in the behavior of earnings. They argue that after controlling for the non-linear patterns, the relation between dividend changes and future earnings is lost.

Given that economic deregulation induces drastic changes in the operating environment, it provides an ideal setting to test this proposition. Even though I find little evidence through the analysis of CARs that dividend changes are more informative during the deregulation period, I further explore the issue in this subsection by specifically testing the relation between dividend changes and future earnings.

7.4.2.1 Sample and data

The sample construction generally follows the procedures used for the analysis of CARs in the above section except that there is no restriction on the availability of stock return data (i.e., no item iv). Following Benartzi et al. (1997), I match the dividend announcements made during fiscal year t to the earnings in fiscal year t. The annual dividend change is the annualized rate of quarterly cash dividend changes which is calculated as $R\Delta DIV_t = (1 + \Delta DIV_{t,1})*(1 + \Delta DIV_{t,2})*(1 + \Delta DIV_{t,3})*(1 + \Delta DIV_{t,4}) - 1$. Table 28 reports summary statistics of the sample. The mean (median) annual dividend increase is 15.61 percent (7.19 percent) while the mean (median) annual dividend decrease is -39.32 percent (-41.67 percent), higher than quarterly dividend increase and decrease reported in Table 24. There are 2,066 annual dividend increases, 136

dividend decreases, and 1,903 no-changes.[23] Firms that announce dividend increases are on average bigger in size and more profitable, while firms cutting dividends are less profitable. These are consistent with the firm characteristics in prior studies (Grullon, Michaely, Benartzi and Thaler (2005); Nissim and Ziv (2001)).

In the following analysis, I use two linear models proposed by Nissim and Ziv (2001) and two nonlinear models proposed by Grullon, Michaely, Benartzi and Thaler (2005) to examine the relation between dividend changes, and future earnings changes and future earnings levels.

7.4.2.2 Test of relations between dividend changes and future earning changes using linear model

I follow Nissim and Ziv (2001) and use the following linear model to test the relations between dividend changes and changes in future earnings:

$$\frac{(E_t - E_{t-1})}{BE_{-1}} = \beta_0 + \beta_{1P} DPC_0 \times R\Delta DIV_0 + \beta_{1N} DNC_0 \times R\Delta DIV_0 + \beta_2 ROE_{t-1} + \beta_3 \frac{(E_0 - E_{-1})}{BE_{-1}} + \varepsilon_t \qquad (7.8)$$

The dependent variable is future earnings changes from year t-1 to year t (year 0 is the event year of dividend changes) scaled by book value of equity at the end of year -1 (BE_{-1}). E_t is the earnings before extraordinary items in year t. ROE_{t-1} is computed as earnings before extraordinary items in year *t* divided by the book value of equity in year *t-1*. ROE_{t-1} and $(E_0 - E_{-1})/BE_{-1}$ are included to control for uniform mean reversion and momentum in earnings. $R\Delta DIV_0$ is the annual dividend change in year 0. Given that the relation between dividend changes and earnings changes is not symmetric for dividend increases and decreases (DeAngelo and DeAngelo (1990); Benartzi, Michaely and Thaler (1997)), different coefficients are allowed for on dividend increases and decreases. *DPC* (*DNC*) is a dummy variable equal to 1 for dividend

[23] The number of observations for dividend increases and decreases is slightly different from that reported in Table 24 for two reasons. First, an annual dividend increase may encompass more than one quarterly dividend increase. Second, the sample in this subsection does not require the availability of stock return which is the data requirement for Table 24.

increases (decreases) and 0 otherwise. The coefficients of interest, β_{1P} and β_{1N}, are expected to be positive and statistically significant if dividend changes are correlated with future earnings.

Panel A in Table 29 report the regression results for t = 1 (earnings change from year 0 to year 1) and Panel B for t = 2 (earnings change from year 1 to year 2). For t = 1, the coefficients on dividend increases are positive and significant for deregulated firms during the periods of regulation and partial deregulation and only significant for control firms during the partial deregulation period. The coefficients on dividend decreases are positive and significant only during the partial deregulation period and the magnitude of the coefficients are similar for both deregulated and control firms. For t = 2, the coefficients on dividend increases and decreases for deregulated firms are generally not significant. The above analysis indicate that dividend changes do not appear to carry more information for firms in control industries than firms under regulation during the regulation period and dividends do not become more informative about future earnings with the progress of economic deregulation for deregulated firms, thus providing little support for the information content hypothesis.

7.4.2.3 Test of relations between dividend changes and future earnings levels using linear model

Nissim and Ziv (2001) provide an alternative way to examine the relation between earnings and dividend changes. In this part analysis, I use the following linear model to estimate the relation between dividend changes and future earnings levels:

$$ROE_t = \beta_0 + \beta_{1P} DPC_0 \times R\Delta DIV_0 + \beta_{1N} DNC_0 \times R\Delta DIV_0 + \beta_2 ROE_{t-1} + \beta_3 \left(ROE_0 - ROE_{-1} \right) + \beta_4 MTB_{-1} + \beta_3 SIZE_{-1} + \varepsilon_t \quad (7.9)$$

MTB_{-1} is the ratio of market value of equity to book value of equity at the end of year -1 and $SIZE_{-1}$ is the logarithm of total assets at the end of year -1. Other variables are as previously defined.

The results from this analysis are reported in Table 30 with Panel A for t = 1 and Panel B for t = 2. For t = 1, the coefficients on dividend changes (including increases and decreases) are only significant during partial deregulation period for deregulated firms. For t = 2, the coefficients on dividend changes are generally not significant. Moreover, there is no distinctive pattern of the coefficients along the economic deregulation process. In sum, neither can we find a significantly positive relation nor can we detect any pattern in the coefficients of interest in the regression estimates.

7.4.2.4 Test of relations between dividend changes and future earnings changes using non-linear model

Grullon, Michaely, Benartzi and Thaler (2005) argue that the coefficients of the regressions in Nissim and Ziv (2001) are likely to be biased because the assumption in their equation that the rate of mean reversion and the level of autocorrelation are uniform (momentum) across all observations may not be valid. They propose an alternative nonlinear regression model to test the relations between dividend changes and earnings changes as follows.

$$\begin{aligned}(E_t - E_{t-1}) / BE_{-1} = {} & \beta_0 + \beta_{1P} DPC_0 \times R\Delta DIV_0 + \beta_{1N} DNC_0 \times R\Delta DIV_0 \\ & + (\gamma_1 + \gamma_2 NDFED_0 + \gamma_3 NDFED_0 \times DFE_0 + \gamma_4 PDFED_0 \times DFE_0) \times DFE_0 \\ & + (\lambda_1 + \lambda_2 NCED_0 + \lambda_3 NCED_0 \times CE_0 + \lambda_4 PCED_0 \times CE_0) \times CE_0 + \varepsilon_t \qquad (7.10)\end{aligned}$$

DFE_0 is defined as $ROE_0 - E(ROE_0)$ where $E(ROE_0)$ is the fitted value from the cross-sectional regression of ROE_0 on the logarithm of total asset in year -1, the logarithm of the market-to-book ratio of equity in year -1, and ROE_{-1}. CE_0 is calculated as $(E_0 - E_{-1})/BE_{-1}$. $NDFED_0$ ($PDFED_0$) is a dummy variable equal to 1 if DFE_0 is negative (positive) and 0 otherwise. $NCED_0$ ($PCED_0$) is a dummy variable equal to 1 if CE_0 is negative (positive) and 0 otherwise. Similarly, if dividend changes are correlated with future earnings changes, we expect the coefficients of interest, β_{1P} and β_{1N}, to be positive and statistically significant.

Table 31 reveals results similar to those documented earlier. Specifically, the coefficients on dividend increases are not significant across all three periods for deregulated firms and the coefficients on dividend decreases have the expected sign and are significant only for the regulation period when t = 1. Our results are similar to those shown in the annual cross-sectional regression coefficients in Grullon, Michaely, Benartzi and Thaler (2005).

7.4.2.5 Test of relations between dividend changes and future earnings levels using non-linear model

I further use the following nonlinear model to estimate the relations between dividend changes and future earnings levels.

$$\begin{aligned} ROE_t = {} & \beta_0 + \beta_{1P} DPC_0 \times R\Delta DIV_0 + \beta_{1N} DNC_0 \times R\Delta DIV_0 \\ & + (\gamma_1 + \gamma_2 NDFED_0 + \gamma_3 NDFED_0 \times ROE_0 + \gamma_4 PDFED_0 \times ROE_0) \times ROE_0 \\ & + (\lambda_1 + \lambda_2 NCED_0 + \lambda_3 NCED_0 \times CE_0 + \lambda_4 PCED_0 \times CE_0) \times CE_0 \\ & + \varphi_1 MB_{-1} + \varphi_2 SIZE_{-1} + \varepsilon_t \end{aligned} \qquad (7.11)$$

The variables are defined as previously. As shown in Table 32, I still document similar results as the above. Specifically, the coefficients on dividend changes are only positive and significant for the partial deregulation period for t = 1 and are not significant across all three periods for t = 2. The results are also inconsistent for control firms over time. As a whole, this set of analyses provides little evidence that dividend changes contain information about future earnings changes or earnings levels.

7.4.3 Summary and discussion

Since, when regulated, firms use dividends mainly as an “artificial” means of getting rid of free cash flows and creating needs to go to the financial market to cope with the “double agency problems”, rather than as a mechanism to signal future earnings and profitability, it was expected that dividends are less informative for firms under regulation relative to non-regulated

firms. The heightened competition induced by economic deregulation may incentivize firms to use dividends to signal information and distinguish good performers from bad performers. If this is the case, deregulation should help re-orient the dividend policy of deregulated firms toward future earnings and profitability, thus making dividend changes more information-laden.

I use two ways to test the changing information content of dividends. Analyzing the cumulative abnormal returns (CARs) surrounding the announcement of dividend changes along the deregulation process, I find the CARs are significant during the regulation period and move toward insignificance in the complete deregulation period, indicating that deregulated firms follow the pattern of control firms and do not exhibit a distinctive upward trend as predicted. In testing the sensitivity of CARs to the magnitude of dividend changes in a multivariate setting, I find that the response coefficients for both dividend increases and decreases do not exhibit an upward trend either. This first set of analyses indicate that deregulated firms do not differ from control firms in market reactions to dividend changes and both group of firms exhibit a declining information content of dividends.

I further test the information content hypothesis by examining the relations between dividend changes and future earnings changes and future earnings levels with the assumption of both linear and non-linear patterns of earnings behavior. As in Grullon, Michaely, Benartzi and Thaler (2005) and other studies, I could not find any meaningful and consistent association between dividend changes and future earnings changes and earnings levels. In sum, I find little empirical evidence in support of hypotheses 4A and 4B that deregulated firms are more likely to use dividends to signal information during the deregulation period and thus dividends are becoming more informative along the deregulation process.

7.5 Effects of Deregulation on Corporate Financing Activities

There is some evidence that deregulated firms reduce the dividend payout ratio in response to economic deregulation. Neither the information content theory of dividends nor the clientele theory of dividends could explain this evolution because both theories do not predict a downward trend in dividend payout ratio. In addition, my analyses provide little support to the claim that dividends become more informative along the deregulation process. It seems that the documented downward trend is more consistent with predictions of the agency theory of dividends. One possible channel is that deregulated firms are more likely to raise external capitals and thus are subject to the monitoring and discipline of the capital market, which reduces the need of using dividends to mitigate agency costs. In this subsection, I examine the evolution of financing activities along the deregulation process. Specifically, I begin by investigating the percentage of firms with external financing activities and then conduct multivariate analyses of the probability to seek external financing after controlling for firm characteristics that are related to financing needs.

7.5.1 Evolution of frequency of external financing

Following previous literature (Hovakimian, Hovakimian and Tehranian (2004); Hovakimian, Opler and Titman (2001); Leary and Roberts (2005); Ovtchinnikov (2010a)), I consider equity or debt issues to have taken place if the net change in equity or long-term debt divided by lagged assets is greater than 5 percent. A firm is considered to have external financing if either of equity or debt issues has taken place. Table 33 reports the percent of firms with external financing in Panel A, equity issues in Panel B, and debt issues in Panel C for deregulated firms and firms in control industries in each relative year over the three “snapshot” periods.

Data in Panel A show that firms subject to regulation have fewer external financing activities than control firms during the regulation period as the percent of firms with external financing activities ranges from 34.19 percent to 42.86 percent for both firms under regulation and firms in control industries. This evidence suggests that even if regulated firms distribute a larger chunk of their cash flows in dividends to create needs to go to the financial market, in order to subject the management and their regulators to more frequent market monitoring and discipline (Smith (1986)), they still lag behind non-regulated firms in terms of external financing activities. With the progress of economic deregulation, deregulated firms become more and more active in financing activities. The proportion of firms with external financing starts from 37.50 percent in the year prior to the beginning of deregulation (year -1), jumps to 43.83 percent, 44.38 percent, 49.17 percent, 51.27 percent, 42.44 percent in each year of the five-year partial deregulation period, respectively, and then continue increases to 51.27 percent, 55.72 percent, 56.25 percent, 58.41 percent, and 50.53 percent in each year of the five-year complete deregulation period, respectively. The firms in control industries follow a similar trend, but the magnitude of increase appears smaller.

Moving down to Panel B and Panel C, two points stand out. For deregulated firms, the proportion of firms with equity issues grows from 8.58 percent in year -1 to 8.87 percent, 13.03 percent, 20.66 percent, 19.39 percent, and 15.27 percent in each year of the five-year period of partial deregulation, to 25.81 percent, 28.43 percent, 29.00 percent, 32.79 percent, and 27.26 percent in each year of the five-year period of complete deregulation, indicating that equity issues contribute to the increase in financing activities. Firms in control industries follow a similar pattern for equity issues. However, for debt issues, deregulated firms and control firms exhibit different trends. While the percent of control firms with debt issues hovers around 23

percent, the proportion of deregulated firms with debt issues jumps from 22.73 percent in year -1 to 29.66 percent, 35.22 percent, 34.34 percent, 36.25 percent, and 29.45 percent in each year during the five-year period of complete deregulation. The results indicate that deregulated firms increase both equity issues and debt issues after the launch of economic deregulation.

This univariate analysis provides a vivid picture of increasing financing activities for deregulated firms. However, there are two limitations for this analysis. First, neither could I tell whether the time-series increase for deregulated firms is significant nor could I draw conclusion on whether the differences in financing activities between deregulated firms and control firms are significant. Second, both deregulated firm and control firm attributes have changed over time, the increasing financing activities may be due to the changing firm characteristics instead of the effects of deregulation. To overcome these limitations, I further conduct multivariate analyses to control for firm characteristics that are related to financing needs.

7.5.2 Multivariate analysis of financing activities in response to economic deregulation

To test whether economic deregulation induces a significant changing in financing activities, I estimate the following logistic regression model:

$$Issuer_t = Dereg + Pdreg + Dereg * Pdreg + LNAT_{t-1} + MTB_{t-1} + Earning_{t-1} + Bklev_{t-1} + CAPX_{t-1} + \varepsilon_t \quad (7.12)$$

The dependent variable, $Issuer_t$, is set to 1 if a firm has financing activities in year t. I estimate the regression model separately for total financing activities, equity issues and debt issues as well as for the partial deregulation versus the regulation period and the complete deregulation versus the regulation period. Following prior literature (e.g., Lee and Masulis (2009)), I include a set of explanatory variables such as size (*LNAT*), growth opportunity (*MTB*),

profitability (*Earnings*), leverage (*Bklev*), and capital expenditure (*CAPX*). The variables of interest are *Dereg* which is equal to 1 if a firm is in a deregulated industry and 0 if in a control industry, *Pdreg* which takes a value of 1 for the partial (complete) deregulation period and 0 for the regulation period, and the interaction term of *Dereg* with *Pdreg*. The coefficient on *Dereg* captures the difference in the financing frequency between control firms and regulated firms during the regulation period. The coefficient on *Pdreg* reflects the change in financing frequency in the partial (complete) deregulation period compared to the regulation period. The coefficient on the interaction term represents incremental change in financing activities during the partial (complete) deregulation period for deregulated firms after controlling for the general trends exhibited by control firms. If economic deregulation induces more frequent external financing activities, the coefficient on the interaction term is expected to be positive.

Table 34 reports the regression results. Across all models, none of the coefficient on *Dereg* is positive and statistically significant, indicating that firms under regulation do not go to the market for external financing more frequently than control firms during the regulation period, affirming the univiarate results. For the comparison between the partial deregulation vs. the regulation period (first three data columns), both deregulated firms and control firms have increased equity issues, but there is no incremental change for deregulated firms beyond that of control firms (coefficient on interaction term = 0.013, p-value = 0.92). Similar to the univariate results, debt issues are stable for control firms but are more frequent for deregulated firms during the partial deregulated period (coefficient on interaction term = 0.245, p-value = 0.01). Moreover, the overall financing activities (equity issues plus debt issues) do not change significantly for deregulated firms immediately after the commencement of the deregulation process (coefficient on interaction term = 0.092, p-value = 0.29). The comparison between complete deregulation vs.

regulation periods (the last three data columns) reveals a different result. The coefficients on the interaction terms are positive and significant for total financing activities, equity issues and debt issues, indicating that deregulated firms increase external financing activities significantly as economic deregulation progresses.

7.5.3 Summary and discussion

Dividends are viewed as a means of alleviating agency costs if other control mechanisms are not in place. The substitutive nature of dividends suggests that if other control methods are available, the role of dividends in alleviating agency conflicts diminishes, which may induce firms to decrease dividend payments. I explore one of these other control mechanisms, namely the monitoring and discipline from more frequent external financing, which may contribute to a lower dividend payout ratio along the deregulation process. My analyses reveal that deregulated firms increase equity and debt issues steadily immediately after the deregulation initiatives and accelerate the increase with the progress of the deregulation process. This pattern mirrors the images I documented earlier for the magnitude of payout ratio. The overall evidence indicates that the reduced dividend payment along the deregulation process is partly due to enhanced market monitoring and discipline arising from more frequent external financing activities of deregulated firms.

As documented by Kole and Lehn (1999), both internal and external equity ownership become more concentrated, CEO pay increases, stock option grants to CEOs increase, and board size decreases post-deregulation for airline industry. My explanation does not exclude the effect of these governance changes on the downward trends on dividends. Collectively, my evidence, together with that from Kole and Lehn (1999) suggests that firms improve their governance

mechanisms post-deregulation, thus reducing the needs to use dividends to control agency costs. This explanation is consistent with the agency theory of dividends.

8. Conclusions

In this study, I focus on investigating the dynamics of corporate dividend policy in response to changing operating environments induced by economic deregulation from the 1970s-1990s. Despite voluminous studies on dividends, corporate dividend policy remains as puzzling as before. Serving as an exogenous shock to the operating environment of firms subject to regulation, economic deregulation provides a promising opportunity to test various theories regarding dividends. In this paper, I take a step in the direction by first examining the effects of deregulation on firms' propensity to pay dividends and then studying how deregulation affects the amount of dividends paid. I further explore whether deregulation makes firms to adjust their dividend policy faster to optimal levels based on past and current corporate earnings. And finally I test how the information content of dividend and corporate financing activities change in response to deregulation.

My results reveal that the deregulated firms have a declining propensity to pay dividends and this downward trend seems to capture the general trend observed for the universe of Compustat and CRSP firms. Economic deregulation does not have incremental effects on firms' decisions on whether to pay dividends. There is some evidence that firms reduce their dividend payout ratio in response to economic deregulation and the differences in payout ratio between deregulated and non-regulated control firms narrow down along the deregulation process. I also find that firms adjust their dividend policy at greater speed toward optimal levels post-deregulation than pre-deregulation, suggesting stronger links between corporate dividend policy and firms' operating earnings. Moreover, firms experience more external financing activities

during the post-deregulation period, which subjects them to more frequent external monitoring and market discipline. The increased monitoring from more frequent external financing may partly contribute to the reduced dividend payout ratio. However, the empirical results do not provide support to hypotheses based on the information content theory of dividends against the backdrop of economic deregulation. My findings are in general consistent with predictions of the agency theory.

APPENDIX A: VARIABLE DEFINITIONS

Category 1: Dividend payout variables		
Dividend/Earnings	=	Dividend scaled by earnings for common stock [$DVC_t/IBCOM_{t-1}$]
Dividend/Assets	=	Dividend scaled by lagged book assets [DVC_t/At_{t-1}]
Dividend/Sales	=	Dividend scaled by lagged sales [$DVC_t/LSALE_{t-1}$]
Dividend/Cash flow	=	Dividend scaled by cash flow [DVC/(IB + DP)]
Dividend/Net income	=	Dividend scaled by net income [DVC/NI]
Dividend Yield	=	Dividend scaled by lagged market value of firm [$DVC_t/(CSHO_{t-1}$*PRCC_F_{t-1})]
Category 2: Firm characteristics variables		
AT	=	Total assets [AT]
AGE	=	Firm age, defined as the years since the firm's debut in CRSP
BE	=	Shareholder's equity [SEQ]
Bklev	=	Book leverage, defined as total debt divided by total assets [(DLTT + DLC)/AT]
CE_0	=	calculated as the difference between year 0 and year 1 earnings scaled by year -1 book equity [$(E_0 - E_1)/BE_{-1}$]
dAT/AT	=	Asset growth, computed as difference between total assets in year t and t-1 divided by total asset in year t [$(AT_t - AT_{t-1})) / AT_t$]
DDIVY	=	Annualized change in dividend yield, estimated as 4 * (Current quarter cash dividend – Previous quarter cash dividend) / Price
Dereg	=	Dummy variable equal to 1 if firm is in one of the five deregulation industries, and 0 otherwise
Divcs	=	Dividend scaled by common shares outstanding [DVC/CSHO]
DFE_0	=	Difference between return on equity and expected return on equity in year 0 [$ROE_0 – E(ROE_0)$]
DNC	=	Dummy variable equal to 1 for dividend decreases, and 0 otherwise
DPC	=	Dummy variable equal to 1 for dividend increases, and 0 otherwise
E	=	Earnings before extraordinary items plus interest expense plus income statement deferred taxes if available [IB + XINT + TXDI]
$E(ROE_0)$	=	fitted value from cross-sectional regression of ROE_0 on the logarithm of total asset in year -1, the logarithm of the market-to-book ratio of equity in year -1, and $E(ROE_{-1})$
Ibcomcs	=	Income available for common [IBCOM]
Issuer	=	Dummy variable equal to 1 if a firm issues equity or debt in year t, 0 otherwise
LAGE	=	Logarithm of firm age
LNAT	=	Logarithm of total assets
LnCshr	=	Logarithm of common/ordinary shareholders
LTYLD	=	Stock's long-term yield, in the year before the dividend announcement
LVolatility	=	Logarithm of standard deviation of firm stock return
MV	=	Market value of assets [TA - CEQ + CSHO*PRCC]
MTB	=	Market-to-book ratio [CSHO*PRCC_F/CEQ]
NCED	=	Dummy variable equal to 1 if CE_0 is negative, and 0 otherwise
NDFED	=	Dummy variable equal to 1 if DFE_0 is negative and 0 otherwise
NYP	=	Proxy of fir size, defined as percent of NYSE firms with the same or lower market capitalization at the end of a firm's fiscal year
OCF	=	Operating income before depreciation over total assets [OIBDP/AT]
OCF Volatility	=	Standard deviation of operating income before depreciation [(STD(OIBDP))/AT)]
Payer	=	Dummy variable equal to 1 if a firm pays dividend in year t, and 0 otherwise
PCED	=	Dummy variable equal to 1 if CE_0 is positive, and 0 otherwise

PDFED	=	Dummy variable equal to 1 if DFE_0 is positive, and 0 otherwise
Pdreg	=	Dummy variable equal to 1 if a firm is in a period of deregulation, and 0 otherwise
RΔDIV	=	Annual rate of change in the cash dividend payment
RE	=	Retained earnings (RE)
Reg	=	Dummy variable equal to 1 if firm is the period of regulation, and 0 otherwise
ROA	=	Return on asset, computed as operating income before depreciation divided by total assets [OIBDP/TA]
ROE	=	Return on equity, computed as earnings before extraordinary items dividend by book value of equity [IB/CEQ]
Saleg	=	Sales growth, computed as difference in sales between year t and t-1, divided by sales in year t-1 [$(SALE_t-SALE_{t-1})/SALE_{t-1}$]
SIZEN	=	Logarithm of stock capitalization at the last month prior to the dividend announcement month, normalized by the S&P 500 index
StdOibpd	=	Standard deviation of earnings before extraordinary items over the past five years
Volatility	=	Standard deviation of daily stock returns in a fiscal year

APPENDIX B: FIGURES

Figure 1
Percent of deregulated firms in different dividend groups by relative year

Payers are those that pay dividend in year *t* and non-payers are those who do not. Former payers are those that do not pay dividend in year *t* but paid in a previous year while never-paid are those that have never paid dividends. Year 0 is the beginning year of deregulation for each industry (characterized by the commencement of first major deregulation initiative in that year). Years with negative sign are years in the regulation period. Years from 0 to 4 are years in the partial deregulation period. Years with positive sign are years in the complete deregulation period.

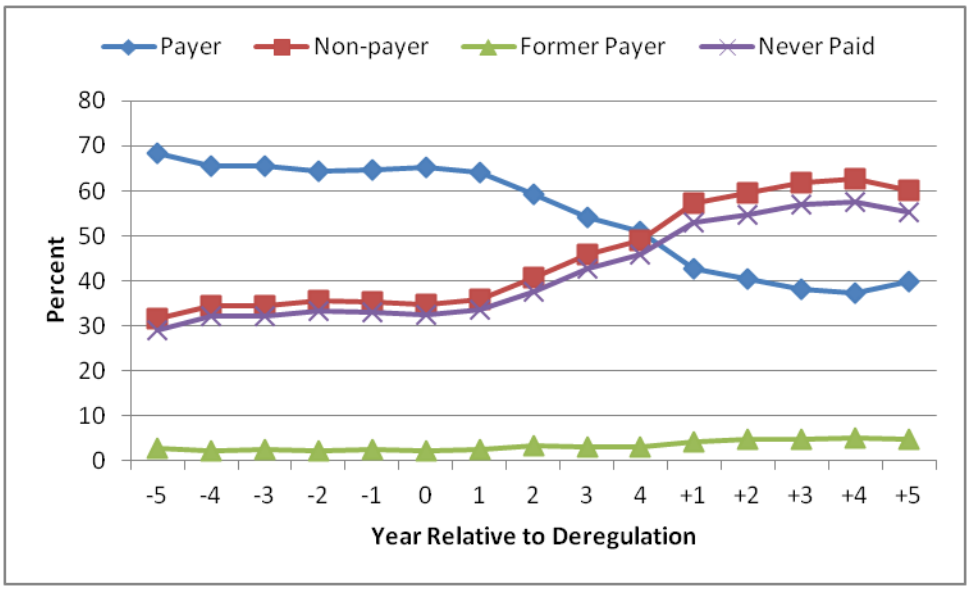
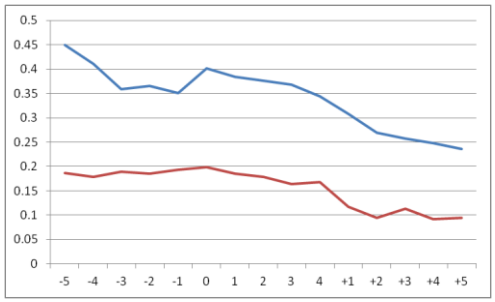
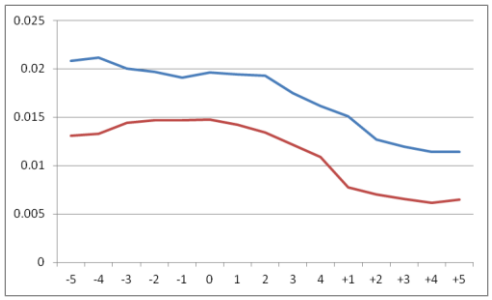


Figure 2
Dividend payouts of all deregulated firms and control firms

Dividend payouts for all deregulated (blue) and control (red) firms are presented in this figure using different measures. Graph A shows *Dividend/Earnings*$_{t-1}$, defined as cash dividends divided by previous earnings before extraordinary items for common shares. Graph B shows the second measure, *Dividend/Asset*$_{t-1}$, estimated as cash dividends dividend by total assets in the previous year and Graph C the third measure, *Dividend/Sales*$_{t-1}$, calculated as cash dividends divided by revenues in the previous year. Graphs D, E and F show the three Grullon and Michaely (2007) measures: *Dividend/Cash Flow*, *Dividend/Net Income* and *Dividend Yield*. The first two are computed as cash dividends divided by cash flow (net income + depreciation) and net income, respectively. *Dividend yield* is defined as common cash dividends scaled by previous fiscal year-end market value of equity, which, in turn, is computed as common shares outstanding multiplied by fiscal year end stock price. Year 0 is the beginning year of deregulation for each industry (characterized by the commencement of first major deregulation initiative in that year). Years with negative sign are years in the regulation period. Years from 0 to 4 are years in the partial deregulation period. Years with positive sign are years in the complete deregulation period.



A



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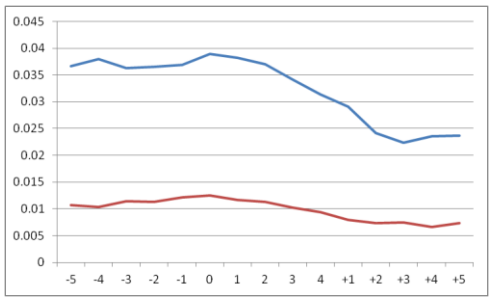

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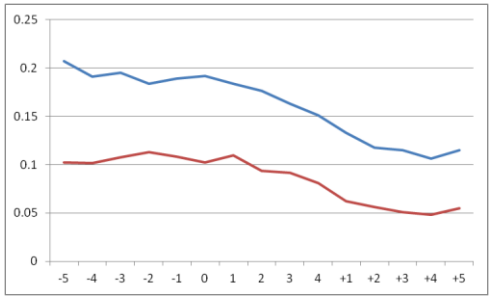

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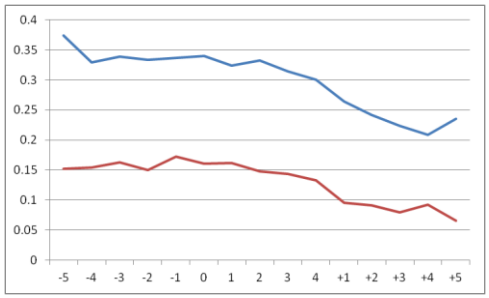

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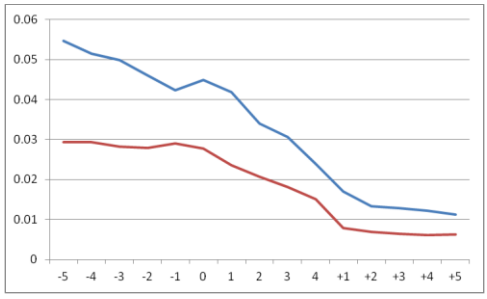
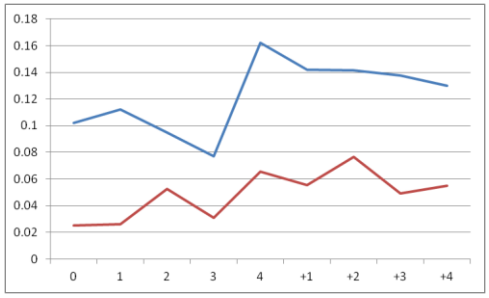


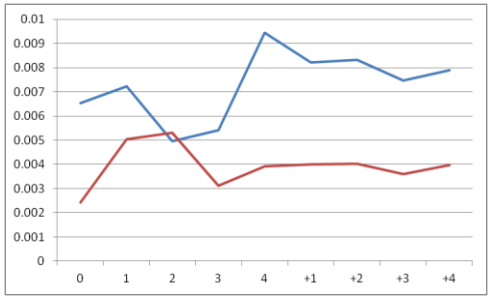
F

Figure 3
Dividend payouts of new entrants in deregulated and control industries

Dividend payouts for new entrants into the deregulated industries (blue curve) and control industries (red curve) are presented using different measures in this figure. Graph A shows *Dividend/Earnings*, defined as cash dividends divided by previous earnings before extraordinary items for common shares. Graph B shows the second measure, *Dividend/Asset*, estimated as cash dividends dividend by total assets in the previous year and Graph C the third measure, *Dividend/Sales*, calculated as cash dividends divided by revenues in the previous year. Graphs D, E and F show the three Grullon and Michaely (2007) measures: *Dividend/Cash Flow*, *Dividend/Net Income* and *Dividend Yield*. The first two are computed as cash dividends divided by cash flow (net income + depreciation) and net income, respectively. *Dividend Yield* is defined as common cash dividends scaled by previous fiscal year-end market value of equity, which, in turn, is computed as common shares outstanding multiplied by fiscal year end stock price. Year 0 is the beginning year of deregulation for each industry (characterized by the commencement of first major deregulation initiative in that year). Years from 0 to 4 are years in the partial deregulation period. Years with positive sign are years in the complete deregulation period.



A



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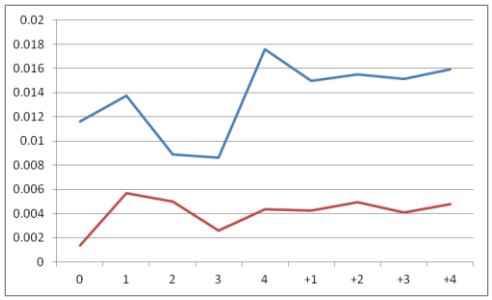

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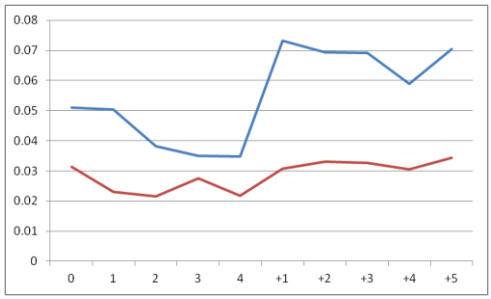

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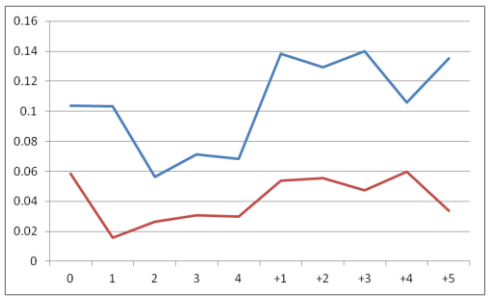

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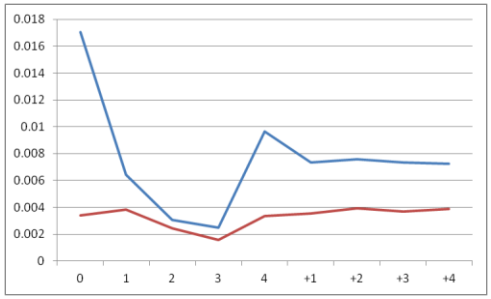

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APPENDIX C: TABLES

Table 1
Major initiatives taken to deregulate industries of entertainment, petroleum and gas, utilities, telecommunications and transportation (Source: Vicsusi, Harrington and Vernon (2005) and Ovtchinnikov (2010a)

Year	Initiative
Entertainment	
1980	Deregulation of cable television (FCC)
1981	Deregulation of radio (FCC)
1984	Cable Communications Policy Act
Petroleum and natural gas	
1978	Natural Gas Policy Act
1981	Decontrol of crude oil and refined petroleum products (Executive order)
1989	Natural Gas Wellhead Decontrol Act
1992	FERC Order 636
Utilities	
1988	Proposed rules on natural gas and electricity (FERC)
1992	Energy Policy Act
1996	FERC Order 888
1999	FERC Order 2000
Telecommunications	
1979	Deregulation of satellite earth stations (FCC)
1980	Deregulation of cable television (FCC)
1980	Deregulation of customer premises equipment and enhanced services (FCC)
1981	Deregulation of radio(FCC)
1982	AT&T settlement
1984	Cable Television Deregulation Act
1988	Proposed rules on price caps (FCC)
1996	Telecommunications Act
Transportation	
1976	Railroad Revitalization and Reform Act
1977	Air Cargo Deregulation Act
1978	Airline Deregulation Act
1980	Motor Carrier Reform Act
1980	Household Goods Transportation Act
1980	Staggers Rail Act
1980	International Air Transportation Competition Act
1982	Bus Regulatory Reform Act

1984	Shipping Act
1986	Trading of airport landing rights
1987	Sale of Conrail
1993	Negotiated Rates Act
1994	Trucking Industry and Regulatory Reform Act
1995	ICC Termination Act

Table 2
Number of deregulated firms in "snapshot" periods of regulation and post-deregulation

This table reports the number of firms in each of the five deregulated industries, namely, entertainment (ENT), petroleum and gas (PAG), utilities (UTI), telecommunications (TLC) and transportation (TRA), in each of the three "snapshot" periods of regulation, partial deregulation, and complete deregulation. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the significant deregulatory initiative (0, 4). The complete deregulation period is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). Panel A reports the number of total deregulated firms. Panel B reports the number of surviving deregulated firms and Panel C reports surviving deregulated firms as percentage of firm in year -1.

Relative Year	ENT	PAG	UTI	TLC	TRA	Total	Interval Total
Panel A: Number of total deregulated firms							
-5	100	165	374	121	120	880	Period of
-4	99	226	374	144	124	967	Regulation
-3	104	246	367	158	124	999	
-2	105	254	363	164	174	1,060	1,159 firms
-1	109	269	353	168	172	1,071	(4,977 obs)
0	107	281	351	162	169	1,070	Period of
1	109	300	347	171	185	1,112	Partial
2	120	381	341	169	178	1,189	Deregulation
3	129	461	335	182	166	1,273	1,481 firms
4	139	475	333	184	168	1,299	(5,943 obs)
+1	146	337	295	362	222	1,362	Period of
+2	155	329	301	411	216	1,412	Complete
+3	153	344	303	416	216	1,432	Deregulation
+4	153	350	302	413	206	1,424	1,815 firms
+5	148	326	297	384	201	1,356	(6,986 obs)
Total firms	279	827	506	709	441	2,762	
Total Observations	(1,876)	(4,744)	(5,036)	(3,609)	(2,641)	(17,906)	
Panel B: Number of surviving deregulated firms							
-1	109	269	353	168	172	1,071	
0	99	261	345	158	167	1,030	Period of
1	91	252	340	157	164	1,004	Partial
2	85	245	335	151	154	970	Deregulation
3	79	233	326	147	140	925	
4	75	224	322	139	129	889	(4,818 obs)
+1	64	101	230	75	44	514	Period of
+2	56	99	224	67	42	488	Complete
+3	45	93	219	52	41	450	Deregulation
+4	45	89	212	48	36	430	
+5	41	81	208	49	35	414	(2,296 obs)
Panel C: Surviving deregulated firms as percent of year -1 firms (%)							

-1	100.00	100.00	100.00	100.00	100.00	100.00
0	90.83	97.03	97.73	94.05	97.09	96.17
1	83.49	93.68	96.32	93.45	95.35	93.74
2	77.98	91.08	94.90	89.88	89.53	90.57
3	72.48	86.62	92.35	87.50	81.40	86.37
4	68.81	83.27	91.22	82.74	75.00	83.01
+1	58.72	37.55	65.16	44.64	25.58	47.99
+2	51.38	36.80	63.46	39.88	24.42	45.56
+3	41.28	34.57	62.04	30.95	23.84	42.02
+4	41.28	33.09	60.06	28.57	20.93	40.15
+5	37.61	30.11	58.92	29.17	20.35	38.66

Table 3
Number of new entrants, exits and existing firms in year t relative to year -1 in deregulated industries

This table reports the number of new entrants, exits and existing firms, by each relative year (relative to year 0 in which the first major deregulatory initiative is taken in an industry), in each of the five deregulated industries, namely, entertainment (ENT), petroleum and gas (PAG), utilities (UTI), telecommunications (TLC) and transportation (TRA), in the periods of partial deregulation and complete deregulation against the backdrop in year -1. The period of partial deregulation is defined as the five years starting from the year of the significant deregulatory initiative (0, 4). The complete deregulation period is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). Relative year is the year relative to the start year of the deregulation process in each regulated industry: those without the plus sign denote the five years immediately following deregulation initiation in an industry (period of partial deregulation) and those with the plus sign represent the five years in the wake of the last major deregulation initiative in an industry (period of complete deregulation). Panel A reports the number of firms in the dynamic change and Panel B reports the firms as percentage of year -1 firms.

			Period of									
			Partial deregulation					**Complete deregulation**				
Industry		**-1**	**0**	**1**	**2**	**3**	**4**	**+1**	**+2**	**+3**	**+4**	**+5**
Panel A: Number of firms												
ENT	Entrants	0	8	18	35	50	64	82	99	108	108	107
	Exits	0	10	18	24	30	34	45	53	64	64	68
	Existing	109	99	91	85	79	75	64	56	45	45	41
	Total	109	107	109	120	129	139	146	155	153	153	148
PAG	Entrants	0	20	48	136	228	251	236	230	251	261	245
	Exits	0	8	17	24	36	45	168	170	176	180	188
	Existing	269	261	252	245	233	224	101	99	93	89	81
	Total	269	281	300	381	461	475	337	329	344	350	326
UTI	Entrants	0	6	7	6	9	11	65	77	84	90	89
	Exits	0	8	13	18	27	31	123	129	134	141	145
	Existing	353	345	340	335	326	322	230	224	219	212	208
	Total	353	351	347	341	335	333	295	301	303	302	297
TLC	Entrants	0	4	14	18	35	45	287	344	364	365	335
	Exits	0	10	11	17	21	29	93	101	116	120	119
	Existing	168	158	157	151	147	139	75	67	52	48	49
	Total	168	162	171	169	182	184	362	411	416	413	384
TRA	Entrants	0	2	21	24	26	39	178	174	175	170	166
	Exits	0	5	8	18	32	43	128	130	131	136	137
	Existing	172	167	164	154	140	129	44	42	41	36	35
	Total	172	169	185	178	166	168	222	216	216	206	201
Total	Entrants	0	40	108	219	348	410	848	924	982	994	942
	Exits	0	41	67	101	146	182	557	583	621	641	657
	Existing	1,071	1,030	1,004	970	925	889	514	488	450	430	414
	Total	1,071	1,070	1,112	1,189	1,273	1,299	1,362	1,412	1,432	1,424	1,356
Interval Total					5,943					6,986		
Panel B: Firms as percent of year -1 (%)												
ENT	Entrants	0.00	7.34	16.51	32.11	45.87	58.72	75.23	90.83	99.08	99.08	98.17
	Exits	0.00	9.17	16.51	22.02	27.52	31.19	41.28	48.62	58.72	58.72	62.39
	Existing	100.00	90.83	83.49	77.98	72.48	68.81	58.72	51.38	41.28	41.28	37.61
	Total	100.00	98.17	100.00	110.09	118.35	127.52	133.94	142.20	140.37	140.37	135.78
PAG	Entrants	0.00	7.43	17.84	50.56	84.76	93.31	87.73	85.50	93.31	97.03	91.08

	Exits	0.00	2.97	6.32	8.92	13.38	16.73	62.45	63.20	65.43	66.91	69.89
	Existing	100.00	97.03	93.68	91.08	86.62	83.27	37.55	36.80	34.57	33.09	30.11
	Total	100.00	104.46	111.52	141.64	171.38	176.58	125.28	122.30	127.88	130.11	121.19
UTI	Entrants	0.00	1.70	1.98	1.70	2.55	3.12	18.41	21.81	23.80	25.50	25.21
	Exits	0.00	2.27	3.68	5.10	7.65	8.78	34.84	36.54	37.96	39.94	41.08
	Existing	100.00	97.73	96.32	94.90	92.35	91.22	65.16	63.46	62.04	60.06	58.92
	Total	100.00	99.43	98.30	96.60	94.90	94.33	83.57	85.27	85.84	85.55	84.14
TLC	Entrants	0.00	2.38	8.33	10.71	20.83	26.79	170.83	204.76	216.67	217.26	199.40
	Exits	0.00	5.95	6.55	10.12	12.50	17.26	55.36	60.12	69.05	71.43	70.83
	Existing	100.00	94.05	93.45	89.88	87.50	82.74	44.64	39.88	30.95	28.57	29.17
	Total	100.00	96.43	101.79	100.60	108.33	109.52	215.48	244.64	247.62	245.83	228.57
TRA	Entrants	0.00	1.16	12.21	13.95	15.12	22.67	103.49	101.16	101.74	98.84	96.51
	Exits	0.00	2.91	4.65	10.47	18.60	25.00	74.42	75.58	76.16	79.07	79.65
	Existing	100.00	97.09	95.35	89.53	81.40	75.00	25.58	24.42	23.84	20.93	20.35
	Total	100.00	98.26	107.56	103.49	96.51	97.67	129.07	125.58	125.58	119.77	116.86
Total	Entrants	0.00	3.73	10.08	20.45	32.49	38.28	79.18	86.27	91.69	92.81	87.96
	Exits	0.00	3.83	6.26	9.43	13.63	16.99	52.01	54.44	57.98	59.85	61.34
	Existing	100.00	96.17	93.74	90.57	86.37	83.01	47.99	45.56	42.02	40.15	38.66
	Total	100.00	99.91	103.83	111.02	118.86	121.29	127.17	131.84	133.71	132.96	126.61

Table 4
Number and percentage of new entrants, exits and existing firms in post-deregulation "snapshot" periods relative to year -1 for deregulated industries

This table reports the number of new entrants, exits and existing firms in each of the five deregulated industries, namely, entertainment (ENT), petroleum and gas (PAG), utilities (UTI), telecommunications (TLC) and transportation (TRA), in the periods of partial deregulation and complete deregulation against the backdrop in year -1. The period of partial deregulation is defined as the five years starting from the year of the significant deregulatory initiative (0, 4). The complete deregulation period is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). Panel A reports the number of firms in the dynamic change and Panel B reports the firms as percentage of year -1 firms.

			Number of firms		Percent of firms	
Industry		**Year -1**	**Partial Deregulation**	**Complete Deregulation**	**Partial Deregulation**	**Complete Deregulation**
ENT	Entrants	0	69	145	63.30	133.03
	Exits	0	10	45	9.17	41.28
	Existing	109	99	64	90.83	58.72
	Total	109	168	209	154.13	191.74
PAG	Entrants	0	276	320	102.60	118.96
	Exits	0	7	168	2.60	62.45
	Existing	269	262	101	97.40	37.55
	Total	269	538	421	200.00	156.51
UTI	Entrants	0	14	105	3.97	29.75
	Exits	0	8	121	2.27	34.28
	Existing	353	345	232	97.73	65.72
	Total	353	359	337	101.70	95.47
TLC	Entrants	0	49	501	29.17	298.21
	Exits	0	10	91	5.95	54.17
	Existing	168	158	77	94.05	45.83
	Total	168	207	578	123.21	344.05
TRA	Entrants	0	42	226	24.42	131.40
	Exits	0	5	128	2.91	74.42
	Existing	172	167	44	97.09	25.58
	Total	172	209	270	121.51	156.98
Total	Entrants	0	450	1297	42.02	121.10
	Exits	0	40	553	3.73	51.63
	Existing	1,071	1,031	518	96.27	48.37
	Total	1,071	1,481	1,815	138.28	169.47

Table 5
Descriptive statistics of sample firms

This table reports descriptive statistics of the sample of deregulated firms. There are 2,762 distinctive firms in the sample, with a total of 17,906 firm-year observations over three "snapshot" periods (altogether 15 years). Deregulated firms are firms in the five deregulated industries, namely, entertainment, petroleum and gas, utilities, telecommunications and transportation. The three "snapshot" periods are periods of regulation, partial deregulation and complete deregulation, defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1), the five years starting from the year of the significant deregulatory initiative (0, 4) and the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5), respectively. All variables are winsorized at the 1st and 99th percentile. Variable definitions are in Appendix A.

Variable	N	Mean	25th	Median	75th	Std Dev
Dividend/Earnings	16,590	0.333	0.000	0.130	0.636	0.439
Dividend/Assets	16,649	0.017	0.000	0.007	0.029	0.022
Dividend/Sales	16,513	0.032	0.000	0.009	0.052	0.045
Dividend/Cash Flow	17,858	0.156	0.000	0.038	0.300	0.205
Dividend/Net Income	17,901	0.293	0.000	0.022	0.578	0.433
Dividend Yield	11,470	0.030	0.000	0.010	0.056	0.036
AT (million)	17,906	2,210.95	24.30	228.31	1,604.90	5,105.25
MV (million)	12,504	3,096.30	46.40	291.39	1,854.47	8,004.57
E/AT	16,384	0.003	0.011	0.055	0.078	0.230
MV/AT	12,504	1.758	1.011	1.188	1.655	2.303
dAT/AT	16,653	0.079	0.002	0.068	0.170	0.287
Saleg	16,512	0.272	0.002	0.096	0.255	0.794
RE/BE	17,590	0.170	0.081	0.376	0.679	3.612
Bklev	17,883	0.354	0.204	0.346	0.452	0.252
Volatility	9,287	0.032	0.017	0.027	0.041	0.022
OCF	17,877	0.093	0.072	0.123	0.171	0.221
OCF Volatility	12,123	0.066	0.014	0.029	0.061	0.159
AGE	9,399	30.76	4.000	13.00	48.00	36.83

Table 6
Dynamic changes of dividend payers and non-payers in year -1 over the process of deregulation

This table presents what happens in relative year *t* to deregulated firms that do and do not pay dividends in year (-1). Panel A reports the number (percent in parentheses) of dividend payers in year (-1) that, in the partial deregulation (0, 4) and the complete deregulation periods (+1, +5), continue to pay, stop paying disappear through merger and acquisition, or delist for various reasons. The total number of dividend payers in year -1 is 692. Panel B report similar information for dividend non-payers in year -1, which stop paying, do not pay, disappear through merger and acquisition, or delist for various other reasons in the deregulation process. The total number of dividend non-payers in year (-1) is 379. Relative year is the year relative to the start year of the deregulation process in each regulated industry: those without the plus sign denote the five years immediately following deregulation initiation in an industry (period of partial deregulation) and those with the plus sign represent the five years in the wake of the last major deregulation initiative in an industry (period of complete deregulation). The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). Percentages are in parentheses.

Panel A: Dynamic changes of dividend payers in year -1

Relative Year	Continue to pay		Stop paying		M&A		Delist		Total
0	660	(95.38)	15	(2.17)	11	(1.59)	6	(0.87)	692
1	643	(92.92)	25	(3.61)	14	(2.02)	10	(1.45)	692
2	614	(88.73)	43	(6.21)	22	(3.18)	13	(1.88)	692
3	588	(84.97)	41	(5.92)	35	(5.06)	28	(4.05)	692
4	562	(81.21)	48	(6.94)	45	(6.50)	37	(5.35)	692
+1	344	(49.71)	47	(6.79)	167	(24.13)	134	(19.36)	692
+2	318	(45.95)	55	(7.95)	175	(25.29)	144	(20.81)	692
+3	290	(41.91)	58	(8.38)	181	(26.16)	163	(23.55)	692
+4	284	(41.04)	53	(7.66)	184	(26.59)	171	(24.71)	692
+5	272	(39.31)	55	(7.95)	190	(27.46)	175	(25.29)	692

Panel B: Dynamic changes of dividend non-payers in year -1

Relative Year	Start paying		Do not pay		M&A		Delist		Total
0	31	(8.18)	324	(85.49)	6	(1.58)	18	(4.75)	379
1	47	(12.40)	289	(76.25)	12	(3.17)	31	(8.18)	379
2	56	(14.78)	257	(67.81)	20	(5.28)	46	(12.14)	379
3	56	(14.78)	240	(63.32)	23	(6.07)	60	(15.83)	379
4	48	(12.66)	231	(60.95)	28	(7.39)	72	(19.00)	379
+1	26	(6.86)	97	(25.59)	69	(18.21)	187	(49.34)	379
+2	28	(7.39)	87	(22.96)	72	(19.00)	192	(50.66)	379
+3	27	(7.12)	75	(19.79)	76	(20.05)	201	(53.03)	379
+4	23	(6.07)	70	(18.47)	82	(21.64)	204	(53.83)	379
+5	26	(6.86)	61	(16.09)	85	(22.43)	207	(54.62)	379

Table 7
Descriptive statistics of subsample for test of propensity to pay dividends

This table presents descriptive statistics of the sample of deregulated firms. Firm characteristics are E_t/AT_t, dAT_t/AT_t, $Saleg_t$, MV_t/AT_t, RE_t/BE_t, NYP_t, MV_t, AT_t, AGE_t, and $Volatility_t$. The variables E_t, AT_t, $Saleg_t$, MV_t/AT_t, RE_t, BE_t, NYP_t, MV_t, AGE_t, and $Volatility_t$, are earnings before interest but after taxes, total assets, sales growth rate, ratio of market value of assets to book value of assets, retained earnings, book value of equity, firm size relative to New York Stock Exchange firms, market value of firm, firm age, and stock return volatility, respectively. $dAT_t = AT_t - AT_{t-1}$, is the year-to-year asset growth. All variables except dummy variable and age are winsorized at the 1st and 99th percentile. Variable definitions are in Appendix A. The values reported in Panel A are for total firms, including both dividend payers and non-payers. Panel B reports values for dividend payers and Panel C for dividend non-payers.

Variable	N	Mean	Median	25th	75th	Std
Panel A: Total firms						
E_t/AT_t	16,384	0.003	0.055	0.011	0.078	0.230
dAT_t/AT_t	16,653	0.079	0.068	0.002	0.170	0.287
$Saleg_t$	16,512	0.272	0.096	0.002	0.255	0.794
MV_t/AT_t	12,504	1.758	1.188	1.011	1.655	2.303
RE_t/BE_t	17,590	0.170	0.376	0.081	0.679	3.612
NYP_t	12,516	0.405	0.357	0.059	0.719	0.339
MV_t	12,504	3,096.30	291.39	46.40	1,854.47	8,004.57
AT_t	17,906	2,210.95	228.31	24.30	1,604.90	5,105.25
AGE_t	9,399	30.76	13.00	4.00	48.00	36.83
$Volatility_t$	9,287	0.032	0.027	0.017	0.041	0.022
Panel B: Dividend payers						
E_t/AT_t	8,130	0.068	0.067	0.050	0.083	0.041
dAT_t/AT_t	9,224	0.074	0.061	0.017	0.120	0.151
$Saleg_t$	9,212	0.117	0.077	0.007	0.161	0.311
MV_t/AT_t	6,466	1.306	1.127	1.000	1.339	0.806
RE_t/BE_t	9,324	0.480	0.472	0.289	0.706	0.582
NYP_t	6,471	0.568	0.629	0.296	0.851	0.313
MV_t	6,466	4,715.67	991.88	193.41	3,921.75	9,612.61
AT_t	9,510	3,299.43	864.00	166.00	3,233.50	5,915.22
AGE_t	4,855	47.67	38.00	11.00	79.00	40.72
$Volatility_t$	4,848	0.020	0.018	0.013	0.025	0.010
Panel C: Dividend non-payers						
E_t/AT_t	8,254	-0.062	0.022	-0.071	0.066	0.308
dAT_t/AT_t	7,429	0.086	0.092	-0.041	0.281	0.396
$Saleg_t$	7,300	0.468	0.159	-0.017	0.496	1.112
MV_t/AT_t	6,038	2.241	1.365	1.030	2.157	3.137
RE_t/BE_t	8,266	-0.180	0.136	-0.412	0.607	5.211
NYP_t	6,045	0.230	0.097	0.016	0.392	0.271
MV_t	6,038	1,362.13	75.80	19.12	405.67	5,284.86
AT_t	8,396	978.05	35.95	5.64	264.63	3,618.49

AGE_t	4,544	12.69	5.00	2.00	14.00	20.06
$Volatility_t$	4,439	0.046	0.040	0.030	0.055	0.024

Table 8
Firm characteristics for different dividend groups of deregulated firms in different periods

This table presents firm characteristics of different dividend groups of deregulated firms in different periods of regulation, partial deregulation and complete deregulation. The numbers are means of annual medians of firm characteristic variables in each period. Firm characteristics are E_t/AT_t, dAT_t/AT_t, *Salegt*, MV_t/AT_t, RE_t/BE_t, MV_t, AT_t, AGE_t, and $Volatility_t$. The variables E_t, AT_t, $Saleg_t$, RE_t, MV_t/AT_t, RE_t, BE_t, MV_t, AGE_t, and $Volatility_t$, are earnings before interest but after taxes, total assets, sales growth rate, ratio of market value of assets to book value of assets, retained earnings, book value of equity, market value of firm, firm age, and stock return volatility, respectively. $dAT_t = AT_t - AT_{t-1}$, is the year-to-year asset growth. A firm is defined as a *Payer* if it pays dividends in the year. *Non-payer* takes the value of one if a firm does not pay dividends in the year. *Never-paid* is a firm that has never paid dividends and *Former Payer* is a firm that paid dividends previous but has ceased to pay dividends. All variables except dummy variables and *Age* are winsorized at the 1st and 99th percentile. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). Variable definitions are in Appendix A. Panel A shows the values for all deregulated firms and Panel B for surviving deregulated firms, which exist in the regulation period and continue to exist in the partial or complete deregulation period.

	Periods of					
	Regulation		**Partial Deregulation**		**Complete Deregulation**	
Panel A: All deregulated firms						
	N	E_t/AT_t	N	E_t/AT_t	N	E_t/AT_t
All Firms	3,990	0.067	5,466	0.062	6,928	0.041
Payer	2,359	0.072	3,038	0.071	2,733	0.055
Non-Payer	1,631	0.049	2,428	0.019	4,195	0.008
Never Paid	1,518	0.050	2,265	0.019	3,865	0.004
Former Payer	112	0.037	163	0.024	329	0.039
	N	dAT_t/AT_t	N	dAT_t/AT_t	N	dAT_t/AT_t
All Firms	4,627	0.066	5,506	0.072	6,520	0.067
Payer	3,149	0.066	3,411	0.064	2,664	0.051
Non-Payer	1,478	0.066	2,095	0.115	3,856	0.096
Never Paid	1,364	0.073	1,931	0.124	3,527	0.104
Former Payer	113	0.006	164	0.021	328	0.042
	N	$Saleg_t$	N	$Saleg_t$	N	$Saleg_t$
All Firms	4,612	0.087	5,476	0.099	6,424	0.104
Payer	3,148	0.074	3,410	0.083	2,654	0.065
Non-Payer	1,464	0.133	2,066	0.174	3,770	0.169
Never Paid	1,350	0.142	1,903	0.190	3,442	0.188
Former Payer	113	0.072	163	0.090	327	0.054
	N	MV_t/AT_t	N	MV_t/AT_t	N	MV_t/AT_t
All Firms	3,214	1.052	4,153	1.181	5,143	1.376
Payer	2,325	1.051	2,343	1.125	1,803	1.291
Non-Payer	889	1.078	1,810	1.614	3,340	1.442
Never Paid	786	1.113	1,659	1.730	3,022	1.467
Former Payer	102	0.910	151	0.992	317	1.276
	N	RE_t/BE_t	N	RE_t/BE_t	N	RE_t/BE_t
All Firms	4,973	0.419	5,920	0.411	6,697	0.273
Payer	3,266	0.465	3,450	0.500	2,608	0.436

Non-Payer	1,707	0.306	2,470	0.165	4,089	0.056
Never Paid	1,589	0.296	2,302	0.149	3,759	0.042
Former Payer	117	0.392	168	0.308	329	0.166
	N	NYP_t	N	NYP_t	N	NYP_t
All Firms	3,214	0.452	4,148	0.311	5,154	0.326
Payer	2,325	0.595	2,338	0.607	1,808	0.697
Non-Payer	889	0.153	1,810	0.063	3,346	0.137
Never Paid	786	0.148	1,659	0.064	3,028	0.119
Former Payer	102	0.247	151	0.062	317	0.343
	N	MV_t	N	MV_t	N	MV_t
All Firms	3,214	242.23	4,148	192.04	5,142	479.49
Payer	2,325	551.08	2,338	713.68	1,803	3,096.49
Non-Payer	889	48.10	1,810	32.21	3,339	193.61
Never Paid	786	44.78	1,659	30.62	3,021	176.49
Former Payer	102	161.57	151	56.82	317	542.381
	N	AT_t	N	AT_t	N	AT_t
All Firms	4,977	147.80	5,943	143.66	6,986	466.86
Payer	3,268	435.37	3,468	622.54	2,774	2468.97
Non-Payer	1,709	16.21	2,475	10.85	4,212	144.62
Never Paid	1,591	14.22	2,307	9.39	3,881	130.66
Former Payer	117	92.76	168	47.954	330	437.48
	N	AGE_t	N	AGE_t	N	AGE_t
All Firms	2,375	23.00	3,044	14.00	3,980	11.00
Payer	1,607	39.70	1,725	41.20	1,523	30.40
Non-Payer	768	6.10	1,319	3.80	2,457	6.60
Never Paid	660	5.20	1,176	3.20	2,155	5.60
Former Payer	107	34.90	143	11.30	301	23.50
	N	$Volatility_t$	N	$Volatility_t$	N	$Volatility_t$
All Firms	2,334	0.021	3,012	0.026	3,941	0.032
Payer	1,602	0.016	1,724	0.017	1,522	0.019
Non-Payer	732	0.036	1,288	0.038	2,419	0.043
Never Paid	626	0.037	1,151	0.039	2,117	0.045
Former Payer	105	0.034	137	0.032	301	0.031
Panel B: Surviving deregulated firms						
	N	E_t/AT_t	N	E_t/AT_t	N	E_t/AT_t
All Firms	3,990	0.067	4,369	0.066	2,278	0.050
Payer	2,359	0.072	2,889	0.071	1,616	0.053
Non-Payer	1,631	0.049	1,480	0.035	662	0.033
Never Paid	1,518	0.050	1,331	0.038	485	0.032
Former Payer	112	0.037	149	0.025	177	0.039
	N	dAT_t/AT_t	N	dAT_t/AT_t	N	dAT_t/AT_t
All Firms	4,627	0.066	4,822	0.067	2,304	0.046
Payer	3,149	0.066	3,305	0.063	1,640	0.047
Non-Payer	1,478	0.066	1,517	0.098	664	0.043
Never Paid	1,364	0.073	1,363	0.109	486	0.044
Former Payer	113	0.006	154	0.019	178	0.031
	N	$Saleg_t$	N	$Saleg_t$	N	$Saleg_t$
All Firms	4,612	0.087	4,804	0.089	2,304	0.059

Payer	3,148	0.074	3,302	0.081	1,641	0.058
Non-Payer	1,464	0.133	1,502	0.136	663	0.058
Never Paid	1,350	0.142	1,349	0.143	485	0.058
Former Payer	113	0.072	153	0.086	178	0.056
	N	MV_t/AT_t	N	MV_t/AT_t	N	MV_t/AT_t
All Firms	3,214	1.052	3,353	1.141	1,526	1.252
Payer	2,325	1.051	2,272	1.124	1,011	1.246
Non-Payer	889	1.078	1,081	1.395	515	1.286
Never Paid	786	1.113	936	1.490	344	1.286
Former Payer	102	0.910	145	0.979	171	1.280
	N	RE_t/BE_t	N	RE_t/BE_t	N	RE_t/BE_t
All Firms	4,973	0.419	4,817	0.453	2,292	0.404
Payer	3,266	0.465	3,300	0.493	1,633	0.433
Non-Payer	1,707	0.306	1,517	0.273	659	0.223
Never Paid	1,589	0.296	1,363	0.257	481	0.210
Former Payer	117	0.392	154	0.340	178	0.229
	N	NYP_t	N	NYP_t	N	NYP_t
All Firms	3,214	0.452	4,148	0.425	5,154	0.567
Payer	2,325	0.595	2,338	0.613	1,808	0.708
Non-Payer	889	0.153	1,810	0.080	3,346	0.177
Never Paid	786	0.148	1,659	0.083	3,028	0.062
Former Payer	102	0.247	151	0.059	317	0.430
	N	MV_t	N	MV_t	N	MV_t
All Firms	3,214	242.23	3,348	330.51	1,526	1,812.62
Payer	2,325	551.08	2,267	741.97	1,011	3,655.20
Non-Payer	889	48.10	1,081	41.41	515	262.78
Never Paid	786	44.78	936	39.62	344	102.90
Former Payer	102	161.57	145	57.02	171	809.35
	N	AT_t	N	AT_t	N	AT_t
All Firms	4,977	147.80	4,823	287.72	2,306	1,878.86
Payer	3,268	435.37	3,305	653.65	1,642	2,702.21
Non-Payer	1,709	16.21	1,518	17.42	664	215.14
Never Paid	1,591	14.22	1,364	15.27	486	86.30
Former Payer	117	92.76	154	48.23	178	582.26
	N	AGE_t	N	AGE_t	N	AGE_t
All Firms	2,375	23.00	2,419	22.50	1,228	52.00
Payer	1,607	39.70	1,667	42.60	873	73.60
Non-Payer	768	6.10	752	7.50	355	24.50
Never Paid	660	5.20	618	6.00	194	20.00
Former Payer	107	34.90	134	11.10	161	34.80
	N	$Volatility_t$	N	$Volatility_t$	N	$Volatility_t$
All Firms	2,334	0.021	2,393	0.022	1,222	0.020
Payer	1,602	0.016	1,666	0.017	873	0.017
Non-Payer	732	0.036	727	0.036	349	0.033
Never Paid	626	0.037	595	0.037	188	0.040
Former Payer	105	0.034	132	0.032	161	0.029

Table 9
Logit regressions to explain deregulated firm decision to pay or to not pay dividends in three periods

This table reports the coefficients of logit regressions explaining the decision of deregulated firms (all firms), payers in year *t-1* (payer), and non-payers in year *t-1* (non-payers) to pay or not to pay dividends in year *t*. The dependent variable, $Payer_t$, takes the value of 1 if a firm pays dividends in year *t* and zero otherwise. The explanatory variables are dAT_t/AT_t, E_t/AT_t, NYP_t, RE_t/BE_t, MV_t/AT_t, *Salegt*, $LAGE_t$ and $LVolatility_t$. The variables E_t, AT_t, *Salegt*, MV_t/AT_t, RE_t, BE_t, NYP_t, $LAGE_t$, and $LVolatility_t$, are earnings before interest but after taxes, total assets, sales growth rate, ratio of market value of assets to book value of assets, retained earnings, book value of equity, firm size relative to that of New York Stock Exchange firms, logarithm of firm age, and logarithm of stock return volatility, respectively. $dAT_t = AT_t - AT_{t-1}$, is the year-to-year asset growth. E_t/AT_t, is a proxy of firm profitability; NYP_t, computed as the percent of NYSE firms with the same or lower market capitalization at the end of a firm's fiscal year, is a proxy of firm size; the growth rate of assets dAT_t/AT_t, ratio of market value of assets to book value of assets MV_t/AT_t, and sales growth rate $Saleg_t$ are proxies of firm growth opportunities; earned equity RE_t/BE_t is measured as the ratio of retained earnings to total book equity. The reported values of the regression coefficients are averaged coefficients from annual regressions in each period. Periods 1, 2 and 3 represent periods of regulation, partial deregulation and complete deregulation respectively. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). The *t*-statistic is computed by dividing average coefficients by their standard error – the time-series standard deviation of the regression coefficient divided by the square root of the number of years in the period. *t*-statistics are in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

		Average Coefficient								
	Period	**Int**	**dAT_t/AT_t**	**E_t/AT_t**	**NYP_t**	**RE_t/BE_t**	**MV_t/AT_t**	**Salegt**	**$LAGE_t$**	**$LVolatility_t$**
Panel A: Regressions using Fama-French (2001) variables										
All Firms	1+2+3	1.487**	-0.723***	14.615***	-3.540	0.580	-0.575***			
		(2.23)	(-3.13)	(15.21)	(-0.63)	(1.59)	(-5.00)			
	1	1.651*	-0.763**	14.964***	-10.650**	1.435	-0.496**			
		(2.25)	(-4.31)	(5.57)	(-3.24)	(1.87)	(-3.21)			
	2	2.917***	-0.491	16.048***	-12.249***	0.225	-0.824***			
		(7.13)	(-0.77)	(41.18)	(-12.22)	(1.68)	(-5.85)			
	3	-0.107	-0.916***	12.834***	12.279***	0.079***	-0.404***			
		(-1.41)	(-16.17)	(25.66)	(5.69)	(9.35)	(-12.85)			
Payer	1+2+3	2.234***	1.225	17.353***	-4.792	2.299**	0.117			
		(3.10)	(1.10)	(4.47)	(-0.84)	(2.73)	(0.47)			
	1	0.471	3.341	20.079**	2.975	2.877	0.399			
		(0.51)	(2.08)	(2.91)	(0.58)	(1.90)	(0.69)			
	2	3.833***	1.330	21.717**	-21.597**	3.208**	0.164			
		(7.58)	(0.95)	(3.98)	(-3.74)	(3.83)	(0.42)			
	3	2.398***	-0.996***	10.263**	4.245*	0.811**	-0.212***			
		(19.95)	(-5.24)	(4.30)	(2.24)	(4.57)	(-4.75)			
Non-Payer	1+2+3	-2.175***	0.824*	9.533***	0.060	0.147	-0.719***			
		(-4.85)	(2.14)	(4.61)	(0.03)	(1.57)	(-3.12)			
	1	-1.336**	0.616	12.570*	0.422	0.383	-1.234**			
		(-3.22)	(2.12)	(2.74)	(0.26)	(1.97)	(-2.96)			

	2	-2.225**	1.787*	5.400***	-3.150	0.041	-0.428			
		(-3.15)	(2.49)	(5.39)	(-1.51)	(1.81)	(-1.31)			
	3	-2.964***	0.069	10.628***	2.907	0.016	-0.495***			
		(-18.41)	(0.31)	(5.41)	(0.79)	(1.82)	(-4.63)			
Panel B: Regressions using Grullon, Paye, Underwood and Weston (2008) variables										
All Firms	1+2+3	-12.586***		11.115***	2.354	0.529	-0.295***	-0.485***	0.449***	-3.230***
		(-12.82)		(10.78)	(0.58)	(1.61)	(-7.07)	(-3.00)	(5.55)	(-13.26)
	1	-14.572***		12.833***	-2.141	1.159	-0.309***	-0.234	0.358***	-3.799***
		(-6.16)		(5.83)	(-0.75)	(1.58)	(-9.85)	(-0.86)	(4.93)	(-7.46)
	2	-11.149***		9.896***	-3.253*	0.317	-0.270**	-0.425	0.683***	-2.810***
		(-28.11)		(28.94)	(-2.50)	(1.39)	(-2.91)	(-1.81)	(18.43)	(-18.77)
	3	-12.039***		10.614***	12.456**	0.111***	-0.305**	-0.794***	0.306**	-3.080***
		(-18.54)		(10.42)	(2.86)	(4.81)	(-4.57)	(-5.59)	(3.72)	(-35.22)
Payer	1+2+3	-11.086***		14.088***	-0.606	2.170**	0.333	1.372	0.413***	-3.191***
		(-6.48)		(3.99)	(-0.11)	(2.58)	(0.90)	(1.38)	(3.77)	(-7.43)
	1	-15.193**		17.073**	6.559	3.083*	-0.209	4.039**	0.295	-4.246**
		(-3.69)		(3.31)	(1.00)	(2.48)	(-0.39)	(3.63)	(1.72)	(-3.47)
	2	-8.051**		17.279**	-16.592**	2.411	1.154	0.490	0.651***	-2.222***
		(-3.23)		(4.37)	(-4.02)	(2.02)	(1.26)	(0.58)	(14.18)	(-7.46)
	3	-10.015***		7.912	8.215	1.017*	0.054	-0.412	0.294**	-3.106***
		(-8.62)		(1.80)	(1.35)	(2.41)	(0.23)	(-1.44)	(4.16)	(-10.09)
Non-Payer	1+2+3	-9.187***		9.360***	-1.148	0.081	-0.613**	-0.189	0.123	-1.807***
		(-7.11)		(5.27)	(-0.22)	(0.66)	(-2.62)	(-1.38)	(1.53)	(-5.61)
	1	-10.295**		11.100***	7.467	0.098	-1.000	-0.153	0.279**	-2.026*
		(-3.25)		(6.86)	(2.02)	(0.28)	(-1.78)	(-0.39)	(2.93)	(-2.35)
	2	-8.965***		4.384***	-3.799	0.116	-0.180	-0.051	0.191*	-1.798***
		(-5.41)		(7.60)	(-1.49)	(1.53)	(-0.87)	(-0.23)	(2.22)	(-5.74)
	3	-8.300***		12.597***	-7.111	0.031	-0.659***	-0.363**	-0.101	-1.596***
		(-8.91)		(5.39)	(-0.55)	(1.02)	(-9.93)	(-3.99)	(-0.99)	(-6.14)

Table 10
Out of sample estimates from logit regressions of the effect of changing firm characteristics and deregulation on percent of firms paying dividends

This table reports the effect of changing firm characteristics induced by economic deregulation on the percent of deregulated firms paying dividends in the periods of partial deregulation (0, 4) and complete deregulation (+1, +5). The period of regulation (-5, -1) is used as the benchmark period for logit regressions for both deregulated firms and control firms. The explanatory variables are Fama and French (2001) variables – NYP_t, (firm size relative to that of New York Stock Exchange firms), MV_t/AT_t (growth opportunity), dAT_t/AT_t (growth rate of assets), E_t/AT_t (profitability), and RE_t/BE_t (firm life-cycle stage), and additional Grullon, Paye, Underwood and Weston (2008) variables – $LAGE_t$ and $LVolatility_t$. AT_t, E_t, RE_t , MV_t/AT_t, BE_t, $LAGE_t$ and $LVolatility_t$ are the firm's total assets, earnings before interest but after tax, retained earnings, market-to-book ratio, book equity, logarithm of firm age and logarithm of standard deviation of stock returns in fiscal year *t*, respectively. NYP_t is measured as the percent of NYSE firms with the same or lower market capitalization at the end of a firm's fiscal year.[24] $dAT_t = AT_t - AT_{t-1}$. The values of expected percent are obtained by applying the average logit regression coefficients for each year of the regulation period to the values of the explanatory variables for each firm in each relative year in the partial and complete deregulation periods, averaging the probability across firms. Actual percent is the percent of payers. I report the results for all deregulated firms using Fama and French (2001) variables in Panel A, the results for surviving deregulated firms using Fama and French (2001) in Panel B, the results for all deregulated firms using and Grullon, Paye, Underwood and Weston (2008) variables in Panel C, and the results for surviving firms using Grullon, Paye, Underwood and Weston (2008) variables in Panel D.

	Regulated Firms					Control Firms					
Relative Year	N	Actual Payer	Expected Payer	Exp-Act	*t*-stat	N	Actual Payer	Expected Payer	Exp-Act	*t*-stat	p value of diff.
Panel A: All deregulated firms, using Fama and French (2001) variables											
0	584	0.697	0.642	-0.055	-3.71	471	0.603	0.596	-0.007	-0.40	0.04
1	640	0.639	0.592	-0.047	-3.20	525	0.552	0.563	0.010	0.58	0.12
2	694	0.598	0.562	-0.036	-2.64	542	0.507	0.524	0.016	0.96	0.02
3	798	0.499	0.494	-0.004	-0.35	603	0.454	0.465	0.010	0.68	0.46
4	876	0.445	0.450	0.005	0.40	652	0.414	0.434	0.020	1.45	0.40
+1	921	0.377	0.442	0.065	4.98	881	0.299	0.337	0.039	3.46	0.13
+2	944	0.362	0.451	0.089	6.79	939	0.274	0.323	0.049	4.45	0.02
+3	1,004	0.337	0.423	0.086	6.87	981	0.242	0.329	0.087	8.39	0.96
+4	1,035	0.311	0.425	0.114	9.32	1,029	0.237	0.315	0.078	7.53	0.03
+5	1,001	0.336	0.447	0.111	8.48	1,029	0.241	0.302	0.061	5.85	0.00
Panel B: Surviving firms, using Fama and French (2001) variables											
0	584	0.697	0.642	-0.055	-3.71	471	0.603	0.596	-0.007	-0.40	0.04
1	618	0.659	0.605	-0.053	-3.58	477	0.600	0.589	-0.010	-0.55	0.07
2	628	0.645	0.597	-0.048	-3.33	457	0.580	0.570	-0.010	-0.52	0.10
3	620	0.624	0.579	-0.045	-2.98	440	0.580	0.542	-0.037	-2.08	0.74
4	595	0.620	0.582	-0.038	-2.45	422	0.571	0.538	-0.033	-1.83	0.82
+1	327	0.673	0.591	-0.082	-3.74	325	0.554	0.513	-0.040	-1.83	0.19
+2	312	0.660	0.622	-0.038	-1.62	298	0.534	0.520	-0.014	-0.59	0.47
+3	302	0.659	0.610	-0.049	-1.97	265	0.509	0.552	0.042	1.75	0.01
+4	286	0.640	0.617	-0.023	-0.92	250	0.532	0.560	0.028	1.03	0.17
+5	273	0.659	0.626	-0.033	-1.26	233	0.549	0.539	-0.011	-0.39	0.56

[24] The increase in the number of firms during the period of partial deregulation is caused by data availability, i.e., for some firms the data become available in later years to allow estimation and comparison.

Panel C: All deregulated firms, using GPUW (2008) variables											
0	402	0.719	0.698	-0.021	-1.29	370	0.659	0.651	-0.008	-0.45	0.62
1	433	0.674	0.658	-0.016	-1.05	384	0.625	0.652	0.027	1.44	0.07
2	463	0.637	0.606	-0.031	-1.96	409	0.553	0.589	0.037	1.99	0.01
3	538	0.532	0.529	-0.002	-0.15	433	0.513	0.557	0.044	2.70	0.03
4	598	0.460	0.458	-0.002	-0.15	490	0.453	0.524	0.071	4.55	0.00
+1	668	0.416	0.458	0.042	3.05	669	0.318	0.407	0.089	6.72	0.02
+2	698	0.403	0.460	0.057	4.30	696	0.309	0.378	0.070	5.20	0.52
+3	703	0.384	0.422	0.038	2.79	721	0.272	0.337	0.065	5.27	0.14
+4	721	0.363	0.420	0.057	4.52	735	0.276	0.359	0.082	6.61	0.15
+5	720	0.383	0.448	0.065	4.79	762	0.273	0.367	0.094	7.73	0.11
Panel D: Surviving firms, using GPUW (2008) variables											
0	402	0.719	0.698	-0.021	-1.29	370	0.659	0.651	-0.008	-0.45	0.62
1	421	0.689	0.667	-0.022	-1.38	360	0.664	0.680	0.016	0.79	0.14
2	422	0.680	0.639	-0.041	-2.57	348	0.629	0.650	0.020	1.02	0.02
3	418	0.663	0.637	-0.026	-1.57	338	0.621	0.639	0.017	0.93	0.08
4	398	0.656	0.615	-0.040	-2.35	329	0.608	0.655	0.047	2.42	0.00
+1	255	0.714	0.690	-0.024	-1.11	259	0.583	0.657	0.074	3.01	0.00
+2	251	0.705	0.726	0.020	0.99	240	0.575	0.646	0.071	2.76	0.12
+3	238	0.710	0.694	-0.016	-0.64	216	0.542	0.623	0.082	3.03	0.01
+4	227	0.705	0.727	0.023	1.01	203	0.581	0.674	0.092	3.24	0.05
+5	225	0.724	0.771	0.046	2.05	189	0.603	0.697	0.094	3.23	0.19

Table 11
Out of sample estimates from logit regressions of the effect of changing firm characteristics and deregulation on percent of firms paying dividends using all Compustat firms as controls

This table reports the effect of changing firm characteristics induced by economic deregulation on the percent of deregulated firms paying dividends in each deregulation industry the periods of partial deregulation (0, 4) and complete deregulation (+1, +5), using all Compustat firms as control firms for each deregulated industry. The period 1971 to 1975 is used as the benchmark period for logit regressions for both deregulated firms and control firms to obtain coefficients. The explanatory variables are Grullon, Paye, Underwood and Weston (2008) variables – NYP_t, (firm size relative to that of New York Stock Exchange firms), MV_t/AT_t (growth opportunity), dAT_t/AT_t (growth rate of assets), E_t/AT_t (profitability), RE_t/BE_t (firm life-cycle stage), $LAGE_t$ (firm age) and $LVolatility_t$ (return volatility). AT_t, E_t, RE_t, MV_t/AT_t, BE_t, $LAGE_t$ and $LVolatility_t$ are the firm's total assets, earnings before interest but after tax, retained earnings, market-to-book ratio, book equity, logarithm of firm age and logarithm of standard deviation of stock returns in fiscal year *t*, respectively. NYP_t is measured as the percent of NYSE firms with the same or lower market capitalization at the end of a firm's fiscal year. $dAT_t = AT_t - AT_{t-1}$. The values of expected percent are obtained by applying the average logit regression coefficients for each year of the regulation period to the values of the explanatory variables for each firm in each relative year in the partial and complete deregulation periods, averaging the probability across firms. Actual percent is the percent of payers. As a robustness check, I report the results using Grullon, Paye, Underwood and Weston (2008) variables in the out of sample estimation.

	Regulated Firms					Control Firms					
Relative Year	N	Actual Payer	Expected Payer	Exp-Act	*t*-stat	N	Actual Payer	Expected Payer	Exp-Act	*t*-stat	p value of diff.
Panel A: Entertainment											
0	39	0.590	0.626	0.036	0.66	2,409	0.635	0.616	-0.018	-2.46	0.36
1	44	0.500	0.605	0.105	1.65	2,434	0.593	0.640	0.047	6.24	0.30
2	45	0.400	0.632	0.232	3.72	2,502	0.537	0.591	0.054	7.20	0.00
3	52	0.288	0.474	0.185	3.68	2,641	0.490	0.549	0.059	8.31	0.01
4	61	0.279	0.487	0.209	4.28	2,802	0.442	0.575	0.133	18.99	0.11
+1	63	0.254	0.415	0.161	3.16	2,833	0.412	0.532	0.120	17.75	0.37
+2	72	0.208	0.363	0.154	3.84	2,946	0.376	0.470	0.093	14.02	0.16
+3	78	0.154	0.270	0.116	2.98	3,100	0.347	0.374	0.027	4.39	0.03
+4	78	0.154	0.301	0.147	4.14	3,087	0.344	0.433	0.089	14.04	0.15
+5	75	0.173	0.345	0.171	4.21	2,989	0.349	0.491	0.142	21.40	0.49
Panel B: Petroleum and Gas											
0	143	0.594	0.648	0.053	1.82	2,338	0.694	0.673	-0.021	-2.88	0.01
1	165	0.521	0.517	-0.004	-0.17	2,430	0.658	0.658	0.000	0.06	0.87
2	186	0.489	0.415	-0.075	-2.93	2,409	0.635	0.616	-0.018	-2.46	0.04
3	250	0.352	0.370	0.018	0.95	2,434	0.593	0.640	0.047	6.24	0.24
4	308	0.276	0.296	0.020	1.21	2,502	0.537	0.591	0.054	7.20	0.13
+1	201	0.318	0.416	0.098	4.40	3,410	0.310	0.395	0.085	13.94	0.62
+2	213	0.319	0.470	0.151	6.56	3,636	0.300	0.424	0.125	20.52	0.31
+3	216	0.329	0.494	0.165	6.90	3,805	0.291	0.407	0.116	19.50	0.06
+4	216	0.310	0.500	0.189	8.25	4,082	0.280	0.381	0.101	17.76	0.00
+5	216	0.333	0.470	0.136	5.71	4,330	0.262	0.374	0.112	20.69	0.34
Panel C: Utilities											
0	101	0.941	0.934	-0.006	-0.35	3,087	0.344	0.433	0.089	14.04	0.01
1	103	0.951	0.938	-0.014	-0.90	2,989	0.349	0.491	0.142	21.40	0.00
2	104	0.923	0.933	0.009	0.43	2,952	0.347	0.432	0.085	13.06	0.03
3	105	0.933	0.927	-0.006	-0.27	3,004	0.341	0.403	0.063	9.56	0.05
4	107	0.935	0.932	-0.003	-0.11	3,168	0.331	0.392	0.061	9.77	0.06
+1	105	0.962	0.875	-0.087	-3.73	3,866	0.233	0.273	0.041	7.74	0.00

+2	107	0.925	0.898	-0.027	-1.28	3,816	0.222	0.297	0.075	14.18	0.00
+3	108	0.907	0.855	-0.053	-1.80	3,546	0.224	0.361	0.136	23.57	0.00
+4	109	0.862	0.903	0.040	1.55	3,322	0.262	0.437	0.174	26.22	0.00
+5	113	0.867	0.957	0.090	3.07	3,177	0.293	0.509	0.216	30.76	0.00
Panel D: Telecommunications											
0	46	0.717	0.810	0.093	1.82	2,430	0.658	0.658	0.000	0.06	0.09
1	49	0.673	0.779	0.106	2.06	2,409	0.635	0.616	-0.018	-2.46	0.02
2	49	0.694	0.782	0.088	1.82	2,434	0.593	0.640	0.047	6.24	0.44
3	53	0.623	0.702	0.079	1.67	2,502	0.537	0.591	0.054	7.20	0.62
4	53	0.566	0.685	0.119	2.48	2,641	0.490	0.549	0.059	8.31	0.24
+1	178	0.298	0.435	0.137	5.32	4,330	0.262	0.374	0.112	20.69	0.37
+2	176	0.295	0.363	0.067	2.59	4,282	0.255	0.332	0.076	14.38	0.74
+3	163	0.270	0.343	0.073	2.76	3,970	0.244	0.318	0.074	13.74	0.97
+4	190	0.263	0.263	0.000	0.01	3,866	0.233	0.273	0.041	7.74	0.10
+5	197	0.274	0.356	0.082	3.16	3,816	0.222	0.297	0.075	14.18	0.76
Panel E: Transportation											
0	73	0.726	0.741	0.015	0.32	2,308	0.688	0.682	-0.006	-0.90	0.65
1	72	0.736	0.794	0.058	1.25	2,268	0.714	0.742	0.028	3.77	0.47
2	79	0.709	0.733	0.024	0.60	2,338	0.694	0.673	-0.021	-2.88	0.26
3	78	0.667	0.701	0.034	0.75	2,430	0.658	0.658	0.000	0.06	0.43
4	69	0.623	0.625	0.001	0.03	2,409	0.635	0.616	-0.018	-2.46	0.66
+1	121	0.364	0.519	0.155	3.97	4,082	0.280	0.381	0.101	17.76	0.17
+2	130	0.362	0.528	0.167	4.52	4,330	0.262	0.374	0.112	20.69	0.15
+3	138	0.326	0.429	0.102	3.00	4,282	0.255	0.332	0.076	14.38	0.45
+4	128	0.305	0.443	0.138	4.17	3,970	0.244	0.318	0.074	13.74	0.06
+5	119	0.328	0.419	0.091	2.41	3,866	0.233	0.273	0.041	7.74	0.19

Table 12
Out of sample estimates from logit regressions of the effect of changing firm characteristics and deregulation on percent of firms paying dividends using eight randomly selected industries as controls

This table reports the effect of changing firm characteristics induced by economic deregulation on the percent of deregulated firms paying dividends in each deregulation industry the periods of partial deregulation (0, 4) and complete deregulation (+1, +5), using eight (seven) randomly selected Fama and French (1997) industries as control firms for each deregulated industry. The period 1971 to 1975 is used as the benchmark period for logit regressions for both deregulated firms and control firms to obtain coefficients. The explanatory variables are Grullon, Paye, Underwood and Weston (2008) variables – NYP_t, (firm size relative to that of New York Stock Exchange firms), MV_t/AT_t (growth opportunity), dAT_t/AT_t (growth rate of assets), E_t/AT_t (profitability), RE_t/BE_t (firm life-cycle stage), $LAGE_t$ (firm age) and $LVolatility_t$ (return volatility). AT_t, E_t, RE_t, MV_t/AT_t, BE_t, $LAGE_t$ and $LVolatility_t$ are the firm's total assets, earnings before interest but after tax, retained earnings, market-to-book ratio, book equity, logarithm of firm age and logarithm of standard deviation of stock returns in fiscal year *t*, respectively. NYP_t is measured as the percent of NYSE firms with the same or lower market capitalization at the end of a firm's fiscal year. $dAT_t = AT_t - AT_{t-1}$. The values of expected percent are obtained by applying the average logit regression coefficients for each year of the regulation period to the values of the explanatory variables for each firm in each relative year in the partial and complete deregulation periods, averaging the probability across firms. Actual percent is the percent of payers. As a robustness check, I report the results using Grullon, Paye, Underwood and Weston (2008) variables in the out of sample estimation.

	Regulated Firms					Control Firms					
Relative Year	N	Actual Payer	Expected Payer	Exp-Act	*t*-stat	N	Actual Payer	Expected Payer	Exp-Act	*t*-stat	p value of diff.
Panel A: Entertainment											
0	39	0.590	0.626	0.036	0.66	391	0.611	0.589	-0.022	-1.16	0.35
1	44	0.500	0.605	0.105	1.65	406	0.552	0.593	0.042	2.21	0.30
2	45	0.400	0.632	0.232	3.72	431	0.478	0.537	0.059	3.11	0.01
3	52	0.288	0.474	0.185	3.68	455	0.453	0.502	0.049	2.80	0.01
4	61	0.279	0.487	0.209	4.28	523	0.363	0.509	0.146	8.85	0.22
+1	63	0.254	0.415	0.161	3.16	557	0.325	0.460	0.135	8.49	0.61
+2	72	0.208	0.363	0.154	3.84	589	0.294	0.380	0.086	5.56	0.14
+3	78	0.154	0.270	0.116	2.98	618	0.249	0.282	0.033	2.30	0.05
+4	78	0.154	0.301	0.147	4.14	606	0.279	0.370	0.091	5.89	0.21
+5	75	0.173	0.345	0.171	4.21	584	0.295	0.427	0.133	8.38	0.41
Panel B: Petroleum and Gas											
0	143	0.594	0.648	0.053	1.82	561	0.697	0.685	-0.012	-0.87	0.03
1	165	0.521	0.517	-0.004	-0.17	579	0.663	0.663	-0.001	-0.04	0.89
2	186	0.489	0.415	-0.075	-2.93	576	0.639	0.617	-0.021	-1.57	0.06
3	250	0.352	0.370	0.018	0.95	588	0.604	0.644	0.040	2.91	0.38
4	308	0.276	0.296	0.020	1.21	604	0.541	0.603	0.061	4.65	0.06
+1	201	0.318	0.416	0.098	4.40	712	0.361	0.440	0.079	6.18	0.50
+2	213	0.319	0.470	0.151	6.56	745	0.354	0.468	0.114	8.80	0.18
+3	216	0.329	0.494	0.165	6.90	763	0.337	0.456	0.119	9.43	0.09
+4	216	0.310	0.500	0.189	8.25	788	0.335	0.442	0.107	8.41	0.00
+5	216	0.333	0.470	0.136	5.71	817	0.337	0.438	0.102	7.86	0.22
Panel C: Utilities											
0	101	0.941	0.934	-0.006	-0.35	346	0.355	0.418	0.063	3.23	0.01
1	103	0.951	0.938	-0.014	-0.90	344	0.340	0.437	0.097	5.00	0.00
2	104	0.923	0.933	0.009	0.43	337	0.344	0.402	0.057	3.41	0.09
3	105	0.933	0.927	-0.006	-0.27	370	0.314	0.359	0.046	2.63	0.07
4	107	0.935	0.932	-0.003	-0.11	391	0.322	0.356	0.034	2.07	0.21

+1	105	0.962	0.875	-0.087	-3.73	516	0.211	0.259	0.048	3.50	0.00
+2	107	0.925	0.898	-0.027	-1.28	541	0.216	0.269	0.053	3.98	0.00
+3	108	0.907	0.855	-0.053	-1.80	512	0.209	0.339	0.130	8.98	0.00
+4	109	0.862	0.903	0.040	1.55	491	0.230	0.382	0.152	9.45	0.00
+5	113	0.867	0.957	0.090	3.07	480	0.256	0.435	0.179	10.29	0.01
Panel D: Telecommunications											
0	46	0.717	0.810	0.093	1.82	591	0.684	0.686	0.003	0.17	0.12
1	49	0.673	0.779	0.106	2.06	568	0.664	0.661	-0.003	-0.17	0.05
2	49	0.694	0.782	0.088	1.82	545	0.631	0.694	0.063	3.82	0.66
3	53	0.623	0.702	0.079	1.67	538	0.591	0.641	0.050	2.89	0.61
4	53	0.566	0.685	0.119	2.48	562	0.564	0.626	0.062	3.82	0.30
+1	178	0.298	0.435	0.137	5.32	771	0.326	0.479	0.153	10.97	0.58
+2	176	0.295	0.363	0.067	2.59	756	0.316	0.413	0.097	7.08	0.34
+3	163	0.270	0.343	0.073	2.76	707	0.298	0.407	0.108	7.79	0.27
+4	190	0.263	0.263	0.000	0.01	661	0.300	0.368	0.069	4.91	0.02
+5	197	0.274	0.356	0.082	3.16	607	0.311	0.435	0.124	8.20	0.17
Panel E: Transportation											
0	73	0.726	0.741	0.015	0.32	598	0.635	0.666	0.030	2.10	0.74
1	72	0.736	0.794	0.058	1.25	584	0.647	0.729	0.082	5.27	0.61
2	79	0.709	0.733	0.024	0.60	593	0.649	0.662	0.013	0.84	0.81
3	78	0.667	0.701	0.034	0.75	627	0.622	0.646	0.024	1.56	0.83
4	69	0.623	0.625	0.001	0.03	626	0.609	0.582	-0.026	-1.66	0.58
+1	121	0.364	0.519	0.155	3.97	1,037	0.285	0.391	0.106	9.94	0.23
+2	130	0.362	0.528	0.167	4.52	1,087	0.275	0.390	0.115	10.73	0.18
+3	138	0.326	0.429	0.102	3.00	1,077	0.259	0.346	0.087	8.33	0.67
+4	128	0.305	0.443	0.138	4.17	977	0.258	0.311	0.053	4.63	0.01
+5	119	0.328	0.419	0.091	2.41	931	0.259	0.264	0.006	0.49	0.03

Table 13
Dividend abandonment versus failure to initiate

This table presents the analysis of whether the declining propensity to pay dividends is caused by dividend abandonment of payers, or failure to initiate by non-payers, or both. We compute the expected number of dividend payers by summing the probabilities of dividend payment for each individual firm for the year +5, the last year of the five-year period of complete deregulation. Probabilities are computed using the average values for the coefficient estimates from Table 10 regressions estimated annually over the period of regulation (-5, -1), the benchmark period. The coefficient estimates are then applied to the individual firm's characteristics. The shortfall in the number of dividend payers in year +5 is the difference between the expected number of payers and the actual number of payers. Short regression presents values estimated using Fama and French (2001) variables while long regression presents values estimated using Grullon, Paye, Underwood and Weston (2008) variables. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). Panel A reports values for control firms and Panel B for deregulated firms.

	Short Specification			Long Specification		
	N	**Shortfall (Exp-Act)**	**%**	**N**	**Shortfall (Exp-Act)**	**%**
Panel A: Control firms						
Yr-1 Payers	149	-11	-7.38	128	3	2.34
Yr-1 Non-Payers	83	8	9.64	61	14	22.95
Post Yr-1 Payers	163	-27	-16.56	131	-13	-9.92
Post Yr-1 Non-payers	634	92	14.51	442	67	15.16
Total	1,029	62	6.03	762	71	9.32
Panel B: Deregulated firms						
Yr-1 Payers	206	-19	-9.22	180	2	1.11
Yr-1 Non-Payers	66	10	15.15	45	8	17.78
Post Yr-1 Payers	213	-19	-8.92	165	-26	-15.76
Post Yr-1 Non-payers	516	139	26.94	330	62	18.79
Total	1,001	111	11.09	720	46	6.39

Table 14
Convergence of determinants of propensity to pay dividends for partial and complete deregulation periods

This table reports the regression results of determinants of paying dividend for regulated and non-regulated firms over the three "snapshot" periods of regulation, partial deregulation and complete deregulation. The dependent variable is *Payer*, which is equal to 1 if a firm pays dividend in year *t* and 0 otherwise. The explanatory variables include NYP_t, MV_t/AT_t, E_t/AT_t, $Saleg_t$, RE_t/BE_t, $LAGE_t$ and $LVolatility_t$, and their interaction terms with a deregulation indicator (*Dereg*), and a regulation indicator (*Reg*). AT_t, E_t, MV_t/AT_t, RE_t, BE_t, $LAGE_t$ and $LVolatility_t$ are total assets, earnings before interest but after tax, market value, retained earnings, book equity, logarithm of firm age and logarithm of standard deviation of stock returns in fiscal year *t*, respectively. NYP_t is measured as the percent of NYSE firms with the same or lower market capitalization at the end of a firm's fiscal year. *Dereg* is equal to 1 if a firm is in one of the five deregulated industries, and 0 otherwise. *Reg* takes the value of 1 if a deregulated firm is in the period of regulation and 0 otherwise. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). The year fixed effects are controlled for in each of the regression specifications and standard errors are robust to clustering at the firm level. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

	Partial Deregulation		**Complete Deregulation**	
Variable	**β**	**p-value**	**β**	**p-value**
Intercept	-10.134***	0.00	-8.160***	0.00
*Intercept*Dereg*	0.124	0.81	-1.850***	0.00
*Intercept*Dereg*Reg*	-2.952***	0.00	-2.952***	0.00
NYP	3.906***	0.00	3.297***	0.00
*NYP *Dereg*	-1.765***	0.00	-1.155***	0.00
*NYP *Dereg*Reg*	0.309	0.31	0.309	0.31
MV/AT	-0.184***	0.00	-0.697***	0.00
*MV/AT*Dereg*	-0.228***	0.00	0.285***	0.00
*MV/AT *Dereg*Reg*	-0.116	0.31	-0.116	0.31
E/AT	6.662***	0.00	8.833***	0.00
*E/AT*Dereg*	1.275	0.16	-0.896	0.29
*E/AT*Dereg*Reg*	6.717***	0.00	6.717***	0.00
Saleg	-0.726***	0.00	-0.593***	0.00
*Saleg*Dereg*	0.174	0.30	0.041	0.79
*Saleg*Dereg*Reg*	0.211	0.22	0.211	0.22
RE/BE	0.191***	0.00	0.079***	0.00
*RE/BE*Dereg*	-0.150***	0.00	-0.037	0.10
*RE/BE*Dereg*Reg*	0.105*	0.06	0.105*	0.06
LAGE	0.556***	0.00	0.406***	0.00
*LAGE *Dereg*	-0.174***	0.00	-0.025	0.54
*LAGE *Dereg*Reg*	-0.189***	0.00	-0.189***	0.00
LVolatility	-2.167***	0.00	-1.849***	0.00
*LVolatility *Dereg*	-0.115	0.41	-0.433***	0.00
*LVolatility *Dereg*Reg*	-0.966***	0.00	-0.966***	0.00
N	24,895		26,389	
Pseudo R^2	0.48		0.48	

Table 15
Convergence of determinants of propensity to pay dividends for all firms, surviving firms, payers and non-payers after deregulation

This table reports the regression results of determinants of paying dividend for all firms, payers in year *t-1* (payer), and non-payers in year *t-1* (non-payers) after deregulation. The dependent variable is *Payer*, which is equal to 1 if a firm pays dividend in year *t* and 0 otherwise. The explanatory variables include NYP_t, MV_t/AT_t, E_t/AT_t, $Saleg_t$, RE_t/BE_t, $LAGE_t$ and $LVolatility_t$, and their interaction terms with a deregulation indicator (*Dereg*), and a regulation indicator (*Reg*). AT_t, E_t, MV_t/AT_t, RE_t, BE_t, $LAGE_t$ and $LVolatility_t$ are total assets, earnings before interest but after tax, market value, retained earnings, book equity, logarithm of firm age and logarithm of standard deviation of stock returns in fiscal year *t*, respectively. NYP_t is measured as the percent of NYSE firms with the same or lower market capitalization at the end of a firm's fiscal year. *Dereg* is equal to 1 if a firm is in one of the five deregulated industries, and 0 otherwise. *Reg* takes the value of 1 if a deregulated firm is in the period of regulation and 0 otherwise. The year fixed effects are controlled for in each of the regression specifications and standard errors are robust to cluster at the firm level. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Panel A: Convergence of determinants for all firms and surviving firms

	All Firms		Surviving Firms	
Variable	**β**	**p-value**	**β**	**p-value**
Intercept	-8.700***	0.00	-8.682***	0.00
*Intercept*Dereg*	-0.348	0.13	-2.537***	0.00
*Intercept*Dereg*Reg*	-5.316***	0.00	-4.645	0.25
NYP	2.173***	0.00	2.185***	0.00
*NYP *Dereg*	0.153*	0.08	-0.368***	0.01
*NYP *Dereg*Reg*	0.106	0.66	0.576	0.65
MV/AT	-0.316***	0.00	-0.316***	0.00
*MV/AT*Dereg*	-0.032	0.30	0.029	0.61
*MV/AT *Dereg*Reg*	-0.076	0.31	0.144	0.55
E/AT	5.798***	0.00	5.802***	0.00
*E/AT*Dereg*	1.793***	0.00	2.041***	0.01
*E/AT*Dereg*Reg*	5.606***	0.00	-4.990	0.55
Saleg	-0.599***	0.00	-0.602***	0.00
*Saleg*Dereg*	-0.091	0.19	0.090	0.39
*Saleg*Dereg*Reg*	0.348***	0.01	0.880	0.25
RE/BE	0.100***	0.00	0.100***	0.00
*RE/BE*Dereg*	-0.070***	0.00	-0.046**	0.02
*RE/BE*Dereg*Reg*	0.089**	0.03	1.382	0.20
LAGE	0.434***	0.00	0.435***	0.00
*LAGE *Dereg*	-0.086***	0.00	0.033	0.39
*LAGE *Dereg*Reg*	-0.025	0.64	-0.326	0.27
LVolatility	-2.289***	0.00	-2.283***	0.00
*LVolatility *Dereg*	-0.141**	0.03	-0.731***	0.00
*LVolatility *Dereg*Reg*	-1.269***	0.00	-1.042	0.31
N	139,334		125,659	
Pseudo R^2	0.46		0.46	

Panel B: Convergence of determinants for dividend payers and non-payers

	Payers		Non-payers	
Variable	**β**	**p-value**	**β**	**p-value**
Intercept	-4.435***	0.00	-16.863	0.87
*Intercept*Dereg*	-1.104*	0.05	-0.773	0.16
*Intercept*Dereg*Reg*	-1.911	0.26	-0.420	0.76
NYP	1.825***	0.00	0.846***	0.00

*NYP *Dereg*	-0.371	0.12	0.572**	0.01
*NYP *Dereg*Reg*	0.876	0.22	0.468	0.39
MV/AT	-0.155***	0.00	-0.152***	0.00
*MV/AT*Dereg*	0.034	0.62	0.129***	0.01
*MV/AT *Dereg*Reg*	-0.351	0.11	-0.559**	0.04
E/AT	6.766***	0.00	5.686***	0.00
*E/AT*Dereg*	0.051	0.96	-1.642**	0.04
*E/AT*Dereg*Reg*	9.888**	0.04	7.864***	0.00
Saleg	-0.291***	0.00	0.045	0.25
*Saleg*Dereg*	-0.034	0.80	-0.200*	0.06
*Saleg*Dereg*Reg*	0.658	0.12	0.215	0.32
RE/BE	0.077***	0.00	0.035***	0.00
*RE/BE*Dereg*	0.005	0.88	-0.034*	0.06
*RE/BE*Dereg*Reg*	1.492**	0.02	0.064	0.34
LAGE	0.366***	0.00	0.084***	0.00
*LAGE *Dereg*	-0.058	0.26	-0.148***	0.00
*LAGE *Dereg*Reg*	-0.281*	0.08	0.205*	0.08
LVolatility	-2.082***	0.00	-1.012***	0.00
*LVolatility *Dereg*	-0.358**	0.04	-0.245	0.11
*LVolatility *Dereg*Reg*	-0.389	0.43	0.124	0.75
N	57,089		81,388	
Pseudo R^2	0.12		0.04	

Table 16
Estimation of effect of regulatory changes on firm dividend payout in "snapshot" periods

This table presents the results of difference analysis of the effect of regulatory changes on dividend payout of deregulated firms in the three "snapshot" periods of regulation, partial deregulation and complete deregulation. The difference estimator is computed as follows. For each deregulated firm, I first compute the mean value during the regulation and post-deregulation periods. I then calculate the difference between the post-deregulation mean and the regulation mean and test whether the difference is significantly different from zero. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). All variables in this table are winsorized at the 1st and 99th percentile. Variable definitions are in Appendix A. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Variable	Deregulated	Control	Dif	*t*-stat dif
Panel A: Period of regulation				
Dividend/Earnings	0.384	0.187	0.197***	25.39
Dividend/Assets	0.020	0.014	0.006***	12.48
Dividend/Sales	0.037	0.011	0.026***	34.90
Dividend/CashFlow	0.193	0.106	0.086***	21.93
Dividend/NetIncome	0.342	0.158	0.184***	24.29
Dividend Yield	0.049	0.029	0.020***	20.15
Panel B: Period of partial deregulation				
Dividend/Earnings	0.373	0.178	0.196***	24.05
Dividend/Assets	0.018	0.013	0.005***	11.13
Dividend/Sales	0.036	0.011	0.025***	34.79
Dividend/CashFlow	0.172	0.095	0.077***	20.41
Dividend/NetIncome	0.321	0.148	0.173***	22.45
Dividend Yield	0.034	0.021	0.013***	17.51
Panel C: Period of complete deregulation				
Dividend/Earnings	0.263	0.102	0.161***	22.86
Dividend/Assets	0.012	0.007	0.006***	14.98
Dividend/Sales	0.024	0.007	0.017***	27.28
Dividend/CashFlow	0.117	0.054	0.063***	20.26
Dividend/NetIncome	0.235	0.085	0.150***	22.38
Dividend Yield	0.013	0.007	0.007***	15.84

Table 17
Difference-in-differences estimation of effect of regulatory changes on firm dividend payout in "snapshot" periods

This table reports the results from the difference-in-differences analysis of growth rates in each measure of dividend payout for deregulated firms compared to control firms in the three "snapshot" periods of regulation, partial deregulation and complete deregulation. The difference-in-differences estimator is computed as follows. For each deregulated firm and control firm, I first compute the mean value for the regulation and post-deregulation periods. I then calculate the difference between the post-deregulation mean and the regulation mean of each firm. The difference is averaged over all deregulated firms and control firms. The difference-in-differences estimator is the difference between the average differences for deregulated firms and the average difference for control firms. Control firms are found through industry matching, i.e., each deregulated industry is matched with a non-regulated industry based on the three fundamental factors in dividend decisions: size, growth opportunity and profitability. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). All variables in the table are winsorized at the 1st percentile and the 99th percentile. Variable definitions are in Appendix A. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

	Partial deregulation-Regulation				**Complete deregulation-Regulation**			
Variable	**Deregulated**	**Control**	**Dif-in-dif**	***t*-stat**	**Deregulated**	**Control**	**Dif-in-dif**	***t*-stat**
Dividend/Earnings	0.046	0.022	0.023**	2.11	0.032	0.010	0.022	1.10
Dividend/Assets	0.001	0.000	0.001	0.91	-0.002	-0.002	-0.001	-0.63
Dividend/Sales	0.002	0.000	0.002*	1.96	-0.006	0.002	-0.008***	-3.37
Dividend/CashFlow	0.012	0.010	0.002	0.42	-0.023	0.002	-0.024***	-2.32
Dividend/NetIncome	0.039	0.026	0.012	1.06	0.030	0.016	0.014	0.70
Dividend Yield	-0.004	-0.001	-0.004***	-3.24	-0.025	-0.011	-0.014***	-6.23

Table 18
Robustness check of difference-in-differences estimation of effect of regulatory changes on firm dividend payout

This table reports the robustness check results from the difference-in-differences analysis of growth rates in each variable for deregulated firms in the three "snapshot" periods of regulation, partial deregulation and complete deregulation. In this estimation, I require that observations should have non-negative values in earnings, cash flow and net income. In this analysis, the period of regulation includes all the years from 1966, the first year of the sample period, to year -1, the year preceding the deregulation initiation year (year 0) for each industry; the period of partial deregulation includes all the years from year 0 to the year preceding year +1, the year in which the last major deregulation initiative was taken in each industry; the complete deregulation period includes all the years from year +1 to 2008, the last year of the sample period. Control firms are found through industry matching, i.e., each deregulated industry is matched with a non-regulated industry based on the three fundamental factors in dividend decisions: size, growth opportunity and profitability. The difference-in-differences estimator is computed as follows. For each deregulated firm and control firm, I first compute the mean value for the regulation and post-deregulation periods. I then calculate the difference between the post-deregulation mean and the regulation mean of each firm. The difference is averaged over all deregulated firms and control firms. The difference-in-differences estimator is the difference between the average differences for deregulated firms and the average difference for control firms. All variables are winsorized at the 1st percentile and the 99th percentile. Variable definitions are in Appendix A. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

	Partial deregulation-Regulation				**Complete deregulation-Regulation**			
Variable	**Deregulated**	**Control**	**Dif-in-dif**	***t*-stat**	**Deregulated**	**Control**	**Dif-in-dif**	***t*-stat**
Dividend/Earnings	0.076	0.055	0.026	1.15	0.138	0.100	0.038	0.85
Dividend/Assets	0.001	0.001	-0.000	-0.60	-0.006	0.001	-0.008***	-3.35
Dividend/Sales	0.001	0.001	0.001	0.67	-0.011	0.008	-0.019***	-5.06
Dividend/CashFlow	0.015	0.026	-0.011	-1.44	-0.033	0.048	-0.081***	-4.61
Dividend/NetIncome	0.082	0.087	-0.005	-0.28	0.129	0.197	-0.068	-1.51
Dividend Yield	-0.007	0.000	-0.008***	-5.66	-0.031	-0.013	-0.018***	-6.26

Table 19
Difference-in-differences estimation of effect of regulatory changes on firm dividend payout, 1966-2008

This table reports the robustness check results from the difference-in-differences analysis of growth rates in each variable for deregulated firms compared to control firms expanded time periods. In this analysis, the period of regulation includes all the years from 1966, the first year of the sample period, to year -1, the year preceding the deregulation initiation year (year 0) for each industry; the period of partial deregulation includes all the years from year 0 to the year preceding year +1, the year in which the last major deregulation initiative was taken in each industry; the complete deregulation period includes all the years from year +1 to 2008, the last year of the sample period. Control firms are found through industry matching, i.e., each deregulated industry is matched with a non-regulated industry based on the three fundamental factors in dividend decisions: size, growth opportunity and profitability. The difference-in-differences estimator is computed as follows. For each deregulated firm and control firm, I first compute the mean value for the regulation and post-deregulation periods. I then calculate the difference between the post-deregulation mean and the regulation mean of each firm. The difference is averaged over all deregulated firms and control firms. The difference-in-differences estimator is the difference between the average differences for deregulated firms and the average difference for control firms. All variables are winsorized at the 1st percentile and the 99th percentile. Variable definitions are in Appendix A. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

	Partial deregulation-Regulation		**Complete deregulation-Regulation**	
Variable	**Difference-in-differences**	***t*-stat dif**	**Difference-in-differences**	***t*-stat dif**
Dividend/Earnings	0.018**	2.12	0.000	0.01
Dividend/Assets	0.001	0.94	-0.001	-0.81
Dividend/Sales	0.003***	2.50	-0.007***	-3.20
Dividend/CashFlow	0.006	1.07	-0.025***	-2.20
Dividend/NetIncome	0.026***	3.07	0.003	0.20
Dividend Yield	-0.005***	-3.13	-0.012***	-4.66

Table 20
Multivariate estimation of deregulation impact on dividend payout

This table reports parameter estimates of panel ordinary least squares (OLS) regressions of dividend payout on the determining factors for the deregulated firms and industry-matched control firms. The dependent variables in the regressions are six measures of dividend payout, namely, dividends scaled by earnings, dividends scaled by t-1 year asset, dividends scaled by t-1 year sales, dividends scaled by cash flow, and dividends scaled by net income, as well as dividend yield. The explanatory variables are leverage (*Bklev*), size (*LNAT*), ownership (*LnCshr*), market-to-book (*MTB*), earnings volatility (*StdOibpd*), stock return volatility (*Volatility*), profitability (*OCF*) and sales growth (*Saleg*), and their interaction terms with a deregulation indicator (*Dereg*), and a regulation indicator (*Reg*). *Dereg* is equal to 1 if a firm is in one of the five deregulated industries, and 0 otherwise. *Reg* takes the value of 1 if a deregulated firm is in the period of regulation and 0 otherwise. The year fixed effects are controlled for in each of the regression specifications and standard errors are robust to cluster at the firm level. All variables in the table are winsorized at the 1st percentile and the 99th percentile. p-value is in parentheses. Variable definitions are in Appendix A. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Variable	Dividend/ Earnings	Dividend/ Assets	Dividend/ Sales	Dividend/ Cash Flow	Dividend/ Net Income	Dividend Yield
Panel A: Period of partial deregulation						
Intercept	0.294***	0.020***	0.012***	0.215***	0.242***	0.047***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Intercept*Dereg*	0.130**	0.004	0.029***	0.022	0.172***	0.001
	(0.011)	(0.300)	(0.000)	(0.447)	(0.000)	(0.898)
*Intercept*Dereg*Reg*	0.482***	0.015***	0.021*	0.293***	0.416***	0.073***
	(0.000)	(0.005)	(0.074)	(0.000)	(0.000)	(0.000)
Bklev	-0.250***	-0.037***	-0.022***	-0.209***	-0.173***	-0.022***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
*Bklev*Dereg*	0.382***	0.028***	0.032***	0.268***	0.285***	0.050***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Bklev*Dereg*Reg*	0.058	-0.011*	-0.001	-0.088*	0.005	0.001
	(0.499)	(0.059)	(0.925)	(0.083)	(0.951)	(0.924)
LNAT	0.023***	0.000	0.000	0.008	0.027***	0.000
	(0.010)	(0.716)	(0.534)	(0.104)	(0.001)	(0.958)
*LNAT*Dereg*	-0.025**	-0.001	-0.002**	-0.013**	-0.032***	-0.003***
	(0.011)	(0.188)	(0.037)	(0.010)	(0.000)	(0.002)
*LNAT *Dereg*Reg*	-0.048***	-0.002**	-0.002	-0.017**	-0.034***	-0.004***
	(0.000)	(0.035)	(0.147)	(0.022)	(0.009)	(0.006)
LnCshr	0.009	0.003***	0.003***	0.010*	0.002	0.003***
	(0.389)	(0.001)	(0.000)	(0.072)	(0.879)	(0.009)
*LnCshr*Dereg*	0.054***	0.000	0.003***	0.020***	0.055***	0.005***
	(0.000)	(0.875)	(0.001)	(0.001)	(0.000)	(0.000)
*LnCshr*Dereg*Reg*	0.015	0.002**	0.006***	0.012	0.014	0.005***
	(0.283)	(0.045)	(0.002)	(0.130)	(0.327)	(0.006)
MTB	0.004	0.001***	0.001***	0.002	-0.001	-0.001***
	(0.248)	(0.000)	(0.000)	(0.300)	(0.705)	(0.000)
*MTB*Dereg*	-0.010***	-0.001***	-0.001***	-0.004**	-0.005**	0.000
	(0.006)	(0.002)	(0.000)	(0.016)	(0.022)	(0.364)
*MTB*Dereg*Reg*	0.007	0.001*	0.003	0.008	0.007	-0.003**
	(0.398)	(0.074)	(0.120)	(0.167)	(0.432)	(0.013)
StdOibdp	-0.195***	-0.011**	-0.012***	-0.109***	-0.143***	-0.022***
	(0.003)	(0.025)	(0.010)	(0.003)	(0.003)	(0.002)
*StdOibdp*Dereg*	0.070	0.006	0.002	0.051	0.035	0.014*
	(0.305)	(0.226)	(0.741)	(0.179)	(0.501)	(0.057)

*StdOibdp*Dereg*Reg*	0.036	-0.001	0.003	0.057	0.337	-0.007
	(0.898)	(0.960)	(0.905)	(0.656)	(0.235)	(0.723)
Volatility	-3.973***	-0.277***	-0.215***	-2.399***	-3.520***	-0.500***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Volatility*Dereg*	-2.462***	-0.001	-0.374***	-0.924**	-2.530***	-0.135**
	(0.000)	(0.987)	(0.000)	(0.010)	(0.000)	(0.049)
*Volatility*Dereg*Reg*	-9.932***	-0.448***	-0.831***	-5.156***	-8.170***	-1.478***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
OCF	0.183**	0.067***	0.044***	0.073	0.144**	0.017**
	(0.012)	(0.000)	(0.000)	(0.128)	(0.040)	(0.024)
*OCF*Dereg*	-0.283***	-0.049***	-0.039***	-0.133***	-0.234***	-0.020**
	(0.000)	(0.000)	(0.000)	(0.009)	(0.002)	(0.014)
*OCF*Dereg*Reg*	-0.346**	0.038**	-0.020	-0.399***	-0.514***	-0.046**
	(0.032)	(0.022)	(0.558)	(0.000)	(0.007)	(0.025)
Saleg	-0.034**	-0.005***	-0.002	-0.042***	-0.059***	-0.005***
	(0.026)	(0.000)	(0.238)	(0.000)	(0.001)	(0.000)
*Saleg*Dereg*	0.026	0.004***	0.002	0.027***	0.031*	0.004***
	(0.129)	(0.000)	(0.268)	(0.003)	(0.091)	(0.001)
*Saleg*Dereg*Reg*	-0.094***	-0.005***	0.003	-0.077***	-0.143***	-0.013***
	(0.001)	(0.004)	(0.446)	(0.000)	(0.002)	(0.000)
R^2	0.25	0.28	0.27	0.31	0.21	0.44
N	17,925	17,925	17,925	17,923	17,925	17,756
Panel B: Period of complete deregulation						
Intercept	0.216***	0.017***	0.007***	0.133***	0.181***	0.037***
	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)
*Intercept*Dereg*	0.209***	0.007**	0.034***	0.104***	0.233***	0.010**
	(0.000)	(0.032)	(0.000)	(0.000)	(0.000)	(0.026)
*Intercept*Dereg*Reg*	0.482***	0.015***	0.021*	0.293***	0.416***	0.073***
	(0.000)	(0.005)	(0.074)	(0.000)	(0.000)	(0.000)
Bklev	-0.147***	-0.028***	-0.020***	-0.115***	-0.137***	-0.009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.008)
*Bklev*Dereg*	0.279***	0.020***	0.031***	0.174***	0.249***	0.036***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Bklev*Dereg*Reg*	0.058	-0.011*	-0.001	-0.088*	0.005	0.001
	(0.499)	(0.059)	(0.925)	(0.083)	(0.951)	(0.924)
LNAT	0.015***	0.000	0.002***	0.009***	0.017***	-0.001***
	(0.001)	(0.196)	(0.000)	(0.003)	(0.000)	(0.007)
*LNAT*Dereg*	-0.017***	-0.001***	-0.003***	-0.014***	-0.022***	-0.002***
	(0.005)	(0.009)	(0.000)	(0.000)	(0.000)	(0.005)
*LNAT *Dereg*Reg*	-0.048***	-0.002**	-0.002	-0.017**	-0.034***	-0.004***
	(0.000)	(0.035)	(0.147)	(0.022)	(0.009)	(0.006)
LnCshr	0.038***	0.003***	0.003***	0.020***	0.032***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*LnCshr*Dereg*	0.025***	-0.001	0.003***	0.011***	0.024***	0.004***
	(0.000)	(0.313)	(0.000)	(0.006)	(0.000)	(0.000)
*LnCshr*Dereg*Reg*	0.015	0.002**	0.006***	0.012	0.014	0.005***
	(0.283)	(0.045)	(0.002)	(0.130)	(0.327)	(0.006)
MTB	-0.000	0.001***	0.001***	0.001	-0.001	-0.001***
	(0.797)	(0.000)	(0.000)	(0.360)	(0.341)	(0.000)
*MTB*Dereg*	-0.006***	-0.001***	-0.001***	-0.003***	-0.004**	-0.000***
	(0.001)	(0.007)	(0.000)	(0.003)	(0.014)	(0.006)
*MTB*Dereg*Reg*	0.007	0.001*	0.003	0.008	0.007	-0.003**

	(0.398)	(0.074)	(0.120)	(0.167)	(0.431)	(0.013)
StdOibdp	-0.051***	-0.000	-0.000	-0.026**	-0.035**	-0.006***
	(0.008)	(0.885)	(0.813)	(0.024)	(0.032)	(0.001)
*StdOibdp*Dereg*	-0.074***	-0.005**	-0.010***	-0.032**	-0.073***	-0.002
	(0.007)	(0.018)	(0.000)	(0.038)	(0.003)	(0.423)
*StdOibdp*Dereg*Reg*	0.036	-0.001	0.003	0.057	0.337	-0.007
	(0.898)	(0.960)	(0.905)	(0.656)	(0.235)	(0.723)
Volatility	-3.286***	-0.213***	-0.144***	-1.923***	-2.846***	-0.400***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Volatility*Dereg*	-3.148***	-0.064**	-0.445***	-1.400***	-3.203***	-0.235***
	(0.000)	(0.031)	(0.000)	(0.000)	(0.000)	(0.000)
*Volatility*Dereg*Reg*	-9.932***	-0.448***	-0.831***	-5.156***	-8.170***	-1.478***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
OCF	0.142***	0.030***	0.023***	0.091***	0.110***	0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*OCF*Dereg*	-0.241***	-0.013***	-0.019***	-0.152***	-0.200***	-0.013***
	(0.000)	(0.005)	(0.001)	(0.000)	(0.000)	(0.000)
*OCF*Dereg*Reg*	-0.346**	0.038**	-0.020	-0.399***	-0.514***	-0.046**
	(0.032)	(0.021)	(0.558)	(0.000)	(0.007)	(0.025)
Saleg	-0.009*	-0.001***	-0.001*	-0.013***	-0.020***	-0.001**
	(0.073)	(0.000)	(0.059)	(0.000)	(0.000)	(0.032)
*Saleg*Dereg*	0.001	0.001	0.001	-0.002	-0.009	0.000
	(0.926)	(0.174)	(0.243)	(0.659)	(0.215)	(0.571)
*Saleg*Dereg*Reg*	-0.094***	-0.005***	0.003	-0.077***	-0.143***	-0.013***
	(0.001)	(0.004)	(0.446)	(0.000)	(0.002)	(0.000)
R^2	0.27	0.27	0.28	0.32	0.23	0.45
N	18,592	18,592	18,592	18,591	18,592	18,433
Panel C: Surviving firms: period of partial deregulation						
Intercept	0.296***	0.020***	0.012***	0.215***	0.243***	0.047***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Intercept*Dereg*	0.363***	0.018***	0.055***	0.181***	0.442***	0.020***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.009)
*Intercept*Dereg*Reg*	0.247***	0.001	-0.005	0.133**	0.144	0.054***
	(0.006)	(0.870)	(0.640)	(0.015)	(0.128)	(0.000)
Bklev	-0.250***	-0.037***	-0.022***	-0.210***	-0.173***	-0.022***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
*Bklev*Dereg*	0.331***	0.016***	0.017**	0.201***	0.203**	0.031***
	(0.000)	(0.002)	(0.033)	(0.000)	(0.013)	(0.000)
*Bklev*Dereg*Reg*	0.109	0.002	0.014	-0.021	0.088	0.020**
	(0.252)	(0.652)	(0.203)	(0.688)	(0.359)	(0.042)
LNAT	0.023***	0.000	0.000	0.008	0.027***	0.000
	(0.010)	(0.708)	(0.533)	(0.104)	(0.001)	(0.972)
*LNAT*Dereg*	-0.028**	-0.002***	-0.003***	-0.019***	-0.036***	-0.004***
	(0.030)	(0.007)	(0.002)	(0.003)	(0.002)	(0.002)
*LNAT *Dereg*Reg*	-0.046***	-0.000	-0.001	-0.011	-0.030**	-0.004**
	(0.001)	(0.589)	(0.744)	(0.149)	(0.025)	(0.015)
LnCshr	0.008	0.002***	0.003***	0.010*	0.001	0.003**
	(0.417)	(0.001)	(0.000)	(0.081)	(0.912)	(0.011)
*LnCshr*Dereg*	0.042***	0.001	0.004***	0.023***	0.042***	0.006***

	(0.007)	(0.237)	(0.003)	(0.005)	(0.006)	(0.000)
*LnCshr*Dereg*Reg*	0.027*	0.001	0.005***	0.010	0.027*	0.004**
	(0.079)	(0.307)	(0.009)	(0.217)	(0.082)	(0.012)
MTB	0.003	0.001***	0.001***	0.001	-0.001	-0.002***
	(0.288)	(0.000)	(0.000)	(0.344)	(0.604)	(0.000)
*MTB*Dereg*	-0.006	-0.001***	-0.001**	-0.002	-0.003	0.000
	(0.163)	(0.004)	(0.033)	(0.244)	(0.302)	(0.762)
*MTB*Dereg*Reg*	0.004	0.001*	0.002	0.007	0.005	-0.002**
	(0.681)	(0.062)	(0.195)	(0.254)	(0.562)	(0.025)
StdOibdp	-0.211***	-0.012**	-0.012**	-0.116***	-0.159***	-0.025***
	(0.004)	(0.032)	(0.014)	(0.005)	(0.003)	(0.002)
*StdOibdp*Dereg*	-0.228	-0.006	-0.032*	-0.114	-0.270	-0.003
	(0.209)	(0.519)	(0.054)	(0.197)	(0.112)	(0.839)
*StdOibdp*Dereg*Reg*	0.350	0.013	0.037	0.230*	0.656**	0.013
	(0.196)	(0.405)	(0.141)	(0.074)	(0.028)	(0.544)
Volatility	-3.975***	-0.277***	-0.215***	-2.399***	-3.523***	-0.501***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Volatility*Dereg*	-6.579***	-0.188***	-0.760***	-3.131***	-7.025***	-0.463***
	(0.000)	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)
*Volatility*Dereg*Reg*	-5.813***	-0.260***	-0.445**	-2.948***	-3.672**	-1.149***
	(0.001)	(0.002)	(0.012)	(0.001)	(0.020)	(0.000)
OCF	0.186**	0.067***	0.044***	0.073	0.147**	0.017**
	(0.011)	(0.000)	(0.000)	(0.125)	(0.039)	(0.021)
*OCF*Dereg*	-0.682***	-0.032***	-0.059***	-0.390***	-0.631***	-0.031**
	(0.000)	(0.008)	(0.000)	(0.000)	(0.000)	(0.012)
*OCF*Dereg*Reg*	0.050	0.020	-0.000	-0.144	-0.120	-0.036*
	(0.783)	(0.214)	(0.992)	(0.227)	(0.573)	(0.092)
Saleg	-0.032**	-0.005***	-0.001	-0.041***	-0.058***	-0.004***
	(0.039)	(0.000)	(0.268)	(0.000)	(0.001)	(0.000)
*Saleg*Dereg*	0.022	0.002	0.001	0.012	0.015	0.002
	(0.340)	(0.135)	(0.764)	(0.281)	(0.505)	(0.256)
*Saleg*Dereg*Reg*	-0.092***	-0.003*	0.004	-0.062***	-0.129***	-0.011***
	(0.004)	(0.096)	(0.331)	(0.006)	(0.007)	(0.003)
R^2	0.27	0.37	0.35	0.33	0.23	0.46
N	7,526	7,526	7,526	7,525	7,526	7,413
Panel D: Surviving firms: period of complete deregulation						
Intercept	0.296***	0.016***	0.006**	0.185***	0.236***	0.050***
	(0.000)	(0.000)	(0.033)	(0.000)	(0.000)	(0.000)
*Intercept*Dereg*	0.363***	0.022***	0.061***	0.211***	0.450***	0.017**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.026)
*Intercept*Dereg*Reg*	0.247***	0.001	-0.005	0.133**	0.144	0.054***
	(0.006)	(0.870)	(0.640)	(0.015)	(0.128)	(0.000)
Bklev	-0.225***	-0.033***	-0.023***	-0.176***	-0.200***	-0.017***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
*Bklev*Dereg*	0.306***	0.011**	0.018**	0.167***	0.229***	0.025***

	(0.000)	(0.020)	(0.026)	(0.000)	(0.004)	(0.000)
*Bklev*Dereg*Reg*	0.109	0.002	0.014	-0.021	0.088	0.020**
	(0.252)	(0.652)	(0.203)	(0.688)	(0.359)	(0.042)
LNAT	0.013*	-0.000	0.001**	0.006*	0.019***	-0.002***
	(0.053)	(0.852)	(0.027)	(0.097)	(0.002)	(0.001)
*LNAT*Dereg*	-0.018	-0.002***	-0.004***	-0.018***	-0.028***	-0.001
	(0.113)	(0.006)	(0.000)	(0.002)	(0.006)	(0.151)
*LNAT *Dereg*Reg*	-0.046***	-0.000	-0.001	-0.011	-0.030**	-0.004**
	(0.001)	(0.590)	(0.744)	(0.149)	(0.025)	(0.015)
LnCshr	0.036***	0.004***	0.004***	0.021***	0.028***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*LnCshr*Dereg*	0.015	-0.000	0.003**	0.012	0.015	0.004***
	(0.290)	(0.844)	(0.017)	(0.111)	(0.244)	(0.001)
*LnCshr*Dereg*Reg*	0.027*	0.001	0.005***	0.010	0.027*	0.004**
	(0.079)	(0.307)	(0.009)	(0.217)	(0.082)	(0.012)
MTB	0.002	0.002***	0.002***	0.004**	0.000	-0.002***
	(0.435)	(0.000)	(0.000)	(0.035)	(0.938)	(0.000)
*MTB*Dereg*	-0.005	-0.001***	-0.002***	-0.005**	-0.004	0.000
	(0.238)	(0.001)	(0.005)	(0.031)	(0.298)	(0.579)
*MTB*Dereg*Reg*	0.004	0.001*	0.002	0.007	0.005	-0.002**
	(0.681)	(0.062)	(0.195)	(0.254)	(0.562)	(0.025)
StdOibdp	-0.174***	-0.005	-0.008*	-0.080**	-0.115**	-0.019***
	(0.008)	(0.294)	(0.060)	(0.022)	(0.014)	(0.004)
*StdOibdp*Dereg*	-0.265	-0.014	-0.036**	-0.150*	-0.314*	-0.009
	(0.137)	(0.139)	(0.028)	(0.082)	(0.061)	(0.574)
*StdOibdp*Dereg*Reg*	0.350	0.013	0.037	0.230*	0.656**	0.013
	(0.196)	(0.405)	(0.141)	(0.074)	(0.028)	(0.544)
Volatility	-4.385***	-0.259***	-0.186***	-2.510***	-3.642***	-0.510***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Volatility*Dereg*	-6.170***	-0.207***	-0.790***	-3.020***	-6.905***	-0.454***
	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
*Volatility*Dereg*Reg*	-5.813***	-0.260***	-0.445**	-2.948***	-3.672**	-1.149***
	(0.001)	(0.002)	(0.012)	(0.001)	(0.020)	(0.000)
OCF	0.179**	0.068***	0.045***	0.095*	0.129*	0.018***
	(0.017)	(0.000)	(0.000)	(0.069)	(0.062)	(0.010)
*OCF*Dereg*	-0.675***	-0.033***	-0.060***	-0.411***	-0.613***	-0.032***
	(0.000)	(0.005)	(0.000)	(0.000)	(0.000)	(0.008)
*OCF*Dereg*Reg*	0.050	0.020	-0.000	-0.144	-0.120	-0.036*
	(0.783)	(0.214)	(0.992)	(0.227)	(0.573)	(0.092)
Saleg	0.002	-0.003**	-0.000	-0.024**	-0.045***	-0.001
	(0.930)	(0.011)	(0.842)	(0.020)	(0.006)	(0.449)
*Saleg*Dereg*	-0.012	0.000	-0.001	-0.005	0.003	-0.001
	(0.631)	(0.774)	(0.829)	(0.656)	(0.908)	(0.437)
*Saleg*Dereg*Reg*	-0.092***	-0.003*	0.004	-0.062***	-0.129***	-0.011***
	(0.004)	(0.096)	(0.331)	(0.006)	(0.007)	(0.003)

R^2	0.27	0.38	0.34	0.33	0.24	0.48
N	6,956	6,956	6,956	6,956	6,956	6,860

Table 21
Robustness check on multivariate estimation of deregulation impact on dividend payout: excluding observations with negative earnings, net income or cash flow

This table reports parameter estimates of panel ordinary least squares (OLS) regressions of dividend payout on the determining factors for the deregulated firms and industry-matched control firms with non-negative earnings, net income and cash flow. The dependent variables in the regressions are six measures of dividend payout, namely, dividends scaled by earnings, dividends scaled by t-1 year asset, dividends scaled by t-1 year sales, dividends scaled by cash flow, and dividends scaled by net income, as well as dividend yield. The explanatory variables are leverage (*Bklev*), size (*LNAT*), ownership (*LnCshr*), market-to-book (*MTB*), earnings volatility (*StdOibpd*), stock return volatility (*Volatility*), profitability (*OCF*) and sales growth (*Saleg*), and their interaction terms with a deregulation indicator (*Dereg*), and a regulation indicator (*Reg*). *Dereg* is equal to 1 if a firm is in one of the five deregulated industries, and 0 otherwise. *Reg* takes the value of 1 if a deregulated firm is in the period of regulation and 0 otherwise. The year fixed effects are controlled for in each of the regression specifications and standard errors are robust to cluster at the firm level. All variables in the table are winsorized at the 1st percentile and the 99th percentile. p-value is in parentheses. Variable definitions are in Appendix A. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Variable	Dividend/ Earnings	Dividend/ Assets	Dividend/ Sales	Dividend/ Cash Flow	Dividend/ Net Income	Dividend Yield
Panel A: Period of partial deregulation						
Intercept	0.297***	0.020***	0.012***	0.223***	0.279***	0.047***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Intercept*Dereg*	0.117**	0.004	0.029***	0.013	0.123**	0.001
	(0.025)	(0.300)	(0.000)	(0.658)	(0.014)	(0.898)
*Intercept*Dereg*Reg*	0.482***	0.015***	0.021*	0.292***	0.468***	0.073***
	(0.000)	(0.005)	(0.074)	(0.000)	(0.000)	(0.000)
Bklev	-0.256***	-0.037***	-0.022***	-0.214***	-0.154***	-0.022***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.000)
*Bklev*Dereg*	0.409***	0.028***	0.032***	0.275***	0.304***	0.050***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Bklev*Dereg*Reg*	0.021	-0.011*	-0.001	-0.089*	-0.045	0.001
	(0.806)	(0.059)	(0.925)	(0.081)	(0.608)	(0.924)
LNAT	0.028***	0.000	0.000	0.008*	0.033***	0.000
	(0.002)	(0.716)	(0.534)	(0.096)	(0.000)	(0.958)
*LNAT*Dereg*	-0.026***	-0.001	-0.002**	-0.013**	-0.032***	-0.003***
	(0.010)	(0.188)	(0.037)	(0.013)	(0.001)	(0.002)
*LNAT *Dereg*Reg*	-0.047***	-0.002**	-0.002	-0.016**	-0.037***	-0.004***
	(0.001)	(0.035)	(0.147)	(0.028)	(0.008)	(0.006)
LnCshr	0.005	0.003***	0.003***	0.010*	-0.003	0.003***
	(0.613)	(0.001)	(0.000)	(0.096)	(0.771)	(0.009)
*LnCshr*Dereg*	0.058***	0.000	0.003***	0.021***	0.062***	0.005***
	(0.000)	(0.875)	(0.001)	(0.001)	(0.000)	(0.000)
*LnCshr*Dereg*Reg*	0.010	0.002**	0.006***	0.011	0.007	0.005***
	(0.519)	(0.045)	(0.002)	(0.166)	(0.633)	(0.006)
MTB	0.003	0.001***	0.001***	0.002	-0.001	-0.001***
	(0.390)	(0.000)	(0.000)	(0.316)	(0.546)	(0.000)
*MTB*Dereg*	-0.009**	-0.001***	-0.001***	-0.004**	-0.005**	0.000
	(0.012)	(0.002)	(0.000)	(0.018)	(0.031)	(0.364)

*MTB*Dereg*Reg*	0.009	0.001*	0.003	0.009	0.009	-0.003**
	(0.339)	(0.074)	(0.120)	(0.159)	(0.353)	(0.013)
StdOibdp	-0.179***	-0.011**	-0.012***	-0.108***	-0.149***	-0.022***
	(0.003)	(0.025)	(0.010)	(0.003)	(0.002)	(0.002)
*StdOibdp*Dereg*	0.052	0.006	0.002	0.051	0.035	0.014*
	(0.410)	(0.226)	(0.741)	(0.181)	(0.494)	(0.057)
*StdOibdp*Dereg*Reg*	0.048	-0.001	0.003	0.058	0.356	-0.007
	(0.858)	(0.960)	(0.905)	(0.651)	(0.191)	(0.723)
Volatility	-3.850***	-0.277***	-0.215***	-2.443***	-3.753***	-0.500***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Volatility*Dereg*	-2.610***	-0.001	-0.374***	-0.875**	-2.340***	-0.135**
	(0.000)	(0.987)	(0.000)	(0.016)	(0.000)	(0.049)
*Volatility*Dereg*Reg*	-9.563***	-0.448***	-0.831***	-5.144***	-8.202***	-1.478***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
OCF	0.117	0.067***	0.044***	0.044	-0.042	0.017**
	(0.130)	(0.000)	(0.000)	(0.378)	(0.579)	(0.024)
*OCF*Dereg*	-0.231***	-0.049***	-0.039***	-0.113**	-0.108	-0.020**
	(0.006)	(0.000)	(0.000)	(0.032)	(0.190)	(0.014)
*OCF*Dereg*Reg*	-0.374**	0.038**	-0.020	-0.398***	-0.660***	-0.046**
	(0.024)	(0.022)	(0.558)	(0.001)	(0.001)	(0.025)
Saleg	-0.037**	-0.005***	-0.002	-0.045***	-0.088***	-0.005***
	(0.017)	(0.000)	(0.238)	(0.000)	(0.000)	(0.000)
*Saleg*Dereg*	0.024	0.004***	0.002	0.029***	0.047**	0.004***
	(0.152)	(0.000)	(0.268)	(0.002)	(0.022)	(0.001)
*Saleg*Dereg*Reg*	-0.107***	-0.005***	0.003	-0.078***	-0.158***	-0.013***
	(0.001)	(0.004)	(0.446)	(0.001)	(0.003)	(0.000)
R^2	0.28	0.28	0.27	0.31	0.26	0.44
N	17,495	17,925	17,925	17,739	17,243	17,756
Panel B: Period of complete deregulation						
Intercept	0.212***	0.017***	0.007***	0.134***	0.175***	0.037***
	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)
*Intercept*Dereg*	0.203***	0.007**	0.034***	0.102***	0.227***	0.010**
	(0.000)	(0.032)	(0.000)	(0.000)	(0.000)	(0.026)
*Intercept*Dereg*Reg*	0.482***	0.015***	0.021*	0.292***	0.468***	0.073***
	(0.000)	(0.005)	(0.074)	(0.000)	(0.000)	(0.000)
Bklev	-0.129***	-0.028***	-0.020***	-0.111***	-0.075**	-0.009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.032)	(0.008)
*Bklev*Dereg*	0.282***	0.020***	0.031***	0.172***	0.225***	0.036***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Bklev*Dereg*Reg*	0.021	-0.011*	-0.001	-0.089*	-0.045	0.001
	(0.806)	(0.059)	(0.925)	(0.081)	(0.608)	(0.924)
LNAT	0.019***	0.000	0.002***	0.009***	0.023***	-0.001***
	(0.000)	(0.196)	(0.000)	(0.003)	(0.000)	(0.007)
*LNAT*Dereg*	-0.017***	-0.001***	-0.003***	-0.014***	-0.022***	-0.002***
	(0.009)	(0.009)	(0.000)	(0.000)	(0.000)	(0.005)

*LNAT *Dereg*Reg*	-0.047***	-0.002**	-0.002	-0.016**	-0.037***	-0.004***
	(0.001)	(0.035)	(0.147)	(0.028)	(0.008)	(0.006)
LnCshr	0.037***	0.003***	0.003***	0.020***	0.030***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*LnCshr*Dereg*	0.027***	-0.001	0.003***	0.011***	0.028***	0.004***
	(0.000)	(0.313)	(0.000)	(0.005)	(0.000)	(0.000)
*LnCshr*Dereg*Reg*	0.010	0.002**	0.006***	0.011	0.007	0.005***
	(0.519)	(0.045)	(0.002)	(0.166)	(0.633)	(0.006)
MTB	-0.001	0.001***	0.001***	0.001	-0.002*	-0.001***
	(0.538)	(0.000)	(0.000)	(0.340)	(0.080)	(0.000)
*MTB*Dereg*	-0.005***	-0.001***	-0.001***	-0.003***	-0.004**	-0.000***
	(0.008)	(0.007)	(0.000)	(0.003)	(0.041)	(0.006)
*MTB*Dereg*Reg*	0.009	0.001*	0.003	0.009	0.009	-0.003**
	(0.338)	(0.074)	(0.120)	(0.159)	(0.353)	(0.013)
StdOibdp	-0.056***	-0.000	-0.000	-0.027**	-0.048***	-0.006***
	(0.004)	(0.885)	(0.813)	(0.019)	(0.005)	(0.001)
*StdOibdp*Dereg*	-0.071**	-0.005**	-0.010***	-0.030**	-0.066***	-0.002
	(0.011)	(0.018)	(0.000)	(0.047)	(0.010)	(0.423)
*StdOibdp*Dereg*Reg*	0.048	-0.001	0.003	0.058	0.356	-0.007
	(0.858)	(0.960)	(0.905)	(0.651)	(0.190)	(0.723)
Volatility	-3.291***	-0.213***	-0.144***	-1.940***	-2.993***	-0.400***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Volatility*Dereg*	-3.168***	-0.064**	-0.445***	-1.377***	-3.100***	-0.235***
	(0.000)	(0.031)	(0.000)	(0.000)	(0.000)	(0.000)
*Volatility*Dereg*Reg*	-9.563***	-0.448***	-0.831***	-5.144***	-8.202***	-1.478***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
OCF	0.130***	0.030***	0.023***	0.088***	0.068***	0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.006)	(0.000)
*OCF*Dereg*	-0.245***	-0.013***	-0.019***	-0.158***	-0.217***	-0.013***
	(0.000)	(0.005)	(0.001)	(0.000)	(0.000)	(0.000)
*OCF*Dereg*Reg*	-0.374**	0.038**	-0.020	-0.398***	-0.660***	-0.046**
	(0.024)	(0.021)	(0.558)	(0.001)	(0.001)	(0.025)
Saleg	-0.011**	-0.001***	-0.001*	-0.013***	-0.025***	-0.001**
	(0.039)	(0.000)	(0.059)	(0.000)	(0.000)	(0.032)
*Saleg*Dereg*	-0.002	0.001	0.001	-0.002	-0.016**	0.000
	(0.854)	(0.174)	(0.243)	(0.565)	(0.030)	(0.571)
*Saleg*Dereg*Reg*	-0.107***	-0.005***	0.003	-0.078***	-0.158***	-0.013***
	(0.001)	(0.004)	(0.446)	(0.001)	(0.003)	(0.000)
R^2	0.29	0.27	0.28	0.32	0.28	0.45
N	18,145	18,592	18,592	18,404	17,885	18,433

Table 22
Robustness check on multivariate estimation of deregulation impact on dividend payout: using all Compustat firms from 1966 to 2008

This table reports parameter estimates of panel ordinary least squares (OLS) regressions of dividend payout on the determining factors for the deregulated firms and all non-regulated Compustat firms. The dependent variables in the regressions are six measures of dividend payout, namely, dividends scaled by earnings, dividends scaled by t-1 year asset, dividends scaled by t-1 year sales, dividends scaled by cash flow, dividends scaled by net income, and dividend yield. The explanatory variables are leverage (*Bklev*), size (*LNAT*), ownership (*LnCshr*), market-to-book (*MTB*), earnings volatility (*StdOibpd*), stock return volatility (*Volatility*), profitability (*OCF*) and sales growth (*Saleg*), and their interaction terms with a deregulation indicator (*Dereg*), and a regulation indicator (*Reg*). *Dereg* is equal to 1 if a firm is in one of the five deregulated industries, and 0 otherwise. *Reg* takes the value of 1 if a deregulated firm is in the period of regulation and 0 otherwise. The year fixed effects are controlled for in each of the regression specifications and standard errors are robust to cluster at the firm level. All variables in the table are winsorized at the 1st percentile and the 99th percentile. p-value is in parentheses. Variable definitions are in Appendix A. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Variable	Dividend/ Earnings	Dividend/ Assets	Dividend/ Sales	Dividend/ Cash Flow	Dividend/ Net Income	Dividend Yield
Panel A: Panel A: All Compustat firms						
Intercept	0.244***	0.017***	0.010***	0.160***	0.235***	0.031***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Intercept*Dereg*	0.145***	0.005**	0.027***	0.052***	0.149***	0.001
	(0.000)	(0.038)	(0.000)	(0.007)	(0.000)	(0.628)
*Intercept*Dereg*Reg*	0.525***	0.015***	0.022**	0.333***	0.473***	0.104***
	(0.000)	(0.000)	(0.041)	(0.000)	(0.000)	(0.000)
Bklev	-0.062***	-0.017***	-0.012***	-0.068***	-0.057***	-0.002*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.090)
*Bklev*Dereg*	0.160***	0.007***	0.017***	0.102***	0.145***	0.013***
	(0.000)	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)
*Bklev*Dereg*Reg*	0.119	-0.010**	0.015	-0.053	0.021	0.026***
	(0.118)	(0.030)	(0.201)	(0.238)	(0.784)	(0.004)
LNAT	0.007***	-0.000	0.001***	0.002**	0.005***	-0.001***
	(0.000)	(0.107)	(0.000)	(0.022)	(0.000)	(0.000)
*LNAT*Dereg*	-0.004	-0.000	-0.001***	-0.004*	-0.007	0.000
	(0.379)	(0.215)	(0.010)	(0.088)	(0.112)	(0.269)
*LNAT *Dereg*Reg*	-0.057***	-0.002***	-0.003*	-0.023***	-0.036***	-0.009***
	(0.000)	(0.008)	(0.071)	(0.000)	(0.001)	(0.000)
LnCshr	0.033***	0.003***	0.002***	0.019***	0.031***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*LnCshr*Dereg*	0.026***	-0.000	0.003***	0.008***	0.023***	0.002***
	(0.000)	(0.711)	(0.000)	(0.001)	(0.000)	(0.000)
*LnCshr*Dereg*Reg*	0.021*	0.002**	0.007***	0.016**	0.006	0.009***
	(0.087)	(0.015)	(0.000)	(0.018)	(0.617)	(0.000)
MTB	-0.001*	0.001***	0.001***	0.000	-0.001***	-0.001***
	(0.055)	(0.000)	(0.000)	(0.891)	(0.006)	(0.000)
*MTB*Dereg*	-0.004***	-0.000***	-0.001***	-0.002**	-0.004***	-0.000
	(0.003)	(0.001)	(0.000)	(0.018)	(0.002)	(0.331)
*MTB*Dereg*Reg*	0.002	0.001*	0.003*	0.006	0.003	-0.005***

	(0.774)	(0.051)	(0.076)	(0.237)	(0.724)	(0.000)
StdOibdp	-0.060***	-0.002***	-0.002***	-0.034***	-0.049***	-0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*StdOibdp*Dereg*	-0.062***	-0.003**	-0.008***	-0.022**	-0.057***	-0.003**
	(0.002)	(0.011)	(0.000)	(0.032)	(0.002)	(0.035)
*StdOibdp*Dereg*Reg*	-0.014	-0.002	0.016	0.055	0.300	-0.015
	(0.962)	(0.902)	(0.431)	(0.661)	(0.305)	(0.528)
Volatility	-3.278***	-0.196***	-0.148***	-1.956***	-3.152***	-0.330***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Volatility*Dereg*	-2.772***	-0.069***	-0.389***	-1.085***	-2.587***	-0.135***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
*Volatility*Dereg*Reg*	-9.691***	-0.412***	-0.925***	-5.256***	-8.009***	-1.734***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
OCF	0.063***	0.021***	0.014***	0.038***	0.048***	0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*OCF*Dereg*	-0.156***	-0.003	-0.007*	-0.091***	-0.129***	-0.007***
	(0.000)	(0.296)	(0.100)	(0.000)	(0.000)	(0.005)
*OCF*Dereg*Reg*	-0.395***	0.036**	-0.050	-0.458***	-0.639***	-0.072***
	(0.009)	(0.012)	(0.118)	(0.000)	(0.000)	(0.000)
Saleg	-0.019***	-0.002***	-0.001***	-0.021***	-0.028***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Saleg*Dereg*	0.008	0.001**	0.001	0.006**	-0.001	0.000
	(0.275)	(0.026)	(0.261)	(0.045)	(0.799)	(0.890)
*Saleg*Dereg*Reg*	-0.051**	-0.005***	0.004	-0.077***	-0.137***	-0.005**
	(0.014)	(0.001)	(0.284)	(0.000)	(0.000)	(0.031)
R^2	0.19	0.24	0.28	0.22	0.15	0.37
N	93,103	93,109	93,109	93,099	93,106	92,399
Panel B: Firms with non-negative earnings, net income and cash flow						
Intercept	0.249***	0.017***	0.010***	0.162***	0.254***	0.031***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Intercept*Dereg*	0.134***	0.005**	0.027***	0.050**	0.128***	0.001
	(0.000)	(0.038)	(0.000)	(0.011)	(0.000)	(0.628)
*Intercept*Dereg*Reg*	0.528***	0.015***	0.022**	0.331***	0.504***	0.104***
	(0.000)	(0.000)	(0.041)	(0.000)	(0.000)	(0.000)
Bklev	-0.050***	-0.017***	-0.012***	-0.066***	-0.024*	-0.002*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.061)	(0.090)
*Bklev*Dereg*	0.178***	0.007***	0.017***	0.102***	0.164***	0.013***
	(0.000)	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)
*Bklev*Dereg*Reg*	0.077	-0.010**	0.015	-0.055	-0.053	0.026***
	(0.316)	(0.030)	(0.201)	(0.222)	(0.498)	(0.004)
LNAT	0.009***	-0.000	0.001***	0.002**	0.009***	-0.001***
	(0.000)	(0.107)	(0.000)	(0.012)	(0.000)	(0.000)
*LNAT*Dereg*	-0.004	-0.000	-0.001***	-0.004	-0.006	0.000
	(0.445)	(0.215)	(0.010)	(0.109)	(0.201)	(0.269)
*LNAT *Dereg*Reg*	-0.057***	-0.002***	-0.003*	-0.022***	-0.036***	-0.009***

	(0.000)	(0.008)	(0.071)	(0.000)	(0.001)	(0.000)
LnCshr	0.035***	0.003***	0.002***	0.019***	0.033***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*LnCshr*Dereg*	0.027***	-0.000	0.003***	0.008***	0.026***	0.002***
	(0.000)	(0.711)	(0.000)	(0.001)	(0.000)	(0.000)
*LnCshr*Dereg*Reg*	0.016	0.002**	0.007***	0.015**	-0.005	0.009***
	(0.220)	(0.015)	(0.000)	(0.027)	(0.714)	(0.000)
MTB	-0.002***	0.001***	0.001***	-0.000	-0.003***	-0.001***
	(0.002)	(0.000)	(0.000)	(0.828)	(0.000)	(0.000)
*MTB*Dereg*	-0.003***	-0.000***	-0.001***	-0.001**	-0.003**	-0.000
	(0.008)	(0.001)	(0.000)	(0.023)	(0.030)	(0.331)
*MTB*Dereg*Reg*	0.003	0.001*	0.003*	0.007	0.006	-0.005***
	(0.662)	(0.051)	(0.076)	(0.219)	(0.487)	(0.000)
StdOibdp	-0.064***	-0.002***	-0.002***	-0.035***	-0.059***	-0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*StdOibdp*Dereg*	-0.060***	-0.003**	-0.008***	-0.021**	-0.053***	-0.003**
	(0.003)	(0.011)	(0.000)	(0.044)	(0.006)	(0.035)
*StdOibdp*Dereg*Reg*	0.001	-0.002	0.016	0.055	0.317	-0.015
	(0.998)	(0.902)	(0.431)	(0.659)	(0.260)	(0.528)
Volatility	-3.416***	-0.196***	-0.148***	-1.989***	-3.484***	-0.330***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Volatility*Dereg*	-2.728***	-0.069***	-0.389***	-1.052***	-2.424***	-0.135***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
*Volatility*Dereg*Reg*	-9.330***	-0.412***	-0.925***	-5.236***	-7.701***	-1.734***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
OCF	0.041***	0.021***	0.014***	0.030***	-0.013	0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.149)	(0.000)
*OCF*Dereg*	-0.151***	-0.003	-0.007*	-0.091***	-0.131***	-0.007***
	(0.000)	(0.296)	(0.100)	(0.000)	(0.000)	(0.005)
*OCF*Dereg*Reg*	-0.414***	0.036**	-0.050	-0.455***	-0.749***	-0.072***
	(0.007)	(0.012)	(0.118)	(0.000)	(0.000)	(0.000)
Saleg	-0.021***	-0.002***	-0.001***	-0.023***	-0.039***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Saleg*Dereg*	0.007	0.001**	0.001	0.006**	-0.002	0.000
	(0.356)	(0.026)	(0.261)	(0.044)	(0.783)	(0.890)
*Saleg*Dereg*Reg*	-0.062***	-0.005***	0.004	-0.079***	-0.153***	-0.005**
	(0.004)	(0.001)	(0.284)	(0.000)	(0.000)	(0.031)
R^2	0.21	0.24	0.28	0.23	0.19	0.37
N	90,852	93,109	93,109	91,815	89,544	92,399

Table 23
Regression-based evidence based on Lintner and Fama-Babiak models of partial adjustment of dividend policy, 1966-2008

The table reports parameter estimates based on the Lintner (1956) model and its variant Fama-Babiak (1968) model in analysis of corporate dividend policy impacted by economic deregulation. The Lintner model is $D_{it} = \alpha_i + \beta_i D_{i,t-1} + \gamma_i E_{it} + e_{it}$, whereas the Fama-Babiak model adds lagged earnings as regressand. The deregulated industries are entertainment, petroleum and natural gas, utilities, telecommunications, and transportation. This table reports estimates between the partial deregulation period and regulation period, and between complete deregulation period and regulation period, separately. To capture the dynamics of overall changes, I use the expanded definition of the three periods: the period of regulation includes all the years from 1966, the first year of the sample period, to year -1, the year preceding the deregulation initiation year (year 0) for each industry; the period of partial deregulation includes all the years from year 0 to the year preceding year +1, the year in which the last major deregulation initiative was taken in each industry; the complete deregulation period includes all the years from year +1 to 2008, the last year of the sample period. The dependent variable is annual dividend scaled by common shares outstanding ($Divcs_t$) and the independent variables are previous year dividend ($Divcs_{t-1}$), current earnings ($Ibcomcs_t$) and previous year earnings ($Ibcomcs_{t-1}$), and their interaction terms with a deregulation indicator (*Dereg*), and a post-deregulation indicator (*Pdreg*). *Dereg* is equal to 1 if a firm is in one of the five deregulated industries, and 0 otherwise. *Pdreg* takes the value of 1 if a firm is in the partial (complete) deregulation period, and 0 otherwise. The dependent and independent variables are scaled by the number of shares outstanding of each year. Panel A reports estimates for all firms and Panel B reports estimates for surviving firms. All variables except the dummies are winsorized at 1% on both tails. p-value is in parentheses. Variable definitions are in Appendix A. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels respectively.

	Period of			
	Partial deregulation		**Complete deregulation**	
	Lintner	**Fama-Babiak**	**Lintner**	**Fama-Babiak**
Panel A: All Firms				
Intercept	0.067***		0.056***	
	(0.000)		(0.000)	
$Divcs_{t-1}$	0.678***	0.692***	0.626***	0.644***
	(0.000)	(0.000)	(0.000)	(0.000)
$Ibcomcs_t$	0.060***	0.061***	0.025***	0.024***
	(0.000)	(0.000)	(0.000)	(0.000)
$Ibcomcs_{t-1}$		0.005		0.003
		(0.607)		(0.584)
$Dereg_{it}$	0.054***	0.112***	0.065***	0.112***
	(0.001)	(0.000)	(0.000)	(0.000)
$Divcs_{t-1}$* Dereg*	0.182***	0.212***	0.234***	0.259***
	(0.000)	(0.000)	(0.000)	(0.000)
$Ibcomcs_t$* Dereg*	-0.022**	0.033*	0.013**	0.069***
	(0.018)	(0.056)	(0.048)	(0.000)
$Ibcomcs_{t-1}$* Dereg*		-0.081***		-0.079***
		(0.000)		(0.000)
*Dereg*Pdreg*	-0.017	-0.008	-0.007	0.002
	(0.233)	(0.525)	(0.643)	(0.897)
$Divcs_{t-1}$* Dereg*Pdreg*	-0.039*	-0.076***	-0.158***	-0.214***
	(0.071)	(0.000)	(0.000)	(0.000)
$Ibcomcs_t$* Dereg*Pdreg*	-0.003	-0.053***	0.002	-0.061***
	(0.650)	(0.001)	(0.745)	(0.000)
$Ibcomcs_{t-1}$* Dereg*Pdreg*		0.069***		0.088***

		(0.000)		(0.000)
Adj. R^2	0.88	0.91	0.81	0.84
N	42,461	42,438	61,153	61,059
Speed of adjustment				
Control firms	0.322	0.308	0.374	0.356
Firms under regulation	0.140	0.096	0.140	0.097
Firms after deregulation	0.179	0.172	0.298	0.311
Target dividend payout ratio				
Control firms	0.186	0.198	0.067	0.067
Firms under regulation	0.271	0.979	0.271	0.959
Firms after deregulation	0.196	0.238	0.134	0.103
Panel B: Surviving Firms				
Intercept	0.047***		0.045***	
	(0.000)		(0.000)	
$Divcs_{t-1}$	0.745***	0.741***	0.806***	0.804***
	(0.000)	(0.000)	(0.000)	(0.000)
$Ibcomcs_t$	0.061***	0.056***	0.032**	0.026
	(0.000)	(0.000)	(0.017)	(0.138)
$Ibcomcs_{t-1}$		0.016		0.017
		(0.287)		(0.135)
Dereg	0.074***	0.112***	0.076***	0.112***
	(0.000)	(0.000)	(0.000)	(0.000)
$Divcs_{t-1}$* Dereg*	0.115***	0.163***	0.054	0.100**
	(0.001)	(0.000)	(0.152)	(0.011)
$Ibcomcs_t$* Dereg*	-0.022*	0.038*	0.006	0.067***
	(0.073)	(0.060)	(0.666)	(0.003)
$Ibcomcs_{t-1}$* Dereg*		-0.092***		-0.094***
		(0.000)		(0.000)
*Dereg*Pdreg*	0.009	0.016	0.063***	0.072***
	(0.577)	(0.309)	(0.007)	(0.002)
$Divcs_{t-1}$* Dereg*Pdreg*	-0.020	-0.049**	-0.137***	-0.201***
	(0.368)	(0.028)	(0.000)	(0.000)
$Ibcomcs_t$* Dereg*Pdreg*	-0.006	-0.044***	0.006	-0.064***
	(0.412)	(0.009)	(0.459)	(0.001)
$Ibcomcs_{t-1}$* Dereg*Pdreg*		0.053***		0.100***
		(0.004)		(0.000)
Adj. R^2	0.89	0.93	0.87	0.91
N	33,667	33,659	26,789	26,780
Speed of adjustment				
Control firms	0.255	0.259	0.194	0.196
Firms under regulation	0.140	0.096	0.140	0.097
Firms after deregulation	0.160	0.145	0.277	0.298
Target dividend payout ratio				
Control firms	0.239	0.216	0.165	0.133
Firms under regulation	0.279	0.979	0.271	0.959
Firms after deregulation	0.206	0.345	0.159	0.097

Table 24
Regression-based evidence based Lintner and Fama-Babiak model of partial adjustment of dividend policy in "snapshot" periods

The table reports robustness check results of parameter estimates based on the Lintner (1956) model and its variant Fama-Babiak (1968) model in analysis of corporate dividend policy impacted by economic deregulation, using the three "snapshot" period of regulation, partial deregulation and complete deregulation. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). The Lintner (1956) model is $D_{it} = \alpha_i + \beta_i D_{i,t-1} + \gamma_i E_{it} + e_{it}$, whereas the Fama-Babiak (1968) model adds lagged earnings as regressand. The deregulated industries are entertainment, petroleum and natural gas, utilities, telecommunications, and transportation. The dependent variable is annual dividend ($Divcs_t$) and the independent variables are previous year dividend ($Divcs_{t-1}$), current earnings ($Ibcomcs_t$) and previous year earnings ($Ibcomcs_{t-1}$), and their interaction terms with a deregulation indicator (*Dereg*), and a post-regulation indicator (*Pdreg*). The dummy variable, *Dereg*, is equal to 1 if a firm is in one of the five deregulated industries, and 0 otherwise. *Pdreg* takes the value of 1 if a firm operates in the partial (complete) deregulation period, and 0 otherwise. The dependent and independent variables are scaled by the number of shares outstanding of each year. Panel A reports estimates for all firms and Panel B reports estimates for surviving firms. All variables except the dummies are winsorized at 1% on both tails. P-value is in parentheses. Variable definitions are in Appendix A. *, **, and *** denote statistical significance at the 10%, 5% and 1% level respectively.

	Period of			
	Partial deregulation		**Complete deregulation**	
	Lintner	**Fama-Babiak**	**Lintner**	**Fama-Babiak**
Panel A: All Firms				
Intercept	0.013		0.057***	
	(0.190)		(0.000)	
$Divcs_{t-1}$	0.768***	0.817***	0.684***	0.696***
	(0.000)	(0.000)	(0.000)	(0.000)
$Ibcomcs_t$	0.073***	0.086***	0.033***	0.033***
	(0.000)	(0.000)	(0.000)	(0.004)
$Ibcomcs_{t-1}$		-0.029*		0.005
		(0.071)		(0.650)
Dereg	0.085***	0.091***	0.042**	0.091***
	(0.000)	(0.000)	(0.014)	(0.000)
$Divcs_{t-1}$* Dereg*	0.091	0.073	0.176***	0.194***
	(0.135)	(0.190)	(0.005)	(0.001)
$Ibcomcs_t$* Dereg*	-0.040**	-0.024	-0.001	0.030
	(0.018)	(0.343)	(0.952)	(0.152)
$Ibcomcs_{t-1}$* Dereg*		-0.014		-0.048**
		(0.588)		(0.035)
*Dereg*Pdreg*	0.010	0.017	0.027	0.035*
	(0.556)	(0.309)	(0.160)	(0.062)
$Divcs_{t-1}$* Dereg*Pdreg*	-0.032	-0.040	-0.172***	-0.208***
	(0.323)	(0.220)	(0.000)	(0.000)
$Ibcomcs_t$* Dereg*Pdreg*	0.004	-0.006	0.014	-0.020
	(0.663)	(0.778)	(0.177)	(0.396)
$Ibcomcs_{t-1}$* Dereg*Pdreg*		0.014		0.049*
		(0.538)		(0.058)

Adj. R^2	0.90	0.92	0.82	0.85
N	16,026	16,020	18,918	18,894
Speed of adjustment				
Control firms	0.232	0.183	0.316	0.304
Firms under regulation	0.141	0.110	0.140	0.110
Firms after deregulation	0.173	0.150	0.312	0.318
Target dividend payout ratio				
Control firms	0.315	0.470	0.104	0.109
Firms under regulation	0.234	0.564	0.229	0.573
Firms after deregulation	0.214	0.373	0.147	0.135
Panel B: Surviving Firms				
Intercept	0.005		0.036**	
	(0.611)		(0.015)	
$Divcs_{t-1}$	0.812***	0.834***	0.735***	0.754***
	(0.000)	(0.000)	(0.000)	(0.000)
$Ibcomcs_t$	0.069***	0.076***	0.068***	0.072***
	(0.000)	(0.000)	(0.001)	(0.001)
$Ibcomcs_{t-1}$		-0.015		-0.004
		(0.376)		(0.820)
Dereg	0.093***	0.091***	0.062***	0.091***
	(0.000)	(0.000)	(0.002)	(0.000)
$Divcs_{t-1}$* Dereg*	0.047	0.056	0.124*	0.136*
	(0.349)	(0.335)	(0.097)	(0.086)
$Ibcomcs_t$* Dereg*	-0.037**	-0.014	-0.035*	-0.009
	(0.023)	(0.567)	(0.090)	(0.744)
$Ibcomcs_{t-1}$* Dereg*		-0.028		-0.039
		(0.278)		(0.124)
*Dereg*Pdreg*	0.014	0.021	0.131***	0.142***
	(0.449)	(0.233)	(0.000)	(0.000)
$Divcs_{t-1}$*Dereg*Pdreg*	-0.012	-0.027	-0.148***	-0.199***
	(0.698)	(0.406)	(0.001)	(0.000)
$Ibcomcs_t$*Dereg*Pdreg*	-0.001	-0.015	0.017	-0.031
	(0.903)	(0.453)	(0.160)	(0.322)
$Ibcomcs_{t-1}$*Dereg*Pdreg*		0.020		0.069**
		(0.367)		(0.044)
Adj. R^2	0.90	0.93	0.86	0.89
N	14,762	14,757	11,228	11,223
Speed of adjustment				
Control firms	0.188	0.166	0.265	0.246
Firms under regulation	0.141	0.110	0.141	0.110
Firms after deregulation	0.153	0.137	0.289	0.309
Target dividend payout ratio				
Control firms	0.367	0.458	0.257	0.293
Firms under regulation	0.227	0.564	0.234	0.573
Firms after deregulation	0.203	0.343	0.173	0.104

Table 25
Magnitude of dividend increases and decreases during the process of deregulation

This table shows evolution of the magnitude of dividend increases and decreases by firms in formerly regulated industries in the three "snapshot" periods along the process of deregulation. The five deregulated industries are entertainment, petroleum and natural gas, utilities, telecommunications and transportation. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). Dividend increases and decreases are defined as changes in quarterly dividend per share. The means and medians of dividend increases and decreases for deregulated firms and control firms in partial (complete) deregulation periods are compared with those in the regulation period. *, ** and *** represent statistical significance at the 10%, 5% and 1% level, respectively.

		Period of								
		Regulation			**Partial Deregulation**			**Complete Deregulation**		
		No.	**Mean**	**Median**	**No.**	**Mean**	**Median**	**No.**	**Mean**	**Median**
Increases	Deregulated	772	0.149	0.091	954	0.122**	0.067***	387	0.096***	0.048***
	Control	641	0.198	0.146	473	0.178*	0.143**	295	0.146***	0.111***
	t-Stat Dif		5.06	11.10		3.54	14.03		2.82	9.39
Decreases	Deregulated	37	-0.312	-0.333	51	-0.346	-0.375	45	-0.367	-0.405
	Control	51	-0.245	-0.200	28	-0.425***	-0.478***	19	-0.394***	-0.500***
	t-Stat Dif		1.38	0.93		-1.41	-1.08		-0.39	-0.73

Table 26
Dividend announcement CARs during different periods of the deregulation process

This table shows three day (-1, 1) event period cumulative abnormal returns (CARs) of stock in response to announcements of dividend increases and dividend decreases of firms in the five deregulated industries in the three "snapshot" periods along the process of deregulation. The five deregulated industries are entertainment, petroleum and natural gas, utilities, telecommunications and transportation. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). Dividend increases and decreases are defined as changes in quarterly dividend per share. Panel A reports market-index adjusted announcement CARs of all dividend increases and decreases in the sample, while Panel B displays size-decile adjusted announcement CARs. In the parentheses are p-values.

		Period of						**p-value of mean dif**	
		Regulation		**Partial Deregulation**		**Complete Deregulation**		**Partial-**	**Complete-**
		Mean	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Regulation**	**Regulation**
Panel A: Market-index adjusted three-day (-1, 1) CARs									
Increase	Regulated	0.012	0.009	0.007	0.004	0.002	0.003	(0.00)	(0.00)
	p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.38)	(0.16)		
	Control	0.015	0.011	0.01	0.007	0.002	0.002	(0.04)	(0.00)
	p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.35)	(0.49)		
	p-value Dif	(0.31)	(0.32)	(0.20)	(0.17)	(0.84)	(0.82)		
Decrease	Regulated	-0.032	-0.015	-0.022	-0.011	-0.014	0.003	(0.42)	(0.19)
	p-value	(0.00)	(0.00)	(0.01)	(0.04)	(0.14)	(0.69)		
	Control	-0.022	-0.024	-0.019	-0.005	-0.033	-0.017	(0.75)	(0.44)
	p-value	(0.00)	(0.00)	(0.04)	(0.08)	(0.01)	(0.01)		
	p-value Dif	(0.41)	(0.68)	(0.79)	(0.92)	(0.26)	(0.05)		
Panel B: Size-decile adjusted three-day (-1, 1) CARs									
Increase	Regulated	0.012	0.009	0.007	0.004	0.002	0.004	(0.00)	(0.00)
	p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.17)	(0.02)		
	Control	0.014	0.011	0.009	0.007	0.002	0.002	(0.06)	(0.00)
	p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.26)	(0.33)		
	p-value Dif	(0.48)	(0.44)	(0.15)	(0.11)	(0.96)	(0.54)		
Decrease	Regulated	-0.033	-0.018	-0.020	-0.007	-0.012	0.004	(0.30)	(0.12)
	p-value	(0.00)	(0.00)	(0.01)	(0.08)	(0.20)	(0.83)		
	Control	-0.023	-0.017	-0.017	-0.007	-0.031	-0.008	(0.62)	(0.56)
	p-value	(0.00)	(0.00)	(0.05)	(0.09)	(0.01)	(0.01)		
	p-value Dif	(0.39)	(0.60)	(0.81)	(0.86)	(0.25)	(0.06)		

Table 27
Estimation of dividend response coefficients during the process of deregulation

The regression model to estimate dividend response coefficient for the three period of deregulation is:

$$CAR_j = \alpha_0 + \alpha_1 DDIVY_j + \alpha_2 SIZEN_j + \alpha_3 LTYLD_j + \alpha_4 Dereg + \alpha_5\, DDIVY_j * Dereg + \alpha_6 SIZEN_j * Dereg + \alpha_7 LTYLD_j * Dereg + \alpha_8 Dereg * Pdreg + \alpha_9\, DDIVY_j * Dereg * Pdreg + \alpha_{10} SIZEN_j * Dereg * Pdreg + \alpha_{11} LTYLD_j * Dereg * Pdreg + \varepsilon_j$$

Consistent with Amihud and Li (2006), CAR_j is the three-day (-1,1) cumulative abnormal return of stocks in response to dividend increases or decreases; $DDIVY_j$ is annualized change in the dividend yield. $SIZEN_j$ is the stock capitalization normalized by the S&P 500 index to control for firm size. $LTYLD_j$ is the stock's long-term yield, in the year before the dividend announcement. *Dereg* is a dummy variable that is equal to 1 if a firm is in one of the five deregulated industries, and 0 otherwise. *Pdreg* is also a dummy variable that takes the value of 1 if a firm operates in the partial (complete) deregulation period, and 0 otherwise. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). In parentheses are *p* values. Variable definitions are in Appendix A. *, ** and *** represent statistical significance at the 10%, 5% and 1% level respectively.

	Period of			
	Partial deregulation		**Complete deregulation**	
Variable	**Coef.**	***t*-statistic**	**Coef.**	***t*-statistic**
Panel A: Dividend increases				
Intercept	0.002	0.698	-0.005*	0.079
DDIVY	2.572***	0.000	2.120***	0.000
SIZEN	-0.040	0.233	0.025	0.342
LTYLD	0.028	0.536	0.124**	0.040
Dereg	-0.000	0.965	0.006	0.216
*DDIVY*Dereg*	-0.104	0.824	0.348	0.511
*SIZEN*Dereg*	0.003	0.954	-0.063	0.168
*LTYLD*Dereg*	0.021	0.708	-0.076	0.278
*Dereg *Pdreg*	-0.001	0.849	-0.002	0.792
*DDIVY*Dereg*Pdreg*	0.170	0.745	-1.260*	0.092
*SIZEN*Dereg*Pdreg*	0.005	0.917	0.142	0.593
*LTYLD*Dereg*Pdreg*	-0.074	0.132	-0.096	0.221
Adj. R^2	0.08		0.07	
N	2,261		1,704	
Panel B: Dividend decreases				
Intercept	0.031	0.237	0.002	0.922
DDIVY	1.572***	0.003	1.255**	0.045
SIZEN	-0.236	0.313	0.060	0.745
LTYLD	-0.080	0.705	-0.342	0.199
Dereg	-0.078	0.154	-0.048	0.372
*DDIVY*Dereg*	-2.348*	0.064	-2.031	0.139
*SIZEN*Dereg*	0.721	0.163	0.426	0.415
*LTYLD*Dereg*	-0.965*	0.054	-0.703	0.200
*Dereg *Pdreg*	0.054	0.397	0.042	0.481
*DDIVY*Dereg*Pdreg*	1.047	0.421	1.462	0.281
*SIZEN*Dereg*Pdreg*	-0.409	0.453	-2.345*	0.078

*LTYLD*Dereg*Pdreg*	0.601	0.374	1.778***	0.007
Adj. R^2	0.24		0.24	
N	97		104	

Table 28
Summary statistics of the subsample of firms that increase, decrease or maintain dividends

This table reports the firm characteristics of those that increase dividends, reduce dividends or keep dividends unchanged. *RΔDIV* is the annual rate of change in the cash dividend payment. *MV* is the market value of firm equity. *MTB* is the market-to-book equity ratio. *ROE* is computed as the earnings before extraordinary items dividend by the book value of equity. *ROA* is computed as the operating income before depreciation divided by total assets. Variable definitions are in Appendix A.

Variable	N	Mean	Median	P25	P75
A: Dividend Increases					
RΔDIV	2,066	0.16	0.07	0.04	0.17
MV ($ Million)	2,027	2,021.29	384.45	94.36	1,423.92
MTB	2,027	1.61	1.37	1.07	1.76
ROE	2,050	0.15	0.14	0.12	0.17
ROA	2,045	0.16	0.14	0.12	0.19
B: Dividend Decreases					
RΔDIV	136	-0.39	-0.42	-0.50	-0.23
MV ($ Million)	122	1,672.99	468.6	54	1,697.96
MTB	122	1.51	1.38	1.03	1.83
ROE	130	0.10	0.11	0.05	0.16
ROA	130	0.16	0.11	0.09	0.21
C: No-changes					
RΔDIV	1,903	0	0	0	0
MV ($ Million)	1,839	2,273.10	410.72	84.43	1,534.64
MTB	1,839	1.83	1.42	1.03	1.95
ROE	1,889	0.13	0.13	0.09	0.17
ROA	1,886	0.15	0.13	0.10	0.19

Table 29
Regressions of future earnings changes on dividend changes using linear model

This table reports estimates of regressions of future earnings changes on dividend changes in year 0 (event year). The model used is the linear model in Nissim and Ziv (2001):

$$\frac{(E_t - E_{t-1})}{BE_{-1}} = \beta_0 + \beta_{1P} DPC_0 \times R\Delta DIV_0 + \beta_{1N} DNC_0 \times R\Delta DIV_0 + \beta_2 ROE_{t-1} + \beta_3 \frac{(E_0 - E_{-1})}{BE_{-1}} + \varepsilon_t$$

E_t is earnings before extraordinary items in year t. BE_{-1} is the book value of equity at the end of year -1 (year 0 is the event year). $R\Delta DIV_0$ is the rate of change in cash dividend payment in year 0. *DPC* (*DNC*) is a dummy variable equal to 1 for dividend increases (decreases) and 0 otherwise. ROE_{t-1} is computed as earnings before extraordinary items in year t divided by the book value of equity at the end of year t-1. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). In parentheses are *p* values. Variable definitions are in Appendix A. *, ** and *** represent statistical significance at the 10%, 5% and 1% level, respectively.

	Period of					
	Regulation		**Partial deregulation**		**Complete deregulation**	
Variable	**Deregulated**	**Control**	**Deregulated**	**Control**	**Deregulated**	**Control**
Panel A: t = 1						
β_0	0.043***	0.022***	0.004	-0.010	0.002	-0.047*
	(0.00)	(0.00)	(0.42)	(0.13)	(0.83)	(0.09)
β_{1P}	0.028*	0.013	0.044**	0.040**	-0.010	0.161
	(0.06)	(0.56)	(0.03)	(0.04)	(0.81)	(0.29)
β_{1N}	0.068	0.041	0.103*	-0.103**	-0.081	-0.087
	(0.17)	(0.54)	(0.06)	(0.03)	(0.23)	(0.76)
β_2	-0.169***	-0.028***	0.061***	0.182***	0.023**	-0.018
	(0.00)	(0.00)	(0.00)	(0.00)	(0.05)	(0.33)
β_3	-0.382***	0.051	-0.606***	-0.506***	-0.522***	-0.406***
	(0.00)	(0.27)	(0.00)	(0.00)	(0.00)	(0.00)
Adj. R^2	0.133	0.030	0.273	0.196	0.111	0.029
N	1,246	974	1,638	979	1,053	705
Panel B: t = 2						
β_0	0.051**	0.022**	0.006	0.031	0.027**	0.021
	(0.03)	(0.04)	(0.48)	(0.35)	(0.03)	(0.35)
β_{1P}	-0.036	0.143***	0.001	0.034	-0.029	0.007
	(0.67)	(0.00)	(0.98)	(0.77)	(0.65)	(0.95)
β_{1N}	0.099	0.107	-0.336***	-0.138	0.017	0.761***
	(0.72)	(0.45)	(0.00)	(0.63)	(0.87)	(0.00)
β_2	-0.073	-0.022**	-0.062	-0.135	-0.146***	0.002
	(0.45)	(0.03)	(0.12)	(0.40)	(0.00)	(0.80)
β_3	0.068	-0.753***	-0.219***	-0.114	-0.375***	-1.291***
	(0.73)	(0.00)	(0.00)	(0.61)	(0.00)	(0.00)

Adj. R^2	0.001	0.078	0.023	0.002	0.041	0.276
N	1,246	974	1,638	979	1,053	705

Table 30
Regressions of future earnings levels on dividend changes using linear model

This table reports estimates of regressions of earnings levels on dividend changes in year 0 (event year). The model used is the linear model in Nissim and Ziv (2001):

$$ROE_t = \beta_0 + \beta_{1P} DPC_0 \times R\Delta DIV_0 + \beta_{1N} DNC_0 \times R\Delta DIV_0 + \beta_2 ROE_{t-1} + \beta_3 \left(ROE_0 - ROE_{-1} \right) + \beta_4 MTB_{-1} + \beta_5 SIZE_{-1} + \varepsilon_t$$

ROE_t is computed as earnings before extraordinary items in year t divided by the book value of equity at the end of year t-1. *DPC* (*DNC*) is a dummy variable equal to 1 for dividend increases (decreases) and 0 otherwise. $R\Delta DIV_0$ is the rate of change in cash dividend payment in year 0. ROE_{t-1} is lagged *ROE*; ROE_0 is return on equity in year 0 and ROE_{-1} is return on equity in year -1. MTB_{-1} is market-to-book ratio of equity in year -1 and $SIZE_{-1}$ is the logarithm of firm total assets in year -1. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). Variable definitions are in Appendix A. In parentheses are *p* values. Variable definitions are in Appendix A. *, ** and *** represent statistical significance at the 10%, 5% and 1% level, respectively.

	Period of					
	Regulation		**Partial deregulation**		**Complete deregulation**	
Variable	**Deregulated**	**Control**	**Deregulated**	**Control**	**Deregulated**	**Control**
Panel A: t = 1						
β_0	0.110***	0.163	0.099***	0.018	-0.002	-0.200
	(0.00)	(0.14)	(0.00)	(0.31)	(0.95)	(0.50)
β_{1P}	0.009	0.077	0.087***	0.035	0.017	0.083
	(0.72)	(0.60)	(0.00)	(0.12)	(0.63)	(0.87)
β_{1N}	0.111	3.629***	0.440***	-0.006	0.007	1.183
	(0.19)	(0.00)	(0.00)	(0.91)	(0.91)	(0.21)
β_2	0.383***	-0.141	-0.053	0.548***	0.357***	-2.276***
	(0.00)	(0.68)	(0.37)	(0.00)	(0.00)	(0.00)
β_3	-0.207**	0.114	-0.364***	-0.082	-0.399***	-1.574**
	(0.02)	(0.74)	(0.00)	(0.25)	(0.00)	(0.01)
β_4	0.022**	0.028	0.026***	0.021**	0.039***	0.439**
	(0.05)	(0.54)	(0.01)	(0.03)	(0.01)	(0.01)
β_5	-0.004	-0.002	0.002	0.004	0.003	0.052
	(0.16)	(0.91)	(0.31)	(0.13)	(0.31)	(0.23)
Adj. R^2	0.032	0.064	0.221	0.178	0.295	0.108
N	1,229	953	1,602	972	1,026	697
Panel B: t = 2						
β_0	0.229***	0.137	1.153	-0.070	-0.060	-0.148
	(0.00)	(0.23)	(0.20)	(0.71)	(0.46)	(0.63)
β_{1P}	0.042	0.152	0.223	-0.051	-0.009	0.170
	(0.19)	(0.38)	(0.85)	(0.84)	(0.94)	(0.74)

β_{1N}	0.098	-0.069	4.195	0.125	-0.039	-6.425***
	(0.37)	(0.91)	(0.23)	(0.84)	(0.83)	(0.00)
β_2	-0.405***	-0.041	-8.583***	0.196	0.171**	0.016
	(0.00)	(0.29)	(0.00)	(0.58)	(0.04)	(0.68)
β_3	-0.249***	-0.007	-5.884***	-0.639	-0.044	0.550
	(0.01)	(0.86)	(0.00)	(0.26)	(0.15)	(0.20)
β_4	0.046***	0.079	1.125**	0.001	0.137***	-0.020
	(0.00)	(0.11)	(0.02)	(0.99)	(0.00)	(0.89)
β_5	-0.007*	-0.011	-0.023	0.041	0.005	0.048
	(0.08)	(0.59)	(0.86)	(0.18)	(0.60)	(0.29)
Adj. R^2	0.100	0.005	0.028	0.003	0.027	0.057
N	1,228	952	1,598	972	1,026	695

Table 31
Regressions of future earnings change on dividend changes using nonlinear model

This table reports estimates of regressions of future earnings changes on dividend changes in year 0 (event year). The model used is the nonlinear model in Grullon, Michaely, Benartzi and Thaler (2005):

$$(E_t - E_{t-1}) / BE_{(-1)} = \beta_0 + \beta_{1P} DPC_0 \times R\Delta DIV_0 + \beta_{1N} DNC_0 \times R\Delta DIV_0$$
$$+(\gamma_1 + \gamma_2 NDFED_0 + \gamma_3 NDFED_0 \times DFE_0 + \gamma_4 PDFED_0 \times DFE_0) \times DFE_0$$
$$+(\lambda_1 + \lambda_2 NCED_0 + \lambda_3 NCED_0 \times CE_0 + \lambda_4 PCED_0 \times CE_0) \times CE_0 + \varepsilon_t$$

E_t is earnings before extraordinary items in year t. BE_{-1} is the book value of equity at the end of year -1 (year 0 is the event year). *DPC* (*DNC*) is a dummy variable equal to 1 for dividend increases (decreases) and 0 otherwise. $R\Delta DIV_0$ is the rate of change in cash dividend payment in year 0. DFE_0 is defined as $ROE_0 - E(ROE_0)$ where $E(ROE_0)$ is the fitted value from the cross-sectional regression of ROE_0 on the logarithm of total asset in year -1, the logarithm of the market-to-book ratio of equity in year -1, and ROE_{-1}. CE_0 is calculated as $(E_0 - E_{-1})/BE_{-1}$. $NDFED_0$ ($PDFED_0$) is a dummy variable equal to 1 if DFE_0 is negative (positive) and 0 otherwise. $NCED_0$ ($PCED_0$) is a dummy variable equal to 1 if CE_0 is negative (positive) and 0 otherwise. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). Variable definitions are in Appendix A. In parentheses are *p* values. *, ** and *** represent statistical significance at the 10%, 5% and 1% level respectively.

	Period of					
	Regulation		**Partial deregulation**		**Complete deregulation**	
Variable	**Deregulated**	**Control**	**Deregulated**	**Control**	**Deregulated**	**Control**
Panel A: t = 1						
β_0	0.013**	0.007	-0.002	-0.001	-0.001	-0.025
	(0.03)	(0.47)	(0.63)	(0.90)	(0.94)	(0.52)
β_{1P}	0.018	-0.006	0.020	0.017	-0.012	0.296**
	(0.22)	(0.78)	(0.23)	(0.29)	(0.75)	(0.04)
β_{1N}	0.118**	0.028	0.064	-0.082**	-0.039	0.002
	(0.02)	(0.68)	(0.18)	(0.05)	(0.54)	(0.99)
γ_1	0.062	-0.226	-0.061	0.076	0.227***	-0.250
	(0.78)	(0.29)	(0.59)	(0.57)	(0.00)	(0.69)
γ_2	-0.694**	-0.302	-0.466**	-0.143	-0.310	0.935
	(0.03)	(0.27)	(0.01)	(0.51)	(0.19)	(0.33)
γ_3	-0.358	-0.019***	-0.337***	0.351***	0.888***	0.416
	(0.26)	(0.00)	(0.00)	(0.01)	(0.00)	(0.20)
γ_4	-4.579***	1.618	-0.016	-0.808	-0.012***	0.141
	(0.00)	(0.18)	(0.45)	(0.21)	(0.00)	(0.69)
λ_1	0.209**	0.420***	0.562***	0.372***	-0.452***	0.638
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)	(0.38)
λ_2	0.211	-0.021	-0.137	-0.150	0.828***	-1.667*
	(0.40)	(0.94)	(0.54)	(0.50)	(0.00)	(0.07)
λ_3	1.664**	0.814	1.052***	0.853***	0.684***	-0.231**
	(0.04)	(0.15)	(0.00)	(0.00)	(0.00)	(0.02)

λ_4	-0.110	-0.304***	-1.558***	-0.961***	0.270	-6.594***
	(0.50)	(0.00)	(0.00)	(0.00)	(0.13)	(0.00)
Adj. R^2	0.24	0.16	0.12	0.40	0.29	0.15
N	1,229	953	1,602	972	1,026	697
Panel B: t = 2						
β_0	0.024	0.008	0.023**	0.070	0.006	0.052**
	(0.49)	(0.67)	(0.03)	(0.13)	(0.71)	(0.02)
β_{1P}	-0.042	0.110**	0.025	0.046	-0.035	-0.087
	(0.64)	(0.01)	(0.53)	(0.70)	(0.59)	(0.27)
β_{1N}	-0.010	0.004	-0.446***	-0.189	-0.001	-0.416***
	(0.97)	(0.98)	(0.00)	(0.53)	(0.99)	(0.01)
γ_1	0.506	-0.933**	-0.776***	0.076	-0.314**	-0.745**
	(0.71)	(0.03)	(0.00)	(0.94)	(0.02)	(0.03)
γ_2	-0.513	1.228**	1.027**	-0.245	0.269	-0.850
	(0.79)	(0.02)	(0.02)	(0.88)	(0.50)	(0.11)
γ_3	0.326	0.010	0.233*	-0.095	-0.404	-0.694***
	(0.86)	(0.21)	(0.09)	(0.92)	(0.21)	(0.00)
γ_4	-7.299	5.995**	0.200***	-5.101	0.016**	-0.188
	(0.45)	(0.01)	(0.00)	(0.27)	(0.02)	(0.34)
λ_1	0.478	0.601**	-0.269	-1.089	0.087	-0.432
	(0.42)	(0.02)	(0.30)	(0.23)	(0.73)	(0.28)
λ_2	-0.677	-1.407***	0.204	2.147	-0.405	2.641***
	(0.65)	(0.01)	(0.70)	(0.18)	(0.35)	(0.00)
λ_3	-1.342	-0.458	-0.989	2.684	0.336*	1.113***
	(0.79)	(0.68)	(0.19)	(0.21)	(0.08)	(0.00)
λ_4	0.480	-2.324***	0.516	1.472	-0.371	0.554
	(0.63)	(0.00)	(0.19)	(0.53)	(0.23)	(0.45)
Adj. R^2	0.01	0.24	0.04	0.01	0.05	0.70
N	1,229	953	1,602	972	1,026	697

Table 32
Regressions of future earnings levels on dividend changes using nonlinear model

This table reports estimates of regressions of future earnings levels on dividend changes in year 0 (event year). The model used is the nonlinear model in Grullon, Michaely, Benartzi and Thaler (2005):

$$ROE_t = \beta_0 + \beta_{1P} DPC_0 \times R\Delta DIV_0 + \beta_{1N} DNC_0 \times R\Delta DIV_0$$
$$+(\gamma_1 + \gamma_2 NDFED_0 + \gamma_3 NDFED_0 \times ROE_0 + \gamma_4 PDFED_0 \times ROE_0) \times ROE_0$$
$$+(\lambda_1 + \lambda_2 NCED_0 + \lambda_3 NCED_0 \times CE_0 + \lambda_4 PCED_0 \times CE_0) \times CE_0$$
$$+\varphi_1 MTB_{-1} + \varphi_2 SIZE_{-1} + \varepsilon_t$$

ROE_t is computed as earnings before extraordinary items in year t divided by the book value of equity at the year of year t-1. *DPC* (*DNC*) is a dummy variable equal to 1 for dividend increases (decreases) and 0 otherwise. $R\Delta DIV_0$ is the rate of change in cash dividend payment in year 0. MTB_{-1} is market-to-book ratio in year -1 and $SIZE_{-1}$ is the logarithm of firm total assets in year -1. DFE_0 is defined as $ROE_0 - E(ROE_0)$ where $E(ROE_0)$ is the fitted value from the cross-sectional regression of ROE_0 on the logarithm of total asset in year -1, the logarithm of the market-to-book ratio of equity in year -1, and ROE_{-1}. CE_0 is calculated $(E_0 - E_{-1})/BE_{-1}$. $NDFED_0$ ($PDFED_0$) is a dummy variable equal to 1 if DFE_0 is negative (positive) and 0 otherwise. $NCED_0$ ($PCED_0$) is a dummy variable equal to 1 if CE_0 is negative (positive) and 0 otherwise. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). Variable definitions are in Appendix A. *, ** and *** represent statistical significance at the 10%, 5% and 1% level respectively.

	Period of					
	Regulation		**Partial deregulation**		**Complete deregulation**	
Variable	**Deregulated**	**Control**	**Deregulated**	**Control**	**Deregulated**	**Control**
Panel A: t = 1						
β_0	0.095***	0.246*	-0.011	-0.029	-0.029	-0.305
	(0.00)	(0.07)	(0.46)	(0.19)	(0.25)	(0.24)
β_{1P}	0.001	0.012	0.034*	0.008	0.007	-0.103
	(0.97)	(0.93)	(0.06)	(0.72)	(0.82)	(0.81)
β_{1N}	0.101	3.313***	0.153***	-0.076	0.000	4.410***
	(0.24)	(0.00)	(0.00)	(0.15)	(1.00)	(0.00)
γ_1	0.409	-0.837	0.863***	0.998***	0.793***	0.699
	(0.12)	(0.35)	(0.00)	(0.00)	(0.00)	(0.49)
γ_2	0.043	-0.423	-0.081	-0.106	-0.279***	0.083
	(0.84)	(0.59)	(0.16)	(0.34)	(0.00)	(0.92)
γ_3	0.358	-0.045**	0.766***	0.736***	0.651***	8.751***
	(0.42)	(0.05)	(0.00)	(0.00)	(0.00)	(0.00)
γ_4	0.384	2.499	-0.208***	-0.074	-0.045***	0.406
	(0.64)	(0.26)	(0.00)	(0.84)	(0.00)	(0.50)
λ_1	-0.078	-0.196	0.217**	0.014	-0.303**	-1.868
	(0.57)	(0.81)	(0.04)	(0.93)	(0.02)	(0.38)
λ_2	0.167	4.548**	-0.005	0.146	0.108	4.707*
	(0.66)	(0.01)	(0.98)	(0.53)	(0.59)	(0.06)
λ_3	1.192	5.088	-0.381	-0.228	-0.321***	0.576**

	(0.36)	(0.16)	(0.21)	(0.16)	(0.00)	(0.02)
λ_4	-0.097	0.126	-0.879***	-0.372	0.286*	2.094
	(0.38)	(0.86)	(0.00)	(0.36)	(0.06)	(0.60)
φ_1	0.014	0.048	-0.022***	-0.011	0.013	0.084
	(0.26)	(0.38)	(0.00)	(0.27)	(0.34)	(0.57)
φ_2	-0.003	0.003	0.004**	0.004*	0.005	0.054
	(0.27)	(0.87)	(0.03)	(0.08)	(0.12)	(0.14)
Adj. R^2	0.04	0.08	0.50	0.31	0.44	0.38
N	1,229	953	1,602	972	1,026	697
Panel B: t = 2						
β_0	0.133***	0.191	0.426	-0.190	-0.071	-0.132
	(0.00)	(0.25)	(0.68)	(0.48)	(0.39)	(0.71)
β_{1P}	-0.012	0.201	-0.666	-0.007	0.001	0.169
	(0.73)	(0.25)	(0.58)	(0.98)	(0.99)	(0.77)
β_{1N}	0.018	0.069	4.624	0.178	-0.015	-10.293***
	(0.87)	(0.91)	(0.17)	(0.78)	(0.93)	(0.00)
γ_1	-0.135	-0.932	-1.516	-0.822	0.536***	-2.078
	(0.69)	(0.39)	(0.71)	(0.66)	(0.00)	(0.12)
γ_2	0.405	-1.001	-5.549	1.947	-0.798***	-0.573
	(0.12)	(0.30)	(0.16)	(0.16)	(0.00)	(0.62)
γ_3	-2.368***	-0.060**	-7.628***	0.001	-0.148	-2.727***
	(0.00)	(0.03)	(0.00)	(1.00)	(0.69)	(0.01)
γ_4	1.445	-0.500	-1.269	5.717	-0.031***	0.999
	(0.16)	(0.85)	(0.14)	(0.20)	(0.00)	(0.22)
λ_1	0.190	1.595	2.562	0.055	-0.756*	0.040
	(0.29)	(0.11)	(0.56)	(0.98)	(0.06)	(0.99)
λ_2	1.999***	-4.307**	-24.646**	-2.903	0.601	3.058
	(0.00)	(0.05)	(0.01)	(0.31)	(0.35)	(0.36)
λ_3	13.044***	-8.942**	17.786	-3.903**	-0.087	0.782**
	(0.00)	(0.04)	(0.34)	(0.05)	(0.74)	(0.02)
λ_4	-0.281**	-0.499	-0.910	-0.638	0.671	0.181
	(0.05)	(0.57)	(0.62)	(0.90)	(0.17)	(0.97)
φ_1	0.008	0.160**	1.219**	-0.082	0.111***	0.175
	(0.61)	(0.02)	(0.02)	(0.51)	(0.01)	(0.39)
φ_2	-0.000	-0.009	-0.077	0.054*	0.009	0.086*
	(0.92)	(0.68)	(0.54)	(0.08)	(0.36)	(0.08)
Adj. R^2	0.09	0.02	0.04	0.01	0.05	0.11
N	1,257	992	1,645	1,002	1,071	730

Table 33
Comparison of number of deregulated and control firms seeking external financing along the deregulation process

This table reports the number and percentage of total securities issuers, equity issuers and debt issuers of deregulated and control firms in each relative year in the three "snapshot" periods of regulation, partial deregulation and complete deregulation. Deregulated firms are firms in the five industries that undergo the deregulation process: entertainment, petroleum and natural gas, utilities, telecommunications and transportation. Control firms are found through industry matching, i.e., each deregulated industry is matched with a non-regulated industry based on the three fundamental factors in dividend decisions: size, growth opportunity and profitability. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). Panel A reports the number and percentage of firms that issue equity/debt in a year. Panel B reports the number and percentage of equity issuers. Panel C reports the number and percentage of debt issuers.

Relative	Regulated		Control	
Year	Count	Percent	Count	Percent
Panel A: Total equity and debt issuer				
-5	231	35.54	152	34.70
-4	227	34.19	150	33.94
-3	247	36.27	179	38.74
-2	309	42.86	184	40.44
-1	261	37.50	171	37.75
0	309	43.83	175	37.88
1	324	44.38	155	32.70
2	384	49.17	194	36.26
3	443	51.27	241	42.50
4	407	42.44	234	37.80
+1	486	51.27	381	44.98
+2	565	55.72	426	47.76
+3	585	56.25	457	48.88
+4	639	58.41	516	52.65
+5	529	50.53	477	47.60
Panel B: Equity Issuer				
-5	68	11.06	40	10.18
-4	34	5.50	31	7.81
-3	36	5.75	35	8.62
-2	47	7.57	42	10.50
-1	53	8.58	41	9.90
0	54	8.87	53	12.18
1	83	13.03	70	15.18
2	145	20.66	86	16.54
3	152	19.39	121	22.83
4	138	15.27	111	18.56
+1	222	25.81	227	27.85
+2	253	28.43	260	30.70
+3	266	28.98	305	34.46
+4	321	32.79	357	37.78

+5	265	27.26	339	35.06
Panel C: Debt Issuer				
-5	186	23.34	122	20.61
-4	206	23.76	129	21.01
-3	230	24.16	153	24.36
-2	283	28.97	154	24.80
-1	235	22.73	150	25.08
0	288	27.80	136	23.09
1	276	26.49	109	18.38
2	303	28.13	130	21.70
3	368	32.37	157	23.68
4	333	27.50	143	20.11
+1	374	29.66	201	20.81
+2	447	35.22	230	22.03
+3	453	34.34	223	20.76
+4	486	36.05	239	21.19
+5	387	29.45	214	18.87

Table 34
Multivariate analysis of changes in deregulated firms' external financing activities

This table reports results of logit regression of a firm's probability of seeking external financing on *Dereg*, an indicator variable equal to 1 if a firm is in a deregulated industry and 0 otherwise, *Pdreg*, an indicator variable equal to 1 if a firm is in a period of deregulation, and 0 otherwise, and their interaction term, and other variables identified as correlated with the probability of seeking external financing. The model being estimated is as follows:

$$Issuer_t = Dereg + Pdreg + Dereg*Pdreg + LNAT_{t-1} + MTB_{t-1} + E_{t-1}/AT_{t-1} + Bklev_{t-1} + CAPX_{t-1}$$

The dependent variable, *Issuer*, is equal to 1 if a firm issues equity/debt in year t. $LNAT_{t-1}$ is the logarithm of total assets, MTB_{t-1} is market-to-book ratio, E_{t-1}/AT_{t-1} *i*s defined as earnings before extraordinary items scaled by total assets, $Bklev_{t-1}$ is total debt over total assets, and $CAPX_{t-1}$ is capital expenditure scaled by total assets. The five industries that undergo the deregulation process are: entertainment, petroleum and natural gas, utilities, telecommunications and transportation. Control firms are found through industry matching, i.e., each deregulated industry is matched with a non-regulated industry based on the three fundamental factors in dividend decisions: size, growth opportunity and profitability. The period of regulation is defined as the five years immediate preceding the year in which the first significant deregulatory initiative was taken in an industry (-5, -1). The period of partial deregulation is defined as the five years starting from the year of the first significant deregulatory initiative (0, 4). The period of complete deregulation is defined as the five years immediately following the year in which the last significant deregulatory initiative was adopted (+1, +5). Variable definitions are in Appendix A. *, ** and *** represent statistical significance at the 10%, 5% and 1% level respectively.

	Period of					
	Partial Deregulation			**Complete Deregulation**		
	Total	**Equity**	**Debt**	**Total**	**Equity**	**Debt**
Intercept	-1.460***	-2.481***	-1.606***	-1.425***	-2.452***	-1.784***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Dereg	-0.118*	-0.137	-0.079	0.008	-0.020	-0.069
	(0.08)	(0.20)	(0.27)	(0.90)	(0.85)	(0.32)
Pdreg	0.081	0.419***	-0.106	0.265***	0.923***	-0.110
	(0.23)	(0.00)	(0.15)	(0.00)	(0.00)	(0.11)
*Dereg*Pdreg*	0.092	0.013	0.245***	0.266***	0.303***	0.508***
	(0.29)	(0.92)	(0.01)	(0.00)	(0.01)	(0.00)
$LNAT_{t-1}$	-0.103***	-0.157***	-0.071***	-0.069***	-0.110***	-0.010
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.26)
MTB_{t-1}	0.187***	0.291***	-0.033**	0.321***	0.381***	0.027**
	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.01)
E_{t-1}/AT_{t-1}	0.341*	0.005	0.634***	-0.789***	-1.191***	0.437***
	(0.07)	(0.98)	(0.00)	(0.00)	(0.00)	(0.00)
$Bklev_{t-1}$	1.568***	1.034***	1.357***	0.617***	-0.019	0.900***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.86)	(0.00)
$CAPX_{t-1}$	4.750***	1.818***	4.852***	3.781***	1.259***	4.391***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Pseudo R^2	0.10	0.09	0.07	0.13	0.19	0.06
N	11,177	11,166	11,262	13,913	13,890	10,299

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ABSTRACT

ECONOMIC DEREGULATION AND CORPORATE DIVIDEND POLICY

by

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December 2012

Advisor: Dr. Ranjan D'Mello

Major: Business Administration (Finance)

Degree: Doctor of Philosophy

I investigate the evolution of corporate dividend policy in response to the changing operating environment induced by economic deregulation from the 1970s-1990s. Specifically, I examine the impact of deregulation on the firm's propensity to pay dividends, dividend payout ratio, the sensitivity of corporate dividend policy to earnings, changes in the information content of dividends, and changes in corporate financing behavior along the deregulation process. Empirical results reveal that economic deregulation does not have significant incremental impacts on firms' propensity to pay dividends. However, it seems that firms reduce dividend payout along the deregulation process and adjust their payout ratio closer to that of non-regulated firms. I also find that deregulated firms' dividend policy becomes more sensitive to past and current earnings following deregulation. In addition, deregulated firms become more active in external financing activities in the new operating environment, which subjects them to more frequent and closer monitoring of financial markets. The findings are in general consistent with predictions of the agency theory of dividends. However, the empirical results provide little

support to hypotheses based on the information content theory and the clientele theory of dividends in the setting of economic deregulation.

Key words: *Dividend policy, economic deregulation, agency conflict, information content, signaling, tax-based clientele*

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