CORPORATE INVERSIONS AND THE COST OF EQUITY: A TALE OF TWO STRATEGIES

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ABSTRACT

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Firms invert either through a pure inversion strategy or by merging with a foreign entity. I document that the impact of corporate inversions on the cost of equity is significantly different between the two strategies. I find that pure inversions increase the cost of equity by 10%, whereas inversions through mergers decrease it by 13%. Although both inversion strategies increase the inverting firm's shareholder value, inversions through mergers appear to create more value. However, before the tax reform of 2004, which eliminated the tax savings from pure inversions, most inversions were pure, whereas after the tax reform most were done through mergers. This finding suggests that the tax reform had an unintended consequence of reducing a managerial agency problem by eliminating the less beneficial inversion option.

This dissertation is dedicated to my wife, Xiaohui Lin.

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Last but definitely not the least, I sincerely thank the support from my wife, Xiaohui Lin, who always believes that the glass is "half full". She has "transformed" me to maintain a simply hope that tomorrow is going to be better than today. Magically, this project was started at about the same time that we knew each other, and I defended my dissertation at the time that we got married. Therefore, I would like to dedicate this dissertation to her.

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1. INTRODUCTION

The exodus of U.S. corporations for tax-haven countries,[1] known as "corporate inversion," has led to a discussion among policy makers regarding possible tax and other regulatory reforms. In a corporate inversion, a U.S. multinational corporation (UMC) either (i) is acquired by its own foreign subsidiary (pure inversion strategy) or (ii) merges with or is acquired by a foreign operating company (M&A inversion strategy). The newly incorporated firm is governed and taxed by the foreign jurisdiction's corporate laws while still maintaining its listing in the U.S. stock markets.

The current literature on corporate inversions has focused on the benefits of inversions. Hines and Hubbard (1990), Atlshuler, Newlon, and Randolph (1995), and Desai, Foley, and Hines (2001) identify that the inverting firm avoids paying repatriation taxes by inverting to a country with a territorial tax regime.[2] An inverting firm will also allocate its expenses more effectively across borders and reap indirect tax savings after inversion,[3] Additionally, Talley (2015) argues that besides the tax incentives, the progressive "federalization" of corporate law and corporate governance encourages UMCs to reincorporate overseas.

Although the benefits of inversions have been extensively investigated in the literature, not much attention has been paid to the costs associated with inversions and the differences between inversion strategies. Specifically, issues requiring further inquiry include the impact of inversion

[1] Tax-haven countries are those with special tax attributes designed to attract foreign investors. They typically have very low tax rates. In return, they will receive large foreign investments and enjoy fast economic growth. Currently, there are about 40 tax havens, including Bermuda, the Cayman Islands, and Ireland. (see Dharmapala and Hines, 2009).

[2] The tax-saving motive is also the most commonly cited reason for inverting firms' management to support their inversion decision. For instance, in its announcement of inverting to Canada, Burger King predicted that it could save $117 million annually. Similarly, Walgreens estimated that it could dodge up to $4 billion in U.S. taxes over five years by inverting to Switzerland.

[3] For example, the surviving tax-haven parent company can lend to the U.S. subsidiary, thereby generating interest deductions against U.S. taxable income while the interest income of the parent company is tax-free (Desai and Hines, 2002). This practice is referred to as "interest stripping." In contrast, this practice is not allowed for UMCs because the funds borrowed from subsidiaries are taxed as repatriated dividends.

on a firm's financing costs; whether pure and M&A inversion strategies are equally efficient at increasing existing shareholder value; whether there is evidence that the choice of strategies may be driven by the managerial agency problem; and whether the 2004 tax reform aimed at curbing inversions has been effective.

This paper attempts to answer some of these questions. First, I believe this paper is the first to document changes in the cost of equity caused by a corporate inversion. I also find differential impacts of inversions on the cost of equity between the two inversion strategies: pure inversions increase the cost of equity by around 10% of pre-inversion levels, whereas M&A inversions decrease it by around 13%. Second, I document that an M&A inversion is more beneficial to existing shareholders than a pure inversion and on average delivers an additional amount of around $4.6 billion to existing shareholders over a 5-year window. Third, before the 2004 tax reform, most inversions were pure, whereas after the tax reform, they were done through M&A. Although this may have been an unintended consequence of the tax reform, my results suggest that the tax reform appears to have reduced a managerial agency problem by making the less efficient strategy unattractive and, thus, inducing managers to choose the more efficient inversion strategy.

The differential impacts of inversions on the cost of equity between the two strategies can be explained by the salient differences between them. The preferred pure inversion destinations are usually offshore tax-haven destinations such as Bermuda and the Cayman Islands, where corporate tax rates are usually zero. Moreover, there is usually no change in the location of the headquarters, the firm's management, and the daily operations of inverting firms under pure inversion.[4] There is a change, however, in the jurisdiction of the firm because it is now governed by the new home country's corporate laws, which are usually weaker.[5] Political and economic

[4] In fact, the company is not required to conduct any meetings or even have an office in the newly incorporated country.
[5] For example, the U.S. corporate laws are more protective against hostile take overs than the corporate laws in most

risks are larger in these destination jurisdictions as well.

In contrast, the headquarters location, firms' management, and their business operations are likely to change if there are efficiency gains to be achieved in an M&A inversion. Also, the destination jurisdictions of M&A inversions are in better developed countries such as Ireland and the United Kingdom, and their corporate law systems and political risks are similar to those in the United States. Therefore, ceteris paribus, the cost of equity increase caused by the change in corporate law jurisdiction in an M&A inversion should be smaller than the increase following a pure inversion. Second, in an M&A inversion, a UMC merges with a foreign firm that is usually of similar size, economically profitable, and internationally well known. All else equal, merging with such firms mitigates equity investors' concerns about the impact of the change in corporate laws and therefore lowers the shareholders' required rate of return. Last, since the two companies in an M&A inversion are generally in the same industry, an M&A inversion decreases the global competition of this industry and expands the inverting UMC's business. Overall, the estimated positive effect of M&A inversions on the cost of equity indicates that the benefits created through an M&A inversion outweigh equity investors' concerns about losing the protection of U.S. corporate laws.

Though an M&A inversion strategy is more favorable than pure inversions in terms of reducing the cost of equity, the tax savings through an M&A inversion strategy are usually less than those through pure inversions because the corporate tax rates in the destination jurisdictions of M&A inversions are usually higher than those in the offshore tax-haven destination jurisdictions of pure inversions. This begs the question of which strategy is more beneficial to existing shareholders. I look at the impact of the 2004 tax reform, which restricts the tax benefits from pure

of the tax havens.

inversions and induces inverting firms to invert through mergers. By estimating the changes in existing shareholder value after a firm inverts, either through a pure inversion strategy or by merging with a foreign entity, I am able to document that the M&A inversion strategy is more beneficial to existing shareholders in that it delivers an additional amount of around $4.6 billion to existing shareholders. This finding suggests that prior to the 2004 tax reform, managers do not appear to maximize shareholder value. Moreover, it appears that the tax policy change had an unintended consequence of reducing the managerial agency problem.

To test the hypothesis that UMCs invert in order to have access to the cash held in foreign subsidiaries, I look at changes in the cash holdings of inverting firms and find a statistically significant decrease in the cash holdings of pure-inverting firms. I further show that the repatriated cash holdings are mainly used to invest in potentially profitable projects located in the United States instead of used to distribute more dividends: the capital expenditure of the pure-inverting firm significantly increases, whereas the dividend payment is unchanged after a pure inversion. However, the cash holdings and investment policies of the foreign acquirer affect the post-inversion cash holdings, dividend payments, and capital expenditure in an M&A inversion, which makes the changes insignificant.

In this paper, I investigate the impact of inversions on the cost of equity and shareholder value by causal inference. The difference-in-difference (diff-in-diff) method is used to eliminate factors that can simultaneously affect inverting and non-inverting firms, thus leaving inversion to be the only policy change between the inverting firm and its matched non-inverting control pair. Moreover, different from the traditional “two groups-two periods" linear diff-in-diff model, I use “two groups-multiple periods" individual-level linear and nonlinear diff-in-diff models to capture more unobserved firm and time heterogeneities and hence to increase explanatory power.

Since the incentive to invert comes from the less costly benefit of having profitable foreign operations and repatriating cash held in foreign subsidiaries, I choose the control sample from the pool of U.S. multinationals. To find the appropriate match for the inverting firm, I first define the "measurement quarter" as the last quarter of the calendar year prior to the announcement of inversion. Then within the same industry[6] and measurement quarter, I identify up to four control firms for each inverting one by matching on three observable firm characteristics using the Mahalanobis distance[7]: firm size (log of total assets), leverage (leverage ratio), and profitability (return on assets). My matching results show that there is no statistical difference in the distribution of these matched variables between the treated and control sample. Since I find matches for each inverting firm, I essentially estimate the average treatment effect on the treated (ATT) of corporate inversions. Robustness checking results show that the analysis in this paper is robust to the size of the control sample.

The rest of the paper is organized as follows. Section 2 discusses the related literature. Section 3 briefly discusses the benefits of corporate inversions and the legislative actions taken that aim to curb (pure) inversions. Section 4 gives my empirical methodology. Section 5 describes the data and provides the summary statistics. Section 6 discusses the empirical testing results of the impact of inversions on the cost of equity. Sections 7 compares changes in existing shareholder value after a firm inverts either through a pure inversion strategy or by merging with a foreign entity. Section 8 concludes.

[6] Industry is an important factor to control because there is significant heterogeneity in the concentration of inversions (Babkin, Glover, and Levine, 2016).

[7] The Mahalanobis distance of two vectors $\mathbf{x_i}$ and $\mathbf{x_j}$ is defined as $d(i; j) = (\mathbf{x_i} - \mathbf{x_j})'\Sigma^{-1}(\mathbf{x_i} - \mathbf{x_j})$, where Σ is the variance-covariance matrix of $\mathbf{x_i}$ and $\mathbf{x_j}$. For a fixed vector $\mathbf{x_i}$, the vector $\mathbf{x_j}$* that gives the shortest $d(i; j)$ is the best match for vector $\mathbf{x_i}$.

2. LITERATURE REVIEW

An important strand of literature on corporate inversions is investigating the causes of inversions. Hines and Hubbard (1990), Atlshuler et al. (1995), and Desai et al. (2001) identify two components of the tax benefits of inversion. First, by inverting to a country with a territorial tax regime, the firm can avoid paying repatriation taxes as well as circumvent taking costly actions to avoid such taxes had the firm not inverted. Second, an inverting company can save taxes by reallocating expenses, including the allocation of interest expense to foreign source income. Desai and Hines (2002) find that large firms, those with extensive foreign assets, and those with considerable debt are most likely to expatriate, which suggests that U.S. taxation of foreign income, including the interest expense allocation rules, significantly affects inversions. Seida and Wempe (2003a) further confirm that the reduction in taxes post-inversion is partly due to the reduction in U.S. taxable income by shifting more expenses to the United States after inversion. Talley (2015) argues that besides the tax incentives, the progressive “federalization" of corporate law and corporate governance has encouraged UMCs to reincorporate overseas. Over the last 15 years, federal law has progressively encroached on firms’ internal corporate governance, which is traditionally the domain of state law. These mandates have displaced state law as a primary source of governance regulations for U.S.-listed issuers, and this displacement has gradually unbundled domestic tax law from corporate governance, which erodes the U.S. market power in regulatory competition.

The second strand of literature on inversion, albeit small, analyzes the costs of inversion. Cortes, Gomes, and Gopalan (2015) find that inverting firms have higher bid-ask spreads and their investors put a lower value on the cash on their balance sheets. They also find that inverting firms have a more concentrated institutional share ownership structure, and they document the lower

stock liquidity resulting from inversions. Different from their paper, my paper analyzes the cost change in a more direct way by analyzing the changes in the cost of equity. Babkin et al. (2016) develop a model to value the net benefits of inversion and show that while the benefits of inversion disproportionately accrue to the CEO, foreign shareholders, and short-term investors, many long-term investors suffer a net loss. The negative return of long-term investors results from the capital gains tax event triggered by inversion. They have to pay capital gains taxes immediately after inversion, thus losing the option to defer capital gains taxes on their shares. That loss outweighs the benefits generated from the reduced future corporate tax rate.

This paper is also related to the literature that analyzes the share price reaction around an inversion. Based on a sample of 19 pure-inverting firms, Desai and Hines (2002) find that share prices rise by an average of 1.7% in response to expatriation announcements. Among these 19 companies, eight experienced positive abnormal returns over the one-day window, and ten did so over a five-day window. But their paper does not indicate whether the increase is statistically significant. Cloyd, Mills, and Weaver (2003) and Seida and Wempe (2003b) find no evidence of a positive market reaction to board approval announcements. Since these papers were published before the passing of Section 7874 of the 2004 American Jobs Creation Act, they all analyze pure-inverting firms with a small sample. The sample used in my paper also includes post-2004 inverting companies and M&A inverting companies. Thus, the sample size in this paper is much larger than their sample size (63 versus 19).

Finally, this paper is also related to the literature on cross-listing firms (Doidge, Karolyi, and Stulz, 2004; Doidge, Karolyi, and Stulz, 2007), which suggests that U.S. listing facilitates the firm to take growth opportunities by limiting the extent to which controlling shareholders can engage in expropriation. But there is a difference between the inverting companies and the cross-

listing companies. Compared to the cross-listed companies discussed in this strand of literature whose significant operations are mainly outside of the United States, the inverting firms still operate mainly in the United States. This further enhances the SEC's ability to enforce its penalties on the inverting companies (Siegel, 2005; Shnitser, 2010; Licht, 2003; Cortes et al., 2015).

3. INCENTIVES OF CORPORATE INVERSIONS

3.1. Incentives of Corporate Inversions

The high U.S. “headline" tax rate has been regarded as an important reason that caused companies to invert. The dominant federal tax bracket for most moderate-sized (or larger) U.S. corporations is 35%.[8] Adding state corporate taxes, which range from 0% to 9%, to this figure, most UMCs are faced with a marginal headline tax rate around 40%.[9] As Figure 1 illustrates, the combined headline rate in the United States (the top thick line) far exceeds the rate in most of the competitive jurisdictions, and the gap has been widening in recent effective tax rate in the United States may be well below the headline tax rates because of various kinds of accounting and financing methods, U.S. corporations are still faced with a large tax bill.

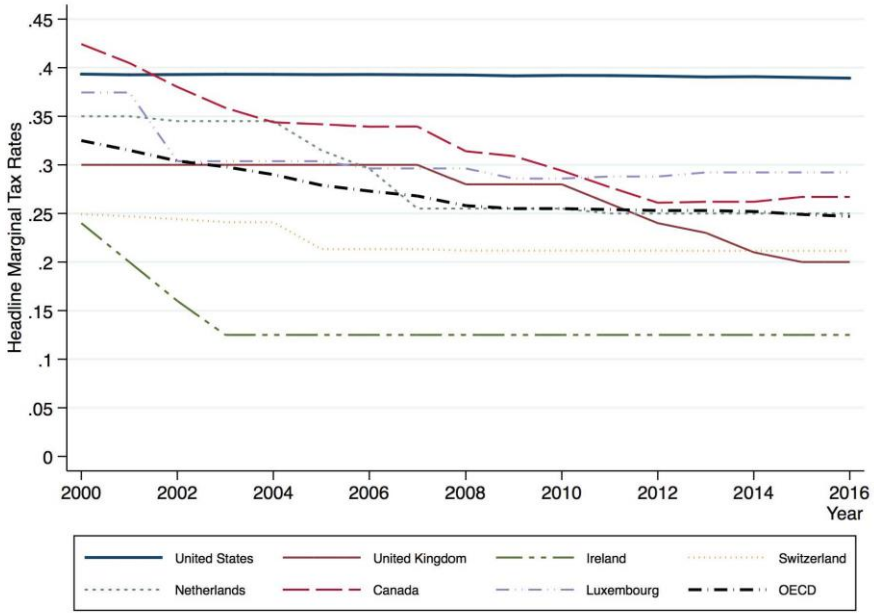
In addition, the worldwide approach of the U.S. tax regime combined with the high U.S. tax rates give UMCs the incentive to invert.[10] Different from the territorial tax regime in most OECD countries, which exempts the distributions from controlled foreign subsidiaries for tax purposes, the U.S. tax authorities levy taxes on UMCs’ worldwide income, not just the proportion generated in the United States. To avoid double taxation, the U.S. tax code grants a credit for foreign taxes already paid to the foreign governments, and the foreign operations are liable only to the extent that tax liability under U.S. law would exceed that amount. Also, a UMC can defer U.S. recognition of earnings as long as it does not repatriate its foreign subsidiary’s earnings to the parent. I use a hypothetical example to illustrate this point (see Panel A of Figure 2).

[8] To be more specific, these are the companies whose taxable net earnings exceed approximately $18.3 million per year (Talley, 2015).

[9] See Corporate Tax Rates Table, KPMG, http://www.kpmg.com/global/en/services/tax/tax-tools-and-resources/pages/corporate-tax-rates-table.aspx.

[10] Besides the United States, other OECD countries that take a worldwide approach are Chile, Greece, Ireland, Israel, South Korea, and Mexico.

Figure 1. Headline Marginal Corporate Tax Rates (Selected Countries).
This figure depicts the headline (country plus state) marginal tax rates of several selected OECD countries. The headline marginal tax rate in the United States (the thick line at the top) far exceeds the rate in most of the competitive jurisdictions, and the gap has been widening in recent years. In 2016, the U.S. corporate headline tax rate is 39%, much higher than that of Ireland (12.5%), the United Kingdom (20% and falling), Canada (26.5%), and the OECD average (25%).



Suppose a U.S. incorporated multinational parent company has two separately incorporated subsidiaries,[11] a U.S. subsidiary and a foreign subsidiary, and each generates $100 in taxable earnings. Suppose the U.S. worldwide corporate tax rate is 40% and the foreign country's territorial corporate tax rate is 15%. Immediately when the earnings are generated, the U.S. subsidiary pays $40 to the U.S. tax authority and the foreign subsidiary pays $15 to the foreign government. No further taxes are levied at the corporate level as long as the remaining $85 is kept in the foreign subsidiary. However, if the foreign subsidiary repatriates the profits to its U.S. parent, in theory it should pay $40 to the United States, but the U.S. law permits the company to

[11] The profits of unincorporated foreign business branches are taxed immediately by the United States. Tax deferral is not allowed for foreign business branches.

claim $15 of foreign tax credits, which equals the amount of taxes already paid to the foreign government. So it needs to pay a $25 repatriation tax to the U.S. government before repatriating the remaining $60 to the U.S. parent. The overall after-tax earnings of the parent company is $120.

There is not much a U.S. parent company can do to avoid the U.S. tax liabilities on the foreign earnings. Though it could defer the $25 U.S. tax liability indefinitely as long as the after-tax foreign earnings are retained within the firm's foreign-incorporated subsidiaries, the parent company might want to utilize these earnings for profitable investment undertakings in the United States or for distributing more cash dividends. A common strategy for using unrepatriated earnings is through intra-company loans from the foreign company to the U.S. parent company. But such practices are usually restricted under Section 956 of the U.S. Internal Revenue Code by deeming such loans as dividends and thus taxable.[12]

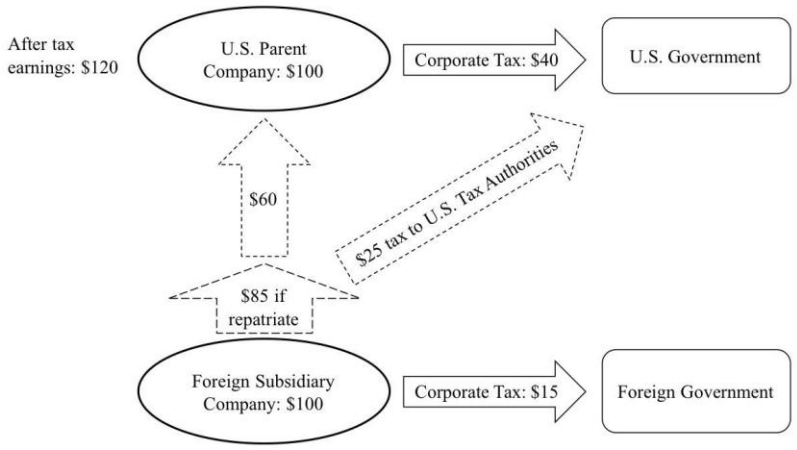
After inverting to a tax-haven country, the multinational firm can avoid paying repatriation taxes and unlock its overseas earnings. Suppose the U.S. parent company shown in Panel A of Figure 2 is acquired by its foreign subsidiary and then the surviving company is reincorporated in the country where the subsidiary is located (Panel B of Figure 2). If that country's tax system is territorial, all $60 in after-tax earnings in the U.S. subsidiary can be repatriated to the foreign parent company without paying any repatriation taxes. The overall after-tax earnings of the parent company are now $145 compared to the $120 pre-inversion, thereby generating $25 in tax savings.

In addition, the surviving firm after an inversion can allocate its expenses more effectively across borders and further save taxes after inversion. For example, the surviving tax-haven-incorporated parent company can lend to the U.S. subsidiary, thereby generating interest

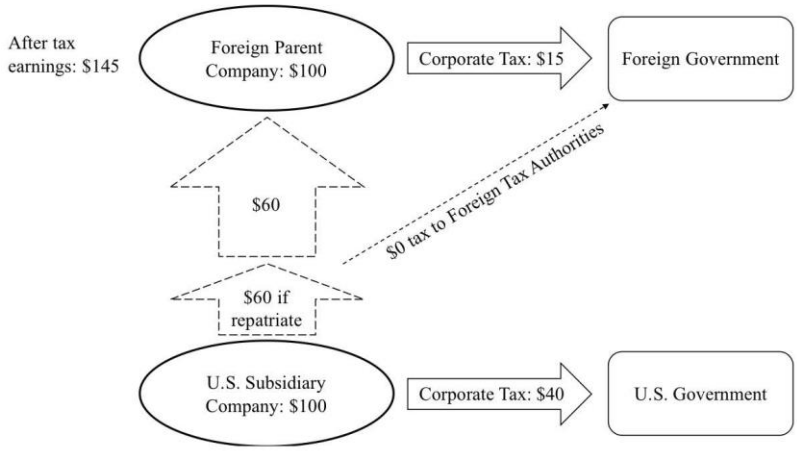
[12] There are some limited exceptions under Section 956 of Internal Revenue Code, which gives criteria under which certain loans are nontaxable. But such loans are required to be short-term in nature and generally need to be repaid within the end of the subsidiary's fiscal quarter.

deductions against U.S. taxable income while the interest income of the parent company is tax-free. In this way, overseas funds are made available to the U.S. subsidiary, and the firm also pays less taxes.

Figure 2. After-Tax Earnings Before and After Inversion.
In this figure I use a hypothetical example to show where the tax savings originate after a corporate inversion. The corporate tax rate in the United States and the foreign country is assumed to be 40% and 15%, respectively. Panel A represents the case in which the multinational corporation is U.S.-incorporated. Because the U.S. tax regime takes a worldwide approach, the firm needs to pay a $25 repatriation taxes to the U.S. government if it wants to repatriate the $85 in foreign after-tax earnings. By flipping the corporate structure and reincorporating in a foreign country where taxes are levied only on the earnings generated domestically (territorial regime), as indicated in Panel B, the multinational firm could save $25 in repatriation taxes and hence increase its overall after-tax earnings by $25.



Panel A: U.S. Incorporated Multinational Company



Panel B: Foreign Incorporated Multinational Company

3.2. Section 7874 of the 2004 American Jobs Creation Act

The first wave of inversion came after 1994 when Helen of Troy, a publicly traded U.S. company in the personal care industry, pure-inverted to Bermuda. From 1994 to 2003, 28 companies were reincorporated abroad, among which 24 companies used pure inversions. Typically, the U.S. parent company is acquired by one of its foreign subsidiaries registered in a tax-haven country such as Bermuda in a pure inversion. After the transaction, the foreign subsidiary becomes the new parent company and the U.S. parent company becomes a subsidiary: therefore, the corporate structure is inverted. Existing shareholders of the former U.S. parent company typically still hold 100% of the shares in the new foreign-incorporated company. For instance, after Helen of Troy announced its inversion decision in December of 1993, it registered a subsidiary firm in Bermuda at first and then flipped it to become the new parent. Shareholders of the former U.S. parent firm received one share of the new firm for each share that they owned. The headquarters location, firms' management, and business operations all remained unchanged.

In response to this trend, Section 7874 of the 2004 American Jobs Creation Act was passed in 2004 and aimed at curbing pure inversions. In Section 7874, the "60% or 80% continuity threshold" (following Talley (2015)) is used to determine whether an inverting firm is qualified to reap tax benefits after an inversion.[13] First, the 60% threshold kicks in when the existing shareholders of the inverting firm hold less than 60% of the shares in the surviving (combined) company. If so, the surviving company will be fully treated as a foreign corporation by the U.S. tax authorities. Second, if the existing shareholders of the inverting firm hold greater than 60% but

[13] Besides the "60% or 80% continuity threshold," two other criteria are set out in Section 7874: (i) the foreign buyer acquires substantially all of the U.S. corporation's properties; (ii) the surviving company does not have substantial business activities in the foreign acquiring company's country of incorporation. If an inversion fails any one of these three criteria, it can reap the benefits of tax savings. But criteria (i) and (ii) are usually satisfied for almost all pure inversions, which makes the "60% or 80% continuity threshold" a key consideration.

less than 80% of the shares in the surviving company, the surviving company is partly recognized as a foreign entity. That is, the U.S. subsidiary's taxable income cannot be less than the gains that it received in this transaction in the following 10 years after inversion. Third, if the existing shareholders of the inverting firm hold more than 80% of the shares in the surviving company, the surviving company is still regarded as a U.S. incorporated company for tax purposes and thus reaps no tax benefits from this inversion.

Section 7874 effectively put a leash on pure inversions because the existing shareholders of a pure-inverting firm hold almost 100% of the shares in the surviving firm, and therefore the firm incurs no tax-saving benefits from the inversion. But the trend of corporate inversions was not stopped by Section 7874, and M&A inversions took the place of pure inversions, becoming the most favorable inversion strategy after 2004. Different from pure inversions, a UMC merges with or is acquired by a foreign company of similar size in an M&A inversion and changes its incorporation country to where the foreign acquirer is located. For example, in August of 2014 the then Delaware-incorporated fast food chain Burger King Worldwide, Inc., announced that it agreed to acquire Tim Hortons, Canada's largest quick service restaurant, for about $11 billion.[14] The new company is now governed by Canadian corporate laws while it still lists on the New York Stock Exchange.

An inverting company can easily bypass the 80% threshold by acquiring a foreign company of similar size, and frequently the existing shareholders' ownership of the surviving company can even be below 60% after M&A inversions. Following this change, more mature and better

[14] In this transaction, Tim Hortons' investors received C$65.50 in cash and 0.8025 a share of the surviving company for each share they owned. The two brands still operate independently after the merger under the new combined company, Restaurant Brands International, which is incorporated in Canada. The shares of the combined company started trading on the Toronto Stock Exchange and New York Stock Exchange under the symbol QSR on December 15, 2014.

developed countries such as Canada, the United Kingdom and Ireland replaced Bermuda and the Cayman Islands as the most popular countries to invert to. These new destinations have stronger economies, more stable economic policies, more favorable corporate law structures, and similar political risks than the pure inversions. Those advantages will possibly be reflected in the inverting firm's cost of equity and existing shareholder value change.

4. EMPIRICAL METHODOLOGY

4.1. Implied Cost of Capital

In this paper, I use the implied cost of capital (ICC), computed using earnings forecasts and market price, to measure the cost of equity. Fama and French (1997) conclude that the cost of equity estimates derived from the capital asset pricing model and three-factor models using realized rate of return are "unavoidably imprecise" because of three potential problems: difficulties in identifying the right asset pricing model, imprecision in the estimates of factor loadings, and the imprecision in the estimates of factor risk premia. Pastor, Sinha, and Swaminathan (2008) further show in simulations as well as empirically that ICC outperforms the realized rate of return in detecting a risk-return trade-off.

The empirical construction of the ICC in this paper closely follows Pastor et al. (2008). The firm-level quarterly ICC is the value of r_e that solves the empirically tractable finite-horizon model:

$$P_t = \sum_{k=1}^{T} \frac{FE_{t+k}(1 - b_{t+k})}{(1 + r_e)^k} + \frac{FE_{t+T+1}}{r_e(1 + r_e)^T} \quad (1)$$

where P_t is the (average) stock price at quarter t, FE_{t+k} and b_{t+k} are the forecasts of the earnings per share (EPS) and the plowback ratio in k years after quarter t, and T is the forecasting horizon (T=15). Notice that $FE_{t+k}(1 - b_{t+k})$ represents the free cash flow to equity in k years after quarter t. The first term in equation (1) captures the total present value of free cash flow to equity up to the terminal period T, and the second term captures the total present value of all cash flows beyond the terminal period.

The EPS forecasts FE_{t+k} ($k = 1; 2; \ldots; T+1$) are obtained based on the following steps. (i) The 1- and 2-year-ahead EPS forecasts are the median I/B/E/S 1- and 2-year-ahead analysts' EPS

forecasts. (ii) The 3-year-ahead EPS forecast is computed as $FE_{t+3} = FE_{t+2}(1+LTG)$, where *LTG* is the long-term earnings growth rate obtained from I/B/E/S. If *LTG* is missing in the I/B/E/S database, I extrapolate the growth rate in the first two years ($FE_{t+2}/ FE_{t+1} -1$) for another year. Following Pastor et al. (2008), firms with growth rates above 100% (below 2%) are assigned with 100% (2%). (iii) By imposing an exponential rate of decline to mean-revert the 3-year-ahead growth rate to the steady-state growth rate, I compute the 4- to (T+1)-year-ahead EPS as follows:

$$g_{t+k} = g_{t+k-1} \times exp\left[log\left(\frac{g}{g_{t+3}}\right)/(T-1)\right] \quad (2)$$

$$FE_{t+k} = FE_{t+k-1} \times (1 + g_{t+k}) \quad (3)$$

where g_{t+k} is the k-year ahead earnings growth rate, and *g* is the steady-state growth rate starting in $T+2$ periods after *t*. I use the 10-year rolling average of the annual nominal GDP growth rate as a proxy for *g*. (iv) I assume that the dividend paid to the shareholders in year $t+k$ is zero if the forecasted earnings in that year are negative.

The last thing needed to compute the ICC is the forecasted plowback rate b_{t+k}, which is computed in two stages: (i) I explicitly forecast the plowback ratio in the nearest two years, b_{t+1} and b_{t+2}, as one minus the firm's most recent payout ratio (i.e., total dividend paid divided by net income)[15]; (ii) I mean-revert the plowback ratios between $t+2$ and $t+T+1$ linearly to the steady-state plowback ratio based on the following equation:

$$b_{t+k} = b_{t+k-1} - \frac{b_{t+2} - b}{T - 1} \quad (4)$$

where b is the steady-state plowback ratio. The variable *b* is computed from the sustainable growth

[15] Following Gerbardt, Lee, and Swaminathan (2001), for firms with negative earnings, I divide dividends by long-term earnings. The long-term earnings are estimated to be 6% of total assets since the long-run return on assets in the United States is 6%.

rate formula, $g = ROI \times b$, where *ROI* is the steady-state return on investment. Following Gerbardt et al. (2001) I use the 10-year rolling average of the firm's return on investment as the steady-state *ROI*. Finally, with the forecasted EPS and plowback ratio readily available, ICC can be computed from equation (1).

4.2. Matching

I test the change in the cost of equity by comparing the inverting firms to a matched sample of UMCs and computing the diff-in-diff estimate of the effect of inversion on the cost of equity. I select the control sample from the pool of UMCs instead of the entire group of U.S. incorporated companies for two reasons. First, as illustrated in Section 3, only multinational firms can benefit from inversions, and the incentive to invert comes from the less costly benefit of having profitable foreign operations and repatriating the cash held within foreign subsidiaries. So companies with 100% business in the United States will not construct a good control sample, and therefore these firms should be excluded from our consideration. Second, because firms in my treated sample are all incorporated in the United States and are publicly traded in U.S. markets before they invert, to make a good comparison, I select the control sample only from the firms that have remained incorporated and publicly traded in the United States since their inception. So, different from Cortes et al. (2015), I do not consider the foreign private issuer (FPI) and American foreign corporations (AFC) in this paper.[16]

To find the appropriate control sample by matching, I first define the measurement quarter

[16] FPIs are foreign incorporated and have business mainly outside of the United States. Though they are cross-listed in the United States and are governed under the federal securities law, they are usually faced with less stringent disclosure and corporate governance rules (Siegel, 2005; Shnitser, 2010; Licht, 2003). AFCs include household names such as Michael Kors Holdings Ltd and Carnival Corporation, which have substantial business in the United States but were incorporate outside of the United States from the time they were built. Since they started out as a foreign company, there is no need to invert out of the United States for them.

to be the last quarter of the calendar year prior to the announcement of inversion. Then, for each inverting firm, I match on three observable firm characteristics while controlling the measurement quarter and industry: firm size (*log(total assets)*), leverage (*leverage ratio*), and profitability (*return on assets*, or *ROA*). These matching variables are chosen because the literature (e.g., Desai and Hines (2002) and Cortes et al. (2015)) has shown that large, profitable multinational firms with high leverage have a higher probability of inverting. Industry is another important factor to control because some industries, such as the pharmaceutical products industry, tend to have more inversions compared to other industries.

Specifically, for each inverting firm in the treated sample, I identify the best match in the same industry and the same measurement quarter in terms of those three observable firm characteristics using the Mahalanobis distance. It might be instructive to look at an example to understand the matching used here. If firm A announces that it will invert to Bermuda in March of 2010, I define the measurement quarter to be the fourth quarter of 2009. I then compute the Mahalanobis distance for all the UMCs in the measurement quarter based on *log(total assets)*, *leverage ratio*, and *return on assets*, and double-sort the firms by distance and industry. Lastly, I use the firm with the smallest distance in the same industry as firm A to be the control firm. To ensure that the control firm is the closest match, I match with replacement and drop the duplicates. In addition, the first four closest matches are used for a robustness check.

This matching method guarantees the three matching variables to be exogenous to the treatment (inversion) because they are measured in the quarter before the inversion announcement. In the commonly used matching method, a match is found for each firm-quarter observation before and after the treatment, so that these matching firm characteristics will be changed by an inversion, especially an M&A inversion, therefore weakening the analysis. In this sense, my matching

method is more advantageous than the commonly used matching method and differs from that of Cortes et al. (2015).

4.3. Linear Difference-in-Difference Analysis

Having identified the treated and control groups, I test the effects of inversion on the cost of equity by estimating the following linear model:

$$RP_{it} = \tau D_{it} + \boldsymbol{x_{it}\gamma} + c_i + \lambda_t + u_{it}, \quad t = 1, 2, \dots, T \tag{5}$$

where RP_{it} is the risk premium (the cost of equity minus the risk-free rate) of company *i* at time *t*, and D_{it} is the incorporation status dummy variable of company *i* at time *t*. If company *i* is incorporated in the United States at time *t*, D_{it} equals 0. Otherwise, if it is incorporated in a foreign country at time t, D_{it} equals 1. Notably, D_{it} equals 0 for all control firms. For treated firms, D_{it} equals 0 before they invert, and 1 afterward. Since no companies in my sample reincorporate back to the United States after they invert, D_{it} = 1 whenever D_{is} = 1 for all $s < t$. *Log(total assets)*, *leverage ratio*, and *ROA* are used as controls and included in $\boldsymbol{x_{it}}$. The term c_i denotes a full set of unobserved heterogeneity effects, which will absorb the impact of any time-invariant firm characteristics, and λ_t denote a full set of time-fixed effects. The error term u_{it} includes all other time-varying unobservable shocks to the cost of equity.

We assume that the incorporation indicator D_{it} is strictly exogenous: after controlling for *log(total assets)*, *leverage ratio*, *ROA*, unobserved firm-specific heterogeneity, and time-fixed effects, u_{it} is conditionally independent of incorporation status, D_{it}. This assumption is plausible because companies invert mainly because of tax savings and expense reallocation, and there is no evidence indicating that shocks to the cost of capital affect a firm's inverting decision.

Following Imbens and Wooldridge (2007), equation (5) is essentially an individual-level diff-in-diff model, and τ is the diff-in-diff estimator. Compared to traditional linear diff-in-diff regressions with only two periods around the treatment, the individual-level diff-in-diff regression controls more unobservable time-fixed effects by using the entire time series path issue to notice is that no systematic factors are included in equation (5). There is little doubt that systematic factors such as the market risk premium, size, and book-to-market effects significantly affect the cost of equity (Pastor et al., 2008). They are omitted from equation (5) because they tend to affect both treated and control observations, and their net contribution to the diff-in-diff estimate is zero.

4.4. Nonlinear Analysis: Fractional Response Models

To make the estimation of the effects of inversion more precise, I use a fractional response model to capture the property that the cost of equity is generally between 0 and 1:

$$R_{it} = G(\tau D_{it} + \boldsymbol{x_{it}\gamma} + c_i + \lambda_t) + u_{it}, \quad t = 1, 2, \dots, T \tag{6}$$

where R_{it} is the cost of equity. Assuming $E(u_{it}|D_{it}, \boldsymbol{x_{it}}, c_i, \lambda_t) = 0$, we have

$$E(R_{it}|D_{it}, \boldsymbol{x_{it}}, c_i, \lambda_t) = G(\tau D_{it} + \boldsymbol{x_{it}\gamma} + c_i + \lambda_t) \tag{7}$$

To ensure $E(RP_{it}|D_{it}, \boldsymbol{x_{it}}, c_i, \lambda_t)$ lies between 0 and 1, I choose three functional forms of $G(\cdot)$:

(i) $G(z) = exp(z)/(1 + exp(z))$; (fractional logit)

(ii) $G(z) = \Phi(z)$, where $\Phi(z)$ is the cumulative function of the standard normal distribution, or $\Phi(z) = \int_{-\infty}^{z} \frac{1}{\sqrt{2\pi}} exp\left(-\frac{x^2}{2}\right) dx$; (fractional probit)

(iii) $G(z) = 1 - exp\big(-exp(z)\big)$; (fractional complementary log-log).

All of these models are estimated using quasi-maximum likelihood estimation, and the standard

errors are fully robust to firm-level heteroskedasticity and serial correlation. The average treatment effect on the treated (ATT) estimated in the fractional response models is the diff-in-diff estimate of the inversion's impact on the cost of equity.

5. DATA AND SUMMARY STATISTICS

5.1. Data

I obtain price data from CRSP, accounting data from COMPUSTAT (U.S., quarterly), analyst forecast data from I/B/E/S, and the one-month T-bill rate of return from Kenneth French's website. Additionally, nominal GDP growth rates are available from the Bureau of Economic Analysis. To compute the ICC, we need to merge COMPUSTAT with I/B/E/S first. However, we cannot merge them directly because COMPUSTAT uses GVKEY as the permanent identifier to track each company, while I/B/E/S uses I/B/E/S TICKER. So I start with merging I/B/E/S and CRSP by CUSIP, CUSIP dates, and company names to build a one-to-one match between I/B/E/S TICKER and CRSP PERMNO,[17] and then merge the resulting file with CRSP/COMPUSTAT-Merged dataset by PERMNO and date. In this way, we obtain the COMPUSTAT/IBES-Merged dataset.

The list of corporate inversions is obtained mainly from three sources: the existing literature (Desai and Hines, 2002; Seida and Wempe, 2003b; Talley, 2015), the Bloomberg Corporate Expatriates list, and the SEC. Appendix A lists 88 companies that announced plans to invert from 1994 to 2015, including 8 companies that failed to pass the board's approval. To be consistent with the existing literature's treatment of inversions, I further screen these companies by comparing each firm with its SEC Edgar filings based on the following criteria: (i) the inversion passed the board's approval; (ii) the inverting company was a publicly traded U.S. company before inversion; (iii) stocks of the surviving company are still publicly traded in the United States;[18] (iv) the transaction was closed/completed by December 31, 2015. We are left with 63 inversions for

[17] The matched pairs whose exchange tickers match but the company names and CUSIPs do not match are omitted.
[18] Hence, firms whose stocks are traded on the OTC market after inversion are not included in the treated sample in this paper.

empirical testing purposes (Appendix B).

5.2. Summary Statistics

Figure 3 plots the total number of inversions and the number of inversions through each strategy from 1993 to 2014. Before 2004, 28 companies inverted overseas, among which the majority (24) inverted purely. Nevertheless, after the passing of Section 7874 in 2004, inverting by merging with a foreign entity replaces pure inversion as the most common inversion strategy. Moreover, it has become the dominant strategy especially after 2010. For instance, while there have been only 4 pure inversion announcements since 2010, there were 13 M&A inversions in 2014 alone. Spin-off inversion is more frequent after 2004 than before, but the number of this type is negligible.

Figure 3. Inversion Volume.
The figure displays the number of inversion announcements from 1993 to 2014. Panel A displays the overall announcements. The other three panels display the number of inversions for all three kinds of inversions: pure inversion (Panel B), M&A inversion (Panel C), and spin-off inversion (Panel D). The integers above the bars indicate the number of inversions announced in that year.

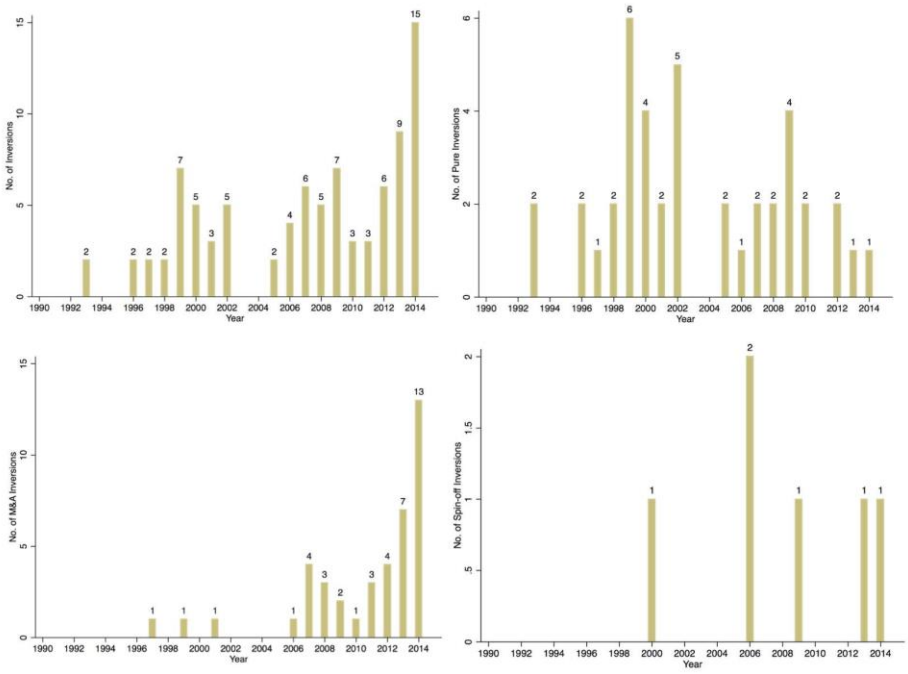


Table 1 displays the number of inversions announced in each industry. Generally, inversions occur in a wide range of industries: they exist in 26 out of 48 Fama-French industries. That being said, inversions cluster mainly in three industries: pharmaceutical products (14), petroleum and natural gas (13), and insurance (8). A firm in the petroleum and natural gas industry inverts mainly through a pure inversion strategy, whereas a firm in the pharmaceutical products industry commonly inverts through mergers.

We also display 17 destination countries in Table 2, and 6 of them are tax havens (Hines and Rice, 1994; Dharmapala and Hines, 2009). The second column in Table 2 gives the total number of inversions for each destination; Bermuda is the most popular destination (26 inversions out of 88). The other popular destination jurisdictions are Ireland (13), the Cayman Islands (10), the United Kingdom (9), Canada (8), and the Netherlands (7). Importantly, inverting firms' destinations have been shifting from less developed offshore tax haven jurisdictions such as Bermuda and the Cayman Islands to more developed countries such as Ireland, the Netherlands, and the United Kingdom (see column (3) of Table 2). Moreover, this shifting has become more apparent after 2010. There have been 12 inversions to Ireland, 8 to the United Kingdom and five to the Netherlands, but only four to Bermuda since 2010 (see column (5) of Table 2).

Inverting firms prefer more developed economies after 2004 because it is easier for them to find a foreign acquirer in these countries to bypass the "60% or 80% continuity threshold" imposed by Section 7874 of the 2004 American Jobs Creation Act. Interestingly, even for the firms inverting to Bermuda after 2004, M&A is also a common strategy to take. These firms were often acquired by a Bermuda-incorporated firm that pure-inverted to Bermuda before 2004. For example, the insurance company Argonaut Group inverted to Bermuda in 2007 by merging with the Bermuda-incorporated PXRE Group in 2007, and the PXRE Group pure-inverted to Bermuda

earlier in 1999.

Table 1: Inversion Announcements Across Industries.
The industry classification follows Fama-French (1997). Inversions exist in 26 out of 48 Fama-French industries and cluster mainly in three industries: pharmaceutical products (14), petroleum and natural gas (13), and insurance (8).

Industries	All	Pure	M&A	Spin-off
Agriculture	1	0	1	0
Automobile and Trucks	1	1	0	0
Business Services	4	1	2	1
Chemicals	3	1	2	0
Communication	4	2	2	0
Computers	2	1	1	0
Construction	2	2	0	0
Construction Materials	2	1	0	1
Consumer Goods	2	1	1	0
Electrical Equipment	2	1	1	0
Electronic Equipment	5	2	1	2
Finance Trading	4	2	2	0
Food Products	1	0	1	0
Insurance	8	5	3	0
Machinery	3	2	1	0
Medical Equipment	4	0	3	1
Non-metallic and Industrial Metal Mining	1	1	0	0
Petroleum and Natural Gas	13	8	4	1
Pharmaceutical Products	14	2	12	0
Precious Metals	3	3	0	0
Rubber and Plastic Products	1	1	0	0
Shipping Containers	1	0	1	0
Textiles	1	1	0	0
Transportation	3	1	2	0
Wholesale	1	1	0	0
restaurants, hotels, motels	2	1	1	0
Total	**88**	**41**	**41**	**6**

Table 2: Inversion Destinations.
This table displays the inversion destination jurisdictions. Overall, Bermuda, Canada, the Cayman Islands, Ireland, the Netherlands, and the United Kingdom are the most popular inversion destinations. Before the passing of Section 7874 of the 2004 American Jobs Creation Act, firms were mainly inverting to Bermuda (17) and the Cayman Islands (7). After 2004, firms were inverting to more developed countries such as Canada (7), Ireland (13), the Netherlands (5) and the United Kingdom (9). Bermuda appears to lose its charm to inverting firms after 2004. The "Y" in the last column indicates that the country is a tax-haven
country, following the definition in Hines and Rice (1994).

Destination	All	Before 2004	After 2004	After 2010	Tax Haven
Antigua	1	1	0	0	
Australia	1	0	1	1	
Austria	1	0	1	0	
Bermuda	26	17	9	4	Y
British Virgin Islands	1	0	1	0	Y
Canada	8	1	7	2	
Cayman Islands	10	7	3	0	Y
Denmark	1	0	1	0	
Ireland	13	0	13	12	Y
Israel	1	0	1	1	
Jersey	1	0	1	0	
Luxembourg	2	0	2	1	
Marshall Islands	3	0	3	0	Y
Netherlands	7	2	5	5	
Switzerland	2	0	2	1	Y
United Kingdom	9	0	9	8	
Total	**88**	**28**	**60**	**36**	**6**

Table 3 displays the summary statistics for the main variables used in this analysis. Panel A and Panel B report the statistics for the group of inversions and the group of 13,152 UMCs separately. All the UMCs reported in Panel B have been incorporated in the United States since their inception. We observe that inverting companies tend to have a lower average cost of equity than UMCs. They are also larger in size, have higher leverage ratios, and are more profitable on average, which is consistent with the findings in the literature. Panel C and Panel D give the summary statistics for firms taking pure and M&A inversion strategies. Slightly different from

pure-inverting firms, M&A-inverting firms typically have a lower leverage than UMCs. But they are both larger in size and more profitable when compared to an average UMC.

Table 3: Summary Statistics for the Main Variables Used in This Analysis.

Panel A: Treatment Group (Firms that Reincorporated from U.S. to Overseas)

Number of Firms:	63				
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
Cost of Equity	4529	0.108	0.018	0.002	0.149
Risk Premium	4529	0.017	0.009	-0.025	0.035
Total Assets (in Million Dollars)	4458	7211.73	13052.23	12.74	135840.7
Total Assets (in Log Points)	4458	7.598	1.787	2.545	11.819
Leverage Ratio	4452	0.572	0.261	0	2.508
Return on Assets	4447	0.005	0.059	-1.296	0.444

Panel B: U.S. Multinational Firms

Number of Firms	13152				
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
Cost of Equity	341244	0.110	0.017	0.00008	0.291
Risk Premium	341244	0.018	0.008	-0.021	0.066
Total Assets (in Million Dollars)	337447	5361.56	47309.95	0.076	3281222
Total Assets (in Log Points)	337447	6.228	2.006	-2.577	15.004
Leverage Ratio	337145	0.546	0.425	-0.004	95.163
Return on Assets	336997	-0.007	0.151	-28.427	10.053

Panel C: Pure Inversion

Number of Firms	31				
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
Cost of Equity	2555	0.106	0.020	0.002	0.147
Risk Premium	2555	0.016	0.009	-0.025	0.035
Total Assets (in Million Dollars)	2543	6756.00	10391.15	24.691	115505.4
Total Assets (in Log Points)	2543	7.647	1.758	3.206	11.657
Leverage Ratio	2543	0.612	0.281	0	2.508
Return on Assets	2536	0.002	0.061	-1.296	0.398

Table 3 (Cont'd)

Panel D: M&A Inversion

Number of Firms	26				
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
Cost of Equity	1582	0.110	0.016	0.018	0.149
Risk Premium	1582	0.019	0.008	-0.020	0.035
Total Assets (in Million Dollars)	1552	6350.10	13200.93	12.738	135840.7
Total Assets (in Log Points)	1552	7.406	1.778	2.545	11.819
Leverage Ratio	1546	0.499	0.230	0.014	1.840
Return on Assets	1548	0.008	0.060	-0.759	0.444

6. RESULTS

6.1. Linear Regression

I start by checking whether we have a comparable control sample to the treated sample in terms of the three matching variables, log(total assets), leverage ratio, and ROA. I use the inverting firms as the treated sample and the closest match as the control sample (CS1). Table 4 reports the 25th percentiles, 50th percentiles, and 75th percentiles of the three matching variables, and I find that the distributions are very close between the treated and control samples.[19] The p-values of the mean and distribution comparisons reported in the last two columns of Table 4 further confirm that the treated and control groups have similar distributions.

Table 4: Comparison of Treated and Control Groups: One-to-One Matching.
This table compares the distributions of the matching variables, *log(total assets)*, *leverage ratio*, and *ROA*, in the treated sample (T) to its one-for-one matched control sample (CS1). This table reveals that the CS1 is very similar to the treated sample. The 25th percentiles, 50th percentiles, and 75th percentiles of the three matching variables are very close. The p-values of the mean and distribution comparisons reported in the last two columns further confirm that these three matching variables have the same distribution between the treated and control samples.

Variables	**25th Percentile**		**50th Percentile**		**75th Percentile**		**P-Values for Mean**	**P-Values for Dist.**
	T	CS1	T	CS1	T	CS1		
log(total assets)	6.60	6.30	7.86	7.72	8.70	8.57	0.86	0.93
Leverage Ratio	0.39	0.40	0.55	0.52	0.75	0.65	0.65	0.34
ROA	-0.01	0.00	0.01	0.01	0.02	0.03	0.32	0.90

Table 5 provides the results of the benchmark linear regressions (equation (5)) using CS1 as the control sample. Columns (1) and (2) of Table 5 report the regression results by including all

[19] The only noticeable difference is that the 25th percentile of treatment sample ROA is negative, whereas that of the CS1 is positive. But considering that their magnitudes are very small, this difference is economically insignificant.

63 inversions as treated sample, and I find no economically and statistically significant impact of inversions on the cost of equity. The magnitude of foreign reincorporation dummy D_{it} is roughly the same with and without the control variables, which indicates that the impacts of the control variables on the cost of equity have been largely captured by the reincorporation dummy.

Next I look at the effects of inversion on the cost of equity by conditioning on inversion strategies (see columns (3) - (6) in Table 5). Results of pure-inverting firms are reported in columns (3) and (4). As a benchmark regression, I do not include any controls in $\boldsymbol{x_{it}}$ in the first specification, and I find that a pure inversion increases the cost of equity by 23 basis points (bps) (column (3)), which is marginally significant at the 5% significance level after controlling for firm-level heteroskedasticity and serial correlation. Since the mean risk premium of pure-inverting firms is 0.0116 before inverting, pure inversion increases the risk premium of these firms by 19.8% on average. In the second specification (column (4)), I include *log(total assets)*, *leverage ratio*, and *ROA* as control variables and find no significant changes in the coefficient of the reincorporation dummy.

The increase in the cost of equity after a pure inversion reveals that the shareholders of pure-inverting firms raise their required rate of return, which could be caused by the following reasons. First, after a pure inversion, the firm is governed under the corporate laws of the destination jurisdiction, thus losing the protection of U.S. corporate laws. Compared to the corporate laws in Bermuda and the Cayman Islands, the Delaware legal framework and accompanying institutions add net economic value to public companies, better serve shareholders' interests (Daines, 2001), and provide more protection to the shareholders against hostile take-overs (Talley, 2015). Second, political risks and economic policy uncertainty are greater in pure inversion destinations such as Bermuda than they are in the United States. Third, pure-inverting

firms' stock trading activities will change after an inversion. For example, Cortes et al. (2015) show that inverting firms tend to have higher bid-ask spreads, less liquid stocks, and less institutional ownership. Investors put a lower value on the cash on their balance sheets after inversions as well.

Columns (5) and (6) of Table 5 report the impact of M&A inversions on the cost of equity. An M&A-inverting firm's cost of equity typically decreases by 33bps (29bps) on average after inversion, which is significant at the 1% significance level, with (without) controlling matching variables. Since the mean risk premium of M&A-inverting firms is 0.018 prior to the inversion, M&A inversion decreases these firms' risk premium by 18.3% on average. Additionally, there is no significant change in the estimates after controlling for industry fixed effects.

The decrease in the cost of equity after an M&A inversion is a result of several mixed effects. First, the new destination jurisdictions of M&A inversions are better developed than destinations of pure inversions and have similar political and economic risks as in the United States. Therefore, U.S. investors would be better protected under the corporate laws of M&A inversion destinations and are more confident about their economic developments compared to pure inversions.

Second, different from pure inversions in which the only material change is the change in the registration jurisdictions, inverting by merging with a foreign entity is bundled with the change in jurisdiction and changes in the firm's management, business operations, and ownership compositions. An M&A-inverting firm commonly merges with a foreign firm which is usually economically profitable and internationally well known, thus mitigating equity investors' concerns, or even boosting their confidence, about the new combined firm's future economic prospectus. This process therefore lowers the shareholders' required rate of return.

Table 5: Effect of Inversion on the Cost of Equity: Benchmark Linear Regression.
This table reports the benchmark results of linear regressions investigating the impact of inversions on the cost of equity. The control samples used in this table are the closest matches for each inverting company based on industry, measurement quarter, *log(total assets)*, *leverage ratio*, and *ROA* (CS1). I run regressions separately using all inversions, pure inversions, and M&A inversions as treated samples, respectively. In columns (1), (3), and (5), we estimate the regression: $RP_{it} = \tau D_{it} + c_i + \lambda_t + u_{it}, t = 1, 2, \dots, T$, and in the other columns, I estimate the regression: $RP_{it} = \tau D_{it} + \boldsymbol{x_{it}\gamma} + c_i + \lambda_t + u_{it}, \quad t = 1, 2, \dots, T$, where RP_{it} is the risk premium of company *i* at time *t*. D_{it} is the incorporation status dummy variable of company *i* at time *t*. If company *i* is incorporated in the United States at time *t*, D_{it} equals 0. If the company reincorporates overseas and thus becomes foreign-incorporated at time *t*, D_{it} equals 1. The variable c_i denotes the unobserved firm fixed effects, and λ_t denotes the time fixed effects. The error term u_{it} includes all other time-varying unobservable shocks to the cost of equity. *Log(Total assets)*, *leverage ratio*, and *ROA* are used as controls and included in $\boldsymbol{x_{it}}$. Standard errors are robust to heteroskedasticity and serial correlation and are reported in parentheses. Note that I use "***", "**", and "*" to indicate that the estimates are significant at 1%, 5%, and 10% significance levels, respectively.

Variables	**All**		**Pure Inversion**		**M&A Inversion**	
	(1)	(2)	(3)	(4)	(5)	(6)
D	-0.0001	-0.0001	0.0021	0.0023	-0.0029	-0.0033
	(0.0008)	(0.0008)	(0.0010)**	(0.0011)**	(0.0009)***	(0.0011)***
Log(TA)		-0.0005		-0.0005		-0.00002
		(0.0002)**		(0.0011)**		(0.0004)
Leverage		-0.0005		-0.0009		-0.0019
		(0.0008)		(0.0011)**		(0.0010)*
ROA		0.0002		-0.0031		-0.00007
		(0.0010)		(0.0030)		(0.0011)
Constant	0.0058	0.0103	0.0059	0.0116	0.0060	0.0070
	(0.0010)***	(0.0022)***	(0.0018)***	(0.0038)***	(0.0004)***	(0.0024)***
Adj. R-squared	0.82	0.81	0.74	0.73	0.87	0.87
Firms in sample	105	105	52	52	52	45
Observations	5272	5192	2410	2395	2395	2410
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes

Last, since the two companies in an M&A inversion are generally household names in the same industry, an M&A transaction decreases the global competition of that industry and expands

the inverting UMC's business to foreign markets. Consequently, the decrease in the cost of equity is a result of the synergy created from less intra-industry competition and geographical business diversification. Overall, the estimated negative effect of M&A inversions on the cost of equity indicates that the positive synergy created from an M&A inversion outweighs equity investors' worries about the political and economic risks in the new destination jurisdiction.

6.2. Fractional Response Model

Fractional response models are suitable for capturing the property that the cost of equity typically lies between zero and one, which makes the diff-in-diff estimate more precise. I use the cost of equity as the dependent variable in three estimation equations following equation (5): fractional logit, fractional probit, and fractional complementary-log-log.[20] All models are fully saturated in that firm- and time-fixed effects are all controlled. Standard errors are fully robust and are clustered at the firm level.

Panel A of Table 6 gives the results of regressions using all inverting firms as the treated group. As shown, the impact of inversion on the cost of equity is economically and statistically insignificant across all three fractional response models, which is consistent with the linear regression findings in Table 5.

Panel B reports the regression results of pure-inverting firms. I find that a pure inversion increases the cost of equity by up to 103bps after controlling for firm- and time-fixed effects (see columns (2), (4) and (6)).[21] Moreover, the estimates are marginally significant at the 5% significance level. Since the mean level of a pure-inverting firm's cost of equity is around 0.106

[20] In particular, the complementary-log-log model allows for the existence of extreme values.
[21] The estimates in regressions with controls (see columns (2), (4), and (6)) are larger than those without any control variables (columns (1), (3), and (5)).

before inversion, pure inversion increases the cost of equity by up to 10%, and it almost doubles the risk premium of inverting firms (from 116bps to 219bps). Additionally, the similarity of the estimates across three models precludes the concern that the estimation over relies on the functional form of $G(\cdot)$ in equation (6).

Panel C reports the results of M&A-inverting firms. I find that an M&A inversion decreases the cost of equity by up to 139bps on average, which is statistically significant at the 1% significance level. Since the average cost of equity and the risk premium before an M&A inversion are 11% and 1.8% respectively, an M&A inversion decreases the cost of equity by up to 12.6% and the risk premium by up to 77%, which indicates that an M&A inversion tends to greatly lower stock investors' required rate of return on the inverting firm's stock.

In sum, the nonlinear diff-in-diff estimates of fractional response regressions are larger than the estimates of linear regressions because fractional response models incorporate the [0; 1] data structure of the cost of equity and therefore make the estimation more precise. That being said, fractional response regression results are consistent with linear regression results in terms of the statistical significance and the direction of the change in the cost of equity.

Table 6: Effect of Inversion on the Cost of Equity: Benchmark Fractional Response Models.
This table reports the results of regressions investigating the impact of inversions on the cost of equity. The control samples used in this table are the closest matches for each inverting company based on industry, measurement quarter, log(total asset), leverage ratio, and ROA (CS1). Panel A uses all the inversions in the treated sample, and Panels B and C use pure inversions and M&A inversions as treated samples, respectively. Within each panel, I estimate three fractional response models: fractional logit, fractional probit, and complementary-log-log. In columns (1), (3), and (5) of each panel, I estimate the regression $R_{it} = G(\tau D_{it} + c_i + \lambda_t) + u_{it}, t = 1, 2, \dots, T$. In columns (2), (4), and (6), I estimate the regression $R_{it} = G(\tau D_{it} + \boldsymbol{x_{it}\gamma} + c_i + \lambda_t) + u_{it}, t = 1, 2, \dots, T$, where R_{it} is the cost of equity of firm *i* at time *t*, and $G(\cdot)$ represents the three functional forms. D_{it} is the incorporation status dummy variable of company *i* at time *t*. If company *i* is incorporated in the United States at time *t*, D_{it} equals 0. If the company reincorporates overseas and thus becomes foreign-incorporated at time *t*, D_{it} equals 1. The variable c_i denotes a full set of firm fixed effects, and λ_t denotes a full set of time fixed effects. The error term u_{it} includes all other time-varying unobservable shocks to the cost of equity. Log(total assets), leverage ratio, and ROA are used as controls and included in $\boldsymbol{x_{it}}$. Fully robust standard errors are reported in parentheses. Note that I use "***", "**", and "*" to indicate that the estimates are significant at 1%, 5%, and 10% significance levels, respectively.

Model	**Fractional Logit**		**Fractional Probit**		**Fractional C-Log-Log**	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Across all inverted firms						
D	-0.0061	-0.0073	-0.0023	-0.0029	-0.0062	-0.0073
	(0.0333)	(0.0338)	(0.0177)	(0.0179)	(0.0312)	(0.0317)
Log(TA)		-0.0203		-0.0108		-0.0190
		(0.0091)**		(0.0048)**		(0.0086)**
Leverage		-0.0212		-0.0110		-0.0200
		(0.0348)		(0.0184)		(0.0326)
ROA		0.0084		0.0037		0.0083
		(0.0444)		(0.0237)		(0.0415)
Constant	-2.5212	-2.3174	-1.4453	-1.3367	-2.5593	-2.3684
	(0.0612)***	(0.1038)***	(0.0301)***	(0.0538)***	(0.0589)***	(0.0981)***
Impact on ICC	**-0.0006**	**-0.0007**	**-0.0004**	**-0.0005**	**-0.0006**	**-0.0008**
	(0.0032)	**(0.0033)**	**(0.0033)**	**(0.0033)**	**(0.0032)**	**(0.0032)**
Observations	5272	5192	5272	5192	5272	5192

Table 6 (cont'd)

Model	**Fractional Logit**		**Fractional Probit**		**Fractional C-Log-Log**	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Panel B: Pure Inversion						
D	0.0928	0.1026	0.0497	0.0550	0.0867	0.0959
	(0.0506)**	(0.0530)**	(0 .0268)**	(0.0280)**	(0.0475)**	(0.0498)**
Log(TA)		-0.0236		-0.0126		0.0221
		(0.0158)		(0.0083)		(0.0149)
Leverage		-0.0408		-0.0212		-0.0382
		(0.0534)		(0.0282)		(0.0501)
ROA		-0.1537		-0.0219		-0.1442
		(0.1279)		(0.0683)		(0.1197)
Constant	-2.5323	-2.2679	-1.4491	-1.3078	-2.5710	-2.3236
	(0.1109)***	(0.1849)***	(0.0538)***	(0.0950)***	(0.1070)***	(0.1753)***
Impact on ICC	**0.0090**	**0.0100**	**0.0093**	**0.0103**	**0.0090**	**0.0100**
	(0.0050)**	**(0.0053)****	**(0.0051)****	**(0.0053)****	**(0.0050)****	**(0.0053)****
Observations	2410	2395	2410	2395	2410	2395
Panel C: M&A Inversion						
D	-0.1247	-0.1454	-0.0658	-0.0767	-0.1171	-0.1365
	(0.0412)***	(0.0501)***	(0.0216)***	(0.0263)***	(0.0388)***	(0.0472)***
Log(TA)		-0.0009		-0.0006		-0.0008
		(0.0161)		(0.0085)		(0.0151)
Leverage		-0.0821		-0.0430		-0.0772
		(0.0425)*		(0.0224)*		(0.0399)*
ROA		-0.0026		-0.0014		-0.0025
		(0.0445)		(0.0235)		(0.0418)
Constant	-2.4893	-2.4492	-1.4306	-1.4092	-2.5279	-2.4905
	(0.0235)***	(0.1001)***	(0.0116)***	(0.0532)***	(0.0225)***	(0.0937)***
Impact on ICC	**-0.0118**	**-0.0136**	**-0.012**	**-0.0139**	**-0.0117**	**-0.0135**
	(0.0037)***	**(0.0045)*****	**(0.0038)*****	**(0.0046)*****	**(0.0037)*****	**(0.0044)*****
Observations	2446	2410	2446	2410	2446	2410
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes

6.3. Robustness Checking

6.3.1. One-for-Four Matching

In this section, I check whether our results are being driven by the choice of control sample size in my earlier regressions. Using the one-for-one match as the control sample might restrict the generalization of the findings. Following Abadie, Drukker, Herr, and Imbens (2004), as a robustness check, I use the first four closest matches of each inverting firm as the control sample. Summary statistics for the comparison between the inverting/treated group and its one-for-four matching group (CS4) are reported in Table 7. The 25th, 50th, and 75th percentiles of the matching variables are close between the treated and control samples. The p-values for the mean and distribution comparisons further confirm that the treated and control groups are statistically equivalent.

Table 7: Comparison of Treated and Control Groups: One-to-Four Matching.
This table compares the distributions of the matching variables, *log(total assets)*, *leverage ratio*, and *ROA*, in the treated sample (T) to its one-for-four matched control sample (CS4). This table reveals that the CS4 is very similar to the treated sample. The 25th percentiles, 50th percentiles, and 75th percentiles of the three matching variables are very close. The p-values of the mean and distribution comparisons reported in the last two columns further confirm that these three matching variables have the same distribution between the treated and control samples.

Variables	**25th Percentile**		**50th Percentile**		**75th Percentile**		**P-Values for Mean**	**P-Values for Dist.**
	T	CS4	T	CS4	T	CS4		
log(total assets)	6.60	6.30	7.86	7.49	8.70	8.28	0.23	0.11
Leverage Ratio	0.39	0.43	0.55	0.53	0.75	0.67	0.85	0.59
ROA	-0.01	-0.01	0.01	0.01	0.02	0.02	0.81	0.39

Table 8: Robustness Check for Control Sample Size: Linear Regression.
This table reports the results of regressions investigating the robustness of control sample size in linear regressions. The control samples used in this table are the first four closest matches for each inverting company based on industry, measurement quarter, log(total assets), leverage ratio, and ROA (CS4). I run regressions separately using all inversions, pure inversions, and M&A inversions as treatment samples, respectively. In columns (1), (3), and (5), we estimate the regression: $RP_{it} = \tau D_{it} + c_i + \lambda_t + u_{it}, t = 1, 2, \dots, T$, and in the other columns, I estimate the regression: $RP_{it} = \tau D_{it} + \boldsymbol{x_{it}\gamma} + c_i + \lambda_t + u_{it}, \quad t = 1, 2, \dots, T$, where RP_{it} is the risk premium of company *i* at time *t*. D_{it} is the incorporation status dummy variable of company *i* at time *t*. If company *i* is incorporated in the United States at time *t*, D_{it} equals 0. If the company reincorporates overseas and thus becomes foreign-incorporated at time *t*, D_{it} equals 1. The variable c_i denotes the unobserved firm fixed effects, and λ_t denotes the time fixed effects. The error term u_{it} includes all other time-varying unobservable shocks to the cost of equity. *log(Total assets)*, *leverage ratio*, and *ROA* are used as controls and included in $\boldsymbol{x_{it}}$. Standard errors are robust to heteroskedasticity and serial correlation and are reported in parentheses. Note that I use "***", "**", and "*" to indicate that the estimates are significant at 1%, 5%, and 10% significance levels, respectively.

Variables	**All**		**Pure Inversion**		**M&A Inversion**	
	(1)	(2)	(3)	(4)	(5)	(6)
D	-0.0001	-0.0002	0.0017	0.0018	-0.0021	-0.0020
	(0.0006)	(0.0006)	(0.0009)**	(0.0010)**	(0.0009)**	(0.0009)**
Log(TA)		-0.0003		-0.0003		-0.0004
		(0.0002)**		(0.0002)		(0.0002)
Leverage Ratio		-0.0003		-0.0006		-0.0008
		(0.0004)		(0.0009)		(0.0006)
Return on Assets		0.0011		-0.0003		0.0011
		(0.0008)		(0.0018)		(0.0012)
Adjusted R-squared	0.79	0.79	0.72	0.72	0.85	0.85
Firms in sample	247	247	127	127	106	106
Observations	10436	10356	4622	4607	5213	5177
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes

I repeat the linear and fractional response regressions using CS4 as the control group. The results are reported in Table 8 (linear) and Table 9 (fractional response). The linear diff-in-diff estimates are still small in magnitude and statistically insignificant if we pool all inverting firms in the treated sample (Panel A of Table 8), which is consistent with our findings in Table 5. The

regression results for pure-inverting firms (Panel B of Table 8) and M&A-inverting firms (Panel C of Table 8) are also consistent with our earlier findings. On average, a pure inversion increases the cost of equity, whereas an M&A inversion decreases it. The diff-in-diff estimates are statistically significant and close in magnitude to the findings using CS1 as the control group.

Table 9: Robustness Check for Control Sample Size: Fractional Response Models.
This table reports the results of regressions investigating the robustness of control sample size in fractional response regressions. The control firms used in this table are the first four closest matches for each inverting company based on Fama-French industry, measurement quarter, log(total asset), leverage ratio, and ROA (CS4). Panel A uses all the inversions in the treated sample, and Panels B and C use pure inversions and M&A inversions as treated samples, respectively. Within each panel, I estimate three fractional response models: fractional logit, fractional probit, and complementary-log-log. In columns (1), (3), and (5) of each panel, I estimate the regression $R_{it} = G(\tau D_{it} + c_i + \lambda_t) + u_{it}, t = 1, 2, \dots, T$. In columns (2), (4), and (6), I estimate the regression $R_{it} = G(\tau D_{it} + \boldsymbol{x_{it}}\boldsymbol{\gamma} + c_i + \lambda_t) + u_{it}, t = 1, 2, \dots, T$, where R_{it} is the cost of equity of firm *i* at time *t*, and $G(\cdot)$ represents the three functional forms. D_{it} is the incorporation status dummy variable of company *i* at time *t*. If company *i* is incorporated in the United States at time *t*, D_{it} equals 0. If the company reincorporates overseas and thus becomes foreign-incorporated at time *t*, D_{it} equals 1. The variable c_i denotes a full set of firm fixed effects, and λ_t denotes a full set of time fixed effects. The error term u_{it} includes all other time-varying unobservable shocks to the cost of equity. Log(total assets), leverage ratio, and ROA are used as controls and included in $\boldsymbol{x_{it}}$. Fully robust standard errors are reported in parentheses. Note that I use "***", "**", and "*" to indicate that the estimates are significant at 1%, 5%, and 10% significance levels, respectively.

Model	**Fractional Logit**		**Fractional Probit**		**Fractional C-Log-Log**	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Across all inverted firms						
D	-0.0062	-0.0069	-0.0024	-0.0028	-0.0062	-0.0069
	(0.0278)	(0.0285)	(0.0149)	(0 .0153)	(0.0260)	(0.0267)
Log(TA)		-0.0144		-0.0076		-0.0136
		(0.0070)**		(0.0037)**		(0.0066)**
Leverage		-0.0151		-0.0081		-0.0141
		(0.0182)		(0.0097)		(0.0170)
ROA		0.0474		0.0251		0.0444
		(0.0356)		(0.0191)		(0.0332)
Impact on ICC	**-0.0006**	**-0.0007**	**-0.0004**	**-0.0005**	**-0.0006**	**-0.0007**
	(0.0027)	**(0.0027)**	**(0.0028)**	**(0.0028)**	**(0.0027)**	**(0.0027)**
Observations	10436	10356	10436	10356	10436	10356

Table 9 (cont'd)

Model	**Fractional Logit**		**Fractional Probit**		**Fractional C-Log-Log**	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Panel B: Pure Inversion						
D	0.0773	0.0805	0.0418	0.0435	0.0721	0.0750
	(0.0427)**	(0.0442)**	(0.0227)**	(0.0235)**	(0.0399)**	(0.0414)**
Log(TA)		-0.0119		-0.0063		-0.0112
		(0.0110)		(0.0057)		(0.0103)
Leverage		-0.0275		-0.0149		-0.0256
		(0.0401)		(0.0209)		(0.0377)
ROA		-0.0126		-0.0078		-0.0112
		(0.0777)		(0.0416)		(0.0725)
Impact on ICC	**0.0075**	**0.0078**	**0.0078**	**0.0082**	**0.0074**	**0.0078**
	(0.0042)**	**(0.0044)****	**(0.0043)****	**(0.0045)****	**(0.0042)***	**(0.0044)***
Observations	4622	4607	4622	4607	4622	4607
Panel C: M&A Inversion						
D	-0.0898	-0.0834	-0.0477	-0.0444	-0.0842	-0.0781
	(0.0365)***	(0.0391)***	(0.0193)***	(0.0206)***	(0.0343)***	(0 .0366)**
Log(TA)		-0.0158		-0.0083		-0.0149
		(0.0105)		(0.0056)		(0.0098)
Leverage		-0.0356		-0.0191		-0.0332
		(0.0231)		(0.0123)		(0.0217)
ROA		0.0449		0 .0241		0.0419
		(0.0489)		(0.0262)		(0.0456)
Impact on ICC	**-0.0086**	**-0.008**	**-0.0088**	**-0.0082**	**-0.0085**	**-0.0079**
	(0.0033)**	**(0.0036)****	**(0.0034)****	**(0.0037)****	**(0 .0033)*****	**(0.0035)****
Observations	5213	5177	5213	5177	5213	5177
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes

The fractional response regression results using CS4 as the control group are also consistent with the results obtained using CS1. The estimate of the impact of inversion on the cost of equity

using all inverting firms as the treated sample (Panel A of Table 9) is still insignificant. Panel B and Panel C show that the impact on the cost of equity is positive (up to +82bps) for pure inversions and negative (up to -88bps) for M&A inversions. Moreover, the diff-in-diff estimates in Table 9 are slightly smaller than the estimates obtained using CS1 because CS4 increases the control sample size by including less perfectly matched observations. In summary, my regression results are robust to the choice of control sample observations.

6.3.2. Augmented Linear Regression

In our prior regressions, we treat the reincorporation dummy as an exogenous variable, and we assumed that besides a firm's size, leverage, and profitability, no other factors affecting a firm's cost of equity are correlated with its inversion decision. In this section, I address the concern that other variables might be simultaneously driving a firm's inversion decision and its cost of equity by looking at an augmented linear model and using CS1 as the control sample. I identify four variables that might be missing in our earlier regressions: Cash Holdings, Capital Expenditure, R&D Expenditure, and Tax Rate. Cortes et al. (2015) have demonstrated that these variables are all relevant to a firm's inversion.

Cash holdings will affect a firm's financing costs for two possible reasons. First, cash held inside the firm could be regarded as a high-quality collateral, which tends to lower the cost of equity. On the other hand, holding too much cash may imply that the firm lacks good investment opportunities, which tends to increase the cost of equity (or equivalently, the required rate of return by stock investors). Whichever the direction is, both reasons demonstrate that cash held inside the firm is correlated with the cost of equity. Section 3 has discussed that a firm with more cash held in a foreign subsidiary has more incentive to invert to repatriate the cash in a less costly manner.

Therefore, the cash holdings of a firm might correlate with both the cost of equity and the inversion decision.

High expenditures in capital and R&D in a firm have two implications. A firm with high expenditures in capital and R&D will have a high demand for equity to finance such activities, and this tends to increase the cost of equity. It might also signal to the equity investors that the firm has good investment opportunities, and this tends to lower the cost of equity. Both implications demonstrate that the capital expenditure and R&D expenditure are correlated with the cost of equity. They also appear to be correlated with inversion decisions in that a multinational firm with high capital and R&D expenditures has a higher demand for repatriating its overseas cash to spend on such activities.

Additionally, the Modigliani and Miller theorem demonstrates that a firm's cost of equity is positively correlated the corporate taxes. Since avoiding high U.S. corporate taxes is the main incentive of inversions, as shown in Section 3, I also include the firm's average tax rate in the augmented regression model.

Technically, besides reincorporation dummy, *log(total assets)*, *Leverage*, and *ROA*, I include *Cash Holdings*, *Capital Expenditure*, *R&D Expenditure*, and *Tax Rate* in $\boldsymbol{x_{it}}$ of equation (5) to eliminate the potential missing variable issue in Table 5, and I report the results in Table 10. I find that generally there are no significant differences in the diff-in-diff estimates with and without these extra control variables: a pure inversion still increases the inverting firm's cost of equity, and an M&A inversion still decreases it. The results reported are statistically significant, which implies that our earlier results are robust to the potential missing variable issue.

Table 10: Augmented Linear Regression.
This table reports the augmented linear regression results by adding extra controls in $\boldsymbol{x_{it}}$ of equation (5): $RP_{it} = \tau D_{it} + \boldsymbol{x_{it}\gamma} + c_i + \lambda_t + u_{it}, t = 1, 2, \ldots, T$. The control sample used in this table is CS1. I run regressions separately using all inversions (column (1)), pure inversions (column (2)), and M&A inversions (column (3)) as treated samples. *Log(total assets)*, *Leverage*, *ROA*, *Cash Holdings*, *Capital Expenditure*, *R&D Expenditure*, and *Tax Rate* are included in $\boldsymbol{x_{it}}$ as control variables. Firm and time fixed effects are both controlled. Standard errors are robust to heteroskedasticity and serial correlation, and are reported in parentheses. Note that I use "***", "**", and "*" to indicate that the estimates are significant at 1%, 5%, and 10% significance levels, respectively.

Variables	**All**	**Pure Inversion**	**M&A Inversion**
	(1)	(2)	(3)
D	-0.0005	0.0012	-0.0024
	(0.0007)	(0.0005)***	(0.0010)***
Log(total assets)	-0.0001	0.0005	0.0000
	(0.0004)	(0.0003)	(0.0005)
Leverage	-0.0002	-0.0001	-0.0013
	(0.0007)	(0.0009)	(0.0015)
ROA	0.0006	0.0004	0.0001
	(0.0012)	(0.0022)	(0.0015)
Cash	-0.0004	-0.0030	0.0002
	(0.0011)	(0.0011)***	(0.0011)
Capital Expenditure	-0.0028	-0.0162	0.0016
	(0.0034)	(0.0059)***	(0.0031)
R&D Expenditure	-0.0004	0.0062	-0.0004
	(0.0021)	(0.0048)	(0.0025)
Tax Rate	-0.0006	0.0002	-0.0009
	(0.0004)	(0.0012)	(0.0004)**
Constant	0.0106	0.0080	0.0054
	(0.0017)***	(0.0017)***	(0.0017)***
Adj. R-squared	0.85	0.91	0.87
Observations	1502	357	1081
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

6.4. Cash Holdings, Dividend Payments, and Capital Expenditures

As illustrated in Section 3, firms have an incentive to invert because of the less costly benefit of repatriating the cash held in foreign subsidiaries either to invest in projects in the United

States or to pay more dividends to U.S. shareholders. Therefore, the cash holdings in a pure-inverting firm will decrease after an inversion. However, different from pure inversions, the surviving firm's cash holdings after an M&A inversion are also affected by the cash holdings of the foreign acquirer. Therefore, it is unclear how the cash holdings will change after an M&A inversion. I empirically test the cash holdings change for pure and M&A inversions separately in Table 11.

Table 11: Effect of Inversion on Cash Holdings.
This table reports the changes in cash holdings following an inversion. The control sample used in this table is CS1. I run regressions separately using all inversions (column (1)), pure inversions (column (2)), and M&A inversions (column (3)) as treated samples. The dependent variable, Cash Holdings, is defined to be the ratio of cash held within the firm to total assets. The explanatory variables include Reincorporation Dummy, log(total assets), Leverage, ROA, Capital Expenditure, R&D Expenditure, and Tax Rate. Firm and time fixed effects are both controlled. Standard errors are robust to heteroskedasticity and serial correlation, and are reported in parentheses. Note that I use "***", "**", and "*" to indicate that the estimates are significant at 1%, 5%, and 10% significance levels, respectively.

Variables	**All**	**Pure Inversion**	**M&A Inversion**
	(1)	(2)	(3)
D	-0.0488	-0.1798	-0.1593
	(0.0514)	(0.0753)***	(0.1003)
Log(total assets)	-0.0299	-0.0550	-0.0071
	(0.0160)**	(0.0512)	(0.0202)
Leverage	-0.1629	-0.0928	-0.1778
	(0.0577)***	(0.0842)	(0.0527)***
ROA	0.0080	0.8527	-0.1180
	(0.0771)	(0.0941)***	(0.0649)**
Capital Expenditure	-0.4239	-0.0434	-0.7438
	(0.1649)**	(0.3683)	(0.1728)***
R&D Expenditure	-0.3946	-0.8872	-0.3740
	(0.1068)***	(0.3657)	(0.0883)***
Tax Rate	-0.0434	0.0866	0.0522
	(0.0282)	(0.0757)	(0.0312)*
Constant	0.3944	0.5230	0.2373
	(0.0757)***	(0.3213)	(0.0659)***

Table 11 (cont'd)

Variables	All	Pure Inversion	M&A Inversion
	(1)	(2)	(3)
Adj. R-squared	0.15	0.46	0.17
Observations	1502	357	1081
Firms in sample	58	24	29
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Regression results reported in Table 11 are consistent with our hypothesis proposed above. On the one hand, the ratio of cash to total assets decreases by about 18 percentage points and is statistically significant after a pure inversion (column (2)), which indicates that a pure inversion enables the U.S. subsidiary to utilize the cash held overseas, and subsequently the total cash holdings in the firm decrease. Additionally, for a firm with better profitability (higher ROA), the cash holdings tend to be higher. On the other hand, though the impact of an M&A inversion on cash holdings is negative, it is statistically insignificant (column inversion, which indicates that the purpose of pure inversion is not to repatriate cash in foreign subsidiaries to pay the firm's existing shareholders more dividends. Again, lacking information on the foreign acquirer's dividend payment policy, we could not see the impact of inversion on dividend payments in the M&A case.

The effects of corporate inversions on capital expenditures are reported in Table 13. A pure-inverting firm's capital expenditure increases after it inverts to countries such as Bermuda or the Cayman Islands. Considering that the cash holdings of the pure-inverting firm decrease while their dividend payments do not change significantly, this indicates that pure-inverting firms repatriate their cash held in foreign subsidiaries to invest in potentially profitable projects in the United States. However, similar to Table 11 and Table 12, the change in capital expenditures after an M&A inversion is statistically insignificant because the investment policy of the foreign

acquirer also affects the change in capital expenditures after an M&A inversion.

Table 12: Effect of Inversion on Dividend Payments.
This table reports the changes in dividend payments following an inversion. The control sample used in this table is CS1. I run regressions separately using all inversions (column (1)), pure inversions (column (2)), and M&A inversions (column (3)) as treated samples. The dependent variable, *Dividend*, is defined to be the ratio of dividends paid to total assets. The explanatory variables include *Reincorporation Dummy*, *log(total assets)*, *Leverage*, *ROA*, *Cash Holdings*$_{t-1}$, *Capital Expenditure*, *R&D Expenditure*, *Tax Rate*, and *SG&A*. Firm and time fixed effects are both controlled. Standard errors are robust to heteroskedasticity and serial correlation, and are reported in parentheses. Note that I use "***", "**", and "*" to indicate that the estimates are significant at 1%, 5%, and 10% significance levels, respectively.

Variables	**All**	**Pure Inversion**	**M&A Inversion**
	(1)	(2)	(3)
D	-0.0015	-0.0018	-0.0058
	(0.0025)	(0.0074)	(0.0045)
Log(total assets)	-0.0005	0.0015	-0.0007
	(0.0017)	(0.0043)	(0.0023)
Leverage	-0.0066	0.0102	-0.0089
	(0.0035)*	(0.0130)	(0.0038)**
ROA	0.0309	-0.0369	0.0346
	(0.0160)*	(0.0688)	(0.0168)**
Cash Holdings$_{t-1}$	0.0001	0.0015	0.0024
	(0.0060)	(0.0155)	(0.0089)
Capital Expenditure	0.0472	0.1301	0.0339
	(0.0279)	(0.0962)	(0.0369)
R&D Expenditure	0.0976	0.0401	0.0809
	(0.0548)	(0.1003)	(0.0670)
Tax Rate	-0.0028	-0.0014	-0.0041
	(0.0015)	(0.0052)	(0.0017)**
SG&A	-0.0002	0.0126	-0.0003
	(0.0005)	(0.0291)	(0.0006)
Constant	0.0071	-0.0163	0.0003
	(0.0094)	(0.0310)	(0.0097)
Adj. R-squared	0.02	0.16	0.02
Observations	1502	357	1081
Firms in sample	58	24	29
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Table 13: Effect of Inversion on Capital Expenditures.
This table reports the changes in capital expenditures following an inversion. The control firms used in this table are CS1. We run regressions separately using all inversions (column (1)), pure inversions (column (2)), and M&A inversions (column (3)) as treated samples. The dependent variable, Capital Expenditures, is defined to be the ratio of capital expenditures to book value of total assets. The explanatory variables include *Reincorporation Dummy*, *log(total assets)*, *Leverage*, *ROA*, *R&D Expenditure*, and *Tax Rate*. Firm and time fixed effects are both controlled. Standard errors are robust to heteroskedasticity and serial correlation, and are reported in parentheses. Note that I use "***", "**", and "*" to indicate that the estimates are significant at 1%, 5%, and 10% significance levels, respectively.

Variables	**All**	**Pure Inversion**	**M&A Inversion**
	(1)	(2)	(3)
D	0.0135	0.0258	0.0011
	(0.0079)*	(0.0113)**	(0.0053)
Log(total assets)	0.0024	0.0042	0.0035
	(0.0021)	(0.0100)	(0.0025)
Leverage	0.0165	-0.0060	0.0204
	(0.0067)**	(0.0090)	(0.0084)**
ROA	0.0241	0.0521	0.0155
	(0.0111)**	(0.0527)	(0.0106)
R&D Expenditure	0.1433	0.3476	0.1117
	(0.0374)***	(0.0700)***	(0.0528)**
Tax Rate	-0.0012	0.0199	-0.0046
	(0.0053)	(0.0113)	(0.0060)
Constant	0.0167	-0.0122	0.0005
	(0.0070)**	(0.0576)	(0.0070)
Adj. R-squared	0.18	0.16	0.20
Observations	1502	357	1081
Firms in sample	58	24	29
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

7. CORPORATE INVERSION STRATEGIES AND EXISTING SHAREHOLDER VALUE

7.1. The Advantage of M&A Inversions over Pure Inversions

In the former section, I have demonstrated that inverting by merging with a foreign entity is more favorable than inverting through a pure inversion strategy in terms of reducing financing costs. However, the tax savings through an M&A inversion strategy are usually less than those through a pure inversion strategy because the corporate tax rates in the destination jurisdictions of M&A inversions are usually higher than the tax rates in pure inversion destinations. Specifically, corporate tax rates in offshore tax-haven jurisdictions where pure inversions commonly reincorporate are usually zero, whereas the corporate tax rates in M&A inversion destination jurisdictions are usually higher than zero. For example, for the three commonly used M&A inversion destinations, Ireland, the United Kingdom, and Canada, their marginal corporate tax rates are 12.5%, 20%, and 26.5%, respectively, in 2016. Therefore, compared to the pure inversion strategy, taking an M&A inversion strategy lowers tax savings by around 20% depending on where the foreign acquirer is located. This begs the question, which strategy is more beneficial overall to existing shareholders? In this section, I look at the impact of the 2004 tax reform, which restricts the tax benefits in a pure inversion and induces firms, perhaps unintentionally, to use an M&A inversion strategy.

Technically, I compare the existing shareholder value increase after a pure inversion to the increase after an M&A inversion using the following diff-in-diff model:

$$MKV_{it} = \beta_0 + \beta_1 After_{it} + \beta_2 MA_{it} + \beta_3 After_{it} \times MA_{it} + u_{it}, \quad t = 1, 2, \dots, T \qquad (8)$$

where MKV_{it} is the market value of firm *i*'s existing shareholder value at time *t* (in billions of dollars). $After_{it}$ equals 1 in the post-inversion stage and 0 in the pre-inversion stage. MA_{it} equals 1 for M&A-inverting firms and 0 for pure-inverting firms. The error term u_{it} includes all the other

time-varying unobservable shocks to existing shareholder value. It is easy to show that

$$\begin{aligned}\beta_3 = (&E[MKV_{it}|After_{it}=1, MA_{it}=1] - E[MKV_{it}|After_{it}=0, MA_{it}=1]) \\ -(&E[MKV_{it}|After_{it}=1, MA_{it}=0] - E[MKV_{it}|After_{it}=0, MA_{it}=0])\end{aligned} \quad (9)$$

which means that the coefficient of the interaction term, β_3, measures the difference between the existing shareholder value increase in M&A inversions and the increase in pure inversions.

The data used to estimate equation (8) are obtained from CRSP. Before inversion, the pre-inversion shareholders' equity value equals the product of the stock price and the number of outstanding shares. After inversion, the existing shareholder value is calculated as follows:

$$MKVPOST_{it} = Fraction_{it} \times Price_{it} \times Shares_{it}, \ \ t = 1, 2, \dots, T \quad (10)$$

where $MKVPOST_{it}$ is the pre-inversion shareholders' value after an inversion. $Price_{it}$ denotes the stock price and $Shares_{it}$ denotes the number of shares outstanding. $Fraction_{it}$ denotes the U.S. inverting firm i's ownership percentage of the surviving company. For pure-inverting firms, $Fraction_{it}$ equals 100% because the pre-inversion shareholders still hold 100% of the firm after a pure inversion. In contrast, $Fraction_{it}$ is less than 100% for M&A inversions because when a U.S. multinational firm merges with a foreign company, only the surviving/combined firm is traded on the NYSE or NASDAQ. The actual U.S. inverting firms' ownership percentage of the surviving company is obtained from Talley (2015), Appendix B, and from SEC filings (forms S-4, 14D9, 14D6, and 8-K).[22]

The regression results are reported in Panel A of Table 14. Because the dependent variable is highly serially correlated, I report the Newey-West standard errors in parentheses. In column (1), I use the monthly data after 1978 for estimation.23 The estimate of β_3 (in boldface) is positive

[22] Since the first inverting firm in our inversion sample, Helen of Troy, announced its plans to invert in 1993, I choose 1978 as the starting year to make sure there is a 15-year window prior to its announcement.

and statistically significant at the 1% significance level. That means, all else equal, an M&A inversion delivers around $2.07 billion additional to existing shareholders than a pure inversion on average.

Table 14: Existing Shareholder Value Change.
This table reports the regression results of existing shareholder value change based on the following diff-in-diff model: $MKV_{it} = \beta_0 + \beta_1 After_{it} + \beta_2 MA_{it} + \beta_3 After_{it} \times MA_{it} + u_{it}$, where MKV_{it} is existing shareholder value of firm *i* at time t (in billions of dollars). $After_{it}$ equals 1 in the post-inversion stage and 0 in the pre-inversion stage. MA_{it} equals 1 for M&A-inverting firms and 0 for pure-inverting firms. The error term u_{it} includes all other time-varying unobservable shocks to existing shareholder value. I use all the pure-inverting and M&A-inverting firms in Panel A, and I drop the firms that pure-inverted after 2004 in Panel B. In column (1) of each panel, I use all the available monthly data from 1978 to 2016. Then I separately estimate the regression in a 10-year, 5-year, and 3-year window, and report the results in columns (2), (3), and (4). Moreover, as a robustness check, to control for the potential price reaction to inversion before the announcement due to information leakage and insider trading, I drop the year prior to the inversion announcement month and redo the regressions in columns (2) to (4). Results for these censored tests are reported in columns (5) to (7). Newey-West standard errors are reported in parentheses.

Variables	**All**	**10-Year Window**	**5-Year Window**	**3-Year Window**	**Censor. 10-Year**	**Censor. 5-Year**	**Censor. 3-Year**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: All pure-inverted and M&A-inverted firms							
After	4.10	3.55	2.46	1.27	3.72	2.63	1.42
	(0.23)***	(0.26)***	(0.31)***	(0.35)***	(0.26)***	(0.31)***	(0.36)***
MA	5.29	5.06	4.57	4.73	5.01	4.32	4.34
	(0.39)***	(0.47)***	(0.59)***	(0.77)***	(0.49)***	(0.65)***	(0.93)***
After*M&A	**2.07**	**2.88**	**4.60**	**4.78**	**2.93**	**4.86**	**5.16**
	(0.87)***	**(0.99)*****	**(1.16)*****	**(1.34)*****	**(1.01)*****	**(1.20)*****	**(1.44)*****
Constant	2.44	2.91	3.40	3.75	2.74	3.23	3.61
	(0.08)***	(0.10)***	(0.14)***	(0.18)***	(0.10)***	(0.15)***	(0.20)***
Adj. R-Squared	0.08	0.09	0.10	0.09	0.09	0.10	0.10
Obs.	9143	7127	4506	2956	6584	3963	2413
Firms in Sample	53	53	53	53	53	53	53

Table 14 (cont'd)

Variables	All	10-Year Window	5-Year Window	3-Year Window	Censor. 10-Year	Censor. 5-Year	Censor. 3-Year
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel B: Dropping the firms pure-inverted after 2004							
After	4.08 (0.24)***	3.47 (0.28)***	1.97 (0.32)***	0.98 (0.37)***	3.66 (0.28)***	2.15 (0.32)***	1.10 (0.38)***
MA	5.61 (0.39)***	5.40 (0.47)***	4.81 (0.60)***	4.98 (0.77)***	5.37 (0.50)***	4.58 (0.66)***	4.63 (0.93)***
After*M&A	**2.08**	**2.97**	**5.09**	**5.14**	**3.00**	**5.33**	**5.48**
	(0.58)***	**(0.99)*****	**(1.16)*****	**(1.35)*****	**(1.01)*****	**(1.20)*****	**(1.45)*****
Constant	2.13 (0.09)***	2.56 (0.11)***	3.16 (0.15)***	3.50 (0.19)***	2.37 (0.11)***	2.98 (0.16)***	3.32 (0.21)***
Adj. R-Squared	0.09	0.09	0.10	0.10	0.09	0.11	0.10
Obs.	8638	6641	4189	2749	6139	3687	2247
Firms in Sample	46	46	46	46	46	46	46

Because other corporate structural changes during a firm's lifetime might affect the existing shareholder value, I rerun the regression with shorter windows. In the second specification, I use a 10-year window (the data within 120 months before the announcement month and the data within 120 months after the completion month of inversions) for the regression. The regression results reported in column (2) of Table 14 are close to the results in column (1). Similarly, I run regressions with a 5-year window and a 3-year window. With these shorter windows, the estimate of β_3 is still positive and statistically significant, but the magnitude is larger.

Potentially, the inverting firms' stock prices could react before the announcement of inverting decisions. This reaction could be caused by information leakage and insider trading. As a robustness check, I delete the data within the 12 months before the inversion announcement and

redo the regressions in columns (2), (3), and (4), and I report the results with these "censored" windows in columns (5), (6), and (7). I find no significant difference with and without censoring. Additionally, it can be shown that

$$\beta_1 = (E[MKV_{it}|After_{it} = 1, MA_{it} = 0] - E[MKV_{it}|After_{it} = 0, MA_{it} = 0]) \quad (11)$$

which means that β_1 measures the increase in existing shareholder value if the firm inverts through a pure inversion strategy. The results in columns (1) to (7) in Table 14 reveal that although a pure inversion increases the cost of equity, it still increases the inverting firms' shareholder value, and the increase is statistically significant.

Including firms that pure-inverted after the 2004 tax reform in the sample tends to lower the average existing shareholder value increase in pure inversions, and therefore overestimates the advantage of an M&A inversion strategy over a pure inversion strategy. That is because pure-inverting firms that do not pass the "60% or 80% continuity threshold" test in Section 7874 will not be able to save as much in repatriation taxes. As a robustness check, in Panel B of Table 14, I drop all the firms that pure-inverted after 2004 and redo the regression reported in Panel A.[23] All the estimates of β_3 reported in Panel B are positive and statistically significant at the 1% level and are very close in magnitude to the results reported in Panel A, which is consistent with our earlier results that the existing shareholder value tends to increase more if the firm inverts by merging with a foreign entity.

7.2. A Moral Hazard Implication

In Section 6 and Section 7.1, I have established that compared to the pure inversion

[23] Seven firms are dropped in this panel: Lazard, Freescale Semiconductor, Western Goldfields, Tim Hortons, ENSCO International, Styron, and Delphi Automotive.

strategy, inverting through a merger not only lowers the inverting firms' cost of equity but also adds more value to existing shareholders. Therefore, theoretically, to maximize existing shareholder value, firm managers should choose an M&A inversion as the main inversion strategy. However, in reality, a pure inversion strategy was more preferable prior to the passing of Section 7874 of the 2004 American Jobs Creation Act, which effectively restricts the tax savings from pure inversions. We observe 28 pure inversions from 1990 to 2004 but only three M&A inversions in the same period.

The disagreement between theory and reality discussed above has two implications. First, before 2004, inverting firms' managers appear not to maximize existing shareholders' interest. Since the main objective of inversion is to save repatriation taxes by changing the incorporation country, reincorporating overseas without changing the headquarters location and management team composition would be the easiest method for inverting firms' managers. Additionally, by taking a pure inversion strategy, managers still have the same level of control in the company. In short, inverting firms' managers tend to incur lower costs by taking a pure inversion strategy, though it adds less to existing shareholder value.

Second, while the main objective of passing Section 7874 is to curb corporate pure inversions and maintain the tax revenue paid to the U.S. government, the tax reform has two unintended consequences. First, managers are induced to take an M&A inversion strategy after the tax reform, which might not be expected by the policy makers. The trend of inverting to foreign countries has not been stopped by the 2004 reform, and there are even more M&A inversions from 2004 to 2014 than pure inversions from 1990 to 2004 (38 versus 28). Therefore, the tax reform appears to have failed in stopping lost tax revenue and switches corporate inversions from one mode to another, echoing the current mainstream view that another tax reform is needed.

Second, and more important, the tax reform has an unintended consequence of reducing the managerial agency problem because managers are induced to take an M&A inversion strategy, which adds more value to existing shareholders. Contrary to the common belief that economic interventions generally are detrimental to social welfare, the tax reform tends to increase shareholder wealth in the inversion case. Therefore, the 2004 tax reform appears to be successful. If the government policy aims at increasing shareholder wealth instead of maximizing tax revenue, no additional tax reform is needed.

8. CONCLUSION

The past two decades have witnessed more than 80 U.S. multinational companies leaving to reincorporate overseas. The exodus of U.S. corporations for tax-haven countries has led to heated discussions among policy makers regarding possible tax and other regulatory reforms. For example, in his weekly presidential address on July 26, 2014, President Obama said,

> *"Even as corporate profits are as high as ever, a small but growing group of big corporations are fleeing the country to get out of paying taxes. They are keeping most of their business inside the United States, but they're basically renouncing their citizenship and declaring that they're based somewhere else, just to avoid paying their fair share.*[24]*"*

In this paper, I analyzed the changes in the cost of equity caused by a corporate inversion contingent on two major inversion strategies: pure inversions and M&A inversions. The linear and nonlinear regression results indicate that the impacts of inversions on the cost of equity between these two inversion strategies are different. On average, a pure inversion increases the cost of equity by around 10%, whereas an M&A inversion decreases the cost of equity by around 13%. The difference arises from two sources: the differential political and economic risks associated with the new jurisdictions and the synergy created through the merger. My findings are robust to the control sample size and the missing variable issue.

Moreover, I documented that while pure inversions do increase existing shareholder value, these shareholders benefit more from M&A inversions, and the results are economically and statistically significant and robust to various testing windows. My findings imply that the managers

[24] Barack Obama, President, United States of America, Weekly Presidential Address: Closing Corporate Tax Loopholes (July 26, 2014) (the transcript is available at: https://obamawhitehouse.archives.gov/the-press-office/2014/07/26/weekly-address-closing-corporate-tax-loopholes).

appear not to maximize existing shareholder value. By looking at the impact of the 2004 tax reform that restricted tax savings under pure inversions, I am able to document that whereas before 2004 most inversions were pure, the ones after 2004 were done mostly through mergers. This finding suggests that the reform had an unintended consequence of reducing the managerial agency problem by making their more preferred mode unattractive and increasing existing shareholder value.

There are two potential directions that future research on inversions could follow. One direction is to disentangle the M&A inversion's "pure" impact on the cost of equity from the synergy created in an M&A transaction. This research would help us to better understand the pure effect of inversions on an inverting firm's equity financing costs and quantify the synergy created by merging with a foreign entity. The other direction is to investigate the consequences of the higher (lower) post-inversion cost of equity on corporate financing and investment behavior. This paper has provided some evidence on the changes in cash holdings and capital expenditures after an inversion, but a more detailed analysis should be a valuable path to take in the future.

APPENDICES

APPENDIX A. List of Corporate Inversions Announced between 1993 and 2015.

This appendix lists 88 firms that announced plans to reincorporate overseas between 1993 and 2015. The first column of Table A1 lists the company name at the time of the inversion announcement (some firms changed their names after the inversion was completed). The second column lists the industry in which the firm is operating. Industry classification follows the 48-industry classification system in Fama and French (1997). The third column lists the foreign acquirer's name. "N/A" in this column means that the firm announced plans to pure-invert abroad. The fourth column lists the inversion strategy: pure inversion, M&A inversion, or spin-off inversion. The fifth column lists the destination jurisdiction. Columns (6) and (7) report the time when the company's management announced their inversion decision and the time when the transaction was completed. "Y" in column (8) indicates this company was/is listed in the S&P 500 portfolio.

Table A1: List of Corporate Inversions Announced between 1993 and 2015

U.S. Target Name	Industry	Foreign Acquirer Name	Type	Dest.	Ann.	Finish	S&P
Helen of Troy	Consumer Goods	N/A	Pure	Bermuda	1993-12	1994	
Core Laboratories	Petroleum and Natural Gas	N/A	Pure	Netherlands	1993-12	1994	
Loral	Communication	N/A	Pure	Bermuda	1996-01	1996	
Triton Energy	Petroleum and Natural Gas	N/A	Pure	Cayman Islands	1996-02	1996	
Chicago Bridge & Iron	Construction	N/A	Pure	Netherlands	1997-03	1997	
Tyco International	Electronic Equipment	ADT	M&A	Bermuda	1997-03	1997	Y
Flirty Girl International	Business Services	N/A	Pure	Antigua	1998-05	1998	
Xoma	Pharmaceutical Products	N/A	Pure	Bermuda	1998-11	1999	
Gold Reserve	Precious Metals	N/A	Pure	Canada	1999-02	1999	
Fruit of the Loom	Textiles	N/A	Pure	Cayman Islands	1999-03	1999	
Transocean Offshore	Petroleum and Natural Gas	N/A	Pure	Cayman Islands	1999-05	1999	Y

Table A1 (cont'd)

U.S. Target Name	Industry	Foreign Acquirer Name	Type	Dest.	Ann.	Finish	S&P
Everest Reinsurance Holdings	Insurance	N/A	Pure	Bermuda	1999-09	2000	
PXRE	Insurance	N/A	Pure	Bermuda	1999-10	1999	
White Mountains Insurance Group	Insurance	N/A	Pure	Bermuda	1999-10	1999	
Trenwick Group	Insurance	LaSalle Re Holdings	M&A	Bermuda	1999-12	1999	
Tycom	Electronic Equipment	N/A	Spin-off	Bermuda	2000-01	2000	
Applied Power	Machinery	N/A	Pure	Bermuda	2000-07	2000	
Seagate Technology	Computers	N/A	Pure	Cayman Islands	2000-08	2000	Y
Arch Capital Group	Insurance	N/A	Pure	Bermuda	2000-09	2000	
Foster Wheeler	Construction	N/A	Pure	Bermuda	2000-12	2001	
Cooper Industries	Electrical Equipment	N/A	Pure	Bermuda	2001-06	2002	Y
Global Marine	Petroleum and Natural Gas	Santa Fe Int'l	M&A	Cayman Islands	2001-09	2001	
Ingersoll-Rand	Machinery	N/A	Pure	Bermuda	2001-10	2001	Y
Noble Drilling	Petroleum and Natural Gas	N/A	Pure	Cayman Islands	2002-01	2002	Y
Stanley Works	Construction Materials	N/A	Pure	Bermuda	2002-2	Failed	Y
Herbalife	Wholesale	N/A	Pure	Cayman Islands	2002-02	2002	
Nabors Industries	Petroleum and Natural Gas	N/A	Pure	Bermuda	2002-06	2002	
Weatherford Int'l	Petroleum and Natural Gas	N/A	Pure	Bermuda	2002-06	2002	
Luna Gold	Precious Metals	N/A	Pure	Canada	2005-10	2005	
Lazard	Finance Trading	N/A	Pure	Bermuda	2005-12	2005	

Table A1 (cont'd)

U.S. Target Name	Industry	Foreign Acquirer Name	Type	Dest.	Ann.	Finish	S&P
Covidien	Medical Equipment	N/A	Spin-off	Ireland	2006-01	2007	Y
TE Connectivity	Electronic Equipment	N/A	Spin-off	Switzerland	2006-01	2007	Y
Freescale Semiconductor	Electronic Equipment	N/A	Pure	Bermuda	2006-09	2006	
Patch International	Petroleum and Natural Gas	Damascus Energy	M&A	Canada	2006-12	2006	
Argonaut Group	Insurance	PXRE Group	M&A	Bermuda	2007-03	2007	
Star Maritime Acq.	Transportation	Star Bulk Carriers	M&A	Marshall Islands	2007-03	2007	
Western Goldfields	Precious Metals	N/A	Pure	Canada	2007-05	2007	
Ascend Acquisition	Business Services	e.Pak Res. (S) Pte.	M&A	Bermuda	2007-07	2007	
Vantage Energy Services	Petroleum and Natural Gas	Offshore Group Inv.	M&A	Cayman Islands	2007-08	2007	
Lincoln Gold	Non-metallic and Industrial Metal Mining	N/A	Pure	Canada	2007-09	2007	
Energy Infrastructure Acquisition	Transportation	N/A	Pure	Marshall Is.	2008-06	Failed	
InterAmerican Acquisition	Finance Trading	N/A	Pure	BVI	2008-07	2008	
Arcade Acquisition	Transportation	Conbulk	M&A	Marshall Is.	2008-09	2008	
Hungarian Tel & Cable	Communication	Invitel Holdings	M&A	Austria	2008-11	2007	
Alpha Security	Finance Trading	Soya China Pte.	M&A	Bermuda	2008-12	Failed	
Invitel Holdings A/S	Communication	N/A	Pure	Denmark	2009-02	2009	
Ideation Acquisition	Finance Trading	SearchMedia Int'l	M&A	Cayman Islands	2009-04	2009	

Table A1 (cont'd)

U.S. Target Name	Industry	Foreign Acquirer Name	Type	Dest.	Ann.	Finish	S&P
2020 ChinaCap Acquirco	Consumer Goods	Windrace Int'l	M&A	British Virgin Islands	2009-05	2009	
Altisource Portfolio Solutions	Business Services	N/A	Spin-off	Luxembourg	2009-07	2009	
Tim Hortons	restaurants, hotels, motels	N/A	Pure	Canada	2009-09	2009	
Delphi Automotive	Automobile and Trucks	N/A	Pure	Jersey	2009-10	2011	Y
ENSCO Int'l	Petroleum and Natural Gas	N/A	Pure	UK	2009-11	2009	Y
Plastinum Polymer Technologies	Rubber and Plastic Products	N/A	Pure	Netherlands	2010-06	Failed	
Styron	Chemicals	N/A	Pure	Luxembourg	2010-06	2010	
Valeant Pharmaceuticals Int'l	Pharmaceutical Products	Biovail	M&A	Canada	2010-06	2010	
Alkermes	Pharmaceutical Products	Elan	M&A	Ireland	2011-05	2011	
Jazz Pharmaceuticals	Pharmaceutical Products	Azur Pharma	M&A	Ireland	2011-09	2011	
Tronox	Chemicals	Exxaro Res.	M&A	Australia	2011-09	2011	
AON	Insurance	N/A	Pure	UK	2012-01	2012	Y
Rowan Companies	Petroleum and Natural Gas	N/A	Pure	UK	2012-02	2012	Y
Pentair	Machinery	Tyco International	M&A	Switzerland	2012-03	2012	Y
Stratasys	Computers	Objet	M&A	Israel	2012-04	2012	
Tower Group	Insurance	Canopius Holdings Bermuda	M&A	Bermuda	2012-04	2012	
Eaton	Electrical Equipment	Cooper Industries	M&A	Ireland	2012-05	2012	

Table A1 (cont'd)

U.S. Target Name	Industry	Foreign Acquirer Name	Type	Dest.	Ann.	Finish	S&P
Axalta Coating Systems	Chemicals	The Carlyle Group	M&A	Bermuda	2013-02	2013	
Liberty Global	Communication	Virgin Media	M&A	UK	2013-02	2013	
Actavis	Pharmaceutical Products	Warner Chilcott	M&A	Ireland	2013-05	2013	Y
Omnicom Group	Business Services	Publicis Groupe UK	M&A	UK	2013-07	Failed	Y
Perrigo	Pharmaceutical Products	Elan, Blisfont	M&A	Ireland	2013-07	2013	Y
Applied Materials	Electronic Equipment	Tokyo Electron	Pure	Netherlands	2013-09	Failed	Y
Allegion	Construction Materials	N/A	Spin-off	Ireland	2013-11	2013	Y
Endo Health Solutions	Pharmaceutical Products	Paladin Labs	M&A	Ireland	2013-11	2013	Y
Multi Packaging Solutions Int'l	Shipping Containers	AGI-Shorewood Group	M&A	Bermuda	2013-11	2014	
Horizon Pharma	Pharmaceutical Products	Vidara Therapeutics Int'l	M&A	Ireland	2014-03	2014	
Chiquita Brands Int'l	Agriculture	Fyffes Plc	M&A	Ireland	2014-04	2014	
Pfizer	Pharmaceutical Products	Astrozenica	M&A	UK	2014-04	Failed	Y
Questcor Pharmaceuticals	Pharmaceutical Products	Mallinckrodt	M&A	Ireland	2014-04	2014	
Theravance	Pharmaceutical Products	N/A	Pure	Cayman Islands	2014-04	2014	
Mondelez International	Food Products	D.E. Master Blenders	M&A	Netherlands	2014-05	2014	
C&J Energy Services	Petroleum and Natural Gas	Nabors Industries	M&A	Bermuda	2014-06	2014	
Medtronic	Medical Equipment	Covidien	M&A	Ireland	2014-06	2014	Y
AbbVie	Pharmaceutical Products	Shire	M&A	UK	2014-07	Failed	Y

Table A1 (cont'd)

U.S. Target Name	Industry	Foreign Acquirer Name	Type	Dest.	Ann.	Finish	S&P
Mylan	Pharmaceutical Products	Abbott Laboratories Non-US Assets	M&A	Netherlands	2014-07	2014	Y
Burger King Worldwide	restaurants, hotels, motels	Tim Hortons	M&A	Canada	2014-08	2014	
Auxilium Pharmaceuticals	Pharmaceutical Products	Endo International	M&A	Ireland	2014-10	2014	
Steris	Medical Equipment	Synergy Health	M&A	UK	2014-10	2014	
Wright Medical Group	Medical Equipment	Tornier	M&A	Netherlands	2014-10	2014	
Paragon Offshore	Petroleum and Natural Gas	N/A	spin-off	UK	2014-11	2015	

APPENDIX B. Corporate Inversions Used for Empirical Analysis.

This appendix lists the inverting firms used for empirical analysis in this paper. The firms listed in Appendix A are further screened by comparing each firm with their SEC Edgar filings based on the following criteria and using the ones that qualify: (i) the inversion passed the board's approval; (ii) the inverting company was a publicly traded U.S. company before inversion; (iii) stocks of the surviving company are still publicly traded in the United States; (iv) the transaction was closed/completed by December 31, 2015. We are left with 63 inversions after screening.

Table A2: Corporate Inversions Used for Empirical Analysis

U.S. Target Name	Industry	Foreign Acquirer Name	Type	Dest.	Ann.	Finish	S&P
Helen of Troy	Consumer Goods	N/A	Pure	Bermuda	1993-12	1994	
Loral	Communication	N/A	Pure	Bermuda	1996-01	1996	
Triton Energy	Petroleum and Natural Gas	N/A	Pure	Cayman Islands	1996-02	1996	
Chicago Bridge & Iron	Construction	N/A	Pure	Netherlands	1997-03	1997	
Tyco International	Electronic Equipment	ADT	M&A	Bermuda	1997-03	1997	Y
Xoma	Pharmaceutical Products	N/A	Pure	Bermuda	1998-11	1999	
Gold Reserve	Precious Metals	N/A	Pure	Canada	1999-02	1999	
Fruit of the Loom	Textiles	N/A	Pure	Cayman Islands	1999-03	1999	
Transocean Offshore	Petroleum and Natural Gas	N/A	Pure	Cayman Islands	1999-05	1999	Y
PXRE	Insurance	N/A	Pure	Bermuda	1999-10	1999	
White Mountains Insurance Group	Insurance	N/A	Pure	Bermuda	1999-10	1999	
Trenwick Group	Insurance	LaSalle Re Holdings	M&A	Bermuda	1999-12	1999	

Table A2 (cont'd)

U.S. Target Name	Industry	Foreign Acquirer Name	Type	Dest.	Ann.	Finish	S&P
Everest Reinsurance Holdings	Insurance	N/A	Pure	Bermuda	1999-09	2000	
Tycom	Electronic Equipment	N/A	Spin-off	Bermuda	2000-01	2000	
Applied Power	Machinery	N/A	Pure	Bermuda	2000-07	2000	
Seagate Technology	Computers	N/A	Pure	Cayman Islands	2000-08	2000	Y
Arch Capital Group	Insurance	N/A	Pure	Bermuda	2000-09	2000	
Foster Wheeler	Construction	N/A	Pure	Bermuda	2000-12	2001	
Global Marine	Petroleum and Natural Gas	Santa Fe Int'l	M&A	Cayman Islands	2001-09	2001	
Ingersoll-Rand	Machinery	N/A	Pure	Bermuda	2001-10	2001	Y
Noble Drilling	Petroleum and Natural Gas	N/A	Pure	Cayman Islands	2002-01	2002	Y
Herbalife	Wholesale	N/A	Pure	Cayman Islands	2002-02	2002	
Nabors Industries	Petroleum and Natural Gas	N/A	Pure	Bermuda	2002-06	2002	
Weatherford Int'l	Petroleum and Natural Gas	N/A	Pure	Bermuda	2002-06	2002	
Lazard	Finance Trading	N/A	Pure	Bermuda	2005-12	2005	
Freescale Semiconductor	Electronic Equipment	N/A	Pure	Bermuda	2006-09	2006	
Covidien	Medical Equipment	N/A	Spin-off	Ireland	2006-01	2007	Y
TE Connectivity	Electronic Equipment	N/A	Spin-off	Switzerland	2006-01	2007	Y
Argonaut Group	Insurance	PXRE Group	M&A	Bermuda	2007-03	2007	

Table A2 (cont'd)

U.S. Target Name	Industry	Foreign Acquirer Name	Type	Dest.	Ann.	Finish	S&P
Star Maritime Acq.	Transportation	Star Bulk Carriers	M&A	Marshall Islands	2007-03	2007	
Western Goldfields	Precious Metals	N/A	Pure	Canada	2007-05	2007	
Altisource Portfolio Solutions	Business Services	N/A	Spin-off	Luxembourg	2009-07	2009	
Tim Hortons	restaurants, hotels, motels	N/A	Pure	Canada	2009-09	2009	
ENSCO Int'l	Petroleum and Natural Gas	N/A	Pure	UK	2009-11	2009	Y
Styron	Chemicals	N/A	Pure	Luxembourg	2010-06	2010	
Valeant Pharmaceuticals Int'l	Pharmaceutical Products	Biovail	M&A	Canada	2010-06	2010	
Delphi Automotive	Automobile and Trucks	N/A	Pure	Jersey	2009-10	2011	Y
Alkermes	Pharmaceutical Products	Elan	M&A	Ireland	2011-05	2011	
Jazz Pharmaceuticals	Pharmaceutical Products	Azur Pharma	M&A	Ireland	2011-09	2011	
Tronox	Chemicals	Exxaro Res.	M&A	Australia	2011-09	2011	
AON	Insurance	N/A	Pure	UK	2012-01	2012	Y
Rowan Companies	Petroleum and Natural Gas	N/A	Pure	UK	2012-02	2012	Y
Pentair	Machinery	Tyco International	M&A	Switzerland	2012-03	2012	Y
Stratasys	Computers	Objet	M&A	Israel	2012-04	2012	
Tower Group	Insurance	Canopius Holdings Bermuda	M&A	Bermuda	2012-04	2012	

Table A2 (cont'd)

U.S. Target Name	Industry	Foreign Acquirer Name	Type	Dest.	Ann.	Finish	S&P
Eaton	Electrical Equipment	Cooper Industries	M&A	Ireland	2012-05	2012	
Axalta Coating Systems	Chemicals	The Carlyle Group	M&A	Bermuda	2013-02	2013	
Liberty Global	Communication	Virgin Media	M&A	UK	2013-02	2013	
Actavis	Pharmaceutical Products	Warner Chilcott	M&A	Ireland	2013-05	2013	Y
Perrigo	Pharmaceutical Products	Elan, Blisfont	M&A	Ireland	2013-07	2013	Y
Allegion	Construction Materials	N/A	Spin-off	Ireland	2013-11	2013	Y
Endo Health Solutions	Pharmaceutical Products	Paladin Labs	M&A	Ireland	2013-11	2013	Y
Horizon Pharma	Pharmaceutical Products	Vidara Therapeutics Int'l	M&A	Ireland	2014-03	2014	
Questcor Pharmaceuticals	Pharmaceutical Products	Mallinckrodt	M&A	Ireland	2014-04	2014	
Theravance	Pharmaceutical Products	N/A	Pure	Cayman Islands	2014-04	2014	
Mondelez International	Food Products	D.E. Master Blenders	M&A	Netherlands	2014-05	2014	
C&J Energy Services	Petroleum and Natural Gas	Nabors Industries	M&A	Bermuda	2014-06	2014	
Medtronic	Medical Equipment	Covidien	M&A	Ireland	2014-06	2014	Y
Mylan	Pharmaceutical Products	Abbott Laboratories Non-US Assets	M&A	Netherlands	2014-07	2014	Y

Table A2 (cont'd)

U.S. Target Name	Industry	Foreign Acquirer Name	Type	Dest.	Ann.	Finish	S&P
Burger King Worldwide	restaurants, hotels, motels	Tim Hortons	M&A	Canada	2014-08	2014	
Steris	Medical Equipment	Synergy Health	M&A	UK	2014-10	2014	
Wright Medical Group	Medical Equipment	Tornier	M&A	Netherlands	2014-10	2014	
Paragon Offshore	Petroleum and Natural Gas	N/A	spin-off	UK	2014-11	2015	

APPENDIX C. Variable Definitions

- *Cash Holdings*: The ratio of cash and short-term investments to the book value of total assets.
- *Capital Expenditure*: The ratio of capital expenditures to the book value of total assets.
- D_{it}: A dummy variable that identifies the incorporation status of company *i* at time *t*. If company *i* is incorporated in the United States at time *t*, D_{it} equals 0. If the company reincorporates overseas and thus becomes foreign-incorporated at time *t*, D_{it} equals 1.
- *Dividend*: The ratio of total dividends paid to the book value of total assets.
- *Leverage*: Leverage ratio, defined to be the ratio of the book value of total debt to the book value of total assets.
- *R&D Expenditure*: The ratio of R&D expenditures to the book value of total assets.
- *ROA*: Return on assets, defined to be the ratio of earnings to the book value of total assets.
- *SG&A*: The ratio of selling, general, and administrative expenses to the book value of total assets.
- *Tax Rate*: The ratio of cash tax paid to pre-tax income before special items. Extreme values are truncated at zero and one.
- *Total Assets*: The book value of total assets (in millions of dollars).

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