Competition and Debt Conservatism

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Abstract

Exploiting the staggered changes in national competition laws, we find that competition is conducive to zero leverage, especially for financially constrained firms. Competition increases firms' cash savings from cash flows and does not lead to higher constraints and less payout. In event time, zero leverage is accompanied by increases in cash, payout, and equity issuance, and such increases in cash are partly due to changes in competition. A duration analysis on a subsample where firms deleverage for financial flexibility shows that zero leverage occurs sooner when competition increases. Overall, competition induces firms to use zero leverage to restore financial flexibility.

Keywords**:** Zero Leverage Puzzle; Competition; Competition Law Index; Quiet Life; Financial Constraints; Financial Flexibility.

JEL Classification**:** K21; G32; G38.

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1. Introduction

A well-known puzzle in the finance literature is that firms are on average under-leveraged relative to their optimal debt ratios from traditional capital-structure models, and some even use zero leverage. In the U.S., the proportion of zero-leverage public firms was 13.6% during 1987 to 2009 (Strebulaev and Yang, 2013). Over a similar period, El Ghoul et al. (2018) find that the average proportion of zero-leverage firms across 72 countries (excluding the U.S.) is 12.0%. A substantial portion of firms do not use debt, and such extreme debt conservatism appears to be a global phenomenon.

A growing body of research investigates what drives firms' decisions to use zero leverage. Some of these factors include CEO ownership, family control, board independence (Strebulaev and Yang, 2013), debt capacity (Devos et al., 2012), etc. Another stream of studies focuses on the role of *external environment* in driving firms' zero-leverage policies. For instance, Devos et al. (2012) document that the zero-leverage phenomenon is prevalent in many countries, and is determined by country-level institutions, such as investor and creditor protection. More recently, El Ghoul et al. (2018) document that national cultures, such as conservatism, mastery, and trust, significantly affect firms' decisions to use no debt. Our study extends the evidence on external environment by investigating the role of an important yet unexplored external factor — competition — in firms' zero-leverage policies.

Competition is one of the most important and extensively studied economic forces (see review by Vickers, 1995), which could affect firms' debt conservatism through at least three mechanisms. First, according to agency theory, corporate managers who are risk-averse will seek to minimize financial risk. They are incentivized to eschew debt in order to avoid costly efforts to tap external capital markets, and to avoid the monitoring activities of creditors (Bertrand and

Mullainathan, 2003; Strebulaev and Yang, 2013). That is, firms adopt zero-leverage policies because of managers' personal preferences towards the pursuit of a "quiet life." Competition increases the difficulty of survival, thereby increasing incentives to work harder and perform well, and reducing managers' preferences for a quiet life (Rhoades and Rutz, 1982; Hart, 1983). The agency view therefore predicts that competition reduces managerial preferences for using zero leverage, i.e., it predicts a *negative* relation between competition and zero leverage. We denote this as *the quiet life hypothesis*.

Second, some argue that zero leverage arises because of firms' reluctance or inability to obtain costly debt financing. Due to market frictions, firms face a considerable wedge between the costs of external and internal financing and thus would avoid costly debt financing and decide to use no debt due to financial constraint (Devos et al., 2012; Bessler et al., 2013). Increased competition also reduces firms' pledgeable income and raises their cash-flow risk (Valta, 2012), which in turn leads to more costly external financing and a lowered target leverage according to the traditional trade-off theory (e.g., Xu, 2012). Competition could also exacerbate information-asymmetry problems, as firms facing more competitive pressure would be more discouraged from disclosing private information to other firms (e.g., Verrecchia, 1983; Janssen and Roy, 2015; Huang et al., 2017). Therefore, as competition raises the cost of external financing and makes firms more financially constrained, we should find that competition intensifies firms' debt conservatism, i.e., there should be a *positive* relation between competition and zero leverage. We call this view the *financial-constraint hypothesis*.

Third, another prevalent view about the zero-leverage phenomenon is that firms maintain low or zero leverage to save up or preserve unused debt capacity that can be quickly deployed in future times when investment opportunities arise (Strebulaev and Yang, 2013; DeAngelo et al.,

2017). Under this alternative view, firms are unlevered because of a desire to restore and maintain ample financial flexibility in anticipation of future investment needs. Since competition increases the riskiness and uncertainties of the business environment (Valta, 2012), firms are likely to find that the economic benefits of having ample financial flexibility are higher. As competition becomes more intense, firms with more financial slack perform better and increase their market share, compared with rivals with weaker balance sheets (Frésard, 2010). If this view is correct, we should find that competition encourages firms to increase their financial flexibility and implement conservative debt policies, i.e., there should be a *positive* relation between competition and zero leverage. This view is referred to as the *financial-flexibility hypothesis*.

To test our hypotheses, we compile a large international sample of 25,784 publicly listed firms from 58 countries (including the U.S.) using data from the Compustat Global and North American Fundamental Annual databases. Over the period from 1988 to 2010, approximately 11.7% of our sample represents zero-leverage firms, while it is 14.1% for U.S. firms. The statistics resemble prior studies (e.g., Bessler et al., 2013; Strebulaev and Yang, 2013; El Ghoul et al., 2018) and are consistent with zero leverage being a global phenomenon.

Our identification strategy relies on the plausibly exogenous variation in competition provided by staggered changes in the stringency of competition laws across countries and over time. Competition laws are statutes passed by national governments to regulate competition through provisions prohibiting firms from gaining dominance and/or engaging in market-abusive and/or anticompetitive activities. Recent research by Bradford and Chilton (2018) codes more than 700 competition laws from more than 123 countries over the period 1889-2010, and constructs an aggregate competition law index that gauges the degree of *regulatory risk* firms face when competing in an economy. The competition law index consists of two components capturing the

authority of the regime, and substantive provisions in regulating competition, respectively. A higher value of the index indicates more stringency in competition laws and thus greater competition.

We first examine whether variation of the competition law index is exogenous to firm decisions. If zero-leverage firms lobby their governments for or against competitive laws due to agency problems or a dislike of competition, OLS estimates would be biased due to reverse causality. Our country-level OLS regressions confirm that past zero-leverage policies cannot explain future changes in the competition law index—there is no evidence of reverse causality. Second, we examine whether the stringency of competition laws increases the degree of competition firms face (the inclusion criterion). Our industry-level tests show that increases in the index are followed by reductions in industry sales concentration and increases in the number of competitors in an industry, suggesting that these laws are effective in fostering competition.

Our baseline regressions reveal that the competition law index has a positive and significant effect on firms' propensity to use zero leverage, controlling for a wide array of firm and country characteristics as well as firm and industry-year fixed effects. Specifically, a one-standard-deviation increase in *Competition law index* raises the probability that a firm has a zero-leverage policy by 0.99 percentage points, or by 8.5% relative to the unconditional mean. The positive effect is robust to using alternative measures of zero leverage, industry effects, standard-error adjustments, and alternative samples.

To glean more insights, we estimate alternative change-on-change regressions. First, results from the change-on-change regressions corroborate those from our regressions in levels. Second, as behavioral-economics theories posit that economic agents care more about downside risk/losses than upside gain, we study whether firms respond differently to increases and decreases

in competition. Decomposing the competition law index changes into positive and negative, we find that firms respond to both increases and decreases in competition, and the effect is symmetric. Third, we include leading changes in the index up to two years ahead; none of the leading terms can explain changes in zero-leverage policies, thus offering further evidence against the reverse causality concern.

Since our baseline model is a staggered difference-in-differences (DiD) model with a continuous treatment assignment variable (Atanasov and Black, 2016), a potential concern is that our staggered DiD estimates may be biased if some control groups used in one year are treated in other year(s), i.e., heterogeneity in treatment effect across groups and time periods (Goodman-Bacon, 2021; Baker et al., 2022). Following Gormley and Matsa (2011), we adopt the "stacked" approach and construct a panel of "stacked cohorts." Each cohort is a subsample of all treated and "clean" control firms (i.e., with no law index changes over the entire window) from the three years before to three years after. In further analysis, we match each treated firm with a "clean" control firm with the closest propensity score. Our results under both the stacked and matching DiD approaches remains robust.

The positive effect of competition on zero leverage rejects the quiet life hypothesis but can be explained by either the financial-constraint hypothesis, the financial-flexibility hypothesis, or both. We perform a series of additional tests to examine the three economic mechanisms.

We begin by examining heterogeneity in the effect of competition on zero leverage and conjecture that the positive effect of competition is stronger among firms that are more financially constrained. If limited access to financing drives our results, when competition increases, more constrained firms should face greater difficulty in obtaining external debt and be more likely to adopt zero-debt policies. Similarly, if financial flexibility is the true mechanism, more constrained

firms should see a greater need to preserve financial flexibility using zero debt and cash piling. Using non-dividend paying status and the Whited and Wu (2006) index as proxies of finance constraints, our tests show that the positive effect of competition on zero leverage is more pronounced, and only statistically significant, among firms that are more constrained. Results from our heterogeneity tests support the two hypotheses in question.

Another prediction of both the financial-constraint hypothesis and the financial-flexibility hypothesis is that competition raises firms' need and desire to accumulate cash. Thus, if competition makes firms more constrained, we should find that competition increases firms' propensity to save cash out of cash flows. Likewise, firms that deleverage to restore financial flexibility are typically accompanied by decisions to increase cash holdings, because more unused debt capacity and cash holdings are imperfect substitutes (DeAngelo et al., 2017). Thus, competition should induce firms to save more cash from cash flows. Following Almeida et al. (2004), we find that the competition law index significantly increases the sensitivity of cash to internal cash flows, thereby lending further support to both hypotheses.

Our mechanism tests so far have presented evidence supportive of both the financial-constraint hypothesis and the financial-flexibility hypothesis. We next conduct several additional tests that seek to distinguish between the two. In the first test, we directly examine whether competition raises the extent of financial constraints faced by firms. Our estimation shows an insignificant effect of the competition law index on the Whited and Wu (2006) index of financial constraints, thus offering the first evidence against the financial-constraint hypothesis.

Second, we examine whether and how competition affects firms' payout policies. If the financial-constraint hypothesis is correct, we may find that competition induces firms to reduce payout to their shareholders, especially in terms of share repurchases, which are shown to be an

increasingly prevalent but flexible ways to pay out cash (e.g., Floyd et al., 2015). We document an insignificant effect of competition on share repurchases, which does not support the financial-constraint hypothesis.

Third, we examine whether competition affects firms' access to equity financing, captured by their "equity recycling" activities, i.e., raising cash from the equity market only to pay it out again to shareholders. If competition exacerbates information asymmetry and hinders firms' access to debt, their ability to tap the equity market is likely to be hampered as well. According to Farre-Mensa and Ljungqvist (2015), firms engaging in more equity recycling typically face a more inelastic supply of equity, have a smaller wedge between internal and external costs of equity, and thus are less constrained. If the financial-constraint hypothesis is true, we should find that competition reduces firms' equity-recycling activities. Our tests show an insignificant effect of competition on equity recycling, thus offering little evidence that competition makes firms more constrained.

Fourth, we perform an event analysis on all zero-leverage events in our sample.[1] Our goal is to gain insights on why firms adopt zero-leverage policies, by studying other financial policies of firms around the time they adopt the zero-leverage status. Based on a sample of 691 zero-leverage events from 15 countries, in event time (i.e., year $t - 3$ to year $t + 2$ surrounding the events), we observe that zero leverage is accompanied by gradual but noticeable increases in *abnormal* cash holdings, dividend payout and share repurchases (relative to matched "clean" control firms)—increases in abnormal payout are inconsistent with the financial-constraint

[1] To avoid capturing zero-leverage policies that are short-lived or transient in nature, we adopt a more stringent definition for the zero-leverage events. Specifically, a firm is defined as having a zero-leverage event if its debt-to-asset ratio (*Debt/TA*) is positive in the past consecutive three years (i.e., year $t - 3$, year $t - 2$, and year $t - 1$), but it becomes zero in years t and continue to have a zero leverage in the next two consecutive years (i.e., year $t + 1$ and year $t + 2$).

arguments. In addition, results from multivariate regressions indicate that the abnormal increases in cash, though not in payouts, are partly driven by changes in the competition law index. The absence of a significant, negative effect of changes in competition on abnormal changes in payout is again inconsistent with the financial-constraint hypothesis. The evidence that cash holdings and payouts increase suggests that firms tend to choose zero-leverage status at times when they have surplus cash flow, which facilitates their repayment of debt.

Our final set of tests seeks to document more direct evidence for the financial-flexibility hypothesis. Because the desire to restore flexibility is difficult to measure, we draw on recent evidence by DeAngelo et al. (2017) that after reaching a peak leverage ratio, a large portion of firms deleverage substantially to save up or preserve unused debt capacity for future investment opportunities. We construct a "deleveraging subsample" by retaining 10 years of observations after their historical peak leverage ratio. Among the 1,614 firms that reach zero leverage within the 10 years, it takes on average 3.3 years to reach the trough. From peak to trough, we not only observe a large decrease in average debt-to-assets ratio (by 33.0 percentage points) but also a marked increase in cash holdings (by 8.8 percentage points), and moderate increases in dividend payout, share repurchases, and equity issuance.

In the deleveraging subsample, we estimate duration models to examine the effects of competition on whether firms adopt zero-leverage policies, and how long it takes them to do so. Since in this subsample firms are more likely to be deleveraging for financial-flexibility reasons (DeAngelo et al., 2017), the effect of competition on zero leverage, if any, can be more confidently attributed to firms' desire for flexibility. Our duration analysis shows that more intense competition is associated with a higher likelihood that firms adopt a zero-leverage status. A one-standard-deviation increase in the competition law index implies that the likelihood of zero

leverage is 10.6 percentage points higher. Overall, the evidence from our mechanism tests is most consistent with the financial-flexibility hypothesis.

Our interpretation of the evidence as a whole is as follows. We argue that greater competition makes firms value financial flexibility more, but it does not make them more financially constrained. As a result, when competition increases, some firms repay all their debt to raise and restore their financial flexibility. Constrained firms are more inclined than unconstrained firms to choose zero-leverage status in response to greater competition, which suggests that flexibility has greater value for these firms. Some of the firms that choose to repay their debt do so because they have surplus cash flow at the time, despite appearing to be constrained according to our measures. Our evidence does not necessarily conflict with that of Devos et al. (2012) and Bessler et al. (2013), who argue that zero-debt firms are financially constrained. We study decisions to adopt or abandon zero debt in the context of changes in the competitive environment. Some of the firms that already have zero debt when there is a change in competition could remain unlevered because they are constrained.

Our study contributes to the growing finance literature on whether and why firms use extremely low or no debt. The three main explanations are managerial preference for a quiet life (the quiet life hypothesis), excessive costs of external financing (the financial-constraint hypothesis), and maintenance of financial flexibility (the financial-flexibility hypothesis). Empirical evidence on the explanations remains mixed; most of the research in this line of inquiry relies on cross-sectional variation for identification. For instance, Strebulaev and Yang (2013) find that zero leverage is positively associated with managerial ownership and family control, consistent with the quiet life explanation as well aversion to idiosyncratic risk. Bessler et al. (2013) document global evidence that most no-debt firms have limited access to debt, in line with the

constraint explanation. In our study, we examine within-firm variation in zero leverage, documenting that competition is a significant factor that shapes firms' zero-leverage policies. Our extensive mechanism tests provide little evidence that competition renders firms more financially constrained, leaving the financial-flexibility hypothesis as the mostly likely explanation for why some firms choose to repay all debt in response to perceived greater competition. Our study complements previous research by disentangling evidence regarding the financial-constraint and desire-for-flexibility motives, for a subset of firms that adopt or abandon zero-leverage status.

Our findings also add to the extensive body of research documenting that competition influences the real decision making of corporate managers (e.g., Rhoades and Rutz, 1982; Li, 2010; Flammer, 2015; Levine et al., 2020; Ding et al., 2022; Chung et al., 2023; Chen et al., 2024). A stream of studies exploits staggered reductions in import tariff rates as sources of exogenous variation in competition (e.g., Valta, 2012; Xu, 2012; Flammer, 2015; Huang et al., 2017; Chen et al., 2024). For instance, Xu (2012) finds that exogenous increases in competition caused by import penetration reduce financial leverage, consistent with traditional trade-off models. Heath and Sertsios (2023) exploit the increases in trademark protection due to the passage of Federal Trademark Dilution Act, finding that the subsequent exogenous increases in market power and profitability lead to transient declines in leverage. A few other recent studies make use of the exogenous variation in competition measured by the competition law index compiled by Bradford and Chilton (2018) for identification (e.g., Levine et al., 2020; Ding et al., 2022). Our research extends this latter body of research by showing that competition laws have a causal, positive effect

on firms' debt conservatism in a global setting. This effect appears to be incremental to the explanatory power of profitability on leverage.[2]

Finally, our work also relates to the broader finance literature arguing and documenting that financial flexibility (in the form of surplus or alternative funding sources) has an important role in corporate financing policies (e,g., Denis and McKeon, 2012; DeAngelo et al., 2017; Jang, 2017; Fahlenbrach et al., 2021; Barry et al., 2022). Our findings suggest that when the business environment becomes more competitive and riskier, firms maintain little or no debt to save up and preserve financial flexibility.

The remainder of our paper is structured as follows. Section 2 explains our data, variable measurement, and descriptive statistics. Section 3 reports our baseline and additional tests. Section 4 presents tests on the underlying economic mechanisms. Section 5 concludes.

2. Data and Variable Construction

2.1 Data

We compile a large, global sample of public-listed firms using several databases. For the non-U.S. firms, we download their accounting and stock information from the Compustat Global Fundamental and Security Monthly databases from 1988 onward, including total assets, long- and short-term debt, stock prices, number of shares outstanding, total sales, dividend, earnings, etc. All these variables are translated into U.S. dollars using exchange rates from Thomson Reuters or the Bank of England (whichever is available). For the U.S. firms, we obtain their accounting and security data from the CRSP/Compustat Merged database.

[2] The zero leverage phenomenon cannot readily be explained by the trade-off theory, because leverage targets for profitable zero-leveraged firms are well above zero (Graham, 2000; Strebulaev & Yang, 2013). Different explanations for zero-leverage status are therefore required. We test competing explanations for zero-leverage status, that are distinct from the negative effect of competition on target leverage that is predicted under trade-off (due to reduced expected profitability).

We obtain the competition law index, which is compiled by Bradford and Chilton (2018) through collecting, analyzing, and coding more than 700 competition laws.[3] The index captures competition-related regulations in 123 countries over the period from 1889 to 2010. We download several country macroeconomic variables from the World Bank, including aggregate and per capita GDP, consumer price indexes (CPIs), credit provided to the private sector by banks, stock market capitalization, total value of stocks traded, etc.

Financial firms are excluded from the sample because of their heavily regulated and highly leveraged nature. After merging the various datasets and discarding observations with missing values in the main variables, we further exclude countries where there are fewer than 10 companies. Our final sample consists of 169,571 firm-year observations from 25,784 unique firms from 58 countries (including the U.S.) over the period from 1988 to 2010.

2.2 The Competition Law Index

We exploit the variation in competition provided by staggered changes in competition laws across economies and over time. Specifically, following recent finance research (e.g., Levine et al., 2020; Ding et al., 2022), we utilize the competition law index developed by Bradford and Chilton (2018), which gauges the degree of "regulatory risk" firms face when competing in any given economy. The competition law index (*Competition law index*) we use in our main analysis is calculated from the equal-weighted average of two component indexes: the authority index (*Authority*) and the substance index (*Substance*).

[3] We thank Professor Anu Bradford and Adam S. Chilton (2018) for making the competition law index publicly available. The index along with documentation can be downloaded via: www.comparativecompetitionlaw.org.

Authority captures the authority granted, i.e., provisions on who can enforce the laws and the limits of their application. It is computed by adding or deducting scores based on the given country's presence or absence of provisions on: a private right of action, fines, imprisonment, divestitures, damages, extraterritoriality, industry exemptions, and categorical enterprise exemptions. Specifically, regimes in which individuals can bring suits against firms with anticompetitive activities, and where the latter can be punished with fines, imprisonment, divestiture, or compensation to the private party, tend to have more stringent competition laws. Further, the ability of the authorities to attach jurisdiction whenever their market is affected, regardless of the firm's nationality or the location of the anticompetitive activity (i.e., extraterritorial enforcement), is conducive to competition. But exemption of industries and certain types of firms from the regulations lowers competition. *Authority* is an index ranging from -1 to 6.

Substance captures the substantive rules regulating competition, and is computed by taking the equal-weighted average of three subcomponent indexes: *Merger control*, *Abuse of dominance*, and *Anticompetitive agreements*. It ranges from -3.5 to 12.

Merger control is constructed by adding or subtracting scores based on variables capturing the presence or absence of provisions in relation to pre-merger notification, the jurisdiction's discretion and scope in restricting anticompetitive mergers, and certain exemptions to such restrictions. In jurisdictions where notified mergers need to be approved by the authorities before the closing of the transaction, and where such pre-merger notification is mandatory, firms face more regulatory risk when seeking to increase their market power through mergers. Moreover, more stringent competition statutes allow the authorities to restrict mergers based on economic and public-interest grounds (to prevent firms strengthening their dominance), whereas

defenses/exemptions to such restrictions, based on grounds of efficiency, firm failure, or public interest, reduce the stringency of competition laws.

Abuse of dominance captures the extent to which market-abusive behaviors by dominant firms are prohibited, and is constructed by adding scores based on the type of "blanket" prohibition imposed, and on whether certain types of anti-competitive behavior are considered as abusive by the authorities. In some regimes, the authorities have vast discretion to prohibit abusive conduct by dominant companies, because there is no statutory requirement to offer guidance on what constitutes an abuse. Such a blanket prohibition raises firms' regulatory risk. In other regimes there is no blanket prohibition, and the more common types of abusive activities that can be prohibited include discriminatory pricing, unfair pricing, predatory pricing, anticompetitive discounts, and refusal to deal with customers or suppliers. But the presence of defenses on grounds of efficiency outweighing anticompetitive effects, or of public interest, lowers the subcomponent index.

Anticompetitive agreements are constructed based on the presence of substantive prohibitions on horizontal and vertical agreements. Horizontal agreements (cartels) represent one of the most prohibited anticompetitive activities around the world, and provisions that prohibit each of the four most common cartel practices—price fixing, market sharing, output limitations, and bid rigging—add to the subcomponent index. For vertical agreements, prohibitions on exclusive dealing, resale price maintenance, and tying or agreements that eliminate competitors, add scores to the subcomponent index. Similarly, defenses on grounds of efficiency and public interest lower competition and carry deductions from the subcomponent index.

To construct the overall index of competition laws (*Competition law index*), the authors first adjust *Authority* by multiplying it by two (i.e., so that it counts as equivalent to 12 points) and then aggregate the two component indexes, the adjusted *Authority* and *Substance*, by taking their

equal-weighted average. The aggregated index is then rescaled to lie between 0 and 1. A value of 0 indicates that the given country does not have any competition laws in the given year, whereas a value of 1 implies a legal regime with the most stringent competition laws, i.e., the highest level of competition.

2.3 Descriptive Statistics

Table 1 provides a sample breakdown by country. The top five countries in terms of firm-years in our sample are the U.S. (53.5%), Japan (13.9%), China (6.7%), United Kingdom (3.2%), and Malaysia (3.2%). We report the proportion of firm-years in which the debt-to-assets ratio (*Debt/TA*) is zero, i.e., zero leverage (*ZL*). The top five countries in terms of mean *ZL* are Bahrain (61.2%), Saudi Arabia (48.8%), Oman (25.9%), Qatar (21.9%), and Peru (19.7%), whereas the bottom five are Bulgaria (0.0%), Colombia (0.0%), Portugal (0.0%), Spain (0.3%), and Belgium (0.7%).

Insert Table 1 about here

In terms of mean *Competition law index*, we find that Japan (0.99), Israel (0.88), Slovenia (0.87), Ireland (0.85), and Brazil (0.84) have the most stringent competition laws, whereas six countries, including Bahrain, Oman, Nigeria, United Arab Emirates, Bangladesh, and Kuwait have no competition laws over the entire sample period.

Insert Table 2 about here

Table 2 reports summary statistics for the main variables used in our study at the firm and country levels. The full-sample mean (median) of the zero-leverage dummy variable (*ZL*) is 0.117, indicating that about 11.7% of the firm-years have no debt in our sample. An average firm in our sample has a ratio of total debt to total assets of 23.0%, a market capitalization of USD$1.8 billion,

a market-to-book equity ratio of 1.28, ROA of 7.8%, a proportion of net property, plant, and equipment (PPE) in total assets of 31.1%, a common dividend to total assets ratio of 1.2%, a R&D to sales ratio of 10.0%, a ratio of capital expenditure to total assets of 6.0%, a cash-to-assets ratio of 16.6%, an income tax to total assets ratio of 2.0%, and a proportion of non-debt tax shield in total assets of 4.2%. About 42.2% of firm-years constitute dividend-paying firms. These statistics closely resemble those reported in prior international studies, such as El Ghoul et al. (2018).

At the country-year level, the mean annual percentage growth rates in CPI and GDP are 3.9% and 3.6%, respectively. For an average country, credit provided by banks to the private sector is about 83.6% of its GDP; the value of stocks traded amounts to 45.3% of GDP; stock market capitalization is about 72.6% of GDP.

The pairwise correlations between the firm- and country-level variables can be found in Table OA.1 of the Online Appendix.

3. Empirical Results

3.1 Pre-Existing Zero Leverage and Competition Laws

Before our main analysis, it is important for us to ascertain that the variation in competition given by the competition law indexes is exogenous to firms' decisions. This assumption would be violated if zero-leverage firms actively lobby the governments for or against competitive laws. For instance, under the agency theory, unlevered firms whose managers enjoy a quiet life and dislike competition may lobby governments against statutes that encourage competition. Likewise, unlevered firms may be active in lobbying the governments in favor of such statutes, for reasons such as to avoid being abused and/or acquired by more dominant firms with more debt financing capacity. Under both cases, OLS estimates would be biased due to reverse causality. Moreover, if

the adoptions or removals of competition laws coincide systematically with variations in macroeconomic conditions, our estimation would be biased due to omitted variables, as lawmakers or firms may respond to these market-level changes and then adjust their lobbying strategies regarding competition laws accordingly.

To examine this concern, we aggregate our data to the country-year level and examine whether one- and two-year lagged average *ZL* (ZL_{t-1} and ZL_{t-2}), i.e., pre-existing zero leverage, predict the competition law index in the current year. Moreover, we control for a number of average firm characteristics, namely the natural logarithm of market capitalization (*ln(Size)*), market-to-book equity ratio (*Market-to-book ratio*), operating profitability (*ROA*), asset tangibility (*Asset tangibility*), dividend-to-assets ratio (*Div/TA*), R&D intensity (*R&D/Sale*), capital investment (*Capx/TA*), cash holdings (*Cash/TA*), income tax liability (*Tax/TA*), and non-debt tax shield (*Non-debt tax shield/TA*). We also include six lagged country macroeconomic variables, namely annual growth in CPI and GDP (ΔCPI and ΔGDP), the natural logarithm of GDP per capita (*ln(GDP per capita)*), the ratio of credit to the private sector by banks to GDP (*Private credit/GDP*), the ratio of stocks traded in GDP (*Stocks traded/GDP*), and the market capitalization to GDP ratio (*Market capitalization/GDP*). Detailed definitions of the above variables can be found in Appendix A.1. State and year fixed effects are included to account for time-invariant state-level heterogeneity and the effect of market-wide shocks on the competition law index.

Insert Table 3 about here

The estimation results are reported in Table 3. The analysis is performed at the country-year level. In column (1) where only the one-year lagged *ZL* is included, we find that it is insignificant in explaining the competition law index. In column (2), we introduce the aggregated firm characteristics, finding that the results hold. In column (3), we further include the lagged country

macroeconomic variables, finding that lagged *ZL* does not predict the competition law index. We also find that annual growth in CPI and market capitalization are positively and significantly associated with *Competition law index*. This evidence motivates us to control for these country characteristics in all subsequent tests.

In columns (4) to (6), we augment the models with two-year lagged *ZL*, finding that the lagged *ZL* variables are always insignificant across the models. The coefficients on all other controls have similar signs and statistical significance as those in columns (1) to (3). Overall, results from this section indicate no reverse causality and that the exogeneity assumption is likely to hold.

3.2 Inclusion Criterion

In this section, we evaluate the inclusion criterion of the competition law index, i.e., we examine whether increases in the index (more stringent competition laws) raise the degree of market competition firms face. While Ding et al. (2022) have showed that increases significantly reduce industry concentration, we perform additional tests on our international sample for more credence.

Specifically, we aggregate our sample to the industry-country-year level and construct two measures of competition. The first is a 3-digit SIC industry sales Herfindahl–Hirschman index of industry concentration, and the second is the number of firms in each industry-country-year; we log-transform both measures due to high skewness. The rationale is that more competitive markets should have a lower industry sales concentration and a higher number of competing firms within an industry. We regress the two industry competition measures on the one-year-lagged

Competition law index, firm and country characteristics, and country and year fixed effects. The results are reported in Table 4.

Insert Table 4 about here

As shown in columns (1) and (5), when only industry, country, and year fixed effects are included, we find that competition laws significantly reduce industry concentration and raise the number of firms in an industry-country pair. In columns (2), (3), (6), and (7), the results continue to hold after including the aggregated firm and country characteristics in the models. Finally, in columns (4) and (8), we further include industry-year interacted fixed effects to sweep out all industry-specific time trends, finding that our results are intact.

Overall, our findings suggest that stringent competition laws intensify the degree of competition firms face, consistent with the inclusion criterion.

3.3 Competition and Zero-Leverage Policies

Our previous sections show that competition laws offer plausibly exogenous variation in competition. We now proceed to investigate the effect of competition on firms' debt conservatism. Specifically, we estimate a linear probability regression that models firms' zero-leverage status as a function of the competition law index, firm and country control variables, and firm and industry-year interacted effects, written as follows:

$$ZL_{ijt} = \beta_1 Competition\ law\ index_{jt} + \delta \cdot X_{ijt-1} + \gamma \cdot V_{jt-1} + Firm\ FE + Industry \times Year\ FE + \varepsilon_{ijt}, \quad (1)$$

where i, j, and t denote a firm, country, and year. ZL_{it} is a dummy variable equal to 1 if firm i has no debt in year t and 0 otherwise. *Competition law index*$_{jt}$ is the overall index capturing the stringency in competition legislations for country j in year t, as described in Section 2.2.[4]

The vector, X_{it-1}, contains the same set of lagged firm-level characteristics as in Section 3.1, which are shown to determine the firm's zero-leverage status in the prior literature (e.g., El Ghoul et al., 2018). The above variables are also well-known determinants of leverage according to traditional trade-off and pecking order theories, and other empirical evidence (see review by Graham and Leary, 2011). To ensure that the competition law index is not picking up the effect of other macroeconomic factors, we also include the same set of lagged country characteristics as in Section 3.1.

Firm fixed effects are included in the model to account for the effect of any time-invariant unobserved firm characteristics on zero-leverage policies, such as national and firm-level cultural attributes as well as potential differences in ESG preferences between countries (Ding et al., 2022). Industry-year interacted fixed effects are included in the model to sweep out all unobserved heterogeneities at the industry-year level. With the inclusion of firm and industry-year fixed effects, the identification of the relation in question relies primarily on within-firm variation in competition and zero leverage. Since *Competition law index* varies only at the country-year level, we cluster standard errors at the country level, following the recommendations by Bertrand et al. (2004).

Insert Table 5 about here

[4] Prior studies (e.g., Levine et al., 2020; Ding et al., 2022) examine the contemporaneous effect of competition on economic variables such as corporate innovation and social responsibility. We follow this strand of studies and similarly study the contemporaneous relation between competition and firms' zero-leverage status. Nonetheless, our results are not sensitive to using the one-year lagged *Competition law index* as the main independent variable. These results are available upon request.

The estimation results of equation (1) are reported in Table 5. In column (1) where only *Competition law index* and the fixed effects are included, the estimate on *Competition law index* is 0.026 and is statistically significant at the 1% level. In column (2), we introduce the lagged firm control variables, finding that the results hold. In column (3) where the full model is estimated, the estimate on *Competition law index* remains similar in both magnitude (coefficient = 0.036) and statistical significance. Based on the estimates in column (3), a one-standard-deviation increase in *Competition law index* raises the probability that firms adopt a zero-leverage policy by 0.99 percentage points (= 0.275 × 0.036), or by 8.5% (= 0.0099/0.117) relative to the 0.117 unconditional mean value of *ZL*.

As for the firm-level control variables, most of them have signs that are consistent with those reported by prior studies such as El Ghoul et al. (2018), and are highly significant, although our model specification differs from theirs due to the inclusion of firm fixed effects. All the macroeconomic variables except *Market capitalization/GDP* are insignificant in determining firms' zero-leverage policies.

Overall, our results reveal a positive and statistically significant effect of competition on debt conservatism, inconsistent with the quiet life hypothesis but in line with both the financial-constraint hypothesis and financial-flexibility hypothesis.

3.4 Change-On-Change Regressions

In this section, we estimate alternative regressions in changes. Specifically, we estimate the following change-in-change regression that replaces all variables with their yearly changes:

$$\Delta ZL_{ijt} = \beta_1 \Delta Competition\ law\ index_{jt} + \delta \cdot \Delta X_{ijt-1} + \gamma \cdot \Delta V_{jt-1} + Industry \times Year\ FE + \varepsilon_{ijt}, \quad (2)$$

where Δ is a first-difference operator. $\Delta Competition\ law\ index_{jt}$ is the yearly change in *Competition law index* from year $t - 1$ to year t. ΔX_{it-1} and ΔV_{jt-1} are vectors containing the yearly changes in the lagged firm and country control variables, respectively. Industry-year interacted fixed effects are included; standard errors are clustered at the country level.

Insert Table 6 about here

As column (1) of Table 6 shows, the estimate on *ΔCompetition law index* is 0.038 and statistically significant at the 1% level, which is remarkably similar in both magnitude and significance to those of the baseline results from regressions in levels.

To account for the possibility that the effect of competition law index on firms' zero leverage is non-linear, we replace the continuous *ΔCompetition law index* with $\Delta Competition\ law\ index_{Dummy}$, the latter being a categorical variable that takes on a value of 1 if there is an increase in *Competition law index*, a value of -1 if there is a decrease in *Competition law index*, and 0 for no change. As column (2) shows, the estimate on $\Delta Competition\ law\ index_{Dummy}$ is 0.013 and remains statistically significant at the 1% level. In column (3), we further include firm fixed effects in the model to eliminate all between-firm heterogeneities, again finding that the positive estimate on $\Delta Competition\ law\ index_{Dummy}$ remains similar in size and significance.

A related question is whether firms' zero-leverage policies respond differently to increases and decreases in competition, i.e., there is an asymmetry. Behavioral economics theories suggest that people tend to care more about downside losses and risks than about upside gains (Kahneman and Tversky, 1979; Gul, 1991; Ang et al., 2006). Since competition is expected to make the business environment riskier, firms may respond more to increases in competition (and be more inclined to use zero leverage) than to decreases in competition. To test this conjecture, we decompose $\Delta Competition\ law\ index_{Dummy}$ into a positive and negative component: *+ve*

ΔCompetition law index$_{Dummy}$ (*-ve ΔCompetition law index*$_{Dummy}$) is a dummy variable that takes on the value of 1 (-1) if there is an increase (decrease) in *Competition law index*, and zero otherwise. As shown in column (4), the estimates on *+ve ΔCompetition law index*$_{Dummy}$ and *-ve ΔCompetition law index*$_{Dummy}$ are 0.009 and -0.017, both significant at the 1% level.[5] The Wald test of coefficient equality shows that the two estimates are not significantly different from each other (*p*-value = 0.177). Our finding shows that while firms appear to respond moderately more to decreases in competition, the difference is statistically insignificant.

In column (5), we test the reverse causality concern by including two leading changes in the competition law index into equation (2): *ΔCompetition law index*$_{Dummy}^{at\ t\ =\ -2}$ (*ΔCompetition law index*$_{Dummy}^{at\ t\ =\ -1}$) takes on a value of 1 if there is an increase in *Competition law index* two years (one year) later, a value of -1 if there is a decrease in *Competition law index* two years (one year) later, and 0 if there is no change in *Competition law index* two years (one year) later. If our results are subject to reverse causality as firms may actively lobby for or against competition laws, firms' zero-leverage policies may be affected even prior to the actual changes in competition laws. Reassuringly, in column (5), we find that the estimates on *ΔCompetition law index*$_{Dummy}^{at\ t\ =\ -2}$ and *ΔCompetition law index*$_{Dummy}^{at\ t\ =\ -1}$ are small and statistically insignificant. Importantly, the positive estimate on *ΔCompetition law index*$_{Dummy}$ remains similar in size and significant at the 1% level, thus ruling out the reverse causality concern.

[5] The negative and significant estimate on *-ve ΔCompetition law index*$_{Dummy}$ is indicative of a positive relation between changes in *Competition law index* and changes in *ZL*. The results show that when competition law index decreases, i.e., when *ΔCompetition law index*$_{Dummy}$ is -1, firms tend switch from ZL status to positive leverage.

3.5 The Stacked Approach

Since the competition law index changes in a staggered fashion across countries and over time, one may view our baseline model of equation (1) as a staggered DiD model with a continuous treatment assignment variable (Atanasov and Black, 2016). Recent studies (e.g., Goodman-Bacon, 2021; Baker et al., 2022) show that if the treatment effect is heterogeneous across groups and time periods, a staggered DiD model may give misleading estimates. The reason is that the staggered DiD estimate is a weighted average of treatment effects across groups and time periods; negative effects may arise as control groups used in one period are treated in another period, thus biasing the estimate of the average treatment effect (De Chaisemartin and D'Haultfœuille, 2020).

To alleviate this concern, we follow Gormley and Matsa (2011) and adopt a stacked estimation approach. Specifically, in each year where the competition law index changes in at least one country, we retain all firm-year observations in the 3 years before and after the event year (for each firm, we require that it has an observation during the event year and at least one observation before and after the event year) and then remove all control firms (i.e., firms in countries without a law index change) that have already experienced or will experience a change in the competition law index within the 7-year event window. This procedure yields a 7-year subsample for each year of law index change, i.e., a "cohort," that consists of the treated firms (i.e., firms from countries with a law index change) and *clean* "control" firms. We then stack all cohorts into a panel and estimate the baseline tests of equation (1). Firm and industry-year fixed effects are interacted with the cohort dummy variables to account for any cohort-specific firm and industry heterogeneities.

Insert Table 7 about here

The estimation results are reported in Panel A of Table 7. In the three columns, the estimates on *Competition law index* range from 0.027 to 0.041 and are all statistically significant

at the 1% level. The remarkable similarity between these estimates with the baseline estimates from Table 5 in both magnitude and statistical significance indicates that the potential heterogeneous treatment effects across countries and years are unlikely to confound our results.

3.6 The Matching Approach

The identifying assumption of our tests is that, absent changes in competition, the zero-leverage policies of treated and control firms would evolve in the same way, i.e., on parallel trends. This assumption is more credible, the more similar the two types of firms are. Hence, we utilize matching techniques to improve the balance in covariates between the treated and "clean" control firms (see Section 3.5).

Specifically, we estimate a full-sample logit regression modelling the likelihood of firms in receiving a change in *Competition law index* as a function of the lagged baseline firm and country controls, and industry and year fixed effects, and obtain the estimated propensity scores. In each year with at least one change in the competition law index (i.e., a cohort), we match each treated firm with a "clean" control firm (see Section 3.5) with the closest propensity score within the same economic region, requiring that the absolute difference in propensity score does not exceed 1%.[6] For each matched pair, we retain its observations in the 3 years before and after the event year, if available (all firms must have an available observation during the event year and at least one observation before and after the event year). We then stack the cohorts into a panel (in total 2,120 matched pairs of firms) and estimate the baseline test.

In Panel B of Table 7, we compare the means of the level and change in zero-leverage status, and of the baseline firm and country characteristics, for the treated and matched "clean"

[6] There are in total five broad economic regions: Africa, Americas, Asia, Europe, and Oceania.

control firms in the pre-treatment year. Not only are the differences in mean insignificant, but their standardized differences are all small, indicating that the matching procedure performs well in removing differences in covariates between the two groups of firms.

In Panel C, we report the estimation results of baseline models estimated on the stacked matched sample. The firm and industry-year fixed effects are interacted with the cohort dummy variables. In all three columns, *Competition law index* enters the model positively and statistically significantly (at the 10% level or higher), with estimates ranging between 0.029 and 0.045, consistent with our baseline results.

3.7 Component Analysis

As discussed in Section 2.2., the overall competition law index is calculated from two component indexes relating to the authority to promote competition (*Authority*), and substantive rules (*Substance*), and *Substance* further comprises three subcomponent indexes which relate to the control over mergers (*Merger control*), the abuse of market power by dominant firms (*Abuse of dominance*), and anticompetitive agreements (*Anticompetitive agreements*). In this section, we estimate the baseline model with the overall competition law index replaced by the component and subcomponent indexes. Table 8 reports the results.

Insert Table 8 about here

In column (1), we find that the estimate on *Authority* is 0.021 and statistically significant at the 10% level. Column (2) shows that *Substance* enters the model positively (coefficient = 0.043) and significantly (at the 5% level). In column (3) where both component indexes are included, we find that only the positive estimate on *Substance* is statistically significant (at the 5% level), whereas that on *Authority* is small and insignificant. The evidence shows that the positive effect

on ZL status of the competition law index stems from the substantive provisions regulating competition.

In column (4), we replace *Substance* with its underlying three subcomponent indexes, while controlling for *Authority*. Our results show that the coefficient on *Merger control* is positive (0.037) and significant at the 1% level, whereas those on *Abuse of dominance* and *Anticompetitive agreements* are small and insignificant.

Overall, the results show that firms' zero-leverage policies significantly respond to changes in provisions in relation to merger control but not to those provisions regulating either abusive behavior by dominant firms, or firms' anticompetitive agreements. This evidence is consistent with the view that mergers and acquisitions are widely recognized as one of the most effective ways through which firms lessen competition and gain dominance. The curbing of firms' capacity to increase their market power through merger could inhibit the development of oligopolies, in which competition is limited via tacit agreements between firms.

3.8 Robustness Checks

In this section, we perform additional robustness checks for our baseline estimation. The model specification follows the baseline model of equation (1). For brevity, we report the results in Table OA.2 of the Online Appendix. First, we use an alternative, (near-)zero leverage measure, ZL (*ZL (book leverage<2.5%)*), which is a dummy variable equal to 1 if a firm's debt-to-asset ratio is below 2.5%, and zero otherwise. We continue to find a significantly positive effect of *Competition law index* on near-zero leverage.

In rows (2), (3), and (4), we use alternative classifications for constructing industry fixed effects, including the 3-digit SIC, 6-digit GICS, and 4-digit GICS industry classifications. Our results hold.

In rows (5) and (6), to alleviate the concern that competition laws are confounded by unobserved macroeconomic factors, we include region-year and industry-region-year interacted fixed effects in the models, respectively, to control for region- and industry-region specific time trends. Our results are unaffected.

In rows (7) and (8), we alternatively cluster standard errors two ways at the country and year levels as well as one way at the firm level, respectively. In row (9), following prior studies (e.g., Strebulaev and Yang, 2013; El Ghoul et al., 2018), we further control for firm-level earnings volatility (*ROA* σ) in the model, defined as the standard deviation of quarterly *ROA* estimated over the past 12 quarters (requiring at least three quarterly observations for the estimation). The inclusion of *ROA* σ in the model reduces our sample to 142,599 but does not affect our results.

In row (10), since the U.S. has the largest sample coverage and may be over-represented in the estimation, we drop the U.S. firms, and find that our results remain similar in both magnitude and significance (the sample is down to 78,881 observations). Finally, firms in countries that have experienced changes in competition laws may differ substantially from those in countries that have not experienced any changes. In column (11), to alleviate this possible selection issue, we exclude firms from countries where there have not been any changes in *Competition law index* over the entire sample period, finding that our results are unaffected.

4. Economic Mechanisms

Our results thus far show that competition raises firms' propensity to adopt a conservative debt policy, which is inconsistent with the quiet life hypothesis but consistent with the financial-constraint and financial-flexibility hypotheses.

Under the financial-constraint hypothesis, firms use zero debt because they are unable to raise external capital, i.e., limited access to finance, due to market frictions. Theories suggest that when competition intensifies, firms are more reluctant to disclose private information to other competing firms (e.g., Verrecchia, 1983; Janssen and Roy, 2015; Huang et al., 2017), which exacerbates information asymmetry problems and thus raises the cost of external financing. Additionally, competition reduces firms' pledgeable income and raises their cash-flow risk (Valta, 2012), thus leading to higher default risk and cost of debt financing. Given these points, if the financial-constraints hypothesis is true, we should find that competition reduces firms' access to financing.

The financial-flexibility hypothesis posits that, because raising external financing is costly under market frictions such as adverse selection (Myers and Majluf, 1984) and transaction costs (Leary and Roberts, 2005), firms eschew debt and accumulate cash, in order to save their borrowing capacity for future investment opportunities, i.e., they build financial slack (Gamba and Triantis, 2008; DeAngelo et al., 2017). Though firms will borrow at times, they then tend to deleverage substantially, to ensure that sufficient unused debt capacity can be employed in future (DeAngelo et al., 2017). As competition heightens, since the business environment becomes riskier, the value of having financial flexibility and slack within the firm increases. Besides, because firms are competing more fiercely in such markets, their ability to respond quickly to new investment opportunities is increasingly vital to their survival and success. Hence, competition is conducive

to zero-leverage policies because financial flexibility is more valuable for firms under more competitive environments.

In subsequent sections, we perform a series of heterogeneity tests to examine the economic mechanisms underlying our results.

4.1 Financial Constraint and Firms' Response to Competition

First, we conjecture that the increase in propensity to adopt zero leverage is more pronounced among firms that are more financially constrained. This conjecture is consistent with both the financial-constraint hypothesis and the financial-flexibility hypothesis. If limited access to finance is the true mechanism, when competition increases, financially constrained firms should face greater difficulty in accessing external capital and be more inclined to adopt a zero-leverage policy. Likewise, if financial flexibility is the true motive, firms that are more constrained should see a greater need to preserve financial flexibility through using zero debt and accumulating cash. Hence, results from the heterogeneity tests would provide further evidence for the two remaining hypotheses.

We consider two proxies for financial constraint. The first is based on firms' actions in relation to whether they pay dividend. The literature widely accepts that non-dividend paying firms tend to face more external-finance constraints (e.g., Fazzari et al., 1987; Campello et al., 2010; Farre-Mensa and Ljungqvist, 2015). The second proxy is the Whited and Wu (2006) index of financial constraint (*WW*), computed as a linear combination of six firm characteristics capturing financial constraint, including cash flow, a dividend indicator, long-term leverage, log total assets, and industry and firm sales growth. A higher value of *WW* indicates greater constraint. A firm is

defined as constrained if it is not a dividend payer, or if its *WW* value is above the sample median for its peers from the same country and in the same year.

Insert Table 9 about here

The heterogeneity test results are reported in Table 9. Columns (1), (2), (4), and (5) report results from baseline tests estimated on the constrained and unconstrained subsamples; in column (3) and (6), we report tests in which all the independent variables and fixed effects are interacted with the two dividing variables, i.e., a dummy variable for non-dividend payers and a dummy variable for firms with above-median *WW* value.[7]

As shown in columns (1) and (2), we find that the positive estimate of competition on *ZL* is considerably larger and only statistically significant in the subsample of non-dividend paying firms; the difference in coefficient estimates on *Competition law index* (= 0.065) is statistically significant at the 10% level (see column (3)). In columns (4) and (5), we similarly find that the estimate on *Competition law index* is 0.072 and statistically significant at the 1% level in the subsample with high *WW*, whereas it is -0.000 and insignificant in the subsample of low *WW*. The difference in coefficient estimates on *Competition law index* (= 0.073) is statistically significant at the 1% level.

Overall, the results from this section are consistent with our conjecture that the increase in propensity of zero-leverage policies is more pronounced and only statistically significant among firms that are more financially constrained, thus lending support to both the financial-constraint hypothesis and the financial-flexibility hypothesis.

[7] Interacting all independent variables and fixed effects with the dividing dummy variable produces estimates that are equivalent to those from baseline models estimated separately on subsamples of firms, divided based on the dividing dummy variable, i.e., the results in columns (1), (2), (4), and (5)). Hence, in columns (3) and (6) the significance of *Competition law index* × dividing dummy estimates the significance of the difference between the subsamples in the coefficients on *Competition law index*.

4.2 Competition and Cash-Flow Sensitivity of Cash

Another shared prediction by the financial-constraint hypothesis and the financial-flexibility hypothesis is that increased competition induces firms to accumulate cash. The rationale is that financially constrained firms likely find balance sheet liquidity to be valuable as it allows them to undertake investment when the opportunities arise (Almeida et al., 2004). Similarly, deleveraging to restore financial flexibility is typically accompanied by decisions to increase cash holdings, as more unused debt capacity and cash holdings are imperfect substitutes (DeAngelo et al., 2017). Hence, if either of the two hypotheses is true, we expect that competition increases firms' propensity to save cash out of cash flow, as captured by a higher cash-flow sensitivity of cash. We follow Almeida et al. (2004) to estimate the following regression:

$$\Delta Cash/TA_{ijt} = \beta_0 + \beta_1\, Cash\ flow/TA_{ijt} + \beta_2\, Competition\ law\ index_t + \beta_3\, Cash\ flow/TA_{it} \times Competition\ law\ index_{it} + \delta \cdot Z_{ijt-1} + \lambda \cdot V_{jt-1} + Firm\ FE + Industry \times Year\ FE + \varepsilon_{ijt}, \quad (3)$$

where $\Delta Cash/TA_{ijt}$ is firm i's change in cash holdings from year $t - 1$ to year t divided by total assets in year t; $Cash\ flow/TA_{ijt}$ is firm i's cash flow divided by total assets in year t, where cash flow is defined as the sum of income before extraordinary items and depreciation and amortization; Z_{it-1} is a vector containing lagged Tobin's q, natural logarithm of total assets, capital expenditure, and acquisition expenditure, as well as the yearly changes (from year t – 1 to year t) in net working capital and short-term debt. The coefficient of interest is β_3 that gauges to what extent cash to cash-flow sensitivity varies with competition law index.

Insert Table 10 about here

The estimation results of equation (3) are reported in Table 10. In column (1) only cash flow, competition laws, their interaction, and industry fixed effects are included. The estimate on

Cash flow/TA is 0.127 and statistically significant at the 1% level. This evidence suggests that an average firm saves about 12.7% out of its internal cash flow. Importantly, the estimate on *Cash flow/TA* × *Competition law index* is 0.129 and statistically significant, consistent with our expectation that competition increases firms' propensity to save cash out of cash flow.

In columns (2) and (3), we include lagged firm and country control variables. The results remain qualitatively similar. In column (4), we further include firm fixed effects into the model, again finding that our results hold. Specifically, in column (4), the estimate on *Cash flow/TA* increases to 0.221, while that on the interaction term between cash flow and competition laws reduces to 0.103; both remain statistically significant at the 1% level. This evidence suggests that an average firm saves slightly below one-fourth of its cash flow.[8] The significant interaction term indicates that when *Competition law index* moves from the 25th (= 0.517) to the 75th percentiles (= 0.782), the implied coefficient on *Cash flow/TA* increases from 0.274 (= 0.517 × 0.103 + 0.221) to 0.302 (= 0.782 × 0.103 + 0.221), i.e., an increase in cash savings by 2.73 percentage points, or by USD$42.8 million given a USD$1,567.8 million sample mean value of total assets.

4.3 Competition, Financial Constraints, and Payout Policies

Our results from the previous two sections are consistent with either the financial-constraint hypothesis, financial-flexibility hypothesis, or both. From this section onwards, we perform tests to distinguish between the two hypotheses.

First, if the financial-constraint hypothesis is true, we should find that competition makes firms in general more financially constrained. By contrast, the financial-flexibility hypothesis

[8] This magnitude is remarkably close to that documented by Frésard (2012) who finds a 0.21 sensitivity for the U.S. firms over the 1970-2006 period.

argues that firms deleverage to restore debt capacity for precautionary purposes, and does not lead to this prediction. To test the effect of competition on financial constraint, we estimate the baseline model of equation (1) on the full sample of firms, using the Whited and Wu (2006) index of financial constraint as the dependent variable. We winsorize *WW* at the 5th and 95th percentiles. The estimation results are reported in Panel A of Table 11.

Insert Table 11 about here

As column (1) shows, we find that the competition law index has a positive but insignificant effect on *WW*. To further mitigate the effect of outliers, we construct a rank variable of *WW* (WW_{Rank}) by dividing firms into 100 groups within each country-year bin, assigning the corresponding rank number to each firm, and then dividing the rank variable by 100 (so that it lies between 0 and 1). As shown in column (2), we continue to find that the competition law index has an insignificant effect on WW_{Rank}. The results do not support the view that competition makes firms more financially constrained.

Second, we examine the effect of competition on firms' decisions to buy back shares. If the greater zero-leverage policies following increased competition is due to firms' inability to access external financing (i.e., financial constraints), we should find that competition induces firms to reduce payout to shareholders, especially in terms of share repurchases. As pointed out by prior studies (e.g., DeAngelo et al., 2004), share repurchases represent an increasingly important and more flexible method for firms to distribute cash back to shareholders, compared to dividend payout.

In Panel B of Table 11, column (1) presents a baseline regression of equation (2) with the proportion of share repurchases in total assets (*Repur/TA*) as the dependent variable. The estimate on *Competition law index* is 0.001 and statistically insignificant. This evidence suggests that firms

do not reduce share buyback as competition increases, inconsistent with the financial-constraint hypothesis.

Third, if competition exacerbates information asymmetry problems and hampers firms' access to debt, we may find that their ability to tap the equity market is also reduced. Specifically, we examine the effect of competition on the extent to which firms engage in "equity recycling," i.e., the practice of raising cash from the equity market only to pay it out again to shareholders. According to Farre-Mensa and Ljungqvist (2015), firms engaging in more equity recycling are likely to face a more inelastic supply of equity curve, have a smaller wedge between their internal and external costs of equity capital, and thus are less financially constrained. Hence, if the financial-constraint hypothesis is correct, we should find that competition law index also reduces the extent of firms' equity recycling. Following Farre-Mensa and Ljungqvist (2015), we estimate the following change-on-change model:

$$\Delta Payout/TA_{ijt} = \beta_0 + \beta_1 \Delta EIS/TA_{ijt} + \beta_2 \Delta Competition\ law\ index_t + \beta_3 \Delta EIS/TA_{it} \times \Delta Competition\ law\ index_{it} + \delta \cdot \Delta Z_{ijt-1} + \lambda \cdot \Delta V_{jt-1} + Industry \times Year\ FE + \varepsilon_{ijt}, \quad (4)$$

where Δ is a first-difference operator; $\Delta EIS/TA_{ijt}$ is the change in equity issuance of firm i from year $t - 1$ to year t. Yearly changes in the baseline firm and country control variables are included in all models. The coefficient β_1 captures the extent to which funds raised via equity issuance are distributed to shareholders, i.e., equity recycling; the coefficient of interest is β_3, which gauges to what extent firms' equity recycling is affected by competition. The results are reported in Panel C of Table 11.

In column (1) where $\Delta Payout/TA$ is the dependent variable, the estimate on $\Delta EIS/TA$ is positive and significant, suggestive of significant equity recycling in our international sample and consistent with U.S. based evidence (e.g., Farre-Mensa and Ljungqvist, 2015). Importantly, the

estimate on *ΔCompetition law index* × *ΔEIS/TA* is small and statistically insignificant, indicating that equity recycling is not affected by competition. In columns (2) and (3), we replace *ΔPayout/TA* with *ΔDiv/TA* and *ΔRepur/TA*, respectively, as the dependent variables. The results are similar in that we find no significant interaction effect between changes in equity issuance and in competition law index. The absence of a significant interaction effect implies that competition does not make firms more constrained, which is inconsistent with the financial-constraint hypothesis.

4.4 Competition and Corporate Policies Surrounding Zero-Leverage Events

Our results from the previous section indicate that as competition increases, firms do not reduce payout and do not lower equity-recycling activities, which is inconsistent with them becoming more financially constrained. To glean more insights into the economic mechanisms, we take an alternative approach that focuses on all zero-leverage events within our sample, and we seek to better understand the underlying reasons as to why firms adopt zero-leverage policies.

To facilitate this event analysis, and to avoid capturing zero-leverage policies that are short-lived or transient in nature, we define a firm as having a zero-leverage event if its *Debt/TA* is positive in the past consecutive three years (i.e., year $t-3$, year $t-2$, and year $t-1$), and it becomes zero in year t and continues to have a zero leverage in the next two consecutive years (i.e., years $t+1$ and $t+2$). There are in total 709 zero-leverage events in 16 countries. We first estimate a full-sample logit regression modelling the likelihood of zero-leverage events as a function of the lagged baseline firm and country controls, and industry and year fixed effects, and obtain the estimated propensity scores.

In each year where there is at least one zero-leverage event, we retain all firms with no missing observations over the 6-year event window (i.e., from year $t-3$ to year $t+2$) and then

exclude control firms (i.e., firms without a zero-leverage event in the event year) with at least some years of zero leverage within the 6-year window (i.e., to retain only "clean" control firms (see Section 3.5)). We then match each treated firm (i.e., firms with a zero-leverage event) with a "clean" control firm from the same country and with the closest propensity score during the event year, requiring that the absolute differences in propensity score must not exceed 1%. This procedure yields a 6-year-long subsample consisting of the treated firms and matched "clean" control firms for each year with at least one zero-leverage event, i.e., each cohort. We then stack the observations across the cohorts and perform analysis on it. There are in total 691 matched pairs, spanning 15 countries.

Insert Table 12 about here

In Panel A of Table 12, we report the means in *Debt/TA*, *Cash/TA*, *Div/TA*, *Repur/TA*, and *EIS/TA* for the treated and matched "clean" control firms in event time. We observe noticeable increases in cash holdings, dividend payout, and share repurchases among the treated firms over the 6-year window, but no trends in these variables for the matched "clean" control firms. Specifically, the post-minus-pre changes in *Debt/TA*, *Cash/TA*, *Div/TA*, *Repur/TA*, and *EIS/TA* are 8.8 (0.3), 6.0 (-0.9), 0.2 (0.1), 0.8 (0.3), and -0.4 (-0.9) percentage points for the treated firms (matched "clean" control firms), respectively, and the DiD for *Debt/TA*, *Cash/TA*, *Div/TA*, and *Repur/TA* are statistically significant at the 1% level (based on standard errors clustered at the pair level). These statistics indicate that zero-leverage events coincide with increases in cash holdings, dividend payout, and share repurchases.

Although the increases in cash holdings are in line with both the financial-constraint hypothesis and financial-flexibility hypothesis, the increases in dividend payout and repurchases are inconsistent with increased financial constraints. Rather, the evidence suggests that firms

choosing to adopt zero leverage have surplus cash flow, which enables repayment of debt, increases in cash holdings, and increases in payout. The financial-constraint reason for adopting zero debt would be that the firm has no choice, because it is *unable* to continue borrowing. The flexibility reason for adopting zero debt implies that the firm chooses to repay debt when this is possible and convenient. The firm could have carried on borrowing had it wished to.

Our international evidence complements prior U.S. studies arguing that zero leverage or deleveraging is driven by the desire to restore financial flexibility (e.g., Strebulaev and Yang, 2013; DeAngelo et al., 2017). The findings thus add some confidence to our preferred interpretation that competition raises firms' propensity to use zero-leverage policies due to financial-flexibility considerations.

In Panel B, we perform additional tests examining whether, conditional on a zero-leverage event, the (post-minus-pre) changes in the above corporate policies can still be explained by changes in competition, after including the firm and country control variables.[9] For each matched pair, we compute the *abnormal* changes in *Cash/TA*, *Div/TA*, *Repur/TA*, and *EIS/TA* as the differences in the post-minus-pre changes between the treated and the matched "clean" control firms, i.e., the DiD in the four variables (i.e., $\Delta Cash/TA_{\text{DiD}}$, $\Delta Div/TA_{DiD}$, $\Delta Repur/TA_{DiD}$, and $\Delta EIS/TA_{DiD}$). After aggregating the data to the pair level, we estimate the following regression:

$$\Delta Corporate\ policy_{DiD\ ijt} = \beta_0 + \beta_1\, \Delta Competition\ law\ index_{jt} + \delta \cdot Z_{ijt\text{-}1} + \lambda \cdot V_{jt\text{-}1} + Industry \times Year\ FE + \varepsilon_{ijt}, \quad (5)$$

[9] An alternative approach is to estimate full-sample baseline tests that regress the above corporate policies on the competition laws, control variables, and fixed effects. However, in the full-sample estimation, although we may find that some corporate polices respond to changes in competition, it is not clear whether such changes in corporate policies can be linked to the increases in zero leverage we document. In our analysis based on zero-leverage events, we are able to establish a more direct link between zero leverage, changes in corporate policies, and changes in competition.

where $\Delta Corporate\ policy_{DiD\ ijt}$ is either one of the four *abnormal* policy variables, and $\Delta Competition\ law\ index_{jt}$ is the change in *Competition law index* from event year $t - 1$ to event year t. The same set of lagged firm and country control variables are included in the model. Standard errors are similarly clustered at the country level.

The estimation results are reported in Panel B of Table 12. In columns (1) to (4), we find that changes in *Competition law index* are positively and significantly associated with the abnormal changes in cash holdings, i.e., $\Delta Cash/TA_{\mathrm{DiD}}$, whereas its effects are insignificant on the abnormal changes in dividend payout, share repurchase, and equity issuance. This finding corroborates our earlier results that competition (1) induces firms to save more cash from cash flows, (2) does not lower firms' payout to shareholders, and (3) does not affect firms' equity-recycling activities, which rejects the financial-constraint hypothesis, leaving the financial-flexibility hypothesis the most likely explanation.

4.5 Competition and the Timing of Zero-Leverage Policies: Evidence from A Deleveraging Subsample

In this section, we seek to offer more evidence that competition leads firms to adopt zero-leverage policies due to a desire to raise or preserve financial flexibility. However, to directly test this explanation is inherently difficult because such a desire is hard to measure. To this end, we draw on recent empirical evidence by DeAngelo et al. (2017) that a substantial portion of firms have a tendency to deleverage to near-zero levels after reaching a historical peak leverage ratio in order to free up debt capacity for future investment opportunities. Based on this insight, we construct a "deleveraging sample" where firms are most likely to be deleveraging for flexibility motives and then perform a duration analysis on this subsample.

Specifically, for each firm, we identify the year during which its *Debt/TA* is the highest over the entire sample period, i.e., the peak year, and then retain its observations in the post-peak period up to ten years or up to the year where the firm's *Debt/TA* reaches zero. Observations of all firms whose *Debt/TA* is zero during the peak year are excluded.

Insert Table 13 about here

Panel A of Table 13 reports some descriptive statistics for the deleveraging subsample. There are in total 11,965 firms from 57 countries in the subsample; 1,614 firms from 33 countries reach zero leverage within the 10-year window. Among these zero-leverage firms, it takes about 3.3 years on average to reach zero leverage; we also report the means in *Debt/TA*, *Cash/TA*, *Div/TA*, *Repur/TA*, and *EIS/TA* for both the peak and zero-leverage years for the zero-leverage firms. Notably, mean *Debt/TA* has declined by 33.0 percentage points, while mean *Cash/TA* has increased by 8.8 percentage points. We also observe a moderate increase in both dividend payout (0.1 percentage points), share repurchases (0.4 percentage points), and equity issuance (3.0 percentage points). These statistics resemble those based on the U.S. sample by DeAngelo et al. (2017) and are consistent with our event analysis in Section 4.4 documenting an increase in cash and payout surrounding the zero-leverage events.

In this deleveraging subsample, we estimate a Cox (1972) proportional hazards model to examine whether and how changes in *Competition law index* affect the timing of firms' adoption of zero-leverage policies. Analyzing this subsample allows us to more confidently attribute the effect of competition on zero leverage, if any, to firms' deleveraging for financial-flexibility reasons. Moreover, firms that succeed in delevering persistently over time are less likely to be constrained than other firms that choose zero leverage. The regression model is written as follows:

$$\Pr(ZL) = \beta_0 + \beta_1 \Delta Competition\ law\ index_{jt-1} + \delta \cdot \Delta X_{ijt-1} + \gamma \cdot \Delta V_{jt-1} + Country\ FE + Industry\ FE + \varepsilon_{ijt}. \quad (6)$$

In equation (6), we examine the relation between the time to zero-leverage and the lagged changes in the competition law index, controlling for lagged baseline firm and country control variables in changes. Country and industry fixed effects are included to account for the effect of any persistent differences across countries and industries. Firm fixed effects are not included in the model as high-dimensional fixed effects may lead to the typical incidental- parameter problem, widely discussed in the econometrics literature (e.g., Ai and Norton, 2003; Greene, 2010). The estimation results are reported in Table 10. The coefficients on all variables except the fixed effects are reported.

In column (1) where all variables and industry fixed effects are included, the estimate on *ΔCompetition law index* is positive and significant at the 5% level. In column (2), we further include country fixed effects, finding that the results remain similar. Based on the estimates in column (2), a one-standard-deviation increase (0.062) in *ΔCompetition law index* is expected to raise the likelihood of zero leverage by 10.6 percentage points (= $\exp^{(0.062 \times 1.628)}$), implying that greater competition induces firms to progress to a zero-leverage status faster.

Overall, our results from the duration analysis in the deleveraging subsample suggest that firms' increased propensity to adopt zero-leverage policies following a larger increase in competition is likely to reflect their motives to enhance or preserve financial flexibility.

5. Conclusion

Exploiting plausibly exogenous variation in competition caused by staggered changes in competition laws across countries and over time, we find that competition leads to an increase in

firms' propensity to use zero-leverage policies. The results are robust to using alternative measures of zero leverage, samples, and estimation approaches, and they also survive various additional endogeneity tests.

Heterogeneity tests show that the positive effect of competition on debt conservatism is more pronounced among firms that are more financially constrained. Further tests show that competition induces firms to save more cash out of cash flows. Competition does not explain the Whited and Wu (2006) index of financial constraint and payout policies, but it significantly reduces firms' propensity to cut and "omit" a dividend. An event analysis focusing only on the zero-leverage events reveals that such events are accompanied by increases in cash holdings, payout, and equity issuance. Moreover, conditional on the zero-leverage events, changes in competition are positively associated with abnormal changes in cash but not payout and equity issuance.

Finally, we construct a "deleveraging" subsample by retaining the 10 years of observations after firms reach their peak level of leverage and argue that firms are more likely to deleverage for financial-flexibility purposes in the post-peak period (DeAngelo et al., 2017). Our duration analysis estimated on this subsample shows that changes in competition are associated with a higher likelihood of firms adopting zero-leverage policies in this subsample.

Overall, our evidence shows consistently that competition leads to greater debt conservatism in our international setting via increasing firms' desire for financial flexibility. Our paper sheds new light on the determinants of firms' zero-leverage policies and reveals a positive real effect of competition on firms' conservatism in debt policies.

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Table 1
Descriptive Statistics by Country

This table provides the descriptive statistics by country. Our main data sources are Compustat Global and Compustat North American Fundamental Annual Databases for the non-U.S. and U.S. firms, respectively. Our sample consists of 169,571 firm-year observations from 25,784 firms over the period from 1988 to 2010. There are 58 countries in total. We report the number of observations, unique firms, the proportion of firm-year observations with zero leverage, and the mean values of the competition law index and its five subcomponents for each country. The detailed definitions of the variables can be found in Appendix A.1.

Countries	Obs.	%	# of firms	%	*ZL*	*Competition law index*	*Authority*	*Substance*	*Merger control*	*Abuse of dominance*	*Anticompetitive Agreements*
Australia	3,616	2.1%	666	2.6%	9.7%	0.68	0.80	0.53	0.50	0.53	0.62
Austria	199	0.1%	47	0.2%	3.5%	0.75	0.79	0.67	0.50	0.88	0.64
Bahrain	49	0.0%	10	0.0%	61.2%	0.00	0.00	0.00	0.00	0.00	0.00
Bangladesh	62	0.0%	32	0.1%	12.9%	0.00	0.00	0.00	0.00	0.00	0.00
Belgium	270	0.2%	72	0.3%	0.7%	0.60	0.57	0.66	0.63	0.78	0.60
Brazil	529	0.3%	182	0.7%	4.0%	0.84	0.86	0.77	0.38	0.94	0.90
Bulgaria	12	0.0%	10	0.0%	0.0%	0.73	0.84	0.56	0.63	0.77	0.40
Canada	2,532	1.5%	405	1.6%	14.1%	0.81	0.89	0.67	0.35	0.56	1.00
Chile	186	0.1%	71	0.3%	2.2%	0.49	0.61	0.39	0.13	0.42	0.70
China	11,340	6.7%	1,828	7.1%	7.9%	0.52	0.55	0.53	0.30	0.70	0.63
Colombia	23	0.0%	15	0.1%	0.0%	0.74	0.63	0.86	0.75	0.81	0.90
Croatia	24	0.0%	12	0.0%	8.3%	0.55	0.48	0.66	0.78	0.82	0.44
Cyprus	35	0.0%	21	0.1%	2.9%	0.75	0.71	0.77	0.88	0.81	0.60
Denmark	577	0.3%	116	0.4%	4.5%	0.19	0.13	0.28	0.32	0.30	0.22
Egypt, Arab Rep.	19	0.0%	10	0.0%	15.8%	0.36	0.39	0.41	0.38	0.56	0.43
Finland	333	0.2%	99	0.4%	6.9%	0.65	0.57	0.75	0.75	0.70	0.75
France	1,216	0.7%	401	1.6%	1.2%	0.78	0.86	0.65	0.63	0.75	0.60
Germany	1,974	1.2%	482	1.9%	9.5%	0.69	0.79	0.56	0.63	0.79	0.37
Greece	544	0.3%	162	0.6%	7.2%	0.54	0.53	0.58	0.38	0.81	0.60
Hungary	42	0.0%	15	0.1%	11.9%	0.83	0.81	0.80	0.88	0.88	0.63
India	3,518	2.1%	1,025	4.0%	7.0%	0.75	0.80	0.66	0.34	0.70	0.90
Indonesia	844	0.5%	196	0.8%	8.4%	0.50	0.42	0.59	0.45	0.50	0.73
Ireland	208	0.1%	46	0.2%	12.5%	0.85	0.86	0.79	0.88	0.85	0.61
Israel	344	0.2%	134	0.5%	11.3%	0.88	0.93	0.75	0.88	0.89	0.50
Italy	701	0.4%	208	0.8%	2.4%	0.66	0.57	0.77	1.00	0.81	0.50
Japan	23,640	13.9%	3,291	12.8%	8.9%	0.99	0.93	0.97	0.86	0.94	0.95
Kenya	102	0.1%	24	0.1%	12.7%	0.78	0.64	0.93	0.88	0.75	1.00
Korea, Rep.	3,551	2.1%	638	2.5%	2.7%	0.69	0.64	0.75	0.65	0.88	0.70
Kuwait	19	0.0%	12	0.0%	5.3%	0.00	0.00	0.00	0.00	0.00	0.00
Luxembourg	45	0.0%	14	0.1%	2.2%	0.25	0.21	0.42	0.13	0.75	0.50
Malaysia	5,372	3.2%	862	3.3%	11.4%	0.03	0.04	0.02	0.01	0.05	0.02

Mexico	117	0.1%	43	0.2%	17.9%	0.80	0.71	0.88	0.77	0.81	0.92
Morocco	88	0.1%	37	0.1%	8.0%	0.78	0.86	0.65	0.63	0.63	0.70
Netherlands	545	0.3%	123	0.5%	10.1%	0.24	0.22	0.38	0.75	0.53	0.10
New Zealand	418	0.2%	90	0.3%	3.8%	0.70	0.88	0.45	0.59	0.50	0.40
Nigeria	162	0.1%	51	0.2%	17.3%	0.00	0.00	0.00	0.00	0.00	0.00
Norway	778	0.5%	156	0.6%	10.2%	0.54	0.46	0.68	0.88	0.56	0.61
Oman	162	0.1%	39	0.2%	25.9%	0.00	0.00	0.00	0.00	0.00	0.00
Pakistan	654	0.4%	151	0.6%	12.4%	0.49	0.44	0.60	0.54	0.62	0.67
Peru	61	0.0%	28	0.1%	19.7%	0.57	0.61	0.56	0.13	0.72	0.83
Philippines	350	0.2%	101	0.4%	16.3%	0.66	0.87	0.39	0.17	0.62	0.51
Poland	122	0.1%	65	0.3%	12.3%	0.56	0.48	0.71	0.67	0.83	0.62
Portugal	128	0.1%	35	0.1%	0.0%	0.62	0.56	0.72	0.74	0.69	0.70
Qatar	32	0.0%	13	0.1%	21.9%	0.30	0.21	0.52	0.53	0.64	0.48
Saudi Arabia	207	0.1%	58	0.2%	48.8%	0.70	0.69	0.65	0.68	0.58	0.63
Singapore	2,587	1.5%	493	1.9%	7.1%	0.36	0.36	0.34	0.30	0.35	0.35
Slovenia	21	0.0%	12	0.0%	9.5%	0.87	0.93	0.74	0.50	1.00	0.70
South Africa	977	0.6%	201	0.8%	9.2%	0.66	0.83	0.44	0.32	0.69	0.44
Spain	391	0.2%	96	0.4%	0.3%	0.65	0.58	0.75	0.88	0.91	0.49
Sri Lanka	316	0.2%	101	0.4%	2.8%	0.28	0.45	0.18	0.24	0.34	0.22
Sweden	1,095	0.6%	235	0.9%	15.3%	0.54	0.60	0.50	0.44	0.69	0.47
Switzerland	1,347	0.8%	185	0.7%	3.9%	0.61	0.69	0.51	0.55	0.73	0.37
Thailand	742	0.4%	249	1.0%	10.6%	0.62	0.54	0.75	0.69	0.80	0.73
Turkey	130	0.1%	60	0.2%	5.4%	0.68	0.57	0.81	0.88	0.81	0.70
United Arab Emirates	34	0.0%	22	0.1%	14.7%	0.00	0.00	0.00	0.00	0.00	0.00
United Kingdom	5,450	3.2%	1,177	4.6%	12.6%	0.82	0.86	0.72	0.78	0.68	0.68
United States	90,690	53.5%	10,820	42.0%	14.1%	0.70	0.79	0.58	0.88	0.56	0.40
Vietnam	41	0.0%	37	0.1%	4.9%	0.59	0.50	0.72	0.50	0.94	0.70
Total	169,571	100.0%	25,784	100.0%	11.7%	0.56	0.56	0.55	0.51	0.62	0.53

Table 2
Summary Statistics

This table reports summary statistics of the main variables used in our study at both the firm- and country levels. The number of observations, means, standard deviations, and percentile statistics are reported. The detailed definitions of the variables can be found in Appendix A.1.

	Obs.	Mean	Stdev.	25%	Median	75%
Firm-year level						
ZL	169,571	0.117	0.321	0.000	0.000	0.000
ZL (Book leverage<2.5%)	169,571	0.207	0.405	0.000	0.000	0.000
Debt/TA	169,571	0.230	0.201	0.048	0.203	0.357
Competition law index	169,571	0.706	0.203	0.701	0.701	0.736
ΔCompetition law index	169,571	0.006	0.066	0.000	0.000	0.000
Size (in million USD)	169,571	1,768.020	21,458.500	37.594	141.675	576.450
ln(Size)	169,571	5.052	1.996	3.627	4.954	6.357
Market-to-book ratio	169,571	1.284	1.533	0.402	0.770	1.514
ROA	169,571	0.078	0.165	0.048	0.101	0.156
Asset tangibility	169,571	0.311	0.226	0.125	0.265	0.452
Div/TA	169,571	0.012	0.022	0.000	0.003	0.015
R&D/Sale	169,571	0.100	0.490	0.000	0.000	0.021
Capx/TA	169,571	0.060	0.063	0.019	0.041	0.077
Cash/TA	169,571	0.166	0.187	0.033	0.098	0.225
Taxes/TA	169,571	0.020	0.029	0.001	0.014	0.032
Non-debt tax shield/TA	169,571	0.042	0.031	0.022	0.036	0.054
Country-year level						
Competition law index	658	0.588	0.275	0.517	0.678	0.782
Authority	658	0.606	0.294	0.500	0.643	0.857
Substance	658	0.563	0.272	0.488	0.628	0.767
Merger control	658	0.528	0.325	0.125	0.625	0.875
Abuse of dominance	658	0.623	0.289	0.563	0.750	0.813
Anticompetitive Agreements	658	0.553	0.290	0.400	0.600	0.700
CPI growth	658	0.039	0.032	0.017	0.029	0.054
GDP growth	658	0.036	0.033	0.017	0.037	0.055
ln(GDP per capita)	658	9.597	1.255	8.736	10.058	10.612
Private credit/GDP	658	0.836	0.468	0.400	0.769	1.134
Stocks traded/GDP	658	0.453	0.522	0.089	0.261	0.599
Market capitalization/GDP	658	0.726	0.518	0.328	0.576	0.994

Table 3
Pre-Existing Zero Leverage and Competition Laws

In this table, we examine whether pre-existing firms' zero leverage policies explain the competition law index. The analysis is performed at the country-year level. The dependent variable is the competition law index (*Competitive law index*). ZL_{t-1} and ZL_{t-2} are one-year- and two-year-lagged average *ZL* for a given country-year. *ZL* is a dummy variable that is equal to one for firm-years with zero leverage and zero otherwise. Lagged firm-level control variables include the natural logarithm of total firm sales (*ln(Size)*), market-to-book equity ratios (*Market-to-book ratio*), profitability (*ROA*), the proportion of property, plant, and equipment in total assets (*Asset tangibility*), a dividend-payer dummy variable, R&D intensity (*R&D/Sale*), capital investment (*Capx/TA*), cash holdings (*Cash/TA*), the ratio of income taxes to total assets (*Tax/TA*), and the ratio of non-debt tax shield to total assets (*Non-debt tax shield/TA*). All lagged baseline firm control variables are aggregated to the country level. Lagged country-level control variables include the annual percentage growth rates in consumer price index (*ΔCPI*) and GDP (*ΔGDP*), the natural logarithm of GDP per capita (*ln(GDP per capita)*), the ratio of total credit to the private sector by banks to GDP (*Private credit/GDP*), the ratio of total values of stocks traded to GDP (*Stocks traded/GDP*), and the ratio of total market capitalization to GDP. The detailed definitions of all variables can be found in Table A.1 of the Appendix. *T*-statistics based on country-clustered robust standard errors are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Competition law index					
	(1)	(2)	(3)	(4)	(5)	(6)
ZL_{t-1}	-0.238	-0.181	-0.174	-0.182	-0.138	-0.163
	(-1.426)	(-1.005)	(-1.031)	(-1.060)	(-0.835)	(-1.020)
ZL_{t-2}				-0.064	-0.051	-0.013
				(-0.480)	(-0.395)	(-0.090)
ln(Size)		-0.018	-0.023		-0.018	-0.023
		(-1.157)	(-1.530)		(-1.158)	(-1.526)
Market-to-book ratio		-0.000	-0.000		-0.000	-0.000
		(-0.509)	(-0.489)		(-0.508)	(-0.488)
ROA		0.095	0.110		0.093	0.110
		(1.169)	(1.354)		(1.177)	(1.377)
Asset tangibility		0.031	0.001		0.028	0.001
		(0.127)	(0.003)		(0.116)	(0.002)
Div/TA		-0.033	0.047		-0.030	0.047
		(-0.347)	(0.576)		(-0.325)	(0.584)
R&D/Sale		-0.018**	-0.017**		-0.018**	-0.017**
		(-2.393)	(-2.496)		(-2.386)	(-2.493)
Capx/TA		0.242	0.126		0.256	0.130
		(0.633)	(0.350)		(0.646)	(0.353)
Cash/TA		-0.150	-0.340		-0.149	-0.339
		(-0.283)	(-0.657)		(-0.279)	(-0.648)
Taxes/TA		2.403	2.003		2.396	2.001
		(1.460)	(1.336)		(1.448)	(1.322)
Non-debt tax shield/TA		-0.512	-0.882		-0.523	-0.881
		(-0.337)	(-0.626)		(-0.348)	(-0.624)
CPI growth			0.562**			0.563**
			(2.081)			(2.060)
GDP growth			-0.255			-0.255
			(-0.651)			(-0.660)
ln(GDP per capita)			0.184			0.183
			(0.940)			(0.901)

Private credit/GDP			-0.055			-0.055
			(-0.624)			(-0.621)
Stocks traded/GDP			0.029			0.029
			(0.699)			(0.705)
Market capitalization/GDP			0.068**			0.068**
			(2.234)			(2.236)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	677	677	677	677	677	677
R-squared	0.833	0.841	0.851	0.833	0.841	0.851

Table 4
Competition Laws and Industry Competition

This table reports results from regressions examining the effect of the competition law index on industry sales concentration and the number of firms in an industry. The analysis is performed at the industry-country-year level. The industry classification is the 3-digit SIC industry classification. The dependent variable is the log of industry sales Herfindahl–Hirschman index (*ln(HHI)*) and log number of firms in a given industry-country-year bin. The main independent variable of interest is the one-year lagged competition law index (*Competition law index*), which is a country-level measure of the stringency of competition regulations compiled by Bradford and Chilton (2018). The lagged baseline firm control variables (aggregated to the industry-country-year level) and country control variables are included in the models. The detailed definitions of all variables can be found in Table A.1 of the Appendix. *T*-statistics based on country-clustered robust standard errors are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	ln(HHI)				*ln(# of firms)*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Competition law index	-0.245***	-0.243***	-0.159**	-0.144**	0.467**	0.467***	0.268**	0.250***
	(-2.683)	(-2.780)	(-2.646)	(-2.543)	(2.659)	(2.755)	(2.580)	(2.759)
ln(Size)		0.031***	0.030***	0.029***		-0.027	-0.023	-0.018
		(3.854)	(4.085)	(3.994)		(-1.313)	(-1.297)	(-1.176)
Market-to-book ratio		0.007	0.005	0.003		-0.003	-0.001	-0.000
		(0.760)	(0.572)	(0.266)		(-0.258)	(-0.042)	(-0.034)
ROA		-0.177**	-0.155**	-0.165*		0.088	0.038	0.068
		(-2.664)	(-2.171)	(-1.784)		(0.684)	(0.262)	(0.470)
Asset tangibility		-0.227***	-0.224***	-0.248***		0.220**	0.217**	0.244**
		(-3.841)	(-3.802)	(-3.845)		(2.517)	(2.503)	(2.500)
Div/TA		-0.233	-0.239	-0.234		0.077	0.076	0.206
		(-0.672)	(-0.720)	(-0.629)		(0.155)	(0.161)	(0.394)
R&D/Sale		0.065	0.060	0.016		0.025	0.036	0.099*
		(1.329)	(1.270)	(0.316)		(0.375)	(0.563)	(1.738)
Capx/TA		-0.029	-0.046	0.021		0.275	0.298	0.218
		(-0.233)	(-0.375)	(0.203)		(1.334)	(1.499)	(1.450)
Cash/TA		-0.069	-0.060	-0.053		0.169*	0.151	0.157
		(-1.363)	(-1.227)	(-1.016)		(1.759)	(1.619)	(1.443)
Taxes/TA		0.275	0.262	0.315		-0.686	-0.678	-0.847
		(0.948)	(0.947)	(0.878)		(-1.488)	(-1.560)	(-1.569)
Non-debt tax shield/TA		0.424	0.471	0.451		-0.186	-0.278	-0.241
		(1.299)	(1.469)	(1.456)		(-0.481)	(-0.733)	(-0.521)
ΔCPI			0.665	0.506			-0.914	-0.785
			(1.442)	(1.304)			(-1.315)	(-1.275)
ΔGDP			0.552**	0.363**			-0.946**	-0.767**
			(2.469)	(2.018)			(-2.368)	(-2.507)
ln(GDP per capita)			-0.442**	-0.370**			0.860***	0.767***
			(-2.509)	(-2.186)			(3.229)	(3.134)
Private credit/GDP			0.058	0.027			-0.181**	-0.143*
			(1.084)	(0.538)			(-2.315)	(-1.852)
Stocks traded/GDP			0.082***	0.058**			-0.187***	-0.158**
			(2.957)	(2.075)			(-3.338)	(-2.510)
Market capitalization/GDP			-0.023	-0.020			0.070	0.058
			(-0.525)	(-0.521)			(0.939)	(0.940)
Industry FE	Yes	Yes	Yes		Yes	Yes	Yes	
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes		Yes	Yes	Yes	
Industry × Year FE				Yes				Yes
Observations	30,421	30,421	30,421	30,421	30,421	30,421	30,421	30,421
R-squared	0.451	0.457	0.459	0.534	0.583	0.585	0.590	0.641

Table 5
Competition and Zero-Leverage Policies

This table reports the estimation results from the baseline linear probability model regressions examining the effect of the competition laws on the incidence of zero leverage. The dependent variable is *ZL*, a dummy variable equal to one if the firm has zero leverage in the current year and zero otherwise. The main independent variable of interest is the competition law index (*Competition law index*), which is a country-level measure of the stringency of competition regulations compiled by Bradford and Chilton (2018). The lagged based firm- and country-level control variables are included. The detailed definitions of all variables can be found in Table A.1 of the Appendix. Industry effects are constructed based on Fama-French 48 industry classification. *T*-statistics based on country-clustered robust standard errors are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	ZL		
	(1)	(2)	(3)
Competition law index	0.026***	0.041***	0.036**
	(2.915)	(3.348)	(2.540)
ln(Size)		-0.015***	-0.015***
		(-10.400)	(-11.484)
Market-to-book ratio		0.010***	0.010***
		(13.615)	(12.519)
ROA		0.030***	0.030***
		(2.996)	(3.037)
Asset tangibility		-0.057**	-0.057**
		(-2.547)	(-2.570)
Div/TA		0.617***	0.629***
		(10.894)	(12.500)
R&D/Sale		-0.006***	-0.006***
		(-4.255)	(-4.231)
Capx/TA		-0.090***	-0.089***
		(-5.276)	(-5.470)
Cash/TA		0.313***	0.314***
		(34.173)	(35.852)
Tax/TA		0.299***	0.298***
		(8.677)	(8.405)
Non-debt tax shield/TA		0.026	0.030
		(0.763)	(0.926)
ΔCPI			0.115
			(1.014)
ΔGDP			0.063
			(0.898)
ln(GDP per capita)			0.016
			(0.621)
Private credit/GDP			0.007
			(0.787)
Stocks traded/GDP			0.006
			(1.442)
Market capitalization/GDP			-0.011*
			(-1.849)
Firm FE	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes
Observations	169,571	169,571	169,571
R-squared	0.603	0.615	0.615

Table 6
Change-On-Change Regressions

This table report results from regressions based on the alternative change-on-change model specification. The dependent variable is the yearly changes in *ZL*, which is a dummy variable that is equal to one if the firm has zero leverage in the current year and zero otherwise. Δ*Competition law index* is the yearly changes in the competition law index (*Competition law index*), which is a country-level measure of the stringency of competition regulations compiled by Bradford and Chilton (2018). Δ*Competition law index*$_{Dummy}$ is a categorical variable that takes on a value of 1 if there is an increase in *Competition law index* from the previous year to the current year, a value of -1 if there is a decrease in *Competition law index* from the previous to the current year, and 0 for no changes in *Competition law index*. *+ve* Δ*Competition law index*$_{Dummy}$ (*-ve* Δ*Competition law index*$_{Dummy}$) is a decomposed version of Δ*Competition law index*$_{Dummy}$ that takes on the value of 1 (-1) if there is an increase (decrease) in *Competition law index* from the previous year to the current year, and zero otherwise. Δ*Competition law index*$_{Dummy}^{at\ t\ =\ -2}$ (Δ*Competition law index*$_{Dummy}^{at\ t\ =\ -1}$) is a categorical variable that takes on the value of 1 if there is an increase in *Competition law index* two years (one year) later, a value of -1 if there is a decrease in *Competition law index* two years (one year) later, and 0 if there is no change in *Competition law index* two years (one year) later. The yearly changes in the lagged based firm- and country-level control variables are included. The detailed definitions of all variables can be found in Table A.1 of the Appendix. Industry effects are constructed based on Fama-French 48 industry classification. *T*-statistics based on country-clustered robust standard errors are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Δ*ZL*				
	(1)	(2)	(3)	(4)	(5)
Δ*Competition law index*	0.038***				
	(2.832)				
Δ*Competition law index*$_{Dummy}^{at\ t\ =\ -2}$					0.002
					(1.310)
Δ*Competition law index*$_{Dummy}^{at\ t\ =\ -1}$					-0.001
					(-0.650)
Δ*Competition law index*$_{Dummy}$		0.013***	0.014***		0.009***
		(3.897)	(4.271)		(3.817)
+ve Δ*Competition law index*$_{Dummy}$ (a)				0.009***	
				(3.033)	
-ve Δ*Competition law index*$_{Dummy}$ (b)				0.017***	
				(3.304)	
H0: (a)=(b), *p*-value				[0.177]	
ΔFirm controls	Yes	Yes	Yes	Yes	Yes
ΔCountry controls	Yes	Yes	Yes	Yes	Yes
Firm FE			Yes		
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
Observations	139,187	139,187	139,187	139,187	120,421
R-squared	0.008	0.008	0.105	0.008	0.009

Table 7
Alternative Stacked and Matching Approaches

This table reports results based on an alternative stacked approach as well as the propensity score matching approach. In Panel A, in each year *t* where the competition law index changes in at least one country, we retain all firm-year observations in the 3 years before and after the event year (for each firm, we require that it has an observation during the event year and at least one observation before and after the event year) and then remove all control firms (i.e., firms in countries without a law index change) that have already experienced or will experience a change in the competition law index within the 7-year event window. This procedure yields a 7-year subsample for each year with some law index changes, i.e., a "cohort," consisting of all treated firms and clean "control" firms. We stack the firm-year observations across the stacked sample, estimate the baseline tests on the stacked sample, and report these results in Panel A. Panels B to C report results based on the matching approach. We estimate a full-sample logit regression modelling the likelihood of firms in receiving a change in the competition law index as a function of the lagged baseline firm and country controls as well as industry and year fixed effects. Using the estimated propensity scores, for each firm receiving a law index change, we match it with a "clean" control firm within the same economic region and has the closest propensity score during the event year (absolute differences in propensity score must not exceed 1%). We retain the observations in the 3 years before and after the event year for the matched pairs (all firms must have an available observation during the event year and at least one observation before and after the event year), stack the firm-year observations across the cohorts, and perform the baseline tests on the stacked matched sample. Panel B reports the differences in mean in lagged *ZL* (in level and changes) and the baseline firm and country control variables between the treated and matched "clean" control firms during the pretreatment year, along with their respective two-sample *t*-statistics and standardized differences. Panel C reports estimation results from the baseline DiD tests estimated on the stacked matched sample. In both Panels A and C, all models include firm-cohort and industry-year-cohort interacted fixed effects. *T*-statistics based on robust standard errors clustered at the country level are reported in parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Stacked Approach

	ZL		
	(1)	(2)	(3)
Competition law index	0.027***	0.032***	0.041***
	(3.689)	(3.876)	(3.070)
Firm controls		Yes	Yes
Country controls			Yes
Firm × Cohort FE	Yes	Yes	Yes
Industry × Year × Cohort FE	Yes	Yes	Yes
Observations	508,625	508,625	508,625
R-squared	0.699	0.703	0.703

Panel B. Differences in Firm and Country Characteristics Prior to Treatment

	Treated	Control	T - C	*t*-statistics	Standardized differences
ΔZL_{t-1}	0.005	0.006	-0.001	-0.144	-0.005
ZL_{t-1}	0.083	0.100	-0.018	-1.082	-0.061
ln(Size)	4.999	4.643	0.356	1.113	0.189
Market-to-book ratio	1.016	0.991	0.024	0.162	0.019
ROA	0.099	0.098	0.001	0.068	0.007
Asset tangibility	0.371	0.351	0.020	0.795	0.087
Div/TA	0.021	0.021	0.000	-0.027	-0.004
R&D/Sale	0.028	0.027	0.001	0.047	0.003
Capx/TA	0.058	0.058	0.000	0.093	0.005
Cash/TA	0.135	0.136	-0.001	-0.136	-0.010
Tax/TA	0.019	0.018	0.001	0.424	0.044
Non-debt tax shield/TA	0.039	0.039	0.000	0.068	0.008
ΔCPI	0.030	0.029	0.001	0.156	0.040
ΔGDP	0.039	0.032	0.008	0.486	0.167
ln(GDP per capita)	9.386	9.469	-0.083	-0.199	-0.066
Private credit/GDP	1.056	1.029	0.027	0.308	0.077
Stocks traded/GDP	0.607	0.560	0.047	0.367	0.104
Market capitalization/GDP	0.794	0.857	-0.063	-0.349	-0.128

Panel C. Matched DiD Estimates

	ZL		
	(1)	(2)	(3)
Competitive law index	0.043*	0.045***	0.029**
	(2.111)	(3.223)	(2.102)
Firm controls		Yes	Yes
Country controls			Yes
Firm × Cohort FE	Yes	Yes	Yes
Industry × Year × Cohort FE	Yes	Yes	Yes
Observations	19,958	19,958	19,958
R-squared	0.751	0.755	0.756

Table 8
Competition and Zero-Leverage Policies: Component Analysis

This table reports results from regressions examining the effect of the components and subcomponents of the competition law index on the incidence of zero leverage. The dependent variable is *ZL*, a dummy variable equal to one if the firm has a zero leverage in the current year and zero otherwise. *Authority* and *Substance* are the two component indexes of *Competitive law index*, which is defined as the average of the two. *Merger control*, *Abuse of dominance*, and *Anticompetitive agreements* are the three subcomponents of *Substance*, which is defined as the average of the three. The definitions of these component indexes can be found in Appendix A.1. The same set of baseline firm and country control variables and fixed effects are included in all models. *T*-statistics based on country-clustered robust standard errors are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	ZL			
	(1)	(2)	(3)	(4)
Authority	0.021*		0.003	0.002
	(1.778)		(0.263)	(0.180)
Substance		0.043**	0.041**	
		(2.614)	(2.116)	
Merger control				0.037***
				(3.875)
Abuse of dominance				-0.008
				(-0.424)
Anticompetitive Agreements				0.003
				(0.120)
Firm controls	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes
Observations	169,571	169,571	169,571	169,571
R-squared	0.615	0.615	0.615	0.615

Table 9
Heterogeneity By Financial Constraints

This table reports results from tests examining the heterogeneous effect of competition according to two proxies of financial constraints. The dependent variable is *ZL*, a dummy variable equal to one if the firm has zero leverage in the current year and zero otherwise. The main independent variable of interest is the competition law index (*Competition law index*), which is a country-level measure of the stringency of competition regulations compiled by Bradford and Chilton (2018). *Non-dividend dummy* is a dummy variable equal to one for non-dividend paying firms and zero otherwise. *WW* is the Whited and Wu (2006) index of financial constraints, computed as -0.091 times cash flow (scaled by total assets), minus 0.062 times a dividend dummy variable, plus 0.021 times long-term leverage (scaled by total assets), minus 0.044 times the natural logarithm of total assets, plus 0.102 times industry (2-digit SIC industries) sales growth, and minus 0.035 times sales growth. *High WW* is a dummy variable equal to one if a firm's *WW* is above sample median within a country-year bin. The lagged based firm- and country-level control variables are included; in columns (3) and (6), we further include the interaction between the control variables and the dividing variables. The detailed definitions of all variables can be found in Table A.1 of the Appendix. Industry effects are constructed based on Fama-French 48 industry classification. *T*-statistics based on country-clustered robust standard errors are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	ZL					
	Dividend payer		Full sample	*WW*		Full sample
	No	Yes		High	Low	
	(1)	(2)	(3)	(4)	(5)	(6)
Competition law index	0.095***	0.030	0.030	0.072***	-0.000	-0.000
	(4.066)	(1.547)	(1.547)	(3.468)	(-0.022)	(-0.022)
Competition law index × Non-dividend dummy			0.065*			
			(1.862)			
Competition law index × High WW						0.073***
						(2.699)
Firm controls	Yes	Yes	Yes[1]	Yes	Yes	Yes[1]
Country controls	Yes	Yes	Yes[1]	Yes	Yes	Yes[1]
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	77,366	92,205	169,571	77,555	77,881	155,436
R-squared	0.589	0.691	0.636	0.650	0.675	0.665

[1]Interacted with the dividing variable

Table 10
Competition and the Cash-Flow Sensitivity of Cash

This table reports results from tests examining the relation between competition and the cash-flow sensitivity of cash. The dependent variable is the yearly changes in cash holdings divided by total assets (Δ*Cash/TA*). *Cash flow/TA* is the sum of income before extraordinary items and depreciation and amortization, divided by total assets. The main independent variable of interest is the competition law index (*Competition law index*), which is a country-level measure of the stringency of competition regulations compiled by Bradford and Chilton (2018). Lagged firm controls include Tobin's q, the natural logarithm of total assets (in $USD), capital expenditure (scaled by total assets), acquisition expenditure (scaled by total assets), and yearly changes in net working capital and short-term debt (both scaled by total assets). The lagged baseline country control variables are included in some models. The detailed definitions of all variables can be found in Table A.1 of the Appendix. Industry effects are constructed based on Fama-French 48 industry classification. *T*-statistics based on country-clustered robust standard errors are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Δ*Cash/TA*			
	(1)	(2)	(3)	(4)
Cash flow/TA	0.127***	0.207***	0.210***	0.221***
	(7.108)	(8.483)	(8.551)	(7.766)
Competition law index	-0.007**	0.003	0.000	-0.015
	(-2.007)	(0.429)	(0.040)	(-1.462)
Cash flow/TA × Competition law index	0.129***	0.083***	0.081***	0.103***
	(5.558)	(3.514)	(3.461)	(3.136)
Firm controls		Yes	Yes	Yes
Country controls			Yes	Yes
Firm FE				Yes
Industry × Year FE	Yes	Yes	Yes	Yes
Observations	217,335	217,335	217,335	217,335
R-squared	0.162	0.212	0.212	0.360

Table 11
Competition, Financial Constraints, and Payout

This table reports results from tests examining the effect of competition on financial constraints and payout policies. In Panel A, the dependent variables are the Whited and Wu (2006) index of financial constraints (*WW*) and a rank-transformed variable of *WW* (WW_{Rank}). WW_{Rank} is computed by dividing firms into 100 groups based on WW within each country-year bin, then assigning the rank to each firm, and dividing the rank variable by 100. In Panel B, the dependent variable is the proportion of share repurchases in total assets (*Repur/TA*). In both Panels A and B, the main independent variable of interest is the competition law index (*Competition law index*), which is a country-level measure of the stringency of competition regulations compiled by Bradford and Chilton (2018). The lagged baseline firm and country control variables are included in all models. In Panel C, we estimate change-on-change regressions regressing the changes in total payout (Δ*Payout/TA*), dividend (Δ*Div/TA*), and repurchases (Δ*Repur/TA*) (all scaled by total assets) on the changes in the competition law index (Δ*Competition law index*), the changes in equity issuance (scaled by total assets) (Δ*EIS/TA*), and their interaction, the yearly changes in the lagged baseline firm and country control variables, and industry-year interacted fixed effects. The detailed definitions of all variables can be found in Table A.1 of the Appendix. Industry effects are constructed based on Fama-French 48 industry classification. *T*-statistics based on country-clustered robust standard errors are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Competition and Financial Constraint

	WW	WW_{Rank}
	(1)	(2)
Competition law index	0.033	0.042
	(1.221)	(0.898)
Firm controls	Yes	Yes
Country controls	Yes	Yes
Firm FE	Yes	Yes
Industry × Year FE	Yes	Yes
Observations	169,277	169,277
R-squared	0.602	0.715

	Repur/TA
	(1)
Competition law index	0.001
	(0.380)
Firm controls	Yes
Country controls	Yes
Firm FE	Yes
Industry × Year FE	Yes
Observations	163,899
R-squared	0.376

Panel C. Total Payout, Competition, and Equity Issuance

	Δ*Payout/TA*	Δ*Div/TA*	Δ*Repur/TA*
	(1)	(2)	(3)
Δ*Competition law index*	0.001	0.001	-0.001
	(0.254)	(0.573)	(-0.815)
Δ*EIS/TA*	0.012***	0.000	0.009***
	(4.056)	(0.677)	(4.748)
Δ*Competition law index* × Δ*EIS/TA*	-0.007	0.000	-0.003
	(-0.233)	(0.021)	(-0.413)
ΔFirm controls	Yes	Yes	Yes
ΔCountry controls	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes
Observations	135,382	135,382	135,382
R-squared	0.027	0.017	0.026

Table 12
Competition and Corporate Policies Surrounding Zero-Leverage Events

This table reports results from analysis focusing only on the zero-leverage events. We define a firm as having a zero-leverage event if its *Debt/TA* are positive in years $t-3$, $t-2$, and $t-1$, but it is zero in years t, $t+1$, and $t+2$. In each year where there are at least one zero-leverage event, we keep only firms with no missing observations over a 6-year event window (i.e., from 3 years before to 2 years after the event year) and further exclude control firms (i.e., firms without a zero-leverage event in the event year) with at least some years of zero leverage within the 6-year window. We estimate a full-sample logit regression modelling the likelihood of firms in receiving a change in the competition law index as a function of the lagged baseline firm and country controls as well as industry and year fixed effects. Using the estimated propensity score, for each firm with a zero-leverage event, we match it with a "clean" control firm from the same country and has the closest propensity score during the event year (absolute differences in propensity score must not exceed 1%). We then stack the firm-year observations across the cohorts and perform analysis on it. In Panel A, we examine the means in *Debt/TA*, cash holdings (*Cash/TA*), dividend and repurchases (*Div/TA* and *Repur/TA*), and equity issuance (*EIS/TA*) in event time surrounding the zero-leverage events for both the treated and matched "clean" control firms. We also compute the post-minus-pre differences in these variables as well as their difference-in-differences (DiD) estimates, along with *t*-statistics based on firm-clustered standard errors (in parentheses). In Panel B, for each treated firm in each zero-leverage event, we compute its abnormal corporate-policy variables in relation to cash holdings ($\Delta Cash/TA_{DiD}$), dividend ($\Delta Div/TA_{DiD}$), repurchases ($\Delta Repur/TA_{DiD}$), and equity issuance ($\Delta EIS/TA_{DiD}$) as their respective differences in their post-minus-pre differences between the treated and the matched "clean" control firms. We then regress these abnormal policy variables on the changes in the competition law index (Δ*Competition law index*) from year $t-1$ to year t, the lagged baseline firm and country control variables for the treated firms, and industry-year interacted fixed effects. The detailed definitions of all variables can be found in Table A.1 of the Appendix. Industry effects are constructed based on Fama-French 48 industry classification. In Panel B, *t*-statistics based on country-clustered robust standard errors are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Event Analysis Surrounding Zero-Leverage Events

	Treated firms					Matched "Clean" Control firms				
Event year	*Debt/TA*	*Cash/TA*	*Div/TA*	*Repur/TA*	*EIS/TA*	*Debt/TA*	*Cash/TA*	*Div/TA*	*Repur/TA*	*EIS/TA*
-3	0.114	0.279	0.007	0.009	0.059	0.212	0.217	0.007	0.008	0.045
-2	0.093	0.289	0.007	0.010	0.053	0.209	0.221	0.008	0.011	0.041
-1	0.058	0.309	0.008	0.010	0.058	0.200	0.245	0.008	0.014	0.050
0	0.000	0.340	0.009	0.014	0.064	0.200	0.226	0.008	0.015	0.039
1	0.000	0.360	0.010	0.019	0.045	0.203	0.220	0.009	0.014	0.040
2	0.000	0.358	0.011	0.019	0.048	0.209	0.210	0.008	0.014	0.030
Pre (-3 to -1)	0.088	0.293	0.007	0.010	0.056	0.207	0.228	0.007	0.011	0.045
Post (0 to 2)	0.000	0.353	0.010	0.017	0.052	0.204	0.219	0.008	0.014	0.036
Post – Pre	-0.088	0.060	0.002	0.008	-0.004	-0.003	-0.009	0.001	0.003	-0.009
DiD	-0.085***	0.069***	0.002***	0.004***	0.005					
	(-13.004)	(9.744)	(3.248)	(3.010)	(1.020)					

Panel B. Competition and Corporate Policies Among Zero-Leveraged Firms

	$\Delta Cash/TA_{DiD}$	$\Delta Div/TA_{DiD}$	$\Delta Repur/TA_{DiD}$	$\Delta EIS/TA_{DiD}$
	(1)	(2)	(3)	(4)
Δ*Competition law index*	0.221***	-0.012	-0.024	0.095
	(3.063)	(-0.559)	(-1.568)	(1.229)
Firm controls	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes
Observations	691	691	691	691
R-squared	0.569	0.504	0.439	0.503

Table 13
Competition and the Timing of Zero Leverage: Evidence from A Deleveraging Subsample

This table reports results from tests examining the effect of changes in competition on the timing of firms adopting a zero-leverage policy. The analysis is performed on a "deleveraging" sample. To construct the deleveraging sample, for each firm, we first identify the year during which its debt-to-asset ratio is the highest over the entire sample period, i.e., the peak year, and we then keep its observations during the post-peak period up to ten years or the year where the firm's leverage becomes zero. All firms whose debt-to-asset ratio is zero during the peak year are excluded. In Panel A, we report the descriptive statistics of the deleverage subsample, including the total number of firms and the number of firms that adopt a zero-leverage policy within the 10-year window. Among the 1,614 firms that adopt a zero-leverage policy, we also report the average numbers of years for them to deleverage to zero leverage and the means in corporate policy variables relating to *Debt/TA*, cash holdings, dividend, repurchases, and equity issuance at the end of the year during which leverage peaked and the year during which leverage reaches zero. In Panel B, we estimate Cox proportional hazards models. The main independent variable of interest is the changes in *Competition law index* (*ΔCompetition law index*) from year $t-2$ to year $t-1$. The yearly changes in the lagged baseline firm and country control variables are included in the models. Industry effects are constructed based on Fama-French 48 industry classification. *Z*-statistics based on country-clustered robust standard errors are reported in the parentheses. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Descriptive Statistics for the Zero-Leverage Firms in the Deleveraging Sample

	# of countries	Obs./Mean	Median	Peak	Zero	Diff.
# of firms	57	11,965				
# of firms going zero leverage	33	1,614				
# of years taken to go zero leverage		3.3	3			
Debt/TA				0.330	0.000	-0.330
Cash/TA				0.242	0.330	0.088
Div/TA				0.007	0.008	0.001
Repur/TA				0.005	0.009	0.004
EIS/TA				0.055	0.085	0.030

Panel B. Duration Analysis

	t	
	(1)	(2)
ΔCompetition law index	1.469**	1.628***
	(2.174)	(3.010)
Δln(Size)	-0.114**	-0.123***
	(-2.567)	(-3.269)
ΔMarket-to-book ratio	0.127***	0.125***
	(4.479)	(4.942)
ΔROA	-0.936***	-0.827***
	(-4.911)	(-6.077)
ΔAsset tangibility	-0.848**	-0.756*
	(-1.968)	(-1.895)
Δdiv/TA	7.067**	10.091***
	(2.566)	(2.972)
ΔR&D/Sale	-1.489***	-1.151***
	(-2.820)	(-4.264)
ΔCapx/TA	-0.650*	-0.552*
	(-1.703)	(-1.739)
ΔCash/TA	1.152*	0.994*

	(1.762)	(1.756)
ΔTaxes/TA	1.995***	1.587***
	(3.095)	(3.765)
ΔNon-debt tax shield/TA	1.219	0.568
	(0.889)	(0.482)
ΔCPI growth	-0.591	3.423
	(-0.260)	(0.977)
ΔGDP growth	8.997***	6.965*
	(3.185)	(1.896)
Δln(GDP per capita)	-8.217***	-9.750**
	(-3.189)	(-2.077)
ΔPrivate credit/GDP	2.528**	1.181
	(2.473)	(1.583)
ΔStocks traded/GDP	0.241***	0.134
	(3.923)	(1.371)
ΔMarket capitalization/GDP	-0.362	-0.188
	(-1.169)	(-0.704)
Industry FE	Yes	Yes
Country FE		Yes
Observations	47,127	47,127

Appendix A.1
Variable Definitions

This table reports the detailed definitions of the main variables used in our analysis and their respective data sources.

Variable	Definition	Source
ZL	A dummy variable equal to one for firms with zero leverage and zero otherwise.	Compustat Global; Compustat North America
ZL (Book leverage<2.5%)	A dummy variable equal to one for firms whose debt-to-asset ratio is below 2.5% and zero otherwise.	Compustat Global; Compustat North America
Debt/TA	The ratio of the sum of long- and short-term debt to total assets.	Compustat Global; Compustat North America
ln(Size)	Natural logarithm of market capitalization in million USD dollars.	Compustat Global; Compustat North America
Market-to-book ratio	The ratio of market capitalization to total assets.	Compustat Global; Compustat North America
ROA	Operating income before extraordinary items divided by total assets.	Compustat Global; Compustat North America
Asset tangibility	Asset tangibility, computed as net property, plant, and equipment divided by total assets.	Compustat Global; Compustat North America
Div/TA	Common dividend divided by total assets.	Compustat Global; Compustat North America
R&D/Sale	R&D expenses divided by total sales.	Compustat Global; Compustat North America
Capx/TA	Capital expenditure divided by total assets.	Compustat Global; Compustat North America
Cash/TA	Cash and short-term investments divided by total assets.	Compustat Global; Compustat North America
Tax/TA	Income taxes divided by total assets.	Compustat Global; Compustat North America
Non-debt tax shield/TA	Depreciation and amortization divided by total assets.	Compustat Global; Compustat North America

Competition law index	A country-level index of the stringency of competition laws compiled by Bradford and Chilton (2018). It is the equal weighted average of two component indexes: *Authority* and *Substance*.	Bradford and Chilton (2018)
Authority	A component index of *Competition law index*, capturing the stringency of competition laws based on the provisions on who can enforce the laws and the limits of their application.	Bradford and Chilton (2018)
Substance	A component index of *Competition law index*, capturing the stringency of competition laws based on the substance of the laws, i.e., substantive rules regulating competition. It is the equal weighted average of three subcomponent indexes: *Merger control*, *Abuse of dominance*, and *Anticompetitive agreements*.	Bradford and Chilton (2018)
Merger control	A subcomponent of *Competition law index*, capturing the stringency of competition laws relating to the exercising of merger control, e.g., notification, restrictions, and defenses on mergers.	Bradford and Chilton (2018)
Abuse of dominance	A subcomponent of *Competition law index*, capturing the stringency of competition laws relating to prohibition of abusive behaviors by dominant firms.	Bradford and Chilton (2018)
Anticompetitive Agreements	A subcomponent of *Competition law index*, capturing the stringency of competition laws relating to substantive prohibition anticompetitive activities.	Bradford and Chilton (2018)
CPI growth	Annual percentage growth in consumer price index (CPI).	World Bank
GDP growth	Annual percentage growth in GDP.	World Bank
ln(GDP per capita)	Natural logarithm of GDP per capita.	World Bank
Private credit/GDP	Total credit to the private sector by banks divided by GDP.	World Bank
Stocks traded/GDP	Total values of stocks traded divided by GDP.	World Bank
Market capitalization/GDP	Total capitalization of the stock market divided by GDP.	World Bank
ΔCompetition law index	Yearly changes in *Competition law index*.	Bradford and Chilton (2018)
ΔCompetition law index$_{Dummy}$	A categorical variable that takes on a value of 1 if there is an increase in *Competition law index* from the previous to the current year, a value of -1 if there is a decrease in *Competition law index* from the previous to the current year, and 0 if there is no change in *Competition law index* from the previous to the current year.	Bradford and Chilton (2018)
+ve ΔCompetition law index$_{Dummy}$ *(-ve ΔCompetition law indexDummy)*	A dummy variable that takes on the value of 1 (-1) if there is an increase (decrease) in *Competition law index* from the previous year to the current year, and zero otherwise.	Bradford and Chilton (2018)
ΔCompetition law index$_{Dummy}^{at\ t = -2}$ (*ΔCompetition law index*$_{Dummy}^{at\ t = -1}$)	A categorical variable that takes on a value of 1 if there is an increase in *Competition law index* two years (one year) later, a value of -1 if there is a decrease in *Competition law index* two years (one year) later, and 0 if there is no change in *Competition law index* two years (one year) later.	Bradford and Chilton (2018)
ΔCash/TA	Change in cash holdings from year *t* - 1 to year *t*, divided by total assets in year *t*.	Compustat Global; Compustat North America
Cash flow/TA	Cash flow divided by lagged property, plant, and equipment. Cash flow is defined as the sum of income before extraordinary items and depreciation and amortization.	Compustat Global; Compustat North America
Q	The market value of assets minus the difference between the book value of assets and net property, plant, and equipment, divided by lagged net property, plant, and equipment. Market value is the sum of the market value of common stock, total liability, and preferred stock, minus deferred taxes.	Compustat Global; Compustat North America

WW	The Whited and Wu (2006) index of financial constraints, computed as -0.091 times cash flow (scaled by total assets), minus 0.062 times a dividend dummy variable, plus 0.021 times long-term leverage (scaled by total assets), minus 0.044 times the natural logarithm of total assets, plus 0.102 times industry (2-digit SIC industries) sales growth, and minus 0.035 times sales growth.	Compustat Global; Compustat North America
WW_{Rank}	A rank variable, computed by dividing firms into 100 groups based on *WW* within each country-year bin, then assigning the rank to each firm, and dividing the rank variable by 100. This variable ranks from 0 to 1.	Compustat Global; Compustat North America
Repur/TA	Repurchases divided by total assets.	Compustat Global; Compustat North America
Payout/TA	Total payout divided by total assets. Total payout is the sum of common dividend and repurchases.	Compustat Global; Compustat North America
EIS/TA	Equity issuance divided by total assets.	Compustat Global; Compustat North America

Competition and Debt Conservatism

Online Appendix

This version: July 2024

Table OA.1
Pairwise Correlations

This table reports the pairwise correlations between the main variables used in our analysis. Panel A reports the correlations between the firm-level variables estimated on the firm-country-year level; Panel B reports those between the country-level variables estimated on the country-year level.

Panel A. Firm-Country-Year Level

		V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
ZL	V1	1.000														
	p-value															
ZL (Book leverage<2.5%)	V2	0.711	1.000													
	p-value	0.000														
Debt/TA	V3	-0.416	-0.575	1.000												
	p-value	0.000	0.000													
Competition law index	V4	0.000	0.012	-0.032	1.000											
	p-value	0.956	0.000	0.000												
Δ*Competition law index*	V5	-0.006	-0.009	0.001	0.069	1.000										
	p-value	0.010	0.000	0.551	0.000											
ln(Size)	V6	-0.062	-0.048	-0.010	0.098	0.027	1.000									
	p-value	0.000	0.000	0.000	0.000	0.000										
Market-to-book ratio	V7	0.230	0.285	-0.259	-0.031	0.050	0.196	1.000								
	p-value	0.000	0.000	0.000	0.000	0.000	0.000									
ROA	V8	-0.062	-0.069	-0.008	-0.003	0.010	0.275	-0.168	1.000							
	p-value	0.000	0.000	0.001	0.172	0.000	0.000	0.000								
Asset tangibility	V9	-0.204	-0.268	0.301	-0.066	0.032	0.095	-0.200	0.174	1.000						
	p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							
DivTA	V10	0.067	0.076	-0.112	-0.112	-0.004	0.179	0.077	0.299	0.076	1.000					
	p-value	0.000	0.000	0.000	0.000	0.108	0.000	0.000	0.000	0.000						
R&D/Sale	V11	0.116	0.137	-0.089	0.002	-0.018	-0.038	0.294	-0.524	-0.156	-0.098	1.000				
	p-value	0.000	0.000	0.000	0.491	0.000	0.000	0.000	0.000	0.000	0.000					
Capx/TA	V12	-0.082	-0.108	0.135	-0.073	0.013	0.060	0.059	0.117	0.508	0.023	-0.052	1.000			
	p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000				
Cash/TA	V13	0.399	0.468	-0.391	0.021	-0.002	-0.032	0.423	-0.317	-0.410	-0.029	0.440	-0.145	1.000		
	p-value	0.000	0.000	0.000	0.000	0.450	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
Taxes/TA	V14	0.104	0.136	-0.210	0.039	-0.016	0.237	0.206	0.496	-0.059	0.308	-0.119	0.060	0.032	1.000	
	p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		

Non-debt tax shield/TA	V15	-0.050	-0.061	0.087	-0.006	-0.036	-0.058	-0.006	0.010	0.340	-0.020	-0.007	0.346	-0.146	-0.066	1.000
	p-value	0.000	0.000	0.000	0.016	0.000	0.000	0.010	0.000	0.000	0.000	0.007	0.000	0.000	0.000	

Panel B. Country-Year Level

		V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12
Competition law index	V1	1.000											
	p-value												
Authority	V2	0.949	1.000										
	p-value	0.000											
Substance	V3	0.890	0.707	1.000									
	p-value	0.000	0.000										
Merger control	V4	0.712	0.551	0.816	1.000								
	p-value	0.000	0.000	0.000									
Abuse of dominance	V5	0.819	0.689	0.887	0.645	1.000							
	p-value	0.000	0.000	0.000	0.000								
Anticompetitive Agreements	V6	0.782	0.649	0.846	0.447	0.692	1.000						
	p-value	0.000	0.000	0.000	0.000	0.000							
CPI growth	V7	-0.046	-0.048	-0.027	-0.060	-0.056	0.044	1.000					
	p-value	0.236	0.221	0.492	0.127	0.155	0.257						
GDP growth	V8	-0.234	-0.212	-0.226	-0.255	-0.223	-0.120	0.173	1.000				
	p-value	0.000	0.000	0.000	0.000	0.000	0.002	0.000					
ln(GDP per capita)	V9	0.153	0.158	0.109	0.278	0.116	-0.094	-0.518	-0.272	1.000			
	p-value	0.000	0.000	0.005	0.000	0.003	0.016	0.000	0.000				
Private credit/GDP	V10	0.225	0.242	0.150	0.232	0.165	0.013	-0.435	-0.244	0.501	1.000		
	p-value	0.000	0.000	0.000	0.000	0.000	0.745	0.000	0.000	0.000			
Stocks traded/GDP	V11	0.153	0.160	0.117	0.238	0.109	-0.021	-0.278	0.001	0.339	0.435	1.000	
	p-value	0.000	0.000	0.003	0.000	0.005	0.584	0.000	0.982	0.000	0.000		
Market capitalization/GDP	V12	-0.038	0.034	-0.145	-0.109	-0.109	-0.136	-0.303	0.115	0.355	0.450	0.510	1.000
	p-value	0.331	0.379	0.000	0.005	0.005	0.001	0.000	0.003	0.000	0.000	0.000	

Table OA.2
Robustness Tests

This table presents results from our robustness tests. The model specification follows that of the baseline model of equation (1). For brevity, we only report the estimates on *Competition law index*, the number of observations, and the estimated R-squared. In row (1), we use an alternative measure of zero leverage, *ZL (book leverage<2.5%)*, a dummy variable equal to one if a firm has a ratio of total debt to total assets below 2.5% and zero otherwise. In rows (2), (3), and (4), we use the alternative 3-digit SIC, 6-digit GICS (i.e., GICS industry), and 4-digit GICS (i.e., GICS group) industry classifications for constructing the industry fixed effects. In row (5), we control for economic region-year interacted fixed effects; countries are divided into five economic regions, including Africa, Americas, Asia, Europe, and Oceania. In row (6), we control for economic industry-region-year interacted fixed effects. In rows (7) and (8), we alternatively double-cluster standard errors at the country and year levels and single-cluster standard errors at the firm level, respectively. In row (9), we further control for earnings volatilities (*ROA* σ), estimated as the standard deviation of *ROA* using quarterly data over the past 3 years (i.e., a 12-quarter window) (requiring at least 3 quarterly observations for the estimation). In row (10), our sample consists of non-U.S. firms only. In row (11), we exclude firm-year observations where there have been no changes in *Competition law index* over the entire sample period. Symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

		Competition law index		
Row	Description	Coef.	Observations	R-squared
(1)	*ZL (book leverage<2.5%)*	0.042***	169,571	0.655
		(4.021)		
(2)	3-digit SIC industry	0.038**	169,571	0.626
		(2.454)		
(3)	6-digit GICS, i.e., GICS industry	0.037***	169,571	0.617
		(2.739)		
(4)	4-digit GICS, i.e., GICS group	0.036**	169,571	0.613
		(2.506)		
(5)	Controlling for *Region* × *Year FE*	0.044***	169,571	0.615
		(2.864)		
(6)	Controlling for *Industry* × *Region* × *Year FE*	0.041**	169,571	0.620
		(2.623)		
(7)	Clustered by country and year	0.036**	169,571	0.615
		(2.207)		
(8)	Clustered at the firm level	0.036***	169,571	0.615
		(3.305)		
(9)	Controlling for *ROA* σ	0.034***	142,599	0.636
		(2.766)		
(10)	Dropping USA	0.034**	78,881	0.681
		(2.386)		
(11)	Exclude obs. with no changes in *Competition law index*	0.036**	169,102	0.614
		(2.553)		