Monitoring Costs of Public Debt:[1]
Evidence from a Natural Experiment in Israel

Itay Kedmi[*] and Guy Lakan[**]

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Evidence from a Natural Experiment in Israel

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Abstract

The incentive for creditors to monitor borrowers is influenced, in part, by the extent to which the creditor is concentrated in a specific debt, a factor underscored by the differences between the public debt market and the private debt market. In this study, we examine how the investment decisions made by institutional investors were influenced by the implementation of Hodak Committee recommendations. This committee imposed substantial monitoring costs in the public debt market, costs that are borne exclusively by institutional investors. After the recommendations entered into force, the institutional investors redirected their investments to private loans at the expense of public bonds. Using the Difference-in-Differences methodology, we find that the price difference between the two debt instruments diminished significantly. Actually, those findings suggest that following the Hodak Committee, the institutional investors changed their investment preferences in corporate debt.

השפעות ועדת חודק על העדפות ההשקעה של הגופים המוסדיים בחוב קונצרני

איתי קדמי וגיא לקן

תקציר

תמריצי המשקיעים בחוב לבצע ניטור (Monitoring) על הגוף הלווה מושפעים, בין היתר, מריכוזיות הגופים המשקיעים בחוב ספציפי, היבט המתחדד בהבדלים הקיימים בין שוק החוב הסחיר לבין שוק החוב הפרטי. במחקר זה אנו בוחנים כיצד החלטות ההשקעה של הגופים המוסדיים הושפעו מיישום המלצות ועדת "חודק". ועדה זו הטילה עלויות פיקוח ובקרה משמעותיות בהשקעות הגופים המוסדיים באפיק האג"ח הקונצרני. לאחר כניסת ההמלצות לתוקפן, הגופים המוסדיים הפנו את השקעותיהם לאפיק ההלוואות הפרטיות על חשבון אפיק האג"ח הקונצרני הסחיר. באמצעות מתודולוגיית הפרשי-הפרשים, אנו מוצאים כי פער המחירים בין שני מכשירי החוב מצטמצם באופן מובהק לאחר יישום המלצות הוועדה. למעשה, ממצאים אלו מעידים כי בעקבות יישום המלצות ועדת חודק הגופים המוסדיים שינו את העדפות ההשקעה שלהם בחוב קונצרני.

Monitoring Costs of Public Debt:

Evidence from a Natural Experiment in Israel[*]

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October 2021

Abstract

The incentive for creditors to monitor borrowers is influenced, in part, by the extent to which the creditor is concentrated in a specific debt, a factor underscored by the differences between the public debt market and the private debt market. In this study, we examine how the investment decisions made by institutional investors were influenced by the implementation of Hodak Committee recommendations. This committee imposed substantial monitoring costs in the public debt market, costs that are borne exclusively by institutional investors. After the recommendations entered into force, the institutional investors redirected their investments to private loans at the expense of public bonds. Using the Difference-in-Differences methodology, we find that the price difference between the two debt instruments diminished significantly. Actually, those findings suggest that following the Hodak Committee, the institutional investors changed their investment preferences in corporate debt.

Keywords: Institutional Investors, Corporate Debt, Monitoring Costs, Alignment of Interests

JEL Classification code: G12, G23, G28

1 Introduction

When do creditors have an incentive to monitor borrowers? This question has been widely investigated, and even though it seems to be a naive question – the literature suggests complex answers that depend on the characteristics of the lenders and borrowers, and the type of debt instrument. In trying to answer this question we should start by describing the different entities that play a role in the different debt markets that we investigate, as well as the setup which we used to analyze the different factors that may affect the incentives of these creditors to carry out monitoring.

In this paper, we study the effect of a regulation which obligated the institutional investors (pension funds, provident funds and life insurance) in Israel to perform monitoring when investing in public corporate bonds – this regulation applies only to this type of investor, while other investors (mainly mutual funds) don't have to perform any monitoring acts when investing in the public corporate bonds market. In addition, the regulation applies only on one type of debt instrument – public corporate bonds, while there is no obligation to perform monitoring when investing in private loans.

When trying to analyze the factors that may influence the decision of institutional investors to perform monitoring on their investments, it is important to mention the theoretical frameworks as well as the considerable empirical evidence suggested by the academic literature. Shleifer and Vishny (1986), Kahn and Winton (1998) and Maug (1998) suggest theoretical models that shed a light on the decision-making process of institutional investors when deciding whether to perform a costly monitoring activity or simply trade. There is empirical evidence for the benefits of institutional ownership on the firm, which is caused by the monitoring activity of the institutional investors (Bushee 1998; Hartzell and Starks 2003; Almazan, Hartzell, and Starks 2005). There are also studies that found that institutional investors decide to sell their holdings when they are dissatisfied with corporate performance (Parrino, Sias, and Starks 2003). According to Chen, Harford, and Li (2007), when monitoring benefits exceed costs, institutional investors will monitor rather than trade; and their monitoring activities offer them informational advantages that they can use to adjust their portfolios over time.

When focusing on debt investment, it is important to note another aspect that might affect the decision of whether to perform monitoring or not–the level of concentration of investors in

the debt instrument. The academic literature contains a great deal of evidence showing that the concentration of the composition of debt investors increases their incentive to monitor that debt (Diamond 1984; Fama 1985; R. G. Rajan 1992; Focarelli, Pozzolo, and Casolaro 2008). It would therefore be expected to find considerable variance between the level of private debt monitoring which is generally characterized by a small number of investors; and public debt which is generally much less concentrated. The fact that the regulation obligated institutional investors to bear the monitoring costs for their investments in public debt (which is decentralized) could cause the other investors in the debt to act as "free riders", to benefit from the institutional investor's monitoring activity without bearing any of the costs (Grossman and Hart 1980; Kim and Walker 1984; Baumol 2004).

As mentioned above, the regulation applies only to public corporate bonds and not to private loans. In examining the substitutability between investments in public debt and investments in private debt, we must address the structural differences between these two debt instruments. Leftwich (1981) found evidence that costs incurred at the time of renegotiation in the event of insolvency, or in case of a violation of the covenants, will be lower for private debt than for public debt. Kahan and Tuckman (1993) show how public debt is differentiated from private debt in the number of covenants it contains and how stringent they are (stringency was defined as the difference between the actual financial ratio and that defined in the covenant clause). Their principal conclusion is that the conflict of interest is more limited in private debt than in public debt.

In addition to the obligation of monitoring, the regulation has another important impact on the public corporate bond market – improved product quality. The regulation obligated institutional investors to invest only in public corporate bonds that contain financial covenants and contractual undertakings, as generally accepted around the world, and detailed the sanctions to be applied if they are violated (higher rates of interest, partial or full repayment of the bonds).[1] The academic literature on financial contracts emphasizes the important role of covenants in moderating the inherent conflict of interest between a company's bondholders and its stockholders (Jensen and Meckling 1976; Myers 1977). Smith Jr and Warner (1979) described the theoretical effect of these covenants, which they called the Costly Contracting Hypothesis (CCH), and discuss the fact that financial covenants entail substantial costs.

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[1]See extension in Section 2.

However, despite these costs, financial covenants could increase a company's value when the debt is issued and reduce the yield spreads at which the debt series are traded. Empirical evidence of this phenomenon can be found in a study by Bradley and Roberts (2003). As R. Rajan and Winton (1995) show in their theoretical research, there is a strong positive relation between the presence of covenants in the loan's contract and the incentive to perform monitoring by the institutional investor. Therefore, another significant aspect of the Hodak Committee ("HC") recommendations is the obligation imposed on the institutional investors to monitor the public debt in their possession regularly, which involves major costs.

The fact that these monitoring efforts include significant costs raises an important question regarding the efficiency of this kind of monitoring of investments on the public corporate bond market. There is theoretical literature that shows that having junior lenders monitor the borrower is not as effective as a senior lender carrying out monitoring because of distorted incentives (Diamond 1991; Diamond 1993; Repullo and Suarez 1998; Berglöf and Von Thadden 1994). Seniority allows the monitoring senior lender to extract the full return from his monitoring activities (Park 2000). In our research, the public bonds are considered as junior debt, compared to private loans which are considered as senior debt.

Therefore, we can develop our main research hypothesis. The institutional inventors have no incentive to monitor public corporate debt, so we would expect to find an increase in the demand for private loans at the expense of the demand for public corporate bonds, after the implementation of the regulation. As a result, the difference in the yield spreads between these two types of debt instruments will decrease, due to a reduction in the yield spreads of the private loans which is caused by the growing demand among institutional investors.

The empirical analysis indicates some key results. We find that after the implementation of this regulation there was a statistically and economically significant decrease in the yield spread differences between public corporate debt and private loans. We attribute this result to institutional investors' growing demand for private loans as their demand for public bonds diminished, a result that is reinforced in light of the fact that following the implementation of the regulation, institutional investors in Israel have dramatically diverted their investments in corporate debt from public bonds towards private loans, in what was a unique anomaly on a global scale.[2]

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[2]See Section 4 in the Bank of Israel Annual Report for 2018 (link).

This paper contributes to the exiting literature. There is an extensive literature that suggests theoretical frameworks that deal with the decisions of investors when choosing to invest in each type of debt, but the empirical evidence is limited. We contribute to the literature by supporting empirical evidence for the lack of incentive to perform monitoring in the decentralized public debt market. We show it by demonstrating how institutional investors in Israel redirected their investment to the private debt market as a result of the obligation for monitoring only one kind of creditor in decentralized debt market.

The rest of this paper is organized as follows: Section 2 describes the HC recommendations and provides descriptive statistics of the quality of the public bonds issued in the period prior to and after the Committee's recommendations; Section 3 includes a description of the data sets used for the paper; Section 4 describes the identification strategy; Section 5 describes the empirical estimation strategies and the results (including robustness checks); Section 6 concludes.

2 The Regulatory Committee ("Hodak")

In September 2010, the final recommendations of the Hodak Committee (a public committee on behalf of the Ministry of Finance, and chaired by David Hodak) were published. The Committee was established following the growth of the non-government bond market and the GFC, which turned the spotlight on significant weaknesses in the corporate bond investment process by institutional investors. As a result of the financial crisis, many firms were unable to service their liabilities, and the ensuing wave of debt restructuring proceedings demonstrated the weaknesses in the public bond market: most of the issuances, both before and after the crisis, were not backed by collateral and lacked adequate contractual undertakings or financial covenants. The Committee discussed the need for setting professional standards and tools to be used by the institutional investors in reviewing the quality of the borrowers in the public debt market.

The Committee's recommendations focused on non-government bonds and they were not applied to alternative investment classes (e.g., private loans and investments abroad). The Committee's recommendations centered on three main areas: (1) establishing a formal process for each bond series before deciding whether to purchase these bonds ("debt analysis"); (2) determining the type of information that institutional investors will receive; and (3) improving product quality. The

Committee's recommendations regarding improved product quality addressed financial covenants and contractual undertakings, as generally accepted around the world, and detailed the sanctions to be applied if they are violated (higher rates of interest, partial or full repayment of the bonds).[3]

The Committee's recommendations included a closed, structured list of critical parameters required for debt analysis, which include: characteristics of the issuer, including sector, the issuer's strategy and aspects of its corporate governance; characteristics of the bonds, their terms, designation of the issue proceeds and the reasonability of the debt repayment, also in the event of insolvency, considerations such as whether liens are in place, whether there is an undertaking not to create liens, as well as whether contractual undertakings and financial covenants are in place; and an assessment of the bond's risk profile (return versus risk).

Likewise, the proposals to improve product quality can similarly be divided into four categories: (1) a requirement for financial covenants; (2) restrictions regarding rating and dividends distribution; (3) a requirement for liens and collateral; and (4) other contractual undertakings, such as change of control, cross-insolvency, merger / sale of assets, and fundamental breach of the bond conditions.

When analyzing the implementation of the recommendations, it was found that the use of financial covenants, restrictions on the creation of additional debt (or an expansion of debt series) and limitations on the distribution of a dividend, increased during the years following the HC recommendations (Figure 1). Furthermore, there was a marked, steady increase in the share of the new bond series that include an interest compensation in the event of a financial covenants violation or a rating downgrade (Figure 2), which was addressed in detail in the HC recommendations. It was also found that following the implementation of the Committee's recommendations, most of the new bond series included a large number of contractual undertakings compared with bond series that were issued prior to the implementation of the recommendations (Figure 3).[4]

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[3]See for example: Bradley and Roberts (2015).

[4]These findings are consistent with a study published by the Tel Aviv Stock Exchange ("Three years of the implementation of the Hodak Committee recommendations", Nurit Dror) and a paper presented by Ana Brodesky in the Bank of Israel Research Department Conference ("Competition and Structural Changes", December 2020, see link).

Figure 1: Share of new bond series which include restrictions and financial covenants, 2007–2015

- ■ Restrictions on Additional Debt
- ■ Restrictions on Dividend Distribution
- ■ Financial Covenants
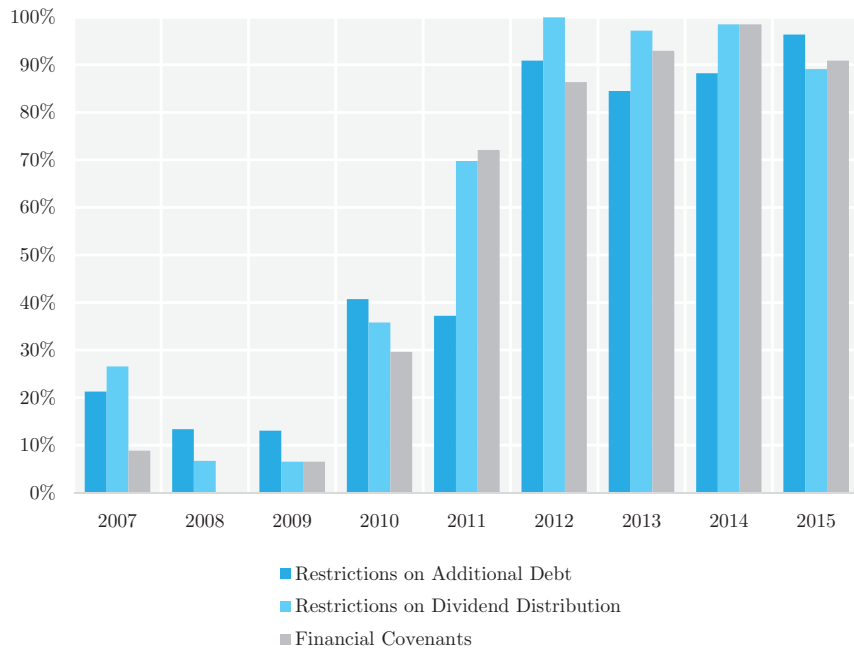
Figure 2: Share of new bond series which include interest compensation[a], 2007–2015

- ■-- Violation of Financial Covenants
- ■— Rating Reduction

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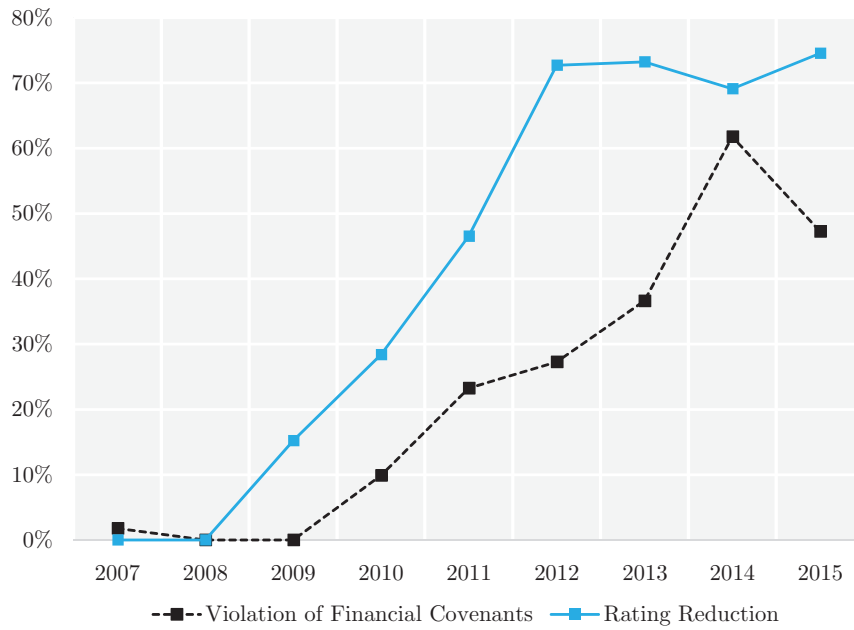
[a]For a negative event, like financial covenants violation or rating reduction.

Figure 3: Distribution of new bond series by number of contractual undertakings[a], 2007–2015
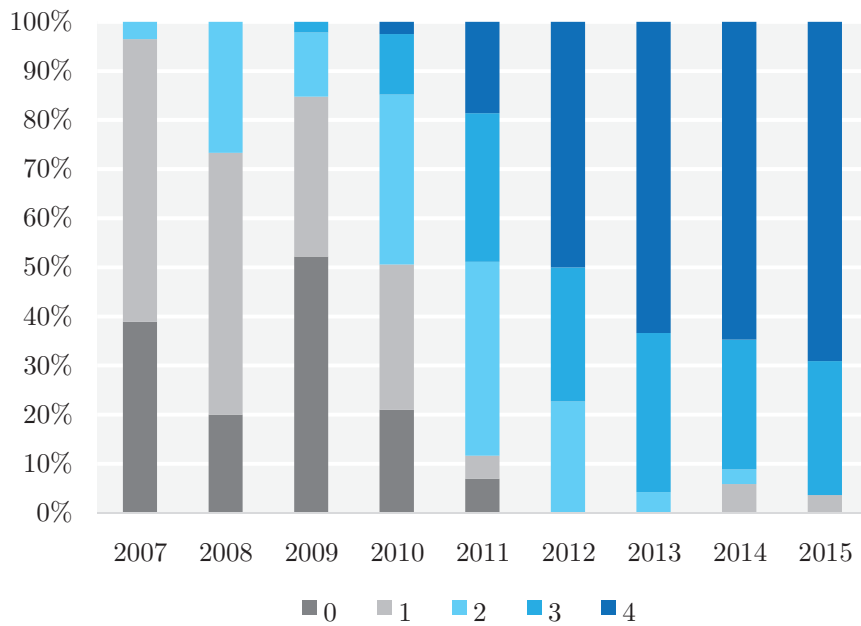
An analysis of additional contractual conditions present in the deeds of trust shows a steady decrease in the proportion of bonds issued (in terms of volume of debt raised) that are not backed by collateral or liens (Figure 4) from 2011 onward – from an average of 86 percent in the period prior to implementation of the Committee's recommendations to an average of 42 percent after implementation of the recommendations. From 2013, most of the increase in terms of the volume of debt raised is via bonds' issuances, which include negative pledge, and in practice do not include collateral but rather limitations imposed on the issuing company to create liens for other creditors.

An analysis of the share of bond issuance (in terms of volume of debt raised) by rating, shows an increase, albeit insignificant, in the rating of the issued series in the two years following the implementation of the Committee's recommendations. Figure 5 divides the bond issuance into two groups: series that were issued with a high rating (A- and higher), compared with series that were issued with a low rating or without any rating; the figure shows that the improvement in the rating of the issued bonds occurred mainly in the period 2009-2010, after the GFC. In 2011-2012, there was a further but negligible improvement in the rating of the issued bonds. In subsequent years, the relatively high quality of the issued bonds was maintained, although to a lesser degree than in 2011-

2012. This finding implies that even though the HC recommendations have been fully implemented, the effect on the risk, as measured by the rating, has been essentially negligible.

Figure 4: Share of new bond issuance (in terms of volume raised) by type of lien, 2007–2019
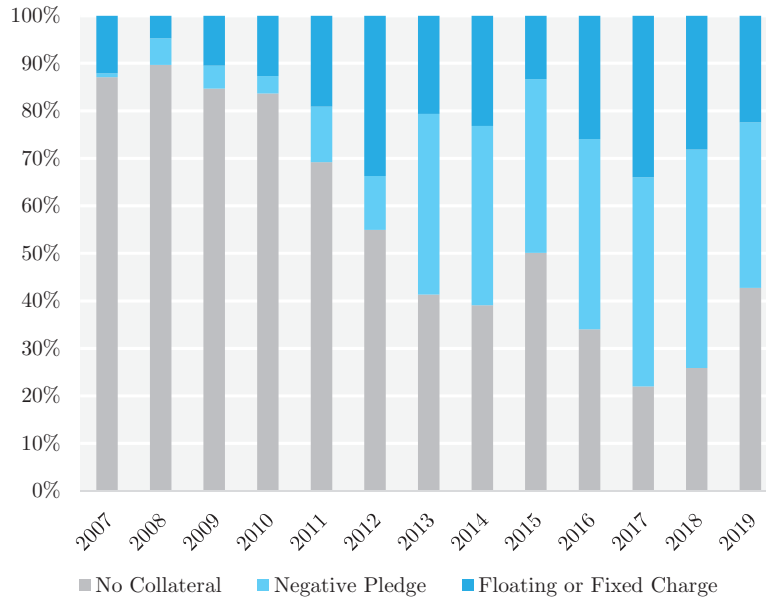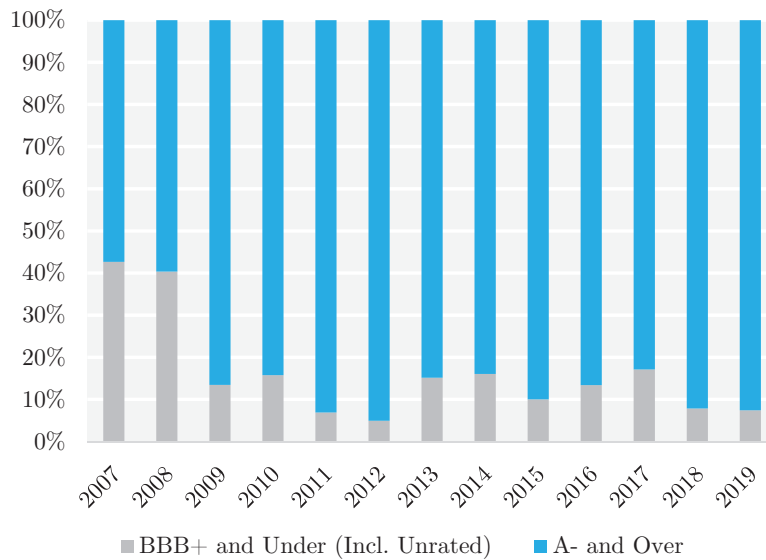

Figure 5: Share of new bond issuance (in terms of volume raised) by rating group, 2007–2019

As the figures above show, the new bond series incorporate numerous contractual undertakings and financial covenants that must be closely monitored at the time of the initial investment as well as continuously throughout the period of holding the bonds, which involves significant monitoring

operations. These operations include control of the quality and value of the collateral, conducting a quarterly review of compliance with financial covenants and violations of the contractual undertakings during the bond's life and preparing a written analysis on the date of the issuance and at least once a year. Additionally, the institutional investor's investment committee and board of directors must receive ongoing reports from the middle office regarding irregularities. Furthermore, once a year, and as necessary, the middle office reviews and updates the internal rating model and then validates it. The costs to the institutional investors involved in these monitoring processes are considerable and were not incurred prior to the implementation of the Committee's recommendations.

Another phenomenon in the new bond series, which underscores the effect of the considerable monitoring costs following HC, is the increase in the concentration among the institutional investors in new bond issuance (almost doubled) following the Committee (Figure 6).[5] This finding implies that the institutional investors increased their stake in each issuance, in order to align the interests between the monitoring efforts and their benefits from the corporate debt investments. In fact, it supports the claim that HC caused changes in investments decisions made by institutional investors due to the monitoring costs.

Figure 6: HHI levels among the institutional investors in new bond series issuance, 2009–2016

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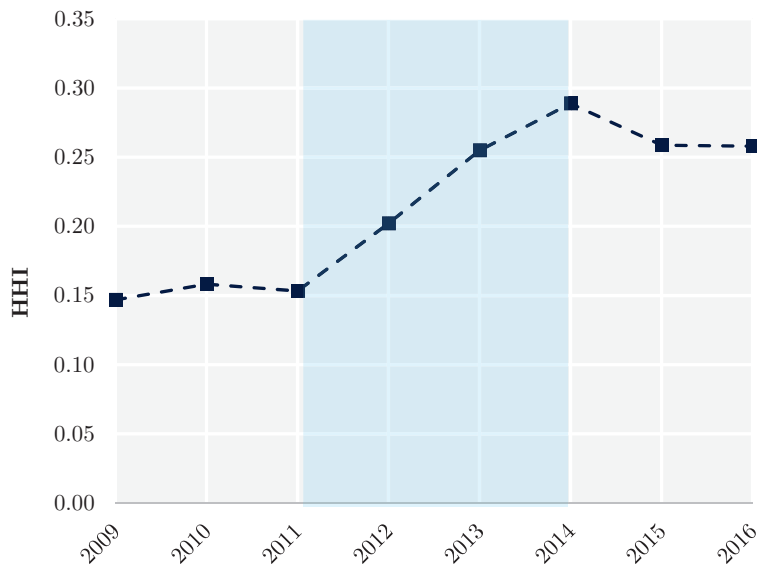
[5]In addition, we observe (in parallel) a significant decline in the market share of the institutional investors in new bond issues following the implementation of HC. For instance, in the years 2009–2011 the average share is 27%, and in the years 2012–2015 the average share is 13%.

3 Data

This study focuses on data of two types of debt instruments – (1) private loans; and (2) public corporate bonds. Both of these were impacted by the implementation of the HC recommendations. Public bonds were directly affected by the recommendations due to the addition of financial covenants and contractual undertakings to deeds of trust, as shown in Section 2, while loans probably were indirectly affected through the shifting in demand by the institutional investors after the implementation of the regulation.

Given that our main estimation strategy in this paper (see below) requires the use of two homogeneous groups, only one of which was affected (or treated) by means of an exogenous shock, in formulating the data set we rely on the fact that the Committee's recommendations do not apply to the expansion of existing bond series. The Committee's recommendations were only applied to new bond series issued from the fourth quarter of 2010 onward. That is, they do not apply to series that were expanded. Consequently, in creating the data set for the public bonds, we used data for new bond series that were issued from 2008 until the third quarter of 2010, and from the fourth quarter of 2010 through 2013 we used bond series that had been expanded (based on the series issued prior to the implementation of the Committee's recommendations). We were therefore able to create one group that was not affected (directly or indirectly) by the Committee's recommendations.[6]

3.1 Private Loans Data

In this paper, we analyze data of 547 loans provided by institutional investors in the period 2008–2013. The HC recommendations were implemented at the end of 2010 and we therefore analyze the credit provided by the institutional investors over a three-year period before and after the regulations entered into force. Notably, these data are not reported publicly and were received from the institutional investors by way of a report requested specifically for this study

Table 7 (Appendix A) describes the private loans data by year and sector. The average volume of a loan in the entire period was NIS 74 million, with an average rating of A, and the average yield

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[6]In bond series that were issued in the period prior to implementation of the Committee's recommendations (and were not affected by its conclusions) and were expanded after implementation of the recommendations, we do not expect to find any effect since the Committee's recommendations only apply to new bond series that were issued later on.

spread was 3.6 percent.[7] The table shows that from 2008 until 2013, the size of the loans provided by the institutional investors increased, whereas in 2011 – immediately following the implementation of the HC recommendations – there was a marked increase in the number of loans. At the same time, the average spread of the loans dropped by 0.56 percentage points (56 basis points) even though no distinct trend is noticeable in the average duration and average rating.

When examining the total volume of the loans by sector[8], the commerce and services sector is prominent, accounting for 30 percent of the total volumes of loans. Other prominent sectors are the real estate and energy (including oil and gas) sectors, where each of the accounting for 20 percent of the total volume. The heterogeneity among the sectors with respect to average duration is also marked.

3.2   Public Bonds Data

In this paper, we analyze data of 476 bond series that were issued on the Tel Aviv Stock Exchange in the period 2008–2013. Table 8 (Appendix A) presents the data for the bond series that were issued, by year and by sector. The table shows that the average volume of the issuance of the bond series is NIS 221 million, higher than that of the average loan. The average spread is lower, compared with the private loans (3 percent compared with 3.6 percent), even though the average duration is slightly higher and the rating is the same.

3.3   Private Loans vs. Public Bonds

Table 1 compares the private loans and public bonds data, before and after the implementation of the Committee's recommendations. In the period prior to implementation of the Committee's recommendations, as one can see, the loans generally had a higher rating, a lower average duration and higher spread, all with a high statistical significance.

In the period subsequent to the implementation of the Committee's recommendations, the average rating in both groups is similar: the rating for the loans was unchanged compared with

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[7]The spread was calculated by subtracting the average yield derived from the zero curve estimation (link) from the price of the loan (the interest rate determined at the date of the loan), according to the duration, index and month in which the loan was provided.

[8]The number of loans multiplied by the average loan value for the sector.

the prior period, while the rating for the bonds was one notch higher. Table 1 also shows that the average duration of the loans increased but is not significantly different from the average duration of the bonds; it is particularly noticeable that in the period after implementation of the Committee's recommendations, the average spread for the loans decreased substantially and it slightly differs from the average spread in the bond series.

Figure 7 shows the sectoral distribution of the two groups (as a share of the total volume). One particularly unusual sector in this comparison is the financial sector (banks and insurance) which accounts for approximately 40 percent of the public debt, but in which the share of loans is extremely low (almost negligible). Another noticeable sector is energy: whereas the proportion of public debt issuance is low, the proportion of loans in this sector is high. The differences in the other sectors are insignificant, and it is also worth noting that at the sectoral distribution, there is no significant difference when comparing the periods prior to and after the implementation of the recommendations.

Figure 7: Sectoral distribution of public bonds and private loans, 2008–2013, in percent
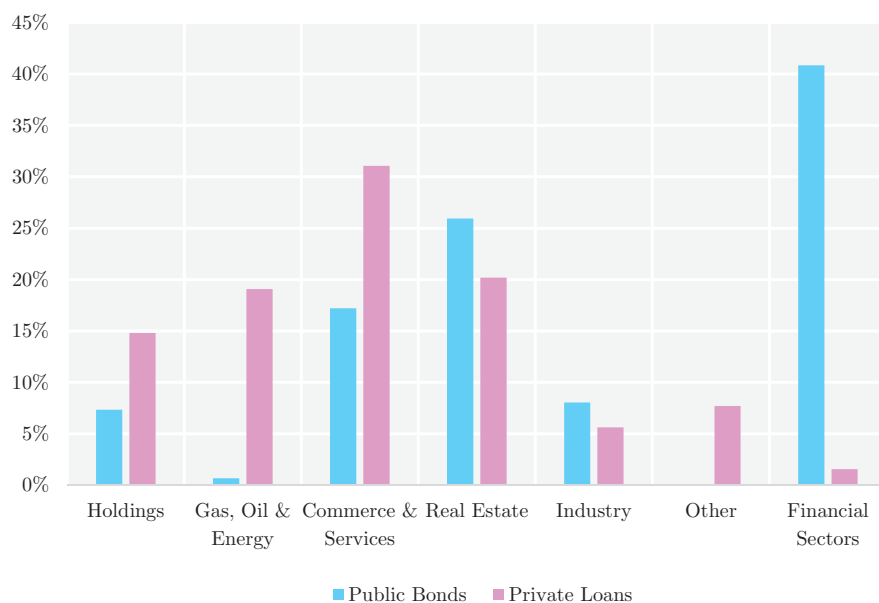
Table 1: Descriptive Statistics – Private Loans Vs Public Bonds — Pre & Post

Private Loans – Pre

	Observations	Mean	Median	Min	Max	SD
Volume (K of NIS)	95	77,400***	30,000	1,100	790,000	129,000
Spread (%)	95	3.9***	3.7	-0.5	15.8	2.7
Duration	95	3.3***	2.0	0.1	14.5	3.3
Rating	95	A***	A+	BB	AA+	2 notches

Public Bonds – Pre

	Observations	Mean	Median	Min	Max	SD
Volume (K of NIS)	176	275,000	169,000	38,000	1,700,000	294,000
Spread (%)	172	2.7	2.7	-3.6	8.8	2.1
Duration	173	5.1	4.5	1.0	18.7	2.4
Rating	176	A-	A	BB	AA+	3 notches

Private Loans – Post

	Observations	Mean	Median	Min	Max	SD
Volume (K of NIS)	452	73,100***	45,000	2,400	940,000	102,000
Spread (%)	452	3.5**	3.5	-0.5	10.5	1.3
Duration	452	4.3	3.8	0.1	11.1	2.8
Rating	452	A	A	BB	AAA	2 notches

Public Bonds – Post

	Observations	Mean	Median	Min	Max	SD
Volume (K of NIS)	336	192,000	105,000	3,500	1,530,000	240,000
Spread (%)	304	3.3	2.6	0.1	15.3	2.0
Duration	304	4.4	4.1	0.8	10.6	1.8
Rating	336	A	A	BB	AAA	3 notches

***, **, * indicate that the average in one group is different than the variable in the other group to a degree that is statistically significant at a level of 1%, 5% and 10%, respectively, based on t-test for equality of average.

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4 Identification Strategy

Since 2010, institutional investors have substantially increased their investments in private loans provided to the business sector, while at the same time reducing their share of investment in public corporate bonds. We also note that the institutional investors did not increase their investments in private loans and public bonds at a faster rate than the increase in their total assets under management (AUM), and throughout the period, the investment in these asset classes as a percentage of the institutional investors' AUM remained unchanged (Figure 8).[9]

Figure 8: Corporate debt investments by the institutional investors, 2008–2019, in percent
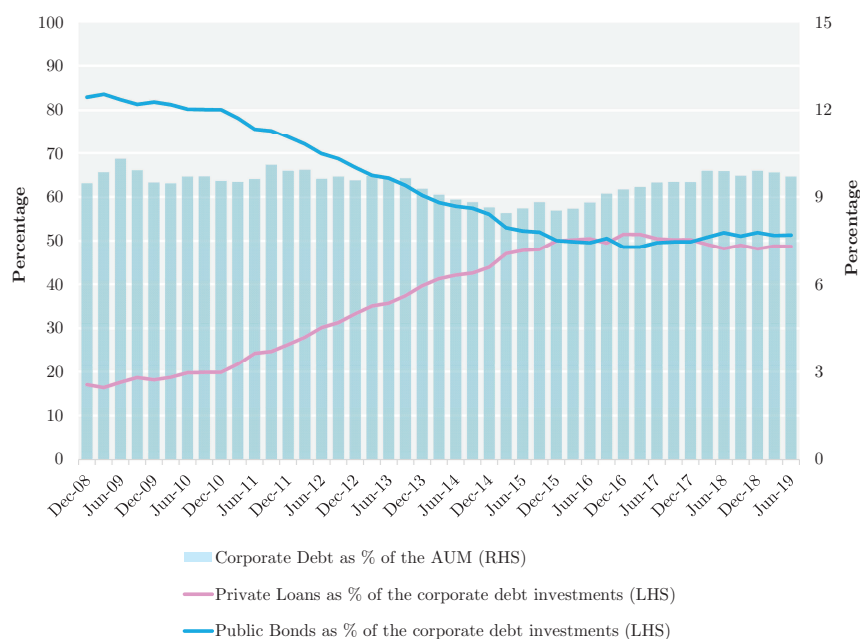
A closer examination of the years in which the key changes in debt investments by institutional investors occurred (2010–2015) shows that in this period the share of public bonds and private loans out of the AUM declined slightly. At the same time, the composition of debt investment has changed – a shift to private loans at the expense of investment in public debt. Figure 9 highlights this distinction: in the first half of 2010, the investments of institutional investors in public bonds and private loans (together) accounted for 9.7 percent of all their managed assets, with loans accounting

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[9]The institutional investors also invest in non-tradable bonds. It is impossible to perform any empirical tests in order to analyse the effect on this type debt instrument. It should be noted that the observed trend in Figure 8 remains the same even if we include the non-tradable bonds (Figure 14, Appendix A).

for approximately one-fifth (20 percent) of corporate debt investments. However, by the end of 2015, investments by institutional investors in public bonds and private loans accounted for 8.5 percent of their managed assets while the loans had increased to half of this investment composition.

Figure 9: Public bonds and private loans investments as a percentage of the AUM, 2010–2015

To understand whether the decrease in corporate bond investments among the institutional investors can be explained by a decrease in the market value of the public bonds, we examined the balance of the bonds over time. Figure 10 shows that in 2010–2015, the balance of the bonds grew at negligible rates and remained almost unchanged.[10] In contrast, there is a noticeable change in the holdings distribution of the key investors in the public debt market – the institutional investors and other participants (mutual funds and households).

In the years 2011–2013, institutional investors' share of investments in public corporate bonds decreased, while at the same time, the other participants increased their investment in public debt.

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[10]One possible explanation for the negligible growth rates is the decline in demand for credit by the business sector in 2010–2013, unrelated to the effect of the HC recommendations. Nonetheless, an analysis of the annual rates of change in credit to the business sector (Figure 15, Appendix A) shows that in 2010–2012, there was no deviation from the average long-term rate of change, and that the growth of credit to the business sector only declined in 2013–2015. Notably, the growth of credit to the business sector began to slow in the end of 2012 and mainly affected credit provided by the banks, with negative annual rates of change until 2014. Accordingly, in the first two years following the HC recommendations, the demand for credit did not change significantly.

From 2014, institutional investors maintained a steady share, but the other participants continued to increase the share of their holdings in public bonds, in line with the increase in total issued public bonds.[11] This finding emphasizes that the institutional investors changed their preferences regarding investments in the public debt market. Following a significant decrease in the share of the investment in 2011– 2013, the institutional investors maintained a steady rate of investment in public debt, despite the growth of the total market value after 2014 and despite the increase in their AUM.

Figure 10: Balance of public corporate bonds[a] and distribution of the main investors, 2009–2019
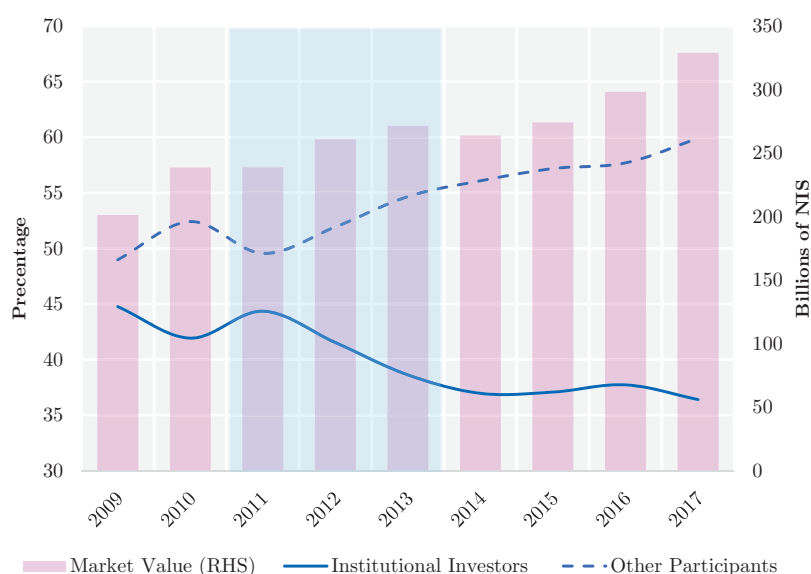
[a]In terms of market value. *Other Participants* refers to mutual fund and households.

In order to identify whether we can interpret the phenomenon described above as evidence for changes in the demand for the different instrument types, we could estimate the differences in yield spreads between private loans and public bonds, in the period before and after the implementation of the HC recommendations[12]. We assume that if institutional investors changed their conduct after

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[11]A possible argument is that in the period following the implementation of HC recommendations the public bonds were underpriced, so the institutional investors could sell these bonds in the secondary market to less sophisticated investors. But, in a working paper of Graham, Michelson and Vieder (2021) there is no evidence for underpricing (or rapid aggregate inflows to mutual funds) in the years following HC (see link).

[12]This difference is ostensibly the illiquidity premium between tradable and non-tradable debt instrument. But, it should be noted that there are different characteristics between these two debt instruments (loans and bonds). Thus, in this study we do not attribute the entire gap in the prices to the illiquidity premium.

implementation of the HC recommendations, such that the increase in the supply of loans they provide was greater than the increase in the demand for loans by businesses, then the price of the loans relative to public bonds would decline.

The main estimation issue is the fact that the regulation affected both the public bonds and the private loans. When trying to address this problem it is important to mention that the HC recommendations did not apply to the expansion of existing series but only to new bond series. In that period, after the implementations of the HC recommendations, the rate of newly issued bond series significantly dropped, and most issues were expansions of existing bond series (Figure 11). This finding is therefore significant evidence of the market players' preference for continuing, where possible, to participate in the issuance of series that do not incorporate the conditions and regulations set out in the Committee's recommendations, in practice evading those recommendations. At a certain point, the expansion of series becomes irrelevant (as their maturity approaches) and it can be seen that from 2014, the share of the new series returns to the "normal" level

Figure 11: New series as a percentage of all public bond issues, 2009–2019, in percent
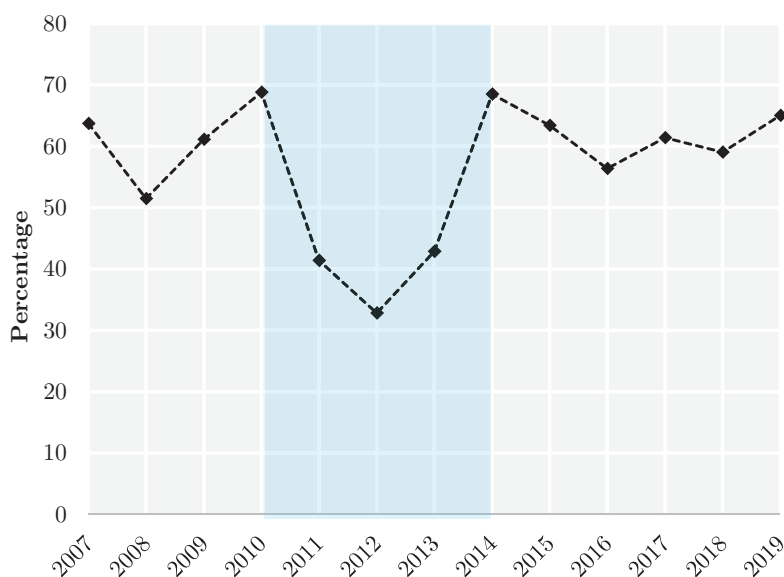
Therefore, the implementation of the HC recommendations resulted in the creation of two groups of public debt series – new series, which are subject to the Committee's recommendations, and expansions of existing bond series, to which the Committee's recommendations do not apply. In practice, the new bond series that were issued after implementation of the HC recommendations

are a separate group from the series that were in publicly issued prior to the publication of the recommendations (as well as from the bond series that were expanded later on), since they incorporate financial covenants and contractual undertakings that were not present previously.

In other words, prior to publication of the Committee's recommendations, there was one homogeneous group which split into two groups in the wake of implementation of the regulation: new bond series and expansions of existing bond series. The empirical investigation in this paper is based on the Committee's recommendations not applying to the bond series that were expanded. We can therefore estimate the difference in the cost of debt over time between a public debt instrument, which should not be affected by the Committee – bond series that were issued prior to the Committee, and the series that were later expanded on the basis of those series[13] – and a private debt instrument, loans, which are likely to be affected, due to demand by the institutional investors being redirected to this debt instrument as a result of the Committee's recommendations.

5   Empirical Strategy and Results

5.1   Estimation of the yield spreads difference by OLS regression

For the purpose of the basic empirical strategy, we used an OLS regression in which the estimated (dependent) variable is the yield spread of each debt instrument. The academic literature[14] proposed several econometric models for estimating yields (or spreads) for corporate bonds, which made use of the characteristics of bonds, such as rating, duration and index. Additionally, characteristics such as the sector in which the company operates and date of the measurement of the spread (as a variable which controls macroeconomic characteristics) could also explain the variance in the bond spread.

The loan spread is relevant to the date of providing the loan and was calculated manually by means of the difference between the interest rate quoted for the loan and the yield derived from a zero

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[13]This data set allows us to create a control group which was not affected by HC. It should be noted that after HC recommendations there was a change in the ratio of issuance of extended bond series (Figure 11), so in order to avoid from the impacts of demand and supply, we use the price in the day in which the company announced that it is going to issue extended bond series, before demand flows by investors. It is possible that in the wake of the company announcement, the yield spreads will rise–because of the leverage increasing–but in some specifications we control for the company's leverage and basically we neutralize all the effects and remain with an untreated group.

[14]For example, see Elton et al. (2001), Campbell and Taksler (2003) and Gilchrist and Zakrajšek (2012).

curve[15], adjusted to the month in which the loan was provided, the duration and linkage. The bond yield spread on the date of issuance[16], according to the Bank of Israel's automatic calculations, is the difference between the yield of the bond series and the yield of the zero curve calculated according to rating and index. The variable of interest is a dummy variable, which takes the value of 1 for a private loan and 0 for a public bond. In practice, the coefficient of this variable estimates the difference in the yield spreads between private loans and public bonds. In the regression, we control for the sector, rating and time (the quarter in which the loan was provided/the bond was issued), which are supposed to control the risk and time factors. Additionally, we control the characteristics of the loan or bond series that was issued, which include amount (volume), time to maturity in years, and a dummy variable for index. The estimated OLS regression is:

$$Y_{i,t} = \beta_0 + \beta_1 Loan + \beta_2 Sector + \beta_3 Time + \beta_4 Rating + \beta_5 Volume$$
$$+ \beta_6 Index + \beta_7 Maturity + \epsilon_{i,t}$$

(1)

The results of the regression are presented in Table 2. Notably, due to the marked sectoral difference between loans and bonds, primarily in the financial sector (banks and insurance) and in the energy sector (see Figure 7), the results are presented in two ways: columns (1) through (3) show the results for all sectors, and columns (4) through (6) show the results without the financial and energy sectors.

Columns (1) and (4) in the regression estimate the difference in the yield spreads over the entire period – without separating the periods before and after the HC. This estimation shows that on average, the premium for a private loan is about 30 basis points (0.3 percentage points) higher than for public bonds and has a high statistical significance, even in an estimation without the excluded sectors. Columns (2) and (5) estimate the difference in the yield spreads in the years prior to publication of the HC recommendations in which we can clearly see that the premium is positive and on average is about 1.2 percentage points with a high statistical significance. Columns (3) and (6) estimate the premium in the period after publication of the HC recommendations. As can be seen, the premium is close to zero percentage points and has no statistical significance. Thus, it can

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[15]The curve derived from Israel government bonds according to the paper by Ana Brodesky and Nadav Steinberg — "Improving the Yield Curve Estimation Implemented at the Bank of Israel".

[16]The yield spreads on the date of issuance serves as an estimation of the debt price of the requested by the institutional investors participating in the bond issuance.

be said that there is no significant difference in the yield spreads in those years.[17]

We can therefore conclude that following the implementation of the Committee's recommendations, the yield spreads required by the institutional investors when providing loans decreased substantially and there is no significant difference between the yield spread of a public bond to the yield spread of a private loan. This is illustrated in Figure 12, which presents the estimation from the regression in the period prior to and after publication of the Committee's recommendations as well as the confidence interval of the estimation (at a level of 5 percent). This result confirms that following the implementation of the Committee's recommendations, the estimated difference is statistically significantly lower than the difference estimated prior to the recommendations.

Figure 12: The estimated yield spread difference and its confidence interval[a], in percent

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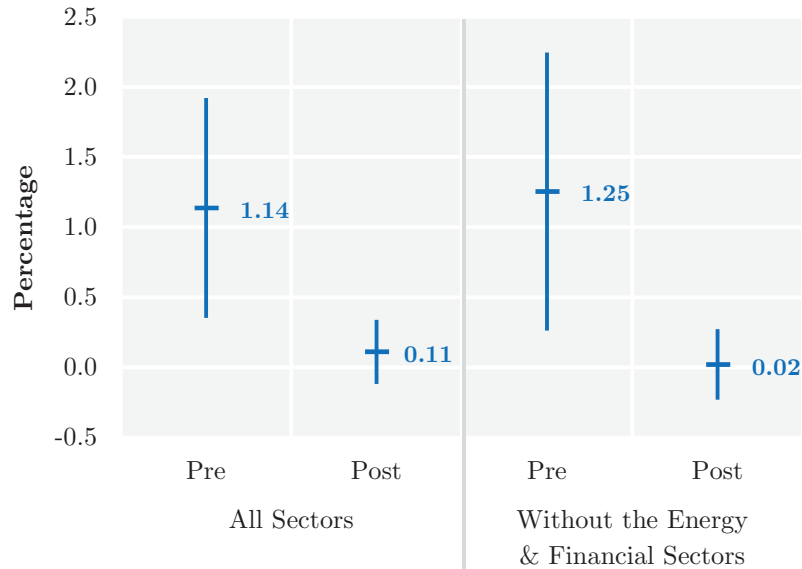
[a]In level of 5%.

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[17]Notably, in robustness tests, we used all the new series that were issued in the sample period (instead of the new series prior to publication of the Committee's recommendations and the series that were expanded after the recommendations) and the results we received are not significantly different from the results we obtained in this estimation, and in fact they increase the robustness of our results.

Table 2: OLS Regression

	All Sectors			No Energy & Financial Sectors		
	(1)	(2)	(3)	(4)	(5)	(6)
	All Period (2008 - 2013)	Pre	Post	All Period (2008 - 2013)	Pre	Post
Loan	0.281**	1.137***	0.111	0.290**	1.254**	0.021
	(0.125)	(0.400)	(0.117)	(0.140)	(0.506)	(0.128)
Time to Maturity	-0.041*	-0.119**	0.029	-0.069**	-0.221**	0.010
	(0.022)	(0.055)	(0.023)	(0.032)	(0.101)	(0.031)
Volume	-0.255***	-0.138	-0.218***	-0.236***	-0.148	-0.165***
	(0.048)	(0.123)	(0.048)	(0.058)	(0.149)	(0.058)
Index Dummy	1.128***	1.532***	0.811***	1.139***	1.344***	0.853***
	(0.109)	(0.246)	(0.114)	(0.130)	(0.296)	(0.134)
Constant	6.230***	5.125**	4.850***	5.709***	5.122	3.205**
	(1.243)	(2.553)	(1.148)	(1.475)	(3.140)	(1.352)
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Rating FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1023	267	756	766	205	561
R^2	0.430	0.504	0.478	0.386	0.452	0.472

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

5.2 Estimation of HC recommendations' effect using the DID method

As described in Subsection 5.1, the period 2008–2013 can be divided into two sub-periods: the sub-period prior to the Committee's recommendations (the Pre period, 2008 – 2010:Q3), and the sub-period after publication of the Committee's recommendations (the Post period, 2010:Q4 – 2013). Therefore, we could utilize this set up in order to use the Difference-in-Differences (DID) methodology. First, we examine the trend in the loan and bond average yield spreads in the Pre period (2008–2010) (Figure 13). A parallel trend can be identified, enabling us to utilize this approach to examine the way in which implementation of the HC recommendations was treated as an exogenous shock. Figure 13 also shows that in 2011–2013 the difference between the loan yield spreads and the bond yield spreads, is slightly low, and as one can see, the parallel trends assumption also holds after the exogenous shock.

Figure 13: Average yield spreads of private loans and public bonds, 2008–2013, in percent
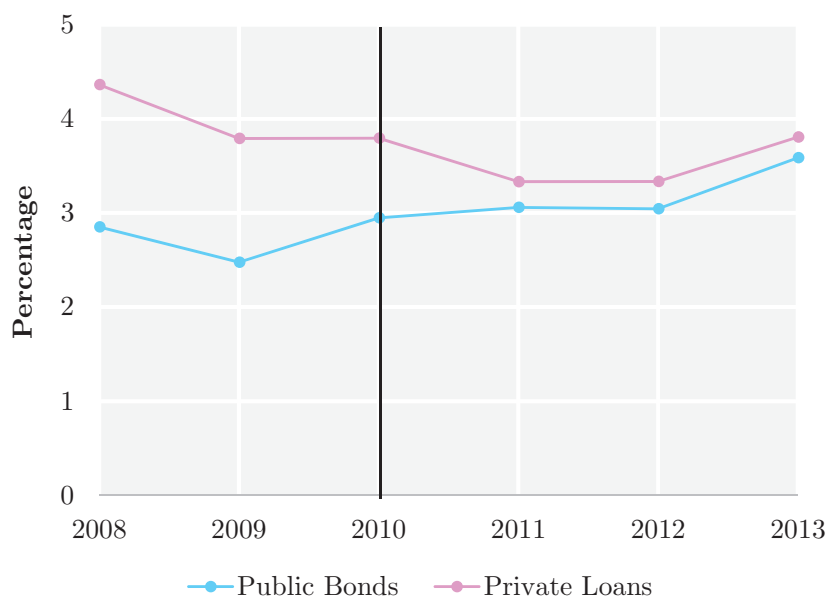
According to the estimation presented in Table 2, the average yield spreads decreased by more than a percentage point in the period after the publication of the Committee's recommendations, but this estimation based on the OLS method does not take into account the Committee's recommendations as a causal effect. We therefore performed the estimation using a DID regression, where we added a dummy variable to the regression in Section 5.1 which takes the value 1 for the Post HC

period, and 0 for the Pre HC period. We also added the interaction variable (the variable which, in practice, estimates the DID) for the Post period, multiplied by the dummy variable for the loan or bond. The DID estimated equation is:

$$Y_{i,t} = \beta_0 + \beta_1 Loan + \beta_2 Post + \beta_3 Loan \times Post + \beta_4 Sector + \beta_5 Time + \beta_6 Rating$$
$$+ \beta_7 Volume + \beta_8 Index + \beta_9 Maturity + \epsilon_{i,t} \tag{2}$$

The results are presented for a sample that includes all sectors of the economy and for a sample that excludes the irregular sectors (financial and energy sectors). Another possible argument that calls into question the concept that these are homogeneous groups is that the companies taking loans are essentially different from companies issuing bonds. To address this argument and to test the robustness of the results, we therefore restricted the sample to companies that have both types of instruments – public bonds and private loans.

After restricting the sample to public firms only, we allow the addition of variables to the regression which control for the firm characteristics, so that we estimated the DID regression including some variables, such as the age and the size of the firm, as well as accounting-financial variables, such as leverage, profitability, liquidity of the assets and the share of the company's tangible assets.

The regression results are presented in Table 3: column (1) presents the results for the entire sample and all of the sectors; column (2) presents the results without the energy and financial sectors; column (3) presents the results in a restricted sample for companies with public bonds and private loans and for all sectors; in column (4) we add to the estimation the control variables for the firm characteristics; in column (5) we restrict the sample only for listed firms and include another variables: standard deviation of the stock (to control for the issuer risk) and a P/B ratio (to control for investments opportunities); and in column (6) we again omit the financial and energy sectors.

In each of the specifications presented in columns (1) – (6) it can be observed that the coefficient for the loan variable is positive, and it has a statistical significance of 1 percent. The coefficient for the interaction variable, which indicates the causal effect of HC, is between -0.5 percentage points (-50 basis points) to -1.3 percentage points, with a high level of statistical significance. The economic effect of this finding is significant – as we can observe in Figure 12, there is a decrease of about 25 percent in the loan yield spread following the implementation of the Committee's recommendations.

Table 3: DID Regression

	All Sample		Loan & Bond Firms Only			
					Listed Firms Only	
	(1)	(2)	(3)	(4)	(5)	(6)
	All Sectors	No Energy & Financial Sectors	All Sectors		All Sectors	No Energy & Financial Sectors
Loan	0.693***	1.052***	1.557***	1.484***	1.476***	1.721***
	(0.238)	(0.283)	(0.436)	(0.447)	(0.483)	(0.502)
Post	-0.548	-0.744	0.758	0.900	1.005	0.931
	(0.431)	(0.506)	(0.973)	(0.971)	(1.004)	(1.007)
Post × Loan	-0.498**	-0.922***	-1.259***	-1.304***	-1.044**	-1.322**
	(0.245)	(0.298)	(0.450)	(0.460)	(0.508)	(0.536)
Time to Maturity	-0.035	-0.047	-0.126***	-0.078*	-0.076	-0.010
	(0.023)	(0.033)	(0.045)	(0.047)	(0.058)	(0.066)
Volume	-0.235***	-0.201***	0.096	0.156	0.173	0.180
	(0.048)	(0.059)	(0.091)	(0.095)	(0.109)	(0.111)
Index Dummy	1.084***	1.049***	0.776***	0.654***	0.632**	0.541**
	(0.111)	(0.133)	(0.196)	(0.205)	(0.258)	(0.262)
Constant	5.600***	4.441***	-2.789	-9.384**	-7.326*	-7.273*
	(1.279)	(1.522)	(2.271)	(4.187)	(4.373)	(4.372)
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Rating FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm Characteristics[a]	No	No	No	Yes	Yes	Yes
Observations	1023	766	292	276	219	208
R^2	0.433	0.394	0.491	0.523	0.571	0.562

Robust standard errors in parentheses.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

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[a]Firm characteristics include age, size, tangibility and financial ratios, like leverage, profitability and liquidity.

For listed firms the standard deviation of the stock and P/B ratio are also included.

5.3 Robustness Checks

5.3.1 Restricted sample period

The original sample period for which we examine the effect of the exogenous shock of publication of the Committee's recommendations is the three years prior to and three years after publication of the HC recommendations – 2008 through 2013. Some events occurred during this period, which will be detailed below, which might partially explain the results obtained in this paper.

The first major event is the GFC of 2008, which affected liquidity in the financial markets and the price of assets (Garcia-Appendini and Montoriol-Garriga 2013; Allen and Carletti 2008; Ivashina and Scharfstein 2010). Consequently, firms that wanted to raise debt at the beginning of the sample period and faced difficulties may have chosen to approach the private debt market, which is characterized with higher yield spreads, a factor that may skew the results of our study.

Another event that could drive the results of the study is the reduced business lending activity by Israel's banks. Given that the banks are the key player in providing loans to large entities, a reduction of their activity for the purpose of accumulating capital (or for any other reason) might cause borrowers to turn to nonbank sources of credit such as the institutional investors. An examination of the business lending trends in the banking system in Israel shows that negative growth rates in credit supply only began toward the end of 2012, which led to a negative growth in the supply in 2013.

These events took place mainly at the edges of our sample period and we therefore restricted the estimated sample period to 2009-2012—namely two years prior to and two years after publication of the HC recommendations—so as to rule out these possible explanations, and examine the same regressions that were estimated in Table 3. These results are presented in Table 4, which shows that the estimations of the Committee's recommendations as a causal effect are almost unchanged (compared with Table 3) and the statistical significance also remains high across the different specifications.

Table 4: DID Regression – Restricted Period

	All Sample		Loan & Bond Firms Only			
			All Sectors		Listed Firms Only	
	(1)	(2)	(3)	(4)	(5)	(6)
	All Sectors	No Energy & Financial Sectors	All Sectors		All Sectors	No Energy & Financial Sectors
Loan	0.649***	0.853***	1.546***	1.582***	1.796***	2.133***
	(0.244)	(0.289)	(0.454)	(0.457)	(0.462)	(0.468)
Post	1.947	0.134	1.421	1.924	1.579	0.866
	(1.381)	(0.431)	(1.362)	(1.327)	(1.316)	(0.627)
Post $\times$ Loan	-0.592**	-0.933***	-1.067**	-1.119**	-1.041**	-1.424***
	(0.256)	(0.312)	(0.479)	(0.486)	(0.510)	(0.522)
Time to Maturity	-0.055**	-0.077**	-0.167***	-0.128**	-0.074	-0.012
	(0.025)	(0.038)	(0.053)	(0.054)	(0.063)	(0.067)
Volume	-0.258***	-0.274***	0.146	0.222**	0.248**	0.246**
	(0.054)	(0.067)	(0.105)	(0.108)	(0.114)	(0.113)
Index Dummy	1.113***	1.158***	1.003***	0.928***	0.913***	0.837***
	(0.122)	(0.149)	(0.224)	(0.231)	(0.273)	(0.267)
Constant	3.376*	4.991***	-4.849*	-6.325	-1.861	-1.179
	(1.855)	(1.635)	(2.572)	(4.657)	(4.462)	(4.304)
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Rating FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm Characteristics[a]	No	No	No	Yes	Yes	Yes
Observations	705	521	202	191	153	146
R^2	0.496	0.465	0.517	0.568	0.642	0.664

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

[a]Firm characteristics include age, size, tangibility and financial ratios, like leverage, profitability and liquidity.

For listed firms the standard deviation of the stock and P/B ratio are also included.

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5.3.2 Using the new bond series for the entire sample period

The empirical strategy in the paper so far is based on the fact that the Committee's recommendations were not applied on expansions of bond series. In order to negate possible arguments in which this group represents specific companies (for example, those that do not require tight monitoring), we use the new bond series for a robustness check. For this purpose, we need to assume that the new bonds' price was not affected at all by the Committee's recommendations. This requires two things: (1) There is perfect competition in the bond market, so the financial institutions could not incur the monitoring costs to the issuer (because there are additional participants, which are not subject to the regulation); (2) Implementation of HC recommendations did not decrease the risk in new bonds.

The first one should be examined by the depth of bonds tradability, as in the study of Gershgoren, Hadad, and Kedar-Levy (2020), indicating that the bond market in Israel is deep. The second requires testing the risk pricing of the new bond series. First, in Figure 5, as one can see the rating of the new bond series almost did not change following the committee. Second, we examined empirically whether the price of new bonds is different from all of the rest of the tradable bonds, and we did not find statistical evidence for that. So assuming that the price of new bond series was not affected, it enables us to execute this check using the DID approach.

The results are presented in Table 5. Columns (1) – (3) include the entire period and columns (4) – (6) include the restricted period (years: 2009–2012). Again, we test for all the sectors (columns (1) & (4)); without the Financial and Energy sectors (columns (2) & (5)); and the restricted sample for companies with public bonds and private loans and for all sectors (columns (3) & (6)). As one can see, as expected, the interaction variable is still negative with high statistical significance.

Table 5: DID Regression – New Bond Series

	Entire Period (2008–2013)			Restricted Period (2009–2012)		
	(1)	(2)	(3)	(4)	(5)	(6)
	All Sectors	No Energy & Financial Sectors	Loan & Bond Firms	All Sectors	No Energy & Financial Sectors	Loan & Bond Firms
Loan	0.699***	1.049***	1.362***	0.608**	0.790***	1.320***
	(0.243)	(0.284)	(0.460)	(0.251)	(0.294)	(0.504)
Post	-0.211	-0.402	1.318	2.098	0.587	2.390
	(0.442)	(0.516)	(1.038)	(1.370)	(0.450)	(1.501)
Post × Loan	-0.736***	-1.161***	-1.569***	-0.753***	-1.185***	-1.768***
	(0.249)	(0.296)	(0.491)	(0.269)	(0.326)	(0.560)
Time to Maturity	-0.044*	-0.065*	-0.166***	-0.067***	-0.097**	-0.188***
	(0.023)	(0.035)	(0.051)	(0.026)	(0.041)	(0.063)
Volume	-0.235***	-0.215***	-0.018	-0.240***	-0.268***	-0.062
	(0.056)	(0.069)	(0.114)	(0.066)	(0.083)	(0.131)
Index Dummy	1.141***	1.023***	1.022***	1.265***	1.255***	1.154***
	(0.115)	(0.135)	(0.221)	(0.128)	(0.153)	(0.264)
Constant	5.725***	4.910***	-0.409	3.390*	5.015**	-1.155
	(1.452)	(1.758)	(2.766)	(2.013)	(1.980)	(3.122)
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Rating FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	887	659	228	609	450	164
R^2	0.440	0.413	0.505	0.496	0.465	0.553

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

6 Conclusion

In this paper we suggest a novel set-up which enables us to analyze investors' incentive to perform monitoring in the public debt market. We use a regulation that obligated the institutional investors in Israel to perform monitoring on borrowers only in the public debt market – which is highly decentralized, but not in the private loans market – which is highly centralized. The fact that this regulation, as an exogenous shock, is applied only on one type of debt instrument, allows us to use the difference–in–differences (DID) methodology in order to estimate the effect of this regulation on the decisions taken by the institutional investors when choosing to invest in each of the debt types.

We examined the question using an identification method based on estimation of the yield spread differences between public bonds and private loans provided by the institutional investors, pre and post implementation of the Hodak Committee's recommendations. The key finding in the study is that implementation of the HC recommendations brought about a statistically and economically significant decrease in the yield spread differences between the two types of corporate debt instruments, so that the results are robust to a large number of specifications and different subsamples over the study period. We attribute the decrease in the yield spread differences to institutional investors' growing demand for private loans as their demand for public bonds declined.

In examining the causes that led the institutional investors to change their preferences and increase their demand for private loans at the expense of public bonds, it is worth noting that the regulations described above apply exclusively to institutional investors, whereas the other players in the market (mainly the mutual funds) were not governed by them. Consequently, following implementation of the regulations, the institutional investors found themselves alone in bearing the burden of the substantial monitoring costs, which in practice became a public good, from which other players in the market also benefited. In other words, a free rider situation was created among the players competing with the institutional investors in the public debt market.

The fact that the Committee recommendations caused institutional investors to incur significant monitoring costs in a decentralized debt market led them to redirect their investments to the much more concentrated loan market, in which the institutional investor is generally the single lender. This resulted in an alignment of interests between the costs of the monitoring activity and the benefits inherent in this activity, which provides the institutional investor the incentive to monitor

the borrower, and although this process entails certain costs, the monitoring is at the discretion of the institutional investor.

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Appendix A

Table 6: Definitions of the Main Variables

Variable	Definition
Y_i *(Yield Spreads)*	The yield spread for each of the debt instruments from government bonds adjusted to the average duration and index. *For loans*, the spread is calculated manually by means of the difference between the interest rate quoted on the loan and the yield derived from a zero curve, which is consistent with the month in which the loan was provided, the average duration and the index. *For bonds*, the spread is based on the Bank of Israel's automatic calculations, in which the difference between the yield for the series and the zero curve yield consistent with rating and indexation is calculated. For the new bond series, we used the spread at the issuance date of the series and for the expanded bond series we used the spread at the date of the prospectus for the expanded series.
Loan	A dummy variable that takes the value of 1 for a private loan and 0 for a public bond.
Sector	A dummy variable for the sector, which is defined in accordance with the sectoral classification of the Tel Aviv Stock Exchange.
Rating	A dummy variable for the rating, based on the generally accepted rating scale in Israel. For loans, the rating is according to an external rating by a rating company (Maalot or Midroog) or an internal rating model prepared by the institutional investor. For bonds, the rating is according to an external rating prepared by a rating company (Maalot or Midroog).
Quarter	A dummy variable for quarter t in which the loan is provided, the bond series is issued (for new bond series), or publication of the prospectus (for expanded bond series).
Maturity	The time to maturity (in years) of the loan or bond.

Table 6: Definitions of the Main Variables - Continued

Variable	Definition
Volume	A variable for the amount of the private loan or volume of the public bond issuance.
Index	A dummy variable that takes the value of 1 for linkage to the CPI and 0 for nominal debt instrument.
Post	A dummy variable that takes the value of 1 for loans or bond series that were provided or issued after the date of publication of the Hodak Committee recommendations and 0 before.
Age	The firm's age (in years) in the time of estimating the regressions.
Size	The size of the firm is measured using the natural log of the company's total assets in quarter *t-1*.
Leverage	Leverage of the firm, calculated according to the Debt to Cap ratio (the financial debt divided by the financial debt and shareholders' equity) in quarter *t-1*.
Profitability	The firm's profitability, calculated according to the company's ROE (return on equity) in quarter *t-1*.
Liquidity	The level of the firm's liquid assets, measured according to its immediate liquidity ratio (cash and cash equivalents and short-term investments as a percentage of current liabilities) in quarter *t-1*.
Tangibility	The level of the firm's tangible assets, calculated according to the ratio of tangible assets to the firm's total assets in quarter *t-1*.
P/B ratio	A measure of the firm's growth opportunities, calculated by the ratio of the quarterly average market cap to the shareholders' equity (book value) at the end of quarter *t-1*.
Standard Deviation	The standard deviation of the monthly stock return in the period before the bond was issued or the loan was taken (the periods which tested are 1 year, 3 years and 5 years).

Table 7: Descriptive Statistics – Private Loans

Panel A: by sector

	Observations	Mean				Median			
		Volume (K of NIS)	Spread (%)	Duration	Rating	Volume (K of NIS)	Spread (%)	Duration	Rating
Holdings	56	107,000	3.63	3.19	A+	79,900	3.57	3.12	A+
Gas, Oil & Energy	136	56,700	3.34	6.42	A	38,000	3.41	7.71	A
Insurance	6	36,600	1.98	7.27	AA-	23,300	2.05	6.98	AA-
Banks	6	67,400	3.81	3.63	AA-	57,200	3.60	1.80	AA-
Commerce & Services	168	74,800	3.80	2.94	A+	33,000	3.72	2.16	A+
Real Estate	127	64,300	3.96	3.80	A	41,000	3.65	3.64	A
Industry	16	142,000	3.66	4.07	A-	56,000	3.57	4.11	A-
Other	32	97,500	2.29	3.35	A-	29,500	1.78	3.71	A-
Total	547	74,000	3.60	4.14	A	40,000	3.47	3.51	A

Panel B: by year

	Observations	Mean				Median			
		Volume (K of NIS)	Spread (%)	Duration	Rating	Volume (K of NIS)	Spread (%)	Duration	Rating
2008	28	94,600	4.36	2.28	A	12,000	3.43	1.37	A
2009	31	73,500	3.79	4.61	AA-	41,000	3.44	2.79	AA-
2010	54	60,500	3.79	3.03	A+	36,500	3.72	2.46	A+
2011	137	62,500	3.33	4.15	A	35,500	3.31	3.74	A
2012	137	58,900	3.33	4.15	A+	35,000	3.13	3.74	A
2013	160	97,800	3.80	4.75	A	57,700	3.96	4.04	A
Total	547	74,000	3.60	4.14	A	40,000	3.47	3.51	A

Table 8: Descriptive Statistics – Public Bonds

Panel A: by sector

		Mean				Median			
	Observations	Volume (K of NIS)	Spread (%)	Duration	Rating	Volume (K of NIS)	Spread (%)	Duration	Rating
Holdings	37	207,000	3.87	4.46	BBB+	150,000	3.54	4.31	A-
Gas, Oil & Energy	5	138,000	4.10	4.88	BB	134,000	3.74	4.83	BB
Insurance	29	148,000	2.71	6.54	A+	120,000	1.98	6.74	AA-
Banks	75	512,000	1.10	6.11	AA-	344,000	1.33	5.92	AA
Commercial & Services	86	209,000	3.08	3.78	A	137,000	2.88	3.56	A
Real Estate	207	131,000	3.68	4.28	A-	80,000	3.14	4.14	A
Industry	37	227,000	2.87	4.25	A	120,000	2.71	3.96	A
Total	476	221,000	3.06	4.64	A	125,000	2.66	4.32	A

Panel B: by year

		Mean				Median			
	Observations	Volume (K of NIS)	Spread (%)	Duration	Rating	Volume (K of NIS)	Spread (%)	Duration	Rating
2008	23	330,000	2.85	4.19	A-	236,000	2.25	4.20	A+
2009	59	310,000	2.48	5.40	A-	212,000	2.80	4.33	A
2010	116	219,000	2.95	4.93	A-	119,000	2.78	4.67	A
2011	74	233,000	3.06	4.29	A	146,000	2.27	4.12	A+
2012	97	212,000	3.04	4.46	A+	116,000	2.80	4.16	A+
2013	107	154,000	3.59	4.38	A-	90,700	2.90	4.16	A
Total	476	221,000	3.06	4.64	A	125,000	2.66	4.32	A

Figure 14: Corporate debt investments by the institutional investors, 2008–2019
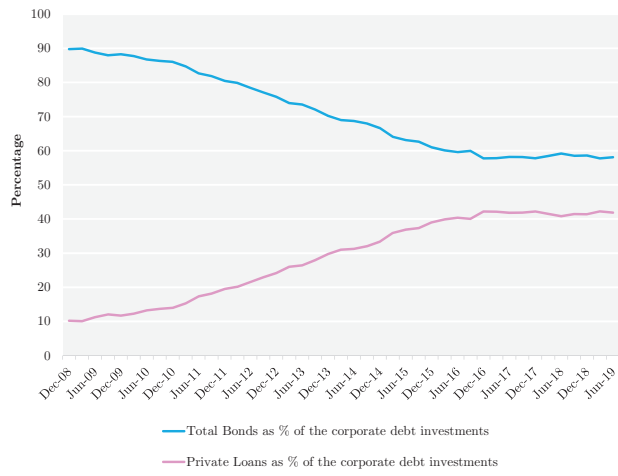

Figure 15: Annual rates of change in credit provided to the business sector, 2006–2019, in percent