Master Thesis U.S.E.

Title: *The choice between bank loans and bonds, depending on firm characteristics, after Covid-19 pandemic in the U.S. market.*

Student: Charalampos Giannopoulos 7063113

University Supervisor: Stefano Lugo

ABSTRACT

In this thesis I study if the choice between bond and loan issuance, before and after Covid-19, is affected, using US market quarterly within firm-level data, from the second quarter of 2012 until the second quarter of 2022. I also study the impact of firms' asset tangibility on the debt choice during the global pandemic. To answer these questions I combine firm characteristic data from Compustat, bonds from Mergent and large syndicated loans data from FactSet. I perform linear and logistic regressions applying fixed-effects to my models. Banks proved to be surprisingly resilient against the financial impact of Covid-19 on the US economy, while the bond market is negatively affected.

CONTENTS

1) INTRODUCTION

In this thesis I examine the impact of Covid-19 on the choice of firms to raise debt between market and bank debt capital. Based on extant theories of capital structure, I predict that the crisis has a positive impact on the preference of firms for market debt compared to debt capital provided by banks in the form of loans, and particularly so for firms with relatively more tangible assets.

In a very recent working paper highly related to my thesis, Becker and Benmelench (2021) address the impact of the Covid-19 pandemic on the amount of new bonds and loans. They firstly find that more bonds were issued right after the start of the pandemic while syndicated loan issuance was low, secondly that Federal reserve actions stimulated bond issuance while loans issued increased but in a lower level and lastly that large and profitable investment-grade firms were more likely to issue bonds. My thesis aims at complementing their findings along two main dimensions. First, Becker and Benmelech (2021) focus on macro trends observed during the crisis. These macro trends can be driven not only by a shift in firms' preferences for one or the other form of capital but also by a shift in the identity of firms willing and able to raise debt capital. Using the approach proposed by Becker and Ivashina (2014), this research projects aim at estimating the within-firm effect of the Covid-19 crisis, conditionally on firms being effectively able and willing to raise debt capital. Second, I investigate how the level of assets tangibility moderates the impact of the Covid-19 crisis on this capital structure decision by individual firms.

A key point for the motivation of my thesis is that Becker and Benmelech (2021) maybe find simply that the type of company that typically use the bond market is already more resilient compared to the firms that use bank loans for debt. Their results may be driven by the fact that the type of firms that use bonds are resilient anyway. Therefore the increasing bonds and decreasing loans may not have an actual economic meaning about bond market and banks. What is more important is to investigate what type of firm is raising bank or bond debt capital. With the within approach of my thesis I can control that. I show the choice of firms to raise debt capital, conditionally on that they can use both and are able to raise on of the two.

The Covid-19 pandemic and the measures taken to tackle the excessive spread and overload of patients in hospitals brought an instantaneous financial crisis in worlds' economy. The pandemic brought many firms into bankruptcies,

unprecedented losses and caused high unemployment. To be more specific, Dow Jones Industrial Average(DJIA) decreased by 6,400 points, in March 2020, approximately 26%, which was one of the most severe crashes in US market history. The difference between Covid-19 and previous crises is that the others were caused by multiple years' actions until financial collapse was unavoidable. This pandemic crisis came up in few months due to an unexpected virus that nobody knew how to tackle.

The main differences of bonds and syndicated loans are stated. Firstly a bond is highly tradeable. If a firm purchase a bond, it can be traded in the bond market. Thus, a firm can sell it instead of waiting its maturity. Loans, on the other hand, are generally non-tradeable. To continue, interest rates on corporate bonds are generally lower depending on the reputation of the corporate compared to bank loans which are likely to have higher interest rates. Furthermore, when a company issues a bond has a higher degree of freedom to operate because it frees them from restrictions often implemented by banks. For instance, a bank might require a firm not to issue more debt or not to make corporate acquisitions until the debt is fully repaid. Finally, bonds that are traded in the market own credit rating, issued by credit rating agencies in the scale of investment grade(low risk) to speculative grade(higher risk). Thus investment grade bonds have low yield. On the contrary, loans have not such an concept where creditworthiness of loans is checked by the creditor.

In the field of finance and macroeconomy it is well known procyclicality is present in debt markets but the extend of its presence is still under investigation(Becker, Benmelech, 2021). With a short description, procyclicality defines the propensity of financial variables to fluctuate around a trend during the financial cycle. Higher procyclicality therefore simply means fluctuations with broader amplitude. Different behaviors of credit markets are not yet very clear. It is still unsure whether bank market is more cyclical than bond market and why. Literature in this thesis focuses on the U.S. credit market and aims to

explain the cyclical behavior of firms' debt capital by studying jointly bonds and loans.

Becker and Ivashina (2014) make a research regarding cyclicality. In their paper they state that credit is highly pro-cyclical due to the banks' unwillingness to lend during recessions and firms are not willing to borrow. They find strong evidence of this substitution at times that are characterized by tight lending standards, depressed aggregate lending, poor bank performance, and tight monetary policy.

Based on previous research and literature review it is understandable that there are some differences regarding market and bank debt. In this paper I will firstly make clear what is the difference when a company issues a loan or a bond and what kind of companies are more likely to make this differentiation. Next I explain why bond market tends to be more resilient during the pandemic.

In my thesis I am going to focus on tangibility as the main firm characteristic and test if this can affect the firms choice to raise debt as a variable by itself and as a interaction term with Covid. Firstly I explain the main differences of the two debt choices and later I write methodology and data.

2) LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Broadly speaking, a firm in need to raise debt capital can decide to tap credit market directly by issuing a tradeable security (e.g., a bond) or ask a financial intermediary (typically a bank) to provide it with the capital required.

Altman, Gande, and Saunders (2007) state that there is something unique with banks as intermediates which gives them an advantage in monitoring. Diamond (1984) declares that banks have lower costs in creating information to apply high quality debt monitoring. Ramakrishnan and Thakor (1984) find that banks are information intermediates that can stimulate welfare by reducing information costs and risk. Ramakrishnan and Thakor (1984)

addresses banks as insiders that have competitive supremacy due to their access to confidential inside information compared to other lenders who take into consideration only public information.

Becker's and Benmelech's(2021) research shows that U.S. corporate bond market was considerably resilient when the pandemic firstly caused a shock to the financial markets. On the other hand, the issuance of syndicated bank loans suffered a significant decrease remaining below the 2010-2019 standards. The same pattern took place during the Global Financial Crisis in 2008.

The question that can be raised here is what makes the bond market to be more resilient than the syndicated loan market during financial crises? At first is very important to address that there is a tendence of bond issuers to be companies of higher credit quality than companies that tend to acquire bank loans. Indeed, from 2009 to 2019 87% of companies that issued bonds had the rating of investment grade where only 19% of companies that relied on syndicated loans were similarly rated. Therefore as Becker and Benmelech (2021) state, noninvestment-grade companies tend to be more riskier during a financial crisis compared to investment grade firms, which are more powerful and more likely to resist this kind of financial shocks.

To continue, another argument according to Becker and Benmelech (2021) is that central bank measures might facilitate more bond markets than loans. Central bank might find obstacles to stimulate bank lending through traditional monetary policies, when the interest rate environment is very low. On the other hand, non-standard monetary policies focused on bond markets directly, without the necessity of financial intermediates, facilitated bond lending significantly more.

The results of Becker's and Benmelech's(2021) regression indicate that there is sufficient evidence for the persistence of bond market for the above explanations. Indeed, they find that the 10-year Treasury yield has a negative correlation with loan issuance but they do not find a correlation with the issuance of bonds. Next, they find that Aaa-Baa spread, which measures the

credit risk price, influences loan issuance considerably more than bond issuance. Therefore, these indications state the greater sensitivity of loans to the cost of debt for both risk-free rate and credit risk spread compared to bonds. These indications also point out that this distinctive effect is more likely to be driven by companies that their risk profile depends more on bank compared to companies that rely on bond issuance.

Furthermore, Becker and Benmelech (2021) find that moves into bond mutual fund, during a financial shock, has a positive correlation with bond issuance but not with loan origination, and this indicates a key difference between commercial banks and bond investors. This indication is proving a choice of safety because investors tend to put on sale all of their assets which are considered to be risky and they indent to buy assets that are considered safe such as bonds. This can be another explanation of the bond market resilience during financial shocks in the market. They also state that loan origination as a comprehensive measure of loans that do not perform is twice as much as that of bonds issued. This indicates that banks have a higher probability to suffer from "dirty" balance sheets that decrease their capability of issuing loans in a financial crisis and in an economic depression.

Bond resilience during crises is also compatible with previous research by Kashyap, Stein and Wilcox (1993) and Becker and Ivashina(2014), when bonds and loans were compared. Regarding the higher investment grade, similar research has been conducted by Greenwood and Hanson(2013) stating the cyclical yield share of bond issuance. Moreover, the importance of bond market of non-financial firms is profound and thus more literature comes out as stated by Benmelech, Kumar, and Rajan (2021).

Additionally, previous researches state that firm characteristics may be significantly related with bond issuance. The main firm characteristic that will be tested is asset tangibility. Generally, a tangible asset is an asset that has a definable financial value and most of the times a physical form. Tangible assets can most of the times be part of a transaction in exchange for a monetary

price. Examples of tangible assets can be cash, inventory, vehicles, property, plant and equipment etc. On the contrary, intangible assets have no physical form such as accounts receivables, pre-paid expenses and goodwill. I take into account previous research to connect debt choice and tangibility. Colla, Ippolito and Li (2009) found that companies with a higher amount of tangible assets tend to be more profitable while Chemmanur Fulghieri (1994) find a strong correlation between profitability and bond issuance. On the other hand they find that firms which are less profitable tend to raise debt from bank loans even though they can be changed with higher interest rate. Moreover, Faulkender and Petersen (2006) find a positive correlation between companies with more tangible assets and higher credit rating, and therefore more likely to raise public debt. Furthermore, Becker and Ivashina (2014) in their paper find a positive association of tangible assets and bond issuance.

To continue, Lemmon and Zender (2010) address the differences on firm characteristics and debt choice. They find that smaller companies with less tangibility, more volatile cash flows have a higher probability to need considerably less debt compared to firm with more tangible assets, higher credit rating and high leverage. As a matter of fact, these smaller companies are more likely to choose "relationship lenders", which are most of the times banks or other financial intermediaries. To continue Cantillo and Wright (2000) find a positive correlation between companies with higher credit rating that borrow in the public debt markets and lower bankruptcy costs(e.g. firms with higher asset tangibility and less volatile cash flows). Indeed in their research they found that only 18 of the 5529 observations were companies of bond rating which didn't issue a bond for debt, which is less than 3%.

However, during the pandemic, the impact of Covid-19 on companies with high tangible assets might lead to different expectations regarding the debt choice. Halling, Yu, and Zechner (2020) examined bond issuance during Covid-19. They find that during the pandemic, firms with high inflexible tangible assets are most likely negatively affected by Covid-19 for the reason that the mandatory

social distancing measures will be more hostile against them. Their results show that firms with high tangible assets pay higher spread on the bonds issued. For instance, they find that McDonald's Corporation which has 78% tangible assets, paid 285 basis points for the spread on bonds, while firms with 30% tangibility, which was the average firms' tangibility on their sample, paid 249 basis points. This might overturn the traditional positive relationship between high tangibility and bond issuance, where tangible assets were used as collateral. Therefore in my thesis I expect a negative relationship in high tangibility during Covid-19 and bond issuance. While Halling, Yu, and Zechner (2020) are mainly studying the effects of firm characteristics during Covid-19 on maturities, spread and ratings of bonds issued, my thesis aims on identifying how firms' tangibility during Covid affects debt choice between bonds and loans, conditionally on firms being able and willing to raise debt capital. Maybe the high spread paid on bonds make firms with high tangible assets to turn to bank debt. My motivation is to apply control on this choice.

3) DATA, METHODOLOGY AND EMPIRICAL STRATEGY

The dataset I plan to use for this thesis is a firm-quarter panel dataset of US (0-9 digit SIC code) firms observed between the second quarter of 2012 and the second quarter of 2022. The sample is built starting from the Compustat universe, retrieved via WRDS. To identify which firms issue one or more bonds in a given quarter, I start from a list of all corporate bonds issued during the sample period; the list is retrieved from the Mergent FISD database, also accessed via WRDS. Each bond will be matched to the issuing firm based on its CUSIP identifier. Similarly, to identify new loans obtained by the firms in the sample I will use a list of all syndicated loans created during the sample period. The latter list is retrieved from FactSet; loans from FactSet will be matched to

firms in the panel database based on the Ticker identifiers of each firm. After the matching I find 6.973 bonds issued and 4.571 loans.

The key outcome variables of interest are proxies for the choice of each firm i to raise long-term debt capital either by issuing a bond or by getting a loan from a (syndicate of) bank(s) in each quarter q. Firstly I explain how I build my dependent variable.

In the beginning I create two dummies for loan and bond issuance. D_loan_{iq} is an indicator equal to 1 if firm i, obtains a loan in quarter q and 0 otherwise. D_bond_{iq} is an indicator equal to 1 if firm, i, issues a bond in quarter q and 0 otherwise. I use these two dummies to create my depended variable $d\_b\_l_{iq}$ which is set equal to 1 if d_bond_{iq} is equal to 1 and set equal to 0 if d_loan_{iq} is equal to 1. The indicator of $d\_b\_l_{iq}$ is set to be missing when d_bond_{iq} and d_loan_{iq} have the same value, i.e., when the firm either does not raise debt capital or when the firm raises debt capital both from the market and from banks.

In this thesis I create two models testing each of my two hypothesis. I take Covid-19 pandemic into consideration. I create my main explanatory variable as a d_covid equal to 1 during the pandemic time frame and equal to 0 to point out the time period before Covid. Next variable is *leverage* which is the sum of long-term debt and debt in current liabilities divided by total assets. I define leverage as the utilization of borrowed capital for future investments. However, leverage is a tricky and complex tool. In case an investor uses it to make an investment which proves to be bad, the loss is going to have much more negative impact if they investment was not leveraged. To compute it I am going to need from Compustat the variables Long Term Debt (DLTTQ) and add it to Debt in Current Liabilities(DLCQ). The sum of these two will be divided by Total Assets (ATQ). My next variable is *profitability*. It is defined as the ratio of EBIDTA to Total Sales(SALEQ). I calculate EBIDTA by subtracting Selling, General and Administrative Expenses (XSGAQ) and Cost of Goods Sold (COGSQ) from Net Sales (SALEQ). I continue with the variable *size*. The proxy for this will

be the natural logarithm of Total Assets. Variable u_{iq} is the idiosyncratic error term with expected value zero and constant variance and α_i is firm fixed effect (within firm time-invariant effect). The model for my first hypothesis is presented below:

$$d\_b\_l_{iq} = \beta 1 d\_Covid_q + \beta 2 tangibility_{iq} + \beta 3 leverage_{iq} + \beta 4 profitability_{iq} + \beta 5 size_{iq} + \alpha_i + u_{iq}$$

Regarding my second hypothesis, as addressed in the literature review I add the interaction term between the variable *tangibility* and *d_covid*. Tangibility is defined as the ratio of property, plant and equipment (NET) to total assets. The variable I will use in Compustat to compute it is Property, Plant and Equipment (PPENTQ) and I divide it with Total Assets (ATQ). My explanatory variables will include *d_covid* for the time frame before and after the global pandemic, variable *tangibility* which will count by how much companies' tangible assets affect the choice of debt. The interaction terms' *d_covid * tangibility* coefficient will indicate the combined effect of Covid or no Covid time frame with one change unit of tangibility on the debt of choice. My control variables will be , *leverage*, *profitability* and *size* which I explained above. The model for the second hypothesis is presented below:

$$d\_b\_l_{iq} = \beta 1 d\_covid_q + \beta 2 tangibility_{iq} + \beta 3 d\_covid_q * tangibility_{iq} + \beta 4 leverage_{iq} + \beta 5 profitability_{iq} + \beta 6 size_{iq} + \alpha_i + u_{iq}$$

Starting with my first model, as presented by Becker and Benmelech, (2021) in the literature review, I expect that bond issuance will prove to be resilient after Covid, while syndicated loans as a choice of debt is going to be negatively affected. Regarding leverage as stated in the literature review after taking into account Lemmon and Zender (2010) indication, I expect the coefficient of higher leverage to have a positive impact on bond issuance and a negative issuance on loan issuance. Same pattern follows the variable profitability. Profitable firms are firms of high credit rating and are more likely, based on the literature review to issue bonds. To continue, variable size is indicating companies with high Total Assets and therefore high credit rating firms. These

firms are more likely to issue bonds so I expect an increase in its coefficient to have a positive impact on bond issuance and a negative on loan issuance.

Regarding tangibility, although literature review state that companies with more tangible assets are more likely to issue bonds rather than loans in normal times, during Covid-19 Halling, Yu, and Zechner (2020) find companies with high tangible assets to be considered more volatile. Therefore I expect the interaction term between Covid-19 and tangibility to have a negative effect on bond issuance. Because as Halling, Yu, and Zechner (2020) state, high tangible companies are seriously affected by Covid-19, I expect my results to be significant.

The continuous variables that I am going to use in my models will be lagged by 1 quarter because with this way I can see their real impact on the choice of bond or a loan issuance. Multicollinearity check for all the variables is performed. In Appendix 1, VIF Table states that there no multicollinearity exists since average VIF is 1,09 remaining below 10.

4) RESULTS AND INTERPRETATION

For my analysis 10 regressions are performed. The first 4 models are testing my first hypothesis, whether the impact of Covid changed the firms' choice to issue bank or public debt and the next 4 models are testing my second hypothesis which is the impact of tangibility during Covid-19 on debt choice. Finally, I perform 2 robust checks to check the validity of my results.

Firstly in Table 1 and 2 I present the observations per industry that have been used in my analysis. The number of observations that are used in every regression vary. Linear models use 8.159 observations while logistic models use 3.517. The reason for that is that the logistic fixed-effects model drops 2.056 district firms which are 5.075 observations because of all positive or negative outcomes. That means that these companies either issued only a loan

or issued only a bond from 2012:Q2 until 2022:Q2. Fixed-effects models are focusing on the determinants of the within-firm variability. In case there is no variability within firms, nothing can be examined. The estimator of the linear model although it uses fixed effects does not rely on the variations of outcome within groups, so it does not drop any values.

In Table 1, I present the observations that are used in the linear regression which includes all the control variables used and in Table 2 the observations that are used in the logistic regression. As stated in Table 1 the observations that are used more in the linear regression belong to the manufacturing field consisting 33,6% of the sample. On the other hand the field that is taken the least into consideration is the Agriculture, Forestry and Fishing field.

Table 1			
Observations per industry: Model 1 & 2			
SIC	Industry	Number of observations	Percent %
0	Agriculture, Forestry and Fishing	10	0,12
1	Mining and Construction	613	7,5
2&3	Manufacturing	2.739	33,6
4	Transportation, Communications, Electric, Gas and Sanitary service	1.624	19,90
5	Wholesale Trade, Retail Trade	656	8,04
6	Finance, Insurance and Real Estate	1.347	16,5
7&8	Services	1.136	13,92
9	Public Administration	34	0,41
Sum		8.159	100

Table 2 reports that the observations that are used the most in the logistic regression belong again to the Manufacturing sector and the observations that are used less is the regression are issuances from Public Administration firms.

Table 2	
Observations per industry: Model 3 & 4	

SIC	Industry	Number of observations	Percent %
1	Mining and Construction	287	8,16
2&3	Manufacturing	1.506	42,82
4	Transportation, Communications, Electric, Gas and Sanitary service	668	18,99
5	Wholesale Trade, Retail Trade	326	9,27
6	Finance, Insurance and Real Estate	206	5,86
7&8	Services	492	13,99
9	Public Administration	32	0,91
Sum		3.517	100

To continue, since the number of observations vary, I present 2 Tables of descriptive statistics of the variables used, one for every regression. Table 3 states the descriptive statistics for the observations used in the linear regression for model 1 and 2. As reported, the mean of the depended variable *d_b_l* shows that there are slightly more bond issuances than loan. *D_covid* mean shows the expected results. There are much more observations before Covid-19 than after. The reason is that the time period is from the second quarter of 2012 until the second quarter of 2022, and Covid starts on the first quarter of 2020. To continue, the average *tangibility* is 30,4% and the average *profitability* 25,6%. Finally average *leverage* is 36,6%. To proxy *size*, I take the natural logarithm of Total Assets. Therefore firm's average size on the sample is $7,84 billion.

Table 3						
Descriptive Statistics for Models 1 & 2						
Variable	min	Mean	Median	max	Standard deviation	Observations
d_b_l	0	0,628	1	1	0,483	8.159
d_covid	0	0,269	0	1	0,444	8.159

Variable	min	Mean	Median	max	Standard deviation	Observations
Tangibility	0,001	0,304	0,189	0,973	0,284	8.159
Profitability	0,001	0,256	0,212	0,9587	0,177	8.159
Leverage	0,001	0,366	0,350	0,992	0,188	8.159
Size	1,573 ($4.83m)	8,966 ($7,84b)	8,892 ($7,27b)	14,924 ($3.029,89b)	1,54 ($4,7m)	8.159

Notes: Dummy variable *d_b_l* represents the choice of a firm to issue a loan (0) or a bond (1) in a specific quarter.
D_covid represents the time when Covid-19 did not start (0) or the time that the pandemic started (1).
Tangibility is computed as the ratio of Property, Plant and Equimpent(Net) to Total Assets.
Profitability is computed as the ratio of EBITDA to Total Sales.
Leverage is computed as the ratio of Long Term Debt and Debt in Current Liabilities to Total Assets.
To proxy *Size* the natural logarithm of Total assets is computed.

Descriptive statistics for the logistic model do not state significant differences, although the observations used are considerably less. Table 4 shows that *d_b_l* and *d_covid* mean is similar to Table 3. Additionally, *tangibility*, *profitability* and *leverage* have a mean of 30,5%, 22,6% and 39,5%, respectively, which is very close to what Table 3 reported. Finally, the average *size* is slightly more in Table 4 compared to Table 3, as here the average total assets are $11,79 billion.

Table 4						
Descriptive Statistics for Models 3 & 4						
Variable	min	Mean	Median	max	Standard deviation	Observations
d_b_l	0	0,656	1	1	0,475	3.517
d_covid	0	0,269	0	1	0,443	3.517
Tangibility	0,001	0,305	0,206	0,973	0,257	3.517
Profitability	0,001	0,226	0,195	0,840	0,146	3.517
Leverage	0,002	0,395	0,375	0,991	0,164	3.517
Size	3,222 ($25,03m)	9,375 ($11,79b)	9,264 ($10,552b)	14,182 ($1.443,23b)	1,544 ($4,7m)	3.517

Notes: Dummy variable *d_b_l* represents the choice of a firm to issue a loan (0) or a bond (1) in a specific quarter.
D_covid represents the time when Covid-19 did not start (0) or the time that the pandemic started (1).
Tangibility is computed as the ratio of Property, Plant and Equimpent(Net) to Total Assets.
Profitability is computed as the ratio of EBITDA to Total Sales.

Furthermore, before I start my regressions, I choose to use fixed effects mainly because I am interested in the effect of Covid over time and therefore I want to estimate the within-firm effect. On top of that, I perform a Hausman test to support my argument. Table 5 reports that the probability of chi2 is lower than 5% and therefore I reject the null hypothesis and I use fixed-effects.

	(b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
		Table 5		
		Hausman Test		
d_covid	-0,274	-1,042	0,767	0,056
Tangibility L1	-1,073	-0,260	-0,813	0,922
Profitability L1	-2,57	3,759	-6,338	0,692
Leverage l1	-1,541	-1,205	-0,335	0,413
Size L1	-0,405	0,664	-1,069	0,135
				Prob >= chibar2 = 0.000

4.1) Impact of Covid-19 on the firm's choice to issue a bond or a loan

Table 6 reports the results of my first hypothesis using 4 models. Models 1 and 2 use linear regression and models 3 and 4 use logistic regression. All models used fixed-effects. For the logistic regressions, odds ratios are used to interpret the results. Odds ratios are interpretable as % changes in probabilities.

Regression outcomes of Model 1 and 2 show that the advent of Covid is associated with a decrease in the probability to issue a bond by 0,039-0,067 percentage points, statistically significant at 1%. Moreover, when profitability and leverage are increasing by one standard deviation, the probability of

issuing a bond is decreasing by 0,038 and 0,039 percentage points respectively, both statistically significant at 1%. Concerning tangibility, one standard deviation increase is decreasing the probability of bond issuance by 0,027 percentage points, but without being statistically significant. Regarding size, when one unit of size is increasing, the probability of issuing public debt is 0,047 percentage points less.

Model 3 and 4 report the odds ratios of logistic regressions. They state that the pandemic is associated with a decrease in the likelihood of issuing a bond by 24%-41% depending on the model, with a statistical significance of 1%. The results are unexpected as they have a different outcome with Becker's and Benmelech's (2021) and with Becker's and Ivashina's (2014) study, which report the resilience of bond market during the pandemic and generally during financial recessions.

To continue, there is a negative effect of tangibility, profitability, size and leverage on bond issuance. Although the direction of the coefficient and odds ratio of log of Total Assets, which is used to proxy size, is consistent with Becker's and Ivashina(2014) findings, the other control variables have the opposite direction. Additionally, Becker and Ivashina (2014) find that leverage and tangibility have a negative relationship with loan issuance and positive with raising capital from the bond market.

This is might be due the difference time used in the 2 studies. Becker and Ivashina (2014) study data from 1990:Q2 – 2010:Q2 while I studied from 2012:Q2 until 2022:Q2. Firms might tend to issue more loans than bonds during Covid-19 pandemic, and bond than loans in the period examined by Becker and Ivashina (2014), a period when global financial crisis occurred.

Moreover, my different findings with Becker and Benmelech (2021) might occur because they study the total amount of bonds and loans issued before and after Covid-19 while I study the within-effect of firms' choice to raise debt capital, taking into consideration that they have the willingness and capability of issuing this kind of debt.

Table 6

	Model 1 Linear regression	Model 2 Linear regression	Model 3 Logit regression	Model 4 Logit regression
	H1: Impact of Covid-19 on the firm's choice to issue a bond or a loan			
	Depended variable: $d\_b\_l_{iq}$= 0 if a firm i issues a loan and $d\_b\_l_{iq}$= 1 if a firm issues a bond in quarter q			
Regression	Model 1 Linear regression	Model 2 Linear regression	Model 3 Logit regression	Model 4 Logit regression
Observations	8.861	8.159	3.786	3.517
Distinct firms	2.681	2.469	625	580
Fixed-effect	yes	yes	yes	yes
Reporting	Coefficient	Coefficient	Odds ratio	Odds ratio
Regressor				
d_covid	-0,067*** (-6,80)	-0,039*** (-3,33)	0,589*** (-6,33)	0,760*** (-2,77)
tangibility L1	-	-0,097 (-0,94)	-	0,342 (-1,13)
Profitability L1.	-	-0,220** (-3,66)	-	0,076*** (-3,33)
leverage L1	-	-0,203 (-3,66)	-	0,214** (-3,12)
Size L1	-	-0,047** (-3,11)	-	0,666** (-2,89)
[Pseudo] R-Squared	0,08	0,0144	[0,001]	[0,022]

Notes: Each observation in the sample represents a new issue of a bank loan or a bond in a specific quarter. Bond data from Mergent is matched to firm data from Compustat using Cusip identifier. Loan data from FactSet is match to firm data from Compustat using Ticker identifier. In case in a given quarter a firm did not issue a bond or a loan, it will be excluded from the sample. If a firm in a given quarter issued both a loan and a bond it will be excluded from the sample. The row "Distinct firms " states how many groups of observations have been used in the regression. The row "fixed-effect" states whether fixed-effect is applied in the model. The table states results from logistic regression in Model 1 and 2 and from linear regression in Model 3 and 4 for the time period of 2012,Q2 until 2022,Q2. For variable **size** the natural logarithm of Total Assets has been used. "L1" next to each variable states that the variable is lagged by one quarter.

Pseudo R-squared is computed and stated into brackets. Within R-squared is stated without brackets.

Below each odds ratio and coefficient the t-statistic is reported. Significance level is represented by *. When * is absent the coefficient/odds ratio is not statistically significant.

***Statistical significance at 10% level, respectively**
*** Statistical significance at 5% level, respectively**
******Statistical significance at 1% level, respectively**

4.2) The impact of tangibility on debt choice during Covid-19

I continue by testing my second hypothesis. This time the interaction term between Covid and tangibility is included, to catch the impact of tangibility on the choice of debt during Covid-19. Table 7 reports the outcomes using again 4 models. Model 1 and 2 are linear probability models while model 3 and 4 are panel logistic models. All models use fixed-effects.

Linear regressions report that Covid is associated with a decrease in the probability of issuing a bond by 0,037-0,064 percentage points, both being statistically significant at 5% and 1% respectively, while the logistic regressions state that the advent of the pandemic will decrease the probability to issue public debt by 20,6%-37,5%, with only the decrease of 37,5% being statistically significant.

Regarding asset tangibility during Covid-19, model 1 and 2 from Table 7 show that 1 standard deviation increase of tangibility during Covid, decreases the probability to issue a bond approximately by 0,001 percentage points, while the logistic models 3 and 4 state that 1 increase of standard deviation tangibility during covid decreases the probability of bond issuance approximately 11,74%. My results tend to confirm the findings from Halling, Yu, and Zechner (2020), who stated the high volatility of high tangible assets on bonds issued during Covid-19. However, the interaction term is not statistically significant. Their findings focus on the higher credit spread of tangible assets that needed to be paid for bonds while I find negative issuance association between the bond market and high tangibility. In fact I find that firms with high tangible assets tend to raise debt capital from bank loans during Covid-19.

Moreover profitability, leverage and size are negatively associated with bond issuance, all being statistically significant. Table 7, results are consistent and very similar with Table 6 and still in contrary with Becker's and Ivashina's (2014) and Becker's and Benmelech's (2021) findings.

Table 7				
H2: The impact of tangibility on debt choice before and after Covid-19				
Depended variable: $d\_b\_l_{iq}$= 0 if a firm i issues a loan and $d\_b\_l_{iq}$= 1 if a firm issues a bond in quarter q				
Regression	Model 1 Linear regression	Model 2 Linear regression	Model 3 Logit regression	Model 4 Logit regression
Observations	8.159	8.159	3.517	3.517
Distinct firms	2.469	2.469	580	580
Fixed-Effect	yes	yes	yes	yes
Reporting	Coefficient	Coefficient	Odds ratio	Odds ratio

Regressor				
d_covid*tangibility	-0,003 (-0,07)	-0,004 (-0,11)	0,907 (-0,28)	0,870 (-0,40)
d_covid	-0,064*** (-4,07)	-0,037** (-2,24)	0,625*** (-3,45)	0,794 (-1,57)
tangibility L1.	-0,156 (-1,50)	-0,096 (-0,92)	0,268 (-1,44)	0,356 -(1,08)
Profitability L1.	-	-0,220*** (-3,01)	-	0,076*** (-3,32)
leverage L1.	-	-0,202*** (-3,65)	-	0,216** (-3,10)
Size L1	-	-0,048** (-3,11)	-	0,663*** (-2,92)
[Pseudo] R-Squared	0,008	0,014	[0,001]	[0,022]

Notes: Each observation in the sample represents a new issue of a bank loan or a bond in a specific quarter. Bond data from Mergent is matched to firm data from Compustat using Cusip numbers. Loan data from FactSet is match to firm data from Compustat using ticker identifier. In case in a given quarter a firm did not issue a bond or a loan, it will be excluded from the sample. If a firm in a given quarter issued both a loan and a bond it will be excluded from the sample. The row "Distinct firms" states how many groups of observations have been used in the regression. The row "fixed-effect" states whether fixed-effect is applied in the model. The Table states results from logistic regression in Model 1 and 2 and from linear regression in Model 3 and 4 for the time period of 2012,Q2 until 2022,Q2. Variable **d_covid*tangibility** *represents the interaction term between firm's tangible assets and the periods before and after Covid-19. For variable* **size** *the natural logarithm of Total Assets has been used. "L1" next to each variable states that the variable is lagged by one quarter. Pseudo R-squared is computed and stated into brackets. Within R-squared is stated without brackets.*
*Below each Odds ratio and coefficient the t-statistic is reported. Significance level is represented by *. When * is absent the coefficient/ odds ratio is not statistically significant.*
***Statistical significance at 10% level, respectively**
**** Statistical significance at 5% level, respectively**
*****Statistical significance at 1% level, respectively**

4.3) Robust checks

Furthermore, 2 robust checks are performed using ordered logistic models. Robust standard errors are used. The depended variable is changed from binary *d_b_l* which has 0 for loan issuance and 1 for bond issuance in a specific quarter to *debt_choice* which has 0 for loan issuance, 1 for both bond and loan issuance, and 2 for bond issuance in a specific quarter. The first panel ordered logistic model includes all the control variables of my first hypothesis and the second one includes the interaction term to be on the same line with my second hypothesis. For the interpretation of the results margins for each outcome are used. Table 8 is consistent with the results of Tables 6 and 7 stating that Covid is positively associated with loan issuance and issuing both bond and a loan in a statistical significance of 1%. However, the advent of the

pandemic is negatively associated with bond issuance. The other control variables are still consistent with the results of Tables 6 and 7 finding a negative relationship between control variables and bond issuance except size, which this time is positively associated with issuing public debt, statistically significant in 1%.

Table 8				
Panel ordered logistic model : Robust standard errors				
Depended variable: debt_choice_{iq}= 0 if a firm i issues a loan, debt_choice_{iq}= 1 if a firm issues both a bond and a loan anddebt_choice_{iq}= 2 if a firm issues a bond in quarter q				
Observations	11.374			
Distinct firms	3.518			
Fixed-effect	No			
Regression	Ordered Logit model	Margins for loan issuance (0)	Margins for issuing both (1)	Margins of bond issuance (2)
Reporting	coefficient	coefficient	coefficient	coefficient
Regressor				
d_covid	-1,024***	0,136***	0,002***	-0,138***
	(-15.08)	(14,23)	(4,64)	(-14,13)
tangibility L1.	-0,586***	0,077***	0,001**	-0,079***
	(-2.80)	(2,79)	(0,013)	(-2,79)
Profitability L1.	-3,607**	0.474***	0.008***	-0,484***
	(-5.71)	(5,72)	(3,90)	(-5,71)
leverage L1.	-0,172	0,022	0,001	-0,023
	(0.98)	(0,99)	(1,00)	(-0,99)
Size L1	0,814***	-0,107***	-0,002***	0,109***
	(21,61)	(-30,4)	(-5,36)	(29,55)
Pseudo R-squared	0,043			

*Notes: Each observation in the sample represents a new issue of a bank loan, a bond or both. Bond data from Mergent is matched to firm data from Compustat using Cusip numbers. Loan data from FactSet is match to firm data from Compustat using ticker identifier. In case in a given quarter a firm did not issue a bond or a loan, it will be excluded from the sample. If a firm in a given quarter issued both a loan and a bond it will be reported as 1 in the depended variable **debt_choice**. The row "fixed-effect" states whether fixed-effect applies in the model. The Table states results from ordered logistic regression. For interpretation margins commands has been used for each outcome. Column " Margins for loan issuance (0)" states the marginal effects when a firm issues a loan in a specific quarter. Column " Margins for Margins for issuing both (1)" states the marginal effects when a firm issues both a bond and a loan in a specific quarter. Column " Margins for bond issuance (2)" states the marginal effects when a firm issues a bond in a specific quarter. For variable **size** the natural logarithm of Total Assets has been used.*
*Next to each coefficient the significance level is reported. When * is absent the coefficient is not statistically significant. Errors are heteroskedasticity-robust.*
Statistical significance at 10% level, respectively
**** Statistical significance at 5% level, respectively***
*****Statistical significance at 1% level, respectively***

Table 9 includes the interaction term of Covid and tangibility. Again the results are consistent with the previous Tables. Tangibility and Covid are positively associated with loan issuance and negatively associated with bond issuance. Moreover, there is still a negative relationship between profitability and leverage with bond issuance. Size is consistent with Table 8 but in contrast with Tables 6 and 7 and affects bond issuance positively.

Table 9				
Panel ordered logistic model : Robust standard errors				
Depended variable: $debt\_choice_{iq}$= 0 if a firm i issues a loan, $debt\_choice_{iq}$= 1 if a firm issues both a bond and a loan and $debt\_choice_{iq}$= 2 if a firm issues a bond in quarter q				
Observations	11.374			
Distinct firms	3.518			
Fixed-effect	No			
Regression	Ordered Logit model	Margins for loan issuance (0)	Margins for issuing both (1)	Margins of bond issuance (2)
Reporting	coefficient	coefficient	coefficient	coefficient
Regressor				
d_covid	-0,992*** (-10,16)	0,136*** (14,19)	0,002*** (4,64)	-0,138*** (-14,09)
tangibility L1.	-0,551** (-2,42)	0,771*** (2,79)	0,001 (0,013)**	-0,079*** (-2,79)
d_covid*tangibility	-0,114 (-0,47)	-	-	
Profitability L1.	-3,612*** (-5,72)	0,476*** (5,73)	0,008*** (3,91)	-0,485*** (-5,72)
leverage L1.	-0,170 (-0,97)	0,022 (0,98)	0,001 (0,99)	-0,023 (-0,98)
Size L1	0,814*** (26,22)	-0,107*** (-30,41)	-0,002*** (-5,37)	0,109*** (29,56)
Pseudo R-squared	0,042			

Notes: Each observation in the sample represents a new issue of a bank loan, a bond or both. Bond data from Mergent is matched to firm data from Compustat using Cusip numbers. Loan data from FactSet is match to firm data from Compustat using ticker identifier. In case in a given quarter a firm did not issue a bond or a loan, it will be excluded from the sample. If a firm in a given quarter issued both a loan and a bond it will be reported as 1 in the depended variable " debt_choice ". The row "fixed-effect" states whether a fixed-effect is applied in the model. The Table states results from ordered logistic regression. For interpretation margins commands has been used for each outcome. Column " Margins for loan issuance (0)" states the marginal effects when a firm issues a loan in a specific quarter. Column " Margins for Margins for issuing both (1)" states the marginal effects when a firm issues both a bond and a loan in a specific quarter. Column " Margins for bond issuance (2)" states the marginal effects when a firm issues a bond in a specific quarter. For variable "size" the natural logarithm of Total Assets has been used.

4.4) Discussion & Limitations

Regarding the impact of Covid-19 on the choice of firms to raise debt capital, I find interesting results which are in contrast to previous studies from Becker and Ivashina (2014) and Becker and Benmelech (2021). While these studies report that the bond market is very robust not only to Covid-19 crisis but also to previous financial crises, I find that Covid-19 has negatively affected firms' choice to raise public debt while they tend to raise more bank loans.

As discussed, regarding Becker's and Ivashina's (2014) paper, the reason for that might be the different time periods examining the within-firm effects. During Covid-19, banks might be more willing to provide capital to firms and that might be the reason of my results. The Covid-19 recession was different than the recession of 2008-2010, which was caused by a shock in the banking system. As a matter of fact, many economic declines in the last 50 years, like stock-market crashes and debt defaults, had financial-system origins. However, the current recession was caused by a global pandemic, and governmental measures to tackle it, which shut down the economy to mitigate the spread of the virus and therefore triggered shocks to supply and demand. The duration which lasted 2 months, is the shortest recession in U.S. history. Banking system has been affected and the industry experienced massive impact from the crisis especially due to the difficulties of their borrowers. However, bank runs and market crashes were not observed because banks in US were well capitalized. As a result, banks proved to be resilient and therefore my results might be accurate as they are might affected less than the bond market.

To continue, my results are also different from Becker's and Benmelech's (2021) study, too. However, in this paper Becker and Benmelech investigate the total number of bonds and loans issued, without looking at the fixed-effect. They find that the bond market still provided a lot of capital during the Covid-19 crisis but if I look at the within-firm effect, conditionally on that firm raising capital, it seems that firms during Covid-19 switched into bank loans instead of bonds. I take into account that a firm is able and willing to raise a bond or a loan, conditionally on doing one of the two, by using the approach by Becker and Ivashina(2014). Becker and Benmelech (2021) may focus on firms that typically issue bonds and they could be already more resilient, while I apply control on that and I check firms that have access to both types of debt. Therefore their findings might not be accurate for the robustness of the bond market during crisis because they might state what type of firms are still able to raise capital and not how resilient the bond market during Covid-19 is.

Concerning the impact of tangibility during Covid-19 on debt's choice, my results, although they are not statistically significant, tend to justify the findings from Halling, Yu, and Zechner (2020). Indeed, firms with high tangible assets, although traditionally have more collateral that can positively affect bond issuance, during the pandemic might be more volatile. They are expected to suffer more from social distancing measures and therefore this might be the reason that leads to a negative association with bond issuance, because they might need to pay higher spread on bonds issued. Maybe these companies during Covid find it more convenient to raise debt from bank loans.

Although my results might be accurate, limitations need to be taken into consideration. Firstly, the fact that my results are puzzling and differ from the literature review from Becker and Benmelech (2021), already constitutes some extent of limitation of my study. Therefore one should be cautious before taking my results as completely reliable. Another limitation might be wrong or missing data used from Mergent, Compustat and FactSet. Loans downloaded from FactSet are considerably less from 2012 to 2017 compared to 2017 to

2022, due to missing information and this might be a selection bias for the period that loans are less. A further limitation might be the matching of Compustat firm characteristics with bond from Mergent and loans from Factset. Two different methods are used as I matched Compustat with Mergent with Cusip identifier while I matched Compustat with Factset with Ticker identifier as Cusips in FactSet database are totally different. This might introduce a selection bias to my analysis as the missing companies that issue bond or loans and cannot be matched may not be random but specific types of firms. Furthermore, many Cusips changed in the last decade which also might lead to missing matched observations from the sample that could also lead to a selection bias, because maybe specific types of companies changed their cusip. Lastly, an additional limitation is that I retrieved only large syndicated loans from FactSet. Small loans are not included in my dataset and therefore this might also cause a biasness in my results, as Mergent dataset does not have this limitation.

5) CONCLUSIONS

Financial markets can deteriorate the extent of recessions and economic shocks, if the funding of firms is limited. This can lead companies to decrease employment and investing activities. Therefore, due to the importance of debt markets in funding firms, disturbance in the choice of raising debt is an important topic to study.

In this thesis, I examine the choice of firms to raise capital by choosing public or bank debt during Covid-19 pandemic. I find that companies tend to issue more loans than bonds during Covid-19. My findings might be accurate because the recession generated by Covid-19 was the shortest recession in US history and banks might be more ready to tackle it compared to the bond market.

I compare my research with the paper of Becker and Benmelech (2021) by implementing a within-firm approach, used by Becker and Ivashina (2014).

Becker and Benmelech (2021) address the strong resilience that the bond market showed during Covid-19. My findings might be different from the literature review because I take into account that each firm is indeed able and willing to raise capital while Becker and Benmelech (2021) investigate the total amount of bonds and loans issued. Their results might be biased because these firms that raised capital from the bond market might be already resilient during Covid-19 and maybe this does not prove the strong resistance of the bond market during the pandemic but only which firms were just strong enough to raise debt capital during this time frame. However because the sign of the odds ratios and coefficients of the control variables of my results is not what I expected, it indicates that there is a possibility that something might be wrong with the data used on the analysis and one should be cautious before questioning the paper from Becker and Benmelech.

Finally, I study if Covid-19 altered the choice of firms with high tangibility to issue debt capital. I find a negative association between bond issuance and high tangibility during Covid which tends to justify the study by Halling, Yu, and Zechner (2020), stating that high tangible assets during Covid-19 are high volatile and pay higher spread on bonds. My study aims to complement their research by investigating the choice between bonds and loans of firms, while they are more focused on how firm characteristics are associated to bond characteristics (e.g. Spreads). My results, although not statistically significant, show a negative relationship between high tangibility during Covid-19 and bond issuance, which might mean that due to their high volatility during Covid, they might find it more convenient to raise debt capital from bank loans.

APPENDIX 1. SUPPLEMENTARY MATERIAL

Variable	VIF	1/VIF
d_covid	1,01	0,992
Tangibility L1	1,08	0,929
Profitability L1	1,18	0,851
Leverage L1	1,05	0,949
Size L1	1,14	0,880
Mean VIF	1,09	

REFERENCES

Altman E, Gande A, Saunders A, (2007), Bank debt versus bond debt: Evidence from secondary market prices, Journal of Money, Credit and Banking, Vol. 42, No. 4 (June 2010) C 2010 The Ohio State University

Anjan V. Thakor, (1984), Information Reliability and a Theory of Financial Intermediation, Review of Economic Studies 51(3):415-3227

Becker B, Benmelech Ef, (2021) THE RESILIENCE OF THE U.S. CORPORATE BOND MARKET DURING FINANCIAL CRISES, NATIONAL BUREAU OF ECONOMIC RESEARCH 1050 Massachusetts Avenue

Becker B, Ivashina V, (2014), Cyclicality of credit supply: Firm level evidence,Journal of Monetary Economics

Benmelech, Kumar N, Rajan R, (2020), THE DECLINE OF SECURED DEBT, NATIONAL BUREAU OF ECONOMIC RESEARCH

Bolton P, Scharfstein D, (1996), Optimal Debt Structure and the Number of Creditors, Journal of Political Economy , Feb., 1996, Vol. 104, No. 1 (Feb., 1996), The University of Chicago Press

Cantillom, Wright J, (2000), How Do Firms Choose Their Leaders? An Empirical Investigation, UC Berkeley

Castro A, (2020), THE IMPACT OF COVID-19 ACROSS CORPORATE DEBT STRUCTURES, Nova School of Business and Economics

Colla P, IPPOLITO F, LI K, (2013), Debt Specialization, THE JOURNAL OF FINANCE

Chemmanur T, Fulghieri P, (1994) Reputation, Renegotiation, and the Choice between Bank Loans and Publicly Traded Debt, Columbia University

Diamond D.W. (1984), Financial Intermediation and Delegated Monitoring, The Review of Economic Studies, Volume 51, Issue 3, July 1984, Pages 393–414

Fama F, (1985), What's different about banks?, Journal of Monetary Economics, 1985, vol. 15, issue 1, 29-39

Faulkender M, Petersen M, (2005), Does the Source of Capital Affect Capital Structure?, The Review of Financial Studies, Volume 19, Issue 1, Spring 2006, Pages 45–79,

Halling M, Yu J, Zechner J, (2020), How Did COVID-19 Affect Firms' Access to Public Capital Markets?,

The Review of Corporate Finance Studies

Harris M, Raviv A, (1991), The Theory of Capital Structure, The Journal of Finance

Kashyap, Anil K, Jeremy C Stein, and David W Wilcox. 1993. "Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance." Amercian Economic Review 83 (Mar.): 78-98.

Lemmon M, Zender J, (2010), Debt Capacity and Tests of Capital Structure Theories, Journal of Financial and Quantitative Analysis

Morellec E, Valta P, Zhdanov A, (2014) Financing Investment: The Choice Between Bonds and Bank Loans

Rajan G,(2021), Monetary and Inflationary Traps, Project Syndicate

Rocholl, Joerg and Niggemann, Taro, Pension Funding and Capital Market Development (August 1, 2010)

Scharfstein D, (2018), Pension Policy and the Financial System,Edmund Cogswell Converse Professor of Finance and Banking Harvard Business School