Bank of Israel **Research Department**

Assessing the Impact of Corporate Bond Purchase Programs: Insights from Israel

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ניתוח ההשפעה של תוכנית רכישת אג"ח תאגידיות: תובנות מהניסיון הישראלי

נועם מיכלסון

תקציר

מאמר זה בוחן את ההשפעה של תוכנית רכישת אגרות החוב התאגידיות (אג"ח קונצרניות) של בנק ישראל, שהחלה ביולי 2020 במהלך מגפת הקורונה. הניתוח מעלה כי ההכרזה על התוכנית הובילה לירידות משמעותיות במרווחי האשראי עבור כלל אגרות חוב, הן אלו הזכאיות להירכש במסגרת התוכנית והן אלו שלא, ובמיוחד עבור אגרות חוב בקבוצת הדירוג A, בעוד שלרכישות בפועל הייתה אמנם השפעה נוספת אך מוגבלת. בנוסף, התוכנית פתחה מחדש את השוק הראשוני להנפקות של איגרות חוב שאינן בדירוג השקעה. לבסוף, הכללת אגרות חוב שהונפקו על ידי בנקים מסחריים כזכאיות לרכישה במסגרת התוכנית, תכונה ייחודית של התוכנית בישראל, השפיעה באופן חיובי על היצע האשראי של הבנקים המסחריים. מחקר זה מספק תובנות חדשות על התערבויות של בנקים מרכזיים במהלך משברים פיננסיים ומציג ראיות חדשות לכלים חדשניים לניהול משברים שמטרתם לעודד אשראי בזמני מצוקה.

Assessing the Impact of Corporate Bond Purchase Programs: Insights from Israel

Noam Michelson

Abstract

This paper evaluates the impact of the Bank of Israel's corporate bond purchase program initiated in July 2020 amid the COVID-19 pandemic. The analysis reveals that the announcement led to significant reductions in credit spreads for eligible and noneligible bonds, and particularly for A-rated bonds, while actual purchases had an additional, yet limited, effect. Additionally, the program reopened the primary market for noninvestment grade issuances. Finally, the inclusion of bonds issued by commercial banks as eligible for purchasing, a unique feature of the program, had a positive effect on commercial banks' credit supply. This study provides new insights into central bank interventions during financial crises and presents novel evidence for innovative crisis management tools intended to stimulate credit in times of distress.

1. Introduction

With the onset of the COVID-19 crisis in March 2020, the prices of corporate bonds traded in Israel declined precipitously, accompanied by an increase in their credit spreads—the difference between the yield to maturity on corporate bonds and the yield to maturity on government bonds with a similar duration[1]—mirroring developments in other countries and trends observed in the prices of other financial assets (Figure 1). The substantial uncertainty prevailing during that period precipitated a 16 percent decline in bond prices within the first 18 days of March. Concurrently, the liquidity level in the corporate bond market and the volume of new issuances also experienced a marked decline. Although a partial recovery in the corporate bond market ensued, significant uncertainty persisted, as evidenced by the sustained high average spread between the yield to maturity on corporate bonds and that on government bonds of similar duration, alongside various liquidity indices. In response to these developments, on July 6, Israel's central bank, the Bank of Israel, announced a plan to purchase corporate bonds in the secondary market amounting to NIS 15 billion. The purpose of the plan, as officially published, was "… to ensure the continued orderly functioning of the corporate bond market, and to strengthen the pass through from monetary policy to the credit market, by reducing the interest rate at which firms issue credit in the capital market, and making additional sources of credit available for all industries."

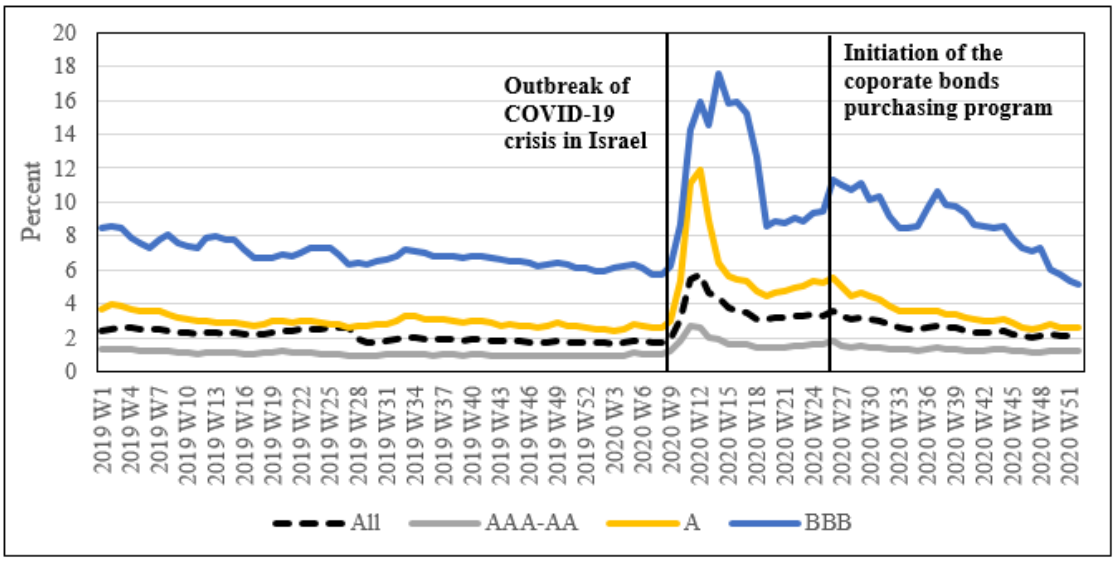

Figure 1. Corporate bond credit spreads, 2019–2020. This figure present corporate bonds' weekly average credit spread by different rating groups, 2019–2020. The first steep decrease in credit spreads was a result of the initiation of the government bond purchasing program by the Bank of Israel.

[1] I use this definition of credit spread throughout this study, unless otherwise stated.

This study has two primary objectives. The first objective is to conduct a comprehensive examination, utilizing granular data, of the impact of the program and its implementation on various facets of the corporate bond market. Specifically, I investigate whether the program and its implementation influenced corporate bond prices and their liquidity, and whether the program had an effect on the bond issuance market. The second objective is to assess the impact of the bond purchase program on bank credit. To address the last question, I highlight a unique aspect of the Bank of Israel's bond purchase program: the acquisition of bonds issued by commercial banks. This feature sets it apart from other corporate bond purchase programs worldwide. Utilizing a detailed micro-level database of bank loans, I examine whether the purchase of bank bonds affected banks' credit supply.

The academic literature has extensively documented the effects of corporate bond purchase programs on prices, credit spreads, and issuances (Haddad, Moreira, and Muir, 2020; Todrov, 2020; Nozawa and Qiu, 2021; Boyarchenko, Kovner, and Shachar, 2022; and others). However, despite the rich body of literature on the subject, this study makes two significant contributions. The first contribution lies in the structure of the domestic bond market. While in the United States and Europe, corporate bond trading predominantly occurs over-the-counter (OTC), corporate bonds in Israel are traded on the stock exchange.[2] Boyarchenko, Kovner, and Shachar (2022), Haddad, Moreira, and Muir (2020), among others, have highlighted the role of frictions arising from the financial constraints of financial intermediaries in creating sharp increases in spreads. Additionally, Kutai, Nathan, and Wittwer (2024) demonstrated that the liquidity crisis in government bonds was more severe in Israel compared to the United States due to differences in the trading mechanisms of bonds between the two countries. Therefore, the Israeli market provides an opportunity to examine the impact of the bond purchase program on the bond market in the absence of financial intermediaries.

The second and more central contribution is the opportunity to examine whether and how the purchase of banks' subordinated debt in the form of bonds issued by commercial banks can influence commercial banks' credit. During a crisis, when risk levels and uncertainty rise, policymakers employ various tools to support the credit market and

[2] A survey of the microstructure of the Israeli corporate bond market can be found in Abudy and Wohl (2017).

prevent credit rationing. In addition to accommodative monetary policy, easing of regulatory capital requirements and preferred loan schemes (e.g., ECB's LTRO programs), the purchase of financial assets for the purpose of credit easing has become a popular tool in the central banks' toolkit, especially in a low-interest rate environment. However, a tool that includes the purchase of commercial banks' *liabilities* is a tool that, to the best of my knowledge, has only been utilized in Israel.[3] Therefore, the findings of this paper could serve as valuable insights for policymakers in future crises.

The results of this study indicate that, similar to other corporate bond purchase programs worldwide, the Bank of Israel's bond purchase program had a significant impact on credit spreads in this market, with the primary effect stemming from the announcement of the program. Following the announcement, credit spreads of all traded bonds in the market decreased, with a more pronounced decrease observed in the credit spreads of bonds eligible for purchase from the A rating group. The actual purchases had an additional, albeit very weak, impact on credit spreads, and this effect was limited to bonds within the A rating group. Furthermore, I find that the mechanism through which the program operated was the reduction of risk premiums. The program also impacted the primary market for bond issuances, reopening it to firms that are not investment-grade rated. Additionally, I find that the purchase of bonds issued by commercial banks—a unique feature of the Bank of Israel's purchase program—increased the quantities of credit supplied by commercial banks, at least for borrowers classified as large businesses.

The remainder of this paper is organized as follows: Section 2 reviews the related literature; Section 3 provides a brief overview of the Israeli bond market on the eve of the COVID-19 crisis and describes the data utilized in this study; Section 4 presents the institutional features of the Bank of Israel's corporate bond purchase program; Section 5 encompasses the empirical analysis; and Section 6 discusses the results and concludes the paper.

[3] Although Japanese banks' corporate bonds were officially eligible for purchase under the Bank of Japan's corporate bond purchasing program, the Bank committed not to buy bonds issued by financial institutions holding current accounts at the BOJ and their parent holding companies (Tsujimoto, 2023).

2. Literature Review

The literature on central bank interventions in corporate bond markets, particularly through bond purchases, highlights several key themes and findings. This section reviews the existing research on the impact of such interventions on market liquidity, corporate behavior, and overall economic stability. Most of the literature focuses on the Federal Reserve's purchasing program that followed the COVID-19 crisis, but there is also an extensive literature that studied the ECB's corporate bond purchasing program that took place in 2016.

Examining both primary and secondary market effects, Boyarchenko, Kovner, and Shachar (2022) identify effects of both the Fed's announcement and the actual purchases on primary and secondary markets. Similarly, Nozawa and Qiu (2021) find that the market had an immediate response to the Federal Reserve's intervention announcement, and that it varied by credit rating, but converged over time. They also note that beyond the announcement, the actual purchases had a tangible effect. Galema and Lugo (2021) find that the ECB's decision on which bonds to purchase had an impact beyond eligibility due to increased demand and market segmentation. Furthermore, the purchases provided a strong and reliable signal to firms, potentially influencing their financing decisions. Gilchrist et al. (2021) differentiate between the announcement of support and the announcement of eligibility criteria, showing that the willingness to intervene was more crucial than the eligibility itself. They argue that the actual purchases had a negligible effect, emphasizing the immense power of central banks when markets trust their ability to deliver on promises.

While Nozawa and Qiu (2021) Boyarchenko, Kovner, and Shachar (2022), among others, attribute most of the reduction in credit spreads that followed central banks' interventions to a decreased expected probability of default or price of risk, other studies highlighted the role of market liquidity and transaction costs as drivers of the crisis and as the channel through which central bank's purchasing program affected the markets. O'Hara and Zhou (2021) identify a severe liquidity crisis in the corporate bond market at the onset of the COVID-19 pandemic, exacerbated by the financial conditions and liquidity needs of brokers. They note that while customer-to-customer trading platforms saw increased activity, transaction costs remained higher compared to broker-mediated trades. The announcement of central bank interventions significantly reduced these

transaction costs, suggesting that the Federal Reserve acted as a market maker by signaling a liquidity backstop, thereby reducing the risk for dealers of holding inventory. Todrov (2020) also finds that the ECB's purchasing program had positive effects on spreads, liquidity, and the primary issuance market. The primary impact was in reducing risk, particularly for higher-risk bonds with longer maturities or those issued by more credit-constrained firms.

Similarly, Haddad, Moreira, and Muir (2020) also point to the acute liquidity issues and the role of financial intermediaries in exacerbating these problems. Kargar et al. (2021) further examine liquidity conditions and find that both changes in demand for liquid assets and the supply of such assets contributed to the sharp decline in liquidity. Their findings suggest that the mere announcement of the bond purchase program effectively reversed the initial "dash for cash," although the increased cost for dealers to supply risky-principal trades persisted. Boyarchenko, Kovner, and Shachar (2022) also find that brokers' constraints contributed to the developments of the crisis.

Moving from liquidity to corporate behavior and economic impact, Todrov (2020) notes that firms used the bond issuances that were set off by the ECB's purchasing program to increase dividend payments. Galema and Lugo (2021) find that purchases influenced firms' financing decisions, pushing more firms to increase their reliance on nonbank credit.[4] Similarly, other studies find that firms whose bonds can be purchased under asset purchasing programs decrease their demand for bank loans, which in turn increases the access to debt capital provided by banks to noneligible firms (Grosse-Rueschkamp et al., 2019; Betz and De Santis, 2022) or small and medium enterprises with limited direct access to credit markets (Arce et al., 2021; Ertan et al., 2020). From the supply side, Krishnamurthy and Vissing-Jorgensen (2011) find that banks with greater exposure to MBSs that were purchased by the Fed increased their credit more than banks with less exposure to purchased assets, and Carpinelli and Crosignani (2021) find that the ECB's design of the LTRO supported Italian banks' credit supply.

Darmouni and Siani (2023) explore how the Federal Reserve's yield-lowering measures translated into the real economy. They find that firms issued bonds following the yield reductions but primarily used the proceeds to repay bank credit and continue dividend

[4] Concurrently, Steinberg and Wohl (2024) find that Israeli firms tended to repurchase bonds especially during periods of system-wide distress and during the COVID-19 crisis in particular.

payments, thereby increasing their cash holdings without significantly impacting investment levels. Bordo and Duca (2022) show that the intervention mitigated the recession by reducing the role of external finance premia in amplifying the pandemic's macroeconomic impact and preventing a wave of corporate bankruptcies that could have worsened the downturn. Ferrando, Popov and Udell (2022) study three of the ECB's unconventional monetary policies, including the corporate bond purchase program, and find that investment and employment increase more for firms expecting bank credit to improve in the future following the implementation of these policies.

In summary, the literature underscores the multifaceted impact of central bank corporate bond purchase programs, highlighting their role in alleviating liquidity crises, influencing corporate behavior, and stabilizing the broader economy. The signaling effect of such interventions appears to be as significant, if not more so, than the actual purchases, underscoring the importance of market trust in central bank actions.

3. Setting and Data

3.1. The Israeli Corporate Bond Market at the Eve of the COVID-19 Crisis: a Brief Overview

At the end of 2019, 246 firms had 650 series of tradable bonds with a total nominal value of NIS 324.5 billion and a total market value of NIS 347.8 billion.[5] The sector with the largest share of outstanding tradable bonds was the construction and real estate sector, although the proportion of bonds issued by banks and insurance companies was also significant. Most traded bonds are rated by local subsidiaries of international rating companies, however the scale is local: a AAA Israel-rated bond is not equal to a AAA-rated bond in the US or Europe, rather to A-rated bond.

Corporate bonds are an important source of credit for business enterprises, and at the end of 2019, the credit raised through them constituted 26.9 percent of the total outstanding credit to the business sector (excluding banks and insurance companies). At the end of 2019, the average spread[6] of all tradable bonds was approximately 2 percent, while the

[5] The figures do not include convertible bonds, commercial papers, or bonds with variable interest rates or foreign currency linkage, as these are not included in the following analysis.

[6] Throughout this study, unless otherwise stated, the spread refers to the difference between the yield to maturity on corporate bonds and the yield to maturity on government bonds with a similar duration.

spread for the business sector alone was 2.5 percent, below the long-term average spread. In terms of liquidity, the bid-ask spread was very low, about half of its long-term average value. Generally, this spread in the Israeli market is not high, even compared to the US market (Abudy and Wohl, 2017), allowing for reasonably priced transactions. However, the average daily trading volume in 2019 was about NIS 771 million, a relatively small amount compared to the outstanding bonds in the market. On the eve of the crisis, the largest holders of outstanding bonds were mutual funds, which held about one-third of the bond market value.

3.2. Data Sources

The source of trading data for bonds, as well as their various characteristics, is the Tel Aviv Stock Exchange (TASE). Data regarding issuing firms and new issuances were obtained from the TASE's MAYA system. Information about the Bank of Israel's bond purchase program, including the identity of the purchased bonds, the volume of purchases, and the dates of purchases, was kindly provided by the Markets Department of the Bank of Israel, which designed and implemented the purchase program.

Most of the data utilized in this study are standard for bond research, including yield to maturity, duration, time to maturity, bond characteristics, and so forth. Among the common methods for calculating credit spreads, I choose the difference between the yield to maturity on corporate bonds and the yield to maturity on government bonds with similar duration and the same indexation characteristics (inflation-linked or non-inflation-linked), similar to the approach of Gilchrist and Zakrajšek (2012). The bid-ask spread is calculated for each bond as the difference between the best bid and ask prices, relative to the price.

3.3. Decomposing Credit Spreads

The actual yield on a bond reflects the issuing company's probability of default, the risk premium that investors demand for a given unit of risk and the risk-free interest rate.[7] The credit spread is the spread between the bond's yield and the risk-free yield, proxied by the yield on government bond with a similar duration. To decompose the credit spread

[7] It also reflects the loss given default, but this parameter is mostly stable over short time frames, so it is excluded from the analysis.

into the probability of default and the risk premium, I adopt an approach similar to that of Boyarchenko, Kovner, and Shachar (2022) and Gilchrist and Zakrajšek (2012). For all bonds in the sample, I estimate an equation where the dependent variable is the spread, and the explanatory variables are the key components of Merton's (1974) model for default risk—namely, the standard deviation of the issuing company's stock over the past 90 days and its leverage[8]—along with bond characteristics (indexation, days to maturity, rating, type of collateral) and a fixed effect for the issuing company. I estimate this equation based on a sample of all eligible and noneligible bonds in the BBB rating category with a duration of more than half a year, on a daily frequency from the beginning of 2015 until the end of February 2020. Using the estimated coefficients, it is possible to calculate the predicted spread for each bond, which should more objectively reflect the probability of default. The gap between the actual spread and the predicted spread essentially reflects the risk premium—the yield premium that investors demand to purchase a bond with a certain probability of default (for further details and application to Israel, see: Graham-Rozen, Michelson, and Vieder, 2024).

4. The Bank of Israel's corporate bond purchasing program

As mentioned, with the onset of the COVID-19 crisis, sharp declines were observed in financial asset markets, particularly in the corporate bond market. In response, on July 6, 2020, during the announcement of the Bank of Israel's Monetary Committee decision on the monetary interest rate, the Bank announced a series of additional measures aimed at continuing to support the economy in coping with the COVID-19 crisis. Among the measures announced by the Bank was a program for purchasing corporate bonds in the secondary market. According to the Bank, "The objective of the program is to ensure the continued proper functioning of the corporate bond market and to strengthen the transmission from monetary policy to the credit market by reducing the interest rate at which firms raise credit in the capital market, thereby freeing up additional sources of credit for all sectors of the economy." The amount allocated to the program was NIS 15

[8] The limitation of using historical volatility is that it is not forward-looking. As an alternative, I used forward-looking default probability measures, such as Moody's-KMV 1-year EDF or Bloomberg's PoDs, instead of the 90-day standard deviation and leverage. I found that the results were qualitatively the same. However, I chose not to use these measures because they are not available for all the issuing firms in my sample.

billion, with which corporate bonds meeting the following conditions would be purchased:

1. Without an equity component.
2. Not linked to foreign currency.
3. Fixed interest rate.
4. Issued by Israeli firms.
5. Rated A- or higher.
6. Have a duration of six months or more.

According to the Bank, approximately 75 percent of the bond market meets these criteria, and the weight of the purchased bonds will be identical to their distribution in the reference group (the "benchmark"). The Bank committed to purchasing the bonds directly, not through financial intermediaries, and to retaining them until maturity even in the event of a downgrade. Unlike the corporate bond purchase program launched in the US, bonds issued by banks and insurance companies were also eligible for purchase under the program's constraints, as well as bonds with a maturity period of five years or more. The European purchase program, launched in mid-2016, included only the purchase of bonds issued by noncredit institutions and only with a maturity period of between six months and 30 years.

Table 1 provides descriptive statistics regarding eligible and noneligible corporate bonds on the eve of the purchase program. For simplicity, I have excluded a minority of bonds with an equity component, variable interest rates, and foreign currency linkage, so the group of noneligible bonds includes those with a rating of BBB+ and below or those issued by non-Israeli firms. Out of 599 corporate bonds with a total nominal value of NIS 311 billion, 342 bonds with a total nominal value of NIS 228 billion were defined as eligible for purchase according to the program's criteria, while 257 bonds with a total nominal value of only NIS 83 billion were not eligible due to a low rating, short duration, or issuance by a foreign company. The eligible bonds are, on average, larger, with lower yield to maturity and credit spreads, shorter time to maturity, and lower bid-ask spreads. The proportion of eligible bonds secured by some form of collateral is higher, although the proportion of bonds with fixed collateral is similar between eligible and noneligible bonds. From a sectoral perspective, most noneligible bonds are from the construction and real estate sector, while all bonds issued by banks are eligible for purchase (Figure 2).

The purchase program was implemented on the day of the announcement with the acquisition of 16 bonds valued at NIS 21.4 million. The purchases were primarily conducted during three time periods: in July, September, and from mid-October to early-to-mid November. Although not officially announced, the purchases effectively concluded four months later, on November 8, 2020. By this time, the Bank of Israel had conducted a total of 2,431 bond purchases, encompassing 269 bonds issued by 114 firms, with a market value of NIS 3.45 billion (Figure 3 illustrates the progression of purchases over time). At the conclusion of the program, the Bank of Israel held 1.14 percent of the total outstanding tradable bonds as of that date. In terms of overall traded volume, on trading days when the Bank of Israel was purchasing corporate bonds, these purchases comprised around 10 percent of the total traded volume for those days.

	Face value (NIS million)		Yield (%)		Spread (%)		Years to Maturity		Bid-ask Spread (X 1000)	
	number of eligible bonds (face value in NIS billions): 342 (228), number or non-eligible bonds: 257 (83)									
	Eligible	Noneligible	Eligible	Noneligible	Eligible	Noneligible	Eligible	Noneligible	Eligible	non eligible
Mean	667.2	322.7	2.0	12.7	2.2	13.4	7.0	10.2	3.1	11.6
Standard deviation	715.6	430.4	2.4	23.7	2.3	26.3	4.1	19.8	3.5	23.1
p25	231.1	89.1	1.1	5.0	1.4	4.7	3.5	2.0	2.2	8.0
p50	412.6	176.0	1.9	7.5	2.0	7.2	5.9	3.4	3.9	15.0
p75	781.2	369.9	3.1	13.2	3.1	12.7	8.2	5.0	7.1	24.9
	eligible	non eligible								
Bonds with issuer a local firm	100.0%	67.7%								
Bonds secured by first lien	49.7%	42.1%								
Bonds have any security	84.2%	57.9%								

Table 1. Descriptive statistics of corporate bonds, by eligibility. This table presents descriptive statistics of traded corporate bonds, as for July 5, 2020, by their eligibility status.

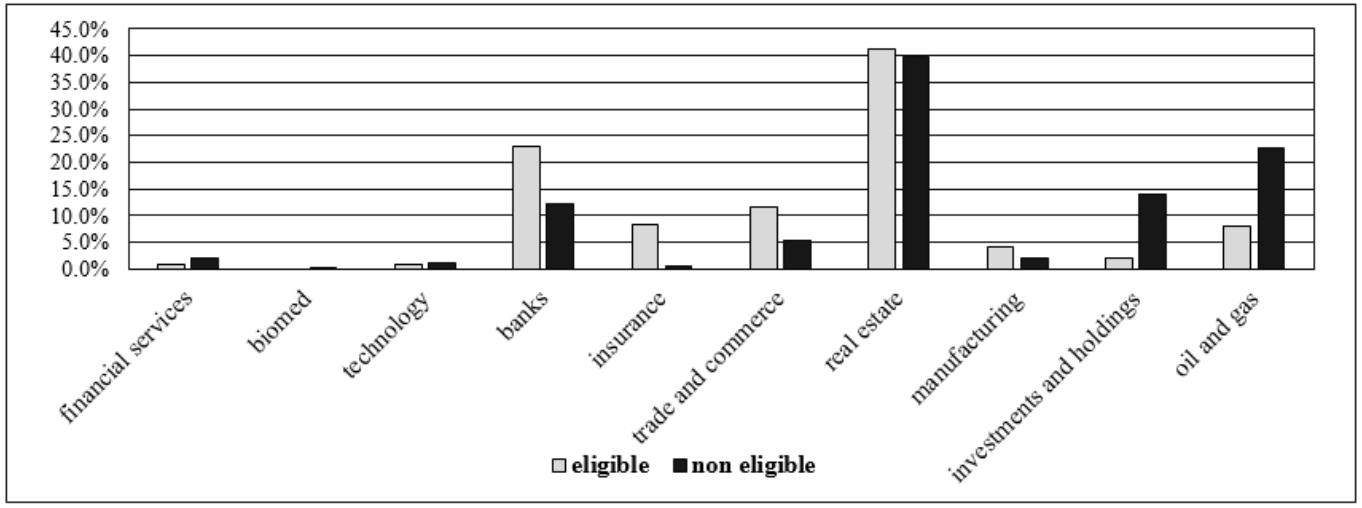

Figure 2. Share of corporate bonds face value by industry and eligibility. This figure presents the distribution of eligible and non-eligible corporate bonds by the industry of the issuing firm.

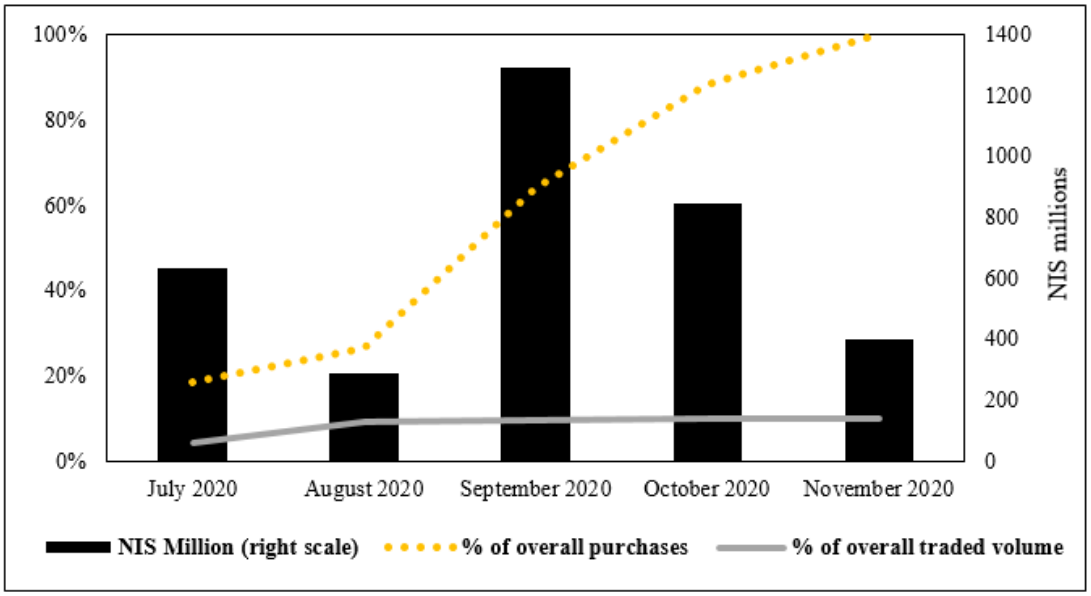

Figure 3. The execution of the corporate bond purchasing program by the Bank of Israel. This figure presents the monthly evolution of the Bank of Israel's corporate bond purchasing program, in terms of NIS million of purchased corporate bonds and as a share of overall purchases. It also presents the share of the purchases in the overall traded volume on trading days when the Bank of Israel was purchasing corporate bonds. Purchases occurred from July 6, 2020 to November 8, 2020.

A preliminary view of the impact of the program's announcement can be seen in Figure 4. Following the announcement, the average spread of all tradable bonds in the market decreased, with a more pronounced decline—starting from a higher level—observed in bonds that were not eligible for purchase under the program: their average spread on July 7, the day after the announcement, was 1.66 percentage points lower than the average spread on July 5, while the average spread of bonds eligible for purchase under the program was 0.73 percentage points lower (Panel A). Conversely, at first glance, the actual purchases had a marginal impact: Panel B shows the average spread of bonds that were purchased at some point under the program relative to bonds that were eligible but not purchased. The figure indicates that the decline in spreads was similar between the two groups. Regarding liquidity, there is a noticeable impact of the program's announcement on the liquidity level of bonds that were not eligible for purchase (Panel C), while it is difficult to see that the purchases themselves had an effect (Panel D).

Bond issuances, which had come to a complete halt in the last two weeks of March, quickly returned to volumes not significantly different from previous years (Figure 5, top panel). However, when breaking down the issuances by the credit rating of the issuing firms (Figure 5, bottom panel), it becomes evident that most issuances after the

onset of the crisis were from firms in the AA rating category and above, while firms in the A rating category maintained issuance volumes that were not unusual compared to previous years. The strongest impact on issuances was observed among firms rated BBB and below, for whom the issuance market appeared to have completely shut down. It was only in September, about two months after the start of the purchase program, that the market seemed to reopen.

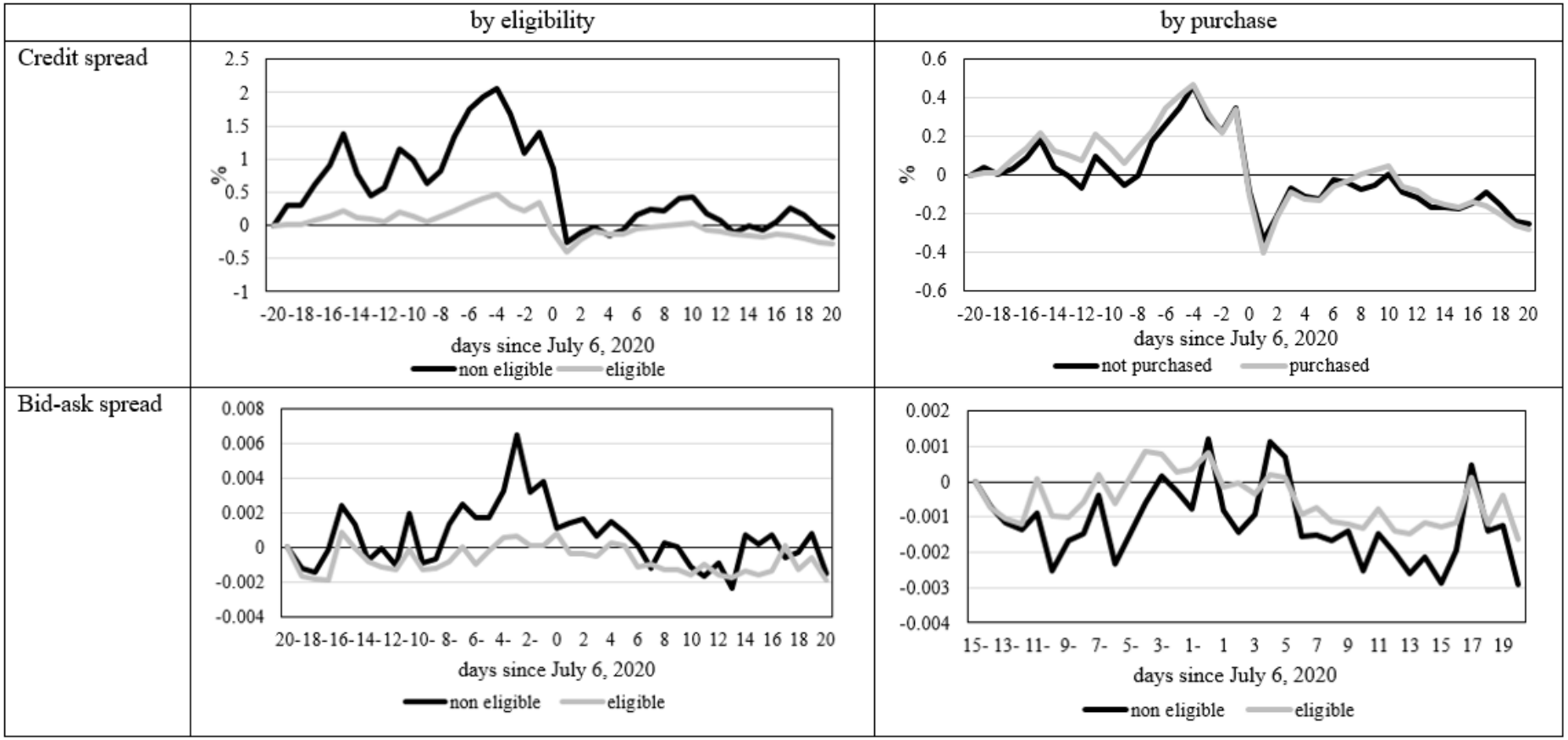

Figure 4. Average credit and bid-ask spreads around the beginning of the purchasing program. This figure presents the weighted average credit spreads and bid-ask spreads of bonds by their eligibility to be purchased or by their purchasing status. Eligible bonds are those that meet the program eligibility conditions as for July 5, 2020. Purchased bonds are bonds that were purchased at some point during the purchasing program. Market value is used as weights. Each group's spreads are normalized to their value at day -20, except for Panel D in which spreads are normalized to their value at day -15 because of high volatility previous to that date. Day 0 is July 6, 2020.

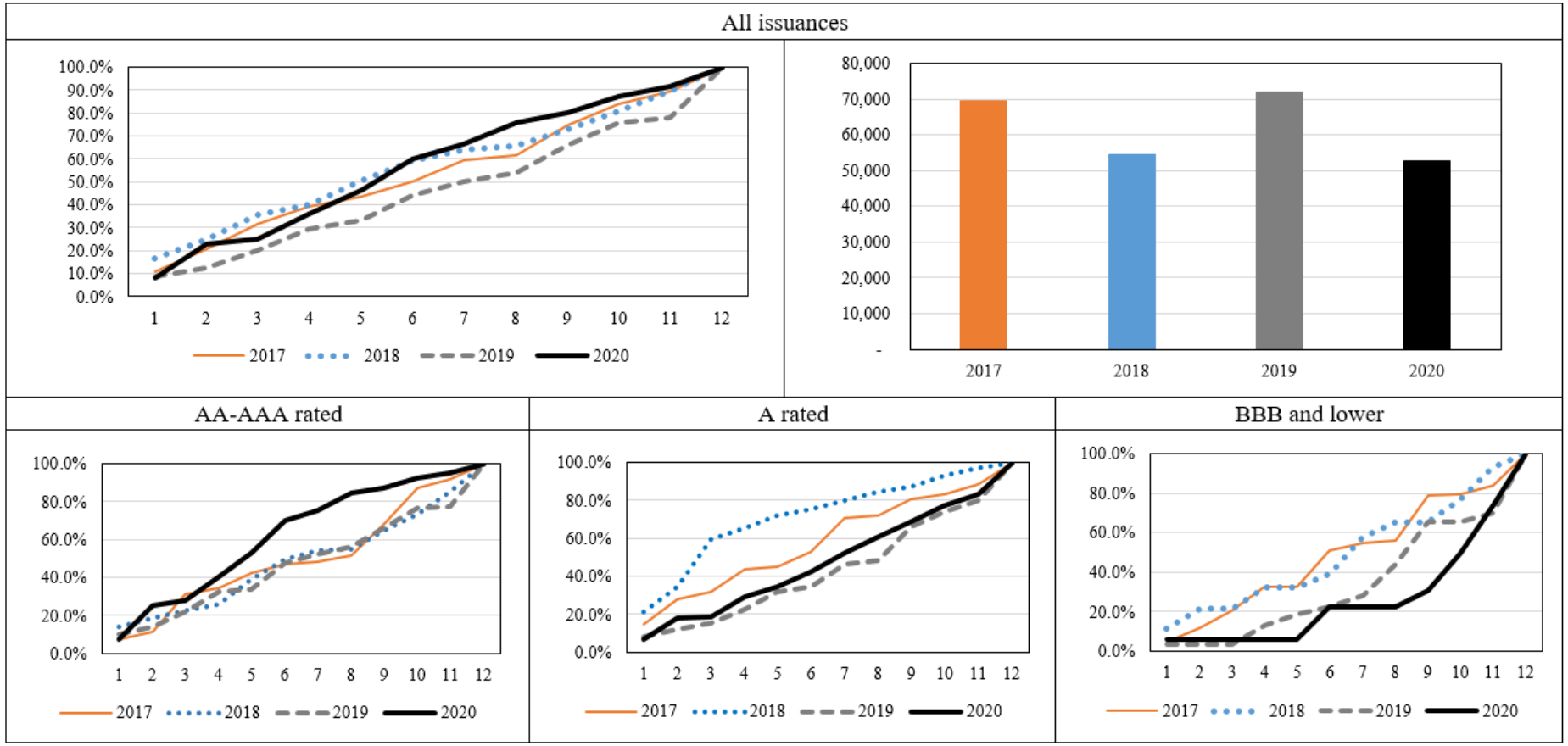

Figure 5. Bonds issuances, by rating. This figure presents the amount of issued bonds in each rating group and in each month as a share of annual overall issuances, for years 2017–2020. The figure in the upper right panel presents the amount of issued bonds in NIS million.

5. The Effect of the Purchasing Program on the Corporate Bond Market

5.1. Which Bonds were Purchased?

In the first empirical analysis, I will examine the characteristics of the bonds that were purchased. As noted, out of 342 bonds eligible for purchase under the program, 269 bonds were acquired. Officially, according to the program details published, the purchased bonds are supposed to reflect the market of eligible bonds. However, given a certain degree of discretion, it is appropriate to examine the characteristics of the bonds that were purchased from those initially eligible for purchase.[9] For this purpose, I estimate the following equation:

$$(1)\Pr(purchased)_{b,f} = \alpha + \beta bond's\ characteristics_{b,f} + \gamma bond's\ market\ condition_{b,f} + \delta firm'sindustry_f + \varepsilon_{b,f}$$

where $purchased_{b,f}$ equals 1 if bond b issued by company f was purchased at any stage under the purchase program, $bond's\ characteristics_{b,f}$ represents the structural characteristics of the bond (log of the bond's face value, indexation, type of security, and rating), $bond's\ market\ condition_{b,f}$ denotes the bond's market performance on the eve of the purchase program's start (July 5, 2020), and $firm's\ industry_f$ is a set of dummy variables for each industry of the issuing company. For market performance, I consider several alternatives. The first alternative is the credit spread and bid-ask spread on the eve of the program's start. The second alternative is the change in these two indicators relative to their values at the beginning of March, just before the onset of the COVID-19 crisis. Additionally, in various specifications, I include the issuing company's stock return from the eve of the COVID-19 crisis to the eve of the purchase program to examine if purchase decisions were also related to the market value aspects of the issuing company. I estimate the equation using a logit model, with standard errors clustered at the issuing company level.

[9] The Fed's purchasing program also used market index as a benchmark for purchasing. However, Flanagan and Purnanandam (2020) observe that even under this constraint, bonds with higher face value, lower credit spreads, longer maturities, and those more affected by liquidity issues were more likely to be purchased. They find no significant impact from the issuing company's exposure to the COVID-19 crisis or its employment levels.

The estimation results are presented in Table 2. In column 1, the average credit spread in June, on the eve of the purchase program, is the variable that reflects the bond's market condition. However, as can be seen, only the bond size has a significant and strong effect on the probability of bond purchase. The bid-ask spread on the eve of the purchase program is also found to have no effect (column 2). In column 3, I include the stock return of the issuing company from the eve of the COVID-19 crisis to the eve of the purchase program and find that bonds of firms that were less affected were more likely to be purchased. In column 4, I include all market variables and find that this effect remains significant, alongside a significant effect of the bond's liquidity condition, both at a significance level of p-value<0.1. To examine whether the change in credit spreads and bond liquidity relative to the pre-COVID-19 state increases the probability of purchase, in column 5, I use changes relative to the pre-COVID-19 state instead of levels. It appears that these also did not have an effect, while the bond size and the issuing company's stock return had a significant impact.

The impact of firm's stock returns on the probability of bond purchases ostensibly suggests that purchases were targeted at firms relatively less affected by the COVID-19 crisis. However, given the correlation between large firms, the volume of bonds issued in the market, and company performance, this relationship may solely reflect the program's design to mirror the benchmark portfolio.

In the previous estimations, I did not include characteristics of the issuing company, aside from its industry. In the next two estimations, presented in columns 6 and 7, I exploit the fact that some firms have more than one bond eligible for purchase under the program and that the purchase program did not specify a clear policy on which bond to prefer in such cases. By including a fixed effect for the issuing company, I effectively eliminate the possibility that the probability of purchasing a specific bond is related to the identity of the issuing company, thereby providing the cleanest comparison of bond characteristics alone. The results in column 6 show that, beyond the (greater) size effect, market performance also had an impact, with bonds having larger credit spreads at the eve of the purchasing program being more likely to be purchased. The credit spread relative to the pre-COVID-19 state had no significant effect, as indicated by the insignificance of this variable in column 7.

After examining the extensive margin, I also analyzed the intensive margin—the nominal value of each bond purchased under the program. However, no effect was found beyond the size of the purchased bond, and therefore, for brevity, I do not present the estimation results.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
log(bond size)	1.475***	1.670***	1.561***	1.817***	1.601***	3.707***	3.967***
	(0.257)	(0.298)	(0.239)	(0.325)	(0.284)	(0.854)	(0.807)
credit spread in June 2020	0.032			-0.046		0.829**	
	(0.067)			(0.2)		(0.404)	
bid-ask spread in June 2020		0.032		0.055*		-0.178	
		(0.024)		(0.032)		(0.131)	
stock price return since March 1,2020			0.035**	0.034*	0.030*		
			(0.017)	(0.018)	(0.018)		
credit spread in July 5,2020 – credit spread in March 1,2020					-0.097		0.266
					(0.155)		(0.196)
bid-ask spread in July 5,2020 – bid-ask spread in March 1,2020					9.162		-3.876
					(10.907)		(38.557)
constant	-10.737***	-11.946***	-9.803***	-11.396***	-10.356***		
	(1.974)	(2.331)	(1.991)	(2.498)	(2.353)		
observations	335	335	291	289	279	256	249
bond's characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
issuing firm's fixed effects	No	No	No	No	No	Yes	Yes
pseudo R-squared	0.283	0.287	0.307	0.317	0.302	0.657	0.625

Table 2. Which bonds did the Bank of Israel buy? This table presents estimation results of a logit model in which the dependent variable takes 1 if a bond was purchased at some point during the operation of the purchasing program and 0 otherwise. The independent variables include the natural log of the outstanding amount of the bond, credit and bid-ask spread as for June 30, 2020, issuing firm's stock return from March 1, 2020 to July 5, 2020, and changes in credit and bid-ask spreads from March 1, 2020 to July 5, 2020. Bond's characteristics include its rating, indexation, time to maturity and type of collateral. Errors are clustered at the issuer level.

5.2. The Impact on the Secondary Market

The literature reviewed in Section 2 emphasizes the impact of the program's announcement as much as its execution, with Gilchrist et al. (2021) even arguing that the announcement alone had an almost exclusive effect. In this section, I will examine both the impact of the program's announcement and the actual purchases, focusing on the bonds targeted by the program as well as other bonds.

5.2.1 The Announcement Effect

Krishnamurthy and Vissing-Jorgensen (2011) identify several channels through which bond purchases of any type affect their yields. Among the channels they list, the most relevant for corporate bonds are the default risk channel and the liquidity channel. In the first channel, the purchase of corporate bonds—or the intention to purchase them—raises their prices, lowers their yields, and eases the financing conditions for the issuing firms. Furthermore, even if the probability of default remains constant, there is also the price of risk to consider. When economic conditions deteriorate, the price of a unit of risk increases, and as bond purchases may reduce the probability of default, they may also affect the price of risk, thereby lowering the yields of bonds not directly purchased (Boyarchenko, Kovner, and Or, 2022).

The impact through the liquidity channel is based on the fact that the price of a corporate bond is also influenced by its liquidity (Longstaff, Mithal and Neis, 2005; Chen, Lesmond, and Wei, 2007). The importance of liquidity is even higher during times of uncertainty, and therefore, central bank bond purchases, which effectively increase market liquidity, affect bond prices. Here too, the effect can be direct on the purchased bonds, but it is possible that increasing liquidity in specific bonds frees up investor resources for investment in other bonds, thereby increasing the liquidity of bonds not directly purchased.

In light of the above, to examine the impact of the announcement of the purchase program on the credit spread of corporate bonds, I estimate a difference-in-differences equation of the following form:

$$(2)\ credit\ spread_{i,[t_0-3,t_0+l]} = \alpha + \beta after\ announcment_t + \gamma(after\ announcment_t \times bond\ rated\ AA\_AAA_i) + \delta(after\ announcment_t \times bond\ rated\ A_i) + \theta bond's\ characteristics_i + \varphi_i + \varepsilon_i$$

where the dependent variable is the credit spread of bond *i* from three days before the announcement to *l* days after it ($l \in [0,4]$), where t_0 is the announcement day (July 6, 2020). The variable $after\ announcment_t$ equals 0 if $t < t_0$ and measures the overall impact of the announcement on all bonds in the sample. The interactions with the bond rating group reflect the differential impact of the announcement on the eligible bonds, distinguishing between two rating groups within them.[10] The control group in this sample comprises bonds that were issued by nonlocal firms but are traded in TASE and bonds that are rated in the BBB rating group.[11] Additionally, to avoid conflating the impact of the announcement with the impact of the actual purchases, I exclude bonds that were purchased in the first four days of the program. Standard errors are clustered at the issuing company level.

A crucial assumption is that no significant economic developments affected either group during the examined period. To the best of my knowledge, this is indeed the case. In particular, no significant events in the parallel US and European programs that could have affected the Israeli market took place.

The results are presented in Table 3, with the specifications in the different columns varying by the number of days included in the sample after the program's announcement. The results indicate that the interaction coefficient between the program announcement and bond rating is negative and significant, suggesting that the announcement had an immediate effect on the eligible bonds (column 1). However, after one day, this effect was only evident in bonds rated in the A rating group, while the effect on higher-rated bonds was not observed. Even four days after the announcement, the credit spreads of A-rated bonds were 63 basis points lower

[10] The rating group indicators, without the interaction with the after-announcement variable, are included but were excluded from the equation for brevity.

[11] As evident in Figure 1, at the beginning of the crisis A-rated bonds reacted very similarly to BBB-rated bonds, and in one point credit spreads were very close. This provides the justification for using BBB-rated bonds as a reasonable control group.

compared to their spreads on the eve of the announcement, which stood at 560 basis points.

In addition to the differential impact on eligible bonds, the results indicate that, starting from the day after the program's implementation, bonds that were not eligible for purchase also experienced a decrease in their credit spreads by nearly 50 basis points. Combined with the differential impact on eligible A-rated bonds, it can be concluded that the program led to a reduction of over one percentage point in the credit spreads of these bonds. The differential timing of the effects might point out the underlying dynamics of the program: in its initiation, investors gained liquidity by selling high quality bonds. These funds were gradually used to purchase lower quality, noneligible bonds.

Similarly, I examine whether the announcement of the program affected the liquidity of the bond market and in what manner. Columns 6 to 10 in Table 3 present the results of estimating Equation 2, where the dependent variable is the bid-ask spread (multiplied by 1,000) of the bonds. In this case, as well, the estimations differ in the number of days included in the sample after the program's announcement. The results in the table indicate that the announcement of the purchase program did not have an immediate impact on the liquidity of corporate bonds, neither on those included in the program nor on those that were not included. It is important to emphasize that the examined impact is immediate, whereas longer-term effects are observed: Estimating the equation with a sample that includes 30 days before and 30 days after the program's announcement shows that the bid-ask spread did indeed decrease for the entire market. However, over such time spans, other factors may have influenced the market, not just the program's announcement.

Thus far, the results indicate that the announcement of the program affected credit spreads but not liquidity spreads, suggesting that liquidity conditions did not influence credit spreads. It remains to be examined whether the announcement reduced the probability of default, the price of risk, or both. As presented in Section 3, I estimate the probability of default by calculating the predicted spread based on the bond's fundamentals, the company's characteristics, and the overall economic conditions. The price of risk for each bond is the difference between the actual spread and the predicted spread. I re-estimate Equation 2, alternately using each of these components. Since not

all firms with traded bonds also have traded equity, reducing the sample size, I also present estimation results using the actual credit spread as the dependent variable, similar to the specifications in Table 3.

The estimation results are presented in Table 4. The results indicate that, across all examined time frames, the impact of the program's announcement is entirely due to the reduction in the price of risk, with no observed effect on the predicted spread that reflects the company's default risk. This finding holds true for both the overall sample of bonds (eligible and noneligible) and the additional impact on eligible A-rated bonds.[12]

The overall estimations indicate that the announcement of the purchase program reduced the price of risk in the bond market for all traded bonds, particularly for those eligible for purchase and rated in the A rating group. This reduction in the price of risk brought bond spreads closer to their predicted values based on the firms' fundamentals, thereby more accurately reflecting the probability of default. Conversely, the announcement did not have an immediate impact on the liquidity spreads of the bonds, and thus, credit spreads were not influenced by any improvement in liquidity.

[12] The magnitude of the impact is lower than that estimated in Table 3. This discrepancy arises because the current estimation sample includes only bonds from firms with publicly traded shares, whereas the previous estimation included all traded bonds, including those issued by firms without publicly traded shares. Firms with publicly traded shares tend to be larger and have higher bond ratings on average. Consequently, the impact of the program's announcement, as estimated based on this subsample, is smaller.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Credit Spread					Bid-ask Spread (X 1000)				
days around announcement	[-3,0]	[-3,1]	[-3,2]	[-3,3]	[-3,4]	[-3,0]	[-3,1]	[-3,2]	[-3,3]	[-3,4]
after announcement	0.07	-0.33**	-0.42***	-0.45***	-0.47**	-10.56	-13.56	-13.97	-13.7	-12.86
	(0.1)	(0.14)	(0.16)	(0.17)	(0.18)	(10.99)	(11.84)	(11.61)	(11.33)	(11.25)
bonds rated AA-AAA	-3.09*	-3.30**	-3.39**	-3.51**	-3.57**	6.27	-0.78	-6.43	-9.52	-10.32
	(1.71)	(1.61)	(1.53)	(1.48)	(1.45)	(6.55)	(5.6)	(6.59)	(7.04)	(7.33)
bonds rated A	-3.07**	-3.19**	-3.23***	-3.31***	-3.34***	2.62	-3.70	-9.42	-12.04*	-12.80*
	(1.37)	(1.26)	(1.19)	(1.16)	(1.14)	(5.75)	(5.16)	(6.31)	(6.83)	(7.16)
bonds rated AA-AAA X after announcement	-0.43***	-0.12	0.01	0.06	0.09	11.05	13.39	13.57	13.29	12.62
	(0.11)	(0.15)	(0.16)	(0.18)	(0.19)	(10.97)	(11.83)	(11.6)	(11.33)	(11.25)
bonds rated A X after announcement	-0.67***	-0.73***	-0.68***	-0.64***	-0.63***	9.59	11.99	12.22	11.55	10.79
	(0.14)	(0.2)	(0.21)	(0.22)	(0.23)	(11.02)	(11.86)	(11.63)	(11.36)	(11.27)
Constant	4.75***	4.98***	5.04***	5.11***	5.13***	28.18***	33.40***	37.55***	41.90***	42.53***
	(1.76)	(1.67)	(1.61)	(1.57)	(1.54)	(8.79)	(8.64)	(9.18)	(9.81)	(9.84)
observations	1,797	2,239	2,682	3,125	3,568	1,882	2,345	2,808	3,271	3,734
bond's characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
firm's fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.913	0.907	0.909	0.911	0.913	0.036	0.042	0.054	0.064	0.073

Table 3. Announcement effect on credit spreads. This table presents estimation results of an OLS model in which the dependent variable is either credit spread (Column 1 to 5) or bid-ask spread (Columns 6 to 10) 3 days before the activation of the program and 0 to 4 days after its activation. The independent variables include indicators for days in which the purchasing program operated and for bond's rating, and an interaction between them. Bond's characteristics include the natural log of the outstanding amount, its rating, indexation, time to maturity, and type of collateral. Errors are clustered at the issuer level.

	Price Of risk	expected credit spread	credit risk	Price Of risk	expected credit spread	credit risk	price of risk	expected credit spread	Credit risk	Price of risk	expected credit spread	credit risk	Price of risk	expected credit spread	credit risk
days around announcement	[-3,0]	[-3,0]	[-3,0]	[-3,1]	[-3,1]	[-3,1]	[-3,2]	[-3,2]	[-3,2]	[-3,3]	[-3,3]	[-3,3]	[-3,4]	[-3,4]	[-3,4]
after announcement	0.14	0.01	0.14	-0.17*	0.01	-0.17	-0.28***	0.01	-0.27***	-0.30***	0.01	-0.29***	-0.31***	0.02	-0.29***
	(0.12)	(0.03)	(0.12)	(0.1)	(0.02)	(0.1)	(0.09)	(0.02)	(0.09)	(0.09)	(0.02)	(0.09)	(0.08)	(0.02)	(0.08)
bonds rated AA-AAA	-0.05	-0.25***	-0.30**	-0.08	-0.25***	-0.32**	-0.08	-0.25***	-0.33***	-0.08	-0.25***	-0.32***	-0.08	-0.25***	-0.33***
	(0.14)	(0.03)	(0.14)	(0.13)	(0.03)	(0.13)	(0.12)	(0.03)	(0.12)	(0.12)	(0.03)	(0.12)	(0.11)	(0.02)	(0.11)
bonds rated AA-AAA X after announcement	-0.49***	0.01	-0.48***	-0.24**	0.01	-0.24**	-0.11	0.01	-0.11	-0.05	-0.01	-0.06	-0.03	-0.01	-0.04
	(0.13)	(0.03)	(0.13)	(0.11)	(0.03)	(0.11)	(0.1)	(0.02)	(0.1)	(0.09)	(0.02)	(0.09)	(0.09)	(0.02)	(0.09)
bonds rated A X after announcement	-0.56***	0.01	-0.56***	-0.58***	0.01	-0.58***	-0.51***	0.01	-0.51***	-0.46***	-0.01	-0.47***	-0.44***	-0.01	-0.45***
	(0.13)	(0.03)	(0.14)	(0.12)	(0.03)	(0.12)	(0.1)	(0.02)	(0.1)	(0.1)	(0.02)	(0.1)	(0.09)	(0.02)	(0.09)
Constant	-0.16	1.70***	1.53***	-0.01	1.70***	1.68***	0.01	1.70***	1.71***	-0.02	1.70***	1.68***	-0.05	1.70***	1.66***
	(0.19)	(0.05)	(0.19)	(0.19)	(0.04)	(0.19)	(0.17)	(0.04)	(0.17)	(0.16)	(0.04)	(0.16)	(0.15)	(0.03)	(0.15)
Observations	1,389	1,389	1,389	1,730	1,730	1,730	2,075	2075	2075	2417	2417	2417	2759	2759	2759
Bond's characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm's fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes								
Adjusted R-squared	0.905	0.988	0.952	0.884	0.988	0.942	0.879	0.988	0.94	0.878	0.988	0.94	0.878	0.989	0.94

Table 4. Announcement effect on credit spreads and its components. This table presents estimation results of an OLS model in which the dependent variable is either the price of risk, the expected credit spread, or the realized credit spread, 3 days before the activation of the program and 0 to 4 days after its activation. The independent variables include indicators for days in which the purchasing program operated and for bond's rating, and an interaction between them. Bond's characteristics include the natural log of the outstanding amount, its rating, indexation, time to maturity and type of collateral. Errors are clustered at the issuer level.

5.2.2 The Effect of the Purchasing on Credit Spreads

After identifying the impact of the program announcement on bond spreads, I now examine whether the actual purchases themselves had an effect. To this end, I estimate the following equation:

$$(3)\ \Delta credit\ spread_{i,f,[t_0-1,t_0+l]} = \alpha + \beta purchased\ today_{i,f,t_0} + \gamma bond\ rated\ A_{i,f,t_0} + \delta purchased\ today_{i,f,t_0} \times bond\ rated\ A_{i,f,t_0} + \delta bond's\ characteristics_{i,f,t_0} + \varphi_i + \vartheta_f + \tau_{t_0} + \varepsilon_{i,f,t_0}$$

where $\Delta credit\ spread_{i,f,[t_0-1,t_0+l]}$ is the change in the credit spread of bond *i* issued by company f from day t_0-*1* to day t_0+*1* (0<=*l*<=2). The explanatory variable $purchased\ today$ takes the value 1 if the bond was purchased by the Bank of Israel on day t_0, and 0 otherwise. Following the finding from the analysis of the program announcement's impact, which indicated that A-rated bonds responded differently than higher-rated bonds, I also included an interaction term between the purchase indicator and an indicator that takes the value 1 if the bond is rated A and 0 otherwise. Since the purchased bonds are rated A and above, the coefficient of this interaction term represents the differential impact of purchasing A-rated bonds compared to higher-rated bonds. Additionally, I include bond-specific variables (size and time to maturity) as well as fixed effects for the bond, the company, and the purchase day. The sample used to estimate the equation includes all bonds rated BBB and above with a duration of more than six months, and all days on which at least one bond was purchased (56 days). Standard errors are clustered at the issuing company level. The results are presented in Table 5.

The results indicate that the purchase of a bond reduces its credit spread by 4 basis points on the day of purchase compared to the spread on the previous day. The median independent effect of this variable in the sample is close to a decrease of one basis point. No additional impact was found for the purchase of bonds in the lower rating group. If it is the first time this bond is purchased, the effect increases by an additional 4 basis points (column 2), totaling 8 basis points, although this effect is not consistent across specifications. Column 3 presents an estimation of a specification that includes dummy variables indicating whether another bond from the same issuer was purchased on the

same day. The table shows that there is indeed a peer effect of bond purchases, with the credit spread of a bond decreasing by 3 basis points even if the bond itself was not purchased, but another bond from the same issuer was. In column 4, I examine whether the results hold when including all days between the start and end of the program (not just the purchase days) in the sample, and find that the effects are slightly stronger in this sample. In column 5, I restrict the sample to include only bonds eligible for purchase under the program and find similar effects.

	(1) [-1,0]	(2) [-1,0]	(3) [-1,0]	(4) [-1,0]	(5) [-1,0]
purchased today	-0.04***	-0.04***	-0.06***	-0.07***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
purchased today X bonds rated A	-0.02	-0.02	-0.01	-0.01	-0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
first time purchase		-0.04*	-0.03	-0.03	-0.05**
		(0.02)	(0.02)	(0.02)	(0.02)
purchase of issuer's other bond today			-0.03***	-0.05***	-0.03***
			(0.01)	(0.01)	(0.01)
Constant	-29.37***	-29.36***	-29.35***	-0.6	0.99**
	(0.65)	(0.65)	(0.65)	(2.14)	(0.48)
Observations	25,351	25,351	25,351	38,931	18,542
Bond's characteristics	Yes	Yes	Yes	Yes	Yes
Bond's fixed effects	Yes	Yes	Yes	Yes	Yes
Firm's fixed effects	Yes	Yes	Yes	Yes	Yes
Day fixed effects	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.147	0.147	0.148	0.105	0.226

Table 5. Corporate bonds purchasing effect. This table presents estimation results of an OLS model in which the dependent variable is the difference between a bond's credit spread at the day of its purchase by the Bank of Israel and one day before the purchase. The independent variables include an indicator that takes 1 if the bond was purchased at that day and 0 otherwise, an interaction between this indicator and an indicator that indicates if the bond is rated within the A-rating group, and two other indicators, one that indicates if it is the first time this bond was purchased and the other the indicates whether other bonds of the same issuer were purchased at that day. Bond's characteristics include the natural log of the outstanding amount, its rating, indexation, time to maturity, whether the issuing firm is local or not, and type of collateral. Errors are clustered at the issuer level.

In Table 6, I examine whether the effect of the purchases persists beyond the day of the purchase itself. I re-estimate the specifications from columns 3-5 in Table 5, but this time the dependent variable is the difference in the credit spread one, two, or three days

after the purchase, relative to the spread one day before the purchase.[13] The results show that as the time horizon extends slightly, the impact of the purchase diminishes somewhat and is primarily observed in A-rated bonds. Similarly, the effect of purchasing another bond from the same issuer also weakens and becomes insignificant at the longest time horizon examined (three days after the purchase).

days around purchase	(1) [-1,1]	(2) [-1,1]	(3) [-1,1]	(4) [-1,2]	(5) [-1,2]	(6) [-1,2]	(7) [-1,3]	(8) [-1,3]	(9) [-1,3]
purchased today	-0.04*** (0.01)	-0.05*** (0.01)	-0.03*** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)	-0.02** (0.01)	-0.02** (0.01)	-0.02** (0.01)	-0.01 (0.01)
purchased today X bonds rated A	-0.02* (0.01)	-0.02* (0.01)	-0.03** (0.01)	-0.01 (0.02)	-0.01 (0.01)	-0.01 (0.01)	-0.03** (0.01)	-0.03** (0.01)	-0.02* (0.01)
first time purchase	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)	-0.02 (0.02)	-0.01 (0.02)	-0.01 (0.02)	-0.02 (0.02)	-0.02 (0.02)	-0.01 (0.02)
purchase of issuer's other bond today	-0.02** (0.01)	-0.03*** (0.01)	-0.01 (0.01)	-0.02* (0.01)	-0.03*** (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.02 (0.01)	0.01 (0.01)
Constant	-8.29*** (0.59)	0.04 (0.33)	0.37 (0.23)	-7.11*** (0.94)	-0.18 (0.34)	0.26 (0.2)	-6.78*** (1.39)	-0.21 (0.36)	0.24 (0.23)
Observations	25,385	38,975	18,542	25,384	38,974	18,541	25,382	38,972	18,539
Bond's characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bond's fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm's fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Day fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.129	0.107	0.213	0.094	0.082	0.166	0.101	0.088	0.165

Table 6. Corporate bonds purchasing effect: longer horizons. This table presents estimation results of the same models for which estimation results are presented in Table 5, but with longer horizons of the differences in credit spread as the dependent variable (1, 2 or 3 days after purchases).

In another set of estimations, I examine whether the proportion of the nominal amount purchased as a share of the total outstanding amount of the bond affects credit spreads. I do this in two different ways: by including this variable in the specification shown in Table 5, column 3 (results are presented in Table 7, column 1–4), and alternatively, within a regression estimated only on the sample of purchased bonds (results are presented in Table 7, column 5–8). The results indicate that on the day of purchase, the quantity purchased did not have an additional effect beyond the purchase itself. However, surprisingly, the quantity of bonds purchased is positively correlated with changes in the credit spread 2–3 days after the purchase. A further analysis shows that

[13] A longer time horizon would make it more difficult to identify the effect of the purchase, as the frequency of additional purchases increases.

this is a result of very few large transactions, and when they are excluded from the sample, the effect disappears.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All bonds				Only purchased bonds			
days around purchase	[-1,0]	[-1,1]	[-1,2]	[-1,3]	[-1,0]	[-1,1]	[-1,2]	[-1,3]
purchased today	-0.06***	-0.06***	-0.07***	-0.06***				
	(0.02)	(0.02)	(0.02)	(0.02)				
purchased today X bonds rated A	-0.01	-0.03*	-0.02	-0.03**				
	(0.02)	(0.01)	(0.02)	(0.02)				
purchased share of bond's outstanding amount X 100	0.03	0.13	0.18*	0.23**	0.23	0.43*	0.68**	0.83**
	(0.08)	(0.1)	(0.11)	(0.11)	(0.32)	(0.22)	(0.27)	(0.34)
first time purchase	-0.03	0	-0.01	-0.02	-0.01	-0.04	-0.07	-0.07
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.04)	(0.05)	(0.05)
purchase of issuer's other bond today	-0.03***	-0.02**	-0.02*	-0.01				
	(0.01)	(0.01)	(0.01)	(0.01)				
Constant	-29.35***	-8.30***	-7.12***	-6.80***	0.04	0.2	0.24	-0.18
	(0.65)	(0.59)	(0.94)	(1.39)	(0.43)	(0.37)	(0.44)	(0.49)
Observations	25,351	25,385	25,384	25,382	2,382	2,382	2,382	2,382
Bond's characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bond's fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm's fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Day fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.148	0.129	0.094	0.101	0.321	0.279	0.214	0.193

Table 7. Corporate bonds purchasing effect: differential quantity effect. This table presents estimation results of similar models that their estimation results are presented in Table 5 and 6, with the addition of the share of purchased bonds out of the total outstanding amount of it (times 100). The sample used for estimation of Columns 1–4 includes all bonds, and the one used for estimation of Columns 5–8 includes only purchased bonds.

Next, I examine whether the purchases also affected other market aspects of corporate bonds—specifically, liquidity spreads and the price of risk. In Table 8, the estimation results of Equation 3 are presented according to the specification in column 3 of Table 5, but instead of using the change in credit spreads, I use the change in liquidity spreads and the price of risk alternately, across different time horizons. The results show that the purchases have a significant effect on liquidity spreads: on the day of purchase itself (column 1), the bid-ask spread decreases by 0.27, whereas the unconditional median is only -0.02. However, the day after the purchase (column 2), the impact on the liquidity spread is halved, and it remains at this reduced level for the next two days (columns 3-4). No significant effect was found for whether the purchase was the first for that bond,

for the purchase of another bond from the same issuer, or for the purchase of A-rated bonds.

The impact on the price of risk is found to be significant and similar in magnitude to the overall effect on credit spreads, consistent with the impact of the announcement of the purchase program. The effect appears to be almost independent of the measured time horizon. Additionally, a significant effect on the price of risk was found when another bond from the same issuer is purchased. This effect is substantial, constituting about half of the impact of directly purchasing the same bond. This effect also remains stable across the different time horizons examined.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Bid-Ask Spread (X 1000)				price of risk			
days around purchase	[-1,0]	[-1,1]	[-1,2]	[-1,3]	[-1,0]	[-1,1]	[-1,2]	[-1,3]
purchased today	-0.27***	-0.15*	-0.11	-0.18*	-0.04***	-0.04***	-0.04***	-0.03***
	(0.09)	(0.08)	(0.1)	(0.09)	(0.01)	(0.01)	(0.01)	(0.01)
purchased today X bonds rated A	-0.05	0.01	-0.1	0.06	0	-0.02	-0.01	-0.01
	(0.17)	(0.16)	(0.16)	(0.17)	(0.01)	(0.01)	(0.02)	(0.01)
first time purchase	0.13	-0.17	-0.1	-0.29	-0.06	-0.03	-0.02	-0.03
	(0.25)	(0.29)	(0.34)	(0.31)	(0.04)	(0.04)	(0.04)	(0.04)
purchase of issuer's other bond today	-0.08	-0.04	0.03	-0.03	-0.02***	-0.02***	-0.03***	-0.02**
	(0.09)	(0.07)	(0.08)	(0.09)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	-0.21	-1.1	-9.29***	-12.25***	0.57**	0.41*	0.44	0.51
	(3)	(3.38)	(3.1)	(4.33)	(0.28)	(0.24)	(0.32)	(0.36)
Observations	24,712	24,840	24,780	24,795	19,281	19,303	19,289	19,273
Bond's characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bond's fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm's fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Day fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.011	0.011	0.015	0.016	0.15	0.149	0.098	0.086

Table 8. Corporate bonds purchasing effect: additional outcomes. This table presents estimation results of the same model used in Column 3 of Table 5, but with different dependent variables: in Columns 1–4 I use the bid-ask spread as a dependent variable and in Columns 5–8 I use the price of risk. The number of observations used in Columns 1–4 decreases relatively to those reported in Table 7 because of the exclusion of outliers, and in Column 5–8 because not all firms with publicly traded bonds have also publicly traded stocks, a key component in the calculation of the price of risk.

To conclude this section, where I estimated the impact of the purchase program on the bond market, I assess the combined effect of the two aspects of the program found to influence credit spreads—the announcement of the program and its execution.

Before estimating the effect econometrically, Table 9 shows the median spread on the eve of the purchase program and at its actual conclusion for each of the five possible groups, which differ in their eligibility for purchase, rating group, and whether they were purchased. In absolute terms, the decline in the spread of bonds not included in the program is the most significant. However, as a percentage change from the initial spread, the impact on bonds in the A rating group, whether purchased or not, is similar. The table also shows—consistent with the results of the above analysis—that the contribution of the announcement was more significant, while the purchases themselves contributed only slightly and mainly to bonds in the A rating group.

In order to establish these raw results, I estimate a difference-in-differences equation similar to Equation 2 with the following modifications. First, I use a sample of daily data on all bonds rated BBB and above with a duration of at least six months throughout the period from the beginning of July until the end of the actual purchases (November 8, 2020), with the period before the program effectively represented by the first three trading days of July. For the explanatory variables, I also add a variable that takes the value 1 if the bond was purchased at least once up to that day, and an interaction with an indicator that takes the value 1 if the bond is rated in the A rating group. Due to the relatively long period included in the sample I use, autocorrelation between observations might be a problem that biases the results. To avoid this, I also include the lagged dependent variable as an explanatory variable.

The estimation results presented in column 1 of Table 10 confirm most of the findings shown by the descriptive statistics in Table 9. The purchase program reduced bond spreads by 10 basis points for all traded bonds. The spreads of bonds purchased under the program actually increased slightly, but this is true only for the highest rating group, as the coefficient of the interaction between purchases and the A rating group is negative and of a similar magnitude.[14] When considering the entire month of June as the period before the purchase program, it is found that the effects of the program's announcement were weaker for the highest-rated bonds and that the purchases had no impact on the spreads of A-rated bonds.

[14] Estimating a similar equation using quantile regression (for the median) indicates that this variable is not significant, suggesting that the positive effect is the result of a few observations of high-rated bonds that were not purchased and had an unusual spread on the eve of the program's implementation.

		not purchased				purchased			
	before	after	difference	diff / before		before	after	difference	diff / before
Noneligible	10.4	5.5	-4.9	47.3%					
Eligible - A rated	3.8	2.1	-1.8	45.8%		4.5	2.3	-2.1	47.9%
Eligible - AA-AAA rated	1.4	1.0	-0.4	27.3%		1.6	1.1	-0.5	28.6%

Table 9. Median credit spreads by eligibility and status of purchase. This table presents the median of each group's credit spread before and after the operation of the purchasing program (July 5 and November 8, respectively). Groups differ by eligibility to be purchased and by status of purchase as for November 8, 2020.

	(1) Pre-program period: July 1 to 5, 2020	(2) Pre-program period: June 1 to July 5, 2020
lag(dependent)	0.92***	0.94***
	(0.01)	(0.01)
after announcement	-0.10*	-0.18***
	(0.06)	(0.03)
bonds rated AA-AAA X after announcement	0.10	0.13***
	(0.06)	(0.03)
bonds rated A X after announcement	0.04	0.02
	(0.07)	(0.03)
purchased	0.02**	0.02***
	(0.01)	(0.01)
purchased X bonds rated A	-0.03*	0.01
	(0.02)	(0.02)
Constant	-0.34	0.13
	(0.35)	(0.24)
Observations	40,332	49,950
Bond's characteristics	Yes	Yes
Bond's fixed effects	Yes	Yes
Firm's fixed effects	Yes	Yes
Day fixed effects	Yes	Yes
Adjusted R-squared	0.993	0.993

Table 10. Estimating announcement and purchasing effect. This table presents estimation results of a model that includes announcement, eligibility and purchases effect. The dependent variable is a bond's credit spread, and the independent variables include the lag of the credit spread, an indicator for the operation of the program (July 6, 2020 onwards), the rating group of the bond and interactions with the operating period of the program operation, an indicator that indicates if the bond was purchased until the same day and an interaction with the A-rated bonds indicator. The sample period includes pre-program periods (July 1 to July 5 in Column 1, June 1 to July 5 in Column 2) and the period in which the program operated (July 6 to November 8, 2020). Bond's characteristics include the natural log of the outstanding amount, its rating, indexation, time to maturity and type of collateral. Errors are clustered at the bond level.

5.3. The Effect of the Purchasing Program on the Primary Market

One of the ways through which corporate bond purchases can affect the credit market is by lowering credit spreads and funding costs. Such an effect essentially facilitates continued credit raising in various markets, particularly through the issuance of new corporate bonds. As shown above, the purchase program had an impact on bond prices in the secondary market, but did it also ease credit raising in the primary market? And if so, were these firms whose bonds were eligible for purchase under the program, or was there a broader impact in the primary market due to the mere announcement of the program? This section will attempt to answer these questions.

To answer this question, I use data on the primary issuances of bonds, which include information on the issuance (date, nominal value, linkage, currency, tradability, rating, and type of collateral) and on the issuing company. I merge the daily issuance data since 2015 with the data on firms whose bonds are traded in the market each day and examine the probability of a particular company issuing on a given day, depending on the company's quality and the period. Formally, I estimate the following equation:

$$
\begin{aligned}
(4)\ \Pr\left(issuance_{f,t}\right) &= \alpha + \beta covid_t \times IG_{f,t} + \gamma purchases\ plan_t \times nonIG_{f,t} \\
&+ \delta was\ purchased_t + \theta firm's\ bonds' characteristics_{f,t} + \vartheta_{f,t} \\
&+ \varepsilon_{f,t}
\end{aligned}
$$

where $issuance_{f,t}$ is a dummy variable that takes the value 1 if company f issued on day t and 0 otherwise, $covid_t$ is a dummy variable that takes the value 1 for all days after March 1, 2020, and 0 otherwise, $nonIG$ is a dummy variable that takes the value 1 if the issuing company is not in investment grade (rating group BBB and lower), $was\ purchased$ is a dummy variable that takes the value 1 from the day the first bond of the company was purchased under the purchase program, and $firm's\ bonds' characteristics$ includes the time to maturity and the log of the total bond liabilities of the company at time t. I also include fixed effects for the industry of the issuing company.[15]

[15] Again, all the variables in this and the next equation enter also without their interaction terms.

Subsequently, I examine whether the characteristics of the issuances vary according to the period as follows:

$$(5)\ issue\ term_{i,f,t} = \alpha + \beta covid_t \times nonIG_{f,t} + \gamma purchases\ plan_t \times nonIG_{f,t} + \delta was\ purchased_t + \vartheta_{f,t} + \varepsilon_{f,t}$$

where $issue\ term$ can be the log of the total nominal value of the issuance, the maturity range, an indicator denoting whether there is a first fixed charge for the issuance, or an indicator denoting whether there is any type of collateral for the issuance. In all estimations, standard errors are clustered at the issuing company level, and the sample I use is at a daily frequency, from the beginning of 2015 until the end of 2020.

The estimation results are presented in Table 11. The estimates in column 1 indicate that after the outbreak of the COVID-19 crisis, the probability of issuing bonds decreased, but only for noninvestment-grade bonds. The initiation of the purchase program increased the probability of bond issuance by noninvestment-grade firms, effectively reopening the primary market for them. Regarding the issuance terms, given that an issuance occurred, the results show that after the outbreak of the crisis, the issuance volume increased for noninvestment-grade bonds (column 2). However, due to the very small number of such issuances, no definitive conclusions can be drawn about this type of bond. Additionally, the results indicate that after the implementation of the purchase program, the average issuance size actually decreased. The number of days to maturity was not affected by the crisis or the implementation of the purchase program, but it was found that firms whose bonds were purchased increased the number of days to maturity in new issuances (column 3). No significant impact of the crisis, the program announcement, or the purchases themselves was found on the presence of a first fixed lien for the new bonds (column 4) or any type of collateral (column 5). All the above results are not sensitive to the exclusion of banks and insurance companies from the analysis.

The findings above suggest that the purchase program and the purchases themselves also affected the primary market for bond issuances, albeit to a very limited extent. The result indicating that the average issuance size decreased after the implementation of the purchase program is surprising. A possible explanation for this finding is the fact

that the program included also the purchasing of banks' bonds, which—as I will show in the next section—stimulated bank credit and made corporate bonds issuance less attractive. We will return to this point later in the paper.

	(1)	(2)	(3)	(4)	(5)
	Is issued?	Log(amount issued)	Log(days to maturity)	first lien	any security
estimation method	*probit*	*OLS*	*OLS*	*probit*	*probit*
COVID-19	-0.004	-0.178	-0.076	0.311	0.204
	(0.05)	(0.12)	(0.07)	(0.24)	(0.29)
non-IG	0.076	-0.533***	-0.170***	-0.613**	-0.664***
	(0.07)	(0.13)	(0.05)	(0.25)	(0.2)
COVID-19 X non-IG	-0.406**	0.541***	-0.889	-0.24	-0.177
	(0.21)	(0.18)	(0.63)	(0.84)	(0.88)
after announcement	-0.112	-0.749*	-0.301**	-0.711	-1.001*
	(0.11)	(0.39)	(0.13)	(0.56)	(0.58)
after announcement X non-IG	0.369*	0.235	0.846	1.045	1.199
	(0.21)	(0.42)	(0.61)	(1.36)	(1.4)
was issuer's bond purchased	0.052	0.591	0.312***	0.297	0.259
	(0.11)	(0.38)	(0.12)	(0.55)	(0.55)
Constant	-3.764***	2.467***	7.389***	0.846	1.022
	(0.13)	(0.32)	(0.15)	(0.64)	(0.66)
Observations	229,944	886	646	812	847
Traded bonds characteristics	Yes	Yes	Yes	Yes	Yes
Industry's fixed effects	Yes	Yes	Yes	Yes	Yes
Adjusted / Pseudo R-squared	0.0264	0.341	0.232	0.128	0.161

Table 11. Estimating the effect of the purchasing program on the issuance market. This table presents estimation results of the effect the corporate bonds purchasing program had on the market of corporate bonds issuance. In the first column, the dependent variable is an indicator for firm's bond issuance, while in columns 2–5 the dependent variable is the issued bond characteristics. The sample includes all issuances form 2015 to the end of 2020.

6. Banks' Bonds Purchases and Bank Credit

Beyond the impact of the bond purchase program on the bond market, it is pertinent to investigate whether the program affected the broader business credit market. Given that the majority of business credit is sourced from banks, it is essential to assess whether bank credit was also impacted by the purchase program. As previously noted, a distinctive feature of the Bank of Israel's purchase program was the eligibility and subsequent purchase of bonds issued by commercial banks and other financial institutions. This approach, unlike other global purchase programs, aimed to alleviate

liquidity constraints and reduce financing costs for the financial sector, in addition to the real sector, thereby facilitating the continued provision of credit.

Bank-issued bonds are an important funding source for commercial banks: according to balance sheet data of all banks as of the end of 2019, funding through all types of bonds comprise 6.3 percent of all liabilities. The debt issued through bonds is classified as subordinated debt and it is part of the tier-2 used for the calculation of regulatory capital adequacy ratios. As of the end of 2019, tier-2 capital comprised 22.9 percent of total regulatory capital, where the largest part (15.7 percentage points) was debt issued through bonds. Moreover, this type of debt is characterized by longer maturities compared to deposits and serves as a funding source for long-term credit. Consequently, supporting bank bonds could have incentivized and eased the provision of credit to the real sector.

However, studying the effect of purchasing commercial bank-issued bonds on banks' credit supply carries an identification challenge, as demand also changed according to borrowers' perceptions of levels of economic uncertainty. In addition, the purchase of nonfinancial corporate bonds concurrently affected the demand for bank credit: according to Grosse-Rueschkamp et al. (2019), bond purchases reduce the costs of raising funds through bonds, enhance the incentive to incur debt via this channel, and diminish the demand for bank credit. Their findings indicate that firms whose bonds were purchased adjusted their debt structure by decreasing bank credit and increasing bond-based credit.

To accurately determine the impact of including bank bonds in the purchase program on the supply of bank credit, it is necessary to control for demand effects stemming from the purchase program, changes in borrower composition and nonstable and rapidly changing economic environment. Clearly, analyzing aggregate credit quantities alone does not provide a robust basis for identification. Therefore, I employ a detailed borrower database and the identification strategy of Khwaja and Mian (2008) to examine the effect of bank bond purchases on the volume of credit extended.

For this purpose, I use a dataset of loan-level data of all large borrowers from all Israel commercial banks. The Banking Supervision Department (BSD) at the Bank of Israel maintains this credit register, started in 2005, the main purpose of which is to collect loan history and to measure and monitor banks' credit exposures exceeding an amount

that is considered significant for their solvency. The register is also used to assess and monitor the risks embedded in banks' loan portfolios. Every commercial bank is obliged to send the BSD a quarterly report of its exposures to borrowers who exceed a minimum threshold, which varies in accordance with the bank's capital. Practically, the six largest banks report credit exposures of NIS 20 million (~$5 million)[16] or above, while the smallest of the seven largest Israeli banks reports every exposure of NIS 4 million (~$1 million) or above.[17] The data reported to the BSD is divided into two main categories: borrower data and exposure data, with the exposure data divided into on-balance sheet exposure and off-balance sheet exposure. For the purpose of this study, I use the amount of on-balance sheet credit.

The model I wish to estimate takes the following form:

$$(6)\ \Delta credit_{f,b,t} = \alpha + \beta share\ of\ banks' bonds\ purchase_{b,t} + \varepsilon_{f,b,t}$$

where $\Delta credit_{f,b}$ is the change in the outstanding amount of credit bank b granted to firm f at time t, and $share\ of\ banks' bonds\ purchase_{b,t}$ is the amount of bank's outstanding debt in bonds held by the Bank of Israel at time t as a share of the bank's total amount to outstanding bonds.

In order for β to be unbiased, $corr(share\ of\ banks' bonds\ purchased_{b,t}, \varepsilon_{f,b,t})$=0 must be satisfied, i.e., there is no omitted variable that simultaneously drives banks' bonds purchases and and changes in credit amounts allocated to firm *f*. Such an assumption is unreasonable: the purchase program was implemented due to the precarious economic situation and significant uncertainty prevailing at that time, which undoubtedly also affected the demand for credit from firms and the level of risk. Therefore, estimating Equation (6) using OLS would yield biased results.

To identify purchases' effect, I use the Khwaja and Mian (2008) fixed-effect estimator, relying on the existence of firms that borrow from more than one bank and using variation in $share\ of\ banks' bonds\ purchased$ across banks and time. Using this sample, I can observe the extent to which variation in credit allocation to a firm, which

[16] Throughout the paper I use an exchange rate of 1$=4 NIS, as observed in October 2023.

[17] Aside from borrowers exceeding these thresholds, there are other borrowers whose exposure a bank is obliged to report. For instance, if a bank lends to a firm that is part of group of borrower (e.g., a group of entities that have the same controlling firm or individual), it has to report all exposures to other firms in this group of borrowers, even if the exposure does not exceed the threshold.

borrowed from two different banks, was dependent on variation in the extent to which the lending bank's bonds were purchased. By using the fixed-effect estimator, I remove all firm-specific non-observable characteristics, such as credit demand.

Formally, using the subsample of firms borrowing from multiple banks, I estimate the following:

$$(7)\ \frac{credit_{f,b,t} - credit_{f,b,t-1}}{0.5(credit_{f,b,t} + credit_{f,b,t-1})} = \alpha_{f,t} + \beta share\ of\ banks' bonds\ purchase_{b,t} + \theta bank\ controls_{b,t-1} + \vartheta_b + \varepsilon_{f,b,t}$$

The dependent variable in this equation is the symmetric growth between time *t-1* and *t* of firm *f*'s used credit from bank *b*. As in Greenwald, Krainer and Paul (2025), I use the symmetric growth because the range of values in this setting lies in the [-2,2] interval, ensuring that outliers will not bias the results, without the need to winsorize or drop them. The independent variable is the amount of bank's *b* bonds purchased by the Bank of Israel from the beginning of the implementation of the purchasing program and until time *t*, as a share of all bank's *b* outstanding bonds (multiplied by 100). $\alpha_{f,t}$ is firm *f*'s fixed effect at time *t* and $bank\ controls_{b,t-1}$ include bank's *b* lagged log assets, core tier 1 capital to assets ratio and the share of bonds in its overall liabilities. I also include fixed effect for each bank to control for any unobservable bank's characteristics. Standard errors are clustered within the bank-firm level.

The sample I use for estimation includes all large borrowing firms from all banks that had any type of credit during 2020:Q3 to 2021:Q2. I use this period for estimation because the purchasing program started during 2020:Q3 and lasted until 2020:Q4, but the effects on bank credit might not appear immediately.

The estimation results are presented in Table 12, Column 1. The results indicate that the higher the proportion of bonds purchased out of the bank's total bond liabilities, the greater the proportion of credit the bank allocates to the borrower. In Column 2, I estimate the same specification but without restricting to borrowers who borrow from at least two banks, resulting in a biased estimate. Although the estimated effect is positive, it is lower and not statistically significant at conventional levels (p-value=0.108). In Columns 3 and 4, I re-estimate the same specifications as in Columns 1 and 2, but I use the quarter-on-quarter rate of change in credit as the dependent

variable instead of the average rate of change, and I exclude observations below the 5th percentile and above the 95th percentile from the sample.

dep. var.	(1) average growth	(2) average growth	(3) qoq growth	(4) qoq growth
share of lending bank's outstanding bonds purchased	0.32***	0.08	0.16***	0.05***
	(0.1)	(0.05)	(0.04)	(0.02)
Constant	-6.16	-11.61*	-34.86***	-26.22***
	(12.58)	(7.03)	(6.57)	(2.97)
Observations	9,417	20,538	8,292	18,564
Bank FE	Yes	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes
Borrower-quarter FE	Yes	No	Yes	No
Adjusted R-squared	0.18	0.01	0.15	0.06

Table 12. Estimating the effect of banks' bond purchases on credit. This table presents estimation results of the effect banks' bond purchases had on credit. The dependent variable is credit growth (either average of quarter-on-quarter) and the main independent variable of interest is the share of lending bank's outstanding bonds that was purchased. Control variables include banks size, its capital to assets ratio and the share of bonds in its total liabilities. Bank and borrower-quarter fixed effect are also included. Errors are clustered within the bank-borrower level.

Using the more intuitive measure of quarter-on-quarter credit growth (column 3), the estimated coefficient implies that for each additional percentage point of the Bank of Israel's bond purchases out of a commercial bank's total bond liabilities, that bank increased the credit to the borrower by 16 percent more than the credit the same borrower received from another bank. The standard deviation of the purchase volume among the seven banks is 0.15. Thus, an increase of one standard deviation in the purchase volume led to a 2.4 percent increase in the credit provided by that bank. The total bond purchases amounted to NIS 780 million, representing 1.2 percent of the banks' bond balance prior to the program's implementation, and the average credit volume per borrower in the sample was NIS 68 million. Therefore, an increase of one standard deviation corresponds to a purchase of NIS 1.2 million (0.15 × NIS 780 million), leading to an additional credit of 1.6 million NIS to the average borrower (1.2 × 0.16 × NIS 68 million).

In Table 13, I present the results of several robustness tests. To ensure that the results are not influenced by outliers, I re-estimate the specification from Table 12, Column 1, but exclude the extreme values (2 and -2). The strength of the effect slightly weakens

but remains positive and significant. In Column 2, I exclude the construction and real estate sector, so the sample includes only C&I loans, and find that the main result remains stable in both direction and magnitude. In Column 3, I add interactions between the proportion of bonds purchased and borrower characteristics. These interactions help identify which borrowers received the new credit allocated as a result of the bank's bond purchases. Specifically, I include the decile of the borrower's exposure size and an indicator of whether the borrower is classified by the lending bank as low-risk. These characteristics are lagged by one quarter. The results show that size and risk level did not play a significant role in credit allocation, indicating that the impact on credit supply was broad-based.

dep. var.	(1) Average growth	(2) average growth	(4) Average growth
share of lending bank's outstanding bonds purchased	0.22*** (0.07)	0.30*** (0.09)	0.21* (0.12)
share of lending bank's outstanding bonds purchased X exposure size (lag)			0.01 (0.01)
share of lending bank's outstanding bonds purchased X low risk borrower (dummy, lag)			0.02 (0.06)
Constant	-11.73 (9.16)	-7.73 (12.69)	33.49* (19.33)
Observations	8,917	9,087	8,615
Bank FE	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes
Borrower-quarter FE	Yes	Yes	Yes
Adjusted R-squared	0.184	0.186	0.154

Table 13. Estimating the effect of banks' bond purchases on credit: robustness tests. This table presents robustness tests for the estimated effect that the banks' bond purchases had on credit. The dependent variable in all specifications is the average credit growth. In column 1, I exclude observations with extreme values of the dependent variable. In column 2, I use only C&I loans for estimations and in column 3 I add interactions between the main independent variable of interest (share of lending bank's outstanding bonds that was purchased) and borrowers' traits (exposure size and level of risk). Control variables include banks size, its capital to assets ratio and the share of bonds in its total liabilities. Bank and borrower-quarter fixed effect are also included. Errors are clustered within the bank-borrower level.

Concurrently with the bond purchase program, another initiative was implemented to incentivize banks to extend credit. Under this program, the Bank of Israel allocated up to NIS 40 billion in monetary loans to commercial banks at a fixed interest rate of 0.1 percent for three years, conditional on the banks increasing credit to small and micro

businesses. Although the program did not target businesses usually included in large credit exposure reports, the reallocation of resources could have indirectly affected them. Since both programs operated simultaneously, I add to the specification in Table 12, Column 1, the log of the cumulative monetary loans each bank received since the program's inception (third quarter of 2020). The estimation results are presented in Table 14. In Column 1, I reiterate the estimation results from Table 12, Column 1. In Column 2, I replace the bank's bond purchases with the volume of monetary loans from the Bank of Israel. The positive and significant result indicates that the loan program indeed increased the credit supply even to large borrowers. However, the inclusion of variables representing both intervention programs (Column 3) reveals that only the bond purchases had an effect, while the direct loan program had no impact. This result holds even when replacing the symmetric rate of change with the quarterly rate of change (Column 4).

dep. var.	(1) Average growth	(2) average growth	(3) average growth	(4) qoq growth
share of lending bank's outstanding bonds purchased	0.32***		0.52**	0.30**
	(0.1)		(0.22)	(0.12)
Log(BOI special monetary loans)		0.01***	-0.01	0
		(0)	(0.01)	(0)
Constant	-6.16	4.7	-12.7	-39.42***
	(12.58)	(12.13)	(14.6)	(7.84)
Observations	9,417	9,417	9,417	8,292
Bank FE	Yes	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes
Borrower-quarter FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.01	0.01	0.01	0.10

Table 14. Estimating the effect of banks' bond purchases on credit among other lending operations. This table presents estimation results of the two main lending operations the Bank of Israel operated as a response to the COVID-19 crisis: bonds purchases and special monetary loans to commercial banks.

What is the mechanism behind the impact of bond purchases on credit supply? One possibility is that the purchases reduce the cost of raising funds for banks, or at the very least, the expectation of a decrease in funding costs.[18] As a larger volume of bonds is

[18] Market prices of the subordinated debt issued through bonds do not affect its value for the calculation of regulatory capital, therefore the capital adequacy (direct) channel is not a potential one.

purchased, funding costs decrease, allowing the bank to lower the cost of credit, thereby increasing the supply. An alternative explanation is based on literature linking the identity of a company's bondholders to its performance (Coppola, 2024; Chodorow-Reich, Ghent and Haddad, 2021; Breckenfelder and De Falco, 2024). According to this literature, the more a company's bonds are held by "stable" hands, the greater the financial certainty for the company, enabling it to engage in longer-term projects. The Bank of Israel's bond purchases and its commitment to hold the bonds until maturity increase the proportion of bonds held by stable hands, thereby facilitating an increase in credit supply.

To examine which of the two alternatives is more plausible, I modify the specification in Table 12, Column 1, in several ways. If the reduction in funding costs is the explanation, it is likely that not only the volume of bond purchases relative to total bond liabilities would have an impact, but rather the volume of bonds purchased relative to the bank's total liabilities. This is because the more significant the purchased liabilities are in the context of total liabilities, the greater the impact on funding costs should be. Therefore, I replace the main explanatory variable with a variable calculated as the total bonds purchased by the Bank of Israel relative to the commercial bank's total liabilities. The estimation results are presented in Table 15, Column 1. The results show that this variable does not significantly affect the increase in credit supply, suggesting that the reduction in funding costs likely did not play a role here.[19]

To test the alternative hypothesis that the bank provides "stable hands" for holding bonds, I calculate the proportion of the bank's bonds held by investors not considered stable hands. In the literature, insurance companies and institutional investors who invest long term are typically seen as stable hands, whereas mutual funds and individuals, both domestic and foreign, are not (Coppola, 2024; Chodorow-Reich, Ghent and Haddad, 2021; Breckenfelder and De Falco, 2024). Therefore, I calculate the proportion of each bank's bonds held by entities other than insurance companies and pension funds. I then multiply the proportion of bonds purchased by the Bank of Israel by the proportion of bonds held by nonstable hands. If the hypothesis that this is the explanatory mechanism is correct, we would expect to see a positive interaction

[19] In additional specifications that were examined, I included an interaction between the volume of purchases and the bank's reliance on bond financing. No relationship was found with the volume of credit provided.

between these two variables—the higher the proportion of bonds held by nonstable hands, the more significant and impactful the Bank of Israel's bond purchases would be.

The estimation results are presented in Table 15, Column 2. The results show that the proportion of bonds held by nonstable hands negatively affects the credit supply, and the impact of the Bank of Israel's bond purchases is stronger as this proportion increases. No significant effect was found for the volume of purchases alone, which is consistent with the hypothesis that the stable hands aspect is driving the results. In Column 3, I use the lagged proportion of bonds held by nonstable hands to avoid the possibility that changes in bondholder composition occurred concurrently with the purchase program. The results remain consistent.

dep. var.	(1) average growth	(2) average growth	(3) average growth
share of lending bank's outstanding bonds purchased		-0.41	-0.24
		(0.43)	(0.27)
share of bonds purchased in bank's liabilities	1.31		
	(2.79)		
share of non-stable holders		-0.03*	
		(0.02)	
share of non-stable holders X share of bonds purchased in bank's liabilities		0.02*	
		(0.01)	
share of non-stable holders (lag)			-0.04***
			(0.01)
share of non-stable holders (lag) X share of bonds purchased in bank's liabilities (lag)			0.01**
			(0.01)
Constant	14.66	0.11	-5.4
	(12.93)	(12.92)	(12.8)
Observations	9,251	9,251	9,417
Bank FE	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes
Borrower-quarter FE	Yes	Yes	Yes
Adjusted R-squared	0.177	0.179	0.181

Table 15. Discovering the mechanism behind the effect of banks' bond purchasing on bank credit. This table presents several tests of the potential mechanisms behind the estimated effect of banks' bond purchasing on bank credit. The dependent variable in all specifications is the average credit growth.

7. Summary and Conclusions

This study investigates the effects of the Bank of Israel's corporate bond purchase program, initiated in July 2020 as a response to the COVID-19 crisis. The program aimed to stabilize the corporate bond market, which had experienced significant disruptions, including a sharp decline in prices and increased credit spreads. The analysis focuses on two main objectives: assessing the impact of the program on various aspects of the corporate bond market and evaluating its influence on bank credit, particularly through the unique feature of purchasing bank-issued bonds.

The findings reveal that the program had a substantial effect on credit spreads, particularly through its announcement. Following this announcement, credit spreads for all traded bonds decreased, with the most significant reductions observed in bonds in the A-rating group. While actual purchases contributed to further decreases in spreads, their impact was relatively limited compared to the initial announcement. The primary mechanism driving these changes was a reduction in risk premiums rather than alterations in default probabilities.

Furthermore, by including bank-issued bonds in its purchasing strategy, in contrast with other central banks purchasing programs, the Bank of Israel was able to enhance the supply of bank credit. The evidence I provide suggests that the mechanism behind this effect is the replacement of a larger share of debt in safer and more stable hands, which reduces uncertainty for issuing banks.

This research contributes to existing literature by examining a corporate bond purchase program within a unique market structure—where bonds are traded on exchanges rather than over-the-counter. This distinction allows for a deeper understanding of how such interventions can operate effectively even in different trading environments. Additionally, by highlighting the effects of purchasing bank-issued bonds, this study offers new insights into how central banks can support credit markets during crises.

In conclusion, the Bank of Israel's corporate bond purchase program proved to be an effective tool for stabilizing the bond market and facilitating credit provision during the COVID-19 crisis. The results emphasize the importance of central bank signaling and intervention in times of financial distress. Policymakers should consider these findings when designing future interventions, particularly regarding the inclusion of various

asset types and understanding market dynamics. The lessons learned from this program can inform strategies for addressing similar challenges in future crises, ensuring that financial markets remain resilient and accessible to businesses in need of support.

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