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Essays in Corporate Finance

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ESSAYS IN CORPORATE FINANCE

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Dedication

I dedicate my dissertation to my wife, Shanta. Thank you for your sacrifices, love, and support during my doctoral program years.

I also dedicate this dissertation to my parents, brother, and sisters. I am especially grateful to my parents. Thank you for praying for me and for being by my side during all my difficult times.

Finally, I dedicate this dissertation to my many friends who have supported me throughout the process and to all who kept me in their prayers, even from the distance. I will always appreciate all they have done for me.

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ESSAYS IN CORPORATE FINANCE

by

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DISSERTATION

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Abstract

This doctoral dissertation examines the impact of firms' geographic location and labor market friction, both based on the states in which firms are headquartered, on corporate policies. The first essay examines the impact of the geographical location of the firm on the use of operating leases. The main idea of this essay is that, because obtaining information and monitoring is costly for potential lessors, especially when a lessee is relatively far away from financial centers, rural firms are less likely to use operating leases in comparison to their urban counterparts. Consistent with this hypothesis, I show that rural firms tend to have lower lease intensities than similar urban and small city firms. In addition, I find that firms with higher levels of debt capacity lease less, with higher financial constraints lease more, and with higher analyst following lease more. These findings are consistent with the existence of an agency problem associated with leasing. The second essay examines whether firms exhibit less tax aggressiveness in order to mitigate workers' exposure to unemployment risk. I use unemployment insurance (UI) benefit laws as a proxy for unemployment risk and multiple measures of tax aggressiveness. Given that tax aggressiveness is risky and costly for the firm and its employees, I argue that high state UI benefits lower labor unemployment risk and, hence provide firms an opportunity to exhibit more tax aggressiveness. Consistent with this hypothesis, I find a negative relation between firms' tax aggressiveness and unemployment risk. In additional analysis, I also find that the negative relation is more pronounced for firms in industries that are more labor intensive and industries in which labor has more bargaining power. Overall, these findings suggest that labor market frictions have implications for corporate tax policy.

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Chapter 1: Introduction- Essays in corporate finance

1.1 Introduction

This dissertation contains two separate essays related to the impact of firms' geographic location and labor market friction on corporate policies (e.g., operating lease decisions and corporate tax policy). In both the essays, I use U.S states where sample firms are headquartered in to determine geographic location and to determine unemployment risk workers are exposed to.

In the first essay, I investigate the association between firms' geographic location and their use of operating leases. Geographic distance imposes a costly information barrier that makes it difficult to obtain firm-specific information and monitor management. Given the fact that remoteness can also exacerbate agency problems in situations where there is a specific underlying asset which is the subject to the separation of ownership (e.g., an operating lease), leasing is susceptible to this agency problem, especially in remotely located firms. The decision to lease critically depends on whether the benefit of leasing (vis-à-vis other types of financing) outweighs the cost due to this agency problem. I, therefore, examine the impact of geographic location on leasing decisions of firms by classifying firms as rural, small city, or urban firms. Since urban firms are located in or close to large cities, where a lessor is more likely to be located, obtaining information and monitoring the firm should be easier for lessors and the probability that leased assets will be abused and less well maintained should be lower for urban firms, relative to rural firms. In other words, the effect of geographic distance on leases should be most pronounced for rural firms, less pronounced for urban firms, and somewhere in between for small city firms. Overall, this suggests that it is more difficult for lessors to forecast asset abuse in rural firms, resulting in more frequent deposit and penalty provisions in lease contracts and high rental expenses requirements. As a result, rural firms may find leasing a less attractive source of financing when compared to their urban and small city counterparts. Hence, rural firms are expected to have a lower lease intensity.

Using a sample of US firms in the Compustat database over the period of 1980 - 2011, I find strong empirical support for this hypothesis. In both univariate and multivariate analyses, I show that rural firms tend to have a lower lease intensity, compared to small city and urban firms. The results are robust to alternative measures of lease intensity and lease ratios. This essay contributes to the literature on geographic location by showing that location affects leasing decisions of firms. I introduce a firms' geographical location as an important factor that can further exacerbate agency problems, increasing the costs of leasing and making lease financing less attractive than alternative financing options. The relation between lease and debt financing in the literature is not well understood. I show that firms with higher debt capacity tend to have a lower lease intensity. Consistent with Yan (2006), my results, therefore, add to the leasing debate by showing that, at least in part, lease and debt are substitutes.

In the second essay, I study the relation between tax aggressiveness and labor unemployment risk. Empirically, I test whether firms located in states with higher unemployment insurance (UI) benefits (i.e., low labor unemployment risk) engage in more tax aggressive activities than do firms located in states with high labor unemployment risk. Involuntary unemployment imposes costs on the labor force that lead workers to require compensation in the form of higher wages, additional benefits, and quality working conditions. Given that firms cannot guarantee workers with insurance covering these costs, a number of studies argue that firms must compensate workers ex ante to bear such unemployment risk (e.g., Hamermesh and Wolfe 1990; Li 1986; Topel 1984; Abowd and Ashenfelter 1981). Firms' compensation benefits payments, therefore, should increases with the probability of unemployment, the degree of workers' risk averseness, and the duration of joblessness. Besides, I also argue that tax avoidance is a risky activity for firms and managers who, if engage in such activity, bear significant costs

that include, but not limited to, fees paid to tax experts for tax planning, time devoted to the resolution of tax audits, reputational penalties, and penalties paid to tax authorities (IRS) if detected. As tax aggressiveness makes the firm risky in the eyes of the labor force, whether to engage in this activity (and by how much) depends on the costs and benefit tradeoff. Hence, unemployment risk raises the costs that are required to compensate workers for bearing greater exposure to this risk.

Using two measures of tax aggressiveness: (1) the effective tax rate (ETR); (2) the cash effective tax rate (CETR), I find that firms located in states with higher UI benefits (i.e., lower labor unemployment risk) exhibit more tax aggressiveness than firms located in higher labor unemployment risk states. These results are consistent across all measures of tax aggressiveness, are highly statistically significant, and have economic significance. The contributions that this essay makes include- First, introducing an additional non-tax cost (labor unemployment risk) to the agency dynamics of being tax aggressive; second, attempting to explore additional corporate activities (e.g., tax aggressiveness) that might be affected by labor market friction; Second, investigating a new non-tax determinant of tax aggressiveness (i.e., a macro variable that measures labor unemployment risk) that adds to the existing literature on cross-sectional determinants of tax aggressiveness.

Chapter 2: Essay 1- Geographic location and lease intensity

2.1 Introduction

A growing body of finance literature emphasizes the importance of a firm's geographical location on investment decisions (e.g., Coval and Moskowitz (1999), Ivković and Weisbenner (2005), Grinblatt and Keloharju (2001), Huberman (2001), Seasholes and Zhu (2010), and Loughran and Schultz (2004)). The basic tenet of this literature is that investors, both on the institutional and the retail level, prefer stocks of firms located close to them.[1]

Geographical distance imposes a costly information barrier that makes it difficult to obtain firm-specific information and monitor management. Surprisingly, although geography is shown to adversely affect the firm's costs of both equity and debt because of these problems, very little attention has been paid in the existing literature to the fact that remoteness can also exacerbate agency problems in situations where there is a specific underlying asset which is the subject to the separation of ownership: an operating lease. Because of its separation of ownership and control, leasing is susceptible to this agency problem, especially in remotely located firms. The decision to lease critically depends on whether the benefit of leasing (vis-à-vis other types of financing) outweighs the cost due to this agency problem. In this paper, I examine the impact of geography on leasing decisions of firms by classifying firms as rural, small city, or urban firms. Since urban firms are located in or close to large cities, where a lessor is more likely to be located, obtaining information and monitoring the firm should be easier for lessors. Consistent

[1] Other studies also examine the impact of geography on financial issues. For example, Francis, Waisman, and Hasan (2007) and Loughran and Schultz (2005) document that the costs of equity and debt are higher when firms are located in rural areas. Malloy (2005) shows that analyst forecasts are less accurate for distantly located firms. Kedia and Rajgopal (2007) show that firms located further from the SEC are more likely to restate earnings and the SEC is less likely to investigate remote firms. Kang and Kim (2008) show that block acquirers are more likely to acquire firms nearby and that the performance of the acquisition is better because the acquirer can take part in the corporate governance activities of the acquired firm.

with the idea of the sensitivity to use and maintenance decision (Smith and Wakeman (1985)), the probability that leased assets will be abused and less well maintained should be lower for urban firms, relative to rural firms. In other words, the effect of geographic distance on leases should be most pronounced for rural firms, less pronounced for urban firms, and somewhere in between for small city firms. Overall, this suggests that it is more difficult for lessors to forecast asset abuse in rural firms, resulting in more frequent deposit and penalty provisions in lease contracts and high rental expenses requirements. As a result, rural firms may find leasing a less attractive source of financing when compared to their urban and small city counterparts. Hence, rural firms are expected to have a lower lease intensity.

Using a sample of US firms in the Compustat database over the period of 1980 - 2011, I find strong empirical support for this hypothesis. In both univariate and multivariate analyses, I show that rural firms tend to have a lower lease intensity, compared to small city and urban firms. I classify firms as rural, small city, or urban based on the five-digit ZIP codes of their headquarters. The classification is mainly based on the distance in miles of the firms' headquarter relative to the closest of the 12 largest metropolitan areas or any city with at least one million people (using the 2010 US Census numbers).[2] After controlling for a host of variables that the existing literature shows to have an effect on leasing, as well as controlling for industry and time fixed effects, the estimates are highly significant. Moreover, my results are robust to alternative measures of lease intensity and lease ratios.

As additional analysis, I also show that rural firms with higher debt capacity have lower a lease intensity than urban firms. Jaffee and Russell (1976) and Stiglitz and Weiss (1981) show that adverse selection problems can lead to a higher cost of debt. One way to reduce this external

[2] Other studies that use same the classification are Coval and Moskowitz (1999), Coval and Moskowitz (2001), Loughran and Schultz (2005), Seasholes and Zhu (2010), Ivković and Weisbenner (2005), and Malloy (2005).

financing cost and, hence, increase debt capacity is to use assets as collateral (i.e., increase tangible assets). Leasing theory also predicts that firms can reduce higher external financing costs by leasing assets. As higher debt capacity firms already have lower costs of external financing, their dependence on leases should be lower. As for the concern that rural firms have monitoring problems and that they, therefore, are more likely to abuse leased assets, analysts can improve the information environment and, to some extent, attenuate the costly information barrier. For example, Frankel and Li (2004) show that analyst following reduces information asymmetry. When I test whether analyst following matters, I find a positive interaction effect of analyst following and leasing for rural firms. This finding supports the view that a higher number of analysts following improve rural firms' ability to lease. Sharpe and Nguyen (1995) and Beatty, Liao, and Weber (2010) suggest that financially constrained firms are more likely to lease fixed capital. Therefore, I also examine whether rural firms with high financial constraints lease more than do typical unconstrained firms. Consistent with previous studies, my findings suggest that rural firms with higher financial constraints have a higher lease intensity. One explanation for this finding is that, even while facing a geographical agency problem, rural firms still find leasing a more attractive financing source.

I contribute to the literature on geographic location by showing that location affects leasing decisions of firms. I show that being located in remote areas limits the ability of firms to lease. As past studies show that firms use lease financing as long as the benefits of doing so outweigh the costs of leasing, I introduce a firms' geographical location as an important factor that can further exacerbate agency problems, increasing the costs of leasing and making lease financing less attractive than alternative financing options. The relation between lease and debt financing in the literature is not well understood. Ang and Peterson (1984) were the first to

address this leasing puzzle and showed that, after controlling for differences in debt capacity, lease and debt are complements. I show that firms with higher debt capacity tend to have a lower lease intensity. Consistent with Yan (2006), my results, therefore, add to the leasing debate by showing that, at least in part, lease and debt are substitutes.

The remainder of this paper is organized as follows. In section 2.2, I discuss the relevant literature and develop my main hypothesis. The sample selection criteria and data description are presented in section 2.3. I present the main empirical findings in section 2.4. In section 2.5, I show some additional analysis in order to further relate my findings with existing studies. Section 2.6 concludes the paper.

2.2 Previous research and hypothesis

2.2.1 Geography

Prior literature has well established the fact that a firm's geographic location has substantial impact on corporate decisions (e.g., Alam, Chen, Ciccotello, and Ryan (2011), Bae, Stulz, and Tan (2008), and Card, Hallock, and Moretti (2010)). Importantly, John, Knyazeva, and Knyazeva (2011) show that geographic distance increases the costs of obtaining information about the firm and the costs of investor's oversight. They argue that the decreased observability of manager's investment decisions of remotely located firms exacerbates agency costs and, thus, increases the likelihood that managers will engage in value destructive behavior. In addition, greater distance implies a disadvantage in obtaining information. Said differently, investors located at a distance form the company are at information disadvantage in obtaining company

specific information. To illustrate, Loughran (2008) uses location as the proxy of information asymmetry.[3]

There are a number of other examples in the literature that show the importance of distance. Coval and Moskowitz (1999) show that U.S. investment managers prefer companies with local headquarters. Extending this idea, Ivković and Weisbenner (2005) confirm these results by investigating retail investors. Loughran and Schultz (2004) provide evidence of localized trading and show that the location of a firm's headquarters affects intraday trading activities. Interestingly, geographic bias can dominate the principles of portfolio theory. Huberman (2001) shows that the shareholders of Regional Bell Operating companies were more concentrated in areas where the company operated. This same trend is observed for employees in that they tend to invest their own companies (e.g., Benartzi, Thaler, Utkus, and Sunstein (2007)). Loughran and Schultz (2005) provide evidence that geography affects liquidity as well. They find that rural firms are more liquid and that, because of local bias, analysts follow a greater percentage of urban firms and institutional investors prefer holding urban firms. They also find that trading costs are higher for rural firms. Francis, et al. (2007) show that the cost of debt is higher for rural firms. Closely related to biasness towards local firms is the idea of monitoring and firm's geographical remoteness. Geographical remoteness makes monitoring and information acquisition more costly. For example, Kedia and Rajgopal (2007) find that geographically distant firms are subject to more agency problems and show that remote firms have a greater propensity for restating earnings. They also find that SEC is less likely to investigate firms in remote locations. Geographical biasness is also observed in acquisitions. Kang & Kim (2008) find that block acquirers tend to buy geographically proximate targets and

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[3] Other studies also show that analysts who are located closer to the company can produce more accurate forecasts than those that are located at a distance (e.g., Malloy (2005) and Bae, et al. (2008)).

that the performance of these acquisitions is relatively better because acquirers can implement corporate governance easier.

2.2.2 Lease intensity

Past studies provide several explanations for why firms lease. The finance literature has mainly focused on the tax explanations for leasing. Other explanations are that leasing increases market power, can reduce transaction costs of redeploying capital, or is part of the optimal portfolio problem. Myers, Dill, and Bautista (1976) show that differences in tax rates among firms may make it beneficial for low tax firms to lease. Smith and Wakeman (1985) provide an informal list of characteristics of both lessors and lessees. They also explain contractual provisions and penalties in lease contracts. Wolfson (1985) studies the risk sharing and incentive problems in lease contracts by showing the trade-off between these considerations. Kim, Lewellen, and McConnell (1978) model sale-and-leaseback transactions and show how stockholders expropriate existing bondholders by issuing high priority claims. Graham, Lemmon, and Schallheim (1998) provide evidence that low tax firms lease more. They also show that firms with lower Altman Z-scores and firms with volatile earnings lease more. A number of studies also focus on financial constraints and their impact on lease versus buy decisions. For example, Sharpe and Nguyen (1995) study both capital and operating leases and find that the lease share is higher for firms that pay no dividends, are cash poor, and are lower rated. Ang and Peterson (1984) document a positive relationship between lease and equity ratio and debt to equity ratio. They argue that leasing and debt are compliments rather than being substitutes. Addressing the lease-debt puzzle, Yan (2006) suggests that lease and debt are substitutes, after controlling for endogeneity problems and firm fixed effects. Also in an attempt to resolve the puzzle, Lewis and Schallheim (1992) provide a resolution suggesting that leasing allows the

transfer of the tax shield, increasing the benefit of debt financing for the lessee. Another plausible solution to this puzzle is that financially constrained firms rely heavily on both leasing and secured debt. Finally, Gilligan (2004) documents the role of leasing in reducing adverse selection problems in the secondary market for durable goods.

2.2.3 Hypothesis development

Motivated by the findings that geographic distance increases the costs of obtaining information and that remoteness makes monitoring more difficult, I expect that rural firms are more likely to have a lower lease intensity. Considering the existing theory of leasing, I offer three explanations, all of which center on agency issues.

First, in a lease contract, the assets stay under the control of a user who is not the ultimate owner. Leasing, hence, introduces separation of ownership, which is costly due to agency problems. Rural firms are more likely to have this agency problem because they are more difficult to monitor by lessors, who are less likely to be located in rural areas. According to the idea of sensitivity to use and maintenance decisions, as in Smith and Wakeman (1985), the probability that leased assets will be abused and less well maintained should be higher for rural firms than for similar urban firms. Given that the cost of information acquisition is higher for rural firms and that detection of under-maintenance or abuse is expensive, lessors are more likely to impose deposits and penalty clauses in a lease contract. This will, eventually, increase the costs of leasing, making leasing less attractive than regular debt.

Second, according to Smith and Wakeman (1985), high forecasted abuse and the resulting high lease payment leads to an adverse selection problem. As an example, lessees who anticipate a relatively moderate use of leased assets will end up buying the assets given the higher rental payment they face, which may result in an increase in the fraction of asset abusing

leases and a relative decrease in lease contracts when assets are more sensitive to abuse (i.e., when lessees are in rural areas). Overall, the adverse selection problem will limit the ability of a rural firm to lease and make leasing a less frequent phenomenon.

Third, according to Wolfson (1985), if there are no incentive problems (e.g., the lessee's actions are observable to the lessor), a standard lease contract can be written. However, rural firms do have such an incentive problem because of their distant location. In the context of the risk sharing model of Wolfson (1985), this case is a departure from the Pareto optimal risk-sharing contract.[4] This situation decreases the expected utility for the lessor. In order to induce a better effort level from the side of the lessee, the lease contract contains more clauses and penalties, thus, increasing the unexpected capital gains (i.e., above equilibrium rent) to the lessor as an investor as opposed to a standard lease contract with no incentive problems where the capital gains to both the lessee and the lessor are equal. The lease contract, consequently, will be less likely an attractive source of financing. Thus, geographical location has potentially a substantial impact on firm's lease intensity.

2.3 Sample selection and data

2.3.1 Sample selection

To generate the sample, I start with all firms in the Compustat database during the period between 1980 and 2011. Since my measure of geography is mainly based on ZIP codes, I exclude firms without available ZIP codes of the firm's headquarters. As a result, I delete 14,623 firm-year observations. I also exclude financial firms (SIC 6000-6999) and utilities (SIC 4900-4999) because these firms are subject to different regulations which may have a differential impact on their capital structure and lease decisions. For the calculation of lease intensity, I

[4] See Wolfson (1985) for more details.

ensure that every firm-year observation has the required variables such as rental expense and future rental commitments. I further require that firms have non-missing information on variables used in my basic regression of lease intensity and the firm's geographic location. As a result of implementing these filters, I lose a total of 144,552 firm-year observations. My final sample consists of 154,704 firm-year observations. I show the detailed sample selection process in Table 2.1.

Table 2.1: Sample selection

This table provides descriptions of the sample selection criteria. The sample includes the US public firms in COMPUSTAT and covers 154,704 observations for a period between 1980 and 2011.

Selection process		**# of observations**
Number of firm-year observations in COMPUSTAT between 1980 and 2011		299,256
Less:		
Missing values in measuring operating lease ratio (OLR)	100,267	
Firms with missing ZIP code in measuring the distance	14,623	
Missing values in calculating size, OIBDP/sales, and tax rate	5,301	
Firm-years with (SIC 6000-6999) and (SIC 4900-4999)	24,361	
Total number of firm years excluded from the sample	*144,552*	
Final sample over 1980-2011		**154,704**

2.3.2 Measures of geography

As the first step of my analysis, I classify firms as urban, small city, or rural. This is similar to Coval and Moskowitz (1999), Coval and Moskowitz (2001), Loughran and Schultz (2005), Seasholes and Zhu (2010), Ivković and Weisbenner (2005), and Malloy (2005). I use a company's headquarter as a proxy for its geographic location, assuming that most of the financial decisions are made there. A firm's headquarter location is based on its five-digit ZIP code and is obtained from the Compustat database. A firm is classified as urban if it is within 30 miles of any of the 12 largest metropolitan areas. According to the 2010 US Census the largest

metropolitan areas are New York, Los Angeles, Chicago, Philadelphia, Miami, Dallas, Boston, Washington D.C., Houston, Detroit, San Francisco, and Atlanta.[5] A firm is defined as a rural firm if it is located at least 100 miles away from any US city with at least one million people according to 2010 US Census. Based on population, 10 cities in US with at least one million people are New York, Los Angeles, Chicago, Houston, Philadelphia, Phoenix, San Antonio, San Diego, and Dallas.[6] A firm is defined as a small city firm if it is located in an area within 100 miles of a city with at least one million people, but at least 30 miles away from the largest 12 metropolitan areas.

The latitudes and longitudes of all ZIP codes that are used to measure distance are obtained from the http://www.unitedstateszipcodes.org/zip-code-database/. I cross check the ZIP code data with alternative sources such as the United States Postal Service, the US 2010 Census Bureau, the Internal Revenue Service, and Yahoo. Since every city in my sample has more than one ZIP code, I follow Clark, Francis, and Hasan (2009) and take the arithmetic mean of latitudes and longitudes. I measure the distance of two ZIP codes by using the spherical distance formula. The urban areas typically have more than one city (e.g., Philadelphia has three cities making up the metropolitan areas- Philadelphia, Camden, and Wilmington). I calculate the distance between a firm's headquarter and any of these cities. I, therefore, define a company as urban if it is within 30 miles of any of these three cities.

2.3.3 Measures of lease intensity

One of the comprehensive measures of lease intensity is the ratio of leased capital to total capital where total capital is the sum of owned and leased capital. I approximate this ratio by

[5] For more detail, visit: www.census.gov/prod/2010pubs/10smadb/2010smadb.pdf

[6] See also: http://2010.census.gov/2010census/popmap/

estimating the annual operating lease ratio (OLR), which is defined as the percentage of net property, plan, and equipment acquired through leasing relative to buying with either internal or external funds.[7] One of the concerns in measuring lease intensity is that operating leases are an off-balance sheet item and that the capitalized value of operating leases is unavailable. I, therefore, rely on the approximate value of operating leases by adding rental expenses to the discounted values of future rental commitments as reported in Compustat. My calculation of lease intensity is based on the approach of Sharpe and Nguyen (1995). Following Graham, et al. (1998), Lim, Mann, and Mihov (2003), and Robicheaux, Fu, and Ligon (2008), I calculate the present value of rental commitments and the thereafter portion of leases using 10% as the discount rate. I define operating lease ratio (OLR) as the sum of rental expense (Compustat item 47) and the present value of rental commitments for next five years and after (item 96, item 164, item 165, item 166, item 167, and item 389) divided by the sum of rental expense, present value of rental commitments for the next five years and after, and property, plant, and equipment (item 8). My measure is somewhat different from the one employed by Sharpe and Nguyen (1995) and Eisfeldt and Rampini (2009), who use the ratio of current-year rental payments to total cost of capital services as a proxy for leases, in that I capture rental expenses of both current year and future commitments. In additional analyses and robustness checks, I also measure lease ratios in two other ways. As in Beatty, et al. (2010), I measure OLR as the capitalized lease expenditure (lagged item 96 × 10) divided by the sum of PPENT (item 8) and capitalized lease expenditure. Following Sharpe and Nguyen (1995), I also measure capital lease ratio (CLR) as net capital lease (item 159) divided by lagged PPENT (item 8). Since the capital lease is only sporadically populated in Compustat, the number of observations drops to 24,334.

[7] OLR = [rental expense + present value of future rental commitments for the next 5 years and present value of thereafter portion] /[rental expense + present value of future rental commitments and thereafter portion + net PPE].

2.3.4 Descriptive statistics

I examine the distribution of the sample by both fiscal year and industry in Table 2.2. Panel A in Table 2.2 shows the distribution of firms by fiscal year. The number of firm-year observations is uniformly distributed throughout the sample period between 1980 and 2011, except the years between 1995 and 2000 when the percentages of firm years are relatively high and range between 4.08% and 4.20%. Interestingly, the distribution by year is fairly similar for all three of my sub samples (i.e., rural, small city, and urban firms). Panel B in Table 2.2 provides the distribution of rural, small city, and urban firms by Fama-French 12 industry classification. Out of all total firm-year observations, 37.35% are rural firms, 8.89% firms are small city based firms, and 53.76% are urban firms. Firms in manufacturing industries are almost equally distributed in both rural and urban areas (e.g., rural firms represent 44.12% and urban firms represent 45.99% of this industry).

Table 2.2: Distribution of sample firm-year observations by industry and fiscal year

This table provides the distribution of the sample by both industry and fiscal years. The sample includes the US public firms in COMPUSTAT and covers 154,704 observations for a period between 1980 and 2011In panel A, firm year observations are presented by distributing them in fiscal years along with categorizing them as rural, small city, or urban firms. Panel B presents the distribution of firm year observations by Fama-French 12 industries. In column 3, percentages are calculated by using the full sample (e.g., 3,066/154,704 = 1.98%). Subsequent percentages represent the firm year observations as the percentage of full sample in a particular industry (e.g., 1,180/3,066 = 38.49%).

Panel A: Distribution by fiscal year

Fiscal	**Full Sample**		**Rural Firms**		**Small city Firms**		**Urban Firms**	
Year	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
1980	3,066	1.98	1,180	38.49	256	8.35	1,630	53.16
1981	3,181	2.06	1,234	38.79	266	8.36	1,681	52.85
1982	3,576	2.31	1,374	38.42	288	8.05	1,914	53.52
1983	3,954	2.56	1,498	37.89	322	8.14	2,134	53.97
1984	4,133	2.67	1,538	37.21	339	8.20	2,256	54.59
1985	4,443	2.87	1,663	37.43	358	8.06	2,422	54.51
1986	4,603	2.98	1,679	36.48	386	8.39	2,538	55.14
1987	4,607	2.98	1,670	36.25	396	8.60	2,541	55.16
1988	4,505	2.91	1,637	36.34	395	8.77	2,473	54.89
1989	4,458	2.88	1,646	36.92	410	9.20	2,402	53.88
1990	4,529	2.93	1,661	36.67	413	9.12	2,455	54.21
1991	4,693	3.03	1,720	36.65	433	9.23	2,540	54.12
1992	5,015	3.24	1,888	37.65	450	8.97	2,677	53.38
1993	5,315	3.44	2,010	37.82	481	9.05	2,824	53.13
1994	5,636	3.64	2,133	37.85	509	9.03	2,994	53.12
1995	6,308	4.08	2,347	37.21	564	8.94	3,397	53.85
1996	6,481	4.19	2,402	37.06	565	8.72	3,514	54.22
1997	6,402	4.14	2,361	36.88	558	8.72	3,483	54.40
1998	6,505	4.20	2,384	36.65	581	8.93	3,540	54.42
1999	6,417	4.15	2,349	36.61	583	9.09	3,485	54.31
2000	6,127	3.96	2,290	37.38	561	9.16	3,276	53.47
2001	5,660	3.66	2,144	37.88	516	9.12	3,000	53.00
2002	5,340	3.45	2,018	37.79	506	9.48	2,816	52.73
2003	5,137	3.32	1,934	37.65	489	9.52	2,714	52.83
2004	5,022	3.25	1,883	37.50	477	9.50	2,662	53.01
2005	4,853	3.14	1,807	37.23	451	9.29	2,595	53.47
2006	4,633	2.99	1,725	37.23	428	9.24	2,480	53.53
2007	4,382	2.83	1,646	37.56	397	9.06	2,339	53.38
2008	4,172	2.70	1,568	37.58	369	8.84	2,235	53.57
2009	4,029	2.60	1,530	37.97	348	8.64	2,151	53.39
2010	3,879	2.51	1,480	38.15	335	8.64	2,064	53.21
2011	3,643	2.35	1,390	38.16	318	8.73	1,935	53.12
Total	***154,704***	***100%***	***57,789***	***37.35%***	***13,748***	***8.89%***	***83,167***	***53.76%***

Table 2.2 (Continued)

Panel B: Distribution by Fama-French 12 industry classification

Industry	**Full Sample**		**Rural Firms**		**Small City Firms**		**Urban Firms**	
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Consumer Non-Durables	10,858	7.02	4,691	43.20	756	6.96	5,411	49.83
Consumer Durables	4,607	2.98	1,876	40.72	554	12.03	2,177	47.25
Manufacturing	19,781	12.79	8,728	44.12	1,956	9.89	9,097	45.99
Energy	7,164	4.63	2,790	38.94	510	7.12	3,864	53.94
Chemicals and Allied Products	4,667	3.02	1,734	37.15	334	7.16	2,599	55.69
Business Equipment (Computers, software etc.)	36,087	23.33	11,675	32.35	3,315	9.19	21,097	58.46
Telephone and Television Transmission	6,804	4.40	2,618	38.48	536	7.88	3,650	53.64
Wholesale, Retail and some services	22,051	14.25	8,950	40.59	1,659	7.52	11,442	51.89
Healthcare, Medical equipment and drugs	17,914	11.58	5,686	31.74	1,790	9.99	10,438	58.27
Others (Mines, Construction, Entertainment etc.)	24,771	16.01	9,041	36.50	2,338	9.44	13,392	54.06
Total	***154,704***	***100%***	***57,789***	***37.35%***	***13,748***	***8.89%***	***83,167***	***53.76%***

Firms in the other industries are located mainly in urban areas. Among the firms in healthcare, medical equipment, and drugs, only 31.74% are located in rural areas as opposed to the 58.27% in urban areas. As for small city firms, as much as 12.03% of firms in consumer durables are small city based firms. Moreover, only 6.96% of the firms in consumer non-durables are located in small cities.

I also examine the univariate comparisons among rural, small city, and urban firms of lease intensity and firm characteristics that are used in my base regression model. The summary statistics, t-tests and Wilcoxon signed rank tests for differences in sample mean and median across firm locations are reported in Table 2.3. In order to minimize the effects of outliers in my estimation, all the variables used in the regressions of lease intensity and geography are winsorized at 1st and 99th percentiles.

The main finding of Table 2.3 is that the lease intensity of rural firms is significantly lower than that of their small city and urban counterparts. The mean (median) lease intensity of rural firms is 34.6% (27.5%) in comparison to 40.5% (37.0%) and 44.2% (43.5%) of small city and urban firms, respectively. Almost all the variables are statistically significantly different across the three sub samples. The number of dividend paying firms is lower in rural areas. 70.2% of rural firms pay dividend in compare to 75.7% and 77.3% of their non-rural counterparts. Rural firms have a higher mean tax rate (21.5%) in comparison to small city and urban firms. Although small city firms and urban firms are sharing similar characteristics in some aspects (e.g., S&P ratings- BB+ to D, tax rate, small tax loss carry forward, and the number of loss years), rural firms are different from small city and urban firms in almost every other aspect. For example, rural firms are bigger in size. The mean rural firm holds 4.529 assets in comparison to 4.26 and

4.416 for the mean small city and urban firms.[8] Overall, Table 2.3 shows that rural firms are holding less leases and are bigger, pay less dividend, have high tax rates, and have more firm-years with negative income before extraordinary items. The finding of locational differences in lease intensity provides initial support to the main hypothesis that rural firms tend to have less lease intensity in comparison to small city and urban firms.

Table 2.3: Differences in firm characteristics among different firm categories

This table gives the descriptive statistics for the variables used in the lease intensity regression and univariate comparison among variables. A firm's location is based on its five-digit ZIP code from COMPUSTAT. ZIP code represents the location of firm's headquarters where most of the financial decisions are made. A firm is considered urban if it is within 30 miles of any of the 12 largest US metropolitan areas according to the 2010 US census (New York, Los Angeles, Chicago, Philadelphia, Miami, Dallas, Boston, Washington D.C., Houston, Detroit, San Francisco, and Atlanta). A firm is rural if it is located at least 100 miles away from any US cities with at least one million people according to the 2010 US Census. A firm is considered small city firm if it is located within 100 miles of a city with at least one million people, but at least 30 miles from the largest US metropolitan areas. *Lease intensity* (OLR) is measured as sum of rental expense (item 47) and present value of rental commitments for next five years and after (item 96, item 164, item 0165, item 166, item 167, and item 389) divided by sum of rental expense, present value of rental commitments for next five years and after, and property, plant, and equipment (item 8). A discount rate of 10% is used to discount all the future rental commitments. *No dividend* is an indicator variable equal to 1 if the firm paid no dividend (item 21) that year and 0 otherwise. *OIBDP* is operating income before depreciation (item 13) and *sale* is item 12. *S&P ratings* are indicator variables equal to 1 if the firm has S&P Domestic Long Term Issuer Credit Rating (item 280) and 0 otherwise. The rating groups are partitioned according to: AAA through AA-, A+ through A-, BBB+ through BBB-, BB+ through D, and Unrated. *Tax rate* is tax expense (item 16) divided by pre-tax income (item 170). *Small tax-loss CF* is a dummy variable equals 1 if firm had a positive tax loss carry-forward (item 52) not exceeding current year OIBDP and 0 otherwise. *Large tax-loss CF* is a dummy variable equals 1 if firm had a positive tax loss carry-forward (item 52) exceeding current year OIBDP and 0 otherwise. *Firm size* is the natural log of total assets (item 6). *Loss* is an indicator variable equals 1 if the firm has negative income before extraordinary items (item 123) in a particular year and 0 otherwise. The mean differences among firms are based on *t*-value and median differences are based on *Z*-value (Wilcoxon signed-rank test). In column 2, 3, 4, and 5, the values represent mean and median in parentheses. The significance levels of 10%, 5%, and 1% are represented by *, **, and *** respectively.

[8] The assets are reported as the natural log of total assets.

	Full Sample	(1) Rural Firms	(2) Small City Firms	(3) Urban Firms	(1) - (2) R – S Mean *t-value*	(1) - (2) R – S Median *Z-value*	(1) - (3) R – U Mean *t-value*	(1) - (3) R – U Median *Z-value*	(2) - (3) SC – U Mean *t-value*	(2) - (3) SC – U Median *Z-value*
Lease Intensity	0.403 (0.365)	0.346 (0.275)	0.405 (0.370)	0.442 (0.435)	-22.41***	-18.99***	-62.62***	-53.40***	-14.00***	-11.71***
No dividend	0.745 (1.000)	0.702 (1.000)	0.757 (1.000)	0.773 (1.000)	-12.84***	-12.83***	-29.97***	-29.87***	-4.02***	-4.02***
OIBDP/Sales	-0.742 (0.079)	-0.526 (0.087)	-0.952 (0.072)	-0.858 (0.074)	11.35***	12.39***	14.36***	18.71***	-2.20***	-1.91**
S&P ratings:										
AAA to AA-	0.010 (0.000)	0.008 (0.000)	0.010 (0.000)	0.012 (0.000)	-3.08***	-3.08***	-8.45***	-8.45***	-2.01**	-2.01**
A+ to A-	0.025 (0.000)	0.025 (0.000)	0.026 (0.000)	0.024 (0.000)	0.82	0.82	1.77*	1.77**	1.91*	1.91**
BBB+ to BBB-	0.035 (0.000)	0.040 (0.000)	0.030 (0.000)	0.033 (0.000)	5.21***	5.21***	6.70***	6.70***	-1.65*	-1.65**
BB+ to D	0.095 (0.000)	0.099 (0.000)	0.092 (0.000)	0.092 (0.000)	2.36**	2.36***	4.25***	4.25***	0.04	0.04
Tax rate	0.202 (0.270)	0.215 (0.300)	0.193 (0.244)	0.194 (0.247)	7.81***	11.27***	12.60***	19.39***	-0.43	-0.57
Small tax-loss CF	0.108 (0.000)	0.114 (0.000)	0.101 (0.000)	0.104 (0.000)	4.19***	4.19***	5.44***	5.44***	-1.19	-1.19
Large tax-loss CF	0.259 (0.000)	0.231 (0.000)	0.295 (0.000)	0.273 (0.000)	-15.79***	-15.76***	-18.15***	-18.13***	5.17***	5.17***
Firm size	4.444 (4.390)	4.529 (4.536)	4.260 (4.184)	4.416 (4.320)	12.06***	11.46***	8.74***	12.79***	-7.09***	-4.34***
Loss	0.403 (0.000)	0.371 (0.000)	0.427 (0.000)	0.422 (0.000)	-12.14***	-12.12***	-19.46***	-19.43***	0.95	0.95
N	154,704	57,789	13,748	83,167						

2.4 Geography and lease intensity

2.4.1 Research design

Following Graham, et al. (1998) and Lim, et al. (2003), I calculate the dependent variable, operating lease ratio (OLR) as the ratio of leases to the sum of leases and plant, property, and equipment where leases is the sum of rental expense and the present value of future rental commitments. The main regression equation (following Beatty, et al. (2010) and Sharpe and Nguyen (1995)) is as follows:

$$\begin{aligned} OLR_{i,t} = \alpha_0 &+ \alpha_1 Rural_{i,t} + \alpha_2 SmallCity_{i,t} + \alpha_3 NoDividend_{i,t} + \alpha_4 \left(\frac{OIBDP_{i,t}}{Sale_{i,t}}\right) \\ &+ \alpha_{5-8} S\&PRatings_{i,t} + \alpha_9 TaxRate_{i,t} + \alpha_{10} SmallTaxLCF_{i,t} \\ &+ \alpha_{11} LargeTaxLCF_{i,t} + \alpha_{12} Size_{i,t} + \alpha_{13} Loss_{i,t} \\ &+ \varepsilon_{i,t} \end{aligned} \quad (2.1)$$

where, $Rural_{i,t}$ is a dummy variable equal to one if the firm (*i*) is classified as a rural firm and zero otherwise; $SmallCity_{i,t}$ is a dummy variable equal to one if the firm is defined as a small city firm and zero otherwise; $NoDividend_{i,t}$ is a dummy variable equal to one if the firm paid no dividend (item 21) that year (*t*) and zero otherwise; $OIBDP_{i,t}$ is operating income before depreciation (item 13); $Sale_{i,t}$ is total sales (item 12); $S\&PRatings_{i,t}$ are dummy variables equal to one if the firm has S&P Domestic Long Term Issuer Credit Rating (item 280) and zero otherwise; The rating groups are partitioned as follows: AAA through AA-, A+ through A-, BBB+ through BBB-, BB+ through D, and Unrated; $TaxRate_{i,t}$ is tax expense (item 16) divided by pre-tax income (item 170); $SmallTaxLCF_{i,t}$ is a dummy variable equal to one if the firm had a positive carry-forward (item 52) not exceeding current year OIBDP and 0 otherwise; $LargeTaxLCF_{i,t}$ is a dummy variable equal to one if firm had a positive carry-forward (item 52)

exceeding current year OIBDP and 0 otherwise; $Size_{i,t}$ is measured as the natural log of total assets (item 6); $Loss_{i,t}$ is an indicator variable equal to one if the firm has negative income before extraordinary items (item 123) in a given year (t) and 0 otherwise.

In order to test my main hypothesis, I estimate the above model as the basic model and, in the additional analysis section, I include additional control variables. Given that the lease decision is likely to be affected by variety of factors, I control for those variables.[9] In addition, I include *Size* and *Loss* as control variables. Beatty, et al. (2010) finds that firm size is negatively related to leasing and losses have a positive association with leasing.

2.4.2 Results

Before I present the regression results, I first investigate the correlations among my variables of interest. Pearson correlations coefficients are reported in Table 2.4. Most of the correlation coefficients in this table are statistically significant. Most importantly, the operating lease ratio is statistically negatively related with the rural firm dummy and statistically positively related with small city and urban firm dummies. This supports my main hypothesis that rural firms tend to have a lower lease intensity.

[9] See Smith and Wakeman (1985) for more details.

Table 2.4: Pearson correlation coefficients for lease model variables

This table presents the Pearson correlation coefficients among variables used in the lease intensity regression. For variable descriptions, please refer to Table 2.3. The significant correlation coefficients are in bold.

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*	*(15)*
Variables	Lease (OLR)	Rural Firms	Small City Firms	Urban Firms	No dividend	OIBDP/ Sales	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to D	Tax Rate	Small T-Loss CF	Large T-Loss CF	Firm size	Loss
(1)	1														
(2)	**-0.153**	1													
(3)	0.002	**-0.241**	1												
(4)	**0.147**	**-0.833**	**-0.337**	1											
(5)	**0.263**	**-0.076**	**0.009**	**0.069**	1										
(6)	**-0.106**	**0.039**	**-0.015**	**-0.029**	**-0.120**	1									
(7)	**-0.100**	**-0.021**	0.000	**0.020**	**-0.167**	**0.024**	1								
(8)	**-0.101**	0.003	0.004	**-0.006**	**-0.241**	**0.035**	**-0.016**	1							
(9)	**-0.082**	**0.019**	**-0.008**	**-0.013**	**-0.209**	**0.040**	**-0.020**	**-0.030**	1						
(10)	**-0.080**	**0.011**	-0.003	**-0.009**	0.002	**0.061**	**-0.033**	**-0.051**	**-0.062**	1					
(11)	**-0.119**	**0.033**	**-0.009**	**-0.027**	**-0.228**	**0.128**	**0.049**	**0.066**	**0.073**	**0.016**	1				
(12)	**-0.056**	**0.015**	**-0.007**	**-0.011**	**-0.071**	**0.073**	**0.005**	**0.068**	**0.095**	**0.107**	**0.093**	1			
(13)	**0.172**	**-0.051**	**0.025**	**0.035**	**0.280**	**-0.138**	**-0.060**	**-0.086**	**-0.084**	**-0.026**	**-0.281**	**-0.205**	1		
(14)	**-0.273**	**0.027**	**-0.024**	**-0.013**	**-0.425**	**0.214**	**0.188**	**0.269**	**0.299**	**0.326**	**0.210**	**0.224**	**-0.279**	1	
(15)	**0.165**	**-0.051**	**0.015**	**0.042**	**0.346**	**-0.246**	**-0.079**	**-0.114**	**-0.114**	0.004	**-0.393**	**-0.171**	**0.410**	**-0.332**	1

Further, consistent with the findings of Beatty, et al. (2010) and Sharpe and Nguyen (1995), S&P ratings and firm size are negatively correlated with the operating lease ratio. Table 2.5 provides the results of the OLS estimation of Operating Lease Ratio (OLR) on the firm's geographic location (Eq. (2.1)). In Model (1) of Table 2.5, no dividend, Small tax loss carry forward, and loss variables are positively related to OLR. The rest of the variables is significant negative related. Most importantly, the rural and small city dummies are both negative significantly related to OLR. The regression coefficient of -0.085 for the rural dummy suggests that rural firms have a lower lease intensity in comparison to their small city and urban counterparts. Also of note is that the coefficient for the rural dummy (-0.085) is significantly different than that of small city dummy (-0.040) with a *p*-value of 0.00.[10] In Model (2) of Table 2.5, I estimate the same model but include industry and time fixed effects. Again, I find that rural firms have a significantly lower lease intensity when compared to urban firms, after including a host of control variables that have been shown in the existing literature to have an effect on a firm's leasing decision. Overall, these pooled OLS regressions show that there is a negative relation between geographic distance away from the large cities and lease intensity. This negative association is more pronounced for rural firms, but also exists for small city firms.

[10] The *p*-value is based on F-test: $H_0: \alpha_2 = \alpha_3$

Table 2.5: Association between lease intensity and firm's geographic location

This table presents the results of the lese intensity regression where Operating *Lease Ratio* (OLR) is the dependent variable. *Rural* (*Small City*) is a dummy variable equal to 1 if the firm is categorized as rural (small city) and 0 otherwise. For the description of other variables, please refer to Table 2.3. The *p*-values are in parenthesis. The significance levels of 10%, 5%, and 1% are represented by *, **, and *** respectively.

	Dependent variable = $OLR_{i,}$	
	(1)	(2)
Intercept	0.443***	0.620***
	(0.00)	(0.00)
Rural	**-0.085*** **	**-0.082*** **
	(0.00)	**(0.00)**
SmallCity	**-0.040*** **	**-0.041*** **
	(0.00)	**(0.00)**
No dividend	0.096***	0.044***
	(0.00)	(0.00)
OIBDP/Sales	-0.002***	-0.001***
	(0.00)	(0.00)
S&P ratings:		
AAA to AA-	-0.124***	-0.051***
	(0.00)	(0.00)
A+ to A-	-0.030***	0.001
	(0.00)	(0.82)
BBB+ to BBB-	0.005	0.018***
	(0.19)	(0.00)
BB+ to D	-0.026***	-0.004*
	(0.00)	(0.07)
Tax rate	-0.018***	-0.009***
	(0.00)	(0.00)
Small tax-loss CF	0.014***	0.005**
	(0.00)	(0.02)
Large tax-loss CF	0.042***	0.036***
	(0.00)	(0.00)
Firm size	-0.019***	-0.029***
	(0.00)	(0.00)
Loss	0.006***	0.006***
	(0.00)	(0.00)
Industry Dummies	NO	YES
Year Dummies	NO	YES
F-test *p*-value: $H_0: \alpha_2 = \alpha_3$	< 0.0001	< 0.0001
N	154,704	154,704
Adj. R^2	0.1293	0.2944

2.5 Additional analysis and robustness checks

2.5.1 Debt capacity and the association between lease intensity and geography

In the previous section, I showed that there exists a relationship between lease intensity and the geographic location of the firm. In this section, I analyze the impact of the debt capacity of a firm on the relation between the lease ratio and geography. A firm's debt capacity refers to its ability to borrow up to a point where the value of the firm no longer increases. Zou and Adams (2008) find that high debt capacity firms have relatively easy access to financial markets and thus have a lower cost of debt. Following Hahn and Lee (2009), I measure debt capacity using the firm-level tangibility measure of Almeida and Campello (2007). Specifically, this measure of asset tangibility for each firm-year observation is calculated as follows:

$$Tangibility = \frac{Cash\ holdings + 0.715 \times receivables + 0.547 \times inventory + 0.535 \times PPE}{Total\ assets}$$

where, cash holdings (item 1), receivables (item 2), inventory (item 3), PPE (item 8), and total assets (item 6) are all obtained from Compustat.

In my regressions, I add this measure as well as an interaction variable with the geography measure and expect that this interaction is negative. Two plausible reasons for this negative effect can be; (1) lease debt substitutability and/or (2) the cost of leasing. Huang and Yildirim (2006) show that the use of lease as financing decreases the debt capacity of a firm, suggesting that leasing and debt are substitutes.[11] In addition, the fact that a lessor will impose higher rental expenses and more provisions on a lease contract for a rural firm which suffers from monitoring problems will potentially make leasing a less attractive alternative for firms

[11] See also Yan (2006).

with a relatively high debt capacity. In order to analyze the interaction effect of debt capacity, I estimate the following equation:

$$
\begin{aligned}
&OLR_{i,t} \\
&= \alpha_0 + \alpha_1 Rural_{i,t} \times DebtCapacity_{i,t} + \alpha_2 SmallCity_{i,t} \times DebtCapacity_{i,t} + \alpha_3 Rural_{i,t} \\
&+ \alpha_4 SmallCity_{i,t} + \alpha_5 DebtCapacity_{i,t} + \alpha_6 NoDividend_{i,t} + \alpha_7 \left(\frac{OIBDP_{i,t}}{Sale_{i,t}}\right) \\
&+ \alpha_{8-11} S\&PRatings_{i,t} + \alpha_{12} TaxRate_{i,t} + \alpha_{13} SmallTaxLCF_{i,t} + \alpha_{14} LargeTaxLCF_{i,t} \\
&+ \alpha_{15} Size_{i,t} + \alpha_{16} Loss_{i,t} \\
&+ \varepsilon_{i,t} \qquad (2.2)
\end{aligned}
$$

where, $DebtCapacity_{i,t}$ is a dummy variable equal to one if the firm has debt capacity that is higher than the median debt capacity in that year (0 otherwise). I categorize debt capacity as high or low by ranking firms into two groups each year (based on the yearly median). The definition of all other independent variables in Eq. (2.2) is the same as in Eq. (2.1).

The results of the estimation of Eq. (2.2) are presented in Table 2.6. In Model (1), I find that rural firms with higher a debt capacity have a lower lease intensity than similar urban firms. This result also applies to small city firms. The coefficient for the debt capacity interaction variable is -0.013, which is statistically significantly different from zero with a *p*-value of 0.00. This finding is not qualitatively different when I estimate the model with industry and time dummies (Model (2)). Hence, rural firms have a significantly lower lease intensity than similar urban firms. Overall, consistent with existing studies, these results confirm my main claim of the paper in that easy access to and a lower cost of debt makes leasing a more unattractive option for rural firms than for urban firms.

Table 2.6: Debt capacity and the association between lease intensity and firm's location

The table presents the results of interaction effect of debt capacity on association between Lease Intensity and firm's geographic location. *Debt capacity* is a dummy variable equals 1 if the value is above the median and 0 otherwise. For the description of other variables, please refer to Table 2.3. The *p*-values are in parenthesis. The significance levels of 10%, 5%, and 1% are represented by *, **, and *** respectively.

	Dependent variable = $OLR_{i,}$	
	(1)	(2)
Intercept	0.434***	0.623***
	(0.00)	(0.00)
Rural × Debt capacity	**-0.013*** **	**-0.009*** **
	(0.00)	**(0.00)**
Small City × Debt capacity	**-0.010** **	**-0.010** **
	(0.03)	**(0.03)**
Rural	-0.079***	-0.079***
	(0.00)	(0.00)
Small City	-0.037***	-0.038***
	(0.00)	(0.00)
Debt Capacity	0.016***	0.001
	(0.00)	(0.62)
No dividend	0.098***	0.046***
	(0.00)	(0.00)
OIBDP/Sales	-0.002***	-0.001***
	(0.00)	(0.00)
S&P ratings:		
AAA to AA-	-0.120***	-0.048***
	(0.00)	(0.00)
A+ to A-	-0.027***	0.002
	(0.00)	(0.64)
BBB+ to BBB-	0.007*	0.018***
	(0.08)	(0.00)
BB+ to D	-0.024***	-0.005**
	(0.00)	(0.05)
Tax rate	-0.018***	0.009***
	(0.00)	(0.00)
Small tax-loss CF	0.015***	0.006***
	(0.00)	(0.01)
Large tax-loss CF	0.042***	0.035***
	(0.00)	(0.00)
Firm size	-0.019***	-0.030***
	(0.00)	(0.00)
Loss	0.008***	0.006***
	(0.00)	(0.00)
Industry Dummies	NO	YES
Year Dummies	NO	YES
N	152,328	152,328
Adj. R^2	0.1322	0.2956

2.5.2 Analyst following and the association between lease Intensity and location

Smith and Wakeman (1985) suggest that the separation of use right to a leased asset from the claim to its residual value leads to an increase in penalties and deposits in a lease contract, which leads to adverse selection problems. Rural firms are hard to monitor and, because they are remotely located, they are susceptible to a higher probability of asset abuse. Analyst following can mitigate this problem by reducing information asymmetry associated with the firm. Using profitability and intensity of insider trades to proxy for information asymmetry, Frankel and Li (2004) show that analyst following reduces information asymmetry among insiders and outsiders. Analyst following, thus, may have a monitoring role as well. In addition, greater distance implies a disadvantage in obtaining firms specific information (e.g., Loughran (2008) and Malloy (2005)), a relative higher number of analyst following may help a potential lessor to better monitor a lessee. Therefore, rural firms with a high number of analysts following the firm may be expected to have a higher operating lease ratio. I investigate the effects of analyst following by estimating following model:

$$\begin{aligned} OLR_{i,t} &= \alpha_0 + \alpha_1 Rural_{i,t} \times Num - Analyst_{i,t} + \alpha_2 SmallCity_{i,t} \times Num - Analyst_{i,t} + \alpha_3 Rural_{i,t} \\ &+ \alpha_4 SmallCity_{i,t} + \alpha_5 Num - Analyst_{i,t} + \alpha_6 NoDividend_{i,t} + \alpha_7 \left(\frac{OIBDP_{i,t}}{Sale_{i,t}}\right) \\ &+ \alpha_{8-11} S\&PRatings_{i,t} + \alpha_{12} TaxRate_{i,t} + \alpha_{13} SmallTaxLCF_{i,t} + \alpha_{14} LargeTaxLCF_{i,t} \\ &+ \alpha_{15} Size_{i,t} + \alpha_{16} Loss_{i,t} \\ &+ \varepsilon_{i,t} \end{aligned} \quad (2.3)$$

where, $Num - Analyst_{i,t}$ is a dummy variable equal to one if the firm has a higher than the median number of analyst following, in a given year. I divide firms based on the median number of analyst following each year. If the number of analyst estimates in IBES for a firm-year is greater than the median in that year, that firm-year is considered a high analyst following year.

Table 2.7: Analyst following and the association between lease intensity and location

The table presents the results of interaction effect of number of analyst following on association between Lease Intensity and firm's geographic location. *Num-Analyst* is a dummy variable equals 1 if the value is above the median and 0 otherwise. For the description of other variables, please refer to Table 2.3. The *p*-values are in parenthesis. The significance levels of 10%, 5%, and 1% are represented by *, **, and *** respectively.

	Dependent variable = $OLR_{i,}$	
	(1)	(2)
Intercept	0.428***	0.651***
	(0.00)	(0.00)
Rural × Num-Analyst	**0.035*** **	**0.025*** **
	(0.00)	**(0.00)**
Small City × Num-Analyst	**0.015**	**0.015***
	(0.13)	**(0.07)**
Rural	-0.091***	-0.094***
	(0.00)	(0.00)
Small City	-0.064***	-0.055***
	(0.00)	(0.00)
Num-Analyst	0.018***	0.028***
	(0.00)	(0.00)
No dividend	0.139***	0.069***
	(0.00)	(0.00)
OIBDP/Sales	-0.003***	-0.003**
	(0.00)	(0.00)
S&P ratings:		
AAA to AA-	-0.110***	-0.055***
	(0.00)	(0.00)
A+ to A-	-0.044***	-0.005
	(0.00)	(0.40)
BBB+ to BBB-	-0.009	0.006
	(0.14)	(0.30)
BB+ to D	-0.040***	-0.010**
	(0.00)	(0.03)
Tax rate	-0.005	0.014***
	(0.31)	(0.00)
Small tax-loss CF	0.013***	0.003
	(0.00)	(0.32)
Large tax-loss CF	0.059***	0.045***
	(0.00)	(0.00)
Firm size	-0.019***	-0.033***
	(0.00)	(0.00)
Loss	0.014***	0.018***
	(0.00)	(0.00)
Industry Dummies	NO	YES
Year Dummies	NO	YES
N	35,512	35,512
Adj. R^2	0.1780	0.3381

Table 2.7 presents the results of estimating Eq. (2.3). As expected, the interaction effect of analyst following and the rural firm dummy is significantly positive. The interaction coefficient is 0.035 (0.025) in Model (1) (Model (2)). The significantly positive interaction coefficients can be interpreted as follows: rural firms with a high number of analysts tend to have a higher lease ratio in comparison to similar urban firms. Note that since the number of analysts is not available for all of the firm-years in my sample, the regression is run using only 35,512 firm-year observations. Overall, these results support the view that analyst following enhances the richness of information environment of rural firms which helps lessors better monitor the firm. In addition, analysts may end up monitoring the firm, themselves, as well. As a consequence, rural firms end up having a higher lease ratio than urban firms.

2.5.3 Financial constraints and the relation between lease intensity and location

A number of studies, including Sharpe and Nguyen (1995) and Beatty, et al. (2010) suggest that financially constrained firms are more likely to lease. I test this prediction for rural firms by including a financial constraints dummy to my main regression. Again I expect to find a positive interaction effect of the financial constraints dummy with the rural firm dummy. The literature is inconclusive as to which constraint measure is best. Therefore, I employ two commonly used measures of financial constraints, namely the KZ index (Kaplan and Zingales (1997)) and the WW index (Whited and Wu (2006)). I construct both the KZ and the WW index for each firm-year observation and then assign firms in quintile portfolios based on the calculated index for each year. Firms in top quintiles in the relevant index are labeled financially

constrained and firms in other quintiles are labeled unconstrained.[12,13] I estimate the following model with an interaction effect of financial constraints and the rural and small city firms.

$$
\begin{aligned}
&OLR_{i,t} \\
&= \alpha_0 + \alpha_1 Rural_{i,t} \times Fin - Constraint_{i,t} + \alpha_2 SmallCity_{i,t} \times Fin - Constraint_{i,t} \\
&+ \alpha_3 Rural_{i,t} + \alpha_4 SmallCity_{i,t} + \alpha_5 Fin - Constraint_{i,t} + \alpha_6 \left(\frac{OIBDP_{i,t}}{Sale_{i,t}}\right) \\
&+ \alpha_{7-10} S\&PRatings_{i,t} + \alpha_{11} TaxRate_{i,t} + \alpha_{12} SmallTaxLCF_{i,t} + \alpha_{13} LargeTaxLCF_{i,t} \\
&+ \alpha_{14} Loss_{i,t} \\
&+ \varepsilon_{i,t} \qquad (2.4)
\end{aligned}
$$

where, $Fin - Constraint_{i,t}$ is a dummy variable equal to one if the firm belongs to the top quintile of the KZ or WW indices. Since dividend and firm size are also used as the proxy for firm's financial constraints, I exclude these variables from this regression to avoid a potential multi-collinearity problem.

Table 2.8 presents the results of the estimation of Eq. (2.4). I find that the interaction of the financial constraints dummy with the rural firm dummy is positively associated with a firm's lease intensity. Specifically, the regression coefficients are 0.008 and 0.010 in Model (1) and Model (2), respectively. These coefficients are statistically significantly different from zero with *p*-values of 0.02 and 0.00, respectively. Overall, this suggests that rural firms with higher levels of financial constraints lease more in comparison to urban firms. The result holds for both measures of financial constraints.

[12] Lamont, Polk, and Saa-Requejo (1997) use the regression coefficients from Kaplan and Zingales (1997) to compute the KZ index as follows: KZ=-1.002(CF/TA)-39.368(DIV/TA)-1.315(CA/TA)+3.139LEV+0.283Q, where CF is cash flow, CA is cash balances, LEV is total debt, Q is the ratio of the market-to-book value of the firm's assets, and TA is total assets.

[13] The WW index of Whited and Wu (2006) is calculated as: WW=-0.091(CF/TA)-0.062(DIVDUM+0.021(LTD/TA)-0.0441logTA+0.102INDSG-0.035SG, where DIVDUM equals one if the firm pays cash dividend and zero otherwise, LTD is long-term debt, INDSG is the firm's three-digit industry sales growth, and SG is the firms sales growth.

Table 2.8: Financial constraints and the association between lease intensity and location

The table presents the results of interaction effect of financial constraints on association between Lease Intensity and firm's geographic location. *Fin-Constraint* is a dummy variable equals to 1 if the firm is financially constrained and 0 otherwise. For the description of other variables, please refer to Table 2.3. The *p*-values are in parenthesis. The significance levels of 10%, 5%, and 1% are represented by *, **, and *** respectively.

	Dependent variable = $OLR_{i,}$	
	(1)	(2)
	KZ-Index	WW-Index
Intercept	0.499***	0.486***
	(0.00)	(0.00)
Rural × Fin-Constraint	**0.008****	**0.010*****
	(0.02)	**(0.00)**
Small City × Fin-Constraint	**0.017*****	**-0.001**
	(0.00)	**(0.91)**
Rural	-0.084***	-0.085***
	(0.00)	(0.00)
Small City	-0.045***	-0.041***
	(0.00)	(0.00)
Fin-Constraint	-0.010***	0.077***
	(0.00)	(0.00)
OIBDP/Sales	-0.003***	-0.002***
	(0.00)	(0.00)
S&P ratings:		
AAA to AA-	-0.199***	-0.192***
	(0.00)	(0.00)
A+ to A-	-0.130***	-0.124***
	(0.00)	(0.00)
BBB+ to BBB-	-0.100***	-0.093***
	(0.00)	(0.00)
BB+ to D	-0.080***	-0.070***
	(0.00)	(0.00)
Tax rate	-0.014***	-0.009***
	(0.00)	(0.00)
Small tax-loss CF	-0.009***	-0.006***
	(0.00)	(0.00)
Large tax-loss CF	0.052***	0.045***
	(0.00)	(0.00)
Loss	0.041***	0.026***
	(0.00)	(0.00)
Industry Dummies	YES	YES
Year Dummies	YES	YES
N	129,059	129,059
Adj. R^2	0.2678	0.2781

2.5.4 Alternative measures of lease intensity

In this section, I investigate whether my results are robust to alternative measures of lease intensity. Following Beatty, et al. (2010) and Sharpe and Nguyen (1995), I measure lease ratios in two other ways. First, I measure OLR as the capitalized lease expenditure (lagged item 96 × 10) divided by the sum of PPENT (item 8) and capitalized lease expenditure. Second, I measure Capital Lease Ratio (CLR) as PPENLS (item 159) divided by lagged PPENT (item 8). Since the capital lease is sparsely populated in Compustat, the number of observations used in the regression drops to 24,334.

The results reported in Table 2.9 are consistent with those found earlier in the paper. The coefficients are statistically significant different from zero and are -0.078 and -0.045 for my alternative measures. Rural firms have lower lease intensity than similar urban firms. These results are highly significant, even after including a number of control variables and controlling for industry and time fixed effects. Overall, I find support for my main hypothesis that rural firms are more likely to have lower leases ratios compared to small city and urban firms.

Table 2.9: Alternative measures of lease intensity and firm's geographic location

The table presents the results of association between Lease Intensity and firm's geographic location. *OLR* is measured as the capitalized lease expenditure (lagged item 96 × 10) divided by the sum of PPENT (item 8) and capitalized lease expenditure. *CLR* is the capital lease ratio measures as the PPENLS (item 159) divided by lagged PPENT (item 8). For the description of other variables, please refer to Table 2.3. The *p*-values are in parenthesis. The significance levels of 10%, 5%, and 1% are represented by *, **, and *** respectively.

	Dependent variable = Lease	
	OLR	CLR
Intercept	0.747***	-0.005
	(0.00)	(0.96)
Rural	**-0.078*** **	**-0.045********
	(0.00)	**(0.00)**
Small City	**-0.039*** **	**-0.039********
	(0.00)	**(0.00)**
No dividend	0.034***	0.047***
	(0.00)	(0.00)
OIBDP/Sales	-0.001***	-0.003***
	(0.00)	(0.00)
S&P ratings:		
AAA to AA-	-0.029***	-0.037***
	(0.00)	(0.01)
A+ to A-	0.019***	-0.023**
	(0.00)	(0.02)
BBB+ to BBB-	0.026***	-0.027**
	(0.00)	(0.02)
BB+ to D	-0.007***	-0.010
	(0.00)	(0.13)
Tax rate	0.002	-0.009*
	(0.29)	(0.10)
Small tax-loss CF	0.006***	0.011**
	(0.01)	(0.04)
Large tax-loss CF	0.033***	0.020***
	(0.00)	(0.00)
Firm size	-0.043***	-0.004***
	(0.00)	(0.00)
Loss	0.017***	-0.012***
	(0.00)	(0.00)
Industry Dummies	YES	YES
Year Dummies	YES	YES
N	130,119	24,334
Adj. R^2	0.3395	0.1817

2.6 Conclusions

I classify firms as urban, small city, or rural firms based on their distance from large cities and show that rural firms are more likely to have a lower leasing intensity. One explanation for my findings is that obtaining information about and monitoring rural firms is costly. This barrier makes a potential lessor likely to include more penalties and/or provisions in lease contracts. This, in turn, increases the rental expense and makes alternative financing sources more attractive for potential lessees. After including a number of control variables suggested in the existing lease literature, I document a strongly significant impact of geographic location on a firm's leasing ability. I also include a firm's debt capacity, financial constraints, and analyst following in additional analyses. Consistent with my predictions, this essay suggests that rural firms with higher level of debt capacity lease less, higher financial constraints lease more, and higher number of analyst following the firm lease more. In summary, the findings strongly support my main empirical prediction that rural firms tend to have lower lease intensity than urban or small city firms.

Chapter 3: Essay 2- Labor unemployment risk and tax aggressiveness

3.1 Introduction

Tax expenditures of U.S. firms are not trivial. I find that the median effective tax rate of US firm during the 1987 − 2012 period equals 31 percent. It is therefore not surprising that a substantial amount of literature exists that suggests that firms may aggressively attempt to push their taxes down (e.g., Chyz, Leung, Li, and Rui 2013; Richardson, Taylor, and Lanis 2013; Lanis and Richardson 2011; Lanis and Richardson 2012; Chen, Chen, Cheng, and Shevlin 2010; Armstrong, Blouin, and Larcker 2012).[14] However, this tax aggressiveness or tax avoidance may not be without costs. Other than potential costly IRS actions (e.g., Rego and Wilson 2009; Weisbach 2002), there may be stakeholders that could be affected negatively (e.g., Desai and Dharmapala 2008; Desai and Dharmapala 2009; Chen et al. 2010). In my paper I focus on the relation between tax aggressiveness of the firm and one specific group of stakeholders that may be negatively affected by relatively high levels of tax aggressiveness: employees. To be precise, I study the relation between tax aggressiveness and labor unemployment risk. Empirically, I test whether firms located in states with higher unemployment insurance (UI) benefits (i.e., low labor unemployment risk) engage in more tax aggressive activities than do firms located in states with high labor unemployment risk.[15]

Prior literature suggests that workers' perceptions of unemployment risk impact firm policy on layoffs and wage setting and reduce labor supply (e.g., Hamermesh and Wolfe 1990; Li 1986; Topel 1984; Topel 1983). In addition, Agrawal and Matsa (2013) argue that labor

[14] See also Hanlon and Heitzman (2010) for a review of the tax literature.

[15] To my knowledge, there exists only one paper that investigates a somewhat similar issue. Chyz et al. (2013) look at unionization rates and tax aggressiveness. Specifically, that means that they investigate the effects that the bargaining power of employees may have on tax aggressiveness. I look at one of the underlying reasons that may cause employees and firms to reduce tax aggressiveness: unemployment risk. Moreover, I analyze a sample of over 80,000 firm-years, whereas their paper covers a much smaller sample.

market frictions (i.e., unemployment risk) are important factors in the corporate decision making process.[16] Combined, this would suggest that tax aggressiveness may, at least partially, be a reflection of a firms' effort to mitigate workers' exposure to unemployment risk. Prior literature also suggests that workers require higher compensating wage differentials (i.e., premium in wages and benefits) when they perceive unemployment risk (e.g., Topel 1984; Abowd and Ashenfelter 1981). If this is the case, firms may choose conservative corporate policies, such as low tax aggressiveness, in order to minimize unemployment risk, and indirectly reduce wages and benefits. So, I hypothesize that, in the presence of labor unemployment risk, firms will exhibit less tax aggressiveness.

However, measuring unemployment risk is a challenging task. I follow Agrawal and Matsa (2013) and use state unemployment insurance (UI) benefit laws and examine the relation with tax aggressiveness of US firms over the period 1987 to 2012. Topel (1984) argues that higher UI benefits make layoffs less costly and reduces demand of laborers for compensating wage differentials. Hence, firms should be more tax aggressive when unemployment risk is relatively low (i.e., the state has higher UI benefits). Based on state UI benefits, I calculate a proxy for unemployment risk. Specifically, I use the log of the maximum weekly benefit amounts multiplied by the maximum duration in weeks associated with these benefits. Higher *Log max total benefit* indicates lower unemployment risk. To test whether a relation between unemployment risk and tax aggressiveness exists, I employ two measures of tax aggressiveness: (1) the effective tax rate (*ETR*), measured as the total tax expense divided by pre-tax book

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[16] They find that companies choose conservative financing policies in order to mitigate unemployment risk. This finding is consistent with theoretical work by Titman (1984) and Berk, Stanton, and Zechner (2010). A somewhat related stream of literature suggests that labor unions have incentives and risk preferences that manifest itself in conservative financial reporting (e.g., Faleye, Mehrotra, and Morck 2006; Leung, Li, and Rui 2012; Chyz et al. 2013).

income and; (2) the cash effective tax rate (*CETR*), measured as the cash tax paid divided by pre-tax book income.

My main empirical evidence suggests that firms located in states with higher UI benefits (i.e., lower labor unemployment risk) exhibit more tax aggressiveness than firms located in higher labor unemployment risk states. These results are consistent across all measures of tax aggressiveness, are highly statistically significant, and have economic significance. I find that there is substantial economic impact of *Log max total benefit* on *ETR* and *CETR*. Using the mean level of pre-tax income of $131 million for my sample and a change in *Log max total benefit* from the first to the third quartile, the impact of an increase in *Log max total benefit* translates into $5.24 million and $6.90 million of tax savings for *ETR* and *CETR*, respectively. One could argue that adopting more risky tax policy will increase unemployment risk. This concern about increases in unemployment risk may lead state policy makers to pass more generous UI laws in order to protect employee welfare. In order to address this reverse causality problem, I employ the first-differenced GMM approach of Arellano and Bond (1991), my main conclusions remain unaltered.

I also analyze the impact of bargaining power, labor intensity, and the expected costs associated with unemployment for employees (i.e., labor market search costs). As expected, my results support my additional empirical predictions that the relation between tax aggressiveness and labor unemployment risk is stronger in industries that are more labor intense and in states with higher labor bargaining power. Using Unemployment insurance payment rates as a proxy for labor search costs, I find some (albeit weaker) evidence that labor search costs seem to have an effect on the relation between tax aggressiveness and unemployment risk. Finally, my results are robust to the use of an alternative proxy for unemployment risk, exclusion of firms with

foreign sales, exclusion of loss firms, exclusion of big firms, and exclusion of industries that have a dispersed labor force.

This essay makes several contributions to the existing literature on labor friction and corporate policy. First, my paper attempts to answer calls by Scholes, Wolfson, Erickson, Maydew, and Shevlin (2005) and Desai and Dharmapala (2006) for more research on tax aggressiveness. Their calls are specific, in that they ask for more research of tax research in an agency context. Although employees cannot perfectly contract with management, they do bestow decision making power regarding tax policy on managers, while at the same time demanding higher compensating wage differentials, when facing unemployment risk. Specifically, workers can indirectly make managers consider unemployment related costs in the tradeoff analysis of tax aggressiveness. My paper adds an additional non-tax cost (labor unemployment risk) to this agency dynamic. Second, Agrawal and Matsa (2013), in their study of labor unemployment risk and debt policy, argue that labor market friction is a vital factor in corporate environment and call for more research on similar corporate policies. I attempt to fill this void in the literature by providing empirical evidence suggesting that firms may be less tax aggressive in order to mitigate workers' exposure to unemployment risk, thereby reducing the demand for higher wage differentials. Finally, by investigating a new non-tax determinant of tax aggressiveness (i.e., a macro variable that measures labor unemployment risk) I add to the existing literature on cross-sectional determinants of tax aggressiveness (e.g., Gupta and Newberry 1997; Dyreng, Hanlon, and Maydew 2008, Graham and Tucker 2006; Shevlin 2001).

The remainder of this paper is structured as follows: In section 3.2, I discuss how my paper relates to the existing literature and develop the main hypothesis. Section 3.3 describes the data, my measures of tax aggressiveness and unemployment risk, and my research design. In

section 3.4, I discuss my main empirical findings. Finally, section 3.5 summarizes my findings and concludes the paper.

3.2 Related literature and hypothesis development

Existing literature on tax aggressiveness, motivated by the Scholes et al. (2005) framework focuses on outcomes related to tax aggressiveness in which rational managers will engage in tax aggressive activities as long as the marginal benefits outweigh the marginal costs. One of the obvious benefits of tax aggressiveness is the tax savings that may potentially increase the amount of cash flows available to the firm. Managers may benefit from tax aggressive activities as well, either directly or indirectly through compensation. In addition, they may use these activities for rent extraction using masked and opaque tax avoidance (Desai and Dharmapala 2006). Some examples of empirical work that centers on costs of tax aggressiveness or tax planning implementation costs are Mills and Newberry (2001), Guenther, Maydew, and Nutter (1997), and Rego and Wilson (2012). Existing literature also suggests that firm's tax aggressiveness is risky (e.g., Rego and Wilson 2012; Guenther, Matsunaga, and Williams 2012; Brown, Drake, and Martin 2012).

In light of the fact that these benefits and costs may accrue to not only the shareholders of the firm it is not surprising that a growing body of research investigates tax outcomes for different stakeholders. Examples of recent studies in this area examine tax aggressiveness from the perspective of debt holders (Kim, Li, and Li 2010; Lisowsky, Mescall, Novack, and Pittman 2011) and taxing authorities (Desai, Dyck, and Zingales 2007). Finally, there is also evidence that labor unions may affect tax aggressiveness (Chyz et al. 2013). They find that labor unionization rates are negatively associated with tax aggressiveness at both the firm and the industry level.

These last findings are part of a broader stream of literature that provides empirical evidence of the impact that labor market frictions can have on corporate decision making. Most related to my work, Agrawal and Matsa (2013) argue that changes in UI benefits can provide meaningful shocks to the costs to workers. Similar studies that also examine the interaction of labor economics and finance include Benmelech, Bergman, and Enriquez (2012), Chen, Kacperczyk, and Ortiz-Molina (2011), and Matsa (2010).

3.2.1 How labor unemployment risk impact tax aggressiveness

Involuntary unemployment imposes costs on the labor force. Examples of such costs are job search costs (Mortensen and Pissarides 1994; Mortensen 1986; Diamond 1982), layoff discouragement effects (Jahoda 1982), a limited supply of matched job opportunities (Lazear 2003), and other possible labor market frictions. These unemployment related costs lead workers to require compensation in the form of higher wages, additional benefits, and quality working conditions. These direct or indirect payments are usually labeled compensating wage differentials. Given that firms cannot guarantee workers with insurance covering these costs, a number of studies argue that firms must compensate workers ex ante to bear such unemployment risk (e.g., Hamermesh and Wolfe 1990; Li 1986; Topel 1984; Abowd and Ashenfelter 1981). Firms' compensation benefits payments, therefore, should increases with the probability of unemployment, the degree of workers' risk averseness, and the duration of joblessness.

Previous studies provide empirical evidence on the importance of compensating wage differentials for unemployment risk. Abowd and Ashenfelter (1981) show that compensating wage differentials vary across industries and account for about 14 percent of total wages. Hamermesh and Wolfe (1990) argue that $14 - 41$ percent of the industry wage differentials can

be explained by the change in unemployment risk. Compensating wage differentials seem to impact firms' corporate policies.

Besides, consistent with Hanlon and Heitzman (2010), Rego and Wilson (2012), and Badertscher, Katz, and Rego (2013), I also argue that tax avoidance is a risky activity for firms and managers who, if engage in such activity, bear significant costs that include, but not limited to, fees paid to tax experts for tax planning, time devoted to the resolution of tax audits, reputational penalties, and penalties paid to tax authorities (IRS) if detected. As tax aggressiveness makes the firm risky in the eyes of the labor force, whether to engage in this activity (and by how much) depends on the costs and benefit tradeoff. Hence, unemployment risk raises the costs that are required to compensate workers for bearing greater exposure to this risk.

The following equation presents a simplified view of being tax aggressive:

$$\begin{aligned} Net\ benefits\ (tax\ aggressiveness) \\ &= Grossbenefits - Costs\ (direct\ and\ indirect) \\ &- Wage\ differentials\ (unemployment\ risk) \qquad (3.1) \end{aligned}$$

Based on Eq. (3.1), firms engage in tax aggressive activities as long as the benefits exceed the costs. In this paper, I argue that when workers are already exposed to unemployment risk, further risky corporate activity (e.g., tax aggressiveness) is likely to increase wage differentials, reducing the net benefits of tax aggressiveness.[17] Given that the level of risk aversion is an important

[17] The demand for higher wage differentials when firms engage in risky corporate activities (e.g., tax aggressiveness) does not require that workers observe firms' tax aggressiveness decisions. Workers may recognize these risks from informative signals from coworkers, management, the media, the regulatory authorities, and economic environment. To illustrate, Brown and Matsa (2012) find that job seekers are able to perceive the financial situation of a firm.

input into the model of optimal tax evasion (Crocker and Slemrod 2005), I expect labor unemployment risk to increase the marginal costs of tax aggressiveness, leading managers to exhibit less tax aggressiveness.

A similar argument is that workers will more likely demand higher wages and costly benefits if they perceive cash flows as riskier due to managers' investment in tax aggressiveness. Consistent with Agrawal and Matsa (2013) (managers use less debt to assure laborers of lower bankruptcy risk), Chen et al. (2010) (managers engage in less tax aggressiveness because outside investors suspect increased agency costs), and Chyz et al. (2013) (managers engage in less tax aggressiveness because of the demand from labor unions of higher compensation), managers are more likely to reduce tax aggressiveness when labor unemployment risk is higher so as to reduce the need to compensate for higher wage differentials.

3.2.2 Hypothesis

The discussion above suggests that when laborers perceive high unemployment risk, they require a higher level of wage differentials, increasing the costs of tax aggressiveness. This argument leads us to the following hypothesis.

MAIN HYPOTHESIS: *Firms located in states with higher UI benefits (i.e., lower unemployment risk) exhibit more tax aggressiveness.*

A finding of more tax aggressiveness of firms located in states with low unemployment risk is consistent with the idea that unemployment risk can constrain firm behavior and decrease the net benefits of tax aggressiveness. I test this hypothesis by conducting cross-sectional analyses at the firm-year level.

3.3 Data and research design

3.3.1 Measures of tax aggressiveness

The dependent variable in my empirical tests is corporate tax aggressiveness. To be consistent with prior literature (i.e., Chen et al. 2010; Rego and Wilson 2012; Chyz et al. 2013), I use multiple measures of tax aggressiveness. All measures are calculated using data from the Compustat annual files. The first measure of tax aggressiveness is the effective tax rate (*ETR*), which is computed as total tax expense (Compustat data#16) divided by pretax income (data# 170). The second measure is the cash effective tax rate (*CETR*), which is computed as cash taxes paid (data# 317) divided by pretax income (data# 170). Higher values of *ETR* and *CETR* represent lower tax aggressiveness. I winsorize both these measures at [0,1]. While *ETR* is a simple measure, Dyreng et al. (2008) argue that *CETR* is a more accurate variable in measuring a firm's ability to maintain persistent tax avoidance strategies.

3.3.2 Proxy for labor unemployment risk

Given that a precise measure or appropriate proxy for labor unemployment risk is scarce in the existing literature, measuring workers' exposure to unemployment risk is a challenging task. Following Agrawal and Matsa (2013), I use the log of the maximum total benefit, unemployment insurance (UI), as a proxy for unemployment risk. I calculate the maximum total benefit (*Log max total benefit*) as:

$$\text{Log}\, of\ Maximum\ Total\ Benefit = \log(Maximum\ weekly\ benefit\ amount \times Maximum\ number\ of\ weeks) \quad (3.2)$$

I collect information on UI benefits from the US Department of Labor's "Significant Provisions of State UI Laws" from 1987 through 2012.[18] These annual publications have detailed explanations of UI benefit schedules for each state. According to the publication, eligible claimants receive a weekly benefit payment for a specified number of weeks. The level and duration of UI benefit payment depends on workers' employment history during a base period. From each publication, I collect the maximum weekly benefit amount and the maximum duration a claimant is eligible to enjoy the benefit. As Eq. (3.2) shows, my main focus is on the product of the maximum weekly benefit amount and the maximum duration allowed. As an additional test, I use the maximum weekly benefit amount as a proxy for UI benefits. I limit my analysis to UI benefit amount in dollar (e.g., *Log max total benefit* and *Log max weekly benefit*).[19]

State UI benefits can be considered a good proxy for unemployment risk. Topel (1984) argues that higher UI benefits make layoffs less costly and reduce workers' demand for being compensated by their employers for facing unemployment risk. A number of studies show that UI compensation has economically meaningful effects on workers' behavior and on aggregate labor supply (e.g., Topel and Welch 1980; Topel 1984; Meyer 1990; Meyer and Mok 2007; Gormley, Liu, and Zhou 2010). Agrawal and Matsa (2013) find that measures of UI benefits are reflected in the aggregate realized value of UI benefits paid by each state. They reported an elasticity of 0.9 between maximum total benefit and actual compensation payments. They also find that aggregate compensation payout is correlated with both the maximum weekly benefit amounts and the maximum duration in weeks.

[18] I start my sample period in 1987 because income tax paid (Compustat TXPD), which is used for calculating one of the measures of tax aggressiveness (*CETR*), is missing for years before 1987.

[19] Maximum duration allowed has less variation across the states. The standard deviation is only 0.037 as opposed to the 0.381 and 0.364 for *Log max total benefit* and *Log max weekly benefit*, respectively.

3.3.3 Sample selection and descriptive statistics

I test the association between corporate tax aggressiveness and labor unemployment risk at the firm-year level. I hand collect unemployment insurance benefit data from the US Department of Labors' "significant provisions of State UI Laws" from 1986 to 2012. I also collect firms' balance sheet and income statement data from the Compustat annual file for the period 1986 - 2012. I match the Compustat sample with the UI benefit sample in two steps. First, my initial sample has 256,533 firm-year observations. I exclude financial firms (SIC 6000 – 6999) and utilities (SIC 4900 – 4999) because these firms are subject to different regulations. As a result, I delete 75,130 firm-years. For my regression models, I require non-missing values for the control variables (e.g., ROA, Leverage, Market-to-book, size, foreign income, PPE, Intangible, equity income in earnings, loss carry forward; 44,207 firm-years). I only keep sample firm-years if I am able to calculate my two tax aggressiveness measures (*ETR* and *CETR*). This requirement screens out 45,001 firm-years.

Table 3.1: Sample selection and sample distribution

This table presents sample selection procedure (Panel A) and sample distribution by year (Panel B) and by industry (Panel C). I define industry by two-digits SIC code. The sample covers the period between 1987 and 2012. I identify all the sample observations for which financial statement data is available in the Compustat. ETR is the effective tax rate, which is computed as total tax expense (data#16) divided by pretax income (data# 170). CETR is the cash effective tax rate, which is computed as cash taxes paid (data# 317) divided by pretax income (data# 170). Unemployment insurance benefit is the log of the maximum weekly benefit amounts multiplied by the maximum duration in weeks associated with these benefits.

Panel A: Sample selection process		
		# firm-year observations
Number of firm-year observations in COMPUSTAT between 1987 and 2012		256,533
Less:		
Financial and utilities (SIC 6000 − 6999 and SIC 4900 − 4999)	75,130	
Missing values in measuring control variables	44,207	
Missing ETR and CETR	45,001	
Missing unemployment insurance benefit	8,772	
Missing values for state GDP growth rate	530	
Total number of firm-years excluded from the sample	*173,640*	
Final sample over 1981-2012		**82,893**

Panel B: Sample distribution by year

Year	*Frequency*	*Percent*
1987-1989	5,850	7.1%
1990-1994	14,510	17.5%
1995-1999	18,524	22.4%
2000-2004	18,733	22.6%
2005-2009	16,703	20.2%
2010-2012	8,573	10.3%
Total	82,893	100%

Table 3.1: (continued)

Panel C: Sample distribution by industry

Two-digit SIC	*Frequency*	*Percent*
13 — Oil & gas extraction	3,604	4.3%
20 — Food & Kindred Products	2,250	2.7%
28 — Chemicals & allied products	6,120	7.4%
35 — Industrial & commercial machinery & computer equip.	5,868	7.1%
36 — Electronic & Other Electrical Equip. & Components, Except Computer Equip.	7,581	9.1%
37 — Transportation equip.	2,268	2.7%
38 — Measuring analyzing controlling Inst.; Photographic medical & optical Goods	5,834	7.0%
48 — Communications	2,764	3.3%
50 — Wholesale trade – durable goods	2,791	3.4%
59 — Miscellaneous retail	1,799	2.2%
73 — Business services	10,564	12.7%
80 — Health services	1,976	2.4%
87 — Engineering accounting research management & related services	1,831	2.2%
— Industries with < 2% representation	27,643	33.3%
Total	82,893	100.0%

Finally, I match state employment insurance data with Compustat data based on the state where a firm's headquarter is located. Company headquarters information for some firms is missing in Compustat. Because the unemployment risk measure for a firm is dependent on the state where it is located, I only keep those firm-years for which I am able to get the unemployment risk variable (*Log max total benefit*). This deletes 8,772 firm-years and as a result there are 82,893 firm-years in my final sample. I describe the sample formation process in detail in Table 3.1. In Panel B of this Table, I present how the sample is represented in different sample periods. It appears that my firm-years are not particularly clustered though time. In Panel C, I present all 2-digit SIC codes that comprise at least two percent of the firm-years in my sample. There are thirteen such industries which in aggregate contain about 67% of the sample. The 2-digit industry that is most represented is 73- Business Services (12.7%), followed by 36 – Electronic and Other Equipment (9.1%).

Table 3.2: Descriptive statistics

This table presents the descriptive statistics for the variables used in my regressions. Panel A represents the dependent variables used in my analyses. Panel B show the benefit variables and panel C represents the control variables used in my regressions. *ETR* is the effective tax rate, which is computed as total tax expense (data#16) divided by pretax income (data# 170). *CETR* is the cash effective tax rate, which is computed as cash taxes paid (data# 317) divided by pretax income (data# 170). *Log max total benefit* is the natural log of the product of max weekly benefit and max duration that a worker is entitled to receive as state UI benefits. *Log max weekly benefit* is the natural log the maximum weekly wage benefit allowance given to workers in an average state-year; *Log max duration* is the natural log of the maximum number of weeks that a state provides unemployment insurance benefits to claimants. *Return on assets* is measured as operating income (Compustat data# 170 – data# 192) scaled by lagged assets (data# 6); *Leverage* is measured as long-term debt (data# 9) scaled by lagged assets; *Loss carry forward* is an indicator variable coded as one if loss carry forward (data# 52) is positive as of the beginning of the year *t*; Δ*loss carry forward* is the change in loss carry forward (data# 52) scaled by lagged assets; *Foreign income* is measured as foreign income (data# 273) scaled by lagged assets; *PPE* is the net property, plant, and equipment (data# 8) scaled by lagged assets; *Intangible assets* is measured as intangible assets (data# 33) scaled by lagged assets; *Equity income* is the equity income in earnings (data# 55) scaled by lagged assets; *Size* is the natural log of market value of equity (data# 199 × data# 25) at the beginning of year; *Marekt-to-book* is measured as market value of equity (data# 199 × data# 25) divided by book value of equity (data# 60) at the beginning of the year. *GDP growth* rate is the change in state GDP in year *t* and *t-1*.

Variable	N	Mean	Standard deviation	25th percentil e	Median	75th percentil e
Panel A: Dependent variables						
ETR	82,893	0.248	0.206	0.000	0.309	0.381
CETR	82,893	0.189	0.236	0.000	0.097	0.321
Panel B: Unemployment insurance variables						
Log max total benefit	82,893	9.041	0.357	8.767	9.023	9.274
Log max weekly benefit	82,893	5.776	0.343	5.509	5.765	6.016
Log max duration	82,893	3.266	0.033	3.258	3.258	3.258
Panel C: Control variables						
Return on assets	82,893	-0.068	0.600	-0.057	0.048	0.127
Leverage	82,893	0.209	0.274	0.002	0.123	0.310
Loss carry forward	82,893	0.362	0.481	0.000	0.000	1.000
Δ*loss carry forward*	82,893	0.051	0.810	0.000	0.000	0.000
Foreign income	82,893	0.008	0.028	0.000	0.000	0.001
PPE	82,893	0.301	0.277	0.093	0.218	0.424
Intangible assets	82,893	0.147	0.228	0.000	0.047	0.203
Equity income	82,893	0.000	0.004	0.000	0.000	0.000
Size	82,893	4.825	2.360	3.131	4.801	6.489
Market-to-Book	82,893	2.569	5.156	0.988	1.790	3.195
GDP growth rate	82,893	5.102	2.740	3.580	5.210	7.130

The summary statistics of the dependent-, benefits-, and control variables are presented in Table 3.2. Panel A presents the summary statistics of the measures of tax aggressiveness used in this study. The mean (median) of ETR and CETR are 0.25 (0.31) and 0.19 (0.10), respectively.

In Panel B, the summary statistics of the benefit variables are presented. The *Log max total benefit* is the natural log of maximum weekly benefit amount times the maximum number of weeks. The average *Log max total benefit* is 9.04 (approximately $8,442 per week). The *Log max weekly benefit* is the natural log of the maximum weekly benefit allowance given to a qualified worker in an average state-year. The average *Log max weekly benefit* is 5.78 (approximately $324 per week). The *Log max duration* is the natural log of maximum number of weeks a state provides unemployment benefits to a worker. The average *Log max duration* is 3.27 (approximately 26 weeks). I present the descriptive statistics of the control variables used in my models in Panel C.[20] The mean (median) return on assets in my sample is -0.068 (0.048). The mean (median) firm has approximately 21% (12%) debt in its capital structure. The mean (median) market value of equity, a proxy for size is $125 ($122) million. The mean and median GDP growth rate in the sample is about 5%.

To mitigate concerns that there may not be much variation in my benefit variables, I investigate how much variation there is in this variable across states and across time (within a given state). I do find a significant variation in unemployment benefits across states. In 2012, for example, the maximum total unemployment insurance benefit varies from $6,110 in Mississippi to $29,370 in Massachusetts. I also graphically present the evolution of UI benefits over time across states. Fig. 3.1 presents the percentage change in UI benefit by quinquennium.

[20] All the control variables are winsorized at 1 percent and 99 percent tails

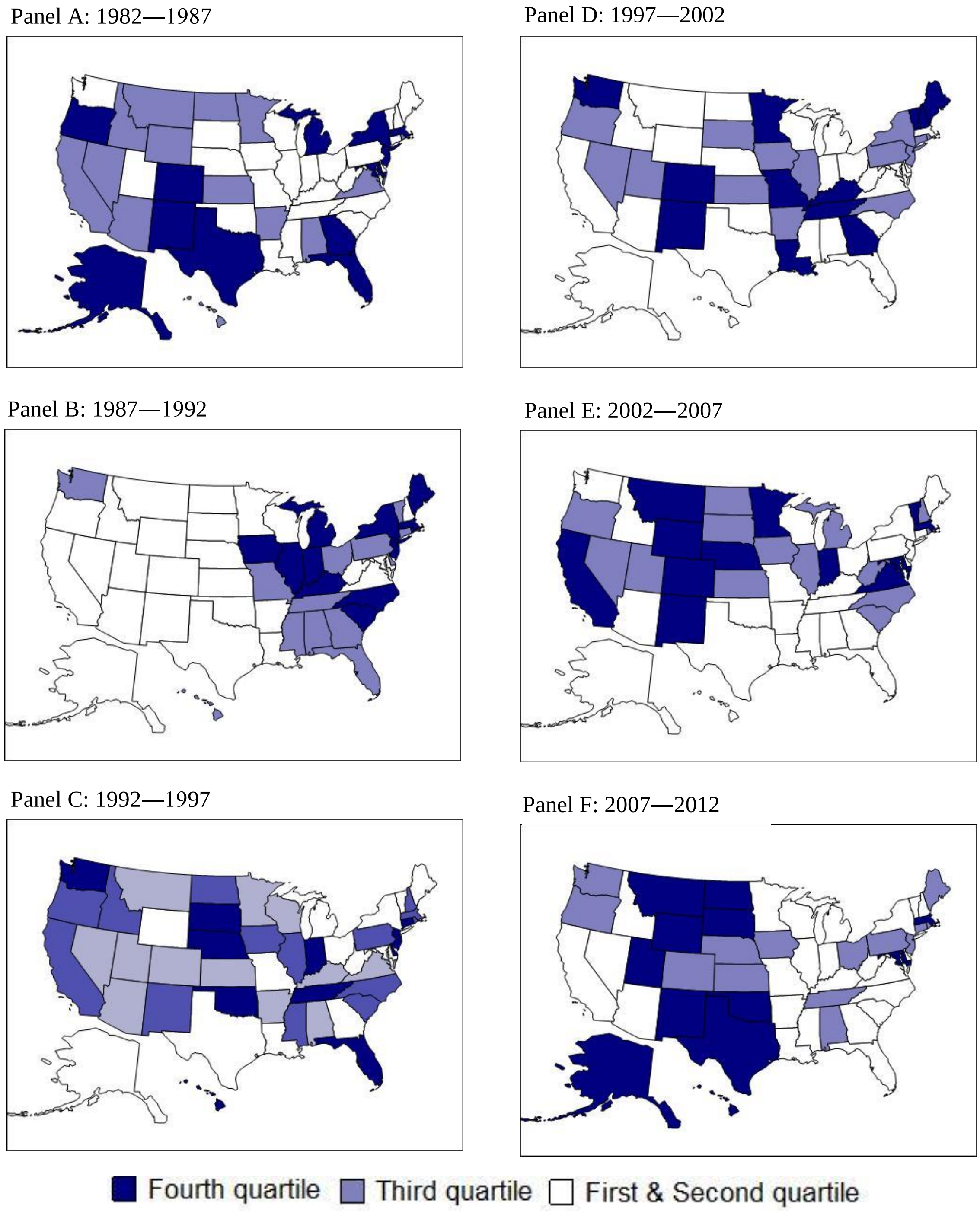

Figure 3.1: Variations in state unemployment insurance benefit by quinquennium

These figures represent the quartiles of increase in state maximum unemployment insurance (UI) benefit by quinquennium over 1987 to 2012. Larger increases in benefits are shown in darker shades. Maximum total benefit is the product of the statutory maximum weekly UI benefit and the maximum duration.

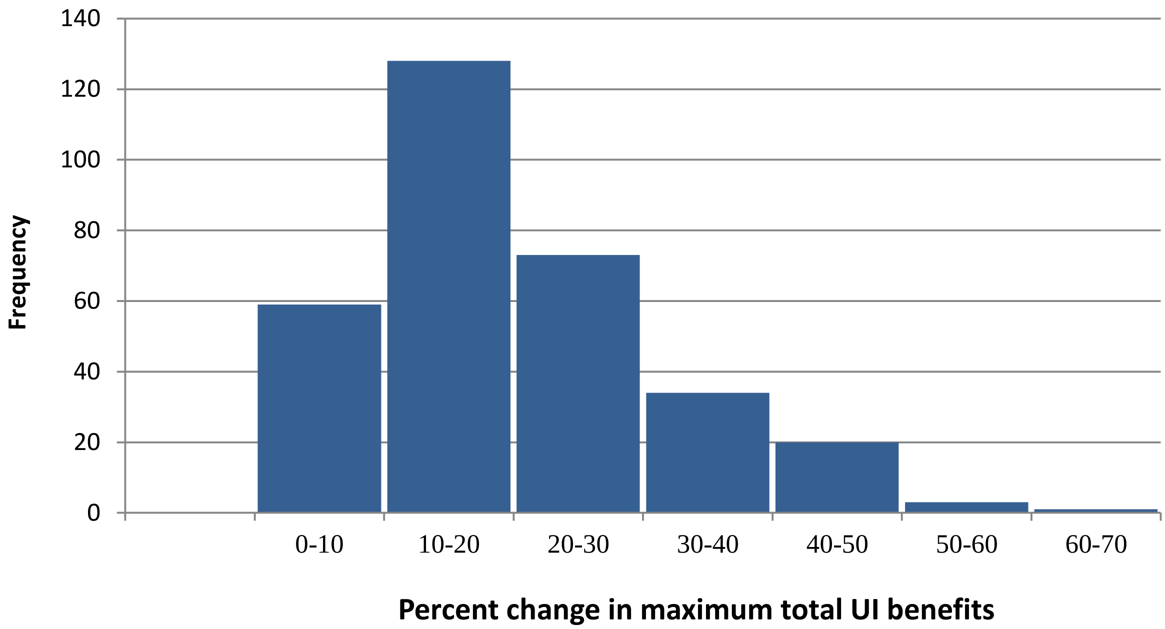

Figure 3.2: Distribution of increase in state unemployment benefit

The figure represents the distribution of state increase in state maximum unemployment insurance (UI) benefit by quinquennium over 1987 to 2012. Maximum total benefit is the product of the statutory maximum weekly UI benefit and the maximum duration.

Each map depicts the quartile change in UI benefit for each state in different time period (i.e., five years). The darker shades indicate a larger percentage change in benefits. States display a reasonable heterogeneity in UI benefit trends. In Fig. 3.2, I plot the distribution of absolute changes in UI benefits. I find a 10% to 20% (absolute) change in UI benefits by US states in each five years. Although less prevalent, larger (absolute) benefit changes also occur.

3.3.4 Research design

I use cross-sectional regressions to examine the relation between tax aggressiveness and UI benefits. I estimate the following base model:

$$
\begin{aligned}
&TaxAGG_{it} \\
&= \alpha_0 + \beta_1 Log\max total\ benefit_{st-1} + \beta_2 Return\ on\ assets_{it} + \beta_3 Leverage_{it} \\
&+ \beta_4 Loss\ carry\ forward_{it} + \beta_5 \Delta Loss\ carry\ forward_{it} + \beta_6 Foreign\ income_{it} + \beta_7 PPE_{it} \\
&+ \beta_8 Intangible\ assets_{it} + \beta_9 Equity\ income_{it} + \beta_{10} Size_{it-1} + \beta_{11} MB_{it-1} \\
&+ \beta_{12} GDP\ growth\ rate_{it} + StateDummies + IndustryDummies \\
&+ \varepsilon_{it} \qquad (3.3)
\end{aligned}
$$

where $TaxAGG_{it}$ is tax aggressiveness (e.g., *ETR* and *CETR); $Log\max total\ benefit_{st-1}$ is my proxy for labor unemployment risk. This variable is the log of maximum weekly benefit amount times the maximum number of weeks a certain state provides unemployment benefit to a claimant. All these (and other) variables are measured at the firm-year level. I define the control variables as follows: $Return\ on\ assets_{it}$is measured as operating income (data# 170 – data# 192) scaled by lagged assets (data# 6); $Leverage_{it}$ is measured as long-term debt (data# 9) scaled by lagged assets; *Loss carry forward* is an indicator variable coded as one if loss carry forward (data# 52) is positive as of the beginning of the year *t*; Δ*loss carry forward* is the change in loss carry forward (data# 52) scaled by lagged assets; FI_{it} is foreign income (data# 273) for firm *i* in year *t* scaled by lagged assets; PPE_{it} is the net property, plant, and equipment (data# 8) for firm *i* in year *t* scaled by lagged assets; $Intangible\ assets_{it}$ stands for intangible assets (data# 33) for firm *i* in year *t* scaled by lagged assets; $Equity\ income_{it}$ is measured as the equity income in earnings (data# 55) for firm *i* in year *t* scaled by lagged assets; $Size_{it-1}$ is the natural log of market value of equity (data# 199 × data# 25) for firm *i* at the beginning of year *t*; MB_{it-1} refers to the market-to-book ratio measured as market value of equity (data# 199 × data# 25) divided by book value of equity (data# 60) for firm *i* at the beginning of year *t*.

If firms are located in states with lower labor unemployment risk (i.e., higher UI benefits) and are more tax aggressive, I expect the coefficient on *Log max total benefit*, β_1 to be negative when *ETR* and *CETR* are used to capture tax aggressiveness. I also consider certain firm characteristics that may potentially play roles as determinants of corporate tax aggressiveness. To be consistent with prior studies (e.g., Mills 1998; Manzon and Plesko 2002; Rego 2003; Dyreng, et al. 2008; Frank, Lynch, and Rego 2009; Wilson 2009; Chen et al. 2010; Rego and Wilson 2012), I control for two sets of firm characteristics to ensure that my results are not driven either by fundamental differences among firms with different levels of unemployment risks that workers are facing or by differential book and tax treatment on capital investment. The first set of control variables which is designed to capture firms' profitability, leverage, and foreign operations are *Return on assets, Leverage, Loss carry forward, ∆Loss carry forward, and Foreign income*. For example, more profitable firm and firms with lower levels of tax loss carry forwards tend to have higher effective tax rates. Similar logic can be applied to firms with foreign income. Graham and Tucker (2006) find that tax shelter firms have lower leverage ratios than their control sample, suggesting that leverage and tax shelter activity serve as substitutes. Therefore, leverage is expected to be negatively related to the effective tax rate. The second set of control variables is designed to capture differences in book and tax reporting, they are *Plant, property, and equipment (PPE), Intangible assets, and Equity income*. For example, firms with higher capital expenditure are affected more by the differential treatment of depreciation in reporting income for tax and financial purposes. Moreover, *Intangible assets* and *equity income* are used to control for differential book and tax treatment and for differences in reporting earnings in equity. I also control for *Size* and *Market-to-book* ratio as growing firms may invest more in tax favored assets which generates timing difference in recognizing expenses. Lastly, to

control for contemporaneous local macro-economic conditions (see Agrawal and Matsa (2013)), I include state *GDP growth rates* (based on data from the US Bureau of Economic Analysis) in my regressions. I also include state and industry dummies to control for industry characteristics and overall state characteristics.

Table 3.3 presents the Pearson correlation analysis among the variables used in my analysis. The correlation coefficient between *ETR* and *CETR* is positive and significant with a coefficient value of 0.495 and a *p*-value of 0.000. The correlation coefficients between *Log max total benefit and ETR* and *CETR* are -0.076 and -0.068 respectively, which are statistically significant. These negative coefficients provide initial support to my main hypothesis that firms located in higher UI benefit states exhibit more tax aggressiveness. Most of the correlation coefficients among control variables are small enough to override the issue of multicollinearity.

Table 3.3: Pearson correlation results

This table presents the Pearson correlation matrix. The italic numbers below the coefficients are p-values. All variables are defined in Tables 3.2.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) ETR	1.000													
(2) CETR	0.495	1.000												
	(0.00)													
(3) Return on assets	0.316	0.233	1.000											
	(0.00)	(0.00)												
(4) Leverage	0.022	-0.028	-0.083	1.000										
	(0.00)	(0.00)	(0.00)											
(5) Loss carry forward	-0.205	-0.197	-0.122	0.010	1.000									
	(0.00)	(0.00)	(0.00)	(0.00)										
(6) Δ Loss carry forward	-0.077	-0.051	-0.234	0.019	0.025	1.000								
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)									
(7) Foreign income	0.114	0.118	0.132	-0.024	0.011	-0.023	1.000							
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)								
(8) PPE	0.097	0.009	0.043	0.351	-0.092	-0.025	-0.013	1.000						
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)							
(9) Intangible assets	0.058	0.032	-0.016	0.286	0.062	-0.013	0.052	-0.120	1.000					
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)						
(10) Equity income	0.054	0.049	0.060	0.022	-0.027	-0.015	0.077	0.035	0.003	1.000				
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.32)					
(11) Size	0.284	0.230	0.280	0.061	-0.075	-0.102	0.296	0.109	0.194	0.098	1.000			
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)				
(12) Market-to-book	0.004	0.004	0.100	-0.057	-0.001	-0.052	0.056	-0.006	0.037	-0.009	0.178	1.000		
	(0.31)	(0.28)	(0.00)	(0.00)	(0.72)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)			
(13) GDP growth rate	0.036	0.022	0.039	0.047	-0.090	-0.019	-0.031	0.119	-0.056	0.010	-0.063	0.035	1.000	
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		
(14) Log max total Benefit	-0.076	-0.068	-0.066	-0.059	0.136	0.019	0.088	-0.169	0.143	-0.004	0.160	0.004	-0.339	1.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.22)	(0.00)	(0.24)	(0.00)	

3.4 Empirical results

3.4.1 Univariate analysis

One of my primary objectives is to investigate the relation between tax aggressiveness and labor unemployment risk. The results of my univariate comparison are presented in Table 3.4. I divide the sample into two groups, based on the median value of log total UI benefit (*Log max total benefit*).

For the low benefit firm-years, the mean (median) for *ETR* 0.26 (0.33) and *CETR* is 0.20 (0.12). For the high benefit group the mean (median) of *ETR* is 0.23 (0.28) and for *CETR* the mean (median) is 0.17 (0.08). The differences in means and medians between the two subgroups are statistically highly significant. And this is the case for both *ETR* and *CETR*. These findings show that firms with low UI benefits (or high labor unemployment risk) are less tax aggressive than those with high UI benefits (low labor unemployment risk). The univariate comparison in Table 3.4 also suggests that firms located in states with higher labor unemployment risk are generally smaller in size, more profitable, have more plants and equipment, have a lower market-to-book ratio, and have higher leverage ratios.

Table 3.4: Univariate results

This table presents the difference of both tax aggressiveness and firm characteristics in two subgroups. Median level of UI benefits is used as the cutoff in forming the two subgroups. States with UI insurance benefits below the median level are treated as low UI benefit and states with UI benefits equal or above the median level are treated as high UI benefit. The numbers in the table are mean and median values of all firms within the same subgroup. The mean differences between groups are based on *t*-value and median differences are based on *Z*-value (Wilcoxon signed-rank test). *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively. All variables are defined in Tables 3.1 and 3.2.

Variable	Unemployment Insurance Benefit						Difference (Low-High)	
	Low UI Benefit			High UI Benefit				
	Mean	Median	N	Mean	Median	N	Mean (*t-value*)	Median (*Z-value*)
ETR	0.261	0.333	41,753	0.234	0.281	41,140	19.17***	27.12***
CETR	0.204	0.122	41,753	0.174	0.075	41,140	17.94***	12.50***
Return on assets	-0.031	0.052	41,753	-0.106	0.044	41,140	18.05***	8.05***
Leverage	0.221	0.141	41,753	0.198	0.103	41,140	12.38***	16.20***
Loss carry forward	0.301	0.000	41,753	0.424	0.000	41,140	-37.06***	-36.75***
Δ*loss carry forward*	0.037	0.000	41,753	0.066	0.000	41,140	-5.08***	-3.27***
Foreign income	0.006	0.000	41,753	0.010	0.000	41,140	-25.27***	-31.96***
PPE	0.342	0.261	41,753	0.260	0.177	41,140	43.08***	41.52***
Intangible assets	0.116	0.023	41,753	0.178	0.081	41,140	-39.39***	-45.05***
Equity income	0.000	0.000	41,753	0.000	0.000	41,140	-1.97***	-6.03***
Size	4.447	4.347	41,753	5.208	5.309	41,140	-47.03***	-43.87***
Market-to-Book	2.550	1.744	41,753	2.588	1.839	41,140	-1.06	-7.80***
GDP growth rate	5.925	5.970	41,753	4.267	4.390	41,140	91.43***	82.07***

3.4.2 Multivariate analysis

Table 3.5 presents the regression analysis that tests my hypothesis that firms located in states with higher levels of labor unemployment risk will be less tax aggressive.[21] I conduct the analyses using my proxies for tax aggressiveness (e.g., *ETR* and *CETR*) and using *Log max total benefit* as the labor unemployment risk variable.[22] My findings suggest that higher UI benefits (i.e., a higher value for *Log max total benefit*) are positively related with tax aggressiveness. These results are consistent across both measures of tax aggressiveness and all regression types and are significant at the 1 percent level in all my regressions. Note that higher values for *ETR* and *CETR* represent low tax aggressiveness. So, I do expect to find a negative association between *Log max total benefit* and *ETR* or *CETR*. Specifically, I find that the coefficient on *Log max total benefit* variable is negative and significant when *ETR* is used (coefficients are between -0.081 and -0.074) and *CETR* is used (coefficients are between -0.105 and -0092).

I run various permutations of the basic models where I aggregate by either firm-year or state-year. The estimates in table 3.5 (column 1 and 4) show that increases in UI benefit (*Log max total benefit)* are associated with decreases in both *ETR* and *CETR*. This relation is both statistically significant and economically meaningful. A 100 log point increase in the *Log max total benefit* is associated with 7.9 percentage points (for *ETR*) and 10.4 percentage points (for *CETR*) lower average market *ETR* and *CETR*, respectively. I also analyze the economic significance of my findings by multiplying the coefficient estimates for the *Log max total benefit* variable by the change in the level of *Log max total benefit* when moving from the 25th

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[21] Note that in all my regressions in the paper, I adjust standard errors for two-way clustering at the firm level and state level.

[22] In later analysis, I corroborate my findings by using *Log max weekly benefit* as an alternative measure of state UI benefits.

percentile to the 75th percentile (Table 3.2 shows an increase of 0.507 (= 9.274 - 8.767). The economic effect of *Log max total benefit* on *ETR* and *CETR* can therefore be represented as a decrease in tax rates of 4.00 percent (*ETR*) and 5.27 (*CETR*) percent, respectively. Using the mean level of pre-tax income of $131 million for my sample firms (this number is not reported in any of my tables, but available upon request), this effect translates into $5.24 million and $6.90 million of tax savings, respectively for an average firm-year.

Workers receive UI benefits from the state in which they work. However, my empirical analysis measures UI benefit in state where their companies headquartered. This contradiction may contaminate my estimates if workers work in a state different from state that companies are headquartered in. To address this issue, I estimate Eq. (3.3) after excluding industries in which a large portion of labor force is likely to be dispersed (e.g., retail, wholesale, and transport). The results are presented in Table 3.5 (Column 2 and 5). As expected, the coefficient of *Log max total benefit* increases by about 2.5% to 8.1 percentage points (for *ETR*) and by 1.0% to 10.5 percentage points (for *CETR*), a small increases that, at least, is consistent with my main findings.

The impact of UI benefits on tax aggressiveness is also robust to excluding outlier observations. I collapse the sample into state-year observations and analyze tax aggressiveness by estimating median regression.[23] The results in Table 3.5 (column 3 and 4) show that 100 log point increase in the *Log max total benefit* is associated with 7.4 percentage points (for *ETR*) and 9.2 percentage points (for *CETR*) lower average market *ETR* and *CETR* respectively. This results lend support to the idea that increases in tax aggressiveness in response to an increase in

[23] Standard errors are calculated by using the bootstrap method.

Table 3.5: Relation between labor unemployment risk and tax aggressiveness

This table presents the association between labor unemployment risk and tax aggressiveness. Where indicated, industries are excluded in which a large percentage of workers are likely to be dispersed (e.g., retail, wholesale, and transport). All variables are defined in Tables 3.2. The *t*-statistic is reported in parentheses. Standard errors are adjusted for two-way clustering at the firm and year level. For quintile regression, standard errors are calculated using Bootstrap method. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	ETR			*CETR*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Intercept						
	0.697***	0.813***	0.718***	0.946***	0.994***	0.853***
	(11.22)	(13.26)	(7.47)	(10.69)	(10.83)	(7.32)
Log max total benefit	**-0.079*** (-13.87)**	**-0.081*** (-13.66)**	**-0.074*** (-7.52)**	**-0.104*** (-10.83)**	**-0.105*** (-10.81)**	**-0.092*** (-7.69)**
Return on assets	0.071***	0.069***	0.076***	0.050***	0.049***	0.039***
	(11.23)	(11.37)	(4.15)	(8.43)	(8.52)	(2.58)
Leverage	-0.016***	-0.014***	0.016	-0.033***	-0.030***	-0.033
	(-2.80)	(-2.56)	(0.41)	(-7.58)	(-6.49)	(-0.69)
Loss carry forward	-0.055***	-0.054***	-0.094***	-0.066***	-0.065***	-0.123***
	(-11.48)	(-10.99)	(-4.60)	(-10.87)	(-10.46)	(-8.06)
Δ *loss carry forward*	0.002* (1.63)	0.002* (1.65)	0.001 (0.07)	0.003*** (4.16)	0.003*** (4.39)	-0.008 (-0.90)
Foreign income	0.301***	0.313***	-0.142	0.472***	0.487***	0.876*
	(5.14)	(5.07)	(-0.36)	(7.03)	(7.05)	(1.92)
PPE	0.047***	0.050***	-0.011	0.005	0.010	-0.010
	(7.68)	(7.49)	(-0.21)	(0.69)	(1.37)	(-0.23)
Intangible assets	0.048***	0.050***	0.011	0.033***	0.038***	0.004
	(8.16)	(8.36)	(0.28)	(4.99)	(5.57)	(0.11)
Equity income	0.535*	0.699**	5.991***	0.861***	1.050***	5.067***
	(1.91)	(2.29)	(2.66)	(2.78)	(3.18)	(4.22)
Size	0.018***	0.018***	0.019***	0.019***	0.019***	0.019***
	(19.16)	(18.02)	(4.59)	(20.84)	(19.58)	(3.59)
Market-to-Book	-0.002***	-0.002***	-0.002	-0.002***	-0.002***	0.000
	(-10.06)	(-11.30)	(-0.61)	(-6.97)	(-6.96)	(0.21)
GDP growth rate	0.000	0.000	0.000	-0.001	-0.001	-0.001
	(-0.60)	(-0.64)	(-0.61)	(-1.00)	(-1.21)	(-1.35)
Aggregation	Firm-year	Firm-year	State-year	Firm-year	Firm-year	State-year
Excl. dispersed indus.	No	Yes	No	No	Yes	No
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	No	Yes	Yes	No
Estimation method	OLS	OLS	Median	OLS	OLS	Median
R^2	0.2138	0.2102	0.3996	0.1554	0.1562	0.3792
N	82,893	71,269	1,308	82,893	71,269	1,308

Log max total benefit in my full sample (Column 1, 2, 4, and 5) are not driven by extreme observations.

Overall, the findings of my primary empirical analysis are consistent with the hypothesis that firms located in states with higher UI benefits (i.e., low unemployment risk) exhibit higher levels of tax aggressiveness. My finding is also consistent with recent literature (e.g., Agrawal and Matsa, 2013) that shows that labor market frictions may have a significant impact on the corporate environment.

My main results are based on two assumptions: first, an increase in tax aggressiveness is due to a decrease in unemployment risk; second, unemployment insurance benefit reduces unemployment risks. One of the concerns that may potentially weaken my main conclusion is the reverse causality problem. One could argue that adopting a more risky tax policy increases unemployment risk. This concern about increases in unemployment risk could lead state policy makers to pass more generous UI laws in order to protect employee welfare. Therefore, a potential alternative explanation for my findings is that aggressive tax behavior of firms causes the passage of more generous UI laws. In order to address this reverse causality problem, I employ the first-differenced GMM approach of Arellano and Bond (1991) by using lag values of both dependent (*ETR* and *CETR)* and independent (*Log max total benefit*) variables as instrumental variables. After addressing this potential issue, my results in Table 3.6 show support for the main hypothesis that firms engage in more tax aggressive activities when labor unemployment risk is low (i.e., the coefficients on my variable of interest (*log max total benefit*) remain negative and significantly different from zero).

Table 3.6: First-Differenced GMM estimation- unemployment risk on tax aggressiveness

This table presents the association between labor unemployment risk and tax aggressiveness. All variables are defined in Tables 3.2. The *t*-statistic is reported in parentheses. Standard errors are adjusted for two-way clustering at the firm and year level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	ETR	*CETR*
Log max total benefit	**-0.152***** **(-13.63)**	**-0.117***** **(-9.21)**
Return on assets	0.032*** (14.66)	0.028*** (14.27)
Leverage	0.001 (0.17)	0.009* (1.65)
Loss carry forward	-0.009*** (-2.82)	-0.012*** (-3.06)
Δ *loss carry forward*	0.001** (2.17)	0.002*** (3.28)
Foreign income	0.598*** (9.46)	0.169** (2.42)
PPE	0.014** (2.18)	0.026*** (3.28)
Intangible assets	0.031*** (4.62)	0.029*** (4.13)
Equity income	-0.118 (-0.39)	0.221 (0.60)
Size	0.004*** (3.41)	0.015*** (10.39)
Market-to-Book	0.000 (-0.59)	0.000 (0.22)
GDP growth rate	0.000 (0.02)	-0.001*** (-2.89)
State fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Prob > F	0.000	0.000
N	70,605	70,605

3.5 Additional analysis

3.5.1 Effect of bargaining power on unemployment risk and tax aggressiveness

My main hypothesis states that higher UI benefits lead to more tax aggressiveness. However, especially in industries where employees may have relatively more bargaining power there may be an even stronger relation between unemployment risk and tax aggressiveness.

Prior literature provides substantial evidence that labor unions assess managers' investment decisions through the eyes of bondholders, suggesting that unions prefer less risk than shareholders or mangers (e. g., Faleye, Mehrotra, and Morck, 2006; Chen, Kacperczyk, and Ortiz-Molina, 2011; Chyz, Leung, Li, and Rui 2013). Therefore, any corporate activity that potentially increases overall risk of the firm is less preferred by unions. Therefore, I expect the relation between tax aggressiveness and unemployment risk to be more pronounced in firms with higher level of bargaining power.

I test this by including a bargaining power variable and an interaction variable of this bargaining power variable and the variable that proxies for unemployment risk in my regressions. My bargaining power variable is defined as the state unionization rate and is collected from the Bureau of Economic Analysis. Empirically, I estimate the following model:

$$\begin{aligned} TaxAGG_{it} &= \alpha_0 + \beta_1 Log\max total\ benefit_{st-1} \times BargPower_{st} + \beta_2 Log\max total\ benefit_{st-1} \\ &+ \beta_3 BargPower_{st} + \beta_4 Return\ on\ assets_{it} + \beta_5 Leverage_{it} + \beta_6 Loss\ carry\ forward_{it} \\ &+ \beta_7 \Delta Loss\ carry\ forward_{it} + \beta_8 Foreign\ income_{it} + \beta_9 PPE_{it} + \beta_{10} Intangible\ assets_{it} \\ &+ \beta_{11} Equity\ income_{it} + \beta_{12} Size_{it-1} + \beta_{13} MB_{it-1} + \beta_{14} GDP\ growth\ rate_{it} \\ &+ StateDummies + IndustryDummies \\ &+ \varepsilon_{it} \qquad (3.4) \end{aligned}$$

Table 3.7: Bargaining power and the relation between unemployment risk and tax aggressiveness

This table presents the interaction effect of labors' bargaining power on the relation between labor unemployment risk and tax aggressiveness. *BargPower* is measured as the state unionization rate collected form Bureau of Economic Analysis (BEA). All other variables are defined in Tables 3.2. The *t*-statistic is reported in parentheses. Standard errors are adjusted for two-way clustering at the firm and year level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	ETR	*CETR*
Intercept	0.395	0.310*
	(0.01)	(1.71)
Log max total benefit × BargPower	**-0.143****	**-0.160****
	(-2.26)	**(-2.12)**
Log max total benefit	-0.047***	-0.048***
	(-3.85)	(-2.59)
BargPower	0.014***	0.019***
	(2.49)	(2.86)
Return on assets	0.071***	0.050***
	(11.21)	(8.42)
Leverage	-0.016***	-0.033***
	(-2.81)	(-7.67)
Loss carry forward	-0.055***	-0.065***
	(-11.44)	(-10.87)
Δ *loss carry forward*	0.002	0.003***
	(1.62)	(4.15)
Foreign income	0.299***	0.469***
	(5.12)	(7.04)
PPE	0.046***	0.004
	(7.63)	(0.54)
Intangible assets	0.048***	0.035***
	(8.20)	(5.19)
Equity income	0.531*	0.866***
	(1.89)	(2.79)
Size	0.018***	0.020***
	(19.15)	(21.22)
Market-to-Book	-0.002***	-0.002***
	(-10.12)	(-7.04)
GDP growth rate	0.000	-0.001
	(-0.52)	(0.35)
State fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
R^2	0.2140	0.1560
N	82,893	82,893

I expect to find the coefficient on the interaction variable to be negative for the *ETR* and *CETR* regressions. Table 3.7 presents the results of estimating Eq. (3.4). Consistent with my priors, I find the interaction term to have a significant negative coefficient when *ETR* (-0.143, *t* = -2.26) and *CETR* (-0.160, *t* = -2.12) are used as proxies for tax aggressiveness. Overall, I interpret the results of this analysis as providing evidence that labor bargaining power may have an effect on the relation between unemployment risk and tax aggressiveness.

3.5.2 Effect of labor intensity on unemployment risk and tax aggressiveness

Especially in industries where labor intensity is relatively high, one would expect an even stronger relation between unemployment risk and tax aggressiveness. I test this notion by including a labor intensity variable and an interaction variable of labor intensity and the variable that proxies for unemployment risk in my regressions. As in Pontuch (2011), I measure labor intensity as the inverse of operating assets (data# 6 – data# 1) divided by the number of employees (data# 29).[24] I then create a dummy variable (labeled *LaborIntensity*) that is equal to 1 if the labor intensity is above the median based on three digit NAICS code and zero otherwise. Empirically, I estimate the following model:

$$\begin{aligned} TaxAGG_{it} = {} & \alpha_0 + \beta_1 Log\max total\ benefit_{st-1} \times LaborIntensity_{it} \\ & + \beta_2 Log\max total\ benefit_{st-1} + \beta_3 LaborIntensity_{it} \\ & + \beta_4 Return\ on\ assets_{it} + \beta_5 Leverage_{it} + \beta_6 Loss\ carry\ forward_{it} \\ & + \beta_7 \Delta Loss\ carry\ forward_{it} + \beta_8 Foreign\ income_{it} + \beta_9 PPE_{it} \\ & + \beta_{10} Intangible\ assets_{it} + \beta_{11} Equity\ income_{it} + \beta_{12} Size_{it-1} + \beta_{13} MB_{it-1} \\ & + \beta_{14} GDP\ growth\ rate_{it} + StateDummies + IndustryDummies + \varepsilon_{it} \quad (3.5) \end{aligned}$$

[24] I take inverse of labor intensity ratio for an easy interpretation of regression coefficients. A higher ratio indicates higher labor intensity. Although not reported in a table, the mean (median) labor intensity is 0.012(0.008) and the standard deviation is 0.015.

Table 3.8: Labor intensity and the relation between unemployment risk and tax aggressiveness

This table presents the interaction effect of labor intensity on the relation between unemployment risk and tax aggressiveness. I measure labor intensity as the inverse of Pontuch (2011) measure of labor intensity: the number of employees divided by operating assets. *LaborIntensity* is a dummy variable equal to 1 if the labor intensity is above the median based on three digits NAICS code. All other variables are defined in Table 3.2.The *t*-statistic is reported in parentheses. Standard errors are adjusted for two-way clustering at the firm and year level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	ETR	*CETR*
Intercept	-0.017***	0.729***
	(-2.51)	(6.38)
Log max total benefit* × *LaborIntensity	**-0.017*** **	**-0.021*** **
	(-2.51)	**(-2.88)**
Log max total benefit	-0.066***	-0.083***
	(-8.51)	(-8.06)
LaborIntensity	0.165***	0.221***
	(2.67)	(3.30)
Return on assets	0.076***	0.055***
	(11.06)	(8.52)
Leverage	-0.014**	-0.029***
	(-2.28)	(-6.73)
Loss carry forward	-0.055***	-0.065***
	(-11.20)	(-10.64)
Δ *loss carry forward*	0.001	0.003***
	(1.25)	(3.54)
Foreign income	0.277***	0.446***
	(4.71)	(6.61)
PPE	0.047***	0.005
	(7.34)	(0.75)
Intangible assets	0.052***	0.041***
	(8.47)	(6.26)
Equity income	0.605**	0.930***
	(2.19)	(3.06)
Size	0.019***	0.021***
	(19.68)	(22.20)
Market-to-Book	-0.002***	-0.002***
	(-10.21)	(-7.06)
GDP growth rate	0.000	-0.001
	(-0.55)	(-1.05)
State fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
R^2	0.2120	0.1570
N	80,744	80,744

Similar to my analysis of bargaining power, I expect to find the coefficient on the interaction variable to be negative. Table 3.8 presents the results of my analysis. I do find the interaction term to have a significant negative coefficient when *ETR* (-0.017, *t* = -2.51) and *CETR* (-0.021, *t* = -2.88) are used as proxies for tax aggressiveness.. These results suggest that labor intensity may have an effect on the relation between unemployment risk and tax aggressiveness.

3.5.3 Effect of worker expected unemployment costs on unemployment risk and tax aggressiveness

One can argue that when it is relatively easy to find a job after one becomes unemployed, unemployment risk may not matter as much, and therefore there should not be a clear relation between unemployment risk and tax aggressiveness, when it is relatively easy to find a job. As a proxy for the ease at which workers may be able to get new jobs, I use a variable (for each state) that calculates the fraction of workers that received income from unemployment insurance to the total workers in a state (I label this variable *UiPayRate*). Simply said, if this ratio is high it is relatively difficult to find a new job and therefore workers should be more concerned about potential firm risk taking through tax aggressiveness. Empirically, I test the following equation:

$$\begin{aligned} TaxAGG_{it} = \alpha_0 &+ \beta_1 Log \max total\ benefit_{st-1} \times UiPayRate_{st} \\ &+ \beta_2 Log \max total\ benefit_{st-1} + \beta_3 UiPayRate_{st} + \beta_4 Return\ on\ assets_{it} \\ &+ \beta_5 Leverage_{it} + \beta_6 Loss\ carry\ forward_{it} + \beta_7 \Delta Loss\ carry\ forward_{it} \\ &+ \beta_8 Foreign\ income_{it} + \beta_9 PPE_{it} + \beta_{10} Intangible\ assets_{it} \\ &+ \beta_{11} Equity\ income_{it} + \beta_{12} Size_{it-1} + \beta_{13} MB_{it-1} + \beta_{14} GDP\ growth\ rate_{it} \\ &+ StateDummies + IndustryDummies + \varepsilon_{it} \qquad (3.6) \end{aligned}$$

Table 3.9: Expected unemployment costs and the relation between unemployment risk and tax aggressiveness

This table presents the interaction effect of higher average salary on the relation between unemployment risk and tax aggressiveness. I measure state *UiPayRate* as the fraction of workers that received income from unemployment insurance. The data comes from the United States Census Bureau. All other variables are defined in Table 3.2.The *t*-statistic is reported in parentheses. Standard errors are adjusted for two-way clustering at the firm and year level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	ETR	*CETR*
Intercept	0.629***	0.915***
	(5.58)	(5.83)
Log max total benefit × UiPayRate	**-0.006***	**-0.003**
	(-1.84)	**(-0.65)**
Log max total benefit	-0.062***	-0.099***
	(-5.77)	(-5.89)
UiPayRate	0.059*	0.028
	(1.83)	(0.74)
Return on assets	0.074***	0.053***
	(10.14)	(7.76)
Leverage	-0.014***	-0.032***
	(-2.34)	(-7.29)
Loss carry forward	-0.057***	-0.068***
	(-11.68)	(-10.93)
Δ *loss carry forward*	0.001	0.003***
	(1.13)	(3.78)
Foreign income	0.339***	0.464***
	(5.85)	(6.35)
PPE	0.048***	0.008
	(7.67)	(1.08)
Intangible assets	0.048***	0.033***
	(7.74)	(4.58)
Equity income	0.554**	0.910***
	(1.93)	(2.88)
Size	0.019***	0.020***
	(18.42)	(20.76)
Market-to-Book	-0.002***	-0.002***
	(-10.16)	(-7.37)
GDP growth rate	0.000	0.000
	(-0.07)	(-0.29)
State fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
R^2	0.2189	0.1565
N	77,277	77,277

I report the results of this analysis in Table 3.9 and expect the interaction between *Log max total benefit* and *UiPayRate* to be negative. I find weak evidence consistent with this expectation. When using *ETR*, I do find a marginally negative coefficient on this interaction variable. However, when I use *CETR*, I do find a negative coefficient, but it is not significantly different from zero, at conventional levels.

3.6 Robustness tests

I run several variations of the base regression model (eq. 3.3) to investigate the robustness of my findings. One concern is that my sample may have global firms, for whom the headquarter state does not capture the location of employees very well. To investigate this possibility, I replicate Eq. (3.3) with all control variables, but exclude global firms. I identify global firms as firms with positive foreign sales reported in the Compustat segment filing.[25] The results are reported in Column 1 and 4 of Table 3.10. The results are qualitatively the same for both measures of tax aggressiveness and are the same as those obtained in my earlier analyses.

Another potential concern is the effect of R&D on *ETR*. Specifically, hi-tech firms, which tend to have relatively high R&D, may be an issue for my estimation as high levels of R&D expenses may cause *ETR* to be lower. Following financial accounting rules, only acquired intangibles are reported on the balance sheet. However, the R&D expenses could proxy for research and experimentation tax credit. In order to address this issue, I re-estimate Eq. (3.3) using two approaches: First, excluding R&D intensive industries (e.g., pharmaceuticals, aircraft, motor vehicle, and computer electronic equipment- SIC 283, 371, 372, 376, 357, 384, and 873) from my sample; Second, using an R&D intensity control variable, which is calculated as R&D -

[25] I use geography as the segment type while identifying global firms. Therefore, if a firm reports foreign sales along with domestic sales, it is considered to be a global firm.

Table 3.10: Unemployment risk and tax aggressiveness- excluding foreign sales and R&D intensive industries

This table presents the association between labor unemployment risk and tax aggressiveness. R&D intensity is calculated as R&D expense divided by total assets. Where indicated, R&D intensive industries are excluded (e.g., pharmaceuticals, aircraft, motor vehicle, and computer and electronic equipment- SIC 283, 371, 372, 376, 357, 384, 873). All variables are defined in Tables 3.2. The *t*-statistic is reported in parentheses. Standard errors are adjusted for two-way clustering at the firm and year level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	ETR			*CETR*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Intercept	0.692***	0.794***	0.835***	0.792***	0.988***	0.883***
	(4.73)	(13.45)	(11.43)	(4.78)	(10.36)	(8.44)
Log max total benefit	**-0.066*** **	**-0.079*** **	**-0.085*** **	**-0.081*** **	**-0.105*** **	**-0.104*** **
	(-4.83)	**(-12.72)**	**(-12.13)**	**(-4.69)**	**(-10.26)**	**(-9.21)**
Return on assets	0.046***	0.072***	0.073***	0.029***	0.050***	0.053***
	(14.26)	(10.55)	(11.70)	(9.91)	(7.72)	(9.93)
Leverage	-0.026***	-0.015***	-0.013*	-0.033***	-0.033***	-0.025***
	(-3.92)	(-2.78)	(-1.71)	(-6.58)	(-6.85)	(-5.68)
Loss carry forward	-0.054***	-0.054***	-0.053***	-0.068***	-0.067***	-0.062***
	(-11.94)	(-11.83)	(-10.50)	(-13.06)	(-10.85)	(-9.14)
Δ *loss carry forward*	0.003***	0.001	0.002**	0.003***	0.003***	0.003***
	(3.33)	(0.96)	(1.96)	(6.90)	(3.64)	(3.97)
Foreign income	0.159	0.250***	0.310***	0.366**	0.441***	0.416***
	(1.29)	(3.99)	(4.42)	(2.15)	(5.90)	(5.40)
PPE	0.037***	0.036***	0.072***	0.006	-0.005	0.048***
	(4.71)	(5.87)	(7.62)	(0.64)	(-0.74)	(5.13)
Intangible assets	0.042***	0.044***	0.046***	0.021**	0.026***	0.040***
	(5.50)	(6.77)	(6.36)	(2.32)	(3.75)	(5.46)
Equity income	1.448***	0.414	0.532	1.497***	0.620**	0.824***
	(2.72)	(1.43)	(1.43)	(3.15)	(2.00)	(2.11)
Size	0.022***	0.019***	0.017***	0.019***	0.020***	0.018***
	(20.57)	(19.07)	(15.43)	(18.39)	(20.68)	(15.03)
Market-to-Book	-0.002***	-0.002***	-0.002***	-0.001***	-0.002***	-0.003***
	(-7.48)	(-7/83)	(-12.75)	(-3.99)	(-5.70)	(-8.65)
GDP growth rate	0.000	0.000	0.000	-0.001	-0.001	-0.001
	(-0.70)	(-0.60)	(-0.65)	(0.54)	(-0.83)	(-1.16)
Excld. firms with foreign sales	Yes	No	No	Yes	No	No
Excld. R&D intensive industr.	No	Yes	No	No	Yes	No
R&D intensity control	No	No	Yes	No	No	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.2831	0.2063	0.2258	0.1950	0.1538	0.1639
N	25,414	71,867	47,817	25,414	71,867	47,817

expense divided by total assets.[26] I report the results of the first approach in Column 2 and 5 of Table 3.10 and of the second approach in Column 3 and 6 of Table 3.10. For both *ETR* and *CETR*, I find further consistent evidence that the association between tax aggressiveness and unemployment risk is positive.

I also use the logarithm of the maximum weekly benefit amount (*Log max weekly benefit*) as an alternative proxy for UI benefits. A higher maximum weekly amount should reduce the risk and costs of joblessness. Table 3.11 (Column 1 and 4) presents the results of estimating Eq. (3.3). As expected, I find that the coefficient on *Log max weekly benefit* is negative and significant when *ETR* and *CETR* are used. Overall, the findings of this Table 3.11 are consistent with the hypothesis that firms located in states with higher UI benefits (i.e., lower unemployment risk) exhibit higher levels of tax aggressiveness, corroborating my primary empirical findings earlier in the paper.

Finally, I investigate whether my results differ when I exclude loss firms and big firms. The reason to exclude loss firms (defined as firms with negative ROA) is that loss firms are more likely to have higher tax loss carry forwards, which together with current year losses reduce the tax expense for firms. Therefore, it is possible that I erroneously identify a firm as more tax aggressive. Similarly, the effect of size on firm's effective tax rate is inclusive.

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[26] I delete observations where R&D expense is missing.

Table 3.11: Labor unemployment risk and tax aggressiveness- excluding loss and big firms

This table presents the association between labor unemployment risk and tax aggressiveness. Where indicated, loss firms are firms with negative ROA and big firms are firms with total assets above sample median. All variables are defined in Tables 3.2. The *t*-statistic is reported in parentheses. Standard errors are adjusted for two-way clustering at the firm and year level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	ETR			*CETR*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Intercept	0.544*** (11.78)	0.952*** (18.31)	0.928*** (10.19)	0.649*** (10.56)	1.233*** (9.95)	0.947*** (11.18)
Log max weekly benefit	**-0.080*** (14.01)**	**---**	**---**	**-0.105*** (-10.62)**	**---**	**---**
Log max total benefit	**---**	**-0.087*** (-13.89)**	**-0.093*** (-11.51)**	**---**	**-0.123*** (-8.84)**	**-0.104*** (-11.89)**
Return on assets	0.071*** (11.23)	-0.079*** (-4.47)	0.057*** (10.13)	0.050*** (8.42)	-0.292*** (-12.59)	0.040*** (8.08)
Leverage	-0.016*** (-2.81)	-0.014** (-2.24)	-0.009 (-1.55)	-0.033*** (-7.57)	-0.043*** (-5.73)	-0.014*** (-3.17)
Loss carry forward	-0.055*** (-11.47)	-0.035*** (-10.74)	-0.078*** (-15.70)	-0.066*** (-10.87)	-0.074*** (-9.80)	-0.084*** (-13.55)
Δ *loss carry forward*	0.002* (1.63)	0.006 (1.60)	0.001 (1.58)	0.003*** (4.16)	0.006*** (2.22)	0.003*** (3.88)
Foreign income	0.301*** (5.14)	-0.246*** (-3.74)	0.760*** (12.04)	0.472*** (7.03)	-0.078 (-1.11)	0.720*** (9.18)
PPE	0.046*** (7.65)	0.009 (1.46)	0.056*** (7.95)	0.005 (0.66)	-0.052*** (-5.25)	0.026*** (3.46)
Intangible assets	0.048*** (8.16)	0.063*** (6.52)	0.015*** (2.20)	0.033*** (5.00)	0.033*** (3.11)	0.015** (1.93)
Equity income	0.535* (1.91)	-1.479*** (-4.61)	1.489*** (4.48)	0.861*** (2.79)	-1.121*** (2.82)	1.040*** (3.13)
Size	0.018*** (19.18)	0.012*** (9.64)	0.021*** (13.65)	0.019*** (20.83)	0.015*** (14.65)	0.022*** (13.03)
Market-to-Book	-0.002*** (10.06)	-0.001** (-1.99)	-0.002*** (-8.92)	-0.002*** (-6.97)	-0.001** (-2.28)	-0.002*** (-7.15)
GDP growth rate	0.000 (0.72)	0.000 (-1.03)	-0.001* (-1.77)	-0.001 (-1.08)	-0.002* (-1.89)	-0.001 (-0.80)
Exclude Loss firms	No	Yes	No	No	Yes	No
Exclude Big firms	No	No	Yes	No	No	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.2138	0.0916	0.2300	0.1555	0.0985	0.1637
N	82,893	54,307	41,447	82,893	54,307	41,447

Siegfried (1972) argues that larger firms are likely to be more tax aggressive than smaller firms because they possess greater economic and political power and have more resources to devote in tax planning. However, Stickney and McGee (1983) finds no convincing evidence that size play a dominant role in explaining differences in effective tax rates. In order to address the concern that bigger firms might have greater impact on tax aggressiveness, I exclude big firms (defined as total assets greater than the sample median). The results on my regressions of excluding these firms are reported in Table 3.11 (Column 3 and 6). Similar to virtually all of my previous analyses, it is clear that there remains a statistically significant relation between log max weekly benefit and tax aggressiveness (measured by both *ETR* and *CETR*).

3.7 Conclusions

I examine, and find evidence consistent with, the claim that labor unemployment risk is negatively related to corporate tax aggressiveness. Recent literature suggests that labor unemployment risk affects a firm's corporate decisions. And, given that tax aggressiveness is risky and costly for the firm, I argue that higher UI benefits decrease labor unemployment risk and, hence, provide firms with incentives to exhibit more tax aggressiveness. Consistent with this hypothesis, I provide empirical evidence of a negative association between labor unemployment risk and tax aggressiveness (i.e., a positive association between state UI benefits and tax aggressiveness). My results are economically significant. In additional analysis, I also find that this negative association is more pronounced for firms in industries that are more labor intensive and industries with more labor bargaining power. In conclusion, the findings of this paper suggest that labor unemployment risk plays an important role in firm's tax policy.

Chapter 4

4.1 Summary and conclusions

The headquartering states of firms, geographic location, is the key variable of the two essays of this dissertation. In the first essay, I investigate the association between geographic distance from financial center and firms' use of operating lease. In the second essay, I investigate the association between firms' tax aggressiveness behavior and labor unemployment risk that workers are exposed to. The findings of both the essays are based on states in the U.S. where firms' headquarters are located.

In the first essay, I classify firms as urban, small city, or rural firms based on their distance from large cities and show that rural firms are more likely to have a lower leasing intensity. One explanation for my findings is that obtaining information about and monitoring rural firms is costly. This barrier makes a potential lessor likely to include more penalties and/or provisions in lease contracts. This, in turn, increases the rental expense and makes alternative financing sources more attractive for potential lessees. After including a number of control variables suggested in the existing lease literature, I document a strongly significant impact of geographic location on a firm's leasing ability. Consistent with my predictions, the essay suggests that rural firms with higher level of debt capacity lease less, higher financial constraints lease more, and higher number of analyst following the firm lease more. In summary, the findings strongly support my main empirical prediction that rural firms tend to have lower lease intensity than urban or small city firms.

In the second essay, I examine and find evidence consistent with the claim that labor unemployment risk is negatively related to corporate tax aggressiveness. Recent literature

suggests that labor unemployment risk affects a firm's corporate decisions. And, given that tax aggressiveness is risky and costly for the firm, I argue that higher UI benefits decrease labor unemployment risk and, hence, provide firms with incentives to exhibit more tax aggressiveness. Consistent with this hypothesis, I provide empirical evidence of a negative association between labor unemployment risk and tax aggressiveness (i.e., a positive association between state UI benefits and tax aggressiveness). My results are economically significant. In additional analysis, I also find that this negative association is more pronounced for firms in industries that are more labor intensive and industries with more labor bargaining power. In conclusion, my paper suggests that labor unemployment risk plays an important role in firm's tax policy.

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