Capture and Competition: The Role of Product Market Competition in Reallocating Rents from Regulatory Capture*

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Abstract

The lobbying literature provides evidence of firms shaping their regulatory context, consistent with corporate rent-seeking. We propose that such rent-seeking, where it exists, is unlikely to enrich shareholders at the expense of customers when firms operate in competitive product markets. We test this proposition through an assessment of the dissipation of the cash benefits accrued from corporate tax inversions. We find lower accounting and stock-market returns to shareholders of inverting firms in competitive industries (relative to those in concentrated industries). Further, inverting firms in competitive industries are more likely to improve liquidity and invest in R&D relative to those in concentrated industries. The evidence suggests that in competitive industries lobbying "rents" accrue to customers over shareholders.

Keywords: Regulatory capture, product market competition, tax inversion

JEL codes: D4, G18, H2

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> *"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're 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…when some companies cherrypick their taxes, it damages the country's finances. It adds to the deficit. It makes it harder to invest in the things that will keep America strong, and it sticks you with the tab for what they stash offshore."*
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> President Obama's Weekly Address, July 26, 2014

1. Introduction

A vast literature studies the role of business in society, focusing in particular on the political activities of firms and their managers in shaping their regulatory context. Widespread belief and considerable evidence suggest that firms' lobbying efforts accomplish regulatory capture (Stigler (1971); Rajan and Zingales (2003); Dal Bó (2006); Carpenter and Moss (2013); Ramanna (2015)). The lobbying and regulatory capture are alleged to represent rent extractive activities for the benefit of shareholders and managers of the corporation. Corporations' success in regulatory capture is partly attributable to their relatively organized and well-informed efforts in influencing regulators and/or politicians. In contrast, taxpayers or potentially affected consumers are a diffuse group with individually smaller economic stakes and less knowledge about regulatory issues. Therefore, firms have the potential to extract rents, giving rise to concerns about possible wealth transfers from citizens to special interests.

In this study, we propose that even if such rent extractions or wealth transfers were to exist, they may not enrich the firms' shareholders at the expense of customers. Particularly if such politically successful firms operate in competitive product markets, the rents accrued are likely to dissipate to the firms' customers. That is, in effect, rents are captured by customers, rather than the lobbying firms' shareholders, at the potential expense of taxpayers. And provided such customers are themselves a broad representation of the citizenry, the wealth transfers effected through the political process are reversed (at least partially) in product markets. If true, such wealth transfers

may not be, strictly speaking, "rents" firms capture through the political process but rather attempts by firms to sustain a competitive edge in product markets.

The preceding arguments suggest regulatory wealth transfers are a greater cause for concern when product markets are (largely) uncompetitive. (Of course, this leaves aside an important question in democratic theory — whether it is normatively desirable to allow price-based markets to achieve allocations intended to be achieved through political processes. See, e.g., Sandel (2013))

To test these propositions, we provide some initial evidence on the impact of product market competition on the allocation of wealth extracted through successful corporate political engagement. A convincing test setting ideally has the following elements – (i) evidence of wealth transfers from the intended beneficiaries of regulation to those being regulated, (ii) unsuccessful regulatory/political attempts at leveling the playing field, (iii) an issue that cuts across industries so as to make the inferences generalizable and also to estimate within-treatment variation in product market competition, and finally (iv) the events should be scattered over time so to reduce the possibility of other confounding events.

We select corporate tax inversions in the United States as our setting as it broadly fulfils each of the above requirements. Corporate inversion is a practice that allows firms to substantially reduce their tax liability, freeing up cash in corporate treasuries. Although the practice of such tax inversions has persisted over many years, critics on both sides of the political aisle argue that they represent aggressive tax behavior not consistent with the spirit of the US tax law. However, supporters of the inversions contend that this practice enables firms to remain competitive in product and capital markets, especially internationally (e.g., Mankiw (2014)), and, as such, attempts at closing "loopholes" in tax law that enable the inversions have been unsuccessful (e.g.,

Linskey, (2014). Thus, critics of tax inversions have from time to time alleged that the practice persists partly due to corporate regulatory capture of tax lawmaking in the United States (e.g., Hodgson, 2015). In this study, we do not take a normative position on the debate around tax inversions; rather, we examine whether product-market competition influences the distribution of the cash benefits of such inversions.

We identify three broad classes of stakeholders who may be likely to capture wealth extracted through the tax inversions – customers, shareholders, and managers. If rents do dissipate to customers, they are likely to experience this through lower product prices (lower margins for firms) or improved product quality (higher firm spending on quality). Similarly, if rents dissipate to shareholders, the firm is likely to record increased accounting and stock-market performance. Finally, if rents accrue to managers, we can expect increases in managerial compensation, perquisites, or empire-building activities. Of course, political rents can dissipate to all of the groups – in varying degrees – so we concurrently examine returns to customers, shareholders, and managers as response variables in our empirical tests. In fact, the relative impact of political rents on returns to each of these groups can also be meaningful in the context of our study.

One concern with our setting is that the incidence of tax inversions may itself depend on an industry's product market competition. Put differently, cross-sectional variation based on competition in product markets may not be exogenous to successful wealth transfers through inversions. We mitigate this concern as a confounding factor in our inferences by defining the state of product-market concentration within the sample of corporate inversions. That is, we divide the sample of firms that completed tax inversions into two based on industry competition in the year prior to the inversion. In our main tests, industry competitiveness is identified using industry median price-cost margins. We obtain a balanced sample of inversions across more and less

competitive industries, enabling difference-in-difference tests that generate relatively more dispositive inferences. We also verify robustness to the inclusion of industry (and alternatively firm) fixed effects that absorb all unobserved, time-invariant heterogeneity across industries (and firms). This ensures that the economic consequences of inversions are not on account of industries (or firms) being inherently different.

Using a list of 43 corporate inversions over the period 1990 to 2014 (which updates Desai and Hines (2002); see Rao (2015)), we employ two sets of tests and find consistent evidence across both of them. First, we examine short-window market reaction to the announcement of inversions. We split the 43 announcements based on the extent of product market competition and uncover a distinct pattern – inversions in concentrated industries are associated with more frequent positive market reactions as compared to those in competitive industries. In particular, 16 of the 21 inversions in concentrated product markets generate positive market reactions and 5 elicit negative reactions. This split between positive and negative announcement returns is 12-10 in the competitive markets group. While the 16-5 split between positive and negative returns in concentrated industries is significantly different (p-value = 0.012) from a random chance of 50%, the split of 12-10 in competitive industries is not. These results suggest that inversions are more likely to create wealth transfers in favor of shareholders in concentrated product markets relative to competitive ones. They also indicate that prior inferences about the mixed value implications of corporate inversions (e.g., Desai and Hines, 2002; Rao, 2015) are more representative of competitive rather than concentrated product markets.

The second set of tests examines long-run firm responses to inversions to hone in on the underlying mechanisms of the value creation. We begin by documenting an economically significant decrease in firms' tax rates after the inversion. Further, these decreases are of similar

magnitudes across concentrated and competitive industries – ruling out the possibility that differences in firm outcomes after the inversion could be driven by the differential tax impact of the inversion across these groups.[1] Our results depict a clear dichotomy between concentrated and competitive industries in the manner in which they use the tax-savings from inversions. Firms in concentrated industries are more likely to use these proceeds to increase payouts to shareholders (via stock repurchases), while those in competitive industries are more likely to invest these cash flows in innovation activities (primarily R&D) and retain the rest to improve liquidity. These latter activities are more consistent with the firm improving its competitive position than with shareholder rent extraction. We thus interpret these results as evidence that the narrative of shareholder rent-extraction usually attributed to corporate inversions is more applicable to product markets that are imperfectly competitive. We verify that our results are not on account of cross-industry variation in other factors such as growth opportunities, financing constraints, and corporate governance.

We find more nuanced evidence on the question of how tax-savings from inversions benefit managers across competitive and concentrated industries. While the post-inversion increases in managerial payouts are descriptively much larger in concentrated industries (annual CEO compensation increases from $8 million in the pre-period to $21 million in the post period) as compared to competitive industries ($4.6 million to $6.1 million), these differences are not statistically significant. Further, these increases are observed in both bonus and stock–based compensation making it difficult to infer whether these payouts are the result of greater rent-

[1] Our results are robust to using annual tax expense as well as long-run taxes paid (e.g., Dyreng et al., 2008). In particular, taxes paid as a ratio of pre-tax income decrease by 22% for firms in the top decile of competition as compared to 15% for those in the bottom decile. Results based on annual tax expense are similar (tax expense decreases by 1.5% of assets for firms in the top decile of competition versus 0.82% for those in the bottom decile with these differences being insignificantly different from one another).

extraction (as would be expected with bonus compensation) or attempts to reduce agency-conflicts (i.e., by granting more stock-based compensation). One interpretation for these findings is that managerial compensation is unaffected on average by inversions. Another, perhaps more plausible interpretation is that managers are able to extract some of the rents associated with tax inversions even in cases where competitive product markets mitigate shareholder rent extraction. If so, this latter interpretation may help explain managerial lobbying support for tax inversions regardless of product market competitiveness.

Our inferences are robust to a battery of tests. First, we exploit recent advances in the empirical I/O literature that measure competition based on the number of firms that compete in each firm's product market space (as disclosed in their regulatory filings, see Hoberg and Phillips (2016)). Our results are robust to this alternative measure of competition. Second, we use a dynamic measure of competition (that is updated every year) rather than a static measure (estimated in the year prior to inversion) and find that our conclusions remain unaffected. Third, our findings are insensitive to the use of alternative proxies for the firm's tax liability from the empirical tax-accounting literature (specifically, cash taxed paid). Finally, the use of alternative fixed effects and different ways of clustering the standard errors (i.e., firm as well as industry) do not alter the inferences.

While our study uses tax inversions as the empirical setting, its implications are broader – the rent-extraction benefits alleged to accrue to firms through regulatory capture are passed onto customers in competitive product markets. A natural extension of our results is that increasing competition in product markets alleviates the "perils" of regulatory capture, particularly in industries where customers are a broad representation of society (i.e., consumers). Further, while we find that managers are able to extract some of the rents associated with tax inversions regardless

of product market competition, we conjecture that more customer-focused corporate boards could mitigate managerial rents in less concentrated industries.

2. Corporate inversions in the context of lobbying, regulatory capture and the effect of competition

In this section we begin with a brief description of corporate inversions. While the laws governing corporate inversions might have been an outcome of lobbying, for the purposes of this study, we treat those as a historical fact about US corporate tax laws. We then develop hypotheses about the potential observable impact of corporate inversions as a function of product market competition within the industry of a corporation that has engaged in a corporate inversion.

2.1 Corporate inversions

The history of corporate inversions began in 1982 when McDermott, a Louisiana-based construction company, changed its legal domicile to Panama. The corporation's Panamanian subsidiary served as a holding company for all of McDermott's foreign operations and had built up significant profits on which the firm was reluctant to pay U.S. corporate taxes. McDermott chose instead to invert its corporate structure by making its Panamanian subsidiary the new parent of its U.S. operations. Inverting allowed McDermott to distribute its foreign profits to its shareholders as dividends while avoiding U.S. corporate taxes (see Rao (2015) for more details).

The incentives to undertake a corporate inversion are said to emanate from the US system of corporate income tax. In particular, the US uses a worldwide system of taxation that taxes the foreign income of US resident firms. However, this foreign income is subject to US taxation only when it is repatriated to the US, and companies can receive tax credits for foreign income taxes paid that they can use to offset US tax liabilities. In contrast, under a territorial system of taxation,

which exists in several countries around the world, foreign income is normally exempt from taxation. This discrepancy creates incentives for U.S. firms to invert, that is, expatriate and incorporate in a foreign country (Rao (2015)).

A corporate inversion occurs when a US company combines with a foreign company with the explicit aim of locating the residence of the resulting company in a foreign jurisdiction with a low corporate tax rate and a favorable set of tax rules and treaties (Clausing (2014)). Inversions often do not involve a concurrent relocation of the firm's headquarters, but merely its legal domicile (Rao (2015)).

There are several potential sources of tax advantages from inverting. First, because the US system taxes foreign income upon repatriation, many US corporations have billions of dollars held abroad that cannot be used for dividends, share repurchases, or domestic investment (Clausing, 2014). Firms cannot return this cash to shareholders or otherwise use it in the US without incurring US corporate tax liabilities upon repatriation. A corporate inversion effectively relieves the firm of this tax burden. Technically, cash accrued before inversion within the firm's foreign affiliate still is taxable upon repatriation. When the new foreign parent is created, however, the US corporation's existing foreign affiliates can lend money to the new foreign parent, skipping the US corporation and avoiding the tax due upon repatriation. This ability to skip over the US corporation frees up the funds for more flexible use, including for issuing dividends, repurchasing shares, or funding domestic investments and acquisitions. Thus, the foreign successor to the US company can get full use of the "trapped" foreign cash stockpiles without paying US taxes.

Second, the inverted firm can establish new foreign operations without being subject to controlled foreign corporation rules. The tax savings in this case could be material enough to justify moving existing foreign operations held by the U.S. firm to the new parent. Once the assets and

the business lines are no longer owned by a U.S.-incorporated firm, they are no longer subject to U.S. taxation, and consequently the firm does not owe residual U.S. taxes on what would otherwise have foreign income.

Third, there is the possibility of avoiding taxes on U.S.-source income. Once the company is inverted, it becomes easier to shift income out of the US tax base through earnings stripping. Earnings stripping occurs, for example, when corporations use loans between the new foreign parent and the US affiliate to shift income out of the United States. This happens by leveraging the US corporation, through internal loans within the multinational corporation, and deducting interest on these loans against US taxes due. (The Internal Revenue Code sets limits on such interest deductions.) Beyond interest deductions, any means of reducing the profits booked by U.S. affiliates via tax-deductible payments to the foreign parent – e.g., royalties through a treaty jurisdiction like Barbados or Luxembourg or advantageous transfer pricing – will reduce the U.S corporate tax liabilities once the firm has re-domiciled out of the American worldwide tax system.

Since corporate inversions allow more flexible access to foreign cash stockpiles and easier shifting of income out of the US tax base, there is a strong incentive for corporate inversion.

As Desai and Hines (2002) note, there are two kinds of inversions – a stock inversion and an asset inversion. In a stock inversion, U.S. shareholders execute a taxable share exchange, trading their old shares in the U.S. entity for shares in the newly created foreign entity. In an asset inversion, all of the assets of the U.S. entity are transferred to the foreign entity (which has no material assets) in exchange for stock in the foreign entity, and a taxable gain is realized on the excess of fair market value over the U.S. entity's cost basis in those assets. The U.S. entity is then liquidated and the foreign entity shares are distributed to the public shareholders.

2.2 Corporate inversions are the equivalent of rent extraction through regulatory capture achieved via lobbying

As discussed in the previous section, there are strong economic motives for corporate inversions – such inversions are a source of cash to firms. But inversions come at a direct cost to the public treasury, as they allow US firms to avoid current and future tax obligations. In this sense, inversions are inconsistent with the spirit of the US tax law, and it has been a longstanding US policy to not condone inversions. In fact, numerous politicians from across the aisle have over the years criticized inversions and proposed attempts to tighten US tax law and enforcement to reduce or eliminate inversions. For instance, mitigating corporate inversions was one reason provided by the administration of President George Bush for the passage of the American Jobs Creation Act of 2004 – a one-time repatriation tax holiday for US multinationals. And more recently, the administration of President Barack Obama has adopted measures that make inversions less financially attractive.

But despite such political posturing and attempted proposals against inversions, the practice has endured. Corporations and lobbyists have both implicitly and explicitly defended the practice. For instance, even while publicly criticizing inversions as a tax-avoidance mechanism, former Medtronic CEO and prominent business ethicist Bill George has endorsed inversions as an effective strategic tool for sustaining competitive advantage. (e.g., Gelles (2014) and George (2014)). More recently, the U.S. Chamber of Commerce, the country's largest corporate lobby, has sued to stop the federal government's attempted crackdown on inversions (e.g., Jopson (2016)). And inversions remain a growth area for corporate lobbying expenditures more generally (e.g., Rubin (2014)). Perhaps as a result of this vigorous defense of the status quo, inversions have continued for over three decades.

Critics of inversions have sometimes argued that the continued existence of the practice is itself evidence of the political power of corporations and their capture of US tax law (See, e.g., Drutman (2015) for a discussion on the political "impossibility" of tax reform given the power of business lobbying). For example, Adam Rappaport, a senior counsel at Citizens for Responsibility and Ethics in Washington notes "…there are a lot of reasons why tax reform is stuck in Congress, and one of them is because big companies with vested interests want it to be stuck," (See Linkskey's (2014) Bloomberg piece). For the purposes of this study, we take no position on this question apart from assuming that inversions exist in a contested political economy and that they represent an opportunity for firms to transfer wealth from taxpayers to corporate treasuries.

2.3 Hypotheses

Economic theory predicts that, in competition, the rents accruing to firms through inversions would flow through to firms' customers in the form of lower product prices. While tax savings from inversions may be the equivalent of rents extracted through regulatory capture, firms competing with each other within an industry – either because the US firm competes with foreign firms that enjoy lower tax rates and/or the US firm competes with other US firms who also have similarly engaged in corporate inversions – will have to lower their product prices to remain competitive. Thus, the typical claim that inversions benefit a corporation's shareholders to the detriment of taxpayers is unlikely to hold in competitive industries. In fact, inversions might be a means of remaining competitive. In competition, the rent-extractive activity that an inversion potentially represents might only transfer wealth (rents) from taxpayers to the industry's clientele. And, if the industry's customer base is representative of the beneficiaries of tax revenues that otherwise would have accrued to the government, then inversions may be welfare neutral. Our

empirical tests, however, are silent on whether an inverting industry's customer base mimics the pool of beneficiaries of tax revenues, and thus we make no claims whether the transfer from taxpayers to consumers is desirable or welfare neutral. We simply offer evidence whether and when corporations retain the rents from regulatory capture or whether the rents are dissipated as a result of competition.

We study the consequences of the potentially rent-extractive inversions as manifested in shareholder returns, product prices and product quality, and management compensation. Our first hypothesis is that inverting firms in competitive industries would generate lower announcement period returns to equity holders than inverting firms in non-competitive industries. The lower returns to equity holders for the inverting firms would also be manifested in lower accounting measures of returns in the post-inversion period.

A corollary to predicting lower returns to shareholders among competitive firms is the expectation of greater spending on customer-focused activities by these firms – this is our second hypothesis. Such activities, including R&D spending and product promotions, are likely to enable firms maintain a competitive edge with customers through improved product quality and lower product prices. Thus, we hypothesize that inverting firms in competitive industries expend more resources on innovation and product quality than inverting firms in non-competitive industries.

Finally, we examine the impact of product-market competition on the compensation to managers of the inverting firms in competitive and non-competitive industries. Managerial incentive-compensation is typically usually contingent on accounting- and stock-return-based metrics (e.g., Murphy (1999)). Thus, if inverting firms in competitive industries do in fact generate lower returns to shareholders (relative to firms in non-competitive industries), they should also yield lower relative returns to managers.

3. Results

We present two sets of analyses. The first is a short-window event-study that examines the 5-day stock market reaction to the announcement of a corporate inversion (e.g., Desai and Hines, 2002; Rao, 2015). The second also employs the event-study methodology, but it examines long-run outcomes as appearing in a firm's financial performance and in managers' compensation. The intent is to discern systematic differences in the effects of the (tax saving) proceeds from inversions on firms belonging to concentrated versus competitive industries.

3.1 Sample

We obtain our sample of inversions from two sources – Desai and Hines (2002) for the inversions occurring between 1982 and 2002 and Rao (2015) for those taking place during 2003 to 2014. The two studies in turn collect the inversion dates from corporate announcements and other public sources. We exclude inversions with missing data on CRSP or Compustat. We also exclude inversions that occurred between 2008 and 2010 to remove any confounding effects of the Great Recession. The final sample comprises 43 inversions between 1990 and 2014. Table 1 presents the list of the 43 inversions in the sample along with their respective announcement dates.

3.2 Variable definitions

Following Desai and Hines (2002), we examine 5-day event windows centered around an inverting firm's first announcement of its decision to invert. The market's reaction to the announcement is captured via the cumulative market-adjusted return over the five-day window. Market-adjusted return is calculated as the firm return minus the S&P 500 index return.

We follow the industrial organization literature and measure product market competition using the degree of product substitutability (e.g., Carlton and Perloff (1994); Demsetz (1997); Besanko et al. (2009); Nevo (2001); Karuna (2007)). This measure captures the idea that that the

closer to (further from) perfect competition an industry is, the more (less) price approximates marginal costs. In other words, the greater the intensity of price competition due to higher product substitutability, the smaller the price–cost margin.

Price-cost margins are a preferred measure of competition for two reasons. First, the measure does not neglect private firms within the industry (the traditional sales-based Herfindahl index computed from Compustat ignores private firms, Ali, Klasa, and Yeung (2009)). Second, the measure is influenced by foreign rivals (e.g., Edmans, Jayaraman, and Schneemeier (2016)), a substantively important factor in our setting. We define industry profit-margin (*INDPM*) as the inverse measure of product market competition and calculate it as the industry-level (defined at the 3-digit SIC code level) median profit margin (defined as sales (data item SALE) minus cost of goods sold (data item COGS) scaled by the latter) as of the year prior to inversion.[2]

In the long-run event-study, we begin by documenting the effect of inversions on firms' tax rates. To do so, we define tax rate (*TAX*) as total income taxes (data item TXT) scaled by lagged total assets (data item AT). With regards to the financial, product-market, and compensation effects associated with inversions, we examine four categories of firm-level responses – (i) cash retention and payouts, (ii) profitability, (iii) investing, and (iv) managerial compensation. We expect firms in concentrated industries to use the cash proceeds from inversions to increase shareholder payouts and managerial compensation. In contrast, we expect firms in competitive industries to use the proceeds to increase their sustainability (competitiveness) by increasing liquidity and investing in growth opportunities, rather than dissipating these cash flows via payouts to shareholders and managers. In constructing these measures, we assume the

[2] Robustness tests in Table 5 (discussed later) indicate that our results are robust to using an alternative measure of competition that is based on firms' product descriptions (see Hoberg and Phillips (2016)).

"proceeds" are those left over after a competitive firm has passed on some or all of the tax benefit from inversions in the form of lower product prices.

The retention/payout outcomes we examine are – cash (*CASH*) defined as cash and short-term investments (data item CHE) scaled by lagged total assets, dividends per share (*DPS*) defined as dividends per share ex-date (data item DVPSX_F), and stock repurchases (*REPURC*) defined following Blouin and Krull (2009) as either as the annual change in treasury stock (data item TSTK) where available, or purchase of common and preferred stock (data item PRSTKC), expressed as a percentage of lagged total assets.

The profitability and innovation measures we examine are – return on assets (*ROA*) defined as net income (data item NI) scaled by lagged total assets; research and development (*R&D*) defined as R&D expenditures (data item XRD) scaled by lagged total assets and capital expenditures (*CAPEX*) defined as data item CAPX scaled by lagged total assets.

The managerial compensation variables (from Execucomp) are – total compensation (*TOTCOMP*) defined as the log of annual CEO compensation (data item TDC1). In addition, we examine each of the major components of total compensation viz., salary (*SALARY*) (data item SALARY), bonus (*BONUS*) (data item BONUS) and equity and other compensation (*STOCK*) (defined as TDC1 minus SALARY minus BONUS), respectively. Finally, we define *SIZE* as (the log of) firm size measured with lagged total assets.

For robustness, we define an alternative measure of competition, *TNIC*, defined as the number of firms that operate in the same product market space as the focal firm and is computed using the Text-based Network Industry Classification (TNIC) of Hoberg and Phillips (2016). *TNIC* depicts a negative and significant correlation with *INDPM* (-0.66).

3.3 Descriptive statistics

Table 2, Panel A presents descriptive statistics. The overall tax rate is 2% of total assets, as seen by the average *TAX* of 0.02. The sample comprises large firms as seen by the median *SIZE* of 7.605, which translates into $1.2 billion ($e^{7.605}$). Our measure of product market competition (*INDPM*) has a mean of 0.398 which indicates a price-cost margin of 39.8%. The measure depicts wide cross-sectional variation with a minimum value of 0.038 and a maximum of 1.226. CEOs of the sample firms take home an annual compensation of $6.21 million (as indicated by the mean *COMP* of 1.827). A major component of this compensation is stock and other non-cash forms of compensation (around $4.31 million – mean *STOCK* of 1.460).

Panel B presents differences by market competition groups (defined as above-versus-below median *INDPM*). While firms in concentrated industries pay more taxes than their competitive counterparts both before and after the inversion (which likely reflects their higher profitability levels), the magnitude of the decrease in taxes after inversions is similar across both groups. (1.2% versus 0.8%). Firms in competitive markets experience a sharp decrease in profitability after inversions (*ROA* falls from -0.008 to -0.049) but not those in concentrated industries (*ROA* increases slightly from 0.043 to 0.064). Other notable differences are the increases in share repurchases and managerial compensation within firms in concentrated industries (although these are significantly different between the groups only for total compensation and stock compensation but not salary and bonus). In subsequent tests, we examine whether these univariate results hold up to a multivariate regression design.

4. Results

4.1 Short-window market reaction

Previous research by Desai and Hines (2002) finds that corporate inversions generate mixed market reactions. Our findings for the full sample extend their analysis to 2014 with the tenor of the results unchanged. Figure 1, Panel A depicts the abnormal returns for the 43 inversion announcements, with the bars with dots indicating positive returns while those with vertical lines indicating negative returns. We do not observe any consistent pattern across the announcements. Specifically, we find 28 of the 43 announcements to elicit a positive market reaction while the remaining 15 generate a negative reaction. The mean (median) market-adjusted return reaction is 4.1% (2.2%) with the most positive reaction at 35% (Herbalife International) and the most negative at -17% (Foster Wheeler).[3]

When the sample is partitioned along the lines of competitive and concentrated industries, the announcement period market reactions are as hypothesized. The pattern of announcement-period returns is not mixed anymore. Panels B and C present graphs for the sub-samples of concentrated and competitive product market industries. The sample is split at the (within-sample) median value of product-market competition variable labeled *INDPM*. Of the 21 inversions in the concentrated markets subsample, 16 announcements (i.e., 75%) generate a positive market reaction (and includes Herbalife) whereas five announcements earn a negative market reaction. This split between positive and negative announcement returns is 12-10 (i.e., 55%-45%) in the competitive markets group (and includes Foster Wheeler).

Overall, the short-window event-study evidence is consistent with our hypothesis that competition moderates the rent-extractive opportunity for shareholders through corporate

[3] Both the mean and the median market reactions are significantly different from zero at the 5% significance level.

inversions. In contrast, shareholders of firms in concentrated industries benefit from corporate inversions as they are more likely to be able to retain the resulting tax benefits.

4.2 Long-run outcomes

We examine firms' long-run responses to the inversion decision by studying changes in their cash retention, performance, investing, and managerial compensation decisions. These tests complement the short-window market reaction evidence by providing an insight into the underlying mechanisms that drive the overall shareholder value implications. Our hypothesis is that firms in concentrated industries use the proceeds from inversions for payouts (both to shareholders and to managers) while those in competitive industries use these proceeds to increase sustainability (by increasing liquidity, and deploying them towards innovation). To test these predictions, we estimate the following regression:

$$Y_{i,j,t} = \alpha_0 + \beta_1 INDPM_j + \beta_2 POST_{i,j,t} + \beta_3 POST_{i,j,t} * INDPM_j + \varepsilon_{i,j,t} \quad (1)$$

where, *Y* denotes the various firm-level outcomes that we examine, *INDPM* is the inverse measure of market competition (defined as of the year prior to inversion), *POST* is an indicator variable that takes the value of 1 for the post-inversion period and 0 for the pre-period. Since *INDPM* is increasing in market concentration and its interaction with POST has been included in the specification, the standalone coefficient on *POST* (i.e., where *INDPM* = 0) captures the effect of inversions in the most competitive industry in the sample, while *POST*INDPM* captures the incremental effect of the inversion on firms in concentrated industries. Thus, although our sample comprises only firms undertaking inversions, β_3 provides a difference-in-differences estimate as it not only captures the change in firm-level outcomes before versus after the inversion (first-diff)

but also compares these changes between competitive and concentrated industries (second-diff).[4] Standard errors are clustered at the firm-level in all of the tests.[5]

The long-run tests examine two windows – (i) five years before versus after the inversion (which we label as [-5, 5]) and (ii) ten years before and after ([-10, 10]). To eliminate any potentially confounding effects of the Great Recession, we end the sample in 2007 and exclude inversions done after 2002 (to allow for stable long-run effects). Our final sample is based on 273 firm-year observations for the 19 inversions in Desai and Hines (2002).[6]

4.2.1 Taxes

We begin the long-run analysis by documenting the effect of corporate inversions on tax rates and examining whether this effect varies between concentrated and competitive product markets. Panel A of Figure 2 plots the average values of *TAX* in the pre versus post inversion periods separately for high and low *INDPM* industries (based on the sample median). The graph depicts a decrease in tax rates for both groups, suggesting a similar effect of inversions on tax rates across concentrated and competitive industries. We validate this evidence using regressions below.

We present two sets of results – the first uses a dichotomous classification of market competition into high and low groups while the second uses the continuous measure of *INDPM*. Within each group, we present results based on the [-5, 5] and the [-10, 10] window. Results are in Table 3. Models (1) and (2) present results for the dichotomous classification of competition. The positive coefficient on *INDPM* in both models indicates that concentrated industries paid more taxes per dollar of assets in the pre-inversion period (likely on account of the higher profitability).

[4] This design reduces the need to build a control group using techniques such as propensity-score based matching, since we rely on within-treatment variation in the effect of inversions across concentrated and competitive industries.
[5] In additional sensitivity tests (discussed later), we verify that our results are robust to including fixed effects (industry or firm) and also to clustering by industry rather than firm. These designs mitigate possible confounding effects of unobservable heterogeneity across industries or firms.
[6] We lose three inversions (Seagate Technology, Global Marine and Herbalife International) due to non-availability of data in both the pre and the post periods.

Turning to the effect of inversions, the results are consistent across both specifications and corroborate the univariate evidence – inversions reduce tax liability by an equal magnitude (on a per dollar basis) in both concentrated and competitive product markets. In particular, the coefficient on *POST* is negative and significant in both specifications (indicating lower tax rates in competitive firms) while that on *POST*INDPM* is insignificant (indicating no differential effect for firms in concentrated industries). Results in models (3) and (4) that are based on the continuous variable provide similar inferences – the coefficients on *POST* are negative and significant while those on *POST*INDPM* are insignificant. In terms of economic significance, the coefficient of -0.018 on *POST* in model (3) corresponds to a decline in tax rates to the tune of 1.52% of assets. While this decrease is slightly smaller in concentrated industries (which experience a decrease of 0.82% of assets), it is not significantly different as seen by the insignificant coefficient on *POST*INDPM*.

These results not only validate the use of inversions as a vehicle for wealth transfers out of the treasury but also mitigate concerns that differences in firm-level outcomes (that we examine subsequently) might be on account of the differential tax effect of the inversion across competitive and concentrated industries.

4.2.2 Cash retention and payouts

Table 4, Panel A presents results of the effect of corporate inversions on cash retention (*CASH*) and payouts (*DPS* and *REPURC*). We use the continuous measure of competition in these and subsequent tests (our results are similar using the dichotomous classification).

Results in model (1) using the [-5, 5] window indicate a positive (0.163) and significant (p-value < 0.01) coefficient on *POST* suggesting that firms in competitive industries hold more cash after the inversion. In contrast, the coefficient on *POST*INDPM* is negative (-0.240) and

significant at the 5% level, indicating that (relative to firms in competitive industries) firms in concentrated industries retain less of the tax savings within the firm. In terms of economic significance, cash on hand increases by 12.4% of assets in firms that are in the bottom decile of *INDPM* (i.e., the top decile of competition) as compared to an increase of 2.51% in firms in the top decile of *INDPM* (i.e., the bottom decile of competition).[7]

The next set of results indicate that these firms distribute the proceeds to their shareholders and managers. While we are unable to find significant patterns in dividend payouts (models (3) and (4)), the coefficient on *POST*INDPM* in model (5) that examines stock repurchases (*REPURC*) around the [-5, 5] window is positive and significant (*p*. value < 0.05) indicating that firms in concentrated industries distribute the tax savings to their shareholders via repurchases. This effect is not seen in competitive industries where the negative and marginally significant coefficient on *POST* indicates that firms in competitive markets, if anything, reduce shareholder payouts after inversions. The economic effects get larger if the event window is extended to [-10, 10]. The coefficient on *POST*INDPM* increases to 4.125 (significant at the 10% level), while that on *POST* remains negative at -1.301 (but is no longer significant). In terms of economic significance, firms in the top decile of competition reduce shareholder payouts after inversions by 0.63% of assets, while those in the bottom decile increase payouts by 1.07%. Given median firm size of $1.2 billion, these differences translate into an annual payout of $20.4 million per inverting firm. Panels B and C of Figure 2 present the changes in *CASH* and *REPURC* respectively between the pre and post periods.

[7] These estimates are obtained using the bottom and top decile values of 0.1625 and 0.5744 respectively. In particular, cash increase in the bottom decile is estimated as 0.163 (coefficient on *POST*) + (-0.240*0.1625) (coefficient on *POST*INDPM*0.1625) = 0.1240). Similar computations extend to the top decile of *INDPM*.

Two alternative interpretations warrant further examination. First, it could be that cross-sectional variation in industry-level growth are driving our findings. In other words, if opportunities to invest in positive NPV projects are lower in concentrated industries as compared to competitive industries, then firms in the former group will (justifiably) increase shareholder payouts. To address this concern, we include an additional control for industry sales growth (*INDSGR*) defined as median industry sales growth as of the year prior to inversion. We also include an interaction of this term with *POST*. Panel B of Table 4 presents the results. The correlation between *INDPM* and *INDSGR* is positive and weakly significant, indicating that concentrated industries, if anything, are growing faster during our sample period as compared to competitive industries. The multivariate results show that the competition effect is not subsumed by industry-growth – the coefficient on *POST* and *POST***INDPM* are similar to those reported earlier, even after controlling for *INDSGR* and *POST***INDSGR*.

Second, we consider whether our results are driven by differences in corporate governance. If competitive firms differ systematically from concentrated ones along governance dimensions (e.g., if competitive firms are better governed), then the latter rather than competition could be driving our findings. It should be noted ex-ante-facto that this governance channel is hard to reconcile with our results. For example, agency theory suggests that firms in concentrated industries are likely to exhibit poor governance and should therefore be either hoarding more cash or making more empire-building investments (as in Jensen, 1986). In any case, they should not be returning more cash to their shareholders than competitive firms. Rather, we find that competitive firms are the ones accumulating cash and making investments. We nevertheless verify that differences in governance are not driving our results. Since governance is a rather nebulous construct to capture empirically, we use analyst following since these data are available for most

firms and over our entire sample period (as compared to other proxies such as block holdings and managerial equity ownership). We define mean analyst following at the industry level (*INDANAL*) as of the year prior to inversion and include it as well as its interaction with *POST* in the regression. We find that the coefficients on *POST* and *POST*INDPM* remain unaffected, suggesting that our results are unlikely to be driven by differences in governance.

Overall, we interpret these results are evidence that the competition effect is not subsumed by other factors such as growth opportunities or governance.

4.2.3 Profitability and investing

Panel C of Table 4 presents the profitability and investing results. Firms in competitive industries experience a decline in profitability as seen by the negative and significant coefficients on *POST* in models (1) and (2). In contrast, the positive and significant coefficient coefficients on *POST*INDPM* indicate that such a decline is not seen in concentrated industries. In economic terms, firms in the top decile of product market competition experience a 5.69% drop in *ROA* while those in the bottom decile of competition experience a 1.68% increase.

The above effects can be partly driven by differences in innovation activity – as seen by the positive and significant coefficients on *POST* (0.336 and 0.358) and negative and significant coefficients on *POST*INDPM* (-0.722 and -0.801) in the *R&D* results of models (3) and (4). In economic terms, firms in the top decile of competition increase R&D spending by 21.87 percent while those in the bottom decile decrease innovation expenditures by 7.88%. These estimates should be interpreted cautiously as they are based on a smaller sub-sample of 62 observations with non-missing R&D (see Koh and Reeb (2015) for a discussion about missing R&D).

Models (5) and (6) presents the capital expenditure (*CAPEX*) results. Firms in competitive industries experience an increase in capital expenditure (the coefficient on *POST* is positive in both models) and those in concentrated industries do not (*POST***INDPM* is negative), but these effects are statistically insignificant. Panels D and E of Figure 2 plot the changes in *ROA* and *R&D* respectively between the pre and post periods for low and high *INDPM* industries.

Our results might be driven by differences in financing constraints across firms. For example, it could be that competitive firms are more capital constrained and that the inversion relaxes these constraints, in turn enabling these firms to invest more in the post-inversion period. It is pertinent to note that this argument does not negate our inferences as much as points to the possibility that increased investment among competitive firms might reflect a relaxed capital constraint beyond reasons of competition. However, in such a case one would have expected more frequent positive stock price reactions to the inversion announcement if capital constraints were indeed holding up these firms from investing. However, we do not observe that. We nevertheless control for industry sales growth and its interaction with *POST* (in Panel D) to address the possibility that relaxed financing constraints could be driving our results. We also control for governance and its interaction and find that the competition channel persists.

4.2.4 Managerial compensation

We round up our examination of long-run outcomes by studying changes in managerial compensation. Our ex-ante expectation is that firms in concentrated product markets (but not those in competitive markets) increase payouts to managers as they do to their shareholders. Panel F of Figure 2 provides confirmatory evidence based on a smaller subset of 161 observations with non-missing compensation data on Execucomp. CEOs in competitive (i.e., low *INDPM*) industries

experience a modest increase in total compensation (from $4.6 to $6.1 million) between the pre and post periods, while the comparable increase for CEOs in concentrated (i.e., high *INDPM*) industries is from $8.1 to $21.5 million. The remaining panels of Figure 2 indicate that while some of this increase comes from bonus compensation, the remaining stems from equity-based compensation.

Panel E of Table 4 presents the regression results. While the coefficient on *POST*INDPM* (which captures the incremental effect for concentrated industries) is positive in the *TOTCOMP* regressions (models (1) and (2)), it is significant only in the latter of the two models. The rest of the models split total compensation into its components. Only the stock-based compensation results yield statistical significance (and only under the [-10, 10] specification). Overall, while the data exhibit economically significant average increases in managerial rent-extraction in concentrated industries, these results are not statistically significant. Thus, the evidence on the question of how tax-savings from inversions benefit managers across competitive and concentrated industries is more nuanced. One possible interpretation is that managers of inverting firms, regardless of underlying product-market competition, experience on-average increases in compensation because they can capture some of the rents associated with tax inversions.

4.2.5 Sensitivity tests

We examine the sensitivity of our inferences to alternative ways of defining competition and to the use of fixed effects. In particular, we define product market competition as the number of firms that compete with the focal firm in its product space. To do so, we use Hoberg and Phillips' (2016) Text-based Network Industry Classifications that defines competitors based on firms' product similarities disclosed in their 10-K filings. The advantage of this measure is that each firm

has its own distinct set of product market peers. We label this alternative measure *TNIC*. In contrast to *INDPM* which is decreasing in competition, larger values of *TNIC* indicate greater competition.

Panel A of Table 5 presents these results. We restrict our attention to the main outcomes (*TAX*, *CASH*, *REPURC*, *R&D* and *TOTCOMP*) and the [-5, 5] window. The coefficient on *POST* in model (1) that examines *TAX* is negative and significant, while that on *POST***TNIC* is insignificant, consistent with inversions reducing the tax burden in both concentrated and competitive industries. Results in model (2) for *CASH* are also consistent with the *INDPM* evidence – *POST* is insignificant while *POST***TNIC* is positive and significant, indicating that firms in competitive industries (but not concentrated industries) retain more cash. Results for stock repurchases in model (3) are also similar in that the coefficient on *POST* is positive (albeit insignificant) while that on *POST***TNIC* is negative and significant. Results for *R&D* in model (4) are again consistent, with increases in innovation observed in competitive firms but not concentrated ones. Finally, the results for *TOTCOMP* in model (5) mirror those based on *INDPM*, i.e., a pronounced increase in CEO compensation (as seen by the positive coefficient on *POST***TNIC*) but this effect is insignificant. Overall, we interpret these results based on *TNIC* as being broadly consistent with those based on *INDPM*.

Next, we ensure that our results are robust to including industry and firm fixed effects that absorb all unobserved, time-invariant heterogeneity across industries/firms. This evidence is important as it provides assurance that our results are not due to competitive industries (or inverting firms within these industries) being inherently different from (those in) concentrated ones. We tabulate only the firm fixed effects results since these are more stringent, but note that our results are robust to using industry fixed effects. We also present results based on clustering our standard errors by industry rather than firm. Panel B of Table 5 presents these results. While the economic

significance on some of the variables diminishes (for example model (5) where the *p*. values on *POST* and *POST*INDPM* are 0.108 and 0.103 respectively), the tenor of our results holds. Firms in competitive industries continue to experience a decrease in tax rates (models (1) and (2)), hold more cash (models (3) and (4)), reduce shareholder payouts (models (5) and (6)) and increase innovation expenditures.

Third, we use a dynamic measure of competition by estimating the measure each year (rather than as of the year prior to inversion). In particular, we define *INDPM* as the median industry profit margin as of the start of each year. The advantage of this design is that it incorporates inter-temporal variation in product market structure between the year of inversion and when firm-level outcomes are measured. Panel C of Table 5 indicates that our inferences are robust to this dynamic measure of competition.

Finally, we use cash taxes paid as an alternative proxy for firms' tax liability. We follow prior studies (e.g., Dyreng, Hanlon, and Maydew (2008)) and measure this variable over a longer-time period. In particular, we define effective tax rate (*ETR*) as the ratio of total cash taxes paid (Compustat data item TXPD) over a three-year paid scaled by total pre-tax income over this period (data item PI). Results are in Panel D of Table 5. Consistent with our prior evidence, taxes are lower in the post-inversion period as compared to the pre-period, and these drops are of similar magnitudes across concentrated and competitive industries. Cash taxes paid are lower by 22% for firms in the top decile of competition as compared to 15% for those in the bottom decile, with these differences being insignificantly different from each other (as seen by the insignificant coefficient on *POST*INDPM*).

5. Summary and conclusions

The academic literature on business-government interactions has found consistent evidence of firms shaping their regulatory context. The result is potential wealth transfers from taxpayers to firms. In this study, we propose that even if such rent extractions were to exist, they are unlikely to enrich the firms' shareholders at the expense of customers if such firms operate in competitive product markets.

We test this proposition through an assessment of the dissipation of cash benefits accrued from corporate tax inversions. Such inversions, which have persisted as a practice despite criticisms from politicians across the aisle, allow firms to generate free cash by substantially reducing their tax liability. We find lower accounting and stock-market returns to shareholders of inverting firms in competitive industries (relative to those in concentrated industries). Further, inverting firms in competitive industries are more likely to improve liquidity and invest in R&D relative to those in concentrated industries.

We find more nuanced evidence on the question of how tax-savings from inversions benefit managers across competitive and concentrated industries. While the increases in managerial compensation are economically larger within concentrated industries as compared to competitive industries, these differences are not statistically significant. One interpretation of these results is that managers can extract some of the rents associated with tax inversions regardless of product-market competition. The results may help explain managerial lobbying support for tax inversions.

Because we identify competitive and concentrated industries within the sample of inverting firms, our research design mitigates endogeneity concerns that tax inversions are themselves driven by industry product-market competition. We caution that our evidence on the mitigating effect of product-market competition on shareholder rent-seeking via lobbying is limited to our

singular setting – tax-motived corporate inversions. Moreover, because the population of inverting firms is small, our inferences are based on small samples. Thus, our evidence should be interpreted with attendant prudence.

We encourage future work to examine how inversion-induced rent-extraction changes as industries become more competitive (i.e., a dynamic analysis). Another productive stream of inquiry is the role of corporate governance (especially corporate boards) in mitigating managerial rent-extracting through corporate inversions.

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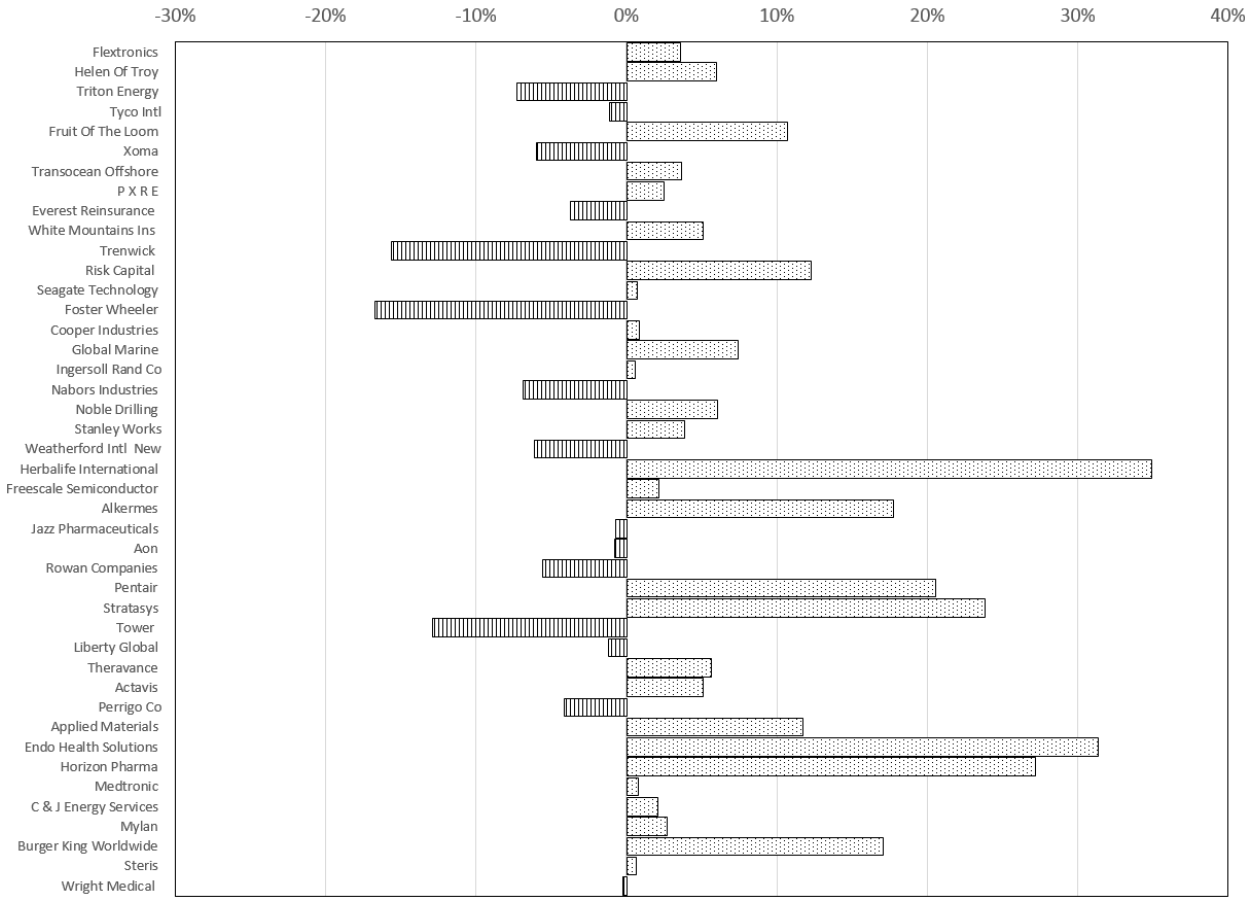
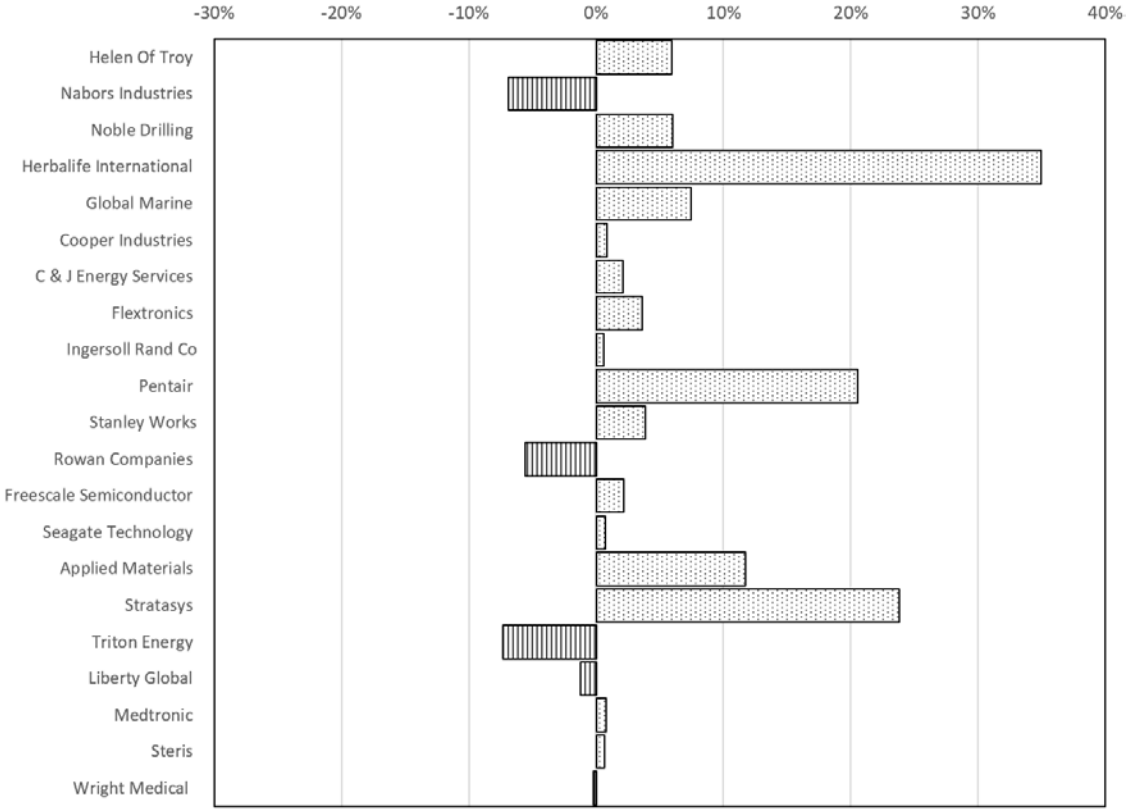
Figure 1: Short-window stock market reaction to the inversion announcement

The horizontal bars plot the 5-day abnormal excess returns (defined as firm returns minus S&P 500 index returns) around the announcement of inversion. Bars with vertical lines (dots) indicate negative (positive) market reactions. Panel A presents results for the entire sample of 43 inversions, while Panel B (Panel C) presents results for inversions by firms in concentrated (competitive) industries defined as above (below) median industry profit margin, and computed as of the year prior to inversion.

Panel A: All inversions



Panel B: Inversions in concentrated industries (High *INDPM*)



Panel C: Inversions in competitive industries (Low *INDPM*)

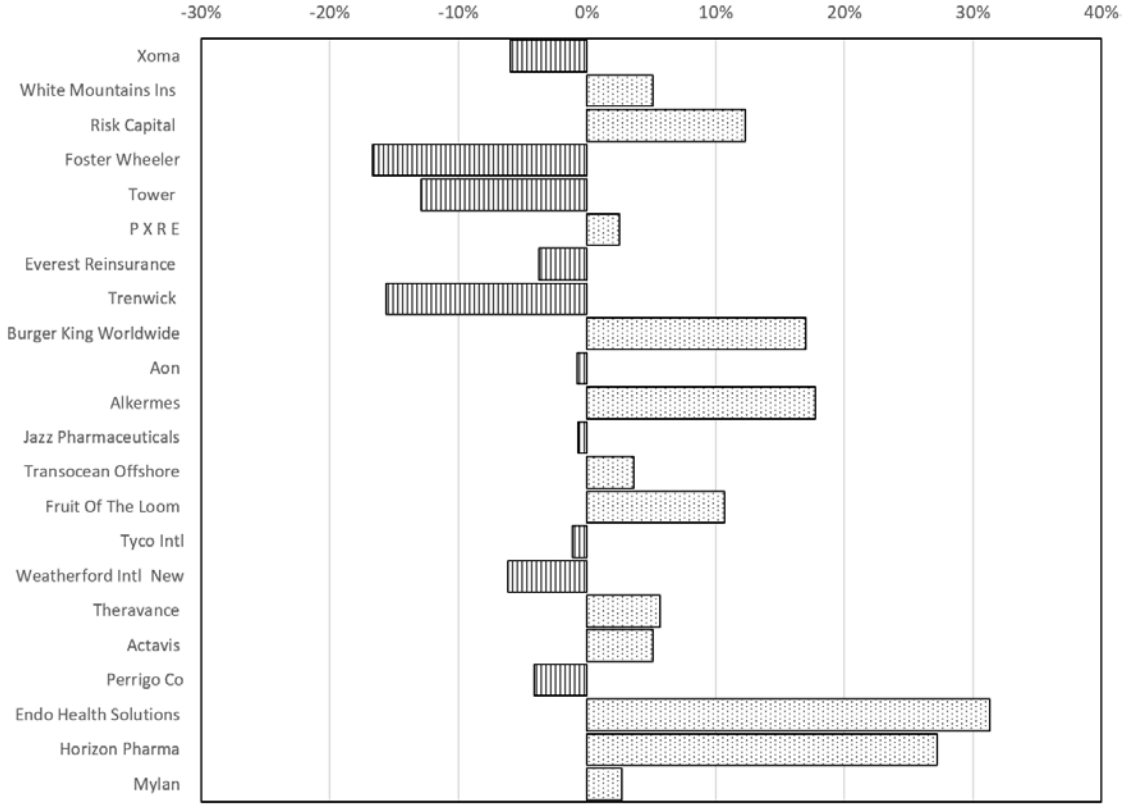
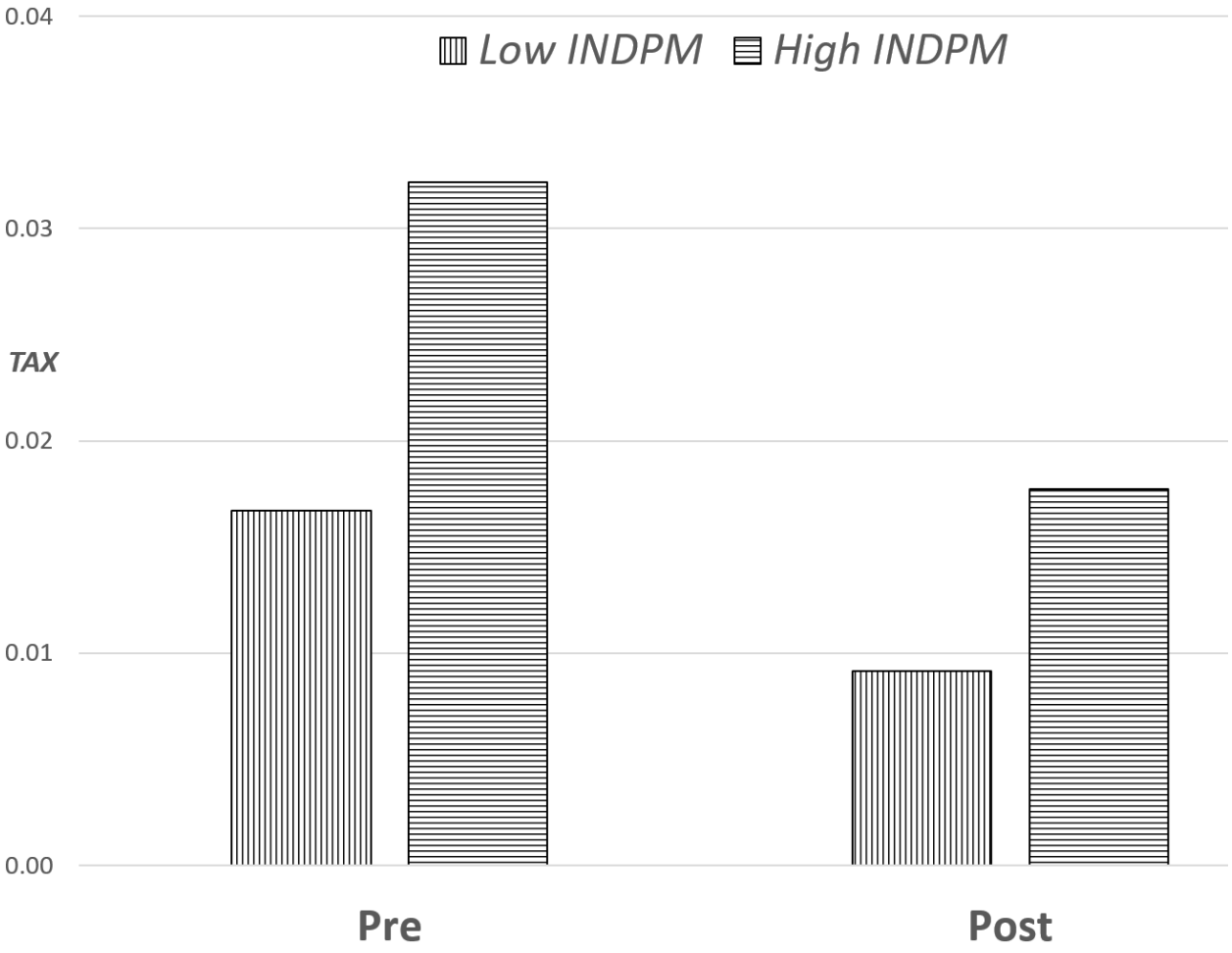


Figure 2: Firm-level outcomes before versus after inversion

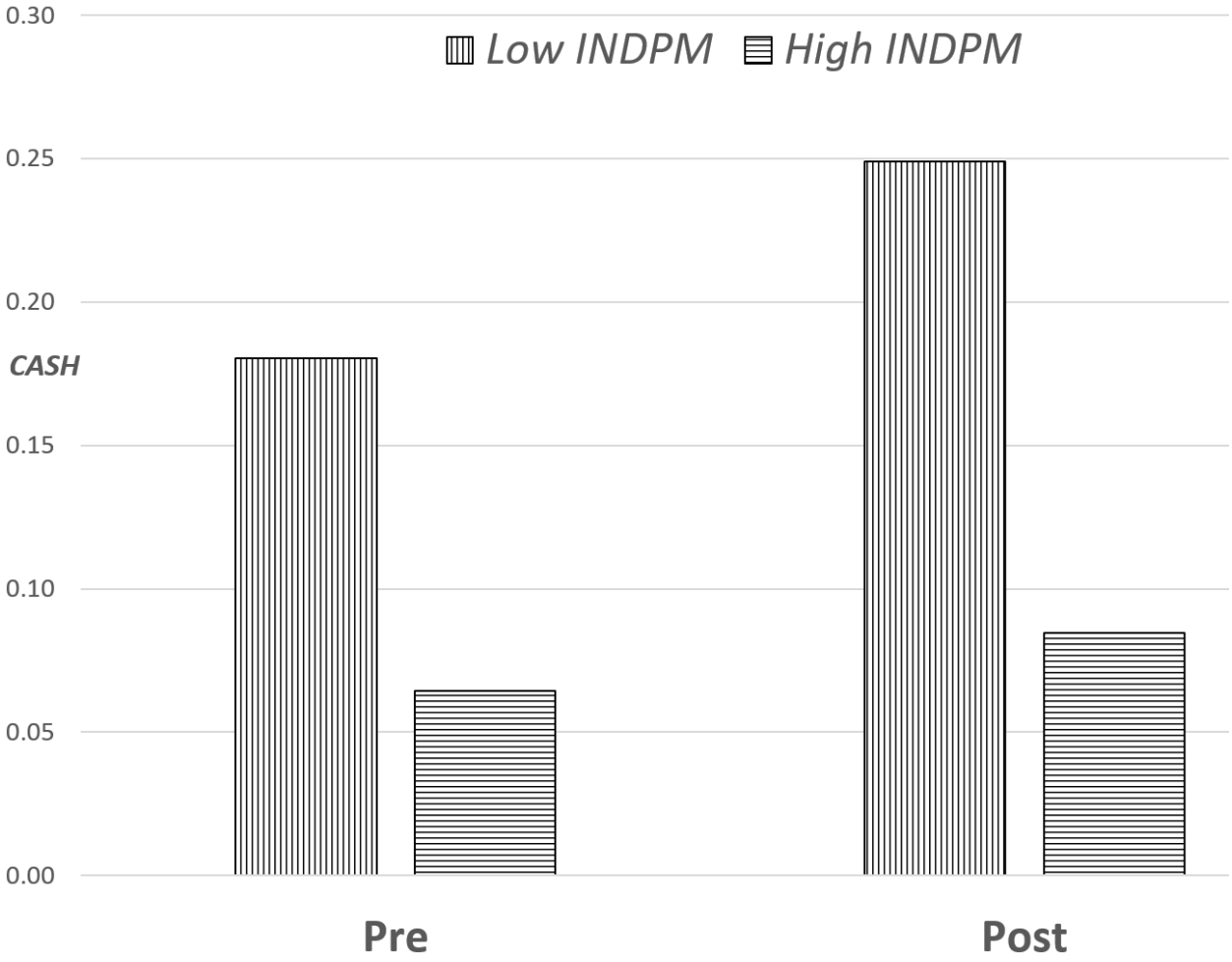
The horizontal axis denotes the pre versus post inversion periods. The vertical axis plots the average tax rate (*TAX*) corresponding to each period separately for firms in competitive (Low *INDPM*) and concentrated (High *INDPM*) industries.

Panel A: Tax



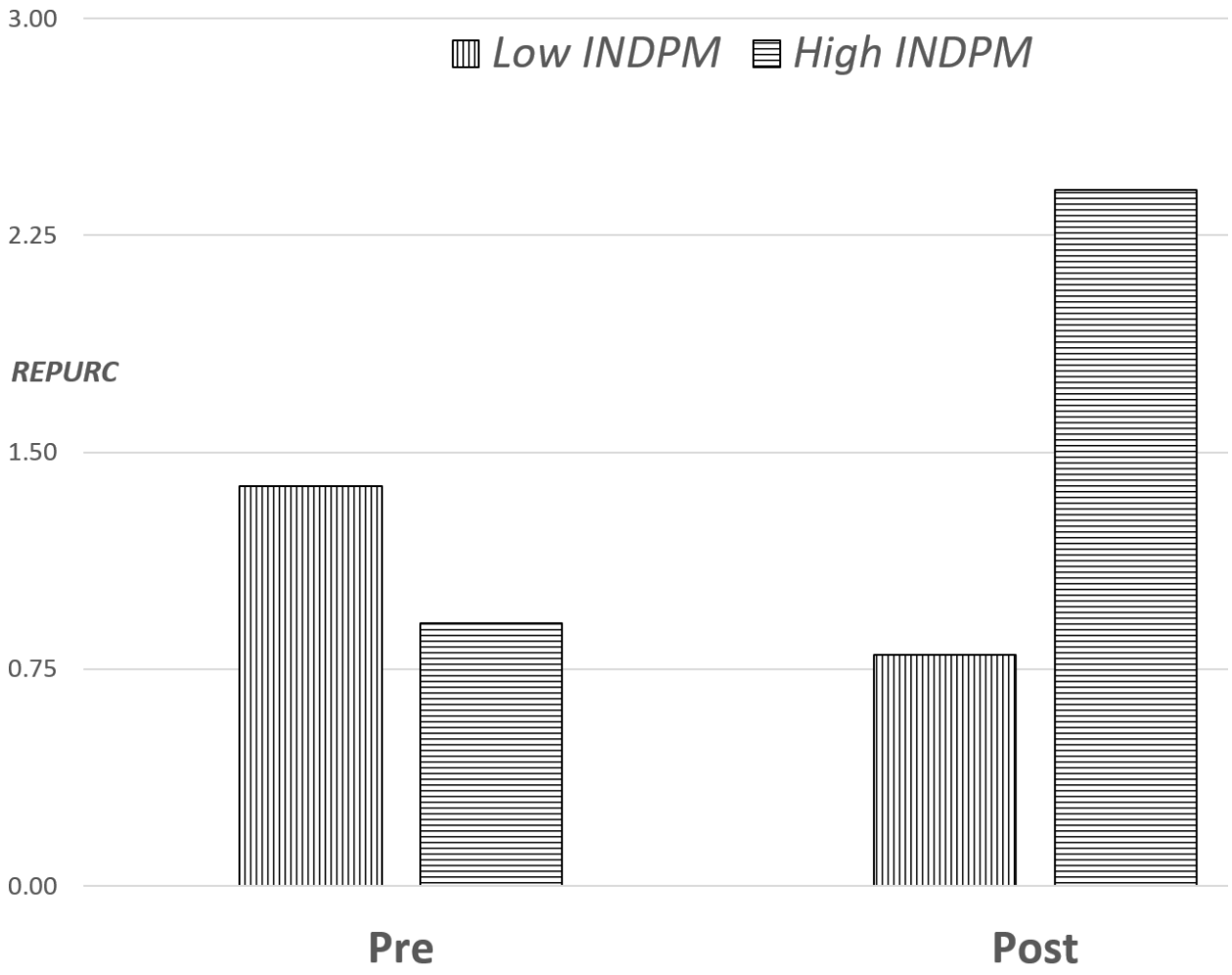
Panel B: Cash

The horizontal axis denotes the pre versus post inversion periods. The vertical axis plots the average cash balance (*CASH*) corresponding to each period separately for firms in competitive (Low *INDPM*) and concentrated (High *INDPM*) industries.



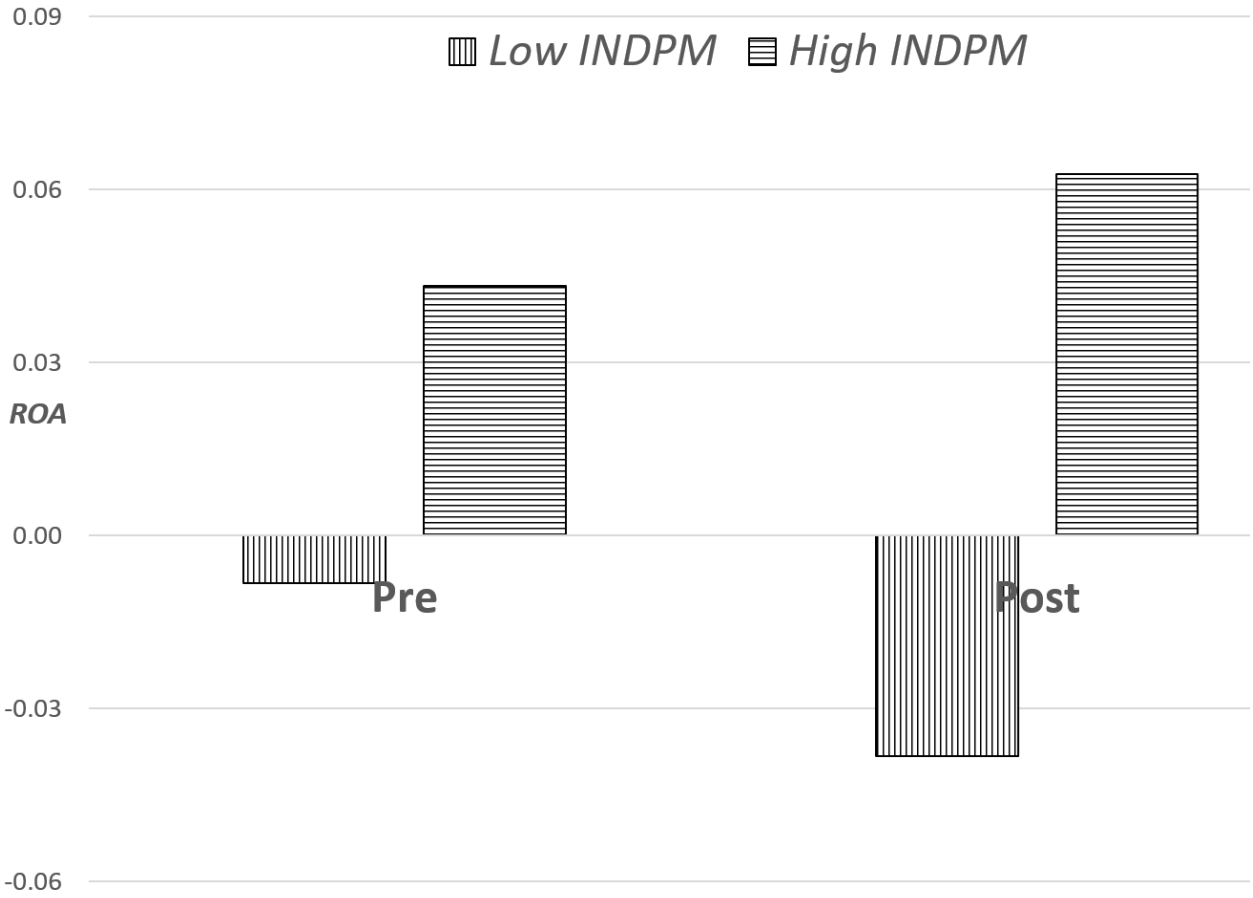
Panel C: Repurchases

The horizontal axis denotes the pre versus post inversion periods. The vertical axis plots the average stock repurchases (*REPURC*) corresponding to each period separately for firms in competitive (Low *INDPM*) and concentrated (High *INDPM*) industries.



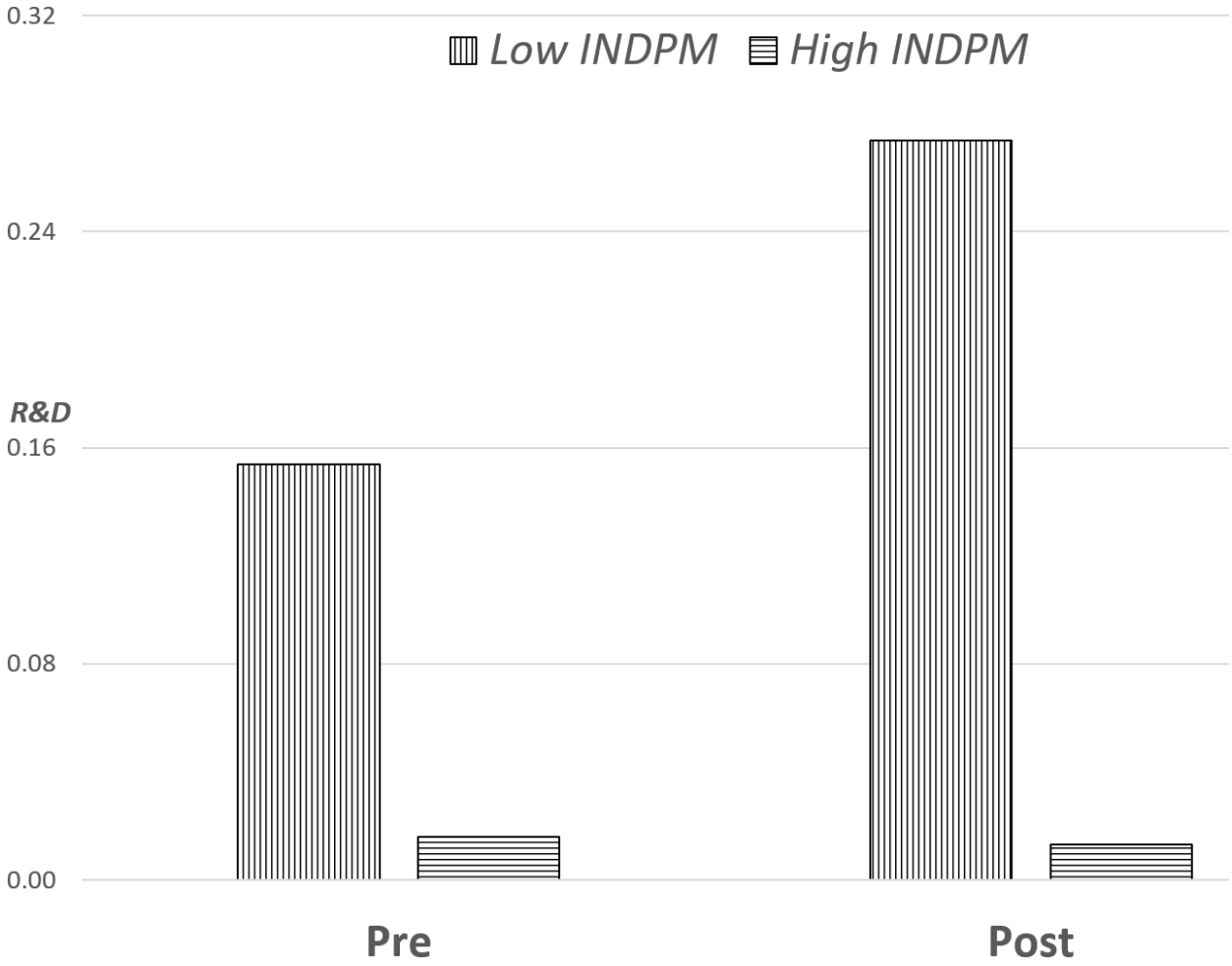
Panel D: ROA

The horizontal axis denotes the pre versus post inversion periods. The vertical axis plots the average return on assets (*ROA*) corresponding to each period separately for firms in competitive (Low *INDPM*) and concentrated (High *INDPM*) industries.



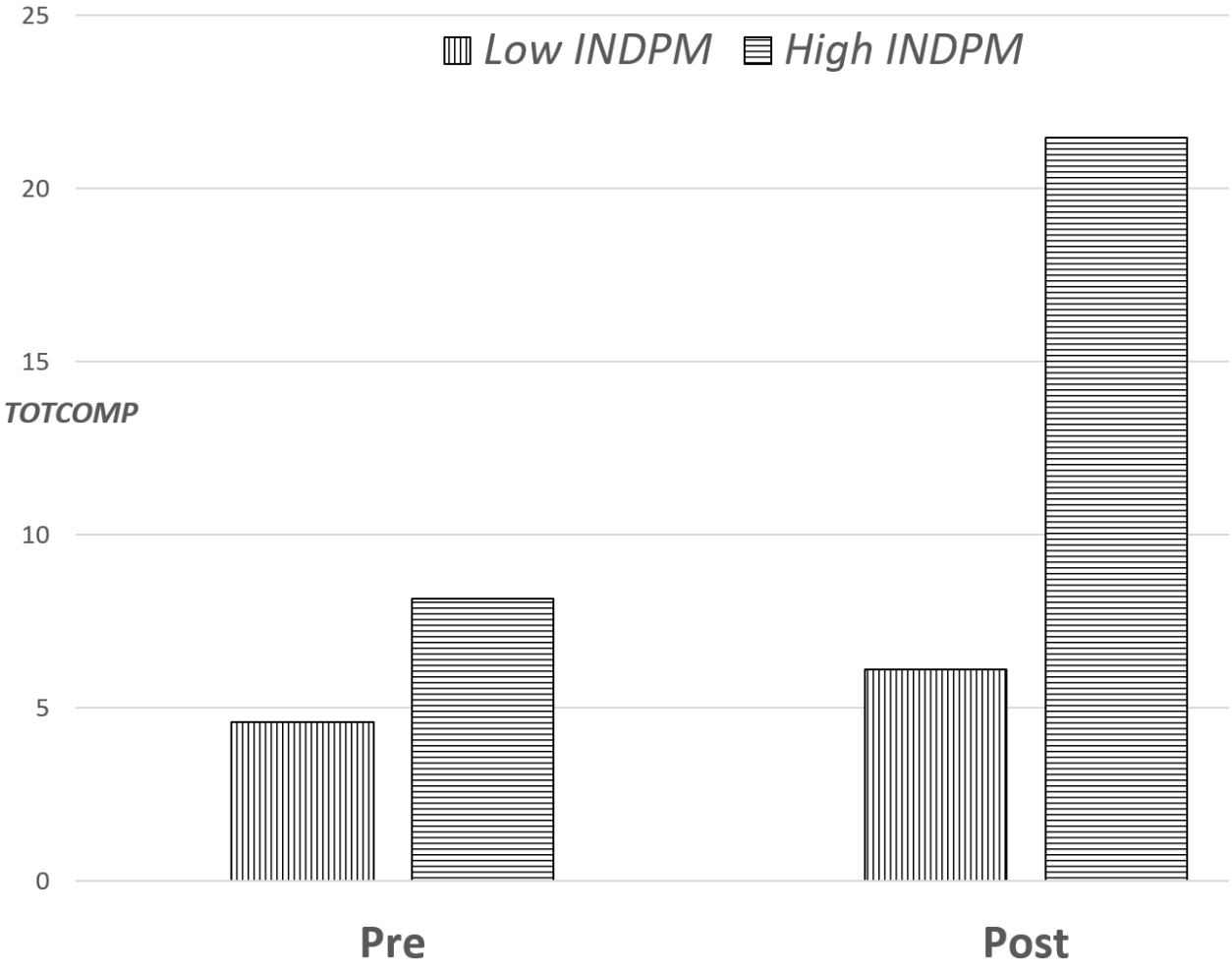
Panel E: R&D

The horizontal axis denotes the pre versus post inversion periods. The vertical axis plots the average research and development expenditures (*R&D*) corresponding to each period separately for firms in competitive (Low *INDPM*) and concentrated (High *INDPM*) industries.



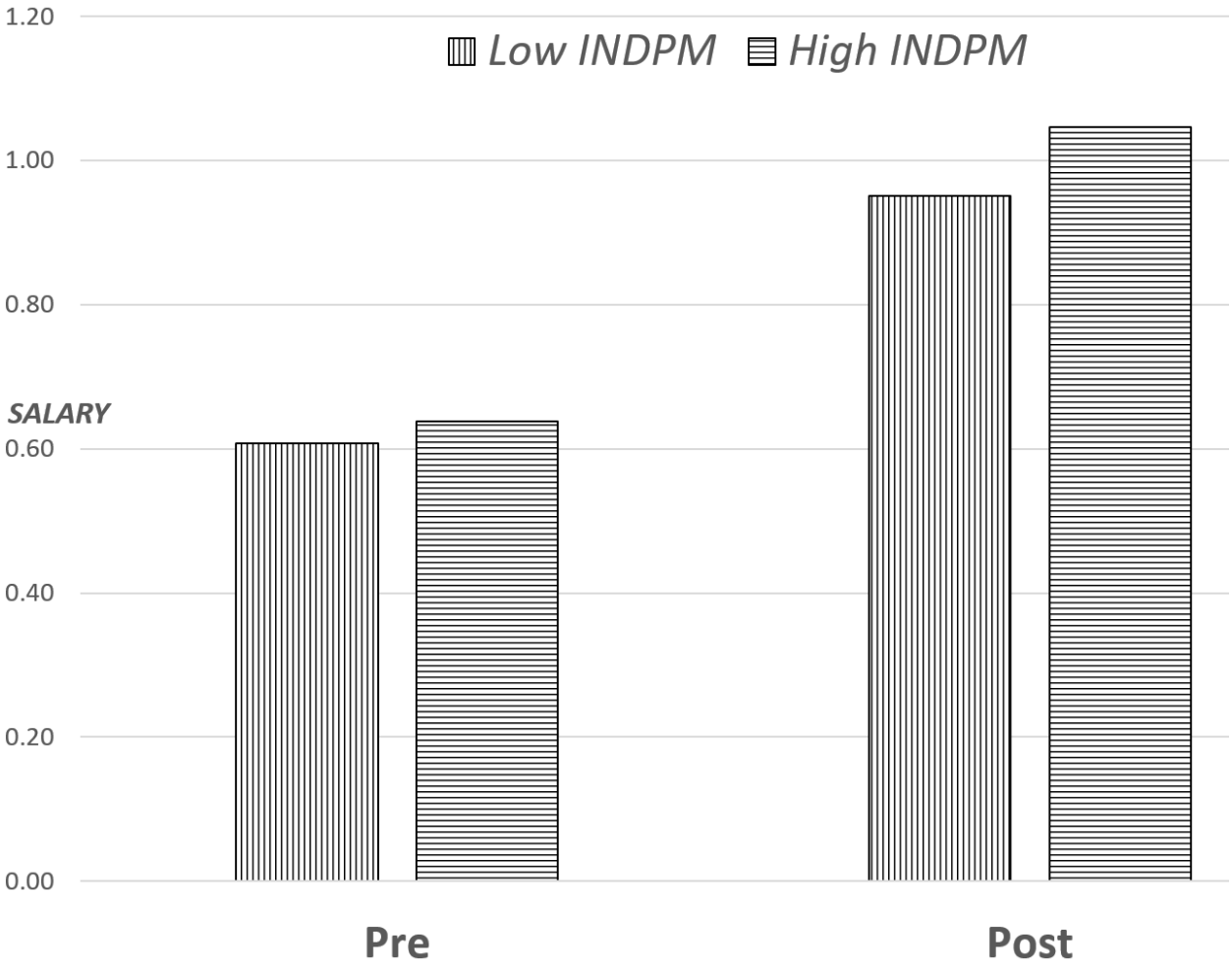
Panel F: CEO total compensation

The horizontal axis denotes the pre versus post inversion periods. The vertical axis plots the average annual CEO compensation in $ millions (*TOTCOMP*) corresponding to each period separately for firms in competitive (Low *INDPM*) and concentrated (High *INDPM*) industries.



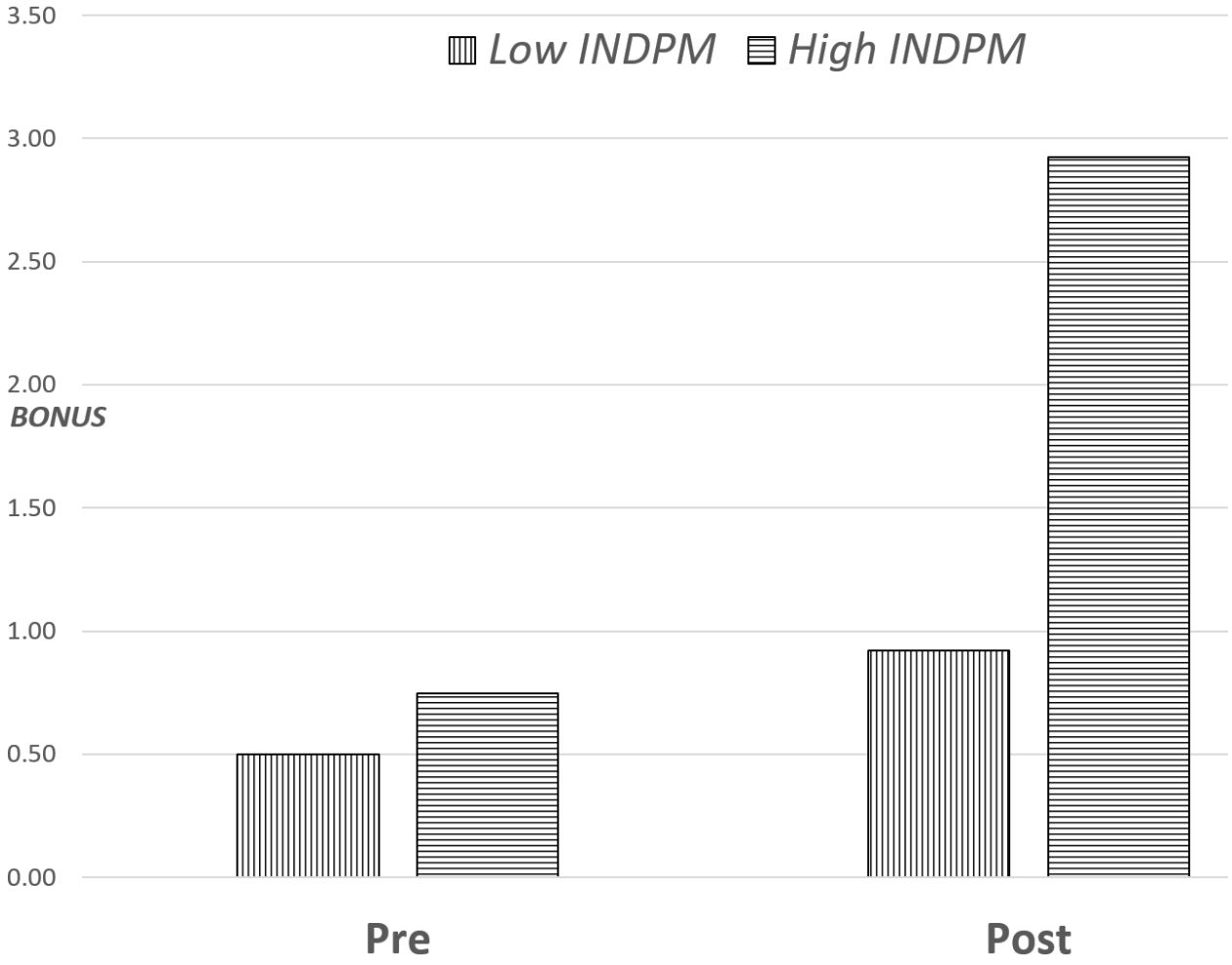
Panel G: Salary

The horizontal axis denotes the pre versus post inversion periods. The vertical axis plots the average annual CEO salary in $ millions (*SALARY*) corresponding to each period separately for firms in competitive (Low *INDPM*) and concentrated (High *INDPM*) industries.



Panel H: Bonus

The horizontal axis denotes the pre versus post inversion periods. The vertical axis plots the average annual CEO bonus compensation in $ millions (*BONUS*) corresponding to each period separately for firms in competitive (Low *INDPM*) and concentrated (High *INDPM*) industries.



Panel I: Stock

The horizontal axis denotes the pre versus post inversion periods. The vertical axis plots the average annual CEO stock-based compensation in $ millions (*STOCK*) corresponding to each period separately for firms in competitive (Low *INDPM*) and concentrated (High *INDPM*) industries.

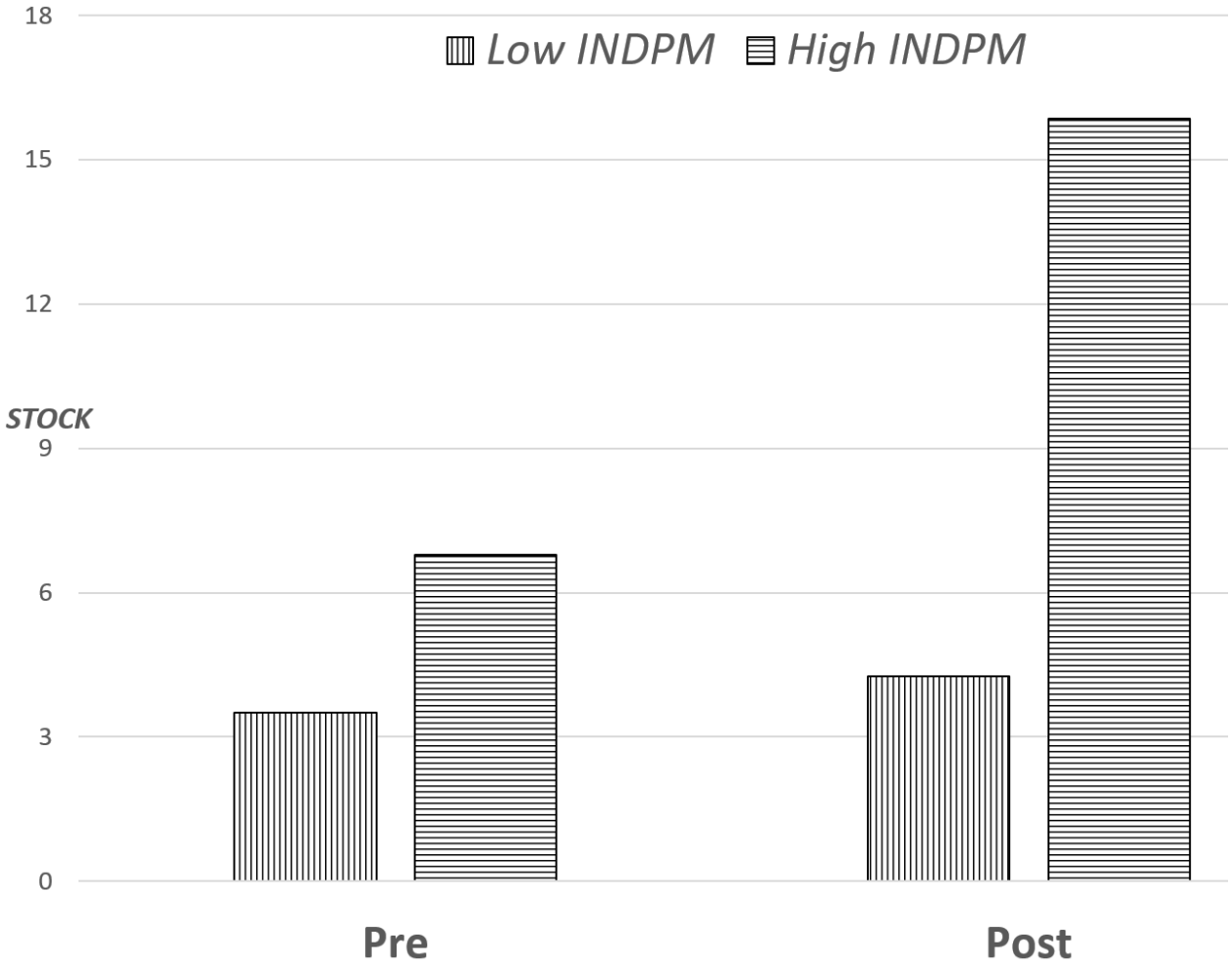


Table 1
Corporate inversions and inversion announcement dates
between 1990 and 2014 (excluding 2009-2010)
Source: Desai and Hines (2002), Rao (2016)

Name	Date	Name	Date
Flextronics	31-May-90	Freescale Semiconductor	15-Sep-06
Helen Of Troy	30-Dec-93	Alkermes	09-May-11
Triton Energy	08-Feb-96	Jazz Pharmaceuticals	19-May-11
Tyco Intl	17-Mar-97	Aon	13-Jan-12
Fruit Of The Loom	11-Feb-98	Rowan Companies	28-Feb-12
Xoma	24-Nov-98	Pentair	28-Mar-12
Transocean Offshore	15-Mar-99	Stratasys	16-Apr-12
P X R E	07-Jul-99	Tower	30-Jul-12
Everest Reinsurance	17-Sep-99	Liberty Global	05-Feb-13
White Mountains Ins	23-Sep-99	Theravance	25-Apr-13
Trenwick	19-Dec-99	Actavis	20-May-13
Risk Capital	18-Jan-00	Perrigo Co	29-Jul-13
Seagate Technology	26-Jan-00	Applied Materials	24-Sep-13
Foster Wheeler	29-Nov-00	Endo Health Solutions	05-Nov-13
Cooper Industries	11-Jun-01	Horizon Pharma	19-Mar-14
Global Marine	04-Sep-01	Medtronic	15-Jun-14
Ingersoll Rand Co	16-Oct-01	C & J Energy Services	25-Jun-14
Nabors Industries	02-Jan-02	Mylan	14-Jul-14
Noble Drilling	31-Jan-02	Burger King Worldwide	26-Aug-14
Stanley Works	08-Feb-02	Steris	13-Oct-14
Weatherford Intl New	05-Apr-02	Wright Medical	27-Oct-14
Herbalife International	10-Apr-02		

Table 2
Descriptive statistics

This panel comprises data for 273 firm-year observations over the period 1983 to 2007 for 19 corporate inversions between 1990 and 2002. Data for each event are selected for the 10 years before and after the year of inversion. Observations after 2007 are excluded to mitigate any confounding effect of the Great Recession. *TAX* denotes total income taxes (data item TXT) scaled by lagged total assets (data item AT). *ROA* is defined as net income (data item NI) scaled by lagged total assets. *R&D* denotes research and development expenditures (data item XRD) scaled by lagged total assets. *CAPEX* denotes capital expenditures (data item CAPX) scaled by lagged total assets. *CASH* denotes cash and short-term investments (data item CHE) scaled by lagged total assets. *DPS* denotes dividends per share ex-date (data item DVPSX_F). *REPURC* denotes stock repurchases defined either as the annual change in treasury stock (data item TSTK) where available, or purchase of common and preferred stock (data item PRSTKC). These values have been multiplied by 100 and are thus expressed as a percentage of lagged total assets. *SIZE* denotes (the log of) firm size, defined as lagged total assets. *INDPM* is the (inverse) measure of product market competition and is defined as of the year prior to inversion as the industry-level median profit margin (defined as sales (data item SALE) minus cost of goods sold (data item COGS) scaled by COGS. Industry is defined at the 3-digit SIC code level. TNIC is an alternative measure of competition and is defined as the number of product market peers competing with the focal firm and is obtained from the sources in Hoberg and Phillips (2016). *TOTCOMP* denotes (the log of) annual CEO compensation (data item TDC1) and is obtained from Execucomp. *SALARY*, *BONUS* and *STOCK* denote (the logs of) annual salary (data item SALARY), annual bonus (data item BONUS and equity-based compensation (defined as TDC1 minus SALARY minus BONUS), respectively.

Panel A: Overall sample

Variable	Obs.	Mean	Median	SD	Min	Max
TAX	273	0.020	0.015	0.022	-0.047	0.080
ROA	273	0.010	0.043	0.154	-0.714	0.263
R&D	106	0.095	0.013	0.207	0.002	1.060
CAPEX	254	0.056	0.031	0.073	0.000	0.359
CASH	273	0.154	0.074	0.231	0.003	1.281
DPS	273	0.458	0.099	1.032	0.000	8.000
REPURC (%)	273	1.310	0.018	2.982	0.000	17.562
SIZE	273	7.038	7.086	1.766	2.245	11.386
INDPM	273	0.398	0.434	0.258	0.038	1.226
TNIC	217	205.922	49.000	241.841	5.000	712.000
TOTCOMP	161	1.827	1.751	1.008	0.470	4.902
SALARY	163	0.563	0.587	0.173	0.259	0.975
BONUS	163	0.570	0.495	0.566	0.000	3.136
STOCK	161	1.460	1.315	1.113	0.009	4.715

Panel B: Pre-Post by Low and High *INDPM* (based on the within-sample median)

	Low *INDPM*			High *INDPM*			Diff-in-diff
Variable	**Pre**	**Post**	**Diff**	**Pre**	**Post**	**Diff**	
TAX	0.017	0.009	-0.008**	0.032	0.020	-0.012***	-0.004
ROA	-0.008	-0.049	-0.041	0.043	0.064	0.021	0.062*
R&D	0.154	0.326	0.172*	0.016	0.012	-0.004	-0.176*
CAPEX	0.032	0.028	-0.004	0.100	0.061	-0.039**	-0.035**
CASH	0.180	0.277	0.097**	0.064	0.090	0.026**	-0.071
DPS	0.289	0.563	0.274	0.463	0.590	0.127	-0.147
REPURC (%)	1.451	0.473	-0.978**	0.931	2.755	1.824***	2.802***
SIZE	5.834	6.654	0.820***	7.373	8.976	1.603***	0.783**
TOTCOMP	1.354	1.527	0.173	1.611	2.617	1.006***	0.833***
SALARY	0.468	0.607	0.139***	0.482	0.688	0.206***	0.067
BONUS	0.336	0.463	0.127	0.512	0.877	0.365***	0.238
STOCK	1.003	1.139	0.136	1.240	2.260	1.020***	0.884***

Table 3
Effect of corporate inversions on firm tax rates

The dependent variable is the tax rate. Models (1) and (2) are based on splitting industries into high and low competition based on the median *INDPM*, where Low (High) *INDPM* denotes competitive (concentrated) industries. *POST* is an indicator variable that takes 1 for the post-inversion period and 0 for the pre. Models (3) and (4) use the continuous values of *INDPM*. The first specification in each set uses the event-window of 5 years before and 5 years after the year of inversion ([-5, 5]) while the second specification employs a 10-year event-window ([-10, 10]). All regressions include robust standard errors clustered by firm, and presented under the coefficients in parentheses. (***), (**), and (*) denotes significance at the 1%, 5% and 10% levels respectively. Table 2 presents detailed variable definitions.

Dep. variable	*TAX*			
	Using High/Low *INDPM*		Using continuous *INDPM*	
	[-5, 5]	[-10, 10]	[-5, 5]	[-10, 10]
	(1)	(2)	(3)	(4)
INDPM	0.018	0.015	0.007	0.012
	[0.008]**	[0.006]**	[0.027]	[0.022]
POST	-0.009	-0.008	-0.018	-0.014
	[0.004]**	[0.004]*	[0.008]**	[0.006]**
*POST*INDPM*	-0.005	-0.005	0.017	0.012
	[0.008]	[0.006]	[0.016]	[0.013]
Adj. R^2	0.17	0.16	0.09	0.14
Obs.	172	273	172	273
Fixed effects	None	None	None	None
Clustering	Firm	Firm	Firm	Firm

Table 4
Effect of corporate inversions on other outcomes

Panel A: Cash retention and payouts

The dependent variable in each regression is noted in the row entitled "Dep. variable". All results are based on the continuous measure of *INDPM*. *POST* is an indicator variable that takes 1 for the post-inversion period and 0 for the pre. The first specification in each set uses the event-window of 5 years before and 5 years after the year of inversion ([-5, 5]) while the second specification employs a 10-year event-window ([-10, 10]). All regressions include robust standard errors clustered by firm, and presented under the coefficients in parentheses. (***), (**), and (*) denotes significance at the 1%, 5% and 10% levels respectively. Table 2 presents detailed variable definitions.

Dep. variable	*CASH*		*DPS*		*REPURC*	
	[-5, 5]	[-10, 10]	[-5, 5]	[-10, 10]	[-5, 5]	[-10, 10]
	(1)	(2)	(3)	(4)	(5)	(6)
INDPM	-0.191	-0.256	-0.230	-0.048	-0.645	-0.995
	[0.206]	[0.243]	[0.296]	[0.329]	[1.288]	[1.100]
POST	0.163	0.137	-0.235	0.291	-1.473	-1.301
	[0.047]***	[0.032]***	[0.157]	[0.506]	[0.692]**	[0.962]
*POST*INDPM*	-0.240	-0.212	0.420	-0.251	2.905	4.125
	[0.095]**	[0.063]***	[0.287]	[0.768]	[1.345]**	[2.235]*
Adj. R^2	0.16	0.17	0.02	0.01	0.02	0.03
Obs.	172	273	172	273	172	273
Fixed effects	None	None	None	None	None	None
Clustering	Firm	Firm	Firm	Firm	Firm	Firm

Panel B: Ruling out growth opportunities as the mechanism

Correlations:

INDPM is the (inverse) measure of product market competition and is defined as of the year prior to inversion as the industry-level median profit margin *INDSGR* denotes median industry sales growth as of the year prior to inversion. *INDANAL* denotes mean analyst following defined at the industry-level and estimated as of the year prior to inversion.

	INDPM	*INDSGR*	*INDANAL*
INDPM	1.000		
INDSGR	0.100*	1.000	
INDANAL	-0.327***	0.367***	1.000

Multivariate evidence:

The dependent variable in each regression is noted in the row entitled "Dep. variable". All tabulated results are based on the [-10, 10] window and using the continuous measure of *INDPM*. *POST* is an indicator variable that takes 1 for the post-inversion period and 0 for the pre. *INDSGR* denotes median industry sales growth as of the year prior to inversion. *INDANAL* denotes mean analyst following at the industry-level defined as of the year prior to inversion. All regressions include robust standard errors clustered by firm, and presented under the coefficients in parentheses. (***), (**), and (*) denotes significance at the 1%, 5% and 10% levels respectively. Table 2 presents detailed variable definitions.

Dep. variable	*CASH*		*DPS*		*REPURC*	
	[-10, 10]	[-10, 10]	[-10, 10]	[-10, 10]	[-10, 10]	[-10, 10]
	(1)	(2)	(3)	(4)	(5)	(6)
INDPM	-0.297	-0.335	-0.040	-0.154	-0.853	-0.394
	[0.277]	[0.314]	[0.365]	[0.351]	[1.168]	[1.037]
POST	0.156	0.200	0.114	-1.524	-1.837	0.734
	[0.045]***	[0.060]***	[0.615]	[0.990]	[0.942]*	[1.082]
*POST*INDPM*	-0.224	-0.255	0.354	1.082	3.884	2.823
	[0.053]***	[0.053]***	[0.946]	[1.088]	[1.771]**	[1.231]**
INDSGR	0.331	0.672	-1.806	-0.780	-1.504	-5.618
	[0.253]	[0.601]	[0.560]***	[1.107]	[1.834]	[4.642]
*POST*INDSGR*	-0.200	-0.143	3.585	-0.959	8.245	15.808
	[0.201]	[0.243]	[4.890]	[4.364]	[3.268]**	[5.202]***
INDANAL		-0.035		-0.107		0.428
		[0.045]		[0.099]		[0.389]
*POST*INDANAL*		-0.010		0.506		-0.820
		[0.016]		[0.297]		[0.412]*
Adj. R^2	0.20	0.24	0.01	0.02	0.04	0.06
Obs.	273	273	273	273	273	273
Fixed effects	None	None	None	None	None	None
Clustering	Firm	Firm	Firm	Firm	Firm	Firm

Panel C: Profitability and Investing

The dependent variable in each regression is noted in the row entitled "Dep. variable". All results are based on the continuous measure of *INDPM*. *POST* is an indicator variable that takes 1 for the post-inversion period and 0 for the pre. The first specification in each set uses the event-window of 5 years before and 5 years after the year of inversion ([-5, 5]) while the second specification employs a 10-year event-window ([-10, 10]). All regressions include robust standard errors clustered by firm, and presented under the coefficients in parentheses. (***), (**), and (*) denotes significance at the 1%, 5% and 10% levels respectively. Table 2 presents detailed variable definitions.

Dep. variable	*ROA*		*R&D*		*CAPEX*	
	[-5, 5]	[-10, 10]	[-5, 5]	[-10, 10]	[-5, 5]	[-10, 10]
	(1)	(2)	(3)	(4)	(5)	(6)
INDPM	0.074	0.055	-0.365	-0.214	0.144	0.151
	[0.167]	[0.157]	[0.259]	[0.168]	[0.044]***	[0.026]***
POST	-0.086	-0.106	0.336	0.358	0.010	0.017
	[0.047]*	[0.049]**	[0.106]**	[0.049]***	[0.023]	[0.024]
*POST*INDPM*	0.179	0.251	-0.722	-0.801	-0.056	-0.085
	[0.091]*	[0.111]**	[0.260]**	[0.163]***	[0.061]	[0.058]
Adj. R^2	0.09	0.10	0.49	0.51	0.12	0.18
Obs.	172	273	62	106	157	254
Fixed effects	None	None	None	None	None	None
Clustering	Firm	Firm	Firm	Firm	Firm	Firm

Panel D: Ruling out financing constraints

The dependent variable in each regression is noted in the row entitled "Dep. variable". All tabulated results are based on the [-10, 10] window and using the continuous measure of *INDPM*. *POST* is an indicator variable that takes 1 for the post-inversion period and 0 for the pre. *INDSGR* denotes median industry sales growth as of the year prior to inversion. *INDANAL* denotes mean analyst following at the industry-level defined as of the year prior to inversion. All regressions include robust standard errors clustered by firm, and presented under the coefficients in parentheses. (***), (**), and (*) denotes significance at the 1%, 5% and 10% levels respectively. Table 2 presents detailed variable definitions.

Dep. variable	*R&D*		*CAPEX*	
	[-10, 10]	[-10, 10]	[-10, 10]	[-10, 10]
	(1)	(2)	(3)	(4)
INDPM	-0.174	-0.159	0.141	0.152
	[0.114]	[0.089]	[0.032]***	[0.032]***
POST	0.280	0.472	0.023	0.058
	[0.116]**	[0.200]**	[0.014]	[0.026]**
*POST*INDPM*	-0.637	-0.723	-0.139	-0.158
	[0.161]***	[0.204]***	[0.039]***	[0.039]***
INDSGR	1.150	1.070	0.365	0.288
	[0.493]*	[0.434]**	[0.066]***	[0.089]***
*POST*INDSGR*	-0.013	0.035	0.106	0.214
	[0.878]	[0.960]	[0.073]	[0.080]**
INDANAL		0.041		0.008
		[0.038]		[0.007]
*POST*INDANAL*		-0.074		-0.011
		[0.036]*		[0.006]*
Adj. R^2	0.63	0.65	0.45	0.46
Obs.	106	106	254	254
Fixed effects	None	None	None	None
Clustering	Firm	Firm	Firm	Firm

Panel E: CEO compensation

The dependent variable in each regression is noted in the row entitled "Dep. variable". All results are based on the continuous measure of *INDPM*. *POST* is an indicator variable that takes 1 for the post-inversion period and 0 for the pre. The first specification in each set uses the event-window of 5 years before and 5 years after the year of inversion ([-5, 5]) while the second specification employs a 10-year event-window ([-10, 10]). All regressions include robust standard errors clustered by firm, and presented under the coefficients in parentheses. (***), (**), and (*) denotes significance at the 1%, 5% and 10% levels respectively. Table 2 presents detailed variable definitions.

Dep. variable	*TOTCOMP*		*SALARY*		*BONUS*		*STOCK*	
	[-5, 5]	[-10, 10]	[-5, 5]	[-10, 10]	[-5, 5]	[-10, 10]	[-5, 5]	[-10, 10]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
INDPM	2.696	1.502	0.285	0.170	1.214	0.825	2.746	1.447
	[0.749]***	[0.676]**	[0.146]*	[0.120]	[0.216]***	[0.245]***	[0.874]***	[0.767]*
POST	0.269	0.083	0.139	0.105	0.304	0.167	0.209	0.043
	[0.276]	[0.294]	[0.084]	[0.083]	[0.277]	[0.220]	[0.252]	[0.289]
*POST*INDPM*	0.546	1.693	0.000	0.218	0.043	0.333	0.544	1.778
	[1.085]	[0.846]*	[0.201]	[0.215]	[0.725]	[0.533]	[1.210]	[0.932]*
Adj. R^2	0.29	0.28	0.29	0.51	0.20	0.18	0.23	0.18
Obs.	117	161	119	106	119	254	117	254
Fixed effects	None	None	None	None	None	None	None	None
Clustering	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Table 5
Additional sensitivity tests

Panel A: Alternative measure of product market competition

The dependent variable in each regression is noted in the row entitled "Dep. variable". All results are based on defining product market competition based on the number of firms that are in the same product market space as the focal firm (*TNIC*), and is based on the Text-based Network Industry Classification scheme of Hoberg and Phillips (2015). *POST* is an indicator variable that takes 1 for the post-inversion period and 0 for the pre. The first specification in each set uses the event-window of 5 years before and 5 years after the year of inversion ([-5, 5]) while the second specification employs a 10-year event-window ([-10, 10]). All regressions include robust standard errors clustered by firm, and presented under the coefficients in parentheses. (***), (**), and (*) denotes significance at the 1%, 5% and 10% levels respectively. Table 2 presents detailed variable definitions.

Dep. variable	*TAX*	*CASH*	*REPURC*	*R&D*	*TOTCOMP*
	[-5, 5]	[-5, 5]	[-5, 5]	[-5, 5]	[-5, 5]
	(1)	(2)	(3)	(4)	(5)
TNIC	-0.004	0.014	0.036	0.154	-0.220
	[0.001]***	[0.012]	[0.191]	[0.010]***	[0.068]***
POST	-0.016	0.025	0.126	-0.017	0.224
	[0.005]***	[0.018]	[0.595]	[0.017]	[0.208]
*POST*TNIC*	0.001	0.025	-0.379	0.123	0.056
	[0.001]	[0.009]**	[0.170]**	[0.008]***	[0.054]
Adj. R^2	0.27	0.11	0.05	0.81	0.18
Obs.	140	140	140	51	108
Fixed effects	None	None	None	None	None
Clustering	Firm	Firm	Firm	Firm	Firm

Panel B: Fixed effects specifications and alternative clustering

The dependent variable in each regression is noted in the row entitled "Dep. variable". All results are based on the [-5, 5] event-window and use the continuous measure of *INDPM*. *POST* is an indicator variable that takes 1 for the post-inversion period and 0 for the pre. The first specification in each set clusters the standard errors by firm while the second specification clusters them by industry. These standard errors are presented under the coefficients in parentheses All regressions include firm fixed effects. (***), (**), and (*) denotes significance at the 1%, 5% and 10% levels respectively. Table 2 presents detailed variable definitions.

Dep. variable	*TAX*		*CASH*		*REPURC*		*R&D*	
	[-5, 5]	[-5, 5]	[-5, 5]	[-5, 5]	[-5, 5]	[-5, 5]	[-5, 5]	[-5, 5]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
POST	-0.015	-0.015	0.134	0.134	-1.264	-1.264	0.249	0.249
	[0.009]*	[0.007]*	[0.040]***	[0.033]***	[0.746]	[0.631]*	[0.120]*	[0.119]*
*POST*INDPM*	0.008	0.008	-0.169	-0.169	2.307	2.307	-0.518	-0.518
	[0.020]	[0.018]	[0.071]**	[0.060]**	[1.345]	[1.221]*	[0.240]*	[0.238]*
Adj. R^2	0.30	0.30	0.63	0.30	0.06	0.06	0.79	0.79
Obs.	172	172	172	172	172	172	62	62
Fixed effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Clustering	Firm	Industry	Firm	Industry	Firm	Industry	Firm	Industry

Panel C: Dynamic measure of competition

The dependent variable in each regression is noted in the row entitled "Dep. variable". All results use the [-5, 5] event window and are based on *INDPM* but measured dynamically as of the start of each year rather than statically as of the year prior to inversion. *POST* is an indicator variable that takes 1 for the post-inversion period and 0 for the pre. All regressions include robust standard errors clustered by firm, and presented under the coefficients in parentheses. (***), (**), and (*) denotes significance at the 1%, 5% and 10% levels respectively. Table 2 presents detailed variable definitions.

Dep. variable	*TAX*	*CASH*	*REPURC*	*R&D*	*TOTCOMP*
	[-5, 5]	[-5, 5]	[-5, 5]	[-5, 5]	[-5, 5]
	(1)	(2)	(3)	(5)	(6)
INDPM	0.000	-0.130	0.015	-0.268	2.669
	[0.019]	[0.150]	[1.228]	[0.250]	[0.694]***
POST	-0.019	0.121	-1.011	0.305	0.906
	[0.006]***	[0.035]***	[0.490]*	[0.186]	[0.483]*
*POST*INDPM*	0.020	-0.135	1.792	-0.660	-1.139
	[0.011]*	[0.060]**	[0.754]**	[0.417]	[0.858]
Adj. R^2	0.09	0.10	0.02	0.32	0.18
Obs.	172	172	172	62	117
Fixed effects	None	None	None	None	None
Clustering	Firm	Firm	Firm	Firm	Firm

Panel D: Using taxes paid

The dependent variable is the ratio of taxes paid to pre-tax income, estimated using a rolling window of 3 years. All results are based on the [-5, 5] event-window and use the continuous measure of *INDPM*. *POST* is an indicator variable that takes 1 for the post-inversion period and 0 for the pre. The first specification does not include any fixed effects, while the second (third) includes industry (firm) fixed effects. Robust standard errors clustered by firm are presented under the coefficients in parentheses. (***), (**), and (*) denotes significance at the 1%, 5% and 10% levels respectively. Table 2 presents detailed variable definitions.

Dep. variable	*ETR*	*ETR*	*ETR*
	[-5, 5]	[-5, 5]	[-5, 5]
	(1)	(2)	(3)
INDPM	-0.390	-1.103	–
	[0.160]**	[0.661]	
POST	-0.247	-0.203	-0.190
	[0.092]**	[0.074]**	[0.081]**
*POST*INDPM*	0.176	0.108	0.080
	[0.157]	[0.123]	[0.119]
Adj. R^2	0.18	0.37	0.37
Obs.	121	121	121
Fixed effects	None	Industry	Firm
Clustering	Firm	Firm	Firm