

Managing risk in corporate groups: Limited liability, asset partitioning, and risk compartmentalization*

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Research Summary. Limited liability enables parent companies within a corporate group to avoid financial responsibility for their subsidiaries. Under certain circumstances, however, courts can disregard the separate legal personality of a firm, “pierce the corporate veil”, and impose the debts of a subsidiary on its parent. Legal scholars refer to this exception to the general principle of limited liability as “enterprise liability”. We argue that, in countries where enterprise liability is weak, groups can better compartmentalize their risks by incorporating a greater fraction of their units as legally independent subsidiaries. Weaker enterprise liability may also encourage headquarters to grant subsidiaries more decision-making autonomy and may induce groups to take on more risks, invest more, and grow faster. Using data from sixteen countries in the Americas, Asia, and Europe, we provide evidence in support of these predictions. This paper highlights two channels—risk compartmentalization and subsidiary autonomy—through which limited liability laws affect organizational and economic outcomes.

Managerial Summary. Limited liability is a key attribute of the corporate form and one of the most important institutional innovations of the nineteenth century. However, when the owner of a corporation is another corporation as in many corporate groups, an important justification for limited liability—to protect small, passive investors from unlimited losses—is severely weakened. As a result, countries differ considerably in their propensity to protect parent and sister companies from the liabilities incurred by other group affiliates. In this paper, we examine how variation in limited liability protections for parent and sister companies affects firm boundaries, internal organization, and group performance. We show that, in countries where limited liability protections are stronger, groups partition their assets more finely into distinct legally independent subsidiaries and grant their subsidiaries more autonomy. Groups also invest more and grow faster, but also experience a higher likelihood of substantial revenue declines. Limited liability protections do appear to have an important effect on organizational structure and performance.

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1 Introduction

Entrepreneurs are unlikely to invest when the risks associated with private enterprise are too great. To mitigate such risks, modern economies have developed a variety of institutions. One particularly important institution is the limited liability company (Bethel & Liebeskind, 1998; Micklethwait & Wooldridge, 2003; Rosenberg & Birdzell, 1986).

Many scholars have stressed the importance of the limited liability company. Columbia University president Nicholas Murray Butler wrote in 1911 that “in my judgment the limited liability corporation is the greatest single discovery of modern times. [...] Even steam and electricity are far less important than the limited liability corporation, and they would be reduced to comparative impotence without it”.¹ Harvard University president Charles W. Eliot noted that limited liability is “the corporation’s most precious characteristic and by far the most effective legal invention made in the nineteenth century”.²

Limited liability is important because it reassures investors that their losses will be limited to the amount they have invested in a company. Because downward risk is bounded, limited liability encourages entrepreneurship, the formation of large firms, the separation of ownership and control, and the development of liquid capital markets. However, limited liability may also encourage excessive risk taking, as the costs of failed economic enterprise are partly externalized to other stakeholders.

A benefit of limited liability which is far less well understood is that limited liability also allows risks to be better compartmentalized in corporate groups (Bethel & Liebeskind, 1998; Witting, 2018). Corporate groups (also known as business groups) are a predominant form of organization around the world (Belenzon, Berkovitz, & Rios, 2013; Khanna & Yafeh, 2007). They are collections of legally independent entities (usually firms) under common control (Belenzon & Berkovitz, 2010; Kandel, Kosenko, Morck, & Yafeh, 2019; Manikandan & Ramachandran, 2015). Risks are better compartmentalized in corporate groups because corporate parents (just like any other owner) are shielded from the liabilities of their subsidiaries. Thus, by creating new subsidiaries (through incorporation), groups can prevent liabilities from spreading from one unit to another.

Take, for instance, Manville, a global leader in the manufacture of asbestos-containing products. It separately incorporated its non-asbestos operations in the aftermath of an asbestos litigation to prevent liabilities from spreading across units (Roe, 1986). Similarly, Philip Morris CEO Hamish Maxwell admitted to analysts that he formed a holding company “to better insulate each business from obligations and

¹The quote is from a speech titled “Politics and Economics” to the 143rd Annual Banquet of the Chamber of Commerce of the State of New York in 1911 (<https://babel.hathitrust.org/cgi/pt?id=coo.31924093105660;view=1up;seq=59>).

²The quote is from Bainbridge and Henderson (2016).

liabilities incurred in unrelated activities” (quoted from Roe (1986, p.5)). Companies that have in the last few years been accused of using subsidiary structures to reduce their liability risks include Johnson & Johnson and 3M (in connection to product liability disputes), owners of U.S. nuclear power plants (in connection to accident and decommissioning costs) and private equity investors in nursing homes (in connection to coronavirus lawsuits).³

There are limits, however, to the extent to which risks can be compartmentalized in corporate groups. While limited liability is the default rule of incorporation, under certain circumstances, courts can disregard the separate legal personality of a firm, “pierce the corporate veil” (PCV), and impose the debts of the firm on its owners. Piercing of the corporate veil is especially likely when a firm belongs to a corporate group because headquarters, unlike individual investors, often exert real control over the operations of their subsidiaries.⁴

The doctrine of enterprise liability refers to the propensity of legal systems to pierce the corporate veil and hold an entire group liable for the losses incurred by one of its affiliates. Legal scholars refer to “enterprise” as the “unified economic group of corporations” (the corporate group) and “entity” as the “single, legal form of the corporation” (the individual firm, or subsidiary) (Dearborn, 2009). Enterprise liability can thus be conceptualized as an exception to the general rule of limited liability. If a parent company enjoys limited liability, it is not liable for the debts of its subsidiaries. However, if enterprise liability applies, the parent company (or more generally the whole group) is liable.⁵

In this paper, we theoretically and empirically examine how enterprise liability affects firm boundaries, internal organization, and corporate group investment and growth. We argue that weaker enterprise liability encourages groups to partition their assets more finely into separate legally independent units and to grant these units more decision-making autonomy. When enterprise liability is weak, losses are not likely to spread across subsidiaries. Headquarters therefore have greater incentives to incorporate business

³On Johnson & Johnson and 3M, see, e.g., Financial Times (2022, July 26, 2021, October 14). On multi-tiered holding companies owning nuclear power plants, see (Schlissel, Peterson, Biewald, & Economics, 2002). On private equity investors and nursing homes, see, e.g., New York Times (2020, May 7). The New York Times writes for instance that “In many cases, [private equity] investors created new companies to hold the real estate assets [of the nursing homes] because the buildings were more valuable than the businesses themselves [...] Separating the real estate from the operating business can also help limit liability in wrongful-death lawsuits, because the latter typically has little cash and few assets. “The structure is designed to keep liability on the company that has the fewest assets and the most debt,” said William Murray, a plaintiffs lawyer who specializes in suing nursing homes”.

⁴In this paper, we use the terms “firm”, “corporation” and “company” interchangeably. Group affiliates are the legally independent entities constituting a group. Group affiliates located at the top of a group’s pyramid are called headquarters. All the other affiliates are called subsidiaries.

⁵The term “enterprise liability” is not universally agreed upon. Some legal scholars (e.g., Bainbridge and Henderson (2016)) use this term to refer only to the case when sister companies are held liable (a “horizontal” form of liability, or veil piercing), thus distinguishing that notion from the traditional or “vertical” notion of liability involving a company and its owners. Here, however, we follow the majority of commentators and use the term enterprise liability to encompass both notions of liability (horizontal and vertical) in the context of corporate groups.

units, to better compartmentalize their risks. Headquarters can also more confidently delegate decision-making authority to subsidiary managers, because the consequences of bad decisions are unlikely to spread to other units. We also expect weaker enterprise liability to be associated with greater investment and faster growth at the group level. This is the traditional argument in favor of limited liability: It encourages owners to take risks, because the costs of failure are partly externalized. The flip side of this greater risk-taking is that groups may experience more “failure”, which we operationalize as large drops in annual revenues.

We test our hypotheses by exploiting the substantial variation that exists across countries in their propensity to apply enterprise liability. Some countries (e.g., Germany) view subsidiaries as an integral part of the group that controls them, while others (e.g., Great Britain) emphasize the legal independence of each individual subsidiary (and hence tend to grant limited liability to parent and sister companies). In collaboration with scholars at Duke University School of Law, we constructed a novel country-level measure of enterprise liability. Countries are ranked on a scale between 0 and 5 according to the propensity of their courts to apply enterprise liability and thus “pierce the corporate veil” (PCV) in cases involving group affiliates. In line with conventional wisdom, Germany has the highest PCV (or enterprise liability) score of 3.93, and Great Britain has the lowest PCV score of 1.3. (The full report detailing how the measure is constructed is provided in Supplementary Appendix D.)

Our estimation sample is constructed from Bureau Van Dijk’s Orbis database and consists of a panel of 931,018 corporate groups with subsidiaries across sixteen countries. We also use firm-level information on autonomy for 1,752 firms from the World Management Survey (WMS) (Bloom & Van Reenen, 2007; Bloom, Sadun, & Van Reenen, 2012).

We present three main findings. First, we show that corporate groups in low-PCV countries (where enterprise liability is weak and groups are not likely to be held liable for the liabilities of their subsidiaries) organize their economic activity across more subsidiaries than groups in high-PCV countries. For instance, moving from Great Britain (PCV score of 1.3) to Germany (PCV score of 3.93) reduces the average number of subsidiaries by 16% conditional on group size and various country-level controls, including legal origin dummies. In line with the idea that finer asset partitioning is driven by risk compartmentalization, this correlation is especially strong in industries where downward risk is more significant. We also conduct a panel event study of the effects of the 2010 BP oil spill on incorporation in the oil and gas industry. This event raised the salience of environmental liabilities and arguably highlighted the value of better risk compartmentalization. Consistent with our theory, we find that, after the BP oil spill, corporate groups incorporated more units in the oil and gas industry than in other industries, especially in low-PCV

countries.

Our second main finding, using WMS data, is that subsidiaries are granted more decision-making autonomy when they operate in low-PCV countries than in high-PCV countries. This finding is consistent with the idea that weaker enterprise liability, by reducing the liability spillovers across units, encourages headquarters to decentralize operations.

Finally, using propensity score matching, we show that groups operating in low-PCV countries invest more, grow faster but also experience a higher likelihood of very large drops in annual revenue than groups from high-PCV countries.

An important caveat is that our results are largely correlational. Omitted variables, correlated with both the strictness of national limited liability laws and our variables of interest, may drive the results. Reassuringly, a few other papers, using a variety of empirical approaches, also find that limited liability is a key determinant of economic outcomes and industry structure (e.g., Boomhower (2019), Akey and Appel (2021)). Nevertheless, more work is certainly needed to provide robust causal evidence of the effects of limited liability laws.

Overall, our findings support contingency theories of organizational structure (Ghoshal & Nohria, 1989; Lawrence & Lorsch, 1967; Nohria & Ghoshal, 1997). These theories hold that the best way to organize a business is dependent, among other things, on external institutional factors. This paper highlights limited liability protections for parent and sister companies as one important such factor (Bethel & Liebeskind, 1998; Hansmann & Kraakman, 2000a; Hansmann, Kraakman, & Squire, 2005; Manikandan & Ramachandran, 2015).

Our work also contributes to a better understanding of the nature of corporate groups. Existing work largely conceptualize corporate groups as either a device to magnify the control of dominant shareholders and potentially expropriate minority shareholders (e.g., Bebchuk, Kraakman, and Triantis (2000); Bertrand, Mehta, and Mullainathan (2002); Baek, Kang, and Lee (2006)) or as a mechanism to redeploy internal resources when external markets work poorly (e.g., Leff (1978); Capron, Dussauge, and Mitchell (1998); Belenzon and Berkovitz (2010); Belenzon et al. (2013); Lieberman, Lee, and Folta (2017)). Both these perspectives characterize groups as an emerging market phenomenon, which should wither away as national legal and economic institutions develop. Groups, in particular, should be relatively uncommon in Great Britain, where protections for minority shareholders are strong and external markets function well.

The present work challenges these views. We demonstrate that Great Britain’s strong limited liability protections for corporate parents (i.e., weak enterprise liability) encourage the incorporation of business

units and hence the formation of large corporate groups with many subsidiaries (but not necessarily more assets). Because corporate groups are extremely common not only in emergent markets, but also in developed countries (Belenzon, Hashai, & Pataconi, 2019; Kandel et al., 2019), we suggest that risk compartmentalization and subsidiary autonomy (stemming from limited liability protections) may provide a more important explanation for the existence of corporate groups than generally believed.

2 Background

2.1 Origins and economic functions of the limited liability company

The limited liability company emerged over an extended period of time (Bainbridge & Henderson, 2016). While its birth is sometimes traced to the Companies Acts of 1856 and 1862 in England (Micklethwait & Wooldridge, 2003), precursors existed much earlier. In ancient Rome, for instance, public or quasi-public bodies tasked by the Senate or the Emperor with advancing the public interest were vested with the absolute immunity of the sovereign. In the Middle Ages, the growth of international shipping gave rise to a new type of partnership, the *commenda*, where a manager administered the business and faced unlimited liability, while the passive investors provided capital and enjoyed limited liability.

Despite these early instances, the desirability of granting limited liability to investors was still debated in the 18th century. The father of economics Adam Smith (1776) argued that the “total exemption from trouble and from risk, beyond a limited sum, encourages many people to become adventurers in joint stock companies” and that the “directors of such companies [...] cannot well be expected that they should watch over [other people’s money] with the same anxious vigilance with which the partners in a private copartnery frequently watch over their own” (1776/1904: 233). The philosopher and political scientist John Stuart Mill was on the other side of the debate, noting the potential for limited liability to encourage entrepreneurship especially among the working classes, and to facilitate the establishment of professionally managed companies (Gamble & Kelly, 2000). Reflecting these disagreements, the practice of limiting liability among state-chartered companies in England varied and uncertainty persisted. The Crown granted to some companies limited liability, to others unlimited liability, and to others still it did not refer to the matter at all (Blumberg, 1993).

Partly because the British ruling classes feared losing business in favor of France, however, by the mid-19th century proponents of limited liability had gained the upper hand. In quick succession, the Limited Liability Act of 1855, the Joint Stock Companies Act of 1856, and the Companies Act of 1906 endowed the company with its modern features: legal personality, tradable shares and limited liability. These laws also made it possible to set up companies without seeking special sanction from parliament.

These laws were quickly copied by other countries and, because the industrial revolution greatly expanded the need to raise capital for large-scale projects, the number of companies around the world rapidly grew.

Nowadays, limited liability is the default rule for corporations in virtually every jurisdiction. Its widespread acceptance suggests that it serves important social goals. Legal scholarship has attributed several benefits to limited liability, most notably the potential to encourage investment, improve efficiency at the organizational level and increase liquidity in capital markets.

As Manne (1967) points out, limited liability encourages investment because it allows individuals to participate in risky ventures “without risking disastrous loss”. Because such investment generates benefits not only to shareholders but also to employees, customers and other firm stakeholders, limited liability, by spurring entrepreneurship and investment, is likely to increase overall social welfare.

Limited liability also enhances economic efficiency by facilitating the formation of large, professionally managed enterprises. Investors are more likely to pool capital together and delegate responsibilities to professional managers when they only risk losing their initial investment, not their whole wealth.

The tradability of ownership shares and the efficiency of capital markets is also enhanced by limited liability. Limited liability eliminates the investors’ own wealth as a factor in determining the price of a share, thus allowing potential investors to value firms solely based on their potential profitability. This makes stock markets more efficient because shares are homogeneous and fungible. Without limited liability, the price of shares would vary among investors based on their wealth and risk profiles, and so potential investors would be compelled to acquire information about other shareholders to determine the value of shares and the risk associated with the investment. These advantages obviously facilitate the creation of large and liquid capital markets.

There are, however, also costs associated with limited liability. A simple but important observation is that, although limited liability shields investors from losing more than their initial investment, the risk of failed economic enterprise is not eliminated, but rather shifted from investors to the firm’s creditors. In this connection, it is important to distinguish between voluntary and involuntary creditors.

Voluntary creditors, also known as contractual creditors, are those who enter a contractual relationship with the firm. Banks and other institutional lenders are examples of voluntary creditors. So are employees and some consumers. In general, limited liability does not externalize the risk of business failure to voluntary creditors but rather facilitates a bargain between the firm and the creditor. Voluntary creditors agree to bear some of the risk in exchange for higher rate of returns. In principle at least, they are fully compensated by a higher interest rate, which reflects the additional risk of limited liability.

Involuntary creditors, on the other hand, are those who did not enter a contractual relationship with

the firm. Hence, they are not compensated for the additional risks that they incur under limited liability. The paradigmatic example for involuntary creditors are tort creditors. Consider for instance a person who is run over by a bus that failed to obey a red-light signal. This person or his family may seek compensation from the bus carrier. Suppose, however, the bus carrier had incorporated the bus as an undercapitalized subsidiary. Then, the victim may not obtain compensation. Note that this creditor is not compensated for the risk of default that incorporation brings about. The loss is simply externalized. Other important involuntary creditors are environmental creditors and tax authorities, but in effect every creditor who is not in a practical position to negotiate credit terms can be regarded as an involuntary creditor. The term, then, could also include employees and consumers.

Voluntary creditors share with investors the benefits of limited liability, such as reducing monitoring costs and risk evaluation costs. Because these benefits may offset the disadvantages they incur under a limited liability regime, whether limited liability harms or benefits voluntary creditors is not a priori clear. By contrast, for involuntary creditors, limited liability bears no immediate upside. So, societies who value fairness and deterrence against externalizations more than others may well choose to eliminate limited liability or reduce its reach under certain circumstances.

A second concern is the risk of opportunism and moral hazard that limited liability may engender. As noted above, limited liability may encourage entrepreneurs to take on socially excessive levels of risk or, as Adam Smith puts it, “to become adventurers”. This may be deemed unacceptable by society, especially if this risk-taking is accompanied by other actions, such as leaving the company undercapitalized, that suggest an intent to externalize losses on others. Banking is a sector where issues of limited liability, undercapitalization and excessive risk-taking are particularly salient (and indeed capital requirements are a fundamental component of bank regulation).⁶ Other sectors include chemicals and oil and gas, where underinvestment in safety systems and foreign subsidiaries can cause tragedies such as the Bhopal disaster (Cassels, 1991).

Because of these concerns, all the countries examined in this study, while granting limited liability to shareholders as the default rule, also allow for exceptions to the general rule. The most notable exception to the limited liability rule is the doctrine of piercing the corporate veil.⁷

⁶For instance, in discussing responses to the financial crisis of 2007–08, Cecchetti (2012, p.3) states that “the private interests of banks and bankers can diverge from those of society at large. [...] The source of this conflict is limited liability: the fact that owners and employees are not held financially accountable beyond their initial investment”.

⁷In cases involving corporate groups, which are the focus of the present paper, creditors may threaten legal action under a number of legal theories besides veil piercing. These include breach of fiduciary duty or deepening insolvency. Statutory control group liability may also apply, for instance under the U.S. Securities Exchange Act of 1934 or the Comprehensive Environmental Response, Compensation and Liability Act (“CERCLA”). In addition, parent companies may have contractual obligations to their subsidiaries (e.g., direct guarantees, joint contracts). See, Erens, Friedman, and Mayerfeld (2008) or

2.2 Piercing the corporate veil (PCV)

Piercing the corporate veil (PCV) is a provision that allows courts to disregard the default limited liability and separate legal personality of the firm and to impose the debts of the firm on its owners. In general, modern corporate law recognizes a ‘veil’ separating the firm’s assets and the owners’ personal assets. But, when a plaintiff prevails in a PCV claim, the court effectively “pierces” the corporate veil by imposing the firm’s debts on its owners.

In general, the PCV doctrine is vague and discretionary. Litigants, both plaintiffs/creditors and defendants/stock owners, cannot rely on uniform tests to predict how courts will treat their case, mainly because veil piercing is widely rationalized on amorphous concepts seeking to capture types of owner-corporation relationship that are illegitimate (and thus, warrant veil piercing). Typically, PCV laws are intended to eliminate the protection of limited liability in cases where owners are identified to abuse the rationales of incorporation. In translating this abstract purpose into concrete guidelines, both courts and legislatures have consistently struggled to formulate clear rules defining when the veil should be pierced. Rather, they created general frameworks where a long list of variables may be factored in under a two- or three-stage analysis.

For example, a test applied by some U.S. courts consists of two stages of analysis. The plaintiff must demonstrate, first, a lack of separation between ownership and management, to the extent that owner completely dominates corporate policy and, second, commitment of fraud or wrong by the owner that proximately causes plaintiff’s injury. A problem is that, to apply this analysis, courts consider an unspecified number of factors. Among the main factors are (1) undercapitalization of the firm; (2) commingling of corporate and personal assets; (3) asset striping/transfer of assets; (4) disregard for corporate formalities, (5) owner’s control or domination over management issues; and (6) fraud or misrepresentation of business operations. In some countries, courts require demonstration of wrongdoing, fundamentally unfair conduct, fraud, or use of the separate personality principle for unlawful goals as prerequisites in veil piercing suits.

In addition to these widely accepted factors, court decisions and statutory provisions weight other factors such as continuation of loss making activities, selective payment practices, unjustified refusal to pay creditors, unjust dividend policy, non-functioning of firm’s officers and directors and assumption of risk by creditors (negative indicator). However, there are neither clear rules guiding the weight given to any of these factors nor clarity of their relationships. The underlying result of such incoherence is that veil piercing jurisprudence has turned into an ambiguous body of law that often leaves litigants with limited

Witting (2018) for comprehensive discussions of the risks of subsidiary bankruptcy for headquarters.

tools to predict how courts will decide their cases.

2.3 Enterprise liability: A comparative perspective

The benefits of limited liability extend not only to situations where the owner of a firm is an individual or a group of individuals, but also to situations when the owner is another corporation (i.e., when the firm belongs to a group). However, when the owner of a firm is another company, the rationale for granting limited liability to owners is weaker.

One reason is that the parent company's individual shareholders are already protected by limited liability. Thus, it is not clear what social benefits protecting these shareholders twice (at the parent's and subsidiary's level) would bring. Second, unlike most individual investors, parent companies typically exert very real control over the operations of their subsidiaries. Thus, granting parent companies limited liability may simply deresponsibilize them (Blumberg, 1985; Strasser, 2004).

Because of these reasons, piercing of the corporate veil is much more common when the owner of a company is another company than when the owners are individual investors. Legal scholars refer to situations when a court makes a parent company (or more generally the whole group) liable for the debts of one of its subsidiaries as "enterprise liability". Enterprise liability is an exception to the general rule of limited liability. If a parent company enjoys limited liability, it is not liable for the debts of its subsidiaries. However, when enterprise liability applies, the parent (or the whole group) is liable.

Importantly, countries differ considerably in their propensity to apply enterprise liability. This heterogeneity can be ascribed to two broad sets of factors.

First, countries differ in their social, cultural, and institutional norms. Distributing risk between different stakeholders (e.g., owners versus involuntary creditors) is ultimately a matter of economic and social priorities, and countries may reach different conclusions regarding the proper allocation of risk, or the desirability of different social goals (e.g., efficiency versus fairness). These differences are likely to be reflected in limited liability laws. In Great Britain, for example, PCV is in essence a very restrictive tool aimed to achieve fairness and to discipline the market. As such, it is invoked mostly as a sanction against fraudulent behavior. In the Netherlands, however, PCV is used primarily to protect tort creditors from externalization of risk. Thus, it is invoked more prominently in tort cases than in non-tort cases.

The second set of factors affecting countries' propensity to pierce the corporate veil relates to the extent to which groups are perceived as a single economic entity. Comparative examination of PCV across countries reveals two polar views regarding enterprise liability. At one end of the spectrum lies the legalistic British approach, by which the parent and the subsidiary are considered to be two distinct

entities that deserve no special treatment compared to any other owner and corporation. British courts have shown reluctance to ignore legal separation even when plaintiffs demonstrate that a parent and its wholly-owned subsidiary acted as a single economic enterprise and the parent sets the broad business policy of the subsidiary. At the other extreme of the spectrum is the German approach. The German law on Konzernrecht (controlled companies) provides the most developed statutory scheme applying what the literature refers to as the “enterprise approach” or “single economic unit approach”. In various cases when a subsidiary is proven to be completely dominated by the parent or subordinated to the parent’s interests, the law on Konzernrecht provides tools aimed at limiting intra-group dealings and at holding the parent liable for the losses incurred by the subsidiary.⁸

In-between these two extremes, there are several intermediate cases. Italy, France, Netherlands, and Argentina follow variants of the enterprise approach (albeit, with a narrower legal framework than in Germany) and as a result provide somewhat easier paths to enterprise liability. In Australia, courts have recognized a general principle under which “in certain circumstances a corporate group is operating in such a manner as to make each individual entity indistinguishable, and therefore it is proper to pierce the corporate veil to treat the parent company as liable for the acts of the subsidiary” (Ramsay & Noakes, 2001).

The United States, Japan, China, Sweden, and Belgium contain no special rules governing corporate groups. Courts consider parent-subsidiary veil piercing under the general framework used for other cases, with no reference to an overarching enterprise theory imposing special legal regime. Nonetheless, the case law seems to draw on some additional policy considerations uniquely applicable in the parent-subsidiary context. For instance, U.S. courts developed some guidelines uniquely designed to deal with affiliated corporations. Courts in all states commonly agree that the mere full ownership of stocks by the parent is not a dispositive fact, nor is common identity of the parent’s and the subsidiary’s officers and directors. Furthermore, demonstration of control over the subsidiary’s affairs that is consistent with norms of corporate behavior, such as delineating general policies and performance monitoring, will not satisfy the control requirement for veil piercing. However, when the parent seems to control day-to-day operations and managerial decision-making and when the subsidiary abandons common corporate practices while being fully operated by the parent, courts will be more inclined to pierce the veil. Other factors considered by courts

⁸In essence, the German law creates a trade-off between two key features of corporate groups. On the one hand, the controlling owner is entitled to give binding instructions to the subsidiary even when the instructions might not be in the subsidiary’s best interest. On the other hand, to compensate for the additional risk that the subsidiary and its stakeholders bear, the law provides instruments that hold the parent company liable for losses incurred by the subsidiary. Specifically, the law imposes additional regulations to protect creditors. Among the duties imposed on the parent are the duty to make the execution and termination of controlling agreement available to creditors and the responsibility to maintain money reserves to compensate for potential losses incurred by the subsidiary.

in corporate group cases are unfair intra-group transactions, excessive dividends, wrongful conduct in the performance of contracts (e.g., when the parent depletes the subsidiary’s assets to the point that it cannot satisfactorily perform its contract obligations) and commingling or shuffling of assets.⁹ Overall, these efforts have attempted to provide a middle ground between the German Konzernrecht theory and the British legalistic approach.

3 Implications of weaker enterprise liability for group structure and performance

The previous section argued that courts in different countries vary substantially in their propensity to apply enterprise liability. This section explores how cross-country variation in the propensity to apply enterprise liability affects group structure and performance. We begin by introducing two concepts—asset partitioning and risk compartmentalization—that play a key role in our analysis. Then, we put forward our empirical predictions. In Online Appendix A we also develop a simple model, based on Aghion and Tirole (1997), where our predictions are formally derived.

A key distinction we draw is between finer and coarser asset partitioning. Asset partitioning refers to the extent to which the assets controlled by a single ultimate owner are divided into multiple legally independent entities (Hansmann & Kraakman, 2000a, 2000b). Finer asset partitioning obtains when assets under common control are divided into a greater number of legally independent entities. Coarser asset partitioning obtains when the assets are divided into a smaller number of legally independent entities.¹⁰ For instance, when Alphabet spun out its self-driving car unit in 2016, Alphabet’s assets were more finely partitioned, because a new, legally independent subsidiary was created (namely, Waymo). Conversely, when Google and Nest merged in 2018, the number of legally independent entities in Alphabet decreased and Alphabet’s assets were more coarsely partitioned.¹¹

⁹Another relevant factor is misrepresentation of corporate structure. Misrepresentation arises when a creditor believes it was dealing with a wealthy parent rather than a thinly capitalized subsidiary. Misrepresentation becomes an issue especially when the parent takes an active role in it.

¹⁰In mathematics, a partition of a nonempty set X is a collection of nonempty disjoint subsets $\{A_1, \dots, A_n\}$ whose union is the whole set. The subsets A_i are usually called blocks or cells of the partition. Let $\{A_1, \dots, A_n\}$ and $\{B_1, \dots, B_m\}$ be two partitions of X . $\{A_1, \dots, A_n\}$ is finer than $\{B_1, \dots, B_m\}$ (and $\{B_1, \dots, B_m\}$ is coarser than $\{A_1, \dots, A_n\}$) if every block A_i of the first partition is a subset of some block B_j of the second partition. Intuitively, blocks in $\{B_1, \dots, B_m\}$ are further subdivided or fragmented to create $\{A_1, \dots, A_n\}$. Our definition of finer asset partitioning is weaker than the definition of finer partition in mathematics. Pragmatically, we define (and measure) asset partitioning in terms of the number of legally independent entities comprising a group. The assets of a group are said to be more finely partitioned if the number of legally independent entities in the group increases. Finer asset partitioning therefore corresponds to a transition from $\{B_1, \dots, B_m\}$ to $\{A_1, \dots, A_n\}$, where $n \geq m$ (a weak increase in the number of blocks or “firms”). The condition $n \geq m$ is necessary but not sufficient for $\{A_1, \dots, A_n\}$ to be finer than $\{B_1, \dots, B_m\}$ in a mathematical sense.

¹¹Acquisitions and divestitures are conceptually distinct from asset partitioning. Acquisitions and divestitures imply a change in the total amount of assets under common control. Asset partitioning is concerned with how a *given* amount of

A benefit of finer asset partitioning is that, when a new subsidiary is created, the rest of the group is better insulated from potential liabilities. Bloomberg notes, for instance, that an advantage of reorganizing Google as Alphabet is that the new structure “helps keep potential challenges in one business from spreading to another... By separating them, it allows the parent company to limit the exposure of the various obligations of the LLCs”.¹² We call this benefit of finer asset partitioning, which stems from the default rule of limited liability, risk compartmentalization.

However, the extent to which risks can effectively be compartmentalized depends on the likelihood that courts will not pierce the corporate veil in cases involving corporate groups. In countries that tend to apply the doctrine of enterprise liability, veil piercing is more likely and liabilities can spread across subsidiaries. Because the benefits of finer asset partitioning are smaller, groups in those countries may incorporate a smaller fraction of their business units as legally independent subsidiaries. That is, groups there will partition their assets more coarsely.

Conversely, in countries where courts are not likely to apply the doctrine of enterprise liability, risks are better compartmentalized. The benefits of finer assets partitioning are larger, and groups may incorporate a greater fraction of their units as legally independent subsidiaries. The effect should be strong especially in industries where the potential for large losses is significant, because externalizing liabilities there is more important. (Thus, in particular, we also expect that, in industries where potential losses are large, groups partition their assets more finely.)

Hypothesis 1 (Firm boundaries). In countries where enterprise liability is weaker, corporate groups partition their assets more finely. The relationship is stronger in industries where downward risk is greater.

In countries where enterprise liability is weak, groups are also more likely to grant their subsidiaries more decision-making autonomy. If courts do not hold the whole group liable for the debts of one of its subsidiaries, groups can enjoy the benefits of decentralized decision-making without having to worry that the consequences of bad subsidiary decisions will spill over to other units. Thus, in countries where enterprise liability is weak, groups may be expected to delegate more decision-making authority to subsidiary managers.

assets under common control is divided into separate legal entities. Also, not all redrawing of firm boundaries result in either finer or coarser asset partitioning. Assets could be reshuffled across units without increasing or decreasing the number of legal independent entities.

¹²See <https://www.bloomberg.com/news/articles/2017-09-01/alphabet-wraps-up-reorganization-with-a-new-company-called-xxvi>.

Hypothesis 2 (Internal organization). Corporate groups grant their subsidiaries more decision-making autonomy in countries where enterprise liability is weak.

We also expect that, in countries where enterprise liability is weak, groups will take on more risks, invest more, and grow faster. There are two distinct reasons for this. First, when risks are better compartmentalized, headquarters can more confidently invest in risky projects because potential losses are more likely to be externalized. This is the traditional argument in favor of limited liability: By limiting the amount of money that headquarters (or investors) can lose when they start a new venture, limited liability spurs entrepreneurship, risk-taking and growth.

Second, as argued above, when enterprise liability is weak, headquarters are more likely to delegate decision-making authority to subsidiary managers. This greater decentralization may enhance a group’s ability to sense and seize growth opportunities. Indeed, Manikandan and Ramachandran (2015) argue that the greater autonomy granted to subsidiary managers, relative to divisional managers in multi-unit firms, is a chief benefit of the group structure. Both better risk compartmentalization and greater autonomy at the subsidiary level suggest that groups operating in countries where enterprise liability is weaker may behave more entrepreneurially and invest and grow more. The downside of this greater risk taking is of course the possibility that new ventures may fail. Thus, we also expect that, in countries where enterprise liability is weak, groups may experience significantly higher likelihood of large revenue declines.

Hypothesis 3 (Corporate group investment and growth). Corporate groups invest more, take on more risk, and grow faster in countries where enterprise liability is weak. Because they take on more risk, they also tend to experience more failure.

4 Data

Our sample consists of 931,018 corporate groups with subsidiaries across sixteen countries over years 2002 through 2014.¹³ We perform our main analysis at the group-country-industry-year level to allow for variation in PCV score and industry downside risk. (Our key results are generally not sensitive to the level of analysis.) The final estimation sample includes 3,122,024 observations.

To construct our sample, we use historical publications (yearly snapshots) of Bureau Van Djik’s Orbis database and construct evolving ownership links between corporate headquarters and their subsidiaries.

¹³France, Germany, Great Britain, Italy, Sweden, and United States, the countries with the greatest presence in our sample, account for 22% (699,162), 24% (735,513), 14% (449,112), 9% (289,198), 10% (308,941), and 7% (206,768) of the sample, respectively.

We identify headquarters using the ultimate owner field in the Orbis database and all their subsidiaries using the ultimate owner field associated with the subsidiaries. For each headquarter, we retain all of the subsidiaries in which the headquarter has more than a 50% ownership stake according to Orbis’s “direct” and “total” ownership share fields.

To explore the relationship between enterprise liability and subsidiary autonomy, we use data from the World Management Survey (WMS). WMS provides survey measures of autonomy that corporate headquarters grant their subsidiaries (Bloom & Van Reenen, 2007).¹⁴ Subsidiaries in WMS are matched to subsidiaries in our sample to arrive at 2,243 subsidiary-year observations covering ten countries across the Americas, Asia, and Europe and years 2005 through 2014. (Years 2007 and 2011 are not included due to a lack of match between the WMS data and our main sample.)¹⁵

4.1 Piercing the corporate veil (PCV) score

To create a measure of enterprise liability, we collaborated with scholars at Duke University School of Law and evaluated relevant legal provisions across sixteen countries in the Americas, Asia, and Europe. We analyzed an exception to the default limited liability rule - piercing the corporate veil (PCV) - that courts use to hold corporate headquarters liable for the debts incurred by their subsidiaries. Countries were scored on a scale of zero to five according to how inclined their courts are to pierce the corporate veil in cases involving corporate groups, with a higher score implying stronger enterprise liability for corporate headquarters.¹⁶ To derive these overall PCV scores, we evaluated five distinct criteria (scored on a scale of zero to five) that either explicitly or implicitly affect intra-group veil piercing and weighted them according to their importance.¹⁷ Table 1 presents our assessment of each criteria as well as the

¹⁴We use the following survey items from WMS: 1) composite measure of autonomy (*central*) based on “To hire a full-time permanent shop floor worker what agreement would your plant need from CHQ?”, “How much of sales and marketing is carried out at the plant level (rather than at CHQ)?”, and “Where are decisions taken on new product introductions - at the plant, at the CHQ or at both?”; 2) measure of investment autonomy (*central5*) from “What is the largest capital investment your plant could make without prior authorization from corporate headquarter?”; 3) measure of product introduction autonomy (*central7*) from “Where are decisions taken on new product introductions - at the plant, at the CHQ or at both?”; 4) measure of sales and marketing autonomy (*central6*) from “How much of sales and marketing is carried out at the plant level (rather than at CHQ)?”; and 5) measure of hiring autonomy (*central4*) from “To hire a full-time permanent shop floor worker what agreement would your plant need from CHQ?”. We also use two indirect measures of autonomy: “Number of levels in the firm between the shop floor and the CEO.” (*levels2ceo*) and “Is CHQ on the site being interviewed?” (*onsite*).

¹⁵On average, a subsidiary in the WMS sample generates 223M USD in revenues and controls around 200M USD in assets, with standard deviations of 734M USD and 582M USD, respectively. They are on average larger than the subsidiaries in the main sample, which generate 60M USD in average revenues and control 101M USD in assets.

¹⁶In multinational groups, jurisdictional problems arise from the separation between parent firms and subsidiaries. Claimants may argue that a case is better heard in the home country of the parent rather than in the host country of the subsidiary. We chose to focus on the PCV score of the country of the subsidiary because in a number of cases in the US and the UK, courts rejected claimants’ attempts to bring proceedings in the home country of the parent, to prevent “forum shopping” (Muchlinski, 2010).

¹⁷To mitigate concerns that our empirical results may be driven by these choices, we conduct several robustness tests. See Section 6.6.

overall PCV scores for our sample countries.

First, we examined the extent to which each country applies the “enterprise” (or “economic unity”) approach in cases involving corporate groups. Application of this legal concept is the most important criterion in determining the probability of corporate veil piercing, because it indicates the likelihood that a corporate parent and its subsidiaries will be treated as a single legal entity and that the parent will be held liable for the losses of its subsidiaries. As shown in Column 1, Germany has the highest score on this dimension, and Great Britain along with China, Japan, and Sweden have the lowest score. That is, courts in Germany are more inclined than those in Great Britain to treat a subsidiary as an integral part of its parent firm.

The second most important criterion is the number and diversity of factors that courts consider when deciding whether to pierce the corporate veil. The more factors that courts are willing to consider, the more likely that they will hold a parent firm liable for the losses of its subsidiaries. Column 2 shows that Great Britain, Sweden, and Denmark have the lowest scores, whereas China and the United States have the highest scores on this dimension. Factors that courts might consider in relation to this criterion include under-capitalization, commingling of corporate and personal affairs, disregard for corporate formalities, fraud or misrepresentation, unfair or unjust conduct, extent of owner’s control over subsidiaries, dysfunctional management, and assumption of risk by creditors.

Third and fourth, some countries limit corporate veil piercing only to bankruptcy and/or fraud cases while other countries are open to piercing the corporate veil in other cases as well. Thus, we examine whether countries are willing to hold a corporate parent liable in cases outside of bankruptcy and fraud and assign separate scores for these two criteria. As indicated by Columns 3 and 4, courts in Australia, Canada, China, Great Britain, Japan, South Korea, and Switzerland are all willing to pierce the corporate veil in cases outside of bankruptcy while German courts are most likely to exercise corporate veil piercing in cases outside of fraud.

Lastly, we looked for available empirical evidence on the inclination of courts to pierce the corporate veil. Actual case data summarized in column 5 reveal that Australia has the lowest corporate veil piercing rate of 33% and China has the highest corporate veil piercing rate of 61%. The score ranges from -5 to 5 with 0 indicating no available data.

Column 6 presents the overall PCV scores for the sixteen countries in our sample, computed as the weighted average of the five criteria. Germany has the highest overall score of 3.93, reflecting its high willingness to hold a corporate parent liable for the debts of its subsidiaries. Great Britain has the lowest overall PCV score of 1.3, reflecting its legalistic regulatory style. (Supplementary Appendix D provides a

detailed description of our cross-country measures of enterprise liability and the data sources used.)

[Insert Table 1 here]

4.2 Descriptive statistics

Table 2 presents the summary statistics for the main variables used in our analysis. (Appendix B details the measure construction.) On average, a corporate group controls (i.e., has more than 50% ownership share in) 1.45 subsidiaries with a standard deviation of 3.84 in a given industry within a country. Through these subsidiaries, corporate groups generate 78 million US dollars in revenues and control 301 million US dollars in assets.¹⁸

[Insert Table 2 here]

Appendix Table C1 presents the mean comparison of the main variables between groups operating in high-PCV countries (i.e., Germany, Italy, France, Netherlands, Australia, Argentina, the U.S.) and groups operating in low-PCV countries (i.e., Great Britain, Sweden, Denmark, Japan, Korea, Canada, Belgium, Switzerland, and China), where high-PCV countries are those with a PCV score above the sample mean. A simple comparison shows that, relative to groups in low-PCV countries, groups in high-PCV countries have fewer subsidiaries (1.37 vs 1.58), generate more revenues (87M USD vs 73M USD), and control more assets 387M USD vs 243M USD). Given the differences in size observed across groups operating in high and low PCV countries, we control for group size in our econometric analysis.

Figure 1 plots the relationship between country PCV score and average number of subsidiaries per one million US dollars in revenues.¹⁹ Hypothesis 1 states that a corporate parent is more likely to incorporate its business units when enterprise liability is weaker (a lower PCV score). The raw data support this prediction: subsidiaries are more prevalent in countries where courts are less willing to pierce the corporate veil. The correlation between PCV score and number of subsidiaries is -0.53. For instance, in Great Britain, where enterprise liability is the weakest, the average number of subsidiaries per one million US dollars is 22, whereas in Germany, where the enterprise liability is the strongest, the average number of subsidiaries per one million US dollars is only 1.6.

[Insert Figure 1 here]

¹⁸Across all industries and countries, corporate groups in our sample have controlling stakes in 2 subsidiaries with a standard deviation of 8.9. They generate 108 million USD in annual revenues with a standard deviation of 2.6 billion USD. Our sample groups in France, Germany, the Great Britain, Italy, Sweden, and United States generate 38, 70, 108, 36, 20, 190 million USD in revenues and control 107, 155, 528, 85, 49, and 573 million USD in assets, respectively.

¹⁹Appendix Table C2 presents summary statistics for the WMS sample.

Figures 2a-f present the relationship between PCV score and subsidiary autonomy measures obtained from the World Management Survey. Because limited liability protects corporate parents against the losses incurred by their subsidiaries, we expect stronger enterprise liability (higher PCV score) to be associated with weaker subsidiary autonomy. The general pattern of results is consistent with our prediction. For instance, Figure 2b shows that as PCV score increases, capital investment autonomy decreases. In Great Britain, where the PCV score is the lowest, the maximum capital investment that a subsidiary can make without prior authorization from the headquarters is approximately 500 USD per employee, while in Germany, where the PCV score is the highest, it is 80 USD per employee (or, as shown on the figure, 2.7 for Great Britain and 1.9 for Germany when log transformed as $\log(\max \text{ capital investment} / \text{number of employees})$).

[Insert Figure 2 here]

Figure 3 presents the mean comparison of the rate of investment, growth, and failure between corporate groups operating in high- and low-PCV countries. Since courts in low-PCV countries are less likely to hold corporate parents liable for mistakes committed by their subsidiaries, corporate groups in those countries are likely to invest more, grow faster, and experience more failures (Hypothesis 3). Consistent with the predictions, the figure shows that groups in low-PCV countries on average invest 20% (as a percentage of their previous year's assets) and grow 23% in revenues. Additionally, 10% of the groups experience failure (i.e., drop of more than 50% in annual revenues). In high-PCV countries, the rates are to 8%, 10%, and 7%, respectively.

[Insert Figure 3 here]

5 Main econometric specifications

To test Hypothesis 1, that groups in a country with a weak enterprise liability partition their assets more finely, we estimate the following specification:

$$\ln(\text{Subs}_{ijct}) = \beta_0 + \beta_1 \text{PCV}_c + \ln(\text{Rev}_{ijct}) + \mathbf{Z}'_{ct} \gamma + \eta_i + \mu_j + \tau_t + \epsilon_{ijct} \quad (1)$$

Subs_{ijct} is number of subsidiaries in corporate group i in three-digit SIC j in country c for year t . PCV_c is the PCV score of the country c where the subsidiaries operate. Rev_{ijct} is annual group revenues in each country-industry pair where it operates²⁰, and $\mathbf{Z}$ is a vector of country-level controls, including

²⁰We use revenues instead of total assets because the coverage of balance sheet items including assets is more sparse, especially for German and American firms. In unreported regressions, we find that using total assets instead of revenues to proxy for group size produces qualitatively similar results to our main findings.

GDP, level of stock market development (the ratio of the total stock market capitalization to GDP), unemployment rate, and strength of employment protection legislation, which have been used in previous studies as country-level determinants of group affiliation. η_i , μ_j and τ_t are complete sets of dummies for corporate groups, three-digit SIC codes, and years. ϵ_{ijct} is an iid error term. The coefficient of interest is β_1 . Consistent with Hypothesis 1, we expect $\beta_1 < 0$.

In addition, we interact industry downside risk with PCV score to test the second part of Hypothesis 1. Consistent with the hypothesis, we expect the relationship between asset partitioning and enterprise liability to be stronger when industry downside risk is high.

To test Hypothesis 2, that a corporate parent is more likely to grant greater decision-making autonomy to its subsidiaries in countries where enterprise liability is weak, we estimate the following specification:

$$\ln(Autonomy_{st}) = \beta_0 + \beta_1 PCV_c + \ln(Rev_{st}) + \mathbf{Z}'_{ct}\gamma + \mu_j + \tau_t + \epsilon_{it} \quad (2)$$

$Autonomy_{st}$ is the level of autonomy (WMS measures) granted to subsidiary s in year t by its corporate parent. The coefficient of interest is β_1 , and consistent with Hypothesis 2, we expect $\beta_1 < 0$ (except for “headquarters presence on site” for which we expect $\beta_1 > 0$).

Finally, we explore Hypothesis 3, that weaker enterprise liability leads to higher corporate group investment, growth, and failure. To test this prediction, we first aggregate the sample to the group-country level and then use the propensity score matching technique to match groups operating in low-PCV and those operating in high-PCV countries based on industry (3-digit SIC), revenues, and assets. We estimate the following specification:

$$Growth_{ic} = \beta_0 + \beta_1 LowPCV_{ic} + \beta_2 \ln(Rev_{ic}) + \mathbf{Z}'_{ct}\gamma + \mu_j + \epsilon_{ic} \quad (3)$$

$Growth_{ic}$ is the percentage change in revenues for corporate group i operating in country c between year $t-1$ to t , averaged over the sample period. $LowPCV$ is a dummy variable taking a value of 1 for corporate groups operating in a country with a low PCV score (i.e., weak enterprise liability). The coefficient of interest is β_1 , and we expect $\beta_1 > 0$. We estimate the equivalent specification for investment (annual change in fixed assets) and failure (drop of more than 50% in annual revenues).

6 Econometric results

This section presents econometric results on the relationship between enterprise liability and the number of subsidiaries; subsidiary autonomy; and corporate group investment, growth, and failure.

6.1 Enterprise liability and number of subsidiaries

Table 3 presents results related to Hypothesis 1. Columns 1 and 2 report within-industry and within-group estimates, respectively, to control for industry- and group-specific, time-invariant factors that could be correlated with PCV score. Consistent with Hypothesis 1, the results show that corporate groups in countries with weak enterprise liability have more subsidiaries, conditional on group size. For instance, estimates from Column 2 indicate that going from Great Britain (with the weakest enterprise liability) to Germany (with the strongest enterprise liability) leads to around 16% decline in number of subsidiaries, for a fixed group size.²¹

Columns 3 and 4 test the second part of Hypothesis 1: that the relationship between PCV score and number subsidiaries will be amplified when industry downside risk is high. We interact PCV score with a dummy variable taking a value of 1 for corporate groups operating in industries that are in the top quartile of the industry downside risk distribution and 0 otherwise. As expected, the estimates from Column 3 show that the enterprise liability-subsidiary relationship is 20% stronger (statistically significant at the 5% level) for corporate groups operating in industries where downside risk is high.²² Column 4 includes a complete set of country dummies to control for time-invariant country characteristics that might influence the tendency of corporate groups to organize their assets across more subsidiaries. The results continue to hold.²³ It should also be noted that the coefficient on *Dummy for high industry downside risk* is positive and statistically significant, suggesting that groups partition their assets more finely when industry downside risk is high.

[Insert Table 3 here]

6.2 Event study: The BP oil spill

To probe further the interplay among enterprise liability, asset partitioning, and industry downside risk, we employ a panel event study (a quasi-experimental method) examining how corporate groups in oil and gas industry responded to the BP oil spill (April of 2010) in the Gulf of Mexico (“Deepwater Horizon oil spill”). The BP oil spill triggered increased scrutiny from governments and interest groups, resulting in

²¹The figure is computed as 0.06×2.63 where 0.06 is the percent change in the number of subsidiaries per unit change in PCV score and 2.63 is the difference in PCV score between Great Britain and Germany. The results are robust across various specifications and subsamples - for single- and multi-industry groups, groups with more than \$100M USD in assets, and widely-held groups.

²²The figure is computed as $(0.01/0.049) \times 100$ where 0.049 is the percent decline in the number of subsidiaries for each point increase in PCV score and 0.01 is additional percentage point decline in the number of subsidiaries when industry downside risk is high.

²³We also performed robustness tests using measures of industry downside risk based on net income, cash, and current assets and based on a threshold of 30% drop. The results are consistent with the findings presented above.

over \$65 billion USD in fines, penalties, and cleanup costs for BP and arguably increasing downside risk (or the perception of downside risk) for the whole industry.²⁴

We design a panel event study to examine the effect of BP oil spill on the corporate group decision to organize assets across more subsidiaries.²⁵ We use a sample of corporate group-industry (4-digit SIC) pairs covering years 2007 through 2015 and the same sixteen countries as in the main analysis.²⁶ The treatment group consists of 1,142 corporate groups in the oil and gas industry, and the control group consists of around 287 thousand corporate groups outside of the oil and gas industry. We also examine the effect of the BP oil spill for corporate groups operating in countries with stronger enterprise liability and those operating in countries with weaker enterprise liability.

Figures 4a-c summarize the results from the panel event study. The horizontal axis is the year relative to the BP oil spill of 2010 (year 0), and the vertical axis is the difference in the log-transformed number of subsidiaries between the treated and the control group relative to the reference difference at year -1. (The results are consistent if we set year 0 as the reference year.) Each vertical bar indicates a 95% confidence interval.

Figure 4a shows that during the pre-BP oil spill period, the difference in the number of subsidiaries between the treated and the control group relative to the reference year was not statistically different from 0.²⁷ However, by year 5, the difference reached 22% relative to the baseline difference. These results reinforce the view that, in environments where industry downside risk is high, corporate groups tend to partition their assets more finely. Column 1 of Appendix Table C5 reports the corresponding event study regression results.^{28 29}

²⁴See, e.g., <https://www.justice.gov/opa/pr/us-and-five-gulf-states-reach-historic-settlement-bp-resolve-civil-lawsuit-over-deepwater> for and details of the lawsuit and <https://www.reuters.com/article/uk-bp-deepwater/horizon/bp-deepwater-horizon-costs-ballooning-to-65-billion-idUKKBN1F50O6> for BP's declared costs relating to the oil spill.

²⁵Section B.3 provides the empirical specification used for the event study.

²⁶We use a corporate group-industry-level panel to account for corporate groups operating in multiple industries. Appendix Table C3 provides summary statistics for the main variables used in the event study. On average, corporate groups at the industry-year level control 1.9 subsidiaries, 104 million USD in revenues, and 417 million USD in total assets. Across all industries, groups control 178 million USD in revenues and 856 million USD in assets.

²⁷Given that parallel trends assumption is not guaranteed to hold in the post-treatment period, we perform a sensitivity test for the parallel trends assumption as suggested by Rambachan and Roth (2023). The sensitivity test based on the algorithm made available by Rambachan and Roth (2023) shows that the effects found in years 4 and 5 of our panel event study analysis are statistically significant unless the slope of the differences in the post-treatment counterfactual trends between two consecutive periods deviates at least 6% from the linear extrapolation of the observed pre-trend differences (Appendix Figure C1a). It also shows that the threshold is 18% for countries with weak enterprise liability (Appendix Figure C1b).

²⁸Recent papers discuss potential issues relating to heterogeneous treatment effects that could bias the results of an event study (Callaway & Sant'Anna, 2021; Goodman-Bacon, 2021; Sun & Abraham, 2021). To mitigate this concern, Appendix Figure C2 presents our baseline analysis using the estimator made available by Callaway and Sant'Anna (2021), which accounts for such heterogeneous treatment effects.

²⁹In columns 4-9 of Appendix Table C5, we report various robustness tests. In column 4, we restrict our sample to corporate groups whose assets are either steady or declining during the sample period to ensure that the relative increase in

Figures 4b and 4c examine whether the effect of BP oil spill on the number of subsidiaries varies between countries with stronger enterprise liability and countries with weaker enterprise liability. Figure 4b shows that, by year 5, the difference in the number of subsidiaries between the treated and the control group in countries with stronger enterprise liability increased by 13.9% relative to the reference year. Figure 4c shows that, during the same time period, the difference in countries with weaker enterprise liability increased by around 35.9%. These results are consistent with the view that enterprise liability of a country is a significant factor that influences the number of subsidiaries that corporate groups organize their assets into. Columns 2 and 3 of Appendix Table C5 report the corresponding event study regression results.

6.3 Subsidiary autonomy

Table 4 presents subsidiary-level results relating to Hypothesis 2, that corporate headquarters grant more autonomy to subsidiaries in countries with weaker enterprise liability. Column 1 shows that enterprise liability has a negative and statistically significant (at the 5% level) relationship with aggregate autonomy in hiring, sales and marketing, and product introduction. Column 2 shows that subsidiaries operating in countries with greater enterprise liability (higher PCV score) have less autonomy in making capital investments. At the sample mean, subsidiaries in Great Britain can invest 166 thousand USD more without prior authorization from corporate headquarters than subsidiaries in Germany.³⁰

The remaining columns show that a higher PCV score is associated with lower levels of autonomy in the areas of product introduction (Column 3), sales and marketing (Column 4), and hiring (Column 5). A higher PCV score is also associated with fewer hierarchical levels from the shop floor worker to the CEO (Column 6) and a higher probability of a HQ manager being on site of the subsidiary (Column 7). These results are consistent with hypothesis 2, that a corporate parent is more likely to grant greater decision-making autonomy to its subsidiaries in countries where enterprise liability is weak.

[Insert Table 4 here]

the number of subsidiaries is not driven by increasing assets. Column 5 includes only the groups with assets over 100M USD to mitigate the concern that Orbis coverage of small groups is less accurate. Columns 6 and 7 drop British and U.S. groups, respectively, to mitigate the potential concern that the effect of BP oil spill is driven only by these countries. In columns 8 and 9, we redefine a subsidiary as one that does not share a common name and one that does not share any board members with the corporate parent. Our main results are robust to these changes to the sample and the definition of subsidiary.

³⁰The figure is computed as $67,783 + 67,783 \times 0.55 \times 2.63$, where 67,783 is the sample mean of investment amount, 0.55 is the percent increase in investment amount per unit decline in PCV score, and 2.63 is the difference in PCV score between Germany and Great Britain.

6.4 Intra-group governance

The relationship between enterprise liability and number of subsidiaries should vary with the level of control that headquarters have over their subsidiaries. Stronger control by headquarters makes subsidiaries less independent rendering limited liability less effective in compartmentalizing risk. The control characteristics we explore are: (i) share of subsidiaries managed by family managers, (ii) share of subsidiaries with a board member who is also on the board of the corporate parent, (iii) share of wholly-owned subsidiaries, and (iv) share of subsidiaries operating under the same or partially the same name as the corporate parent. Appendix B details measure construction, and Table 5 presents the estimation results.

Column 1 interacts the PCV score with a dummy variable taking a value of 1 for corporate groups with at least 50% of subsidiaries managed by family managers and 0 otherwise. (A family manager is defined as a senior manager or an executive sharing the same last name as a shareholder of a corporate group as listed in Orbis.) As expected, the relationship between PCV score and subsidiaries is weaker for groups with a high share of family-managed subsidiaries. As with family managers, board member interlocks between subsidiaries and their corporate parents also suggest that groups are more tightly integrated and headquarters' control over subsidiaries is stronger. Column 2 interacts the PCV score with a dummy variable taking a value of 1 for corporate groups with at least 50% of subsidiaries with a board member who is also on the corporate parent's board and 0 otherwise. Indeed, enterprise liability matters less for groups with a high level of board member interlock.

Headquarters control is likely to be stronger when subsidiaries are wholly-owned than when they are only partly-owned. Thus, we expect the enterprise liability-subsidiary relationship to be weaker for corporate groups with a high share of wholly-owned subsidiaries. Column 3 confirms this prediction by interacting the PCV score with a dummy variable taking a value of 1 for a corporate group with at least 50% of wholly-owned subsidiaries and 0 otherwise. The estimates indicate that the relationship between number of subsidiaries and PCV score is substantially weaker (statistically significant at the 5% level) for corporate groups with a high share of wholly-owned subsidiaries.

A subsidiary operating under a similar name as its corporate parent is likely to be more tightly controlled than a subsidiary with a very different name. Thus, we expect the relationship between number of subsidiaries and PCV score to be weaker for corporate groups with a high share of subsidiaries that use a similar name as their corporate parent. Column 4 interacts the PCV score with a dummy variable taking a value of 1 for a corporate group with at least 50% of subsidiaries using the same or partially same name as the corporate parent and 0 otherwise. The enterprise liability-subsidiary relationship is weaker for groups with a high share of subsidiaries that share their names with their corporate parent.

Taken together, the results suggest that headquarters control over subsidiaries plays an important role in moderating the enterprise liability-subsidary relationship.

[Insert Table 5 here]

6.5 Corporate group investment and growth

Our model predicts that weaker enterprise liability leads to corporate groups investing more, growing faster, and experiencing more failures (Hypothesis 3). To test these predictions, we examine the relationship between enterprise liability and, respectively, corporate group investment, growth, and failure using a matched sample at the group-country level. To construct the sample, we first aggregate the data to corporate group-country level and then use the propensity score matching technique to match corporate groups operating in high-PCV countries with those operating in low-PCV countries based on industry (3-digit SIC), revenues, and assets. Appendix Table C4 provides the summary statistics for the main variables used in this analysis.

Table 6 presents the estimation results. Consistent with Hypothesis 3, columns 1 and 2 show that, corporate groups operating in countries with weak enterprise liability invest more than those operating in countries with strong enterprise liability. Column 2 indicates that, at the sample mean, going from Germany to Great Britain (indicated by a dummy variable, *low PCV*, taking a value of 1 for Great Britain) is associated with 110% increase in investment.³¹

Columns 3 and 4 show that corporate groups operating in countries with weak enterprise liability also grow faster. Column 4 indicates that, at the sample mean, going from Germany to Great Britain is associated with 70% increase in revenue growth.^{32 33}

Columns 5 and 6 show that corporate groups operating in countries with weak enterprise liability experience a higher rate of failure (defined as 50% decline in their annual revenues). Column 6 shows that, at the sample mean, groups operating in Great Britain experience failure at a 120% higher rate than those operating in Germany.³⁴

Lastly, as suggested by the model, the relationship between enterprise liability and profits is likely to be ambiguous given that weaker enterprise liability would allow groups to externalize losses but, at

³¹Change in investment is computed as $0.197/0.178$, where 0.178 is the sample mean of investment and 0.197 is the coefficient on the low PCV dummy (i.e., Great Britain dummy).

³²Yearly revenue growth is computed as $(revenues_t - revenues_{t-1})/revenues_{t-1}$.

³³Revenue growth is computed as $0.149/0.216$, where 0.216 is the sample mean and 0.149 is the coefficient on the low PCV dummy (i.e., Great Britain dummy).

³⁴Change in failure rate is computed as $0.088/0.071$, where 0.071 is the sample mean and 0.088 is the coefficient on the low PCV dummy (i.e., Great Britain dummy).

the same time, would encourage groups to substitute monitoring with managerial initiatives. Columns 7 and 8 show results consistent with this expectation, indicating that the relationship between enterprise liability and profits is not statistically significant. These results provide additional support for Hypothesis 3.

[Insert Table 6 here]

6.6 Additional robustness checks

To mitigate concerns about the validity of the PCV scores and the methodological approach used in this study, we carried out several robustness tests.

For the main analysis, we constructed a composite measure of PCV score based on five distinct criteria, weighted by their importance. A key concern relates to the use of appropriate weights for the criteria. To address this concern, we re-ran the analysis after recalculating the PCV scores by omitting each of the five criteria used to derive them (columns 1-5, Appendix Table C6), recalculating the PCV scores by assigning equal weights to all five criteria (column 6, Appendix Table C6), and deriving principal components from the five criteria (Appendix Table C7). Our results are robust to these alternative specifications of PCV score.

Appendix Table C8 presents additional robustness tests for sample selection, econometric specification, and measurement. One concern is that our analysis focuses on subsidiaries that are majority owned by their corporate parent. This is reasonable because affiliates in corporate groups are generally assumed to be controlled (and not just minority owned) by their parent. However, limited liability regulations may have different effects for units that are majority versus minority owned. To address this concern, in column 1, we reexamined the enterprise liability-subsidiary relationship while keeping all subsidiaries of each corporate group in our sample, including those in which the corporate parent has less than a 50% ownership stake. Another concern is that corporate group size may not be adequately captured by $\ln(\text{Revenues})$. To mitigate this concern, we replaced $\ln(\text{Revenues})$ with Revenues and Revenues^2 in column 2 and with decile dummies for revenues in column 3. Finally, in columns 4 and 5, we estimate our main specification using Poisson and Negative Binomial regressions, where the dependent variable is the number of subsidiaries. Through all of these robustness tests, our main results continue to hold.

7 Concluding remarks

This paper contributes to the literature examining the effects of legal institutions on economic outcomes. It shows that, in countries with weaker enterprise liability, (i) corporate groups partition their assets more

finely into legally independent subsidiaries, (ii) grant more autonomy to their subsidiary managers, and (iii) invest more and grow faster, but are also more likely to experience significant revenue declines. These findings are consistent with the idea that, by better compartmentalizing risks, stronger limited liability protections for headquarters increase the benefits of setting up subsidiaries and decrease the costs of decentralization. Because losses are more likely to be externalized, groups are also likely to take on more risks, invest more, and grow faster.

Scholars have long noted that the corporation is a product of the law (Chandler, 1992; Mayer, 2021). The law endows the corporation with legal personality, the ability to write contracts, and limited liability. Early analyses of the firm from a legal standpoint emphasize differences between the employment relationship within the firm and market contracting. Employment law supports, at least in principle, the authority of management to direct the efforts of employees (Masten, 1988; Williamson, 1975). To avoid undermining the efficacy of hierarchical authority, courts also refuse to hear disputes inside firms that they would hear if the disputes had arisen between firms. Williamson (1991) refers to this form of contract law that supports hierarchy as the doctrine of forbearance.

More recently, Dari-Mattiacci, Gelderblom, Jonker, and Perotti (2017) have noted the role of the law in providing enforcement for agreements among partners to keep the capital invested in the business (capital lock-in). Hansmann and Kraakman (2000a) and Hansmann et al. (2005) similarly stress the importance of “entity shielding” in encouraging owners to more finely partition their assets. Manikandan and Ramachandran (2015) argue that the presence of a separate board with fiduciary duty to the affiliated firm affords subsidiary managers in corporate groups greater sense of autonomy and control over resources than available to divisional managers. This allows them to better sense and seize growth opportunities. Bethel and Liebeskind (1998) argue that, in choosing whether to incorporate a business unit, firms face a trade-off between the benefits of limited liability and the costs of stunted resource redeployment. Consistent with both Bethel and Liebeskind (1998) and Manikandan and Ramachandran (2015), we find that limited liability protections for headquarters influence asset partitioning, decentralization and growth prospects in corporate groups.

There is an extensive literature on firm boundaries and internal organization, but very few papers examine these two issues jointly. Brahm and Tarziján (2016) is a notable exception. They use a database of the construction industry and find that vertical integration and centralization of decision-making are positively related, especially in more complex and uncertain environments where the need for coordination is arguably greater. Alfaro et al. (2018) combine data from the WMS with a firm-level integration index constructed from the WorldBase dataset and find instead that integration and centralization move in

opposite directions. We add to this limited literature, by emphasizing the role of the law in shaping firm boundaries and internal organization.

Our findings can be interpreted as providing support for the contingency view of organizational structure. Contingency theory holds that the best way to organize a group (or a company) depends on the characteristics of the internal and external environment (Lawrence & Lorsch, 1967; Ghoshal & Nohria, 1989; Nohria & Ghoshal, 1997). We highlight the strictness of national limited liability laws as one important institutional factor.

A complementary and very influential perspective focuses instead on legal origins (La Porta, Lopez-de Silanes, Shleifer, & Vishny, 1997, 1998). This literature shows that, compared to French civil law, common law is associated with better investor protection, lighter government ownership and regulation and less formalized and more independent judicial systems. These institutions, in turn, are associated with better outcomes such as higher financial development, better access to finance, less corruption, better functioning labor markets, and more secure property rights (see, e.g., La Porta, Lopez-de Silanes, and Shleifer (2008)). We show that the effects of limited liability laws generally persist even after controlling for legal origin.

One important contribution of this paper is to develop a novel cross-country measure of enterprise liability. We hope that other scholars will find this measure useful in their work. Consider for instance Beaver et al. (2022). They examine bankruptcy in groups and show that recent regulatory reforms affecting the approval and disclosure of related party transactions (RPT) inhibit groups' ability to shield their subsidiaries from credit-risk shocks. Using our measure of enterprise liability and in line with intuition, they also show that groups are more likely to shelter subsidiaries whose debts they are more likely to be held accountable for, and that high veil piercing subsidiaries are disproportionately affected by RPT reforms.

The key mechanism emphasized in this paper is risk compartmentalization. By creating more legally independent subsidiaries, groups create boundaries between businesses that reduce the likelihood that losses in one unit will spill over to other units. An important issue is what type of risks can more effectively be compartmentalized. Sophisticated contractual creditors such as banks and other financial institutions can charge higher interest rates to compensate for the risks associated with weaker enterprise liability, or can demand intra-group guarantees to mitigate the risk of insolvency. Thus, risk compartmentalization may not be a major issue there. By contrast, involuntary, non-contractual creditors such as tort creditors cannot protect themselves using these instruments. They are exposed to the risk that a subsidiary may declare bankruptcy and become insolvent, even if the rest of the group remains solvent. This suggests

that risk compartmentalization is an especially important consideration when tort liabilities loom large. Consistent with this, we find that, in the oil and gas industry (where accidents can lead to extremely expensive lawsuits), groups more finely partitioned their assets relative to other industries in the aftermath of the 2010 BP oil spill. This suggests that the oil spill made environmental liability risks (and hence risk compartmentalization) a more salient issue.

Some recent work has focused on limited liability and environmental risk. Boomhower (2019), for instance, exploits a natural experiment created by the introduction of an insurance requirement in the oil and gas industry in Texas. He compares outcomes immediately before and after the policy change, or between firms that have or have not yet been required to purchase insurance. He finds that the policy substantially improved environmental outcomes among small firms and led to a reallocation of production from small firms to larger firms with better environmental records. Akey and Appel (2021) take advantage of a Supreme Court decision that strengthened parent limited liability protection for some subsidiaries. They find that stronger liability protection for parents led to lower investment in abatement technologies by subsidiaries and significantly higher toxic emissions. These papers, which focus on the “dark side” of limited liability; most notably, the possibility that the externalization of risks may induce companies to underinvest in environmental protection. By contrast, we highlight the traditional, “positive” argument in favor of limited liability, that it may encourage entrepreneurship and overall investment.

Our emphasis on risk compartmentalization also sheds new light on the nature of corporate groups. These structures are widespread in both developed and developing countries (Belenzon et al., 2019; Kandel et al., 2019), although they have largely been characterized as an emerging market phenomenon (e.g., Khanna and Yafeh (2007)). The leading perspectives on corporate groups - the control-magnifying view (e.g., Baek et al. (2006); Bebchuk et al. (2000); Bertrand et al. (2002)) and the institutional voids perspective (e.g., Belenzon and Berkovitz (2010); Belenzon et al. (2013); Capron et al. (1998); Leff (1978); Lieberman et al. (2017)) - both predict that in advanced economies where market institutions work well and protections for minority shareholders are strong, corporate groups should wither away. By contrast, we find that, in Great Britain (a prototypical advanced economy), groups partition their assets quite finely, compared to groups in several other countries (e.g., Germany, China or Argentina). British courts’ tendency to grant headquarters strong limited liability protections appears to give groups stronger incentives to incorporate business units and create new subsidiaries (conditional on group size). Thus, unlike existing perspectives, a focus on risk compartmentalization helps explain why corporate groups are also so widespread in the developed world.

We conclude with two caveats. One is that our analysis is largely correlational. Further work, perhaps

exploiting regulatory changes such as Boomhower (2019), Akey and Appel (2021) or Beaver et al. (2022), is certainly needed to mitigate concerns about omitted variables potentially affecting our results.

One must also be careful in drawing welfare implications from our analysis. On the one hand, shielding headquarters from liabilities arising from risky projects in subsidiaries can encourage experimentation and foster investment and growth. Our empirical analysis provides support for this traditional argument in favor of limited liability. On the other hand, the risks of failed economic enterprise are not eliminated, but rather shifted from investors to other stakeholders. Particularly concerning is that these risks will fall disproportionately on vulnerable stakeholders or the environment. Striking a balance between the conflicting concerns of promoting growth and protecting external stakeholders is difficult, but scholars and policymakers must grapple with these issues.

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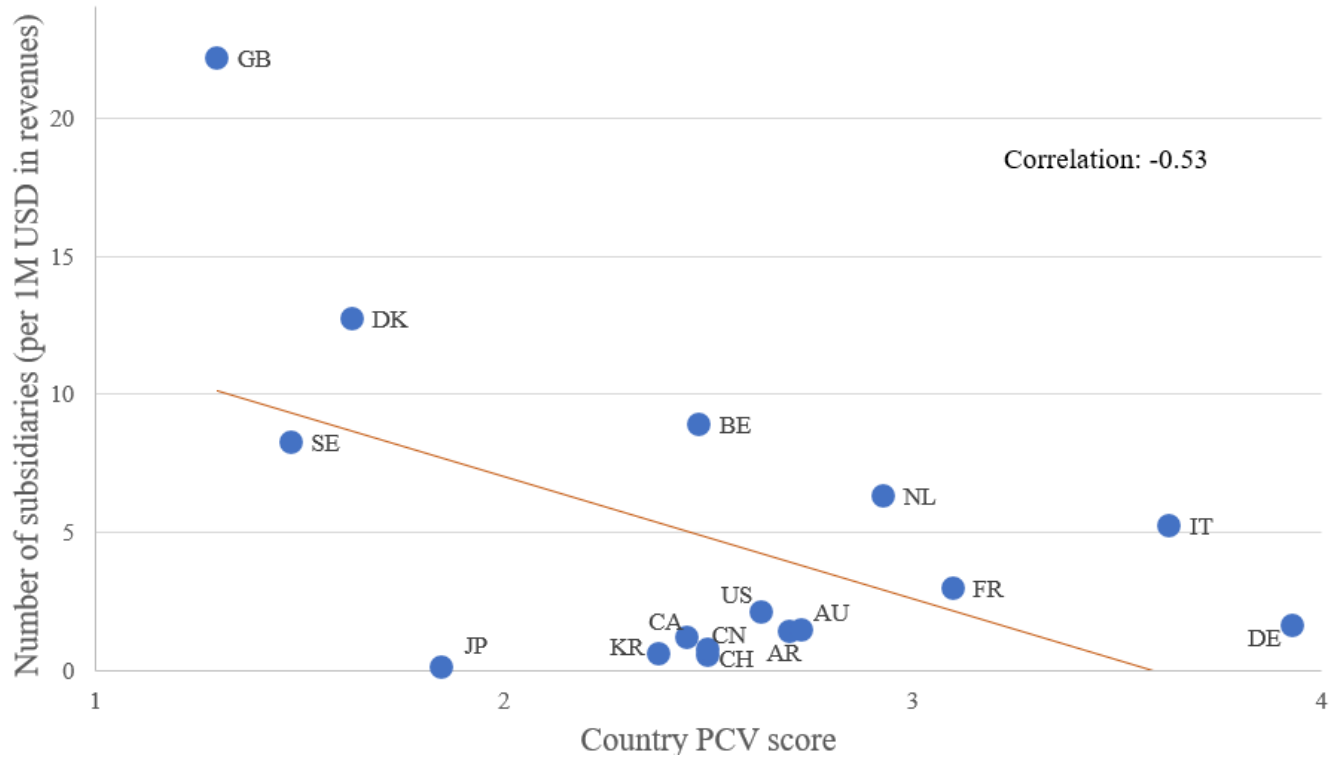
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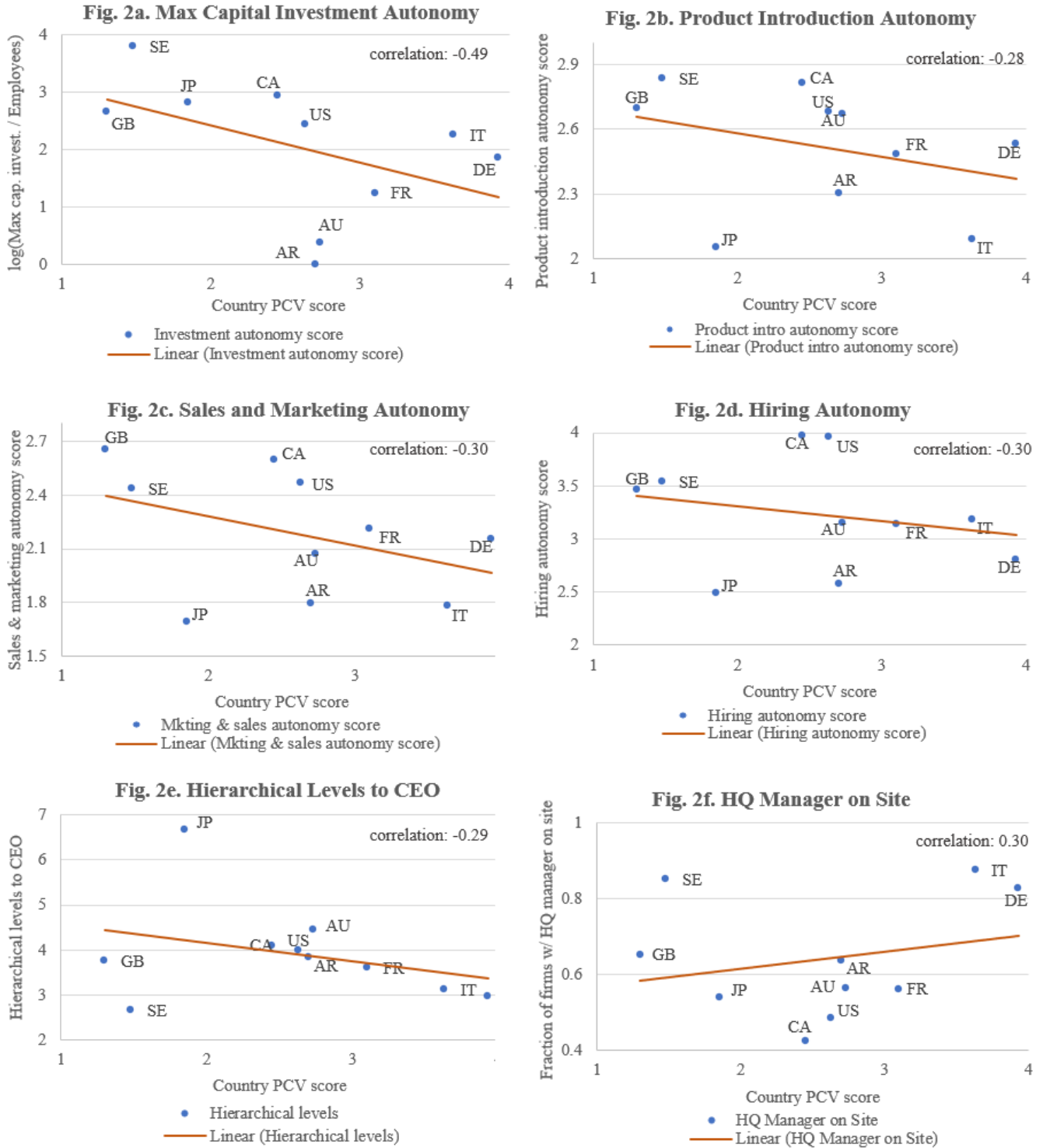
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Figure 1: Number of Subsidiaries and PCV Score



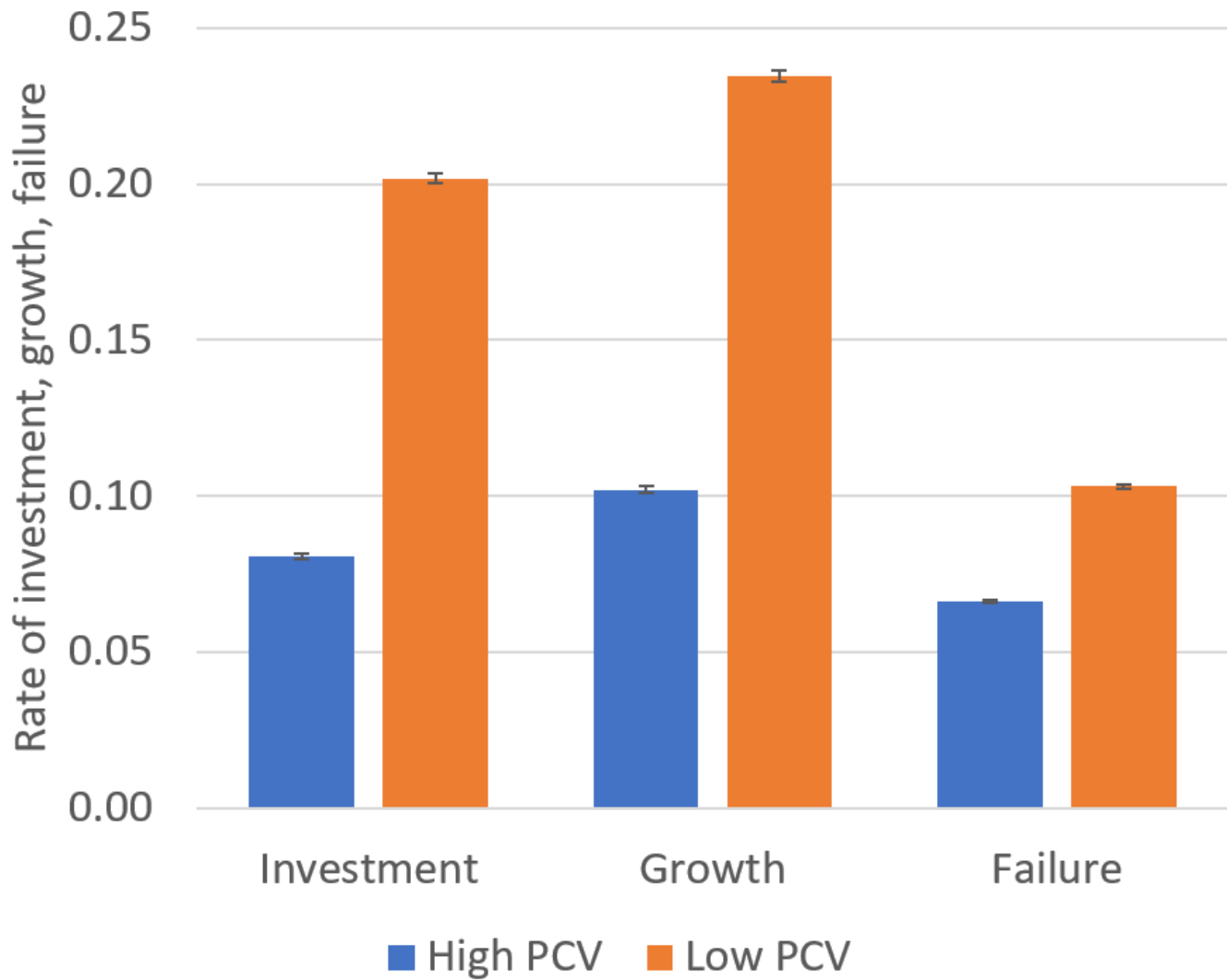
Notes: The figure presents the extent to which asset partitioning (number of subsidiaries per 1M USD in revenues) varies with enterprise liability (PCV score). A high PCV score indicates a higher likelihood that a corporate parent will be liable for the mistakes of its subsidiaries.

Figure 2: Subsidiary Autonomy Measures and PCV Score



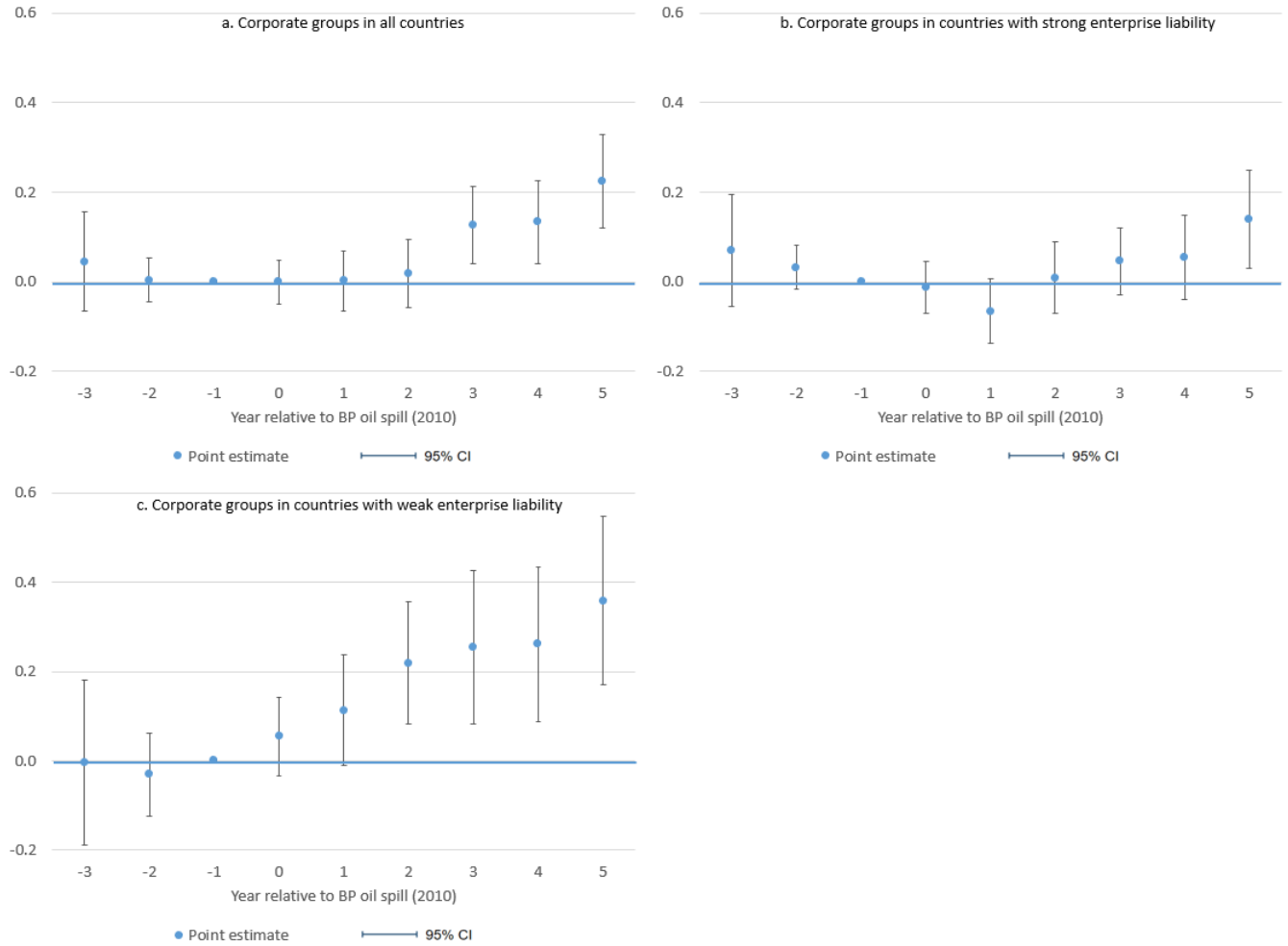
Notes: The figures present how subsidiary autonomy varies with enterprise liability. Capital investment autonomy is the maximum amount of capital that subsidiaries can invest without prior authorization from the headquarters. Max capital investment is normalized as $\log(\text{max capital investment}/\text{number of employees})$. Product introduction autonomy is the extent to which product introduction decisions are made at subsidiaries. Sales marketing autonomy is the amount of sales and marketing conducted by subsidiaries. Hiring autonomy measures the extent to which subsidiaries can hire full-time employees. Hierarchical levels to CEO is the number of layers between the shop floor workers at a subsidiary to the CEO. HQ manager on site is the presence of an HQ manager at the subsidiary.

Figure 3: Corporate group investment, growth, and failure



Notes: The figure shows the mean comparison for investment, growth, and failure between groups operating in high- and low-PCV countries. High-PCV countries consist of Germany, Italy, France, Netherlands, Australia, Argentina, and U.S., while low-PCV countries consist of Great Britain, Sweden, Denmark, Japan, Korea, Canada, Belgium, Switzerland, and China.

Figures 4a-c: Panel Event Study: BP Oil Spill



Notes: The figure presents the effect of increased industry downside risk on corporate group asset partitioning based on a panel event study. The event observed is the BP oil spill of 2010, and the treatment and control groups consist of corporate groups in oil and gas industry and corporate groups outside of oil and gas industry, respectively. The sample consists of corporate group-industry pairs over years 2008 through 2015. X axis is the year relative to 2010 (BP oil spill), and Y axis is log transformed difference in the average number of subsidiaries controlled by the corporate groups in the oil and gas industry and corporate groups in other industries. Controls included in the analysis are yearly % changes in corporate group revenues, corporate group total assets, and average crude oil price as well as log transformed corporate group revenues, corporate group total assets, and average crude oil price all lagged by a year. Figure 4a shows the change in the number of subsidiaries for corporate groups in oil and gas industry relative to those in other industries. Figures 4b and 4c examine corporate groups in countries with strong enterprise liability (Germany, Italy, France, Netherlands, Australia, Argentina, the U.S.) and weak enterprise liability (Great Britain, Sweden, Denmark, Japan, Korea, Canada, Belgium, Switzerland, China), respectively.

Table 1: PCV Scores

	(1)	(2)	(3)	(4)	(5)	(6)
	Application of enterprise / economic unity approach	Number and diversity of factors considered	Veil piercing outside of bankruptcy cases	Veil piercing in the absence of fraud or misconduct	Empirical Data	Overall score
Score Range	(0 to 5)	(0 to 5)	(0 to 5)	(0 to 5)	(-5 to 5)	
Score Weight	0.45	0.25	0.1	0.15	0.05	
Argentina	3.5	2.5	2	2	0	2.70
Australia	2.5	3.5	5	2	-1.5	2.73
Belgium	2	3.5	1	4	0	2.48
Canada	2	3	5	2	0	2.45
China	1	4	5	3	2	2.50
Denmark	2.5	1	1	1	0	1.63
France	4	3	1	3	0	3.10
Germany	5	3	2.5	4.5	0	3.93
Great Britain	1	1	5	1	-1	1.30
Italy	4	3.5	3.5	4	0	3.63
Japan	1	3	5	1	0	1.85
Netherlands	3	3.5	2.5	3	0	2.93
South Korea	1.5	3	5	3	0	2.38
Sweden	1	1	4	2.5	0	1.48
Switzerland	2.5	2	5	2.5	0	2.50
United States	2	4	4	2.5	-1	2.63

Notes: The table presents “piercing the corporate veil” (PCV) scores. The scores presented in this table are based on the evaluation of the likelihood of intra-group veil piercing in each of countries listed. The higher the final score, the more likely that courts will pierce the corporate veil to hold the corporate group liable for the debts of the subsidiaries. The final scores are based on five criteria, for which separate scores are assigned and aggregated. Application of enterprise / economic unity approach measures the extent to which courts will consider a corporate group as a single enterprise. The number and diversity of factors considered for relief from general veil piercing claims indicate the variety of factors that courts are willing to consider to hold the corporate group liable. Availability of veil piercing outside of bankruptcy cases and availability of veil piercing in the absence of fraudulent behavior or misconduct assess whether courts limit themselves to some specific types of cases with respect to pierce the corporate veil. The empirical part of the score assess the likelihood of courts to pierce the corporate veil based on the available empirical data.

Table 2: Summary Statistics of Main Variables

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	No. Obs	Mean	Std. Dev.	Distribution		
				10th	50th	90th
Parent-country-industry-year level						
Number of subsidiaries	3,122,024	1.45	3.84	1.00	1.00	2.00
Revenues (in mil USD)	3,122,024	77.9	1,267	0.10	2.51	59.3
Assets (in mil USD)	2,615,435	301	12,933	0.17	2.30	61.3
Subs with a family manager	488,057	0.139	0.332	0	0	1
Subs with board member interlock	635,067	0.542	0.498	0	1	1
Wholly-owned subs	3,122,024	0.45	0.488	0	0	1
Subs using parent name	2,368,075	0.278	0.384	0	0	1
Industry-year level						
Industry downside risk	2,891	0.03	0.08	0.00	0.00	0.10
Country level						
PCV score	16	2.51	0.71	1.48	2.50	3.63

Notes: The table presents summary statistics for the main variables used in the analysis. *Subs with a family manager* is the share of subsidiaries with a family manager. *Subs with a board member interlock* is the share of subsidiaries whose board member is also a board member of the parent firm. *Wholly – owned sub* is the share of subsidiaries that are wholly owned by the parent firm. *Subs using parent name* is the share of subsidiaries operating under the same name as the parent firm. *Industry downside risk* is the share of firms in an industry (3-digit SIC) that experience an annual drop of at least 50% in revenues.

Table 3: Asset Partitioning and Enterprise Liability

Dependent variable:	ln(Number of subsidiaries)			
	(1)	(2)	(3)	(4)
	Baseline	Group FE	Industry downside risk	Country FE
Country PCV score	-0.011 (0.001)	-0.060 (0.003)	-0.049 (0.003)	
Country PCV score x Dummy for high industry downside risk			-0.010 (0.001)	-0.009 (0.001)
Dummy for high industry downside risk			0.027 (0.002)	0.027 (0.002)
ln(Group-country-industry revenues)	0.023 (0.000)	0.028 (0.000)	0.031 (0.000)	0.031 (0.000)
Country controls	No	Yes	Yes	No
Year dummies	Yes	Yes	Yes	Yes
Three-digit SIC dummies	Yes	Yes	Yes	Yes
Corporate group dummies	No	Yes	Yes	Yes
Country dummies	No	No	No	Yes
Observations	3,122,024	2,702,307	2,061,774	2,061,774
R-squared	0.11	0.46	0.49	0.49

Notes: The table presents the relationship between enterprise liability (PCV score) and number of subsidiaries. The sample contains corporate groups at the country-industry-year level for years 2002 through 2014 across sixteen countries. Where indicated, country controls included are $\ln(\text{Country GDP})$, $\ln(\text{Country unemployment rate})$, *Country EPL*, and *Country stock market development*. Country EPL is the strength of country's employment protection law. Country stock market development measures the ratio of total stock market capitalization to GDP. Dummy for high industry downside risk is a dummy variable taking a value of 1 for corporate groups operating in industries in the top quartile of industry downside risk distribution and 0 otherwise. All columns include legal origin dummies indicating the legal origin (English, French, German, or Scandinavian) from which each country's commercial laws are derived. Standard errors are robust to heteroskedasticity and clustered at the corporate group-country-industry level.

Table 4: Subsidiary Autonomy and Enterprise Liability

Dependent Variable:	Aggregate	ln(Invest. Amount)	Product Introduction	Sales & Marketing	Hiring	Levels to CEO	HQ on Site
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Country PCV score	-0.155 (0.033)	-0.550 (0.122)	-0.068 (0.053)	-0.217 (0.045)	-0.259 (0.040)	-0.226 (0.040)	0.084 (0.011)
ln(Sub revenues)	-0.043 (0.020)	0.331 (0.062)	-0.061 (0.024)	-0.057 (0.029)	-0.001 (0.025)	0.204 (0.026)	-0.041 (0.007)
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Three-digit SIC dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,195	2,009	2,003	2,039	2,191	1,986	2,243
R-squared	0.084	0.094	0.089	0.096	0.088	0.240	0.167

Notes: The table presents the relationship between enterprise liability and the level of autonomy granted to subsidiaries at the subsidiary-year level. The sample includes subsidiaries from the World Management Survey (WMS) matched to our sample firms. *Aggregate* is the average of scores from the following three questions: “To hire a full-time permanent shop floor worker what agreement would your plant need from CHQ?”, “How much of sales and marketing is carried out at the plant level (rather than at CHQ)?”, and “Where are decisions taken on new product introductions - at the plant, at the CHQ or at both?” *Investment autonomy* is the amount of capital investment that a subsidiary can make without prior authorization of the corporate headquarters. *Product introduction autonomy* is the extent to which production introduction decisions are made at subsidiaries. *Sales & marketing autonomy* is the amount of sales marketing conducted by subsidiaries. *Hiring autonomy* measures the degree of autonomy that subsidiaries have in hiring new fully-time employees. *Levels to CEO* is the number of hierarchical layers between the shop floor workers at a subsidiary to the CEO. *HQ on site* is a dummy variable taking a value of 1 if a manager from the corporate headquarters was present at the subsidiary being interviewed. All columns include country controls $\ln(Country/GDP)$ and $\ln(Country\ unemployment\ rate)$. Standard errors are robust to arbitrary heteroskedasticity.

Table 5: Corporate Group Characteristics

Dependent variable:	ln(Number of Subsidiaries)			
	(1)	(2)	(3)	(4)
	Family manager	Board member	Whole ownership	Parent-sub name
Country PCV score	-0.065 (0.006)	-0.069 (0.005)	-0.078 (0.003)	-0.069 (0.003)
Country PCV score x				
Dummy for high share of family managers	0.007 (0.002)			
Dummy for high board member interlock		0.007 (0.002)		
Dummy for high share of wholly-owned subsidiaries			0.041 (0.001)	
Dummy for high share of subsidiaries using parent's name				0.019 (0.001)
Dummy for high share of family managers	-0.014 (0.005)			
Dummy for high board member interlock		-0.011 (0.006)		
Dummy for high share of wholly-owned subsidiaries			-0.107 (0.004)	
Dummy for high share of subsidiaries using parent's name				-0.085 (0.004)
ln(Group-country-industry revenues)	0.055 (0.001)	0.041 (0.001)	0.028 (0.000)	0.030 (0.000)
Country controls	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Three-digit SIC dummies	Yes	Yes	Yes	Yes
Corporate group dummies	Yes	Yes	Yes	Yes
Observations	449,288	580,237	2,702,307	2,243,470
R-squared	0.54	0.50	0.46	0.45

Notes: The table presents how the relationship between enterprise liability and asset partitioning is moderated by group factors related to a parent's control over its subsidiaries. The sample consists of corporate groups at the country-industry-year level for years 2002 through 2014 across sixteen countries. Dummy for high share of family managers takes a value of 1 for groups with more than 50% of subsidiaries managed by a family manager. Dummy for high board member interlock takes a value of 1 for groups with more than 50% of subsidiaries with at least one board member who serves also on the board of the corporate parent. Dummy for high share of wholly-owned subsidiaries takes a value of 1 for groups with more than 50% of subsidiaries that are wholly owned. Dummy for high share of subsidiaries using parent's name takes a value of 1 for groups with more than 50% of subsidiaries taking the same or partially same name as its corporate parent. Where indicated, country controls included are $\ln(\text{Country}/\text{GDP})$, $\ln(\text{Country unemployment rate})$, Country EPL , and $\text{Country stock market development}$. All columns include legal origin dummies indicating the legal origin (English, French, German, or Scandinavian) from which each country's commercial laws are derived. Standard errors are clustered at the group-country-industry level.

Table 6: Corporate Group Investment and Growth (Propensity Score Matching)

Dependent variable:	<i>Investment</i>		<i>Growth</i>		<i>Failure</i>		<i>Profits</i>	
Countries	All	British vs. German	All	British vs. German	All	British vs. German	All	British vs. German
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A dummy for low PCV	0.136 (0.005)	0.197 (0.013)	0.167 (0.005)	0.149 (0.024)	0.045 (0.006)	0.088 (0.011)	0.006 (0.006)	0.020 (0.015)
ln(Group-country-industry revs.)	0.017 (0.001)	0.008 (0.001)	0.021 (0.002)	0.010 (0.001)	-0.013 (0.001)	-0.006 (0.001)	0.006 (0.001)	0.002 (0.002)
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Three-digit SIC dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	417,437	139,310	417,437	139,310	417,437	139,310	417,437	139,310
R-squared	0.049	0.058	0.041	0.046	0.007	0.009	0.007	0.009

Notes: The table presents the relationship between enterprise liability and investment, revenue growth, and failure. The unit of analysis is corporate group-country pair (cross-sectional), and the sample consists of corporate groups operating in high PCV countries matched to corporate groups operating in low PCV countries on industry (3-digit SIC), revenues, and total assets. Propensity scores are used to construct the matched sample. *Investment* is annual change in total assets for a corporate group in a given country averaged over the sample period. *Growth* is yearly revenue growth of corporate groups within each country averaged over the sample period. *Failure* is a dummy variable taking a value of 1 if a corporate group in a given country experiences more than a 50% decline in annual revenues averaged over the sample period. *Profit* is defined as net income over assets. Country-level controls included are $\ln(\text{Country GDP})$, $\ln(\text{Country unemployment rate})$, *Country EPL*, and *Country stock market development*. Standard errors are robust to heteroskedasticity and clustered at the industry level.

Appendix A A Theoretical Model

This appendix develops a simple economic model to formally derive the main predictions that we test in the paper (Hypotheses 1-3 in Section 3). We build on Aghion and Tirole's (1997) well-known model of formal and real authority in organizations (see also (Ayotte, 2017) for a related analysis).

The model has three periods. In period 1, headquarters decides whether to invest in a risky new project. If headquarters invests, a new unit is created in charge of carrying out the project. In period 2, headquarters selects a legal organization for the new unit. Specifically, it chooses whether to incorporate the unit or not. In period 3, both headquarters and the unit's manager exert effort to implement the project.

If headquarters does not invest, the new project/unit is not created. Headquarters earns a payoff normalized to zero, and the game ends.

If headquarters invests, an investment cost $I > 0$ is incurred and the new project/unit is created. The project generates profits B with probability p , losses $\hat{\theta}L$ with probability q , and a payoff 0 (which could be interpreted as early termination of the project) with probability $1 - p - q$. The parameter $\hat{\theta} \in (0, 1]$ captures the extent to which losses arising from the project can be externalized to other stakeholders. The parameters $\hat{\theta}$, p and q will be endogenously determined below.

In period 2, headquarters selects a legal organization for the new unit. Specifically, it could incorporate the unit, which would then become a new, legally independent subsidiary of the group, or it could not incorporate the unit, which would then remain as an (unincorporated) division of an existing subsidiary. Thus, the choice of legal organization is between unincorporated division or legally independent subsidiary.

Incorporation involves a fixed cost $C > 0$. This cost captures expenses such as registration costs, external auditing costs, the cost of hiring new directors, additional taxes, etc. The chief benefit of incorporation is that headquarters enjoys limited liability. If the project fails, headquarters (and the rest of the group) is better insulated from potential liabilities. Specifically, we posit that $\hat{\theta} = 1$ if the unit is not incorporated, and $\hat{\theta} = \theta \in (0, 1]$ if the unit is incorporated. The assumption $\hat{\theta} = 1$ implies that, if the unit is not incorporated, headquarters fully internalizes the potential losses L arising from the project. This would be the case if, for instance, the unit is part of a large subsidiary with enough resources to pay

for L (e.g., Google in the Alphabet group).³⁵

The parameter $\theta \in (0, 1]$ captures the extent to which *subsidiary* losses can be externalized to other stakeholders. It can be interpreted as the propensity of courts to apply the doctrine of enterprise liability. When θ is high, headquarters are more likely to be held liable for the losses of their subsidiaries. When θ is low, headquarters are not likely to be held liable. Thus, the parameter θ can be interpreted as a measure of the strength (or weakness) of enterprise liability.

In period 3, the project is implemented. The implementation phase is similar regardless of whether the unit is organized as a division or as a subsidiary. Our discussion here follows closely Aghion and Tirole (1997). There are $n + 1$ actions, indexed by $i = 0, 1, \dots, n$, $n \geq 3$. Each action i is associated with a pair (V_i, v_i) , where V_i is the payoff that accrues to headquarters and v_i is the payoff or private benefit that accrues to the business unit manager if action i is selected. Action 0 yields a known payoff $(0, 0)$ to headquarters and the manager and can be interpreted as early termination of the project. The consequences of actions $i = 1, \dots, n$ appear identical ex ante to headquarters and the manager and can only be discovered by exerting information gathering effort. Ex ante, the players only know that, with probability α , two of these actions yield (B, b) and $(-\hat{\theta}L, 0)$ and the $n - 2$ other actions yield $(-M, -m)$. With probability $1 - \alpha$, however, two actions yield $(B, 0)$ and $(-\hat{\theta}L, b)$ and the $n - 2$ other actions yield $(-M, -m)$. B, b, L, M, m are all strictly positive. We assume that n, M and m are large enough that, with no additional information about the consequences of these actions, both headquarters and the manager prefer action 0 to randomly picking one of the other actions.³⁶

By gathering information, the headquarters and the manager can learn the consequences associated with actions. Let e be the information gathering effort exerted by the manager, and E the information gathering effort exerted by headquarters. The cost of effort is $\frac{1}{2}ce^2$ for the manager and $\frac{1}{2}CE^2$ for headquarters. By exerting effort e , the manager learns the payoffs associated with all the actions with probability e , and with probability $1 - e$ he learns nothing. Similarly, by exerting effort E , headquarters

³⁵The assumption that $\hat{\theta} = 1$ is extreme but could easily be relaxed. All is needed is that headquarters' losses are higher when the unit is not incorporated than when it is. For instance, we could have assumed that $\hat{\theta} = \bar{\theta} \leq 1$ if the unit is not incorporated, and $\hat{\theta} = \theta \in (0, \bar{\theta}]$ if the unit is incorporated.

³⁶The parameter α can be interpreted as a measure of congruence between the preferences of headquarters and those of the manager. Suppose in fact that the manager perfectly knew the consequences of selecting each of the possible actions $i = 0, 1, \dots, n$. Then, with probability α , the manager would select the action yielding (B, b) , which is also the headquarters' preferred action. However, with probability $1 - \alpha$, he would select the action yielding $(-\hat{\theta}L, b)$, which would give headquarters a negative payoff.

learns the payoffs associated with all the actions with probability E and, with probability $1 - E$, it learns nothing. These probabilities are independent.

In line with the incomplete contracting approach grossman1986costs, we assume that actions cannot be described and contracted on ex ante. Players interact as follows. First, the manager and headquarters simultaneously and non-cooperatively choose effort levels e and E . Then the manager proposes a course of action. Headquarters can reject the manager's proposal and pick a different action, which is then implemented. Headquarters always retains the formal authority to select an action, but the manager can enjoy real authority because headquarters is uninformed. Because of the timing, we interpret the manager's proposal as an initiative originating from the unit, and the headquarters' information gathering and evaluation as monitoring.

Let $\alpha B - (1 - \alpha)\hat{\theta}L \geq 0$ and suppose that, when indifferent between two actions, players always pick the one that maximizes the utility of the other player. Then, headquarters' expected payoff from the project (gross of incorporation and investment costs) is

$$V_H(\hat{\theta}) = EB + (1 - E)e[\alpha B - (1 - \alpha)\hat{\theta}L] - \frac{1}{2}CE^2 \quad (4)$$

and the manager's expected payoff is

$$U_M = E\alpha b + (1 - E)eb - \frac{1}{2}ce^2. \quad (5)$$

To obtain these payoffs, note that, if headquarters is informed (which occurs with probability E), then it will always select the action yielding B (and αb in expectation to the manager). However, if headquarters is uninformed and the manager is informed (which occurs with probability $(1 - E)e$), the manager will recommend the action that yields b to himself and $\alpha B - (1 - \alpha)\hat{\theta}L$ in expectation to headquarters. Of course, headquarters can reject this recommendation and obtain 0 by selecting action 0. However, because we assume $\alpha B - (1 - \alpha)\hat{\theta}L \geq 0$, headquarters always optimally rubber-stamps the manager's recommendation if uninformed. Finally, if both headquarters and the manager are uninformed, action 0 yielding 0 to both will be selected.

In equilibrium, headquarters maximizes (4) with respect to E , and the manager maximizes (5) with

respect to e . Assuming interior solutions, we obtain:

$$E^*(\hat{\theta}) = \frac{B - \frac{b}{c}[\alpha B - (1 - \alpha)\hat{\theta}L]}{C - \frac{b}{c}[\alpha B - (1 - \alpha)\hat{\theta}L]} \quad (6)$$

and

$$e^*(\hat{\theta}) = \frac{b}{c}(1 - E^*(\hat{\theta})) = \frac{b}{c} \left(1 - \frac{B - \frac{b}{c}[\alpha B - (1 - \alpha)\hat{\theta}L]}{C - \frac{b}{c}[\alpha B - (1 - \alpha)\hat{\theta}L]} \right). \quad (7)$$

Equations (3) and (4) imply that E^* and e^* are strategic substitutes – an increase in E^* leads to a decrease in e^* and vice versa. Intuitively, an increase in headquarters' monitoring effort E^* reduces managerial initiative e^* because headquarters is less likely to rubber-stamp the manager's proposal. Hence, the manager has less of an incentive to exert costly effort. From the point of view of headquarters, reducing monitoring effort has the advantage of encouraging managerial initiative, but comes at the cost of loss of control.

The probability that a manager's proposal is rejected, conditional on being made, is $E(1 - \alpha)$. Thus, E can naturally be interpreted as an inverse measure of managerial autonomy. The smaller the headquarters monitoring E is, the greater the (real) autonomy of the manager from headquarters.

Our focus is on how managerial autonomy and initiative (respectively, $-E^*$ and e^*) vary with the likelihood that losses can be externalized ($-\hat{\theta}$). Simple algebra yields

$$\frac{\partial E^*(\hat{\theta})}{\partial \hat{\theta}} > 0 \quad \text{and} \quad \frac{\partial e^*(\hat{\theta})}{\partial \hat{\theta}} < 0. \quad (8)$$

These equations show that, when losses can to a large extent be externalized ($\hat{\theta}$ low), headquarters exerts less monitoring effort (E^* low) and managers enjoy more autonomy ($-E^*$ high); managers also display more initiative (e^* high). Conversely, when losses cannot easily be externalized, headquarters exerts significant monitoring effort, and managerial autonomy and initiative are curtailed.

Recall that $\hat{\theta} = 1$ if the unit is organized as a division, and $\hat{\theta} = \theta \in (0, 1]$ if the unit is organized as a subsidiary. The analysis above immediately implies that a division manager is granted less autonomy and exhibits less initiative than a subsidiary manager. This is because losses in a division have a stronger effect on headquarters than the same "potential" losses in a subsidiary (because of limited liability). As a consequence, headquarters more strongly curtail managerial autonomy in divisions than in subsidiaries. The same argument implies that subsidiary managers are granted more autonomy and exhibit more

initiative in countries where enterprise liability is weak (θ low) than in countries where enterprise liability is strong (θ high).

Proposition 1 (Managerial autonomy).

- (i) Division managers are granted less autonomy and exhibit less initiative than subsidiary managers.

Formally, $E^*(1) \geq E^*(\theta)$ and $e^*(1) \leq e^*(\theta)$ for all $\theta \in (0, 1]$.

- (ii) Subsidiary managers are granted more autonomy and exhibit more initiative when enterprise liability

is weak than when it is strong. Formally, $\frac{\partial E^*(\theta)}{\partial \theta} > 0$ and $\frac{\partial e^*(\theta)}{\partial \theta} < 0$.

Proposition 1(i) formalizes the idea that subsidiary managers are better at sensing and exploiting growth opportunities than division managers (see also (Manikandan & Ramachandran, 2015)). Proposition 1(ii) also makes clear that subsidiary managers enjoy more autonomy and display more initiative in countries where enterprise liability is weak than in countries where enterprise liability is strong (Hypothesis 2).

Next, we examine the choice of legal organization. If the unit is organized as a division (i.e., is not incorporated), then $\hat{\theta} = 1$ and we can write the headquarters' (gross) expected payoff as V_D where

$$V_D = V_H(1) \tag{9}$$

(the subscript D stands for division). If instead the unit is organized as a subsidiary (i.e., is incorporated), then $V_S(\theta) = V_H(\theta)$ and the headquarters' (gross) expected payoff can be written as $V_S(\theta)$ where

$$V_S(\theta) = V_H(\theta) \tag{10}$$

(the subscript S stands here for subsidiary).

Setting up a subsidiary also involves the incorporation cost C . Clearly, headquarters will incorporate the unit if, in equilibrium, the total payoff from setting up a subsidiary is greater than the total payoff of setting up a division:

$$V_S^*(\theta) - C \geq V_D^*. \tag{11}$$

We examine how the choice of legal organization is affected by θ , the strength of enterprise liability. When θ is high, a greater fraction of the potential subsidiary losses L is not externalized and accrues to headquarters. This suggests that setting up a subsidiary is especially beneficial when enterprise liability is weak. This intuition can easily be confirmed by totally differentiating $V_S^*(\theta)$ with respect to θ :³⁷

$$\frac{dV_S^*(\theta)}{d\theta} = \underbrace{\frac{\partial V_S^*(\theta)}{\partial E^*} \frac{\partial E^*}{\partial \theta}}_{=0} + \underbrace{\frac{\partial V_S^*(\theta)}{\partial e^*} \frac{\partial e^*}{\partial \theta}}_{>0} + \underbrace{\frac{\partial V_S^*(\theta)}{\partial \theta}}_{<0} < 0. \quad (12)$$

Equation (9) reveals that there are two effects at play here. The direct effect, measured by $\frac{\partial V_S^*(\theta)}{\partial \theta}$, captures the simple fact that, when enterprise liability is weak (θ low), subsidiary losses are to a greater extent externalized. This obviously benefits headquarters. The indirect effect, measured by $\frac{\partial \Pi_S^*(\theta)}{\partial e^*} \frac{\partial e^*}{\partial \theta}$, captures the effect of enterprise liability on managerial initiative. When enterprise liability is weak, headquarters grant subsidiary managers more autonomy, and subsidiary managers exhibit more initiative. This initiative also benefits headquarters. As a consequence of these two effects, the headquarters' expected payoff in equilibrium when the unit is organized as a subsidiary is decreasing in θ .

From (11), one can easily see that, when $\theta = 1$, it is optimal for headquarters to organize the unit as a division. We assume that $V_S^*(0) - C > V_D^*$ so that, when enterprise liability is very weak ($\theta = 0$), headquarters chooses to set up a subsidiary instead. Together with equation (12), this implies that there exists a threshold $\theta^T \in (0, 1)$ such that, for all $\theta \leq \theta^T$, it is optimal to incorporate the unit and, for all $\theta > \theta^T$, it is optimal not to incorporate the unit.

Proposition 2 (Legal form). When enterprise liability is weak (i.e., $\theta \leq \theta^T$), the unit is organized as a legally independent subsidiary. When enterprise liability is strong (i.e., $\theta > \theta^T$), the unit is organized as an unincorporated division.

Proposition 2 formalizes the idea that, when enterprise liability is weak, groups have an incentive to more finely partition their assets and set up more subsidiaries (Hypothesis 1). Note also that, because $\hat{\theta}$ and L enter multiplicatively in (4), weak enterprise liability promotes finer asset partitioning especially when potential losses L are significant.

³⁷ $\frac{\partial V_S^*(\theta L)}{\partial E^*} = 0$ follows from the first order conditions. $\frac{\partial V_S^*(\theta)}{\partial e^*} > 0$ and $\frac{\partial V_S^*(\theta)}{\partial \theta} < 0$ follow from inspection of (4). $\frac{\partial e^*}{\partial \theta} < 0$ follows from inspection of (7) (and Proposition 1).

Lastly, we examine how enterprise liability affects corporate group investment and performance. In period 1, headquarters must select which projects to fund. Headquarters invests in a project if, in equilibrium, the total returns from investment are higher than the investment cost I . The total returns from investment are V_D^* if $\theta > \theta^T$, and $V_S^*(\theta) - C$ if $\theta \leq \theta^T$. From equation (9), we know that $V_S^*(\theta)$ is strictly decreasing in θ (while V_D^* obviously does not depend on θ). Thus, the likelihood that a project with random investment cost I is funded is higher as θ declines, although the difference between when θ is "medium" and "high" may not be large (because V_D^* is constant over the interval $(\theta^T, 1]$).

We can also evaluate how the probability of "failure", as measured by q , varies with the strength of enterprise liability. From (4), one can see that the probabilities of success p and failure q are endogenized as follows: $p = E + (1 - E)e\alpha$ and $q = (1 - E)e(1 - \alpha)$. The equilibrium values of E and e are given by equations (3) and (4).

Simple algebra shows that q decreases with headquarters' monitoring effort E^* (and conversely increases with managerial initiative e^*). When enterprise liability is weak, headquarters' monitoring effort E^* declines because losses are more likely to be externalized (see equation 5). Thus, the probability of failure becomes higher. The intuition is that, in countries where enterprise liability is weak, headquarters delegate more responsibilities to subsidiary managers. However, delegation comes at the cost of a greater probability to fail, because of agency problems.

We summarize the above discussion, which formalizes Hypothesis 3, as follows.

Proposition 3 (Corporate group investment and performance). When enterprise liability is weak, corporate groups invest more and hence grow faster. The probability of failure, however, also tends to increase.

Interestingly, it is not possible to provide clear-cut predictions for how profitability varies with θ . This is because there are two effects at play. On the one hand, weaker enterprise liability (lower θ) increases expected profits because losses are more likely to be externalized. On the other hand, weaker enterprise liability also induces headquarters to substitute its monitoring effort with managerial initiative. This drop in monitoring effort increases the probability of failure, thus reducing expected profits.³⁸

³⁸Nevertheless, it is still true that the headquarters' expected payoff increases as θ drops (see equation (9)). This is because

the headquarters' expected payoff is composed of two parts: the expected profits minus the cost of monitoring effort. The cost of monitoring effort declines as θ drops, raising the headquarters' payoff even if profitability declines.

Appendix B Data Appendix

B.1 Moderating factors

This section provides definitions for the moderating factors as well as the country-level controls used in the study.

B.1.1 Industry downside risk

In industries where firms face a substantial downside risk, protection against potential losses incurred by subsidiaries should be especially valuable to headquarters. Accordingly, we expect the relationship between enterprise liability (PCV) and asset partitioning to be stronger in industries where firms are more likely to face substantial downside risk. To test this prediction, we construct (based on Standard & Poor's CRSP/Compustat) a measure of industry downside risk as the share of firms in an industry (3-digit SIC) that experience an annual drop of at least 50% in revenues.³⁹ On average, 3% of our sample subsidiaries experience a yearly revenue drop of at least 50% (90th percentile of 9.5%).

B.1.2 Family managers

When a manager of a subsidiary is related to the group's controlling shareholders, interactions between the subsidiary and headquarters are less likely to be arms-length, rendering enterprise liability protection less salient. To test this hypothesis, we collect from Orbis shareholder names for corporate groups along with executive and senior manager names for subsidiaries. We match the last names of the managers to the last names of the shareholders and then compute (at the group-country-industry-year level) the fraction of subsidiaries whose managers include a family member of the shareholders (owning at least 5% of stocks).⁴⁰

B.1.3 Board member interlock

Sharing board members between the parent and its subsidiaries is often indicative of a high level of control that the parent has over its subsidiaries. When board member overlap is high between a subsidiary and its corporate parent, enterprise liability protection should be less effective and less prevalent. To test this prediction, for each corporate group and year, we extract the names of the board members for the subsidiaries and their corporate parent from Orbis. We then compute (at the group-country-industry-year level) the fraction of the subsidiaries with a board member who is also a board member of the corporate headquarters.⁴¹

B.1.4 Wholly-owned subsidiaries

When a corporate parent wholly owns its subsidiary, its level of control should be higher than when the subsidiary is partly owned. Consequently, enterprise liability protection should be less salient for wholly

³⁹We experimented with other reasonable threshold (30%) and with other types of financial assets (i.e., net income, cash, and current assets). Our results are not sensitive to these changes.

⁴⁰Average share of subsidiaries managed by a family manager is 14% ranging from 0% (10th percentile) to 100% (90th percentile).

⁴¹On average, 54% of a subsidiary's board members are also on the board of the corporate parent ranging from 0% (10th percentile) to 100% (90th percentile).

owned subsidiaries relative to partly owned ones. To test this hypothesis, for each corporate parent, we compute (at the group-country-industry-year level) the fraction of its subsidiaries that are wholly owned (i.e., parent has 100% ownership stake in the subsidiary).⁴²

B.1.5 Parent-subsidiary name sharing

Some subsidiaries have the same or similar name as their corporate parent. Name sharing should lead to weaker subsidiary independence due to potential reputation spillovers that justify strong headquarters monitoring. Weaker subsidiary independence makes enterprise liability protection less salient. To test this hypothesis, we extract the names of subsidiaries and their corporate parents, and then compute for each corporate group the fraction of subsidiaries (at the group-country-industry-year level) that share the same or partially the same name (at least one word from the full name after dropping stopwords) with the corporate parent.^{43 44}

B.2 Country-level controls

The country level variables that we employ in our analysis are GDP; unemployment rate; employment protection legislation index (EPL) defined as the cost and difficulty in dismissing a contract employee; and stock market development index defined as the ratio of stock market capitalization to GDP. Data on EPL are obtained from OECD, and data for unemployment rate, GDP, and stock market development index are obtained from the World Bank.

B.3 Empirical specification

B.3.1 Empirical specification for panel event study

To examine how increased downside risk due to BP Oil Spill of 2010 affected the number of subsidiaries controlled by corporate groups, we estimate the following specification:

$$\ln(Y)_{git} = \sum_{j=2}^3 \beta_j (Lead\ j)_{git} + \sum_{k=0}^5 \gamma_k (Lag\ k)_{git} + \mu_{gi} + \lambda_t + X'_{git}\Gamma + \varepsilon_{git}, \quad (13)$$

where $(Lead\ j)_{git} = 1[t = Event_g - j \text{ for } j \in \{2, 3\}]$ and $(Lag\ k)_{git} = 1[t = Event_g + k \text{ for } k \in \{0, 1, 2, 3, 4, 5\}]$. $Event_g$ is the year in which BP oil spill occurs (i.e., 2010). μ_{gi} and λ_t are corporate group-industry pair and year fixed effects, and X'_{git} are time-varying, corporate group-industry (4-digit SIC) level controls, including lagged corporate group revenues and assets as well as their yearly percent changes within each industry. We also include lagged average crude oil price and its yearly percent change as controls. ε_{git} is an i.i.d. error term, and the standard errors are clustered at the corporate group level.

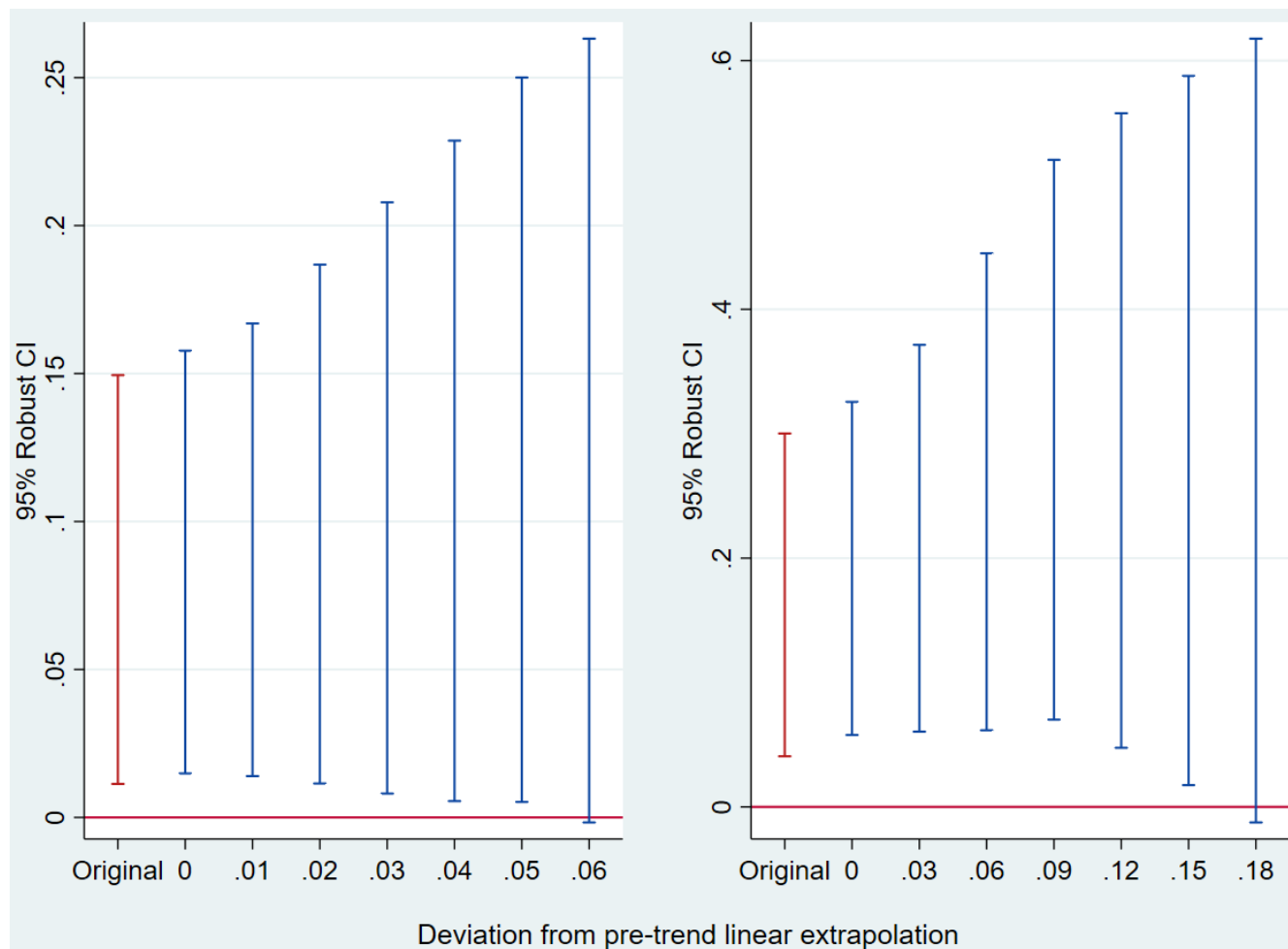
⁴²On average, 45% of the subsidiaries are wholly owned, with the share ranging from 0% (10th percentile) to 100% (90th percentile).

⁴³We also check robustness of our results using share of subsidiaries that share exactly the same name as the corporate parent, and the results are consistent with our main finding.

⁴⁴On average, 28% of the subsidiaries operate under the same or partially same name as their corporate parent, with the share ranging from 0% (10th percentile) to 100% (90th percentiles).

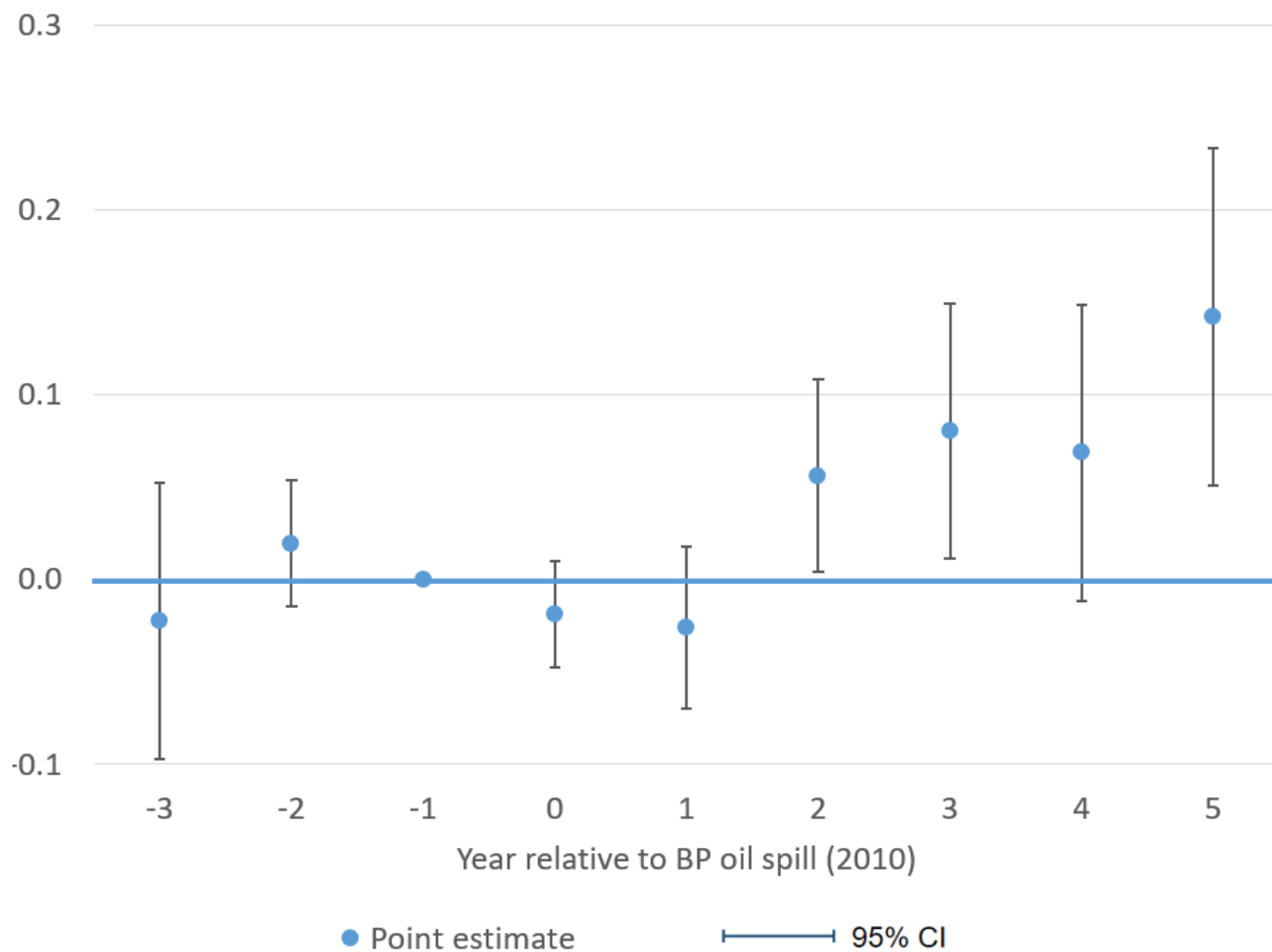
Appendix C Supplementary Figures and Tables

Figure C1: Sensitivity test for post-treatment parallel trends



Notes: The figures present the sensitivity test performed to explore the robustness of the panel event study in Section 6.2. The left panel is for the baseline analysis, and the right panel is for the analysis involving groups in countries with weak enterprise liability. X-axis indicates the deviation (in percent) in the slope of the post-treatment trend from the linear extrapolation of the pre-trend. Y-axis indicates the 95% confidence intervals for the point estimates for the treatment effects.

Figure C2: Difference in differences based on Callaway and Sant'Anna (2021)



Notes: The figure presents results from difference-in-differences regression based on the algorithm made available by (Callaway & Sant'Anna, 2021). The regression includes the same controls included in the main specification. The standard errors are robust to heteroskedasticity and clustered at the corporate group level.

Table C1: Mean comparison of main variables

Panel A: Group-Industry-Country Level							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Mean comp.	High PCV			Low PCV		
VARIABLES	(3) minus (6)	No. Obs.	Mean	Std. Dev.	No. Obs.	Mean	Std. Dev.
Number of subsidiaries	-0.21	1,993,591	1.37	3.31	1,128,433	1.58	4.62
Revenues (in mil)	-14	1,993,591	73	1,260	1,128,433	87	1,280
Assets (in mil)	-145	1,567,686	243	10,800	1,047,749	387	15,600

Notes: The table presents mean comparison between groups operating in high and groups operating in low PCV countries. High-PCV countries are Germany, Italy, France, Netherlands, Australia, Argentina, the U.S., and low-PCV countries are Great Britain, Sweden, Denmark, Japan, Korea, Canada, Belgium, Switzerland, and China.

Table C2: Summary Statistics for the Main Variables (WMS Sample)

	(1)	(2)	(3)	(4)	(5)	(6)
				Distribution		
VARIABLES	No. Obs	Mean	Std. Dev.	10th	50th	90th
Revenues (in million USD)	2,243	223	734	18.7	69.7	454
Assets (in million USD)	1,955	200	582	13.4	57.6	422
Aggregate score	2,191	2.8	1.14	1.33	2.67	4
Investment amount (in USD)	2,008	67,783	188,169	0	9,150	141,900
Product introduction	2,000	2.60	1.75	1	3	5
Sales and marketing	2,035	2.41	1.52	1	2	5
Hiring	2,187	3.31	1.42	1	3	5
Levels to CEO	1,981	3.61	1.36	2	3	5
HQ on site	2,243	0.68	0.47	0	1	1

Notes: The table presents summary statistics for the main variables used in our subsidiary autonomy analysis. The sample consists of corporate subsidiaries from the World Management Survey covering years 2005 through 2014.

Table C3: Summary Statistics for the Main Variables (Event Study)

	(1)	(2)	(3)	(4)	(5)	(6)
				Distribution		
VARIABLES	No. Obs	Mean	Std. Dev.	10th	50th	90th
Group-industry-year level						
Number of subsidiaries	2,707,394	1.91	2.86	1	1	3
Revenues (in million USD)	1,836,271	104	1,823	0.05	2.68	70.9
Assets (in million USD)	2,151,044	417	49,972	0.12	2.86	81.5
Group-year level						
Number of subsidiaries	1,174,588	4.35	10.7	1	1	8
Revenues (in million USD)	1,174,588	178	3,381	0.16	3.43	76.9
Assets (in million USD)	1,174,588	856	69,778	0.30	4.78	100
Year level (2007-2015)						
Oil price (per barrel)	9	87.2	21.1	50.8	96.6	105

Notes: The table presents summary statistics for the main variables used in our event study analysis examining the relationship between BP oil spill and the number of subsidiaries. The sample consists of corporate groups at the industry (4-digit SIC) level for each year from 2007 to 2015.

Table C4: Summary Statistics for the Main Variables (Corporate investment, growth, and failure)

	(1)	(2)	(3)	(4)	(5)	(6)
				Distribution		
VARIABLES	No. Obs	Mean	Std. Dev.	10th	50th	90th
Number of subsidiaries	417,437	1.79	5.289	1	1	2.67
Revenues (in million USD)	417,437	91.4	1,716	0.19	2.98	64
Assets (in million USD)	417,437	297	11,730	0.19	2.26	59
Investment	417,437	0.12	0.52	-0.27	0.03	0.57
Growth	417,437	0.15	0.58	-0.3	0	0.72
Failure	417,437	0.08	0.22	0	0	0.29

Notes: The table presents summary statics for the main variables used in our analysis of corporate investment, growth, failure. The unit of analysis is corporate group-country pair.

Table C5: Event Study: BP Oil Spill

Dependent variable:	ln(Number of subsidiaries)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Baseline	Strong EL countries	Weak EL countries	Groups with steady or decl. assets	Group with $\geq 100M$ in assets	Excluding GB groups	Excluding US groups	Subs with a diff. name	Subs with an indep. board
Lead 3	0.045 (0.057)	0.070 (0.064)	-0.004 (0.094)	-0.087 (0.058)	0.012 (0.071)	0.105 (0.064)	0.009 (0.056)	-0.004 (0.041)	0.009 (0.059)
Lead 2	0.003 (0.025)	0.032 (0.025)	-0.031 (0.048)	-0.022 (0.090)	0.035 (0.033)	0.007 (0.028)	-0.029 (0.031)	-0.009 (0.054)	0.159 (0.093)
Lead 1	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline
Lag 0	0.008 (0.025)	-0.013 (0.030)	0.055 (0.045)	-0.082 (0.049)	0.016 (0.034)	0.003 (0.027)	0.010 (0.029)	-0.085 (0.038)	-0.107 (0.068)
Lag 1	0.002 (0.034)	-0.066 (0.037)	0.113 (0.063)	-0.066 (0.042)	-0.002 (0.045)	-0.002 (0.041)	0.026 (0.040)	-0.085 (0.038)	-0.107 (0.068)
Lag 2	0.091 (0.039)	0.009 (0.041)	0.219 (0.070)	0.024 (0.041)	0.080 (0.050)	0.060 (0.041)	0.105 (0.047)	0.035 (0.033)	-0.015 (0.058)
Lag 3	0.126 (0.044)	0.046 (0.038)	0.254 (0.088)	0.013 (0.032)	0.121 (0.055)	0.100 (0.047)	0.148 (0.056)	0.144 (0.045)	0.272 (0.114)
Lag 4	0.133 (0.047)	0.053 (0.048)	0.261 (0.088)	0.069 (0.039)	0.129 (0.058)	0.113 (0.052)	0.158 (0.057)	0.205 (0.048)	0.297 (0.115)
Lag 5	0.224 (0.053)	0.139 (0.056)	0.359 (0.096)	0.120 (0.039)	0.220 (0.065)	0.191 (0.057)	0.211 (0.065)	0.357 (0.070)	0.467 (0.133)
% change in corp. group revs	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 (0.000)	0.000 (0.000)	0.000 (0.000)
% change in corp. group assets	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.001 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
% change in avg. crude oil price	-0.000 (0.000)	-0.000 (0.000)	-0.001 (0.000)	-0.000 (0.000)	-0.001 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.001 (0.000)	-0.002 (0.000)
ln(Corporate group revenues) $_{t-1}$	0.007 (0.001)	0.007 (0.001)	0.007 (0.001)	0.005 (0.001)	0.011 (0.001)	0.007 (0.001)	0.007 (0.001)	0.009 (0.001)	0.019 (0.004)
ln(Corporate group assets) $_{t-1}$	0.014 (0.001)	0.012 (0.001)	0.018 (0.001)	0.030 (0.002)	0.029 (0.002)	0.015 (0.001)	0.013 (0.001)	0.032 (0.001)	0.036 (0.005)
ln(Avg. yearly crude oil price) $_{t-1}$	0.010 (0.002)	0.014 (0.003)	0.004 (0.004)	-0.007 (0.003)	0.001 (0.005)	0.010 (0.002)	0.012 (0.002)	0.031 (0.003)	0.066 (0.017)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Group-industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of clusters	992,045	581,785	410,260	694,026	353,352	871,334	915,311	693,240	69,091
Observations	2,707,394	1,632,403	1,074,991	1,216,982	1,050,500	2,388,479	2,460,157	1,831,241	168,194
R-squared	0.012	0.009	0.017	0.012	0.017	0.012	0.010	0.12	0.10

Notes: The table presents the effect of increased industry downside risk on corporate group asset partitioning based on a panel event study. The event observed is the BP oil spill of 2010, and the treatment and control groups consist of corporate groups in oil and gas industry and corporate groups in other industries, respectively. The sample consists of corporate group-industry pairs over years 2007 through 2015. *Lead2* and *Lead3* are dummy variables indicating relative years pre-BP oil spill, and *Lag0* – 5 are dummy variables indicating relative years post-BP oil spill. *Lead1* indicates the reference year (i.e., 2009). (The results are consistent if *Lag0* is used as the reference year.) Corporate group revenues and total assets are calculated at the group-industry level for each year. % change in corporate group revenues and % change in corporate group total assets are % change over the previous year (t-1) in the revenues and assets within each industry that the group operates in.

Table C6: Alternative Measures of PCV Score

Dependent variable:	ln(Number of subsidiaries)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Excl. enterp. / econ. unity	Excl. divers. of factors	Excl. bankrupt. case	Excl. fraud. case	Excl. empir. data	Equally weighted
Country PCV score	-0.108 (0.005)	-0.063 (0.003)	-0.052 (0.003)	-0.071 (0.003)	-0.060 (0.003)	-0.093 (0.003)
ln(Country GDP)	0.052 (0.002)	0.058 (0.002)	0.063 (0.002)	0.066 (0.002)	0.064 (0.002)	0.055 (0.002)
ln(Country unemployment rate)	0.001 (0.002)	-0.005 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.001 (0.002)	0.003 (0.002)
Country EPL	-0.137 (0.008)	-0.020 (0.008)	-0.038 (0.008)	-0.056 (0.008)	-0.052 (0.008)	-0.109 (0.008)
Country stock market development	-0.020 (0.004)	-0.011 (0.004)	-0.014 (0.004)	-0.016 (0.004)	-0.019 (0.004)	-0.026 (0.004)
ln(Group-country-industry revenues)	0.028 (0.000)	0.028 (0.000)	0.028 (0.000)	0.028 (0.000)	0.028 (0.000)	0.028 (0.000)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Three-digit SIC dummies	Yes	Yes	Yes	Yes	Yes	Yes
Corporate group dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,702,307	2,702,307	2,702,307	2,702,307	2,702,307	2,702,307
R-squared	0.46	0.46	0.46	0.46	0.46	0.46

Notes: The table presents the relationship between enterprise liability and asset partitioning. The sample consists of corporate groups at the country-industry-year level for years 2002 through 2014 and across sixteen countries. PCV scores are recalculated after dropping each of the five criteria (columns 1-5) and also after dropping the weights used for the criteria (column 6). All columns include legal origin dummies indicating the legal origin (English, French, German, or Scandinavian) from which each country's commercial laws are derived. Standard errors are robust to heteroskedasticity and clustered at the corporate group-country-industry level.

Table C7: Principal Components of PCV Score

Dependent variable:	ln(Number of subsidiaries)	
	(1)	(2)
	Principal components 1-3	Principal components 1-4
Principal component 1	-0.013 (0.002)	-0.017 (0.002)
Principal component 2	-0.031 (0.002)	-0.032 (0.002)
Principal component 3	-0.016 (0.004)	-0.007 (0.004)
Principal component 4		-0.015 (0.002)
ln(Country GDP)	0.051 (0.002)	0.048 (0.002)
ln(Country unemployment rate)	0.001 (0.002)	0.002 (0.002)
Country EPL	-0.141 (0.011)	-0.118 (0.011)
Country stock market development	-0.019 (0.004)	-0.021 (0.004)
ln(Group-country-industry revenues)	0.028 (0.000)	0.028 (0.000)
Year dummies	Yes	Yes
Three-digit SIC dummies	Yes	Yes
Corporate group dummies	Yes	Yes
Observations	2,702,307	2,702,307
R-squared	0.46	0.46

Notes: The table presents the relationship between enterprise liability and asset partitioning. The sample consists of corporate groups at the country-industry-year level for years 2002 through 2014 across sixteen countries. Principal components 1-4 are latent variables derived from the scores of the five criteria underlying the Country PCV score. The Kaiser rule is followed, and thus eigenvalue of 1 is set as the threshold in selecting relevant principal components. All columns include legal origin dummies indicating the legal origin (English, French, German, or Scandinavian) from which each country's commercial laws are derived. Standard errors are robust to heteroskedasticity and clustered at the corporate group-country-industry level.

Table C8: Other Robustness Tests

Dependent variable:	ln(Number of subsidiaries)			Number of subsidiaries	
	All subs.	Revenue polynom.	Rev. decile dummies	Poisson	Neg. binomial
	(1)	(2)	(3)	(4)	(5)
Country PCV score	-0.019 (0.002)	-0.060 (0.003)	-0.052 (0.003)	-0.080 (0.006)	-0.081 (0.006)
ln(Country GDP)	0.078 (0.001)	0.058 (0.002)	0.062 (0.002)	0.101 (0.005)	0.094 (0.004)
ln(Country unemployment rate)	0.023 (0.002)	-0.017 (0.002)	0.011 (0.002)	-0.051 (0.009)	-0.058 (0.008)
Country EPL	-0.100 (0.006)	-0.076 (0.009)	-0.071 (0.009)	0.016 (0.020)	-0.023 (0.016)
Country stock market development	-0.017 (0.003)	-0.026 (0.004)	-0.023 (0.004)	-0.017 (0.007)	-0.023 (0.006)
ln(Group-country-industry revenues)	0.031 (0.000)			0.107 (0.002)	0.093 (0.001)
Group-country-industry revenues		0.000 (0.000)			
Group-country-industry revenues ²		-0.000 (0.000)			
Revenue decile dummies	No	No	Yes	No	No
Year dummies	Yes	Yes	Yes	Yes	Yes
Three-digit SIC dummies	Yes	Yes	Yes	Yes	Yes
Corporate group dummies	Yes	No	No	No	No
Observations	4,906,668	3,134,701	3,134,701	3,122,026	3,122,026
R-squared	0.43	0.46	0.49	-	-

Notes: The table presents the relationship between enterprise liability and asset partitioning using alternative samples, controls, and empirical methods. The sample consists of corporate groups at the country-industry-year level for years 2002 through 2014 across sixteen countries. Column 1 includes all subsidiaries of the corporate parent in our sample regardless of corporate parent's ownership stakes. Columns 2 and 3 include a sales polynomial and sales deciles, respectively. Columns 4 and 5 present results based on Poisson and negative binomial regressions. All columns include legal origin dummies indicating the legal origin (English, French, German, or Scandinavian) from which each country's commercial laws are derived. Standard errors are robust to heteroskedasticity and clustered at the corporate group-country-industry (3-digit SIC) level.