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Holding Companies and Debt Financing: A Comparative Analysis Using Option-Adjusted Spreads

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Abstract: This work investigates and compares the total risk attributable to holding and operating companies, using data from the United States. By proxying overall risk by the option-adjusted spread on corporate bonds, we hypothesize that operating companies face a higher risk. Our data were obtained from Bloomberg and comprise 17,800 corporate bonds. Our methodology entails stratified univariate comparisons of the means of the option-adjusted spreads of sub-samples of operating companies versus holding companies. The principal bases of stratification are issue size, bond maturity, and creditworthiness proxied by the Standard and Poor ratings. With very few exceptions, our results report insignificant t-statistics, thus making us unable to reject the null hypothesis that the operating companies have the same business risk as holding companies. When bond rating, maturity, and size are controlled, there is no consistent cost reduction attributable to holding companies, and contrary to common belief, this is more visible for smaller firms. Our work suggests that there is no evidence consistently favoring holding-company financing compared to operating ones.

Keywords: yield spread; holding company; operating company; option-adjusted spread; cost of debt

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1. Introduction

Most capital market research in finance focuses on equity markets rather than debt markets. There are a few exceptions to the preference for equity market research. For example, in the seminal paper examining the debt market, Dichev and Skinner (2002) evaluate the role of debt covenants in contracts written between lenders and borrowers and report that the evidence is largely mixed. The present research's focus is the private debt and bond spreads in operating and holding companies. An operating company runs day-to-day operations, including manufacturing, selling, and conducting other business operations, and has its own management. It handles all the operational needs, including hiring and entering into contracts with staff, suppliers, consumers, and manufacturers. A holding company, sometimes called a parent or umbrella company, is a business entity, a type of financial organization that owns a controlling interest in other companies but does not actively participate in operational decision-making, create any goods, or deliver any services but will have management oversight and controls the subsidiary operating company's policies. They can elect and remove corporate directors or managers and decide to merge or dissolve. On the financing front, the holding company's management decides where to invest and issues equity or debt, accordingly.

Holding companies exist for controlling other companies and may own real or intellectual property, patents, trademarks, and other assets. They are protected from losses accrued by subsidiaries limiting the financial and legal liability exposure. Holding companies may also lower the tax liability of the subsidiaries, basing some operations in lower tax areas. Some holding companies are large conglomerates with hands in several industries, while others have only a small single subsidiary. Zigirababiri (2019) highlights that "a corporation is a juristic person, separate from its shareholders and its property is not the property of its shareholders though it is running the business of shareholder, and its debts are not the debts of its members". As Brahmbhatt (2008) notes, there could be significant differences in defining a holding and subsidiary company as a single economic unit since different countries take different stands on the issue mostly from a legal perspective. For example, England and the U.S. are strict while the Australian courts are more liberal and hesitant to extend the liability of a subsidiary to a holding company. In addition, certain supranational organizations, such as the European Union, may also have different norms to deal with such situations. Our work is strictly dealing with U.S. holding companies; therefore, we use strict U.S. definitions.

Since the existence of a holding company creates a legal separation between the assets and the owners and reduces the liability for the owners, holding companies offer an added layer of liability protection, suggesting lower debt financing costs[1]. As such, a creditor of the operating subsidiary cannot claim or reach the assets of the holding company or another subsidiary. For instance, if a subsidiary company goes bankrupt, the holding company may experience a capital loss, but the subsidiary's creditors cannot legally pursue the holding company for remuneration since the company does not technically own assets. As a result, many investors may not be aware that several publicly traded corporations are actually holding companies and purchasers of their stocks are actually investing in the holding company and not the operating subsidiary.

There are several financing advantages for the subsidiaries of the holding companies since the holding companies use their resources to lower the cost of operating capital. Holding companies may also finance themselves with other forms of revenue from the subsidiaries, such as receiving dividends, interest payments, and rents. Since a holding company does not need to own all shares of a subsidiary but needs to have only controlling shares, the amount of capital needed is relatively smaller. As a result, a holding company may use the remaining capital to obtain control of another company and its assets at a lower cost than if it had acquired all of the subsidiary's shares. Most importantly, a holding company with financial strength is often capable of obtaining loans for a lower interest rate than operating companies could. This is particularly correct for startups in need of capital with high credit risk. The holding company owning the startup can obtain lower-cost funds for the subsidiary. In the U.S., an existing operating company is allowed to restructure itself to become a holding company through a merger. The merger would generally require shareholder approval, but in the U.S., there are provisions under which a publicly traded corporation can become a holding company without a stockholder vote.

There are also some drawbacks to using a holding company, such as the fact that the holding company's management with little experience in the operating companies' businesses may be overseeing and making major policy decisions for businesses or industries that they are not particularly familiar with. Potentially, holding companies may exploit their subsidiaries in several ways, such as forcing them to appoint chosen directors, making them sell products to one another at below-market prices, or forcing the subsidiaries to buy products from one another at higher-than-market prices. When a publicly traded corporation uses a holding-company structure, it can be fairly difficult for the investors and creditors to keep track of all the subsidiaries in order to see an accurate picture of the financial health of holding companies, due to their formational complexity[2]. Moreover, not having to own 100% of the shares might sometimes be considered a disadvantage as it may require the holding company to deal with minority owners. Sometimes conflicts arise when the interests of the minority owners are different from those of the holding company.

One might expect that an operating company may bear more business risk, but if a holding company will not interfere with a subsidiary's operations, it is expected that operating and holding companies will bear the same business risk, while the holding company may incur lower overall risk due to its better diversified financial portfolio. However, a change in the financing composition may have an impact on the company's business risk, and this issue may be evaluated separately and not addressed here.

Overall, the literature emphasizes that it is difficult to clarify the actual risk taken by the holding companies. Dierick (2004) claims that the risk of capital arbitrage is important for holding companies, and Avraham et al. (2012) agrees, declaring that the efforts to arbitrage capital have led bank holding companies to become more complex. Bressan (2018) emphasizes that when debt is issued by the parent company and the proceeds are invested in subsidiaries as equity, the risk assessment would be very complex. Similarly, a clear understanding of the financing advantages of holding companies requires multidimensional coverage. As highlighted by Fein (2010), if one needs to understand the economic and financial impacts of any regulation imposed on holding companies, one has to start with legal aspects and their impact on economic and financial variables. Holding companies in general, and bank holding companies in particular, are subject to severe regulations, and any regulatory act, such as Dodd–Frank, will have a significant impact on the way holding companies operate and finance. Holding companies are always under more stringent standards that extend into all possible areas, such as liquidity requirements, leverage limits, off-balance sheet activities, examinations and reports, risk management requirements, enhanced public disclosures, limitations of activities, concentration limits, capital requirements, etc.

To understand the reasons and results of ownership structure changes, one has to be familiar with the present determinants of the engaging parties. Gilson and Warner (1998) report that firms switch from private bank debt to public bond financing mainly to free themselves from the tight debt constraints and lender monitoring, and not because of the deteriorating operating performance. In terms of risk, we also see reports favoring holding companies. Ashcraft (2004) reports that a bank affiliated with a multi-bank holding company is significantly safer than a stand-alone bank, and affiliation reduces the probability of future financial distress. Moreover, distressed affiliated banks are more likely to receive capital injections and recover more quickly than other banks.

Several papers using different methodologies suggest that there are no consistent risk-reducing and cost-lowering benefits with holding companies. For example, Rommens et al. (2004) note that if the costs of a holding company outweigh its benefits, the holding company destroys value. They highlight that holding companies play an important role in corporate finance in Belgium and other Continental European countries, but they often trade at a discount to their estimated net asset value. Their work presents a number of reasons for that, such as the fact that noise traders may cause underpricing of the holding company, the original NAV may be an overestimation of the actual value of the holding company, or the discount may be attributable to the private benefits of control. Chernobai et al. (2020) examine the differences in risk-taking among bank-holding companies in the U.S. and conclude that those differences can be explained by differences in the organizational structure of their risk management functions. They construct a Risk Management Index to measure the strength and independence of the risk management function at bank holding companies and show that over the period from 1995 to 2010, holding companies with a higher lagged RMI have lower tail risk and higher return on assets, with all else being equal. Their results suggest that a strong and independent risk management function can curtail tail risk exposures. Geyfman (2005) examines risk-adjusted performance measures in banking holding companies which are used as a guide for efficient asset allocation and performance evaluation in complex, multidivisional financial institutions and finds evidence that traditional stand-alone performance measures can lead to results substantially different. Similarly, Ellul and Yerramilli (2013) show that firms' business complexity increases their operational risk and provide evidence that managerial failure underlying these events offset the benefits of strategic risk-taking. Hirtle (2007) examines the relationship between the amounts of information disclosed by bank holding companies and their subsequent risk profile and performance and reports that more disclosure is associated with lower idiosyncratic risk and higher risk-adjusted returns. Their findings suggest that greater disclosure is associated with more efficient risk-taking and improves risk–return trade-offs. Investigating the borrower accounting quality, Bharath et al. (2008) note that, unlike equity, debt contracts have several attributes, such as interest maturity and collateral. As a result, focusing on the interest cost alone may potentially misestimate the total cost borne by borrowers. Their work distinguishes between private (bank loans) and public (bonds) debts and evaluates in detail the impacts of this diversion on the cost of debt, among other issues.

While holding companies have advantages and disadvantages as highlighted above, the most important agreed-upon advantage of a holding company is its ability to lower the cost of debt due to its risk-reducing characteristics of separating the ownership and assets of an operating subsidiary. This feature enables them to raise debt with better terms compared to an operating company. After evaluating several research papers with mixed signals from the literature, this paper employs a different strategy and investigates the differences in operating- and holding-company yield spreads to see if there exists a statistically significant difference in mean yield spreads in rating groups and maturities. Since the difference in overall risk is reflected in the yield spread of the firms' outstanding bonds, if one can classify holding companies and operating companies separately by using distinct ratings, maturities, and sizes and investigates the yield spread differences, one may obtain valuable insights into how the market actually reacts to the ownership structure differences. The objective of this paper, therefore, is to compute and evaluate the relative cost of issuing debt by operating and holding companies. As such, this work investigates the market-determined yield spreads of operating versus holding companies potentially reflecting their risk-reducing capabilities. This is achieved by computing and contrasting the option-adjusted yield spreads of operating- and holding-company bonds.

The paper proceeds as follows: Section 2 introduces hypothesis development and covers bond yields and corporate spreads, Section 3 is Material and Methods and covers the advanced option-adjusted spreads method and its interpretational characteristics, Section 4 elaborates on data sources, Section 5 reports and discusses the results, and Section 6 concludes the paper.

2. Hypothesis Development

The bond yield is the internal rate of return of the bond's future cash flows. It shows the rate of return that a bondholder earns if the bond is held until maturity and all the cash flows were received as promised. From the issuer's point of view, a bond's yield is the cost of debt, and therefore, in efficient markets, bond yields are used to assess the risk attributable to the issuing firm. In general, higher yields mean the issuing firm has a higher risk. The yield spread is the difference between the yield of one bond or class of bonds and another. It helps us distinguish the different risk components or categories such as credit risk, interest rate risk, or inflation risk. For example, the yield difference between the U.S. Treasury and TIPS (Treasury Inflation-Protected Securities) of the same maturity represents the inflation risk for the period in question. Other yield spreads can be used the same way to dissect other risk factors and study the factors that drive bond prices. Thus, the yield spread is a measure showing additional return above a risk-free rate. Since corporate spreads imply the risk of the underlined debt and the issuing company, they are considered inevitably important measures of risk. Similarly, researchers evaluate the default spreads of corporate bonds to understand a corporation's risk structure. If the risk structure of holding companies differs from that of operating companies, the corresponding spreads in their debt financing must be observably different.

Within this context, it should be highlighted that although the yield spread for a bond provides important information about the return on the investment and the assumed risk embedded in the return, the process is not a straightforward one. The absolute yield spread for a bond is calculated by subtracting the yield of a "risk-free" bond of the same maturity from the yield of that bond to assess the risk of the underlying security and hence the issuing corporation. As highlighted by many researchers, there are a number of issues to consider here. The conventional bond price calculations included in textbooks usually use a constant "yield to maturity" to discount all future coupons and the principal assuming a flat yield curve. A yield curve with a slope, however, implies that short-term cash flows and long-term cash flows would require different discount rates. Proper bond valuation, therefore, requires a benchmark yield curve that captures those rates that should be used in discounting future cash flows. In addition, measuring the risk by using corporate spreads requires comparable risk-free government bonds with similar terms and cash flows. Finally, one may not be able to compare a callable bond by assuming it will not be called before the expiration date since the traditional yield spreads do not account for embedded redemption structures, such as call options, which allow the issuer to redeem the bond prior to maturity. Typically, callable bonds involve optionalities that might affect the value of the spread. Those issues are significant, and if not addressed, one cannot use yield spreads to compare the risks of alternative bonds and their issuing companies that will help us value the bonds and compute the cost of debt.

The aforementioned discussion suggests that operating companies bear more business risk than holding companies. Our research Hypothesis 1 is as follows.

Hypothesis 1. *Operating companies have higher option-adjust spreads than holding companies.*

3. Material and Methods

After classifying the U.S. holding and operating companies by using Bloomberg's ownership structure classification criteria and using the S&P rankings and standard Treasury maturities, we grouped all outstanding bonds from less than one year to 30 years. Our matrix has 8 maturities and 18 S&P rankings, a total of 144 cells. For each cell, we computed the average option-adjusted spread separately for both operating and holding companies. Since the direct comparison of yield spreads may not be possible for bonds due to a number of factors that are covered later in the paper, we computed the advanced option-adjusted spreads (OASs) that make the comparison possible for all outstanding bonds. Finally, we compared the option-adjusted spreads to see if holding-company debt costs, as expected, were lower than operating-company debt for each risk and maturity group. This work, therefore, is the first comprehensive attempt to disclose the risk and cost-reducing effect of holding companies by using actual option-adjusted yield spreads. It evaluates the potential risk divergence between holding and operating companies, including the entire 17,800 outstanding bonds issued by the U.S. operating and holding companies. Approximately 7800 of those are holding-company bonds, and approximately 10,000 of those are operating-company bonds.

Most computed spreads, such as G-, I-, and Z-spreads, are not usable for risk comparison if the bonds in question are not directly comparable due to embedded features[3]. To address this issue, our work employs a more advanced technique, option-adjusted spread analysis to overcome the difficulties underlined above. OAS is essentially a method of making the spreads from different bonds with different cash flow characteristics comparable. For a noncallable bond, the OAS uses the "benchmark spot curve" to value a bond by breaking up its cash-flow components and discounting them with proper discount rates. Once the spot rates for the benchmark curve are established, the OAS of a given bond is determined. For those bonds, Z-spread and OAS values are identical. However, the OAS method helps us compute the price of securities with embedded options. The OAS can be used effectively for callable bonds with unknown maturity dates with cash flows contingent upon the future level of interest rates. Since the OAS is a measure of yield spread that accounts for embedded call options in the valuation of bonds, it is computed by using price and projections of interest rate volatility to account for the possibility of early redemption. The OAS value is interpreted as the constant spread that can be earned on the asset compared to the risk-free option, usually the Treasury curve. The main benefit of the OAS is that it allows for comparability between bonds with different redemption structures[4]. In detail, the option-adjusted spread is a constant spread added to the prevailing rate to discount the cash flows, but it uses a number of scenarios that carry possibilities of numerous interest rate paths that are calibrated to the security yield curve. The cash flows are determined along all the paths, and the results are used in arriving at the price of the security. As highlighted by Fabozzi (2006), OAS computation is model-dependent.

In this work, we used the Bloomberg OAS model to compute the OAS values. As explained in detail in the classic Bloomberg Press book by Miller (2007), the model uses a one-factor, arbitrage-free binomial tree of normally distributed short-rates in order to establish a distribution of several different interest rate scenarios, which are driven by the volatility input for the interest rate. OAS then deals with the bond's call schedule to establish the evolution of rates over time[5]. Once these cash flows are modeled, the present value of the callable bond is determined by using the discount rates found in the tree. As underlined by Cavallo and Valenzuela (2007) "OAS simultaneously considers credit risk and contingent cash flow risk, and it is a useful tool for determining an investor's compensation conditional on the structure of the bond". More details of the model providing a numeric example with steps are included in the related appendix.

In detail, the OAS, like the absolute yield spread, is a measurement of the spread above risk-free rates, but it differs from the traditional yield spread in the way it is calculated and how it is interpreted. The OAS for a callable bond is computed by taking into account the interest rate volatility by using modeled interest rate paths. Since the cash flows of a callable bond depend on whether the bond is redeemed early or held until maturity, the value of OAS depends on the interest rate environment.

In terms of interpretation, OAS is similar to yield spread measured in basis points; however, the values are interpreted as the spread to all of the potential redemption dates for the bond, while all other yield spreads assume that the bond is redeemed at a specific point in time. In addition, the OAS values can be positive or negative. A negative OAS for a callable bond implies that the bond has a lower expected return than the risk-free option after taking the redemption option into account. Naturally, an investor would prefer a higher OAS over a lower OAS, with all other things being equal.

Since the OAS accounts for uncertainty due to the embedded call option, its value will typically be lower than the general value of the yield spread. For instance, a callable bond with a yield spread of 30 basis points may have an OAS of 18 basis points since noncallable bonds do not have an embedded call option. The OAS value should approximate the absolute yield spread for a noncallable bond.

Thus, rather than simply comparing a bond's yield to maturity to a benchmark issue, OAS is a constant spread added to the prevailing rate to discount the cash flows. However, keep in mind that OAS uses a number of scenarios carrying possibilities of numerous interest rate paths that are calibrated to the security yield curve. Therefore, the value is dependent on the model embedded.

This work includes every outstanding U.S. corporate bond separately grouped as operating and holding companies, using their S&P rating, maturity, and size. Our objective is to test the average spread differences for given rating classes, with the term to maturity and size controlled. This is implemented as testing the mean differences for the maturity columns and rating rows by using simple mean-difference t-tests, controlling the sizes. Since we perform this for distinct ratings for each maturity and size, and distinct maturity for each rating and size, the results are obtained under certain available controls and can be interpreted as such. The results showing the p-values of the mean-difference t-tests are tabulated and reported in the Results and Discussion section.

4. The Data

The data were obtained from Bloomberg, using certain filters to refine the information. This study includes 17,800 outstanding U.S. corporate bonds issued by operating and holding companies. To maintain conformity with Treasury maturities, the bonds over 30 years to maturity and the bonds that are not rated are excluded. In terms of sectorial classification, this works covers the sectors under Bloomberg FI Classification System Level 3[6]. In addition, all FI Classification System Level 4 subcategories are included.

Table 1 shows the number of outstanding bond counts, using Bloomberg FI Classification System Level 3 Categories. As the table highlights, banking, consumer non-cyclical, electric, consumer cyclical, capital goods, communications, and energy are showing on top with a combined outstanding-bonds count of over 12,000.

Table 1. The table shows the number of outstanding bonds count, using Bloomberg FI Classification System Level 3 Categories (source: Bloomberg, accessed on 26 September 2022).

Bloomberg FI Classification System Level 3 Categories	
Classification	**Number of Bonds Outstanding (%)**
Banking	4279 (24.00)
Consumer Non-Cyclical	2053 (11.54)
Electric	1966 (11.05)
Consumer Cyclical	1380 (7.76)
Capital Goods	1190 (6.69)
Communications	1189 (6.68)
Energy	978 (5.50)
Insurance	868 (4.88)
Technology	859 (4.83)
Basic Industry	702 (3.95)
Finance Companies	638 (3.59)
REITs	425 (2.39)
Other Industrial	303 (1.70)
Transportation	299 (1.68)
Brokerage Asset Management	286 (1.61)
Natural Gas	230 (1.29)
Other Financial	120 (0.67)
Government Owned	22 (0.12)
Other Utility	11 (0.06)
Local Authority	1 (0.01)

One has to highlight the importance of bank holding companies in the U.S. since they stand out as the most important category, with 25 percent of all outstanding bonds belonging to this category. As Avraham et al. (2012) outline, large banking organizations in the United States are generally organized as bank holding companies, showing the increasing size, complexity, and diversity of these organizations. More particularly, a U.S. bank holding company is a large corporation that owns and controls one or more domestic bank subsidiaries engaged in lending, deposit-taking, and other activities. They may have nonbanking and foreign subsidiaries engaged in a broader range of business activities, such as securities dealing, underwriting, real estate, leasing, asset management, and so on. Their paper also highlights that "nearly all U.S. banking assets are controlled by bank holding companies and as a group (inclusive of firms whose ultimate parent is a foreign banking organization) control well over $15 trillion in total assets, representing a fivefold increase since 1991".

The importance of the U.S. with outstanding corporate bond counts around the globe is obvious, with 17,800 outstanding operating and holding-company bonds, followed by Germany, with only 3700 bonds. To put the numbers in a better perspective, one may highlight that the U.S. has more bonds outstanding than the next 20 countries combined. Bloomberg lists a total of 19,700 bonds worldwide, and the U.S. bond count constitutes approximately 90 percent of this total. In addition, Table 1 highlights that more than half of the bonds are from three industries (banking, consumer cyclical/non-cyclical, and electric) possibly due to the fact that these industries have output amenable to achieving public policy objectives.

Table 2, with its three sections, shows the distribution of those 17,800 outstanding U.S. bonds, using the S&P rating categories, their maturity, and their ownership structure separated for operating and holding companies. In addition, on the ownership front, Table 2 uses three subdivisions for the bond count for operating and holding companies, using up to 500 million, 500 M to 1 B, and over 1 B, making the visualization of the impact of size distribution possible.

Table 2. The table shows bond counts, using issue size, standard and poor ranking, and maturity for operating and holding companies (source: Bloomberg, accessed on 26 September 2022).

Bond Counts by Ownership Structure			Bond Counts by S&P Ranking			Bond Counts by Maturity		
Ownership	**Bond Size**	**Count (%)**	**S&P Rank**	**OPCO (%)**	**HOLDCO (%)**	**Maturity**	**OPCO (%)**	**HOLDCO (%)**
	<500 M	6856 (69)	**AAA**	117 (1.17)	30 (0.4)	**<1 Year**	612 (6)	584 (7)
OPCO	500 to 1 B	2191 (22)	**AA+**	112 (1.12)	7 (0.01)	**1 to 2 years**	576 (6)	732 (9)
	>1 B	940 (9)	**AA**	249 (2.50)	35 (0.5)	**2 to 3 years**	766 (8)	817 (10)
	<500 M	5235 (67)	**AA−**	484 (4.85)	102 (1.3)	**3 to 5 years**	1616 (16)	1439 (18)
HOLDCO	500 to 1 B	1594 (20)	**A+**	936 (9.38)	32 (0.04)	**5 to 7 years**	1514 (15)	1188 (15)
	>1 B	984 (13)	**A**	1211 (12.14)	606 (7.8)	**7 to10 years**	1597 (16)	1117 (14)
			A−	1395 (13.98)	1809 (23)	**10 to 20 years**	1513 (15)	1224 (16)
			BBB+	1593 (15.87)	2286 (29)	**20 to 30 years**	1793 (18)	712 (9)
			BBB	1303 (13.06)	1105 (14)			
			BBB−	998 (10.00)	814 (10)			
			BB+	337 (3.38)	194 (2.5)			
			BB	235 (2.36)	166 (2.1)			
			BB−	302 (3.03)	140 (1.8)			
			B+	191 (1.91)	253 (3.2)			
			B	197 (1.97)	83 (1.07)			
			B−	148 (1.48)	60 (7.7)			
			CCC+	78 (0.78)	26 (0.4)			
			CCC	41 (0.41)	38 (0.5)			
			CCC−	26 0.26)	24 (0.3)			
			CC	26 (0.26)	2 (0.03)			
			D	8 (0.08)	1 (0.01)			

As a result, our work performs a comparative analysis, using not only a combined matrix without size information, but it also produces an extended comparative analysis, using the sizes of the corporations.

This section reports the mean-difference *t*-test performed at the 5 percent significance level. We tested the hypothesis that the OAS spread mean differs for holding and operating companies for the same rating class, with the null hypothesis being that they would be the same. Then we repeat this for different maturities from less than one year to 30 years. We repeated those for three separate sizes to control the size effect and tabulated them in Tables 3 and 4, showing that we consistently fail to reject the null hypothesis that the OAS spread means are the same. It is worth noting that statistics indicate similar distributions with respect to both size and maturity for holding and operating companies, addressing the potential concern that the results may be artifactual driven by issue size and maturity.

Table 3. Table reports the results tested under the null hypothesis (H_0) that the OAS spreads are not different at a 5 percent significance level for 18 different rating groups and four distinct sizes. The alternative hypothesis, for the test in each cell, is that operating companies have a higher risk than holding companies.

	Size: Combined			Size: Less Than 500 M			Size: 500 M to 1 B			Size: Greater Than 1 B		
Rating	***p*-Value**	**df**	**Ho @ 5%**	***p*-Value**	**df**	**Ho @ 5%**	***p*-Value**	**df**	**Ho @ 5%**	***p*-Value**	**df**	**Ho @ 5%**
AAA	0.071	10	Do not reject	0.539	5	Do not reject	0.096	6	Do not reject	0.191	10	Do not reject
AA+	0.681	11	Do not reject	0.3	7	Do not reject	0.884	1	Do not reject	0.396	7	Do not reject
AA	0.061	13	Do not reject	0.558	10	Do not reject	0.165	12	Do not reject	0.379	10	Do not reject
AA−	0.489	14	Do not reject	0.859	14	Do not reject	0.974	8	Do not reject	0.777	10	Do not reject
A+	0.937	14	Do not reject	0.883	10	Do not reject	0.126	12	Do not reject	0.883	10	Do not reject
A	0.521	14	Do not reject	0.873	14	Do not reject	0.783	14	Do not reject	0.816	13	Do not reject
A−	0.804	14	Do not reject	0.983	14	Do not reject	0.706	14	Do not reject	0.721	14	Do not reject
BBB+	0.993	14	Do not reject	0.604	14	Do not reject	0.914	12	Do not reject	0.68	14	Do not reject
BBB	0.736	14	Do not reject	0.772	14	Do not reject	0.134	14	Do not reject	0.646	14	Do not reject
BBB−	0.97	14	Do not reject	0.776	14	Do not reject	0.817	13	Do not reject	0.953	13	Do not reject
BB+	**0.041**	12	**Reject**	0.185	12	Do not reject	0.938	13	Do not reject	0.117	13	Do not reject
BB	0.608	13	Do not reject	0.067	12	Do not reject	0.799	12	Do not reject	**0.007**	6	**Reject**
BB−	0.923	13	Do not reject	0.162	9	Do not reject	**0.007**	13	**Reject**	0.691	4	Do not reject
B+	**0.028**	11	**Reject**	0.289	9	Do not reject	0.152	8	Do not reject	0.91	4	Do not reject
B	0.335	6	Do not reject	**0.289**	5	**Reject**	0.601	6	Do not reject	0.752	3	Do not reject
B−	0.549	9	Do not reject	0.867	7	Do not reject	0.522	4	Do not reject	0.284	3	Do not reject
CCC+	0.452	7	Do not reject	0.089	4	Do not reject	0.834	8	Do not reject	0.384	1	Do not reject
CCC	0.601	8	Do not reject	0.293	5	Do not reject	n/a	n/a	n/a	n/a	n/a	n/a

Table 4. Table reports the results tested under the null hypothesis (H_0) that the OAS spreads are not different at a 5 percent significance level for eight standard Treasury maturities and four different sizes. The alternative hypothesis, for the test in each cell, is that operating companies have higher risk than holding companies.

	Size: Combined			Size: Less Than 500 M			Size: 500 M to 1 B			Size: Greater Than 1 B		
Term	***p*-Value**	**df**	**Ho @ 5%**	***p*-Value**	**df**	**Ho @ 5%**	***p*-Value**	**df**	**Ho @ 5%**	***p*-Value**	**df**	**Ho @ 5%**
≤1 years	0.739	30	Do not reject	0.606	22	Do not reject	0.991	24	Do not reject	0.319	9	Do not reject
1–2 y	0.352	30	Do not reject	0.819	27	Do not reject	0.814	25	Do not reject	0.152	14	Do not reject
2–3 y	0.801	34	Do not reject	0.856	24	Do not reject	0.961	32	Do not reject	0.374	22	Do not reject
3–5 y	0.753	32	Do not reject	0.698	30	Do not reject	0.857	30	Do not reject	0.485	31	Do not reject
5–7 y	0.98	33	Do not reject	0.928	32	Do not reject	0.87	32	Do not reject	0.889	29	Do not reject
7–10 y	0.977	33	Do not reject	0.453	25	Do not reject	0.544	21	Do not reject	0.753	24	Do not reject
10–20 y	0.561	22	Do not reject	0.227	16	Do not reject	0.217	16	Do not reject	0.594	19	Do not reject
20–30 y	0.674	23	Do not reject	0.722	19	Do not reject	0.825	23	Do not reject	0.628	19	Do not reject

5. Results and Discussion

Using the entire set of outstanding bonds issued by operating and holding companies in the U.S., we created a matrix with the S&P ratings, with the rows and Treasury maturities as the columns. Then we computed the OAS for all outstanding bonds and computed the average OAS value for each cell to show a comparable risk attribute for a given maturity and rating. We computed the values separately for all operating companies and holding companies and formed a matrix of "combined values". Then we repeated the same for small, medium, and large companies, using their size information as less than 500 million, 500 million to 1 billion, and over 1 billion as our size categories, respectively.

Bonds' yield spreads reflect the riskiness of the debt-issuing company and enable researchers to dissect the components of the risk attributable to a company. However, yield spreads are usually used to assess the relative riskiness of two firms or two groups of firms due to technical issues embedded in them, making them not directly comparable since debt instruments are highly customized by using a variety of maturities and optionalities. In addition, for a yield spread to make sense, one has to take into account the current treasury yield curve and integrate the spot rates into computations. Then one has to consider the sizes of the firms since it is an important feature in determining the strategic actions of a firm. Those hurdles are significant, making use of yield spreads not popular in risk comparison of alternative classes, such as operating and holding companies.

This paper produced the actual option-adjusted spreads for the entire set of 17,800 U.S. outstanding operating- and holding-company bonds and classified them separately by using S&P ranking and matching Treasury maturities. This methodology makes it possible to compare the risk structure of holding and operating companies to see if the market is indeed pricing them as the theory suggests. In other words, if we can group them by using standardized risk rankings, such as S&P ranking; use the comparable maturities linked to the Treasuries; and obtain the average option-adjusted spreads for each cell that make the comparison possible by taking into account the optionalities of the included debt instruments, we can, indeed, compare the risk structure of the two groups by using the current treasury yield curve's spot rates.

Table 3[7] shows the difference in option-adjusted spreads of operating and holding companies. In summary, the table shows the differences in all computed OASs for corporations under all included scenarios. The purpose of the table is to provide the reader with a visual showing if holding companies are actually lowering the risk of regular operating companies and making them capable of offering lower-cost loans under the umbrella of a holding company.

As we can see in the results reported in the table, an overwhelming majority of the mean-difference *t*-tests fail to reject H_0, which states that the compared means are not different for the operating- and holding-company spreads, as tested for 18 different rating classes for 4 different size categories.

Table 4, above, investigates the mean differences in maturity classes by using eight standard Treasure maturities in four distinct sizes. The table reports that all 32 mean-difference *t*-tests fail to reject H_0 and that the OAS spreads are different at a 5 percent significance level.

In detail, we tested the same null hypothesis (H_0) to see if the OAS spread means differ for holding and operating companies for 18 different rating classes and 3 different sizes, in addition to the combined set aggregating all sizes. In order to see if there exists an OAS mean difference when we compare the debt instruments with alternative terms, we tested the same null hypothesis for eight distinct standard Treasury maturities.

Out of 104 mean-difference tests, we have only 5 *p*-values rejecting the null hypothesis that the OAS spreads are different at a 5 percent significance level. If we relax the test to a 10% level, we add only four more *p*-values, thus rejecting the null hypothesis. It should be noted that the rejections are for the rating of BB+ or lower. The null hypothesis was not rejected at all when we compare the OAS means for the same maturities[8].

We must highlight again that the yield spreads are determined by the market—the perceptions and expectations of the bond investors—and they may or may not confirm the theoretically expected outcomes. The theory suggests that holding companies reduce the risk and lower the cost of debt financing. However, our paper shows that there exists no systematic and consistent risk-lowering outcome attributable to holding companies. While company-based studies require firm-specific data and are customized for a single firm, this work computes distinct average cell values attributable to companies falling within well-defined maturity and risk groups. Those cells will not be affected by outliers easily and present a cell tendency attributable to the members of the cell, making our results dependable.

As such, our paper is the first empirical study directly showing that the comparable yield spreads fail to favor holding companies in terms of their debt issue costs.

6. Conclusions

Our work suggests that there is no evidence consistently favoring holding-company financing compared to operating ones. In Appendix E[9], Table A3's grey-shaded cells highlight lower-cost operating-company financing for those who would like to have a quick visual inspection. They are positive basis point values, showing the average benefit of financing as an operating company for the reference cells. In a more detailed visual review, we report 13 empty cells, 50 positive value cells (favors operating-company financing for the reference cells), and 81 negative value cells (favors holding-company financing for the reference cells). Notice that the combined matrix is the least accurate one due to its averaging the higher number of inputs in each cell. The small company matrix has 34 empty cells, 39 cells with negative values (showing the average benefit of holding-company financing), and 71 cells with positive values (showing the average benefit of operating-company financing for the reference cells). The midsize companies' matrix has 28 empty cells, 57 negative value cells (supports holding companies), and 59 positive value cells (supports operating companies). Finally, the large companies' matrix has 43 empty cells, 44 negative value cells (supports holding companies), and 57 positive value cells (supports operating companies).

For visual clarity, the positive basis point values showing the benefits of financing as an operating company are shaded in gray. As clearly observed in Table A3, there is no evidence supported by the data that the holding companies reduce the attributable risk of operating companies and enable them to finance with a lower cost.

Formal mean-difference *t*-tests reported in Tables 3 and 4 show the mean differences for the maturities and ratings controlling size in 104 different classes, and only 5 out of 104 tests report that the mean differences are statistically significant at the 5 percent level. We have to emphasize that there is no statistically significant mean-difference test for maturity-to-maturity comparisons, as well as rating-class comparisons for BBB or better ratings.

The results are important since, theoretically, many operating firms would consider becoming a holding company just to reduce the overall risk to benefit from debt financing at a lower cost. Adding to the fact that holding companies may disturb the operational efficiencies of the operating companies, this work suggests that operating companies must reevaluate their options carefully before they consider becoming a holding company just for the sake of expected lower-cost financing opportunities.

It is important to understand that our results are not for or against the holding companies since there are a number of reasons to be structured or be part of a holding company. This study, however, focused on and therefore shows the debt financing cost of the holding companies compared to operating ones.

In regard to the limitations of the work, we like to highlight that this type of time-dependent study is valid for a certain time period. Repeating the same analysis when the Treasury yield course is significantly different may provide different results. Even under similar yield curves, repeating the same analysis after a certain period of time may also yield some differences in results. Nevertheless, we believe that the results obtained at certain points and under special assumptions are important reference material for future studies.

Another limitation is data related. When the data on important potential explanatory variables, such as the existence of foreign operations and issue sizes, are available and integrated into the study, the results are more refined and informative. Ultimately, if the individual OAS values per bond are available, we would be able to perform multiple regressions with several binary variables and covariates to extract better information under better controls.

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Appendix A

A *yield spread* is the difference between the yields to maturity on different comparable debt instruments. Common examples of yield spreads are the G-spread, I-spread, Z-spread, and option-adjusted spread. The G-spread, or nominal spread, shows the difference between the yield on Treasury Bonds and the yield on corporate bonds of the same maturity, assuming a flat yield curve. Since the Treasury Bonds are assumed to be default risk-free, the difference between the yield on corporate bonds and Treasury Bonds represents the default risk. Please see Appendix A for an example.

Another widely used spread is the I-spread, or interpolated spread, which shows the difference between the yield on a bond and the swap rate. The difference between the yield on a bond and a benchmark curve such as LIBOR is useful in assessing the credit risk of different bonds. A higher I-spread means that there is a higher credit risk. The I-spread is typically lower than the G-spread. Please see Appendix A for an example.

The Z-spread, or zero-volatility spread, shows the spread added to each spot interest rate to cause the present value of the bond cash flows to equal the bond's price. This is the spread that takes the slope of the yield curve into account.

While the G-spread and I-spread just measure the difference between the static yield to maturity of the bond and the Treasury yields or benchmark rate, the Z-spread determines the difference in yields with reference to the whole term structure of interest rates.

The Z-spread can be calculated by solving the following equation for Z:

$$P = \frac{CF_1}{(1 + S_1 + Z)^1} + \frac{CF_2}{(1 + S_2 + Z)^2} + \ldots + \frac{CF_n}{(1 + S_3 + Z)^n}$$

where P is the price of the bond; CF_1, CF_2, and CF_n are the first, second, and nth cash flows; S_1, S_2, and S_n are the first, second, and n-th spot interest rates; and Z is the zero-volatility spread. Please see Appendix A for a step-by-step computation example.

Finally, the option-adjusted spread, OAS, equals zero-volatility spread minus the value of the call option, as stated in basis points. It is the appropriate yield measure for callable bonds, making it a superior method such that, rather than simply comparing a bond's yield to maturity to a benchmark issue, it measures the constant spread that must be added to the current short-term interest rate to make the price of the risk-free bond, as calculated by the pricing model by equating it to the observed market price of the corporate bond. In a simple form, the option-adjusted spread (OAS) = Z-spread − option value.

G-, I-, and Z-Spread computations: If the 2-year Treasury Bond yield is 2.15 percent and a bond with 2 years to maturity yields 3.45 percent, and the 2-year LIBOR swap rate is 2.85 percent, then one can compute the G-spread as the difference between the bond yield and Treasury yield that yields 3.45 − 2.15 = 1.30 percent. Similarly, the I-spread will be the difference between the bond's yield and the LIBOR swap rate, yielding 3.45 − 2.85 = 0.60 percent. Computing the Z-spread requires knowing the market price of the bond and the 1- and 2-year Treasury yields. If we know that the bond has a par value of USD 1000, trades at 98% of its face value, and pays annual coupon payments based on a 3.5% coupon rate, and the 1-year and 2-year treasury yield is 2.10% and 2.40%, respectively, we can compute the Z-spread as follows:

By taking into account that the bond price is USD 980 and annual coupon payments are USD 35 (=USD 1000 × 3.5%), and considering the Treasury spot rates for 1 and 2 years of 2.10% and 2.40%, the Z-spread would be obtained by solving the following equation for Z:

$$\$980 = \frac{\$35}{(1 + 2.10\% + Z)^1} + \frac{\$35 + \$1000}{(1 + 2.40\% + Z)^2}$$

Solving this equation for Z by using any software, such as Excel Goal Seek, yields 2.1743% as the value of the Z-spread. See Appendix B for the steps of using Excel Goal Seek to obtain the value of Z. It is important to note that bonds with no optionalities will have Z-spread values identical to OAS. Moreover, if a bond has options embedded in it, then the computed Z-spread will not be valuable, as it ignores the optionality in the computations.

Appendix B. Using Excel's Goal Seek to Obtain Z-Spread Values

First, type the equation as it appears in a cell, (say B2): = (35/(1.021 + A2)) + (1035)/(1.024 + A2)^2. Once you hit the Enter key, some number will appear in cell B2. Note that cell A2 is empty at this point. However, entering any number in A2, for now, is okay. Then, while your cursor is on B2, click on the What-If-Analysis under the Data tab and select Goal Seek. On the popup, the <Set Cell> must show B2; then enter the bond's market price in <to value>, which is USD 980.

Finally, click in <by changing> cell, and then click <A2>. At this point, <By changing cell> must show A2. Hit <enter> and cell A2 must show the value of Z = 0.02174 or 2.174 percent. That means that the Z-spread is 2.174 percent.

Appendix C. OAS Computation by Bloomberg

The following steps explain the process of creating a benchmark spot yield curve by Bloomberg Fixed Income Worksheets used for a noncallable bond. Assuming we have a one-year benchmark bond issued today with two semiannual fixed coupon payments, this bond will provide us with a six-month coupon payment made at month six and another six-month coupon payment, together with the principal at the end of the year. To understand the process, assume we have a USD 1000, 4 percent, semiannual coupon bond with a current market price of USD 1018. Assume also that the six-month spot rate to discount the first coupon payment is 2 percent, semiannual. The six-month coupon payment of the one-year benchmark issue is discounted by using the six-month spot rate, or 2 percent, and the amount is subtracted from the current market price, or USD 1018, to solve for the one-year spot rate. For longer-term bonds, the spot rates for successive terms are solved the same way, generating a spot curve based on the underlying benchmark yield curve, resulting in a series of discount factors unique to each term of a bond's cash flows.

Appendix D. Option-Adjusted Spread Analysis and Computation

The Bloomberg Professional Analysis generates a "benchmark spot curve" in the following steps: (1) the six-month spot rate is defined as being equivalent to the benchmark six-month rate; (2) a one-year benchmark bond containing a six-month coupon payment and a one-year coupon and the principal payment is considered; (3) the six-month coupon payment of the one-year benchmark issue is discounted to present value by using the six-month spot rate from (1); (4) the present value of the six-month coupon payment in (3) is then subtracted from the market price of the one-year cash flow to solve for the appropriate discount rate, which becomes the one-year spot rate; and (5) spot rates for successive terms are solved for in a similar way, generating a spot curve based on the underlying benchmark yield curve. The result of these successive calculations is a series of discount factors unique to each term of a bond's cash flows. The OAS analysis for noncallable bonds utilizes the "benchmark spot curve" to value a bond by breaking up its component cash flows and valuing them by using the appropriate discount factor for each cash flow's term. Once the spot rates for the benchmark curve are established, the OAS of a given bond is determined.

Appendix E. Option-Adjusted Spread Tables for Operating and Holding Companies

Table shows and confirms that the values of the yield spread increase as the risk class and maturity increase. A few non-conforming yield spread values are usually attributable to factors such as the liquidity and marketability of the underlying issues. A classic example is illiquid AAA bonds with spread values higher than AA+. In addition, it has to be highlighted that OAS includes optionalities, and therefore negative values are meaningful. The computed OAS numbers confirm that, as the risk and time to maturity increase, the value of the spread will go up. We would like to note once again that since the cell values show the average spread of all bonds included in the cell, they should be taken as such, showing the average spread for a group of bonds included in the cell and not a bond-by-bond comparison. The "–" sign shows that there are no outstanding bonds to include in the cell in question, and as such, those cells are not included in any comparison.

Table A1. Option-adjusted spreads table for U.S. **operating companies,** using S&P ranking and matching Treasury maturities. Cell values are the average OAS in basis points for the bonds in the cell (computed using Bloomberg—Fixed Income Worksheets, accessed on 26 September 2022).

	OPCO OAS COMBINED								**Size = 500 M–1 B**							
S&P Rank	**≤1 Years**	**1–2 y**	**2–3 y**	**3–5 y**	**5–7 y**	**7–10 y**	**10–20 y**	**20–30 y**	**≤1 Years**	**1–2 y**	**2–3 y**	**3–5 y**	**5–7 y**	**7–10 y**	**10–20 y**	**20–30 y**
AAA	90	59	87	103	107	128	138	162	17	-	-	-	-	-	105	150
AA+	25	18	33	62	85	112	163	167	33	−6	12	17	82	66	-	160
AA	43	47	70	103	144	151	191	210	17	13	27	40	121	127	146	190
AA−	148	57	−31	81	134	153	186	196	36	6	27	56	65	97	162	192
A+	67	32	57	76	115	131	184	209	17	13	35	59	107	119	159	193
A	89	65	75	103	147	151	209	210	51	26	51	67	112	137	193	201
A−	109	76	88	123	160	166	227	234	44	27	57	93	128	154	204	226
BBB+	165	82	101	139	163	198	238	233	65	35	78	111	142	174	213	229
BBB	94	84	123	146	197	228	283	295	72	73	119	149	181	222	265	278
BBB−	196	137	174	224	267	287	296	320	84	119	183	240	260	287	298	354
BB+	581	195	264	249	327	334	435	411	148	173	216	259	332	306	307	525
BB	199	275	299	322	397	424	445	610	243	231	220	294	390	508	302	-
BB−	348	425	286	401	415	400	491	498	211	204	263	422	411	373	-	-
B+	150	589	465	471	453	460	232	-	-	-	278	421	474	474	-	-
B	272	550	986	973	622	587	-	-	-	550	835	869	601	603	-	-
B−	639	716	717	657	524	545	-	-	639	-	240	580	537	925	-	-
CCC+	374	-	30	985	837	925	-	-	-	-	200	900	742	980	-	-
CCC	-	481	449	1000	974	605	-	-	-	-	-	999	100	605	-	-
	Size = LT < 500 M								Size = GT > 1 B							
AAA	137	82	99	117	119	128	155	165	−1	−9	17	46	27	-	107	149
AA+	58	43	84	100	119	135	171	168	7	4	20	51	74	105	130	167
AA	71	87	113	145	173	162	224	218	48	5	27	63	93	111	145	182
AA−	172	74	−71	99	153	169	192	195	29	−4	40	63	103	114	198	205
A+	96	50	71	84	126	149	192	229	36	10	42	71	93	119	168	190
A	99	77	84	114	160	160	216	213	61	38	57	90	101	141	155	202
A−	131	94	99	134	169	177	234	239	34	31	66	85	134	142	204	228
BBB+	203	99	114	153	175	211	246	233	81	41	73	98	138	173	209	240
BBB	103	91	128	145	201	231	284	299	68	66	96	157	204	234	310	302
BBB−	251	145	172	225	273	291	297	312	80	129	177	173	228	268	279	308
BB+	746	209	307	245	327	360	467	395	187	259	168	271	289	329	330	451
BB	177	300	338	384	414	381	531	610	-	-	280	276	315	355	304	-
BB−	394	536	299	393	414	427	491	498	-	-	246	366	435	436	-	-
B+	150	589	545	538	438	466	232	-	-	-	378	304	397	430	-	-
B	272	-	996	990	582	549	-	-	-	-	547	732	735	692	-	-
B−	-	716	876	711	530	437	-	-	-	-	-	534	428	-	-	-
CCC+	374	-	694	906	831	843	-	-	-	-	589	-	960	-	-	-
CCC	-	481	449	-	950	-	-	-	-	-	-	-	909	-	-	-

In summary, the OAS values in Table A1's upper-left panel show the combined values for all size firms; we observe double-digit spread values for short-term (<1 to 5 years) A-rated bonds (AAA, AA+, AA, AA−, A+, A, and A−), while for longer-term (>5 to 30 years) A-rated bonds, we observe yield spreads up to 2 percentage point.

It is also interesting to confirm the significantly higher spreads for small firms (<USD 500 million) and significantly lower spreads for firms with sizes over 1 billion. One can safely highlight that the size effect is obvious in assessing the riskiness of operating companies. In addition, the operating companies with sizes over 1 billion have a very limited number of low-quality bonds outstanding compared to the small-size firms.

We also see an observable difference between the company size and the filled cells in our 18 × 8 master matrix. For small firms, out of 144 cells, 14 are empty, implying that they have all that variety of bonds outstanding with all possible risk classes and maturities. Intermediate-size operating companies' matrix has 22 empty cells, and finally, large operating companies' matrix has 35 empty cells, implying that they get more selective with their debt offerings. More importantly, all empty cells line up with high-risk classes and either shorter or longer-term ones with maturities either less than 2 years or longer than 10 years.

Table A2. Option-adjusted spreads for U.S. **holding companies,** using S&P ranking and matching Treasury maturities. Cell values are the average OAS in basis points for the bonds in the cell (computed using Bloomberg—Fixed Income Worksheets, accessed on 26 September 2022).

	HOLDCO OAS COMBINED								Size = 500 M–1 B							
S&P Rank	**≤1 Years**	**1–2 y**	**2–3 y**	**3–5 y**	**5–7 y**	**7–10 y**	**10–20 y**	**20–30 y**	**≤1 Years**	**1–2 y**	**2–3 y**	**3–5 y**	**5–7 y**	**7–10 y**	**10–20 y**	**20–30 y**
AAA	42	−39	−3	47	56	73	132	156	-	−42	22	51	21	-	142	153
AA+	-	0	7	47	-	79	133	149	-	0	7	56	-	-	-	-
AA	11	17	28	50	69	63	98	157	−28	−3	14	-	72	-	120	186
AA−	34	16	33	59	105	119	165	192	34	11	33	41	64	116	199	194
A+	31	18	64	88	128	148	181	235	31	−8	-	82	123	152	181	-
A	124	94	105	113	153	169	214	216	32	31	53	84	132	149	183	219
A−	101	80	87	115	153	171	199	220	21	53	67	99	131	159	192	217
BBB+	115	83	108	140	171	210	244	250	57	62	101	131	167	204	231	248
BBB	76	75	109	135	187	212	267	277	71	63	97	130	177	206	248	272
BBB−	233	153	161	200	240	267	323	334	90	89	166	193	238	262	331	345
BB+	149	96	175	229	280	295	293	320	120	94	155	237	276	287	251	284
BB	232	296	371	419	419	419	540	518	211	496	418	434	443	446	494	-
BB−	224	216	346	356	411	434	883	456	-	174	337	375	458	452	892	499
B+	515	540	410	554	645	724	709	-	361	415	290	519	610	526	756	-
B	491	415	465	600	644	632	-	-	-	452	403	443	576	484	-	-
B−	-	506	782	638	655	504	497	-	-	262	656	796	735	-	-	-
CCC+	-	-	564	480	721	508	0	-	-	-	671	638	707	478	0	-
CCC	475	1000	867	927	658	1000	-	-	-	0	1000	692	620	-	-	-
	Size = LT < 500 M								Size = GT > 1 B							
AAA	42	−33	−54	-	75	-	136	156	-	-	-	45	72	73	96	161
AA+	48	-	-	-	-	-	-	200	-	-	-	38	-	79	133	149
AA	-	16	35	69	126	122	161	189	31	38	43	50	67	63	90	118
AA−	-	-	67	109	132	-	-	235	-	18	-	88	97	-	143	177
A+	176	108	134	134	171	180	226	211	-	26	55	84	123	144	-	-
A	125	95	94	116	156	173	202	220	16	42	61	79	141	134	210	226
A−	135	94	112	144	171	212	247	251	15	67	82	121	162	172	185	225
BBB+	82	84	120	143	200	220	276	279	47	60	89	131	175	201	227	247
BBB	258	160	160	201	243	272	326	336	60	72	108	127	163	200	256	281
BBB−	155	90	185	240	281	308	313	324	0	98	153	247	228	261	317	315
BB+	245	200	327	397	384	379	560	518	134	148	157	173	-	284	280	318
BB	224	248	342	330	387	475	873	435	-	482	531	605	552	426	-	-
BB−	619	555	637	580	659	749	705	-	-	-	419	438	345	366	-	-
B+	-	303	511	687	646	830	-	-	252	-	278	510	504	-	-	-
B	-	607	909	542	598	397	497	-	491	-	438	1000	1000	-	-	-
B−	-	-	511	415	764	-	-	-	-	426	-	646	582	664	-	-
CCC+	475	1000	630	1000	696	-	-	-	-	-	-	461	-	539	-	-
CCC	-	-	-	-	-	-	-	-	-	-	841	0	-	1000	-	-

The table discloses the results for the holding companies and confirms that the values of the yield spread increase as the risk class and maturity increase, with the exception of a few non-conforming yields spread values that may be attributable to liquidity and marketability of the underlying issues. The OAS values in Table A2's upper-left panel show the combined values for all size firms; we observe double-digit spread values for short-term (<1 to 5 years) A-rated bonds (AAA, AA+, AA, AA−, A+, A, and A−), while for longer-term (>5 to 30 years) A-rated bonds, we observe yield spreads up to 220 basis points. The other three size-restricted quadrants of Table A2 show that as the firm size increases, the risk and, therefore, the average cell-based yield spread of the holding firms, just like the operating firms, decline.

Table A3. The table shows the average cell-based option-adjusted spreads' differences for U.S. operating and holding companies, using S&P ranking and matching Treasury maturities. Cell values are averages in basis points for the bonds included in the cell. The U.S. holding companies' cell values are in basis points (computed using Bloomberg—Fixed Income Worksheets, accessed on 26 September 2022).

	DIFFERENCE OAS COMBINED								Size = 500 M–1 B							
S&P Rank	**≤1 Years**	**1–2 y**	**2–3 y**	**3–5 y**	**5–7 y**	**7–10 y**	**10–20 y**	**20–30 y**	**≤1 Years**	**1–2 y**	**2–3 y**	**3–5 y**	**5–7 y**	**7–10 y**	**10–20 y**	**20–30 y**
AAA	−48	−98	−90	−56	−51	−55	−6	−6	-	−42	22	51	21	-	37	3
AA+	-	−18	−26	−15	-	−33	−30	−18	-	6	−5	39	-	-	-	-
AA	−32	−30	−42	−53	−75	−88	−93	−53	−45	−16	−13	-	−49	-	−26	−4
AA−	−114	−41	64	−22	−29	−34	−21	−4	−2	5	6	−15	−1	19	37	2
A+	−36	−14	7	12	13	17	−3	26	14	−21	-	23	16	33	22	-
A	35	29	30	10	6	18	5	6	−19	5	2	17	20	12	−10	18
A−	−8	4	−1	−8	−7	5	−28	−14	−23	26	10	6	3	5	−12	−9
BBB+	−50	1	7	1	8	12	4	17	−8	27	23	20	25	30	18	19
BBB	−18	−9	−14	−11	−10	−16	−16	−18	−1	−10	−22	−19	−4	−16	−17	−6
BBB−	37	16	−13	−24	−27	−20	27	14	6	−30	−17	−47	−22	−25	33	−9
BB+	−432	−99	−89	−20	−47	−39	−142	−91	−28	−79	−61	−22	−56	−19	−56	−241
BB	33	21	72	97	22	−5	95	−92	−32	265	198	140	53	−62	192	-
BB−	−124	−209	60	−45	−4	34	392	−42	-	−30	74	−47	47	79	892	499
B+	365	−49	−55	83	192	264	477	-	361	415	12	98	136	52	756	-
B	219	−135	-	−373	22	45	-	-	-	−98	−432	−426	−25	−119	-	-
B−	-	−210	65	−19	131	−41	497	-	-	262	416	216	198	-	-	-
CCC+	-	-	534	−505	−116	−417	0	-	-	-	−1329	−362	−35	−522	0	-
CCC	475	-	418	−73	−316	395	-	-	-	0	1000	−308	−380	-	-	-
	Size = LT < 500 M								Size = GT >1 B							
AAA	−95	−115	−153	-	−44	-	−19	−9	-	-	-	45	72	73	−9	11
AA+	−10	-	-	-	-	-	-	32	-	-	-	21	-	13	133	−11
AA	-	−71	−78	−76	−47	−40	−63	−29	14	25	16	10	−54	−64	−56	−72
AA−	-	-	138	10	−21	-	-	40	-	12	-	32	32	-	−19	−15
A+	80	58	63	50	45	31	34	−18	-	13	20	25	16	25	-	-
A	26	18	10	2	−4	13	−14	7	−35	16	10	12	29	−3	17	25
A−	4	0	13	10	2	35	13	12	−29	40	25	28	34	18	−19	−1
BBB+	−121	−15	6	−10	25	9	30	46	−18	25	11	20	33	27	14	18
BBB	155	69	32	56	42	41	42	37	−12	−1	−11	−22	−18	−22	−9	3
BBB−	−96	−55	13	15	8	17	16	12	−84	−21	−30	7	−32	−26	19	−39
BB+	−501	−9	20	152	57	19	93	123	−14	−25	−59	−86	-	−22	−27	−207
BB	47	−52	4	−54	−27	94	342	−175	-	251	311	311	162	−82	-	-
BB−	225	19	338	187	245	322	214	-	-	-	156	16	−66	−7	-	-
B+		−286	−34	149	208	364	-	-	252	-	0	89	30	-	-	-
B	-	607	-	-	16	−152	497	-	491	-	−397	131	399	-	-	-
B−	-	-	−365	−296	234	-	-	-	-	426	-	66	45	−261	-	-
CCC+	101	1000	1324	94	−135	-	-	-	-	-	-	−539	-	−461	-	-
CCC	-	-	-	-	-	-	-	-	-	-	841	−1000	-	395	-	-

The table shows the option-adjusted spread differences by subtracting operating-company spreads from holding-company spreads, cell by cell, for matching maturities and S&P risk classes. If the value has a minus sign, it shows how much a holding company saves in financing compared to an operating company, in basis points, for the reference cell. For instance, the very first cell value of −48 shows that less-than-one-year AAA bonds will save 48 basis points due to the ownership structure (i.e., benefit of forming a holding company). This value is obtained by comparing the average financing cost of all outstanding operating-company AAA bonds with less than 1-year maturity (90 basis points) with the average financing cost of all outstanding holding-company AAA bonds with less than 1 year to maturity (42 basis points). A plus sign shows the average benefit of financing as an operating company for the given maturity and risk class in basis points for the cell in question. Finally, a dash indicates that no bonds are outstanding for the specific maturity and risk class.

Notes

1 While the debts of each subsidiary belong to that subsidiary, placing operating companies and the assets of operating companies in separate entities provides a liability shield.

2 Imagine a person who wants to buy an apartment building for rental income may form two business entities: the first entity would own the apartment building, and the second entity owns the first entity. When this person wants to expand operations, he or she sells shares in the second entity and, with the proceeds, buys another business that constitutes another subsidiary.

3 Please see the Appendix A for details.

4 For example, an agency might want to compare the yield for a callable bond with the yield for a noncallable bond. Without OAS, one can only compare the nominal rate of return for each bond without being able to consider a potentially lower return in cases where the callable bond is redeemed before maturity. When used properly, OAS can help investors make more informed decisions about which assets to include in their portfolios that balance their different investment objectives of safety, liquidity, and return.

5 As Choudhry (2004) suggests, it is the spread that must be added to the current short-term interest rate to make the "theoretical" price of the corporate bond, as calculated by the pricing model, identical to the observed market price.

6 The sectors included are Banking, Consumer Non-Cyclical, Electric, Consumer Cyclical, Capital Goods, Communications Energy, Insurance, Technology, Basic Industry, Finance Companies, REITs, Other Industrial, Transportation, Brokerage Asset Management Exchanges, Natural Gas, Other Financial, Government Owned, Other Utility, and Local Authority.

7 Separate matrices for operating companies are available in the Appendix E for those who would like to see the values for operating and holding companies.

8 One can test the statistical significance of the linear regression that OAS is regressed on a binary variable for Opco and several covariates. However, this requires firm-based individual bond information for 17,800 bonds and is not available, making us use an alternative form of controlling the covariates.

9 Appendix E—Tables A1 and A2 provide the readers with individual cell averages.

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