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ANALYZING ENERGY FIRMS' DISTRIBUTION POLICIES IN A POST-JGTRRA ENVIRONMENT

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ABSTRACT

Corporations establish business models and create strategic initiatives aimed at maximizing shareholder value. In doing so, firms have a decision as to multiple forms of capital allocation, comprised of, in their simplest breakdown: dividends, share repurchases, capital expenditures, and debt repayments. The extent of each relies on a number of factors, including the prevailing tax benefits and investment opportunities, and becomes especially prudent in firms with heavy cash flows; such as the case in the energy sector (ex-utilities). When parity amongst capital gains and dividends exists and growth is rampant, the balance between distribution policy and capital deployment becomes a much more complex and intriguing puzzle. The inherent goal of this paper is to analyze a time period under the aforementioned conditions, specifically June 2003 - December 2007, post-Bush tax cuts, in order to decipher whether any clear signal exists as to why firms established their respective distribution and investment policies, and whether said policies had statistically different outcomes for these companies. I found that while both total and aggregate dividends increased, the likely basis behind this was a recovery in net cash flows rather than tax policy. Further, distribution switching was not pronounced, as dividends did increase at a significant rate, but the breakdown of distributions shifted heavily towards repurchases. Lastly, while there was too much noise for a robust result, I saw that management acted too cautiously and thus inefficiently when determining uses of cash flows. These conclusions come at the hands of both qualitative and quantitative analysis of firm and industry actions by creating a linear regression model that accounts for allocations, margins, and sensitivity to oil prices and the broad market.

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Section I: Introduction

As an agent to shareholders, management has long dealt with the dilemma of a continually changing environment when implementing strategic initiatives for increasing shareholder wealth. The decision, which must balance growth with distribution policy, has to take into account a number of firm and industry-specific variables, including commodity price equilibrium (on both the supply and demand side), growth prospects (available resources and the cost of capital), regulatory guidelines[1], and risk tolerance for both the investor and manager[2]. When government intervention alters the benefits of each form of investment (including distribution) whether through direct action or policy changes, it becomes judicious for corporations to re-examine their respective distribution and spending habits. This paper will attempt to analyze firm distribution policy and cash allocation after the JGTRRA, or Jobs Growth and Tax Relief Reconciliation Act of 2003, which lowered both the tax rate on dividends and capital gains, creating parity at 15 percent for the highest tax bracket.

This thesis will build upon previous studies[3] and create both a linear regression and ANOVA model of cash flows based upon a combination of the key themes within the macroeconomic environment and energy industry. The study will primarily analyze company returns as a function of dividends, share buybacks, debt reduction, capital expenditures, return on average capital employed, and price sensitivity to both oil and the broad market to decipher

[1] This paper will specifically focus on the Bush-era tax cuts (2001 EGTRRA and 2003 JGTRRA).
[2] Jensen (1986) argued that firms invest in sub-optimal projects (e.g. pay dividends) in an attempt to remain risk-averse. The allocations must also take into account the various financial externalities that a firm must examine, such as public sentiment around payouts, analysts/economists' views on the business model, and mutual/hedge fund volumes. More specifically, there are multiple firm announcements that can have both intended and unintended consequences on stock prices, including but not limited to regular and special dividend payments, share repurchases, acquisitions, guidance, and growth forecasts.
[3] Such as Lintner's Dividend Model, Osmundsen et al. on the valuation of oil stock prices, and the principles of the corporate cash-flow and dividend signaling model.

whether clear signals of future performance can be developed during the time, as well as to determine whether there was an 'optimal mix,' during this business cycle upswing (or if the noise is too great to come to a conclusion altogether). Further, quantitative analysis of distribution actions, such as dividend increases and distribution switching, will be examined to determine if the dividend increases and switching seen across the board[4] were particularly prevalent in the energy space. Both are developed with a focus on tax policies, as these were the driving forces behind establishing the increased opportunity for investments as well as new distribution benefits to investors.

The following section will provide a brief overview of distribution policy, corporate finance theory, historical tax codes, and the energy sector. In Section II, past studies are examined and their conclusions revisited in the context of the JGTRRA and the oil and gas industry in an effort to determine if they still hold or if new hypotheses need to be created. Section III establishes the motivations for research and model assumptions as prior studies are further examined under these contexts. Section IV provides the data and methodology, while Section V explores the resulting hypotheses that this study attempts to explore. Section VI discusses the empirical results and VII the conclusions of the thesis.

[4] The arguments of Blouin et al versus those of Bratton Kopcke will be examined.

Oil Markets

Oil & gas products range from gasoline to heating distillate, and the markets reach is endless. The major firms in the space are typically split into three main classifications: upstream, midstream, or downstream operations. Each has a specific market function aimed at inevitably completing the process of finding, extracting, refining, and distributing crude and its usable products. Upstream, or exploration and production, is when firms actively seek new acreage to extract crude oil and its equivalents, typically through drilling. These firms rely heavily on oil prices and have a 'net long' position, meaning, to an extent, their share price should have a positive correlation with oil prices. This will be referred to as a firm's 'oil sensitivity' moving forward, and will be explored in more detail as it becomes useful. Midstream is the process of 'cracking,' or turning crude oil into refined products, such as gasoline and heating distillate. These companies are either stand-alone or act as a daughter company to a larger producer, many of whom have been spun-off. A key difference is that these firms rely heavily on the 'crack spread,' or relationship between the price of crude and the price of its refined products. As such, increases in crude prices alone are not beneficial without a resulting shift in the gasoline markets[5]. Downstream is defined by selling these refined products to consumers. When a firm participates in all three phases, it is commonly referred to as a major integrated. Understanding how each firm's business model operates with respect to the previous classification will greater allow for an understanding of not only their relationship with crude prices but also how they make investment decisions, and further permit narrowing the focus of the study.

[5] As well as jet fuel prices, diesel, heating distillate, etc.

In understanding these markets, it is crucial to establish not only the classification of firms but also an economic foundation behind both price equilibrium and the major participants from a supply and demand standpoint. In oil markets, demand comes from a broad range of consumers and has an impact on everyone's day to day operations. From the operation of motor vehicles to heating homes to supplying energy for large corporations, the industry has become a trillion dollar business and affects nearly everyone.

The supply comes from both large sovereign organizations and private corporations. The largest sovereign organization, OPEC, controls a commanding seventy nine percent of the world's oil reserves and is active in just under half of its production. As such, it functions as a primary source of price control (less so now), although these twelve countries who comprise the Organization of Petroleum Exporting Countries are inclined to release crude along with the objective of establishing fair and sustainable price equilibrium to reduce major price fluctuations. The second largest supply-side player is the OECD, or Organization for Economic Cooperation and Development, which controls a significantly smaller portion of oil and encompasses the United States.

The other aspect of the supply-side revolves around the corporations themselves, whose vested interest, if public, is to maximize shareholder value. Some private firms act at the hands of their government and as such operate along different guidelines. These firms purchase land (from individuals or governments), lease acreage, or enter into contracts to tend to the fields or perform any associated work therein. It is the public, shareholder driven firms that will become the basis for the study.

As such, firms face a type of equilibrium game that can be simplified to a two decision model. Imagine that these decisions are produce or not (more specifically, produce at the current rate or expand production via current field or new investments). If all firms choose to produce, despite the ability to sell more oil, profits on existing reserves will decrease as the excess supply will shift the equilibrium price of oil lower. Conversely, the decision to wait will (if followed by all), establish rising prices and guarantee increased profits on existing reserves. This decision making process caused new investments to slow, as described by Osmundsen, and let production on current reserves hit 'peak oil' in 2005, a situation in which the maximum rate of petroleum extraction for a given well is hit[6], further driving up oil prices in the fear of a supply shortage. The equilibrium price that results as a function of the aggregate supply and demand is pivotal, as it has ramifications on a spectrum of consumers as well as the macro economy as a whole. Crawford and Fredericks[7] hypothesized that a ten dollar increase in the price of oil would result in a forty basis point decrease in GDP while simultaneously increasing inflation by fifty basis points. These effects can have drastic impacts when oil prices rise at the rates seen from 2003-2007, and require further investigation when interpreting the proposed model.

This price equilibrium, and expectations of potential fluctuations, can be seen in the futures curve, whose market allows firms to hedge against any drastic changes in these prices. The futures curve graphs the projected prices of a commodity versus time, similar to that of a yield curve. Backwardation is a market situation in which futures prices are lower at time T+N than at time T, whereas contango reflects the opposite (and more intuitive) situation, where futures prices are higher than spot, or current market prices. Backwardation either exists as a

[6] Causing further extraction to decline at a rate typically defined by a Hubbert logistic curve.
[7] Crawford, Peggy. Fredericks, Edward. (2005). Energy Prices and The Global Economic Recovery. *Journal of Business & Economics Research*. Volume 3, Number 1. 25-32.

function of seasonality in energy demand or specific events (wars, production shortage, etc.) that are expected to dissipate in the coming months. This feature was common nature of the curve throughout the time horizon explored and had a drastic impact of management's reluctance to invest.

Firms that choose to enter into hedging practices, as almost all do to some extent, effect the price sensitivity to oil, or risk tolerance, that each has. Thus, it will be interesting to determine whether managers with higher oil sensitivities act as such and invest heavily in new projects. Note, however, that it is possible that the relation is reversed, wherein firms hedge significantly as a result of risky position in unproven regions.

As the industry has some very complex operations and such strong cash flows, there are a number of specific metrics that are vital in the industry for understanding profit and valuing firms:

Return on Average Capital Employed

A financial ratio that shows profitability compared to investments made capital employed. This metric is especially prevalent for capital intensive firms with strong cash flows such as oil companies. It can sometimes be deceptive as its value will decrease immediately following investments and then increase as they become profitable. As a major focal point of analysts, this reason has been used to justify the 'sideline' decision in the aforementioned production decision. RoACE is calculated as:

$$\frac{\text{EBIT}}{\text{Average Total Assets - Average Current Liabilities}}$$

Total Assets - Current Liabilities = Capital Employed [8]

Reserve Replacement Ratio

This metric is calculated by dividing the amount of reserves added by the amount extracted. A ratio greater than one (or 100 percent) is a sign of growth, whereas below one (100 percent) signifies the likely decline of production. In order to get a more accurate figure, these results are typically smoothed over a number of years, similar to RoACE. One important feature is the term reserves and how the industry classifies various types of reserves. The reserves range from proven, with a very high likelihood of being extracted to probable, possible, and finally unproven (less than ten percent likelihood of extraction). This allows analyst's to classify expected future revenue under a discounted cash flow model.

Corporate Finance Overview

As an investor or manager, maximizing wealth is oft believed to be the paramount objective and the driving force behind all decisions. The major ways in which equity holders are able to profit are distributions and capital gains, the former of which remain at the discretion of the firm. As firms with strong cash flows, oil & gas companies have excellent liquidity in strong economic environments as the credit markets remain vast to finance not only their day-to-day operations, but also distributions.

The basic principle of irrelevance theory, first introduced in 1958 by Modigliani and

[8] Investopedia. 2012. http://www.investopedia.com/terms/r/return-on-average-capital-employed-roace.asp#ixzz1pVLJGqVe

Miller[9], claims that distribution policy is irrelevant by assuming markets are frictionless and defining investment policy as fixed. When firms payout excess cash flows, the theorem determines that either way it is paid out is equally beneficial to the shareholder. Firms have the option to distribute cash flows directly to the investor via dividends, either special or regular, or indirectly through share buybacks. While share buybacks are typically announced just like dividends, they are more flexible, whereas dividends are considered 'sticky,' meaning that they are fairly consistent from period to period.

As a corollary, the dividend signaling model has typically implied that increased dividend or special dividend payouts indicate strong future earnings prospects, as they highlight the firms' current financial strength and ability to continuously generate cash flows, while any reduction will signal the firm's inability to handle current liabilities, and thus cause the equity to trade down. While regular dividends are usually paid on a quarterly or bi-annual basis and are announced by the firm, special or one-time dividends typically come unexpectedly and are more flexible in that manner. Special dividends were more prevalent in the in the earlier portion of the 20th century, wherein they were favored over regular dividends (while being paid in a similar fashion) in that by the dividend signaling model specials could cease payment without the same effects of altering regulars and were also more flexible. This tactic gradually dissipated into the latter half of the century and shifted towards repurchases, whose similar flexibility and tax benefits offered a better alternative, as argued by Bratton.

These share repurchases increase investor value by repurchasing outstanding stock, and, in doing so, driving up the share price without the same tax disadvantages to the equity holder.

[9] Modigliani, F., & Miller, M. (1958). The Cost of Capital, Corporation Finance, and The Theory of Investment. *American Economic Review*, 261-297.

Bratton highlighted these benefits below, which were contingent upon specific tax regulations:

> First, OMRs offered the lower capital gains rate to the selling shareholders, along with a tax deferral and the same lower rate for non-selling shareholders. Second, OMRs increased earnings per share by reducing the number of shares outstanding. Third, OMRs signaled good news and supported the firm's stock price in the market. Fourth, because OMRs suited management's preferences, they facilitated payout and reduced the risk of suboptimal earnings retention. Old-fashioned dividends, in contrast, carried a tax disadvantage for most shareholders, did nothing for earnings per share, did less than OMRs to support the stock price, and overly constrained cash flow management.

As such, tax codes remain a pivotal argument behind distribution breakdown, and whether firms change policy as a result of tax implementation is heavily debated.

The second way an investor is able to profit off of an equity investment is through an increase in the share price. When this occurs, an investor is able to sell his or her shares at a higher level than they were purchased, thus making the difference per share a capital gain. It is not until the shares are sold that an investor profits and pays taxes from said capital gains. The justifications behind movements in equities are vast, but in the long-run there is a number of valuation techniques aimed at creating the 'best guess.' The various types of metrics range from simple multiple comparisons (such as Price/Earnings comparisons and extracting a price by multiply through by future earnings projections) to CAPM to Discounted Cash Flow Models (projecting out future cash flows and discounting back to find an intrinsic value per share) to precedent transactions (basing price off of other acquisitions and mergers). This paper mainly uses the EMH and DCF model in theory to discuss future cash flows being priced into the share

price, as well as RoACE, a supplemental metric of the era. The efficient market hypothesis refers to the notion that all currently available information is priced into the value of the stock, which is used as an assumption of this model to claim that the valuation includes projected growth in commodity prices, production, reserve efficiency, etc.

At the point that an investor sells his equity, he or she then must pay taxes on profits, at a rate dependent upon a number of factors, including income, gain/loss, and length of time held (long-term capital gains are those assumed to be the main topic of this paper, taxed at 15% post JGTRRA, whereas short-term investments remain taxable at one's income bracket). Taxation actually begins at the corporate level imposed against each dollar of profit. Once paid, the remaining money can then be allocated at the discretion of management, including distributions. This distribution is then distinguished as income to the individual and taxed again at his or her personal tax rate (based upon the investor's income level and exemptions). For taxpayers in the highest tax bracket before the Bush-era tax cuts, income tax took 38.6% of aggregate dividend payments. Corporate management faces double taxation, in which they pay taxes at both the corporate and investor level. Under this pretext, some claim that dividend payments are an inefficient use of capital, and corporations historically preferred to invest in activities that generate capital gains, on which investors also paid tax, albeit at the significantly reduced rate (20% prior to 2003), encouraging companies to spend revenue on research and development, new equipment, OMR's, etc[10].

The major theme here is that management sometimes has their own self-interest in mind when making decisions that may differ from that of the individual investors. This becomes

[10] Please refer to the literary review for a further discussion on the benefits of various distribution policies.

prevalent when managers favor distribution policy that is more beneficial to them; for example increasing dividends rather than reinvesting assets in the firm (it can be better for managers for a wide range of reasons, however this case will cites tax rates as the primary disconnect between managers and individual shareholders) or remaining risk averse to avoid being fired. In total, understanding the nature of distributions as well as management's decision making, in aggregate with a background of the oil industry will create a unique look at firms whose investment decisions are at the crux of the overall success of the firm, and long-term gain of the shareholder.

Section II: Prior Studies

In an attempt to better gain an understanding of the context for this study, it is crucial to review the works that are widely accepted across the financial community and explore not only their strengths and weaknesses, but moreover, their relevance to this particular topic with the goal of extracting unexplored areas to focus. As such, we review the literary works in the following areas: Distribution Policy & Dividend Signaling, Major Tax Policy, and Oil & Gas Operations and Valuation.

Distribution Policy & Dividend Signaling

Historically, distribution policy has been one of the more widely debated topics in corporate finance theory. As previously mentioned, Modigliani and Miller's *The Cost of Capital, Corporation Finance, and The Theory of Investment*[2] postulated that in a frictionless world with investment policy constrained, payout policy does not have a direct consequence on shareholder value. Under this axiomatic irrelevance proposition, investors are indifferent between dividends and share repurchases. Unfortunately, financial theory is not always the basis for real-world decisions, and as such, it is important to explore the major theories that establish an alternative perspective.

The Dividend Puzzle[11], first presented by Black, argued that investors receive greater benefit from share repurchases, as the tax implications of the era created a disparity between the after-tax profits of the individual. This assertion initially came to be accepted under times where dividends were taxed more heavily than capital gains. Bagwell and Shoven provide additional support for this claim in *Share Repurchases and Acquisitions: An analysis of Which Firms*

[11] Black, F. (1976). The Dividend Puzzle. *Journal of Portfolio Management* , 2, 5-8.

Participate[12], showing an increase in repurchases in the 1980s, which they attribute to firms learning the aforementioned tax advantages of repurchases over those associated with dividends. This paper analyzes a time period under rate parity, inevitably forcing my model to re-examine the theory and attempt to rationalize distribution patterns.

On the contrary, in *Disappearing Dividends: Changing Firm Characteristics or Lower Propensity to Pay?*[13], Fama and French verified that most repurchases are paid by firms that simultaneously issue a dividend, insinuating that companies may be simply increasing repurchases to provide additional distributions rather than substitution, as previously discussed. As such, the model for this paper will use two separate hypotheses to determine the benefits that oil & gas producers see from distributions by decomposing cash flows to see which coefficient yields greater return per dollar increase (and if the two are statistically significant).

In circumstances where managers depart from Black's theory and pay dividends, we must explore the decision-making process further to determine whether there is an underlying objective or a principal-agent problem. In Michael Jensen's *Agency Cost Of Free Cash Flow, Corporate Finance, and Takeovers* [14], managers invested in suboptimal projects (r<k) in an effort to remain risk averse, which he claimed was the basis behind dividends. As the model for this study assumes that the economy had very little waste as the result of commodity prices inflating rapidly (despite peak oil, which is said to have occurred in 2005), we consider Jensen's analysis of risk-aversion as a key flaw in corporate decision making. As such, managers who

[12] Bagwell, L., Shoven, J. (1988). Share Repurchases and Acquisitions: An analysis of Which Firms Participate, in: A. J. Auerbach, ed., *Corporate Takeovers: Causes and Consequences* (University of Chicago Press: Chicago, IL), 191-213.
[13] Fama, E.F., French, K.R. (2001). Disappearing Dividends: Changing Firm Characteristics or Lower Propensity to Pay? *Journal of Financial Economics* 60, 3-43.
[14] Jensen, Michael C. (1986). Agency Cost Of Free Cash Flow, Corporate Finance, and Takeovers. *American Economic Review*, Vol. 76, No. 2.

choose to act this way do so incorrectly, as examined in hypothesis three.

When dividends are issued, maintaining or increasing them has been theorized to directly impact share price, as investor's take them as a signal of strength and confidence from management, which was first coined the "information content of dividends" under the MM model, and was extended to the dividend signaling model, whereby changes in dividends cause investors to take action on the signal given by management. In *Dividend Changes and Future Profitability*[15], Nissim and Ziv confirm the model by using normalized returns of earnings announcements following dividend announcements. My model will not directly test dividend signaling, but will rather look to analyze returns as a function of dividend payments to see if dividends, and distributions altogether, can have a positive impact on share price.

Brav and Campbell surveyed 384 financial executives as well as conducted in depth interviews with 23 of them in *Payout Policy in the 21st Century*[16], which was used to determine the factors that drive dividend and share repurchase decisions. As mentioned by Jensen, management's decision making process plays a vital role in the efficiency and ultimately long term success of a firm, and thus gaining a better understanding for executives' motives will go a long way in providing context for spending. The conclusions from the general consensus amongst the boards studied included a strong desire to maintain the current dividend level, consistent with dividend signaling, which many managers felt was equally as important as new investment. This is vital to understanding why dividends may have been paid after the JGTRRA despite the apparent opportunities for investment. Additionally, repurchases are made from excess cash after investments, however many managers favor repurchases as they are more

[15] Nissim, D., Ziv, A. (2001). Dividend Changes and Future Profitability. *Journal of Finance* 56, 2111-2133.
[16] Brav, Alon P., Harvey, Campbell R., Graham, John R. and Michaely, Roni, (2005). Payout Policy in the 21st Century. *Tuck Contemporary Corporate Finance,* Issues III, Conference Paper.

"flexible" than dividends. Lastly, tax considerations play only a secondary role in the decision making process. This final notion is fairly contradictory to many of the prior studies who cite tax code as a major factor behind distribution breakdown, leaving to fact some uncertainty in the model. However, the following section will explore this in much greater depth to fully determine the extent to which the 2003 tax codes had an effect on distribution policy.

Major Tax Policy

The JGTRRA presented an entirely new tax code for distributions and capital gains, altering the way that management had previously handled this policy. The two major developments were the reduction of the tax on dividends to 15% from the personal income rate (for those in the highest bracket, and as low as 5% for those making little to no income) and a reduction in the tax on long-term capital gains from 20% to 15% for taxpayers also in the highest tax brackets. This, in theory, created parity between the various methods of distribution available to publicly traded corporations (discussed later in further detail).

The first topic that was explored after the JGTRRA was whether or not there was a statistically significant difference in the number of dividends and amount of dividends issued in the quarter after, as this temporary bill was the largest of its kind, and as such, the expectation was that major dividend increases would immediately occur. In Blouin, Raedy, and Shackelford's, *Did Dividends Increase Immediately after the 2003 Reduction in Tax Rates?*[17], dividend changes were analyzed in the quarter following passage. Their study found that aggregate dividends rose by nine percent, wherein a major portion occurred in firms with high

[17] Blouin, Jennifer L., Raedy, Jana Smith and Shackelford, Douglas A., (2004). Did Dividends Increase Immediately after the 2003 Reduction in Tax Rates? *NBER Working Paper Series*, Vol. w10301, 2004.

individual ownership, confirming the notion that it was tax-motivated. One firm even went as far as issuing a special dividend primarily at the request of its largest shareholder who wished to take advantage of the relatively low tax rate on dividends. These claims are aligned with managers acting in their own interests, bringing to the forefront the principle-agent problem. The results, however, only saw major adjustments from firms that issued large, special dividends, as there was little evidence of an increase in regular, quarterly dividend payments at the time.

Their follow up work in October of 2004, entitled, *The Initial Impact of the 2003 Reduction in the Dividend Tax Rate*[18], focused on the consequences given a greater time horizon for the full effects to kick in. They found dramatic increases in not only special dividends, as previously confirmed, but also regular dividends, seemingly inconsistent with what one may expect as the law had a sunset clause, which should correlate to a greater focus on specials as these benefits are not sustainable. Further, they found evidence of distribution switching with a decline in share repurchases in favor of dividends. This was in contrast to The Tax Reform Act of 1986, which also reduced the top individual tax rate on dividends significantly, but, "led to a temporary, concentrated rise in special dividend payments and not a significant difference in the number of regular dividend payers." Further, they were able to confirm with some confidence that there was a change in distribution policy for firms with high insider ownership.

In Chetty and Saez', *Do Dividend Payments Respond to Taxes? Preliminary Evidence from the 2003 Dividend Tax Cut*[19], similar longitudinal data on dividend distributions to Blouin et al.

[18] Blouin, Jennifer L., Raedy, Jana Smith and Shackelford, Douglas A., (2004).The Initial Impact of the 2003 Reduction in the Dividend Tax Rate.
[19] Chetty, Raj and Saez, Emmanuel, (2004). Do Dividend Payments Respond to Taxes? Preliminary Evidence from the 2003 Dividend Tax Cut.

was used to examine whether Microsoft and other firms' behavior post JGTRRA was a result of a successful tax policy (Microsoft used their $60B cash reserves to pay $30B in special dividends and structure a $32B share repurchase plan). The paper analyzed data from the Center for Research in Security Prices (CRSP) spanning 1980 to 2004, and found a sharp and widespread surge in dividend distributions following the tax cut, along several channels. First, the proportion of firms paying dividends increased just after the JGTRRA after having declined continuously for more than two decades. Using time series analysis they claimed that the "associated noise was too great to determine whether the amount was distinguishable, but the total number of dividends did increase as a result of the Bush tax cuts." Further, they claimed that aggregate distribution payments increased, rather than pure distribution switching, similar to Fama and French's theory.

Chetty and Saez also analyzed corporate behavior in *Dividend Taxes and Corporate Behavior: Evidence from the 2003 Dividend Tax Cut.*[20], providing additional evidence for specific groups of firms depending on size and growth prospects. In doing so, they suggested that the tax response was "confined to firms with lower levels of forecasted growth, consistent with an improvement in capital allocation efficiency. The response to the tax cut was strongest in firms with strong principals whose tax incentives changed (presence of large taxable institutional owners or independent directors with large share holdings), and in firms where agents had stronger incentives to respond (large executive ownership and low levels of executive stock-options outstanding)." These findings show that principal-agent issues play a central role in corporate responses to taxation. Additionally, it yields the question as to whether specific sub-

[20] Chetty, R., Saez, E. (2005). Dividend Taxes and Corporate Behavior: Evidence from the 2003 Dividend Tax Cut. *Quarterly Journal of Economics* 120, 791–832.

sectors, specifically those with higher forecasted growth, will yield statistically significant results under my model.

In *The Taxation of Equity, Dividends, and Stock Prices*[21] Kopcke notes that reactions to the tax policy will differ depending on the examined time horizon and firm rather than having the broad ability to define how the taxes will affect firms in total. In the short-run, "dividends will continue to rise in the customary way in response to the recovery in earnings." As such, he is claiming that no real shift towards dividend payouts occurs. In general, "[…] companies can reduce their cost of capital by purchasing their stock instead of paying dividends when the tax rate on dividends exceeds that on long-term capital gains," however, parity eliminates this ability. As the time horizon expands, the tax-cuts will principally reduce company's costs of capital, in that they reduce the cost of equity. He also claims that price-earnings ratios could rise by as much as ten percent and stock prices by more than six percent in the long run. Thus, we will attempt to explore changes over time and compare dividends to profitability, cash flows, and equity returns of the firm rather than as a stand-alone statistic.

William Bratton attempts to tackle the question of whether, assuming payout, dividends hold out relative advantages over stock repurchases as the mode of payment. *The New Dividend Puzzle*[22] uses comparative analysis of dividend volume to conclude that the signaling value is too weak to explain the shift toward dividends (no fundamental shift in payout practice). Further, Bratton suggests that the JGTRRA poses a firm specific cost-benefit analysis that must be run by each company, rather than offering a broad benefit or policy change. This opens up the primary

[21] Kopcke, Richard W. (2005). The Taxation of Equity, Dividends, and Stock Prices. FRB of Boston Working Paper No. 05-1.
[22] Bratton, William W., The New Dividend Puzzle (August 13, 2010). *Georgetown Law Journal*, Vol. 93, p. 845, 2005; Georgetown Law and Economics Research Paper No. 535462.

question for this study: Did the JGTRRA simultaneously cause energy firms to alter their respective distribution policies, and if so, is it possible to determine the benefit.

In a Congressional Report on the JGTRRA[23], mostly comparative studies from data collected by dividends.com between pre-and post-2003 data (how many dividends were issues, etc.). Essentially the conclusion cites increased dividends, improving GDP, a healthier economy, and increased investments to proclaim the JGTRRA as a success. According to the study, the "JGTRRA, and its earlier cousins, were timely and effective[24]." The report also highlighted some of the most crucial aspects of my proposal, including the economic conditions of the time for oil and gas firms, who began to heavily reinvest in projects as the oil markets rebounded. This hypothesis is another basis for examination as a similar question to the dividend example arises: did these increases occur as a natural result, were they robust, and did the JGTRRA play a significant role in the equilibrium.

Oil & Gas Operations and Valuation

In order to rationalize the results in terms of this specific industry, it is first important to understand the major differences between the operations and equilibrium decisions between oil & gas firms versus the broad market. When Hotelling first discussed the oil markets in *The Economics of Exhaustible Resources*[25], he explores the relation between futures and interest rates, claiming that, "given certain simplifying assumptions, the opportunity cost of storing oil is the foregone interest rate." In other words, the price of oil is expected to appreciate at the

[23] http://www.house.gov/jec/taxation/TaxIncentives.pdf.
[24] We use this conclusion only to validate assumptions on our model.
[25] Hotelling, Harold. (1931). The Economics of Exhaustible Resources. *The Journal of Political Economy,* 137–175.

interest rate. This assumption will provide the prevailing concepts behind futures and will be vital in explaining backwardation later in the study.

When creating a model based on energy firms' reactions to dividends, it was vital to not only build off of what we knew for how companies typically react to tax benefits for dividends but also how energy companies are valued in a real world setting. In *Long-run Models of Oil Stock Prices*[26], Manera et al. look at the major oil firms and decompose four major factors that determine the equity price relative to its current value. First, an increase in the ratio between future and spot prices corresponds to an increase value for firms who have net long positions in oil. As such, it is crucial that we either run the model separately for each sub-sector, eliminate those that are net short crude, or account for sensitivity to oil in the model. Second, they suggest that oil prices have a long-run correlation to the price movement (originally verified using SLR), which they further prove through a VECM analysis. Additionally, given crude's denomination in local currency, they claim that said currency's value would also inversely affect the price of oil, and indirectly the price of the stock (although they fail to discuss in much detail the unintended consequences of a weaker dollar and the associated diminished purchasing power and broad market rally that economic theory would suggest). I use their model as a basis for evaluating the effectiveness of their factors and conclude that my model is best served analyzing oil futures/spot prices, broad market movements, and company specific risk.

Osmundsen et al. explored a different valuation metric that has become increasing important in the recent years: RoACE. In *Valuation of International Oil Companies - The*

[26] Manera, Matteo, Lanza, Alessandro, Grasso, Margherita and Giovannini, Massimo, (October 2003). Long-run Models of Oil Stock Prices.

RoACE Era[27], they suggest that cash-flow variables dominate capital-cost variables in the Oil and gas exploration decision-making process. Based on data from 11 international major integrateds, they found no positive relationship between reported RoACE and market-based multiples. Additionally, they claim that the huge cash flows that have been built among oil and gas companies have found their way back to investors in recent years through increased dividends and share buybacks. In effect, they show that the spotlight on RoACE by analysts and investment banks likely influences E&P firms' budget decisions as fear of a decreasing RoACE (which would typically occur immediately following investments) drove firms to issue dividends and purchase shares rather than invest in a potentially profitable argument, offering a more sector specific logic behind the risk-aversion proposed by Jensen.

In studying the same equilibrium decision, Hong et al. took a different approach to the problem, insisting that volumes become equally as important when explaining equilibrium pricing and understanding the supply side concerns. In *The Impact of Higher Oil Prices on the Global Economy - A Tale of Two Different Cases*[28] they cite a causal relationship from economic theory in that increased oil prices should stimulate exploration and the development of new fields, but contend that most analysts are not looking at the core cause of increasing prices: lack of production. Their paper explores the global markets in two dimensions, prices and volumes, and evaluates how price changes must take both variables into account (and are fairly inconclusive otherwise). Their breakdown requires each model to analyze the broad market equilibrium game theory on decision-making and determine whether the overall policy is firm specific or can be classified on a more broad scale.

[27] Osmundsen, Petter, Asche, Frank, Mohn, Klaus and Misund, Bard. (2005). Valuation of International Oil Companies - The RoACE Era. *CESifo Working Paper Series*,No. 1412.
[28] Hong, Pingfan, Nsimba, Edouard, Gray, Carl and Diallo, Oumar, (November 22, 2004). The Impact of Higher Oil Prices on the Global Economy - A Tale of Two Different Cases.

In an Ernst & Young research report entitled *Investment and Other Uses of Cash Flow By the Oil Industry, 1992-2006*[29], a quantitative breakdown of the uses of cash flow evaluates overall usage of cash flows, and allows one to infer that new investment declined as a percent of total cash flows. Across the board (all sub-sectors and all sizes), they found decreases in new investments as a percent of total cash flow (mean of 75% in 2002 to 65% in 2006), while the overall amount increased significantly. This paper's main goal is to propose potential causes for these changes (particularly to note if there are tax specific consequences) as well as determining if there was an optimal investment strategy during the time.

Takeaways for Further Analysis

When taking the summation of these studies, there are a number of recurrent themes that become the motivation behind my thesis. First, the inconclusive nature of the tax effects on distributions. We see two major results, wherein Blouin et al. argue that dividend increases were statistically significant for both special and regular dividends (as well as total and aggregate numbers), Kopcke and Bratton offer an alternative hypotheses that, while crediting an increase, dismiss it statistically through another means, namely a rebound in corporate earnings and a lack of signaling strength, respectively. As such, I will provide the same analysis on a more niche subset of stocks, specifically the energy sector, to determine whether the opportunity cost for distributions can be considered greater due to the possibility of investment or lower due to the heavy cash flows and access to credit markets.

[29] Ernst & Young. (2007). Investment and Other Uses of Cash Flow By the Oil Industry, 1992-2006. http://www.api.org/oil-and-natural-gas-overview/industry-economics/~/media/A3A04578B88A4A4F88C8E542F3764036.ashx.

Additionally, the tax benefits created parity amongst dividends and capital gains, proposing the question of distribution switching. Similarly, distribution switching produced inconclusive opinions as some results found switching to dividends as a result of the diminished advantages of OMR's, while others claimed that no real change was noticeable. I will evaluate distribution breakdowns in the preceding and following years to determine if a relationship can be determined.

Lastly, production habits, which can be taken as a function of cash flows (as the breakdown between capital expenditures, especially those for new investment, versus distribution and debt repayment), were found to have a resounding impact on the price of oil stocks, which is a corollary of the inherent correlation between equilibrium oil prices and stock movements. As each model provides different methods for evaluating these firms, I will attempt to create a new model, one that operates as a culmination of the ideas set forth in the prior studies.

Section III: Motivations for Research and Historical Context

In July of 2010, while Lead Analyst of the Nittany Lion Fund's Energy Sector, one of my largest holdings, offshore driller Noble Corporation (NE), announced plans for a special dividend as well as doubling their regular dividend payment. While the dividend signaling theory would insist that the firm's actions signals future profitability and balance sheet strength, questions of the firm's inability to find new projects in the wake of the Gulf of Mexico oil spill (and the subsequent regulations imposed) caused analysts to question their growth prospects moving forward. Despite Noble's history of paying special's, speculation arose that the firm was distributing their cash reserves due to an inability to find further areas of production. As such, this thesis will attempt to explore whether an altered form of the signaling hypothesis holds for oil and gas firms that operate under what would appear in hindsight to have been an extremely accessible market.

In particular, energy firms require substantial principle for equipment and production (items such as rigs, tankers, mining resources, etc.); as such, dividends and other distributions (open market share repurchases, for examples) would seem to have an extremely high opportunity cost if management could efficiently deploy capital in the absence of waste. This statement inherently makes two very important assumptions: first, there are sufficient areas (purchasing more acreage, buying new rigs, searching for resources, etc.) in which said companies are able to allocate funds for significant profit, and second, firms are able to operate without waste. This paper will make two key assumptions in contrast to Jensen: firms have

access to projects that offer fairly equitable returns as a result of the environment[30], and management is responsible for the decisions leading to poor returns.

In order to ensure the most accurate results with respect to this study, we analyze the 2003-2007 time period (dividends issued in the period immediately following the JGTRRA and their success through 2007, avoiding the effects of the financial crisis on frozen credit markets) in which oil prices were perpetually rising in a (seemingly) improving economy[31], and use that fact to assume that low-return projects and waste were minimal and more the fault of poor management decisions, rather than a lack of opportunity. To clarify, this study does not make any claims about the 'true' health of the economy or even attempt to justify why these factor would create such a market, rather, it argues that the underlying nature of the economy perpetuated strong returns and allowed for (during the time period) opportunities to profit more readily for energy firms. I will examine the net returns of said companies as a function of capital allocations and other externalities to determine the overall relation. The following section decomposes both the macroeconomic and energy specific advantages and disadvantages that this period creates for the models.

Macro Economy and the Oil & Gas Industry

In order to understand why my assumption should hold, we must first analyze the macroeconomic conditions of the time period in question. In the few years prior to 2003, the economy had suffered a number of brutal hits including, but not limited to, the tech bubble and

[30] The "environment" is described below as one of low-interest rate and strong commodity growth, ideal for the firms in the study, allowing us to reject the idea of 'waste' as cited by Jensen. The interest rate environment, as discussed below, does increase greatly as the time period progresses, further evidence for the ideal opportunities immediately following the JGTRRA.

[31] Technically, the paper will begin after the Jobs and Growth Tax Relief Reconciliation, which was not signed into law until May 28, 2003.

September 11th, 2001. As the market turmoil and weak macro conditions continued to threaten many big businesses, President Bush wanted to implement a number of plans[32] in an effort to stimulate spending, and in turn, economic growth. The Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA), which he signed in on May 28, 2003, drastically overhauled the tax code in an attempt to spur investments in big business and in turn return more value to individuals. The following major changes and their effects were outlined by the provision[33]:

1. Reduced the tax rate on qualified dividends from the personal tax rate (up to 38.6% for the highest tax bracket) to a maximum of 15%
2. Reduced the maximum tax rate on long-term capital gains from 20% to 15%
3. Created parity between (1) and (2)
4. Accelerated many of the provisions in EGTRRA, which were supposed to be phased in more gradually
5. Increased tax deductions for small businesses

With respect to dividends and share repurchases, prior to the 2003, investors in the highest tax bracket paid 38.6% on distribution from both regular and special dividends, forcing management to consider alternative ways to deploy cash to shareholders, and therein came the aforementioned dominance of repurchases. While this paper does not aim to assess the effectiveness of the act in spurring an economic recovery, Timothy F. Slaper, Senior Economist at Cummins, Hassett and Hubbard investigated the effects of the 1986 Tax Reform Act, as well

[32] This paper will focus mainly on the JGTRRA, although the Bush Tax Cuts are historically considered to have begun in 2001 with the passing of the EGTRRA, or the Economic Growth and Tax Relief Reconciliation Act
[33] Amadeo, Kimberly. (2010). Jobs Growth Tax reconciliation and Releif Act: Impact of the JGTRRA on the US Economy. http://useconomy.about.com/od/fiscalpolicy/p/JGTRRA.htm

as the major tax reforms of 1962, 1971 and 1981, and concluded that changes in tax policy have had economically significant effects on equipment investments. This was further noted in the congressional report summing up the effects, although they analyzed stand-alone aggregate figures rather than broadening the scope to include other macroeconomic conditions, as my study will attempt to do. I will also attempt to determine whether the JGTRRA can be concluded to fall under the same category as previous tax codes as having 'caused an increase in equipment investment,' or whether the normal rebound in the market following a two year (post tech bubble and 9/11) bear market was the result (naturally, it could be concluded that the tax policy enacted was a major reason behind the recovery, and as such, I will explore its specific consequences on the sector in the absence of other factors).

In addition to its tax effects, the JGTRRA had some unintended consequences that would greatly impact the landscape of the commodity markets. After coming off of the bubble in 2001, an average barrel of WTI crude hovered around $25, depending on the month. The combination of an improving economy, a weakening dollar as a function of the JGTRRA (this was an unintended consequence as the tax breaks brought in significantly less revenue to the government (According to the CBO, hundreds of billions of dollars per year were lost as a result of the Bush tax-cuts[34]) and short-term interest rates were artificially low, the dollar began to weaken), and a low interest rate environment (as the economy improved, these rates inevitably increased with inflation and a risk-on trade) caused a spike in oil prices and investments to follow.

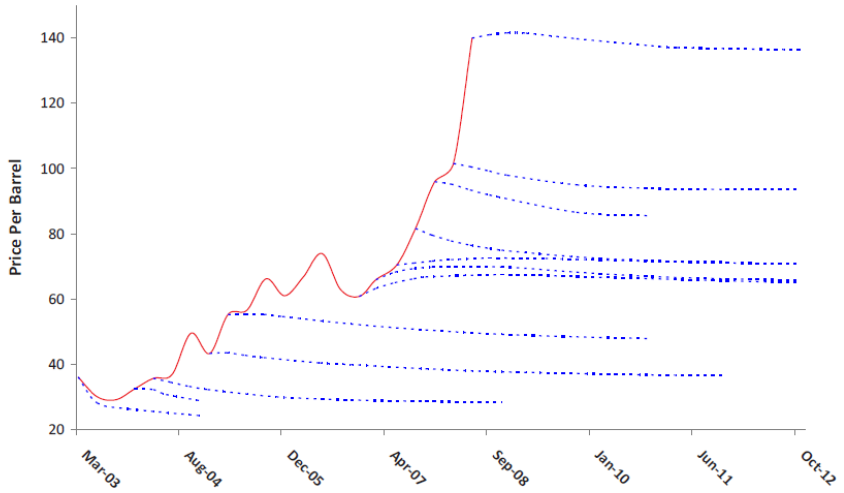
Economic theory states that, in the pursuit of greater profits, an increase in a firm's product will inevitably induce said company to expand output until it reaches the company's

[34] Orszag, Peter R. (2007). Congressional Budget Office. http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/83xx/doc8337/07-20-egtrra-jgtrra_and_deficits.pdf.

short-term, maximum capacity. Best understanding the motives of firms in investment projects must relate to the expected value of return (which can be viewed as RoACE, or as increasing cash flows and thus the intrinsic value per share) and the price sensitivity to oil. When the industry views these decisions, however, they must carefully tie their decision making to projected oil prices, as many firms hedge, or lock in profits, for a large minority or even majority of their production. As such, it is imperative to understand the mindset of managers at E&P firms, in particular, over the 2003-2007 period.

In the post JGTRRA era, in order for energy firms to expand output in the long run, they had to spend on capacity increasing projects as well as infrastructure and productive assets. Unfortunately for E&P managers, unrest in the Middle East was quickly thwarting prices higher, as supply side scarcity became the forefront of concern. In a similar notion to Lintner's model of dividend smoothing, oil and gas companies have paralleled concerns when deploying cash to new investments, as oil price fluctuations can drastically affect the return on a project. When analyzing the cases, it is vital to gather context as where the oil markets were and what the futures were signaling to managers at the time. Figure 1 below illustrates the rapid increase in oil prices with simultaneous negative sentiment on future prices, therein the backwardation.

Figure 1: Oil Prices and Adjacent Futures at Quarter End[35]



Source: Energy Information Administration and the Commodity Futures Trading Commission. Prices for futures contracts shown are for liquid markets (1000 or more contracts).

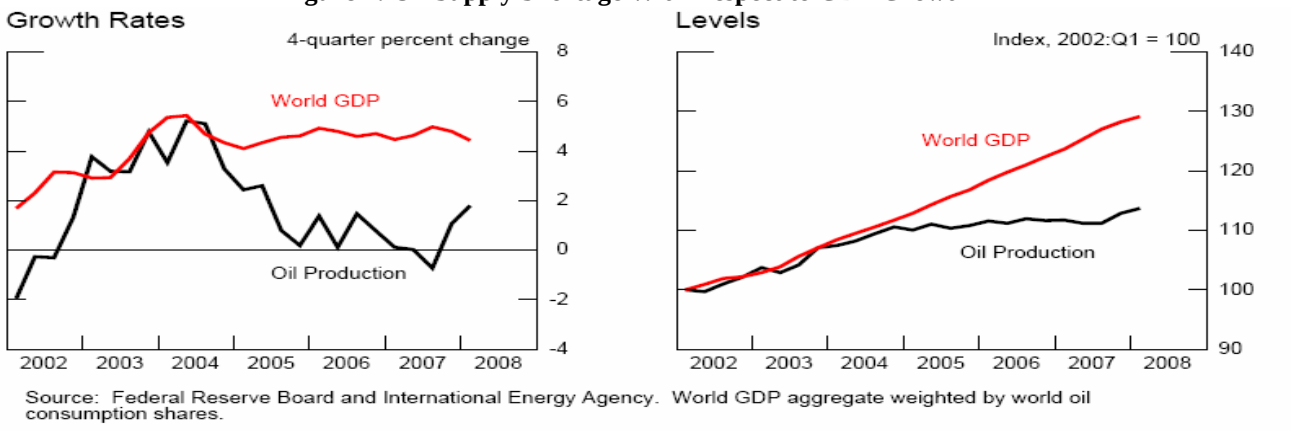
This backwardation caused diminished conviction on the part of managers, and, in conjunction with the emphasis on return as highlighted by Osmundsen et al., rationalizes how analysts focus on RoACE as a base metric of the times may have prevented some managers from fully investing. Under this theory, we could have seen, albeit with a high opportunity cost, an out flux of capital into the hand of investors, as theorized by Jensen. These theories, while logical, do not alter this paper's assumption, and primary objective; that a firm, in hindsight, could have improved returns to shareholders by altering their capital allocation.

The last thing to explore is the notion of peak oil, hypothesized by many to have occurred in 2005. In such, firm's extraction rates on existing wells hit at a maximum, creating the previous need to invest in new projects in order to keep the reserve replacement ratios high in the coming years (in other words, to avoid a supply shortage). This year will be a pivotal point in spending, and as such, particular attention must be paid to it in the conclusions. It can be duly

[35] Energy Information Association & Commodity Futures Trading Commission. (2008).Interim Report on Crude Oil. http://www.cftc.gov/ucm/groups/public/@newsroom/documents/file/itfinterimreportoncrudeoil0708.pdf

noted in Figure 2 below that oil production plateaued in the end of 2004 and staggered for the next three years. This was in the face of increasing demand and can highlight a number of possibilities, including risk-aversion, the 'wait' decision in the two-possibility production game, or, an inability to find projects that matched the required RoACE.

Figure 2: Oil Supply Shortage With Respect to GDP Growth[36]



Source: Federal Reserve Board and International Energy Agency. World GDP aggregate weighted by world oil consumption shares.

[36] Energy Information Association & Commodity Futures Trading Commission. (2008).Interim Report on Crude Oil. http://www.cftc.gov/ucm/groups/public/@newsroom/documents/file/itfinterimreportoncrudeoil0708.pdf

Section IV: Data Collection and Methodology

The main goal of this paper is to analyze the investment and distribution choices of energy firms after the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA). Mainly, we will focus on companies who meet all of the following criteria:

1. The company operates in the coal, natural gas, services, E&P, or major integrated oil and gas segment and is contained in the S5ENRS (the composition of energy stocks contained in the S&P 500)
    a. In being contained in the S&P 500, I assume that a firm has enough operating experience and strong enough cash flows to be considered 'mature.' This distinction is important as Lintner's theories rely on this basis
2. No major restructuring occurred during the time frame
3. The firm is expected to have a positive correlation to oil prices *OR* operate in a field that typically does

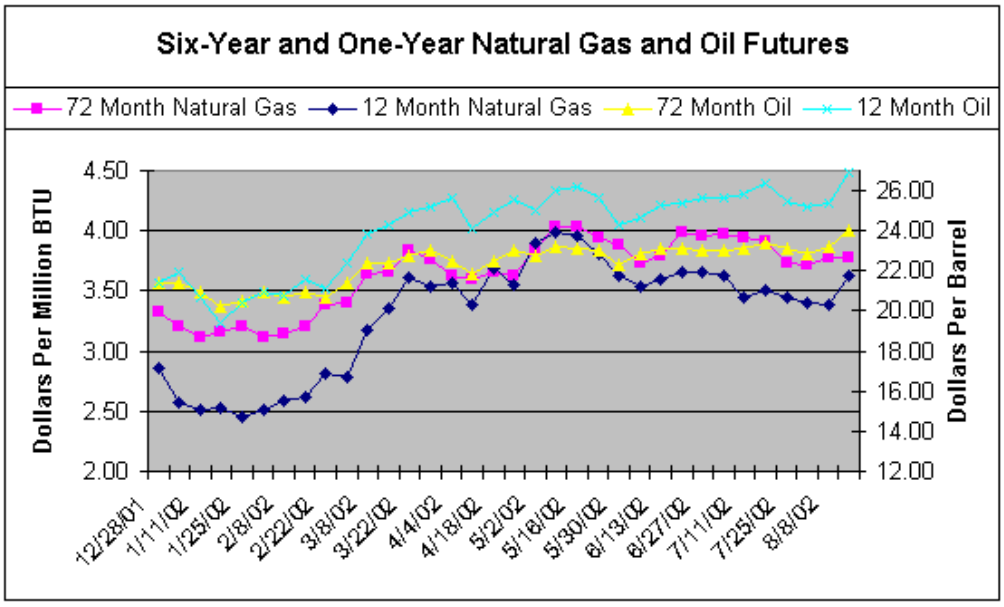
The search began with the forty-one firms currently comprising the S5ENRS, or S&P 500 energy sector, and was narrowed to thirty-eight firms after complete data was unable to be retrieved on the following companies: Alpha Natural Resources (ANR), Spectra Energy (SE), and WPX Energy (WPX). Further, in an effort to ensure the relationship with commodity prices, firms operating in the refining or pipeline space were also eliminated, which included El PASO (EP), Tesoro (TSO), and Marathon Petroleum Corporation (MPC), which was a spin-off of MRO's refining unit, bringing the total number of firms studied to the thirty-five listed below:

	Ticker	Company	Sub-Sector
1	RRC	RANGE RESOURCES CORP	Nat Gas
2	SWN	SOUTHWESTERN ENERGY CO	Nat Gas
3	NOV	NATIONAL OILWELL VARCO INC	Services
4	BTU	PEABODY ENERGY CORP	Coal
5	DNR	DENBURY RESOURCES INC	E&P
6	CHK	CHESAPEAKE ENERGY CORP	Nat Gas
7	HES	HESS CORP	Major
8	CNX	CONSOL ENERGY INC	Coal
9	DO	DIAMOND OFFSHRE DRILLING INC	E&P
10	NBL	NOBLE ENERGY INC	Nat Gas
11	FTI	FMC TECHNOLOGIES INC	E&P
12	MRO	MARATHON OIL CORP	E&P
13	WMB	WILLIAMS COS INC	Services
14	OXY	OCCIDENTAL PETROLEUM CORP	E&P
15	EOG	EOG RESOURCES INC	Services
16	COG	CABOT OIL & GAS CORP	Nat Gas
17	SLB	SCHLUMBERGER LTD	Services
18	CAM	CAMERON INTERNATIONAL CORP	E&P
19	COP	CONOCOPHILLIPS	Major
20	APA	APACHE CORP	E&P
21	NE	NOBLE CORP	E&P
22	MUR	MURPHY OIL CORP	E&P
23	HAL	HALLIBURTON CO	Services
24	NFX	NEWFIELD EXPLORATION CO	E&P
25	DVN	DEVON ENERGY CORP	E&P
26	SUN	SUNOCO INC	Major
27	HP	HELMERICH & PAYNE	Services
28	APC	ANADARKO PETROLEUM CORP	E&P
29	EQT	EQT CORP	E&P
30	CVX	CHEVRON CORP	Major
31	BHI	BAKER HUGHES INC	Services
32	XOM	EXXON MOBIL CORP	Major
33	RDC	ROWAN COS INC	Services
34	PXD	PIONEER NATURAL RESOURCES CO	E&P
35	NBR	NABORS INDUSTRIES LTD	Services

E&P: Exploration and Production, search and produce crude
Services: Provide technology and various services to E&P firms
Major: Major Integrated, operates across all spectrums
Nat Gas: Natural Gas Exploration, a subset of E&P
Coal: Coal Exploration, a subset of E&P

One minor assumption made in order to ensure that the sample size could be large was energy equivalence, meaning that due to the energy potential of each commodity being in some steady relationship (plus a premium to refine and store), oil, natural gas, and coal companies were used in the data set. While this relationship has deteriorated somewhat in recent years as a result of excess production, the below figure of the futures curves for oil and natural gas as of 2001 shows both short and long end futures in equivalence for the products.

Figure 3: Futures Curve Showing Equivalence Ratio[37]



Source: http://www.mcdep.com/industry11119.htm

While it may seem hypocritical to eliminate refiners while keeping natural gas and coal firms, one must realize that the expected percentage increase, in the long run, for shares of natural gas and coal companies, is more correlated than those of refiners as the respective commodities should track oil prices. Additionally, many firms own acreage that produces both forms of energy, making it difficult to completely eliminate natural gas. This assumption will be

[37] Six Year and One Year Natural Gas and Oil Futures. (2001). http://www.mcdep.com/industry11119.htm

examined further after the data is collected to determine if this, and the previous assumptions held.

Empirical data was collected using CRSP and Compustat (done through the WRDS, or Wharton Research Database Service website), in addition to a merged version of the two, as well as supplemental information from Bloomberg. The data was then entered into an excel file and imported into Minitab, where the hypothesis and statistical testing was done to ensure that the data met the LINE (linearity, independence variance, normality, and equal variance) assumptions and the resulting statistical analysis was performed.

Section V: Model Assumptions & Hypothesis Testing

Many models for dividend changes have used some form of time-series analysis, typically by way of a dividend smoothing Lintner model, used to smooth dividend increases as a function of corporate profits. This will in essence help determine if the aggregate dividend changes examined can be attributed to a positive correlation in corporate earnings or tax implications. The equation below shows a modified form used by Poterba[38] to determine long-run dividend elasticity:

$$A)\ \Delta lnD_t = \beta_0 + \beta_1 * \Delta lnPROFIT_t + \beta_2 * \Delta ln\Theta_t + \beta_3 * \Delta ln\Theta_{corp,t} + \beta_4 * lnD_{t-1} + \beta_5 * lnPROFIT_{t-1} + \beta_6 * ln\Theta_{t-1} + \varepsilon_t$$

While the above time-series analysis (at least statistically speaking due to the long-run nature required) is out of the scope of this study (although optically I will evaluate trends through time), there are a number of items to take away from the aforementioned model that will allow for the creation of a similar test. First, Lintner's model had two key implications or axioms that he believed to be tantamount in the dividend decision-making process. First, that companies should establish long-run targets for dividends according to the positive NPV projects available, and second, earnings increases are not always sustainable, leaving managers to hold off on dividend policy until the assurance of new earnings levels.

This theory has a number of implications for our general model and assumptions. With respect to establishing long-run dividend targets as function of NPV projects and earnings, I must take into account a firm's ability to return value per dollar invested in a project (RoACE),

[38] Poterba, James. (2004). Taxation And Corporate Payout Policy. *American Economic Review*, v94, 171-175.

and the overall EPS. While many models take into account pure EPS, the short-run nature of this study does not allow for a valid model including EPS increases, and as such, the general model will make a bold assumption of efficient markets, for simplicity, and that stock prices will reflect these positive changes in EPS (similar to the information content of dividends, as hypothesized by Modigliani and Miller). As such, each of the models not only looks at dividends in total and as aggregate values, but will study dividends and share repurchases in relation to cash flows and market cap as a function of investor returns.

As just noted, a key assumption of the model is that under the efficient market hypothesis, the increased spending results in a revaluation of the discounted cash flow model (or any valuation method used to extract a target stock price), thus moving the equity price to its new equilibrium based on the spending and projected probability given the reserve level (proven through unproven). The drawback to this assumption, however, is that oil prices were rising, albeit at a rapid pace, and futures curves were in backwardation, as most speculators did not believe that these high prices were sustainable. The four and a half year growth rate under the time horizon, however, allowed plenty of time for analysts to witness oil price changes and bake this growth into the equity price while manager altered investment strategies and capital allocation.

The major equation for this hypothesis will also attribute ideas from Manera et al., who established a VECM model that incorporated four major variables for the outcome of oil stock prices: interest rates, currency fluctuations, oil futures vs. spot prices, and broad market movements. Another assumption that is being made is that interest rates and currency fluctuations had direct impacts on oil, and will thus be clumped into the oil variable of the

model. For the sake of excluding market related factors, we will use the CAPM model to establish a new normalized market-adjusted return[39] as well.

With respect to futures, as previous mentioned in the historical context section, the market was in backwardation, and thus firms, under Lintner's model, may have been hesitant to make adjustments to capital expenditures as there was no certainty to the sustainability of higher oil prices (actually, many had argued that a bubble was imminent). While this author cannot refute this point, the goal of the thesis, and therefore the time horizon selected and the model assumptions being considered is only looking to determine if there was an optimal choice, assuming an individual company had the ability to change its decision in hindsight, and if the optimal choice would suggest and alternative way of distribution versus previously used models.

Therefore, using the summation of the theories in existence as well as the corporate cash flow equation[40], and assuming that cash is king, I have devised the following model for the value of investor returns by decomposing the possible ways that a firm can deploy capital as well as external forces:

$$(1)\ INVESTOR\ RETURN = \beta_0 + \beta_1 * DIVIDEND + \beta_2 * BUYBACKS + \beta_3 * CAP\ EX + \beta_4 * \Delta DEBT + \beta_5 * RoACE + \beta_6 * \beta_{S\&P} + \beta_7 * \beta_{OIL} + \varepsilon_t$$

Where *INVESTOR RETURNS* are the annualized sum of capital gains and dividends as a percentage return, *DIVIDEND* reflects the aggregate dividend value divided by market cap at year end (similar to dividend yield, but eliminates price fluctuations through time by fixing each

[39] Adjustments for both the S&P and oil were calculated via Bloomberg by taking the beta for each respective firm from 1990-2000 in order to gain a sense of how each would react under normal market conditions.
[40] After-tax profits + Net new share issues = Dividends + Investment

companies ex-dividend date), and capital gains are the annualized returns. *BUYBACKS* reflect annual share repurchases as a function of market cap, similarly adjusted. *CAP EX* is the average annual capital expenditures taken over market cap, in order to account for larger firms (typically) having greater liquidity and assets to leverage against. Accordingly, the *ΔDEBT* term models a firm's choice to reduce debt, which many firms chose to do as future profits were not foreseeable, calculated as the difference between debt reduced and debt issued in a given year (negative value reflects increased debt). Both beta terms reflect the equity's sensitivity to an external force, namely the broad market and oil. $\beta_{S\&P}$ takes a firms beta, calculated from 1990-2000 via Bloomberg, and plugs it into the capital asset pricing model (using the one year treasury as the risk free rate). Despite the inverse relationship between oil prices and the broad market (higher oil prices decrease margins for firms and eventually hit the discretionary spending of individuals), Osmundsen's paper identifies it as one of the major variable behind changes in stock prices for energy firms. As such, I will attempt to see if the increase in oil prices eventually effects performance over time as a derivative of this trade off. β_{OIL} measures of firm's co-movement with oil prices, and gives the predicted change as a result of the change in prices during the time horizon, which came in just under forty percent annually. Lastly, *RoACE* is the return on average capital employed, smoothed over the time horizon. The error terms takes into account all other possible omitted variables.

Hypothesis 1: The aggregate value and total amount of dividend increases remained unchanged in the post-JGTRRA era

Since the overall goal is to determine whether an energy company, typically whose focus is investments in capital (such as equipment or technology) as well as reserves (production or

new acreage), is distributing excess cash flow as a result of decreased confidence in external investments (either because it's growth prospects are not as strong or beginning to slow), one must first examine the effect of the JGTRRA on distributions, both in quantity and type, as well as measure the effective returns of companies based on their cash flow allocations.

Here I explore this on a cross-sectional basis, in terms of aggregate dividends and total dividend increases. For aggregate dividends, as discussed above, it is crucial to test both pure value changes as well as change with respect to increases in cash flow, which, when using the model (1) as established above, we are in essence testing the following two hypotheses:

$$H_0 : DIV_t = DIV_{t-n} \qquad H_1: DIV_t \neq DIV_{t-n}$$

and

$$H_0 : DIV/NCF_t = DIV/NCF_{t-n} \qquad H_1: DIV/NCF_t \neq DIV/NCF_{t-n}$$

As well as the "net dividend increase" percentage, defined as (number of firms increasing dividends – number of firms reducing dividends)/500, which was 29.8 percent in 2002 according to Blouin et al. and an S&P 500. While statistically most results are inconclusive with respect to the aggregate data and differ on amount, a dominating portion of researchers have found that the total number of firms increasing dividends rose (and more specifically, first time dividends increased as the total number of firms issuing increased), summarized below:

$$H_0 : DIV_{total,t} = DIV_{total,t-n} \qquad H_1: DIV_{total,t} \neq DIV_{total,t-n}$$

Hypothesis 2: The balance between dividends and share buybacks did not change significantly after the enacted tax

$$H_0 : \Delta DIV/NCF_t = \Delta OMR/NCF_t = 0 \quad H_1: \Delta DIV/NCF_t \neq \Delta OMR/NCF_t \neq 0$$

As one of the most studied areas in the post JGTRRA environment was the theory of distribution switching, explored by comparing aggregate changes in cash flow towards dividends and repurchases, this hypothesis will explore its effect in the energy space as share buybacks, which had previously began to win favor due to their tax benefits, were now at rate parity with dividends.

Hypothesis 3: Equity holders were indifferent as to the allocation of capital (dividends, repurchases, capital expenditures, and debt repayments) in the post-JGTRRA environment.

Analyzing a firm on a simplistic level gives four major sources of capital deployment: dividends, repurchases, capital expenditures, and debt repayments. As thoroughly explored through various aspects of this paper, this decision-making process is not only complex but also convoluted with noise and an inherent inability to predict market and energy specific outcomes. As such, firms make their decision as a rational, albeit sometimes risk-averse (Jensen) manager that may or may not be optimal to investors. This looks to determine if there was an optimal mix during the time horizon given the constraints and effectiveness of a firm to deploy said capital. These conclusions will attempt to revive the notions encountered in hypotheses one and two, and draw any links possible to the JGTRRA.

Again, referring back to the original equation (1), we have:

$$H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 \qquad H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4$$

Of course it is also important to look at β_5, β_6, and β_7 as they will most likely have the greatest impact on net returns, although the general hypothesis is more closely tied to the equivalence, or lack thereof, of the null.

Section VI: Empirical Results and Findings

Hypothesis 1: Total and Aggregate Dividends

The original question requires us to view dividends in terms of pure increases and decreases. The thirty-five companies offer a total of 980 quarters of study (2001-2007) offer the following data:

Figure 4: Total Dividend Increases (2001-2007)

Time Frame	Total Increasers	Total Decreasers	Median Increase	Average Increase	Net Dividend Increase
2003	9	0	$0.0250	$0.0425	42.86%
2004	23	0	$0.0250	$0.0392	40.00%
2001-2007	97	10	$0.0250	$0.0341	35.51%

While the heavy cash flows show the energy firms typically have a higher net dividend increase, no robust conclusion about the tax effect can be formed. On a weaker basis, it is clear that there was a slightly larger average increase when firms increased dividends and the net dividend increase was about seven percent larger than the seven year average, although this only equates to roughly one additional dividend and one cent, on average, which could be accounted for by a single large increase. Additionally, no new firms added dividends (of the six who did not pay dividends as of 2003), refuting the notion that there was a clear increase in the number of firms added, as hypothesized by Chetty and Saez.

When establishing conclusions on the second portion of this hypothesis it was central to compare the two conflicting arguments employed by Blouin et al. and Kopcke, namely that the aggregate payments of dividends increased on a statistically significant basis versus the argument that these increases were a result of a normal rebound in corporate earnings. Figure five below

shows not only aggregate dividend payouts, but also the yoy percent change and the annual percentage as a function of net cash flow.

Figure 5: Aggregate Dividend Changes ($MM)

Yr	DVDs	DVD % Ch	DVD/NCF
2002	$12,309.73	3.43%	21.07%
2003	$13,003.12	5.63%	16.58%
2004	$14,045.68	8.02%	13.36%
2005	$15,878.82	13.05%	11.78%
2006	$18,576.57	16.99%	11.66%
2007	$20,530.15	10.52%	11.86%

The data exhibits a number of fairly conclusive results. First, the rate of yoy change shows that dividends did increase throughout the time period and that the 2005-2007 increases were all statistically different than those of 2002 on a stand-alone basis. The tax effect, conversely, shows only a marginal change from 2002 through 2003, one that cannot be concluded to be a faction of the JGTRRA. Additionally, when analyzing why the changes occurred, it is fair to reject Blouin's argument in favor of Kopcke, who said that the increases were a natural function of an improving economy, as evident by the declining value of dividends as a function of net cash flows. Furthermore, Lintner's model of dividend smoothing established the desire for long-run, stable dividend rates. When analyzed with respect to cash flows, it appears that energy firms progressively reached that target level by 2005, which is simultaneously when production began to slow. This may be further validation that firms had reached a happy equilibrium as peak oil took effect, and that rather than continuing to spend on new acreage, they allowed dividends to rise at double digit levels, while simultaneously increasing market repurchases at a more rapid rate.

Hypothesis 2: Distribution Switching

While DeAngelo et al. argued that the timing of dividend decreases and share repurchases do not align, and in a sense disproving the theory of pure substitution as a result of tax policy, evidence has shown that substitution between dividends and share repurchases favored dividend switching post JGTRRA (Blouin et al). Bratton, although differing from DeAngelo on the lack of intentional switching, believed that open market repurchases should begin to dissipate under the JGTRRA as rate parity removed or reversed many of the preferences toward OMR's and had firms' distribution policies trending toward dividends.

From the standpoint of the previous studies, whose results found some validity behind deductions in OMR's as a substitution for dividends, the increased cash flows in the space require a different method: comparing said distribution to a number of energy specific metrics (in this case, I use DIS/NCF and DIS/ACE, which reflect Distributions over Average Capital Employed and Distributions with respect to Net Cash Flows. As well, I wanted to break out the balance of each and compare them to overall growth in distributions. The first breakdown includes Exxon, the sector's largest component, which was broken up to show its effect given the massive cash flows. While not directly included in the hypothesis, it remains crucial to note that overall distributions did eventually increase significantly around 2005 after falling into 2003 and ticking upwards in 2004. This inability to increase distributions into 2003 as a stand-alone measure as well as comparatively to average capital employed and net cash flows adds further conclusive evidence to the lack of direct influence of the JGTRRA on energy firms' distribution policies with respect to investment opportunities and growth.

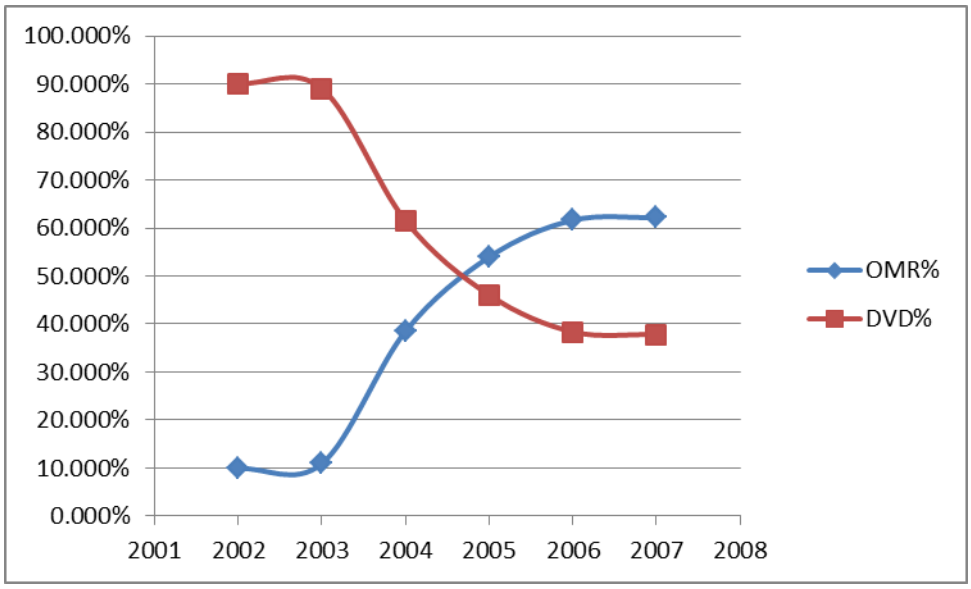
Figure 6: Data of Overall Firm Distribution, Including DVD (Dividends), OMR (Open Market Repurchases), DIS (Total Distributions) ACE (Average Capital Employed) and Net CF (Net Cash Flow)

Yr	OMRs	OMR % Ch	DVDs	DVD % Ch	Total DIS	OMR%	DVD%	ACE	DIS/ACE	DIS/Net CF	Net CF
2002	$ 5,467.66	-29.06%	$12,309.73	3.43%	$17,777.39	30.76%	69.24%	$401,153.37	4.43%	30.43%	$ 58,417.42
2003	$ 6,676.34	22.11%	$13,003.12	5.63%	$19,679.46	33.93%	66.07%	$448,103.28	4.39%	25.10%	$ 78,414.06
2004	$14,428.28	116.11%	$14,045.68	8.02%	$28,473.96	50.67%	49.33%	$498,138.89	5.72%	27.07%	$105,171.31
2005	$28,408.15	96.89%	$15,878.82	13.05%	$44,286.97	64.15%	35.85%	$567,825.45	7.80%	32.86%	$134,786.47
2006	$47,145.08	65.96%	$18,576.57	16.99%	$65,721.65	71.73%	28.27%	$679,251.13	9.68%	41.24%	$159,378.16
2007	$53,067.17	12.56%	$20,530.15	10.52%	$73,597.32	72.10%	27.90%	$791,325.34	9.30%	42.52%	$173,086.66

Figure 7: Data Excluding Exxon, the Largest Company in the S&P 500 Throughout The Time Horizon

Yr	OMRs	OMR % Ch	DVDs	DVD % Ch	Total DIS	OMR%	DVD%	ACE	DIS/ACE	DIS/Net CF	Net CF
2002	$ 669.66	-66.28%	$ 6,092.73	7.89%	$ 6,762.39	9.90%	90.10%	$284,888.87	2.37%	18.20%	$ 37,149.42
2003	$ 795.34	18.77%	$ 6,488.12	6.49%	$ 7,283.46	10.92%	89.08%	$320,422.78	2.27%	14.59%	$ 49,916.06
2004	$ 4,477.28	462.94%	$ 7,149.68	10.20%	$11,626.96	38.51%	61.49%	$354,055.39	3.28%	17.99%	$ 64,620.31
2005	$10,187.15	127.53%	$ 8,693.82	21.60%	$18,880.97	53.95%	46.05%	$410,673.95	4.60%	21.79%	$ 86,648.47
2006	$17,587.08	72.64%	$10,948.57	25.94%	$28,535.65	61.63%	38.37%	$513,138.13	5.56%	25.92%	$110,092.16
2007	$21,245.17	20.80%	$12,909.15	17.91%	$34,154.32	62.20%	37.80%	$614,341.34	5.56%	28.21%	$121,084.66

Figure 8: The Balance of Buybacks and Dividends



While the data does not point to distribution switching, the analysis shows energy firms moved heavily towards share repurchases, jumping from thirty percent of total distribution pre-JGTRRA, to almost seventy percent by 2007 as seen in the graph above. Further, it appears that

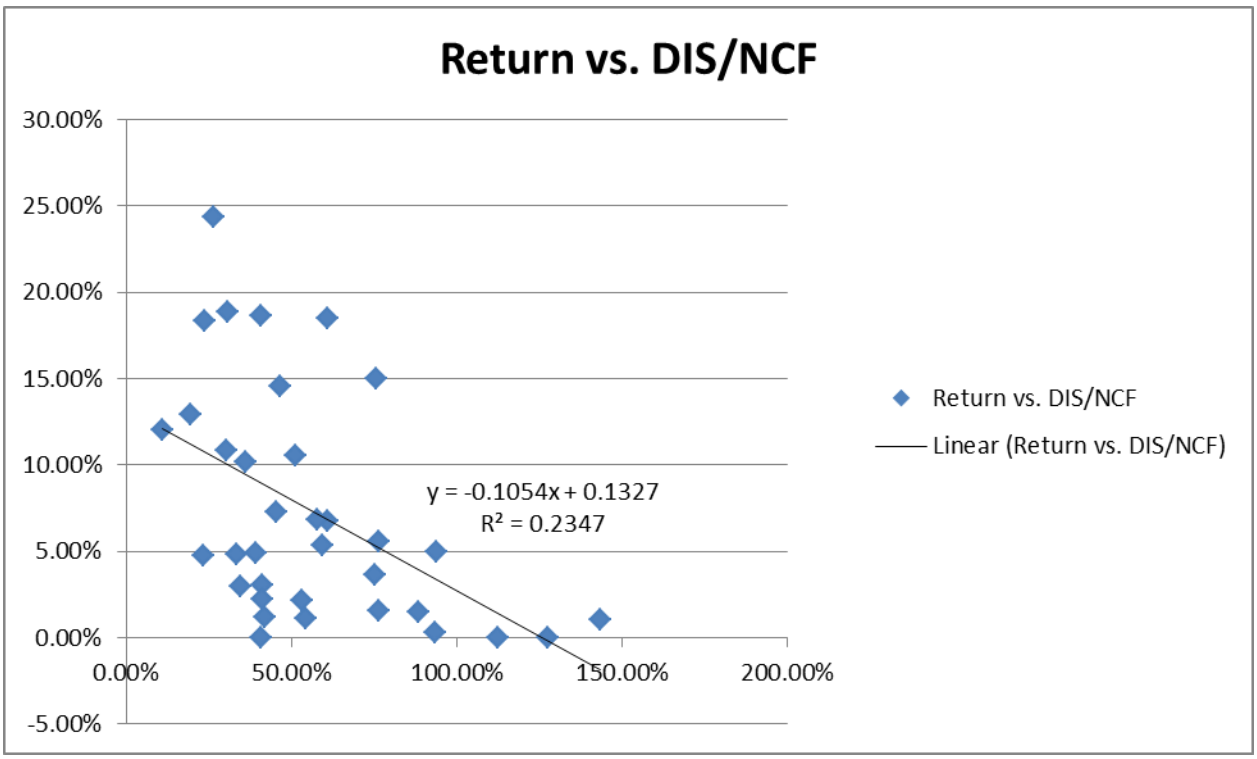
prior to 2003 the balance was pretty much established, whereas a new, buyback dominated equilibrium set in by 2006. This dramatic shift cannot be explained by any of the previous studies, and the broad markets seemed to shift favor towards buybacks in the long-run as the opportunity cost of dividends rose and expectations buybacks allowed a more flexible distribution alternative with increased profitability as multiples expanded. It may be worth noting that of the thirty-five firms examined, there were nineteen stock splits throughout the four year period, which would be an interesting topic to divulge in further study, as the increase in new shares may have impacted the desire to repurchase.

Hypothesis 3: Capital Allocation

In reducing the dividend tax, President Bush gave the rationale that the JGTRRA would encourage corporate investment and increase dividends. While I, along with many others, believe that dividend increases are counterproductive to favorable investment decisions, as higher dividends would ultimately reduce not only retained earnings but also the funds available for investment. Poterba, however, argues that, "analysis of the corporate cash flow identity […] shows that this need not be the case. Dividends and investments could both increase, even if after-tax profits were constant, if firms reduced their use of share repurchases or increased their new share issues." As our first two rounds of conclusions established both dividend and share repurchase increased, this hypothesis will explore whether or not dividend increases and/or share repurchases were counterproductive to favorable investment decisions, given the conflicting nature of my results against Poterba.

Before jumping into the model itself, there are a number of features about spending patterns that are optically interesting. First, it appears that there was an inverse relationship between return and distributions (aggregate value of dividends and buybacks) as a function of net cash flows. Note, however, that this relationship is fairly weak and lacks any true signal, which requires the further statistical testing used below.

Figure 8: Returns vs. Distributions as a Function of Net Cash Flows



Second, as expected, energy firms were leveraging to finance capital expenditures, but surprisingly, many were simultaneously paying off debt at a similar rate. Also, it appears that most of the firms in the upper echelon of performance were spending greater multiples of free cash flow. One possible explanation behind that was the size of the companies, or put another way, their lack of cash flows due to investments that have not yet paid out. While the majors were the worst performing sector, natural gas and coal flourished. As a function of spending,

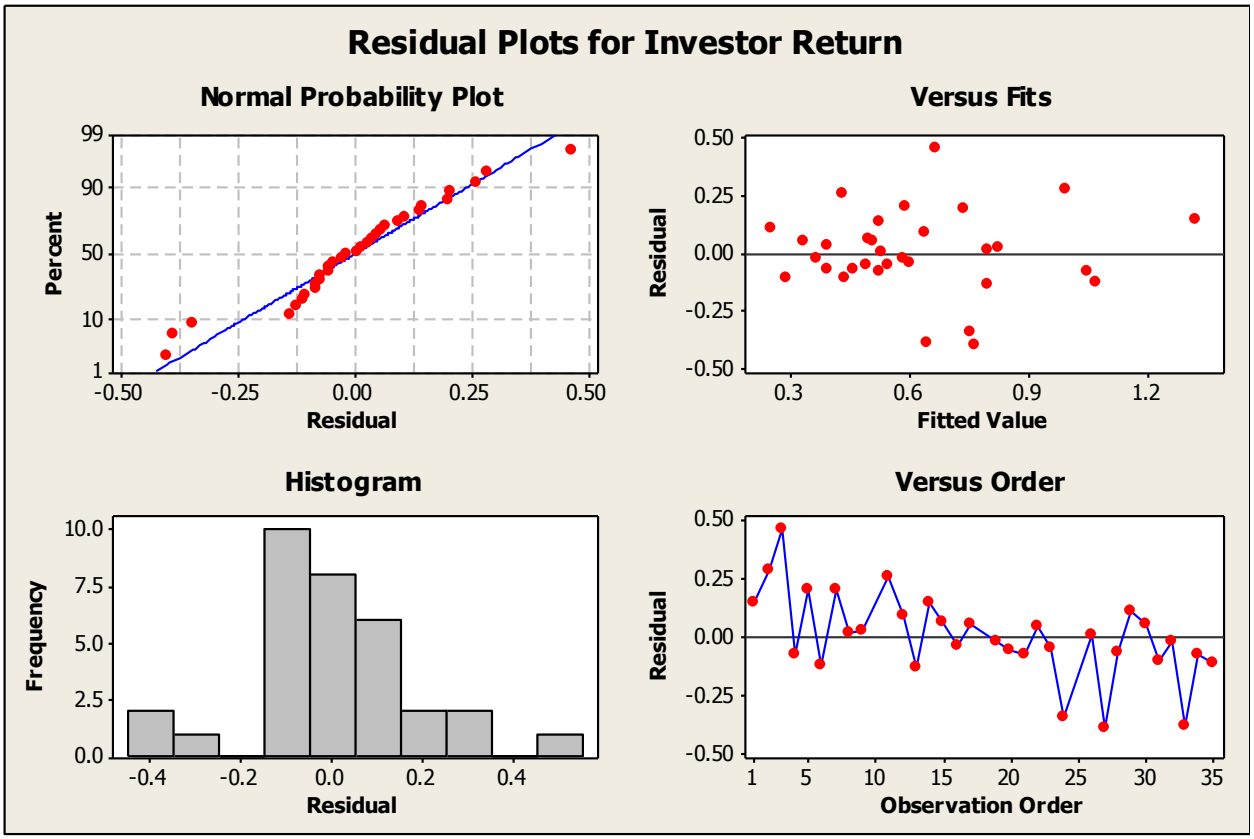
these firms were in a less mature phase and had less predictability for their projects. As such, net cash flows were lower and spending had to be higher. Simultaneously, most of them did not distribute cash flows at all, which may or may not show the opportunity cost of distribution, although as mentioned this result is too weak to be considered valid without further analysis.

Figure 9: Average Cash Flows over 2003-2007, as a Function of Net Cash Flow, Ranked By Returns

Company	DIVIDENDS	BUYBACKS	CAPEX/NCF	ΔDEBT/NCF	Investor Return
RANGE RESOURCES CORP	2.88%	0.54%	105.419%	-44.035%	147.01%
SOUTHWESTERN ENERGY CO	0.00%	0.00%	192.625%	-35.117%	127.73%
NATIONAL OILWELL VARCO INC	0.00%	0.00%	23.460%	8.076%	112.67%
PEABODY ENERGY CORP	1.83%	0.97%	113.604%	-87.934%	96.82%
DENBURY RESOURCES INC	0.00%	0.48%	147.293%	-17.792%	93.80%
CHESAPEAKE ENERGY CORP	5.27%	0.92%	210.025%	-60.701%	94.66%
HESS CORP	2.64%	0.00%	102.597%	8.010%	79.18%
CONSOL ENERGY INC	2.29%	2.44%	105.851%	3.506%	81.05%
DIAMOND OFFSHRE DRILLING INC	9.09%	0.07%	67.948%	-0.106%	84.99%
NOBLE ENERGY INC	1.34%	4.37%	73.378%	-2.956%	81.05%
FMC TECHNOLOGIES INC	0.00%	7.93%	56.444%	7.124%	68.91%
MARATHON OIL CORP	4.88%	6.88%	64.174%	6.281%	72.69%
WILLIAMS COS INC	3.28%	2.86%	108.445%	54.198%	65.66%
OCCIDENTAL PETROLEUM CORP	3.64%	4.65%	48.620%	15.472%	66.22%
EOG RESOURCES INC	0.95%	0.58%	102.245%	-0.376%	55.98%
CABOT OIL & GAS CORP	0.71%	1.84%	100.403%	-4.710%	55.55%
SCHLUMBERGER LTD	1.64%	2.56%	55.042%	10.674%	55.33%
CAMERON INTERNATIONAL CORP	0.00%	5.32%	38.009%	-15.830%	51.79%
CONOCOPHILLIPS	4.29%	5.88%	64.313%	6.379%	55.77%
APACHE CORP	1.10%	0.35%	105.719%	-10.215%	43.32%
NOBLE CORP	0.33%	2.32%	50.002%	-1.704%	43.90%
MURPHY OIL CORP	1.60%	0.00%	110.315%	-10.582%	42.64%
HALLIBURTON CO	2.17%	6.02%	58.242%	-16.927%	48.98%
NEWFIELD EXPLORATION CO	0.00%	0.04%	127.191%	-4.488%	40.73%
DEVON ENERGY CORP	1.20%	5.27%	87.515%	6.434%	45.77%
SUNOCO INC	3.05%	14.47%	54.228%	-1.348%	53.52%
HELMERICH & PAYNE	0.93%	0.70%	141.764%	-28.811%	36.35%
ANADARKO PETROLEUM CORP	1.17%	3.62%	99.274%	8.890%	38.27%
EQT CORP	3.12%	1.59%	181.717%	-15.095%	35.56%
CHEVRON CORP	4.20%	4.12%	53.031%	7.875%	38.66%
BAKER HUGHES INC	1.14%	4.90%	72.012%	9.778%	32.53%
EXXON MOBIL CORP	2.41%	7.87%	31.827%	0.044%	34.07%
ROWAN COS INC	1.68%	0.01%	124.996%	5.715%	25.11%
PIONEER NATURAL RESOURCES CO	0.78%	11.31%	132.453%	-16.853%	31.67%
NABORS INDUSTRIES LTD	0.00%	6.17%	118.618%	-37.831%	17.26%
Average	1.99%	3.34%	95.11%	-7.28%	61.58%

While the linear regression is better served for attempting to predict the response variable, the analysis of variance will allow a window into the impact of each variable. Prior to assessing the models themselves, the assumptions of the linear regression model must first be confirmed. The residual plots below allow me to confirm linearity, independence, normality, and equal variance. Although it is critical to note that the model appears to hold under all four cases, the strength of each linear relationship will be examined with the respective R-squared value.

Figure 10: Residuals



(2) *INVESTOR RETURNS = -0.568337 + 1.79784 DIVIDEND - 0.58399 BUYBACK - 0.352067 CAPEX + 0.608442 ΔDEBT +1.38254 RoACE + 5.4841* $\beta_{S\&P}$ *+ 0.361335* β_{OIL}

SUMMARY OF MODEL

S = 0.193315 R-Sq = 69.16% R-Sq(adj) = 60.17%

ANALYSIS OF VARIANCE

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Regression	7	2.01142	2.01142	0.287346	7.6890	0.000067
DIV	1	0.07159	0.08607	0.086071	2.3031	0.142175
BUYBACK**	1	0.36682	0.23092	0.230917	6.1791	0.020286
CAP EX	1	0.42387	0.09694	0.096945	2.5941	0.120336
DEBT**	1	0.34950	0.28955	0.289554	7.7481	0.010316
B S&P***	1	0.52054	0.63901	0.639009	17.0991	0.000374
B OIL*	1	0.13721	0.15446	0.154465	4.1333	0.053250
RoACE*	1	0.14189	0.14189	0.141894	3.7969	0.063131
Error	24	0.89690	0.89690	0.037371		
Total	31	2.90832				

* Significant at a 90% level
** Significant at a 95% level
*** Significant at a 99% level

Despite the low R-squared value at 69.16%, the data gives some pretty interesting and counterintuitive results. With respect to distributions, I found a statistically significant relationship between returns and buybacks, although not dividends. I feel that there are two possible reasons that could have contributed to this result. First, my second hypothesis established that firms did switch their primary focus away from dividends (with respect to the total proportion of dividends) and into repurchases. When analyzing this further, however, it appears that most of the firms who performed large share buyback programs as a function of total distributions performed poorly, including the major integrateds. It is difficult to see if this is a function of sub-sector returns or attribution to the cash flow breakdown itself. This point can best be noted by the Figure 11, which shows that firms who distributed less had a higher average return, while simultaneously having a lower market cap. The model itself allows me to conclude, given the negative value associated with repurchases, that either there was a high opportunity cost to this distribution practice with respect to new investments, or, given the

inability to relate capital expenditures, a possible link between firms buying equity at extremely high and unattractive valuations, inevitably leading to investor's disapproving of said policy.

Figure 11: Market Caps Relative to Distributions

CAGR %	DIS/Mkt Cap	Mkt Cap Average
100+	13.16%	$1,255.73
75-99	16.79%	$2,399.42
50-74	22.72%	$7,832.49
25-49	19.84%	$14,475.61
0-24	32.33%	$62,459.99

With respect to dividends, although the data is not statistically significant at the desired alpha level (.05), it is interesting to note the strong relationship (close to twice the return per issued dividend). While my argument here is only conjecture, I would revert one's attention back to the dividend signaling model and information content of dividends, whose core implication asserts that firms increasing dividends typically perform well upon announcement as it reflects management's sentiment about the capability to maintain cash flows and repay liabilities, especially given the inevitable increase in the tax dividend rate, as the energy sector had a modestly high NDI.

The most counterintuitive result may have been that of the capital expenditures, as not only was the result statistically insignificant, but also reflected a slightly negative coefficient (although under the model this cannot be considered accurate). As described under the historical context, peak oil occurred in 2005 and an extreme supply shortage took effect as firms were weary of the sustainability of the commodity prices being observed. Additionally, given the already witnessed mentality of confirmation delay (firms wait to enact new policies until trends are confirmed) as originally proposed by Lintner (for dividends), and the market's backwardation view, it may have been perceived as a more beneficial production decision to sit

on current assets rather than to create new investment, although it does appear that firms who had higher CAPEX/NCF performed better optically. Although new investments increased, as a total function of cash flows, they declined 10% over the time period.

Another possible reason why this variable was not only insignificant but also negative could be its interaction with RoACE, or the return on average capital employed. This variable takes into account increase in asset base, and as such, an interaction term should be included in the model for further review. Under this premise, however, the reduction in degrees of freedom by adding the variable would cause us to lose more information than this statistic could benefit.

Under similar logic, and given an increasing interest rate market, it became practical for firms to pay back their debt, although the coefficient seems to indicate that, while significant, it was not the best way to put capital to work. Taxes were supposed to decrease cost of capital (Bratton), but invitably raised it with a weaker dollar and increasing interest rates, making it more expensive to finance. While one of the major arguments for increased spending in a post JGTRRA environment was the decreased cost of capital, making it cheaper for firms to invest, Figure 12 shows only slight modifications to the cost of capital, leaving this an invalid explanation for investment.

Figure 12: Average Cost of Capital across the Sector through Time

	Date	Average WACC	ΔWACC
	6/29/2001	6.853%	N/A
	9/28/2001	7.146%	4.28%
	12/31/2001	7.189%	0.60%
	3/29/2002	6.961%	-3.17%
	6/28/2002	7.390%	6.17%
	9/30/2002	6.894%	-6.71%
	12/31/2002	7.661%	11.11%
Just Prior to JGTRRA	3/31/2003	7.137%	-6.84%
	6/30/2003	6.878%	-3.62%
	9/30/2003	6.636%	-3.51%
	12/31/2003	6.995%	5.41%
	3/31/2004	6.641%	-5.07%
	6/30/2004	7.144%	7.57%
	9/30/2004	6.757%	-5.42%
	12/31/2004	6.992%	3.48%
	3/31/2005	8.484%	21.34%
	6/30/2005	9.971%	17.52%
	9/30/2005	9.875%	-0.96%
	12/30/2005	10.162%	2.91%
	3/31/2006	10.435%	2.68%
	6/30/2006	10.531%	0.93%
	9/29/2006	10.321%	-2.00%
	12/29/2006	10.685%	3.53%
	3/30/2007	11.182%	4.65%
	6/29/2007	10.810%	-3.33%
	9/28/2007	10.568%	-2.23%
	12/31/2007	10.378%	-1.80%

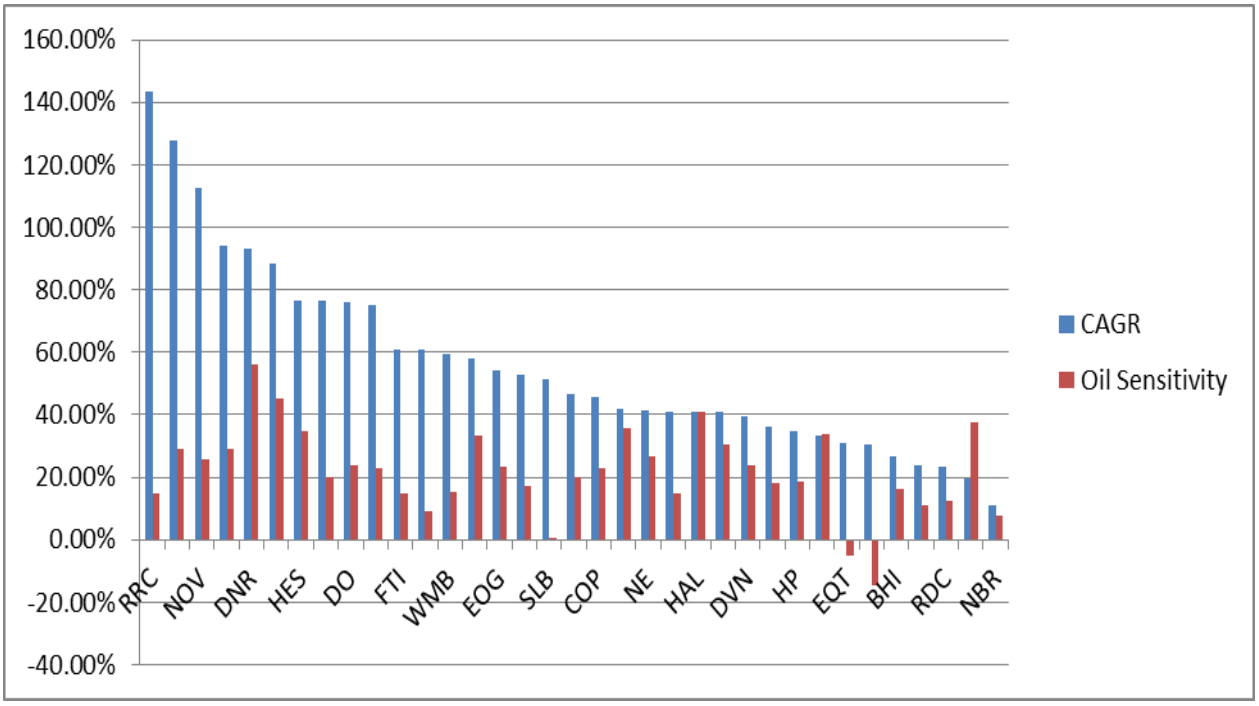
One major caveat that was not explored in this analysis was firms' reissuance of new shares under higher market prices having a negative impact on WACC (meaning that it increased the weighted average cost of capital, a negative for investments and intrinsic value under the discounted cash flows model). Had this been the pure reason behind the increase (or lack of decrease in the months following), it may be possible to show greater investments, but the entanglement with stock splits and increasing buybacks made it difficult to determine the true effect of new share issuances, and as such it was left out of the model.

Shifting to the external forces that effect returns, I found that on a per unit change, the beta to the market had the greatest impact. Essentially what this tell us, and rightfully so, was

that the energy sector as a whole outperformed the market significantly throughout the time period, and it accounted for a large proportion of returns. As the cyclicality of oil prices increased profit margins and put cash flows directly back into the hands of investors, the sector became attractive and represented a buy signal. An interesting follow-up to this study might relate to changes in volumes, as well as the breakdown of investors, over the time horizon relative to other industries. This would allow one to determine the ability of managers to correctly allocate their own capital.

Lastly, the sensitivity of oil is one of the most curious outliers in this data. Although I would have expected both a significant and strong relationship, my model found that it barely was significant at the 90% level and had a weak coefficient. It is important to take a step back and analyze the environment to better grasp why this result occurred. As the markets began to price in an upswing in the business cycle, co-movement with the S&P during a risk-on trade period (noting that the two are intertwined and typically negative correlated) affected the outcome in my model. Again, it may be worth restructuring the equation or retesting with more data points such that adding parameters does not affect the results as is the case here. The chart below gives a better visual as to the lack of a strong relation.

Figure 13: Oil Sensitivity vs. Returns



While insignificant in the model, sensitivity to oil prices impacts how firms spend in relation to capital expenditures. The following regression model establishes a firm relationship between the two (when running the same analysis for RoACE, it was clear that this did not have the same impact on firm decision making[41]):

$$(3)\ \beta_{OIL} = 0.256778 - 2.708\ DIVIDEND + 0.055154\ BUYBACK + 0.457192\ CAP\ EX - 0.262913\ \Delta DEBT$$

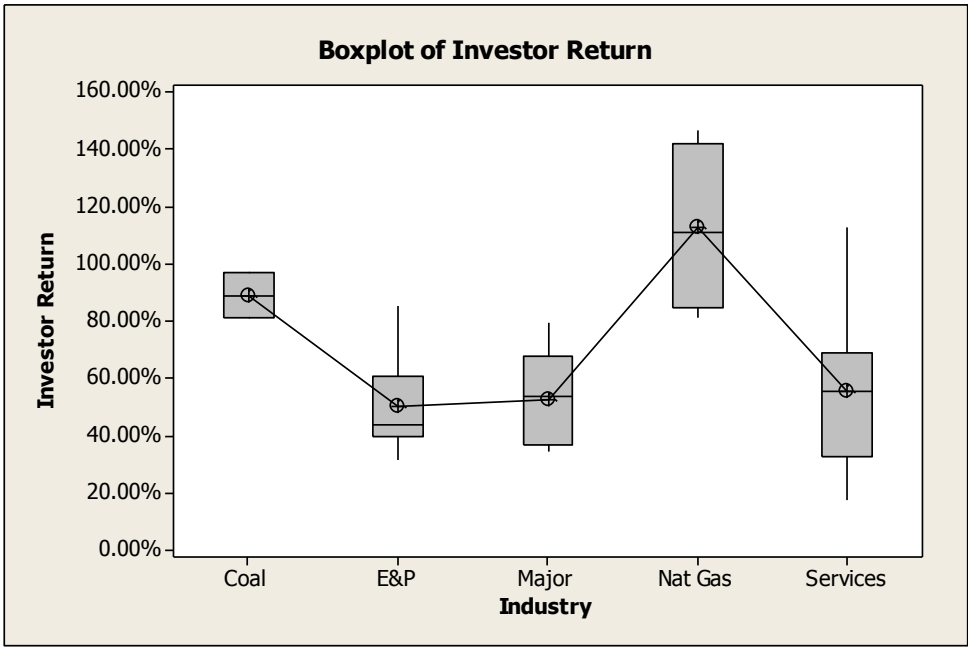
Analysis of Variance

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Regression	4	0.39551	0.39551	0.098878	2.24422	0.090663
DIV	1	0.04154	0.08650	0.086501	1.96330	0.172551
BUYBACK	1	0.01551	0.00011	0.000114	0.00258	0.959831
CAP EX**	1	0.27571	0.20443	0.204427	4.63985	0.040324
DEBT RED	1	0.06275	0.06275	0.062746	1.42413	0.243105
Error	27	1.18959	1.18959	0.044059		
Total	31	1.58510				

[41] See appendix for ANOVA of this model.

Note, however, that while this model shows causality, this could work either way if a firm's sensitivity to oil is based on how they choose to invest in new projects. One possible way to better explain this result is through sub-sector breakdowns. When the model was originally created, a number of loose assumptions about the industry were taken in order to ensure that the sample size would remain large. While the model has proven itself to hold fairly well, it should also be not that performance was heavily tied to sub-sector, as evident via the ANOVA model displayed below with a P-value below (.000).

Figure 14: Returns versus Sub-Sector

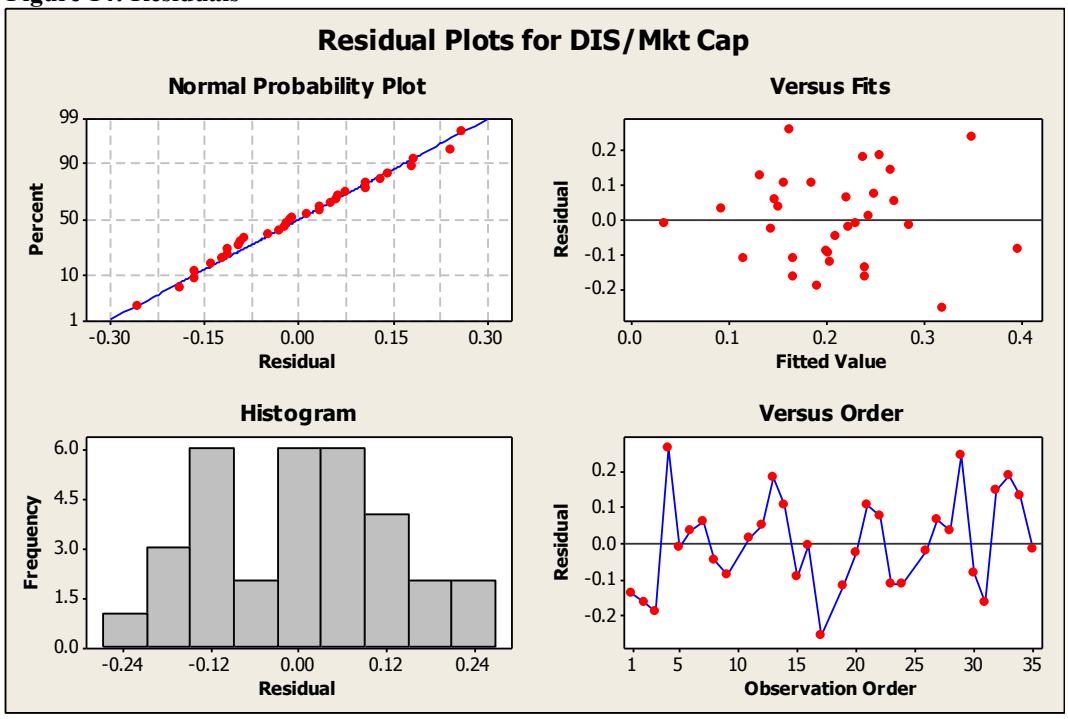


One-way ANOVA: Investor Return versus Industry

Source	DF	SS	MS	F	P
Industry	4	1.4403	0.3601	7.01	0.000
Error	30	1.5406	0.0514		
Total	34	2.9809			

Another point of interest is the potential causes behind dividend payments, including a firm's oil sensitivity and market beta (all other combinations were tested to yield this reduced form model).

Figure 14: Residuals



(4) *DIS/Mkt Cap = 0.342114 - 1.27245* β_{OIL} *- 0.13679* $\beta_{S\&P}$

Summary of Model

S = 0.134081 R-Sq = 24.59% R-Sq(adj) = 19.39%

Analysis of Variance

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Regression	2	0.169971	0.169971	0.084985	4.72724	0.016712
B OIL	1	0.169446	0.169824	0.169824	9.44633	0.004574
B S&P	1	0.000525	0.000525	0.000525	0.02920	0.865501
Error	29	0.521356	0.521356	0.017978		
Total	31	0.691327				

This result becomes possibly the most resounding evidence for management's decision making, as a clear inverse relationship emerges amongst total distributions and a firm's sensitivity to oil. As the metric increases, distributions become relatively less attractive and highlight the opportunity cost of not having new oil investments (as total reserves grow the overall benefit to a firm for each dollar increase in crude simultaneously grows).

Section VII: Conclusions

In a post-JGTRRA economy, Bratton, amongst others, raised new questions regarding the outlay of capital, specifically within distributions given the new tax cuts. Additionally, as one of the main principles behind the reduction in dividend tax rates was to increase investments (Poterba), my study aimed to blend the two questions for a particular industry that saw significant growth: energy (ex-utilities). On the distribution front, I found that while both total increases and aggregate dividends increased, the likely basis behind that was a recovery in net cash flows and corporate earnings rather than tax policy, as Kopcke had initially hypothesized. Further, distribution switching was not pronounced, as dividends did increase at a significant rate, but the breakdown of distributions shifted heavily towards repurchases, contrary to the prevailing theory by Blouin et al. While it is unclear if this is a result of risk aversion or managers believing that an undervaluation in equity prices existed (which I profoundly disagree with, given their lack of a propensity to ramp up new investments), the change was distinct and in opposition to what one would conclude given Bush's tax policy.

When attempting to decipher whether these counterintuitive results negatively impacted returns, my model yielded further another set of questions entirely. When looking for the optimal breakdown amongst the cash flows (distributions, debt repayment, and capital expenditures) my model provided, I found that capital expenditures did not directly impact the model, meaning either firms made bad investments (this 'waste' was hypothesized by Jensen as a reason behind distribution, although I used the time horizon to claim that firm with optimal technology and capabilities to receive permits could avoid this, yet the long run nature of the business model may prove my assumption to be incorrect) or that peak oil and the backwardation of the futures

curve was a sign that investments in new acreage were too volatile (by that, I am referring to the inability for firms and analysts to calculate project NPV's, and as each project requires certain oil prices to remain profitable, the aforementioned fear of a collapse in oil prices, which inevitably happened after the scope of this paper, caused the lack of investment).

In all, the question asks, given the tax policy, were firms correct in their decision, and could they have done better. Reviewing the sum of the information in the paper leads me to suggest that firms could have been more profitable with a smaller portion of buybacks as a function of distributions as well as increased capital expenditures, which I personally conclude (despite the model) by interpreting the possible omitted variable interactions and original theory of rising oil prices. Despite the collapse in 2008, those projects would just be in the early productions phases now and thus would have received the same commodity prices, although the coal and natural gas relationship has decoupled after the collapse as a result of excess capacity of natural gas. The tax code inevitably caused a rise in oil prices along with a slight increase in capital intensity (long-term), however, the perpetuating weakness in the dollar as well as increased global demand shifted the equilibrium of oil prices to unforeseen levels. As such, capital expenditures followed but at a lesser pace than cash flows as the backwardation in the markets generated hesitation on the part of management, inherently bringing dollars back into the hands of shareholders as hypothesized by Jensen. In conjunction with the quantitative analysis of distribution increases as a function of cash flows, as well as the inability to have a significant impact on the cost of capital (as interest rates rose) I have concluded that the tax effects were minimal for energy firms and their investors and were more the result of both unintended consequences and external factors within the oil industry. Additionally, equity prices rose in a consistent manner to a risk-on trade, with all firms benefitting according to risk levels.

Bibliography:

Aharony, J., Swary, I. (1980). Quarterly Dividend and Earnings Announcements and Stockholders' Returns: An Empirical Analysis. *Journal of Finance*, 35, 1, 1-12.

Amadeo, Kimberly. (2010). Jobs Growth Tax reconciliation and Releif Act: Impact of the JGTRRA on the US Economy. http://useconomy.about.com/od/fiscalpolicy/p/JGTRRA.htm

Anabtawi, Iman and Stout, Lynn A. (2008). Fiduciary Duties for Activist Shareholders. UCLA School of Law, Law-Econ Research Paper No. 08-02. *Stanford Law Review*, Vol. 60.

Bagwell, L., Shoven, J. (1988). Share Repurchases and Acquisitions: An analysis of Which Firms Participate, in: A. J. Auerbach, ed., *Corporate Takeovers: Causes and Consequences* (University of Chicago Press: Chicago, IL). 191-213.

Black, F. (1976). The Dividend Puzzle. *Journal of Portfolio Management* , 2, 5-8.

Blouin, Jennifer L., Raedy, Jana Smith and Shackelford, Douglas A., (2004). Did Dividends Increase Immediately after the 2003 Reduction in Tax Rates? *NBER Working Paper Series*, Vol. w10301, 2004.

Blouin, Jennifer L., Raedy, Jana Smith and Shackelford, Douglas A., (2004).The Initial Impact of the 2003 Reduction in the Dividend Tax Rate.

Bratton, William W., The New Dividend Puzzle (August 13, 2010). *Georgetown Law Journal*, Vol. 93, p. 845, 2005; Georgetown Law and Economics Research Paper No. 535462.

Brav, Alon P., Harvey, Campbell R., Graham, John R. and Michaely, Roni, (2005). Payout

Policy in the 21st Century. *Tuck Contemporary Corporate Finance,* Issues III, Conference Paper.

Chetty, Raj and Saez, Emmanuel, (2004). Do Dividend Payments Respond to Taxes? Preliminary Evidence from the 2003 Dividend Tax Cut.

Chetty, R., Saez, E. (2005). Dividend Taxes and Corporate Behavior: Evidence from the 2003 Dividend Tax Cut. *Quarterly Journal of Economics* 120, 791–832.

Crawford, Peggy. Fredericks, Edward. (2005). Energy Prices and The Global Economic Recovery. *Journal of Business & Economics Research*. Volume 3, Number 1. 25-32.

DeAngelo, Harry, DeAngelo, Linda and Skinner, Douglas J. (November 1999). Special Dividends and the Evolution of Dividend Signaling.

Energy Information Association & Commodity Futures Trading Commission. (2008).Interim Report on Crude Oil. http://www.cftc.gov/ucm/groups/public/@newsroom/documents/file/itfinterimreportoncrudeoil0708.pdf

Ernst & Young. (2007). Investment and Other Uses of Cash Flow By the Oil Industry, 1992-2006. http://www.api.org/oil-and-natural-gas-overview/industry-economics/~/media/A3A04578B88A4A4F88C8E542F3764036.ashx.

Fama, E.F., French, K.R. (2001). Disappearing Dividends: Changing Firm Characteristics or Lower Propensity to Pay? *Journal of Financial Economics*, 3-43.

Guay, W., Harford, J. (2000). The Cash Flow Permanence and Information Content of Dividend

Increases Versus Repurchases. *Journal of Financial Economics* 57. 385-415.

Hong, Pingfan, Nsimba, Edouard, Gray, Carl and Diallo, Oumar, (2004). The Impact of Higher Oil Prices on the Global Economy - A Tale of Two Different Cases.

Hotelling, Harold. (1931). The Economics of Exhaustible Resources. *The Journal of Political Economy,* 137–175.

http://www.house.gov/jec/taxation/TaxIncentives.pdf. 2012.

Investopedia. 2012. http://www.investopedia.com/terms/r/return-on-average-capital-employed-roace.asp#ixzz1pVLJGqVe

Jensen, Michael C. and Smith, Clifford W., The Theory of Corporate Finance: A Historical Overview. Michael C. Jensen, Clifford W. Smith, Jr., The Modern Theory of Corporate Finance, New York: McGraw-Hill Inc., (1984) 2-20.

Jensen, Michael C. (1986). Agency Cost Of Free Cash Flow, Corporate Finance, and Takeovers. *American Economic Review*, Vol. 76, No. 2.

Kopcke, Richard W. (2005). The Taxation of Equity, Dividends, and Stock Prices. FRB of Boston Working Paper No. 05-1.

Manera, Matteo, Lanza, Alessandro, Grasso, Margherita and Giovannini, Massimo, (2003). Long-run Models of Oil Stock Prices.

Modigliani, F., & Miller, M. (1958). The Cost of Capital, Corporation Finance, and The Theory of Investment. *American Economic Review*, 261-297.

Nissim, D., Ziv, A. (2001). Dividend Changes and Future Profitability. *Journal of Finance* 56, 2111-2133.

Orszag, Peter R. (2007). Congressional Budget Office. http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/83xx/doc8337/07-20-egtrra-jgtrra_and_deficits.pdf.

Osmundsen, Petter, Asche, Frank, Mohn, Klaus and Misund, Bard. (2005). Valuation of International Oil Companies - The RoACE Era. *CESifo Working Paper Series*, No. 1412.

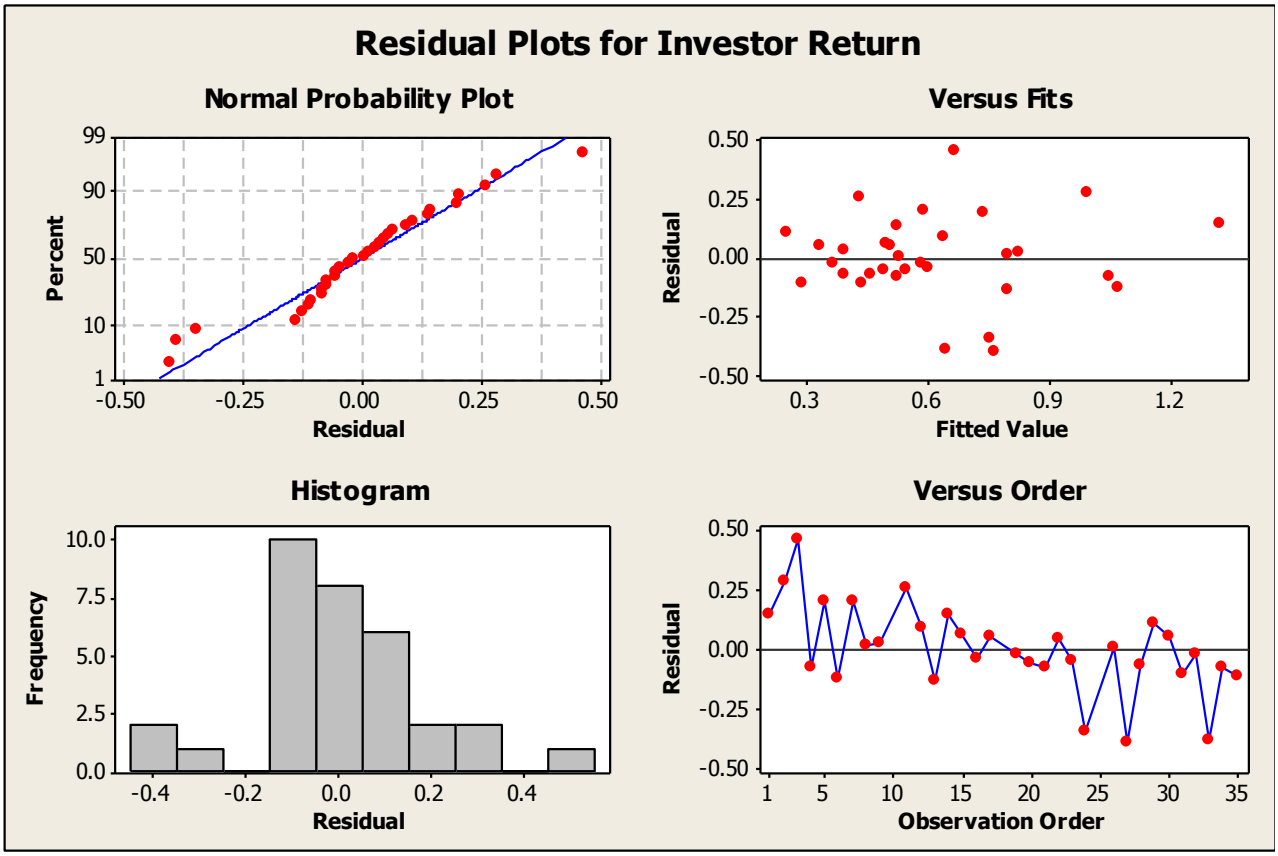
Poterba, James. (2004). Taxation And Corporate Payout Policy. *American Economic Review*, v94, 171-175.

Prakash, Puneet, (2011). Why Did Non-Dividend Paying Firms Benefit More from the 2003 Dividend Tax Cut? Evidence from SEOs.

Six Year and One Year Natural Gas and Oil Futures. (2001). http://www.mcdep.com/industry11119.htm.

Skinner, Douglas J. and Soltes, Eugene F., (August 1, 2009). What Do Dividends Tell Us About Earnings Quality? *Review of Accounting Studies, Forthcoming.*

Appendix:

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Regression Equation

Average RoACE  =  0.150709 + 0.151052 DIV + 0.373796 BUYBACK + 0.0684925 CAP EX
                  - 0.0861594 DEBT RED


                  Summary of Model

                  S = 0.0560592     R-Sq = 13.23%        R-Sq(adj) = 1.66%


                  Analysis of Variance

                  Source       DF     Seq SS      Adj SS      Adj MS        F        P
                  Regression    4   0.014370   0.0143700   0.0035925  1.14315  0.355323
                    DIV         1   0.000371   0.0002802   0.0002802  0.08915  0.767322
                    BUYBACK     1   0.006841   0.0053471   0.0053471  1.70147  0.202015
                    CAP EX      1   0.000200   0.0047448   0.0047448  1.50981  0.228721
                    DEBT RED    1   0.006959   0.0069588   0.0069588  2.21431  0.147173
                  Error        30   0.094279   0.0942789   0.0031426
                  Total        34   0.108649
```

Information showing lack of a connection between RoACE and capital expenditures, implying that it was unlikely that the way a company allocated capital affected the return per project, making this a useful metric.

Table 1: Company's Respective External Sensitivities

	Ticker	Company	Sub-Sector	CAGR	Beta Oil	Beta Market
1	RRC	RANGE RESOURCES CORP	Nat Gas	143.59%	0.148	1.494
2	SWN	SOUTHWESTERN ENERGY CO	Nat Gas	127.73%	0.29	1.603
3	NOV	NATIONAL OILWELL VARCO INC	Services	112.67%	0.256	1.096
4	BTU	PEABODY ENERGY CORP	Coal	94.02%	0.291	1.813
5	DNR	DENBURY RESOURCES INC	E&P	93.32%	0.563	1.18
6	CHK	CHESAPEAKE ENERGY CORP	Nat Gas	88.47%	0.453	0.949
7	HES	HESS CORP	Major	76.54%	0.346	0.976
8	CNX	CONSOL ENERGY INC	Coal	76.32%	0.2	1.655
9	DO	DIAMOND OFFSHRE DRILLING INC	E&P	75.83%	0.236	1.077
10	NBL	NOBLE ENERGY INC	Nat Gas	75.33%	0.23	1.02
11	FTI	FMC TECHNOLOGIES INC	E&P	60.98%	0.15	1.139
12	MRO	MARATHON OIL CORP	E&P	60.93%	0.091	1.428
13	WMB	WILLIAMS COS INC	Services	59.52%	0.153	1.358
14	OXY	OCCIDENTAL PETROLEUM CORP	E&P	57.93%	0.331	0.858
15	EOG	EOG RESOURCES INC	E&P	54.44%	0.233	1.043
16	COG	CABOT OIL & GAS CORP	Nat Gas	53.00%	0.173	1.243
17	SLB	SCHLUMBERGER LTD	Services	51.13%	0.002	1.116
18	CAM	CAMERON INTERNATIONAL CORP	E&P	46.47%	0.2	1.071
19	COP	CONOCOPHILLIPS	Major	45.60%	0.231	1.1
20	APA	APACHE CORP	E&P	41.87%	0.357	0.809
21	NE	NOBLE CORP	E&P	41.25%	0.268	1.021
22	MUR	MURPHY OIL CORP	E&P	41.04%	0.148	0.764
23	HAL	HALLIBURTON CO	Services	40.79%	0.409	0.964
24	NFX	NEWFIELD EXPLORATION CO	E&P	40.70%	0.307	0.999
25	DVN	DEVON ENERGY CORP	E&P	39.30%	0.24	0.787
26	SUN	SUNOCO INC	Major	36.01%	0.18	1.508
27	HP	HELMERICH & PAYNE	Services	34.72%	0.186	1.44
28	APC	ANADARKO PETROLEUM CORP	E&P	33.48%	0.339	0.919
29	EQT	EQT CORP	E&P	30.85%	-0.05	0.805
30	CVX	CHEVRON CORP	Major	30.35%	-0.146	0.9
31	BHI	BAKER HUGHES INC	Services	26.50%	0.162	0.995
32	XOM	EXXON MOBIL CORP	Major	23.80%	0.111	0.954
33	RDC	ROWAN COS INC	Services	23.42%	0.126	1.253
34	PXD	PIONEER NATURAL RESOURCES	E&P	19.58%	0.377	0.85
35	NBR	NABORS INDUSTRIES LTD	Services	11.09%	0.076	0.919

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