Did the Covered Bond Issuance Act decrease the required yield of bonds issued to finance mortgage lending? *

Alejandro Herdin Hallmen†   Jonas Wahl Sjöman‡

Bachelor Thesis in Finance
Stockholm School of Economics
May 2017

Abstract

This paper examines the impact of the Covered Bond Issuance Act in Sweden. We argue that covered bonds exhibit a lower required yield than conventional mortgage bonds, which can reduce the financing cost of mortgage lending for banks. Using data on current yields for a sample of mortgage and covered bonds, we employ a difference-in-differences methodology to test the impact of the new legislation at five different dates where a drop in yields could be observed. We find a statistically significant decrease of 2-3 basis points at the date when covered bonds were first issued to the market. This suggests that the new regulatory framework contributed to a reduction in the mortgage lending financing cost for Swedish banks.

Keywords: Covered bond, Covered Bond Issuance Act, Financing cost, Mortgage bond, Mortgage lending

Tutor: Farzad Saidi

*We thank Farzad Saidi for his feedback and suggestions.
† 23417@student.hhs.se
‡ 23235@student.hhs.se

Contents

1 Introduction

In this paper, we study the effect of the Covered Bond Issuance Act on the yields of bonds issued by banks to finance mortgage lending in Sweden. In doing so, we evaluate if the introduction of covered bond legislation led to a decrease in the mortgage financing cost for the Swedish banks.

The Covered Bond Issuance Act (CBIA) was issued in December 2003 and came into force in July 2004. The introduction of separate covered bond (CB) legislation was common among European countries at the time and Sweden did the same in order to prevent a competitive disadvantage for the Swedish banks (Sandström et al., 2013). Before 2004, Swedish banks financed a large part of their mortgage lending operations using mortgage-backed securities (MBSs). Starting on the 1st of July 2004, Swedish banks could apply to the Swedish Financial Supervisory Authority (SFS) for a license to issue covered bonds. One of the conditions being that previously issued bonds with the same financing purposes for the banks were converted to covered bonds by 2008 (SFS 2003:1223). Nowadays, covered bonds have substituted MBSs as the main source of mortgage financing for Swedish banks. Furthermore, Sweden has developed one of the largest covered bond markets in Europe with over EUR 220 billion outstanding in 2015 (ECBC, 2016). For investors, covered bonds can be considered an alternative to government backed securities as they have historically carried the highest ratings (Packer et al., 2007).

Covered bonds are similar to mortgage- and asset-backed securities, but they differ in certain key features. First, they are regulated by law whereas mortgage bonds are only regulated by a contract between the issuer and the investor. Second, covered bonds are collateralized by a cover pool. This cover pool is normally made up of mortgage assets. It is common for the assets in the cover pool to exceed the principal amount in value, this is known as overcollateralization (Rosen, 2008). Investors have a priority claim on the assets within the pool in case of bankruptcy. Third, the assets serving as collateral are not static, i.e. they are substituted to maintain the cover pool in accordance with the regulation. Fourth, the assets that make up the cover pool are reported in the issuer's balance sheet (Sandström et al., 2013). This is not the case of MBSs, where the assets are pooled into a special purpose vehicle and thus transferred to a separate legal entity with a different balance sheet (Rosen, 2008).

Due to their distinctive attributes, covered bonds present several advantages over conventional mortgage bonds for the issuing entities, investors, and the capital markets. As discussed by Sandström et al. (2013) from Sweden's Central Bank, these advantages include: (1) a greater incentive for banks to conduct better credit risk evaluations as to the quality of the assets in the cover pool, for these appear in their balance sheets. (2) Less credit risk to investors compared to MBSs due to their priority claim on the assets within the cover pool. (3) An improvement in liquidity due to standardization and regulation, which eases trade domestically and internationally. Theoretically, these features should decrease the required yield by investors, translating to lower financing costs for the issuing banks' lending operations.

Our hypothesis is that bonds issued by Swedish banks with the purpose of financing mortgage lending exhibit a decrease in yields after the implementation of the CBIA. Our empirical strategy is to employ a difference-in-differences (DID) methodology to estimate the effect of the covered bond legislation. The DID serves to estimate whether there was a change in the differences between the treatment and control group before and after the treatment date. In doing so, it produces an estimate of the law's effect on yields. The treatment group consists of mortgage bonds and covered bonds issued by six Swedish banks. We use a Swedish sovereign bond as the control group to estimate the counterfactual and identify a causal effect. Swedish sovereign bonds serve as an appropriate control group in this study as they are not affected by the CBIA.

There are three key considerations in our empirical study. First, it is important to properly identify the specific dates where an effect of the CBIA could be observed on yields. That is, the date when the market incorporated the new regulatory framework into the pricing of these bonds. This effect is not necessarily restricted to the date when investors held the new covered bonds. The decrease in required yields could already be exhibited in MBSs at the prospect of conversion to covered bonds. For this reason, we argue that the effect of the new policy could be observed in accordance to the date of issuance or enforcement of the CBIA. Also, it could be observed in relation to the banks' application for a license to issue covered bonds, the granting of said license by the SFS, or at the date of first issue. Due to this uncertainty, we test our hypothesis at those five dates. For the date of issuance and enforcement, we test active mortgage bonds four months prior and after the two dates. For the dates of application, approval, and first issue, we use an equivalent time period but only test bonds announced as subject to conversion. Second, the dates of application, approval, and first issue vary by bank. To obtain estimates for an average effect at these dates, we average the control group by day with respect to each bank's specific date. The third key consideration is to properly reflect investors' required yields in our outcome variable, for which there are various appropriate yield measures. We choose to conduct the analysis using current yield. Current yield is useful as it commonly reflects the coupon rate at which new covered bonds are issued, i.e. the refinancing cost of mortgage lending for the issuing entities.

For the law issue and enforcement date, our empirical results do not produce statistically significant estimates of the legislation effect. Therefore, we cannot confirm our hypothesis at these dates. It is worth noting that we include bond and month fixed effects in these regressions. These serve to control for differences between bonds such as issuer, amount outstanding, and maturity as well as potential time series trends during the period of the analysis. We also include two control variables for relative age and liquidity.

Similarly, regressing on the application date returns non-significant results when including fixed effects and control variables. On the other hand, the approval date returns a significant estimate of the treatment effect showing an increase in yields. This is an unexpected result, not in line with our theoretical framework or the previous literature. We argue, however, that this effect could be driven by a shock unrelated to the CBIA during the approval date time period of analysis. Finally, the date of first issue returns significant results at the 1% level which sustain the inclusion of fixed effects and control variables. Specifically, our estimate is that the CBIA led to a decrease in yields of 2-3 basis points. These results show that the effect of the CBIA could be observed on the date that covered bonds were first issued to the market. We then conduct a robustness check by regressing on ten placebo dates. These regressions produce statistically significant estimates on 3 out of 10 dates. We consider two of these estimates to challenge our results, while the third one presents an expected level of uncertainty in the model. Additionally, we argue that the placebo estimates are less comparable to our results at the first issue date than those at the date of approval. Therefore, we confirm our hypothesis at the date of first issue.

In summary, the results in our paper indicate that the Covered Bond Issuance Act had a statistically significant effect on the yields of bonds issued with the purpose of financing mortgage lending of -2 to -3 basis points. For that reason, the CBIA contributed to a decrease in the financing cost of mortgage lending for the issuing entities. Our findings are in line with Nord and Fagerström's (2006) results regarding the law issue, enforcement, application, and approval date. However, our conclusion differs since we find an effect of the CBIA at the date of first issue. This is mainly due to the fact that banks had not yet issued covered bonds at the time of their analysis and therefore, first issue dates had not been tested.

The rest of our paper is organized as follows. In Section 2 we discuss previous literature. Section 3 provides background information on the covered bond market in Sweden. In Section 4 we describe our data and methodology. Section 5 presents our results and Section 6 concludes.

2 Previous literature

Previous academic research on the topic of covered bonds exists, but it is not as extensive as one would expect given the size and importance of CB markets, especially in European countries. The literature can be divided into three branches. The first develops a better understanding of covered bonds and examines their use compared to mortgage-backed securities. The second discusses covered bond spreads mainly in relation to their credit risk. The third branch focuses on asset pricing models for this asset class. Our paper fits between the first and second, as we analyze the impact of policy implementation causing a switch from MBSs to CBs.

Rosen (2008) defines covered bonds and provides a useful comparison of their structure in relation to MBSs. Additionally, he discusses who benefits from the use of CBs and argues that "there is a trade-off between the increase in lending and the deposit insurance fund". This being dependent on whether banks are issuing covered bonds to replace insured or uninsured deposits, the latter causing the increase in risk for the Federal Insurance Deposit Fund. While this research is specific to the financial system in the US, Rosen's logic provides a good understanding of the implications related to using covered bonds. Lucas et al. (2008) also provide a practical overview of covered bonds as a source mortgage funding. Specifically, their discussion of covered bonds versus mortgage-backed securities in case of bankruptcy is valuable to us. Carbó-Valverde et al. (2011) examine whether CBs are a substitute for MBSs, doing so by analyzing the reasons for which banks issue CBs or MBSs in countries where both types of bonds are utilized versus countries where only one type of security is used. They conclude that CBs and MBSs are used by banks for different purposes, for example, CBs are associated with liquidity needs whereas MBSs are used as a risk-management tool. Our paper does not focus on interchangeability of CBs and MBSs in Sweden, but their research can help us to understand how investors might view issuers and the impact of this on their required yield. Finally, their paper finds that banks issuing MBSs as opposed to CBs in years leading up to the crisis were more likely to be bailed out. This accommodates our hypothesis that CBs exhibit lower required yields due to a lower risk for the investor.

Regarding academic research on spreads between covered bonds and government bonds, Avesani et al. (2007) asses the credit risk of CBs in Germany and Spain, two of Europe's largest markets by looking at asset swap spreads. Their results show that in both countries, asset swap spreads have tightened, indicating a perceived increase in the credit quality of these bonds. They argue that this could be attributed to a "greater transparency in the evaluation of the credit quality of banks' portfolios" thanks to the development of the CB market. Our paper does not make use of the asset swap spread, but their research can provide insights as to how the market perceives and evaluates CBs. Likewise, but using average yield spreads, Prokopczuk et al. (2013) focus on the German market and investigate how credit risk is priced in covered bonds. They conclude that the spread between CBs and government bonds is not only attributable to a liquidity premium but also to differences in credit rating. In fact, their findings suggest that higher credit ratings of bonds can lead to decreases in spreads relative to the Bund of up to -2 basis points. In addition, they find a positive relationship between lower liquidity and higher spreads. While we do not test differences in credit ratings in our model, as there is no variation among the ratings that are available for our dataset, their methodology is helpful to us regarding the use of control variables.

Previous academic literature on covered bonds in Sweden is limited and the few research papers that we have encountered are in the form of three Master Theses and one Bachelor Thesis. Our paper relates closely to that of Nord and Fagerström (2006), which seeks to determine the benefits of covered bonds to investors, whether these benefits are created by expropriating other bondholders, and the impact of covered bond reform on mortgage bond pricing until the time of their Thesis publication. There are three essential differences from our paper. First, our scope is narrower as it seeks to determine the impact on required yields. Second, their study was conducted eleven years ago, at which point only three institutions had applied for licenses to issue covered bonds in Sweden and no CBs had been issued. Their analysis therefore uses 3 bonds (one per institution) to determine the impact on spreads from the prospect of conversion. We use data from 6 Swedish banks and 42 bonds. Third, they employ an event study methodology complemented by a panel regression to evaluate announcement effects and the longer-term impact. We believe that announcement effects would not be reflective of a persistent decrease in banks' financing cost and thus do not conduct an event study. Additionally, our panel regression is in the form of a DID analysis where we separately regress on each event date. Our contribution is therefore to examine the impact of CB policy implementation in Sweden by analyzing its effect at five relevant dates. As previously mentioned, our findings are in line with those of Nord and Fagerström in showing that the impact of the CBIA was not reflected before the conversions actually took place. However, our conclusions ultimately differ as we find an effect of the CBIA at the date of first issue, confirming our hypothesis that the new legislation had an impact on required yields and consequently financing cost. Finally, we use a publication by Sweden's Central Bank's Sandström et al. (2013) which provides a valuable overview of Sweden's covered bond market, its actors, and links to the financial system at large. This paper is an important reference document for us. Our understanding of covered bonds in Sweden is largely based on the information provided by its authors.

3 Background

In this section, we provide background information on the covered bond market in Sweden as well as an overview of the main features of the Covered Bond Issuance Act of 2003.

3.1 Covered bond market in Sweden

Sweden has one of the largest covered bond markets in Europe with over EUR 220 billion outstanding in 2015 according to the European Covered Bond Fact Book (2016). This figure represents a CAGR of approximately 16% over the last decade. The covered bond market is of great significance to the financial stability of Sweden (Sandström et al., 2013). This is not only due to the sheer size of the market, which exceeds government debt by circa EUR 80 billion (Swedish National Debt Office, 2017), but also because covered bonds comprise a large part of the Swedish banks' liquidity buffers. This means that the financial system is greatly dependent on the ability to trade these bonds in the capital markets.

There are eight institutions[1] that have been granted approval to issue covered bonds by the Swedish Financial Supervisory Authority (ASCB, 2017). In addition, there are five market makers[2] which facilitate issues of covered bonds for the issuing entities and maintain the secondary markets. Total issuance in 2015 exceeded EUR 60 billion. The Swedish banks carry out issues both in Swedish kronor, Euro, and other currencies. Over 25% of total covered bonds outstanding are denominated in foreign currency, with the majority being denominated in Euro (ECBC, 2016).

It is also important to understand the functioning of the covered bond market and the interrelationship between its participants. There are two markets and three participants that require special focus. The two markets are referred to as the primary and secondary market and the three participants are issuers, investors, and market makers. Issuers carry out bond issues on the primary market through market makers, most of which are benchmark bond issues. Rather than selling new bonds directly to investors, issuers usually repurchase outstanding bonds approaching maturity and offer current bondholders the possibility to exchange these bonds for similar ones with longer

[1] Nordea Hypotek, Landshypotek, Länsförsäkringar, SBAB, SEB, Skandiabanken, Stadshypotek, and Swedbank Hypotek.
[2] Danske Bank, Nordea, SEB, Svenska Handelsbanken, and Swedbank.

maturities at current yield. The purpose of this mechanism is to avoid the risk of refinancing their debt. Additionally, banks can conduct on-tap issues, which involve issuing more bonds under the same issuance conditions at the current market yield level (Sandström et al., 2013). The secondary market is where bonds that already have been issued are traded. This market allows issuers to observe the price level of their previously issued bonds, and in doing so, to determine the implied interest rates investors would demand of new offerings. For investors, the secondary market serves two main functions. First, it provides liquidity as bondholders can sell their securities for cash, which is made possible by market makers. Second, it provides a source of information as to the fair value of active bonds (Fabozzi and Jones, 2006).

The four largest players in the Swedish covered bond market are Stadshypotek, SEB, Swedbank Hypotek, and Nordea Hypotek, which hold more than 80% of the market share (SEB, 2014). Unfortunately, cover pool data dating further than ten years in the past is not available on the banks' websites, but we estimate that market share by bank has not drastically changed. In terms of investors, the majority are foreign investors, Swedish banks, and other Swedish financial institutions. These top three investors have accounted for around 75% of the Swedish covered bond holdings during the last fifteen years (Sandström et al., 2013). Their shares have not been constant however, as Swedish banks increased their holdings during the period preceding the financial crisis by approximately 10% while foreign investors dropped them by the same amount (Figure 1). In terms of credit ratings, covered bonds in Sweden have historically carried the highest credit ratings for all issuers.

3.2 Covered bond legislation in Sweden

Covered bonds in Sweden are governed by the Covered Bond Issuance Act (CBIA) (SFS 2003:1223). This act was issued on the 18th of December 2003 and came into force on the 1st of July 2004. The purpose of the regulation was to introduce covered bonds to the Swedish market by converting other outstanding mortgage bonds to CBs by 2008.

The CBIA contains an extensive amount of terms and requirements. With the purpose of providing an overview of some of its most relevant specifications, we provide a summary of the CBIA's main sections as discussed by the European Covered Bond Fact Book (2016). First, any bank or credit institution can issue covered bonds in Sweden if they have been granted a CB license by the Swedish Financial Supervisory Authority. To be granted a license, issuers must provide a financial stability plan and convert their outstanding mortgage bonds to covered bonds, among other criteria. Eligible assets for the cover pool include mortgages as well as public sector assets. An important distinction regarding the cover pool of CBs versus common MBSs, is that its assets are removed and replaced if they fail to meet regulatory requirements. For this reason, the cover pool is known as dynamic. Third, valuation shall be conducted to market value and the maximum loan-to-value ratios are of 75% for residential property, 70% for agricultural, and 60% for commercial. Fourth, the cover pool must be overcollateralized and the issuer must provide information about this pool on a quarterly basis. Fifth, in case of issuer bankruptcy, investors have a claim on the cover pool and the issuer. Should the cover pool not suffice, CB investors have a similar claim to other credit investors on the remainder of the issuer's asset value (Sandström et al., 2013).

As previously mentioned, the CBIA came into force in July 2004. However, conversions and issuance of covered bonds did not happen immediately. The first application was filed in May 2005 by Nordea Hypotek and the first issue was carried out by SBAB in May 2006. All other banks had issued covered bonds by 2008 except Skandiabanken, which conducted its first issue in September 2013. For this reason, our dataset excludes Skandiabanken, as they had no bonds subject to conversion during the time of our analysis. In Table 1, we provide further information on license application, approval, and first issue dates.

4 Data and methodology

In this section we describe the theoretical framework on which we base our analysis. We then develop our hypothesis and explain our empirical strategy and implementation. Finally, we describe the data.

4.1 Theoretical framework

As highlighted in previous sections, covered bonds have several distinctive features that make them less risky than mortgage-backed securities. To further understand this proposition, it is useful to break down the risk components of fixed income securities. In general, all bonds are subject to interest-rate risk, where the "price of a fixed income security moves in the opposite direction of the change in interest rates" (Dattatreya and Fabozzi, 2006). However, we argue that the difference in risk between CBs and MBSs is mainly due to liquidity risk and credit risk.

Dattatreya and Fabozzi (2006) define liquidity risk as "the risk that an investor will have to sell a bond below its true value where the true value is indicated by a recent transaction." The CB market is a very liquid one due to its structure and volume. In terms of structure, issues in the primary market are mostly composed of benchmark bonds and thus very standardized. In addition, the secondary market provides a source of information for investors to value their bonds and an opportunity to sell them for cash. In terms of the market's size, it is one of the largest in Europe; its outstanding volume exceeds that of Swedish government bonds by approximately EUR 80 billion (Swedish National Debt Office, 2017). Additionally, covered bonds are "treated favorably under regulatory frameworks such as Basel III and Solvency II" (Prokopczuk et al., 2013). This is a contributing factor to the liquidity of CBs as it arguably increases their demand by banks, asset managers, and other large financial institutions since these investors are able to hold more CBs in their books. While the

MBS market was also large in size and very liquid, the standardization and regulation contribute to a higher market liquidity of covered bonds.

Credit risk can also be an important portion of the spread between covered and government bonds. This type of risk is composed of default risk, credit spread risk, and downgrade risk (Dattatreya and Fabozzi, 2006). Default risk is the risk that the issuer will become insolvent and unable to pay its obligation. Credit spread risk is the risk that the market increases the spread it demands from a specific fixed income security. Downgrade risk involves the risk of the security being downgraded by a credit rating agency, which would decrease its price. MBSs have historically carried very high ratings, and so have their issuers. This has been the case because their probability of default has been very low. However, default risk also includes the magnitude of the losses to an investor in case of bankruptcy. This is where CBs present an advantage over MBSs, for the investor has a claim on both the issuer and the assets in the cover pool. This cover pool is not accessible to other investors, such as senior unsecured creditors, until the covered bond investors have been paid (Lucas et al., 2008). In addition, the assets in the cover pool appear on the issuer's balance sheet, providing an incentive to carry higher quality assets in said pool. Finally, the cover pool is monitored by a financial authority (e.g. SFS) which ensures a certain level of overcollateralization and the removal of assets not meeting the quality criteria.

Another type of risk that is worth considering is timing risk. Timing risk applies to all bonds that carry a call provision, that is, the possibility for the issuer to terminate the issue before the bond matures. All mortgage-backed securities carry this risk, which in their context, is known as prepayment risk. Prepayment risk includes contraction risk and extension risk (Dattatreya and Fabozzi, 2006). The former is the risk that borrowers will prepay their loan when interest rates are low and the latter is the risk that borrowers will postpone mortgage payments in a high-interest rate environment. In practice, MBSs can forgo a potential increase in value in a low-interest environment and delay a decrease in value when facing high interest rates. For the same reasons, the relationship between mortgage-backed securities and interest rates results in unpredictable cash flows, which can complicate their valuation (Becketti, 1989). This risk is priced in the MBS and reflected in its yield. Conversely, covered bonds' coupons and payment schedules are set in advance, so they do not carry prepayment risk (Prokopczuk et al., 2013).

Other types of risks may include maturity, inflation, and currency risk. Concerning maturity risk, there should not be a difference between a MBS and a CB. Inflation risk is similar for all bonds that do not have a floating coupon rate. In our analysis, we only use fixed rate bonds which means that this risk is the same throughout our sample. Finally, currency risk would apply to bonds issued in other currencies, whose payments would have uncertain SEK cash flows. Our analysis only includes bonds denominated in Swedish Kronor to factor out this risk.

In summary, we argue that covered bonds are safer than mortgage backed securities. In fact, some claim that spreads on covered bonds have generally been smaller than those of mortgage-backed securities (Bernanke, 2009). The former Fed Chairman also argues that this remained true throughout the financial crisis, which could be attributed to the legislation governing covered bonds in European countries, i.e. the CBIA in Sweden.

4.2 Hypothesis development

In general, covered bonds are regarded as less risky than mortgage-backed securities. We argue that this can be mainly attributed to lower liquidity risk and credit risk due to the regulatory framework that governs covered bonds. For this reason, the required yield exhibited by investors should theoretically be lower for CBs than for MBSs.

It is important to note, however, that when the Covered Bond Issuance Act was introduced in late 2003 and enforced in mid 2004, covered bonds were not being traded. In fact, applications by banks for covered bond issuing licenses did not start until 2005 and the first issue of a CB in Sweden did not happen until May 2006. Nevertheless, we argue that there is a possibility that a decrease in required yields could already be visible on MBSs as investors would incorporate the prospect of conversion into the pricing of securities that would be subject to such a conversion. Therefore, our hypothesis is the following:

Hypothesis. *Bonds issued by Swedish banks with the purpose of financing mortgage lending exhibit a decrease in yields after the implementation of the CBIA.*

Regarding the specific dates when this effect would occur, we argue that a decrease in required yield could be observable at five different dates. The first two are the date of issuance and enforcement of the CBIA. Already at this point, investors could price MBSs incorporating the new regulatory information. Similarly, the effect could be visible around the dates of application for a covered bond issuing license to the Swedish Financial Supervisory Authority, the approval date of said application, or the date of first issue. That said, we would not expect a negative effect on yields to accumulate over several dates, as the same regulatory framework would not be priced repeatedly.

We will show that our hypothesis holds for the date of first issue, i.e. when conversion had actually taken place. At the same time, it is not true regarding the other four dates.

4.3 Empirical strategy

To test our hypothesis that the implementation of the CBIA led to a decrease in the yields of covered and mortgage bonds, we use a difference-in-differences approach. Our treatment group are the mortgage bonds and covered bonds that would be affected by the new legislation. The control group is a government bond issued by the Swedish government that traded throughout the entire period of our analysis.

The model specification of our study is the following:

$$y_{it} = \beta_1 Treatment_i + \beta_2 Post_t + \beta_3 Treatment_i \times Post_t + \beta_4 X_{it} + \delta_i + \eta_t + \epsilon_{it}, \quad (1)$$

where y_{it} stands for the observed current yield of bond i at day t. $Treatment_i$ indicates if the observed current yield is in the treatment group of covered and mortgage bonds by assuming the value 1, and 0 if it is in the control group, i.e. the government bond. $Treatment_i$ varies by bond. $Post_t$ is a dummy variable indicating if the observed current yield is in the post-treatment window by taking on the value 1, and 0 if it is in the pre-treatment window. This variable varies by time. X_{it} represents bond-level control variables, specifically the relative age of the bond and a proxy for its liquidity. It is worth mentioning that our liquidity proxy controls for idiosyncratic liquidity risk, whereas differences in systematic liquidity risk, i.e. a more liquid covered bond market, could still have an impact on current yields in our model. These control variables vary by bond and time. δ_i and η_t denote bond and month fixed effects, respectively. Robust standard errors are clustered at the bond-month level.

We regress current yields for mortgage/covered bonds and the government bond four months before and after the treatment date (160 trading days). The model captures the effect of the treatment through β_3, providing the direction and size of the change in current yield of mortgage and covered bonds. We refer to β_3 as the DID estimator. An important aspect of our analysis involves the selection of treatment dates. As previously discussed, we argue that the effect of the policy implementation could be exhibited at five different dates. For this reason, we estimate β_3 in five different regressions. The dates that we select for our analysis are the following:

Law issue date (December 18, 2003): The first date where an effect of the policy could be observed is when the CBIA was issued. The reason an effect on yields could be seen around this date is that investors would expect that major banks and housing credit institutions would apply for this authorization and hence convert all their mortgage bonds to covered bonds by 2008. Additionally, this represents a certainty that the new regulatory framework would take place in six-months time. Under these assumptions, investors would price this information into mortgage-backed securities trading during that time. Consequently, MBSs could have already exhibited a decrease in yields from this date.

Law enforcement date (July 1, 2004): This is the date when the CBIA came into force in the Swedish market, i.e. banks could apply for covered bond issuing licenses from this day on. Similar to the law issuance date, the reaction by investors to the new legislation could have been priced at this point in time, as it represents the first day under a new regulatory framework. In addition, investors could be expecting issuing institutions to start applying for licenses immediately.

Application date (varies by bank[3]): This date refers to the day a bank sent an application to issue CBs to the Swedish Financial Supervisory Authority. The new legislation and its requirements to grant a license were available to investors. With this information, it is reasonable to assume that a sophisticated investor could determine if the SFS would approve the application of each bank, causing an effect on required yield. These dates are identified by press releases which specify that the banks have sent an application and name the outstanding bonds subject to conversion.

Approval date (varies by bank): This refers to the day a bank was granted a license by the SFS. From this point in time, investors knew which banks were going to carry out conversions of MBSs to CBs and specifically the bonds that were going to be converted. Once again, this represents a potential date where an effect could be exhibited.

First issue date (varies by bank): The last date for which we carry out our analysis is the first date that covered bonds were issued by banks to the Swedish market. We choose this date as it represents the first time when investors were holding

[3] See Table 1 for specific dates.

a different security. Since we argue that CBs are fundamentally a safer security than MBSs, a decrease in investors' required yields could be exhibited at this date.

Another important specification of our model is the inclusion of fixed effects and control variables. Fixed effects are included at the bond- and month-level. Bond-level fixed effects serve to capture time-invariant characteristics of bonds such as issuer, maturity, maturity date, coupon rate, payment schedule, credit rating, and total amount issued. Additionally, time fixed effects are included at the month-level, where month represents a specific month within a year, i.e. April 2005. We use month-level rather than year-level fixed effects because our regressions span an eight-month period, so in order to capture time series trends we need to disaggregate years into months. Regarding control variables, we employ two different ones in our regressions. First, we use a variable that represents relative age, where we calculate the ratio of a bond's time to maturity to its maturity.[4] Second, we construct a liquidity proxy multiplying the relative age times the total amount issued.[5] This serves as a proxy for liquidity as bonds that are relatively older (closer to maturity) and with lower outstanding amount exhibit lower liquidity. We borrow this reasoning and the two control variables from Prokopczuk et al.'s (2013) research on covered bond credit risk in the German market. However, we do not have time series data on outstanding amount so we use total amount issued instead.

We use the Swedish government bond number 1045 issued in the year 2000 with maturity in 2011 as our control group. This bond covers our time series of data entirely and thus serves as a consistent control group for all the treatment dates on which we run a regression. In addition, it has a fixed coupon rate of 4% paid annually and is therefore similar in type to our treatment group. This bond also carries triple A rating by Moody's. The government bond is an adequate control group as it is not a subject of the Covered Bond Issuance Act.

[4] $\textit{Relative Age}_{it} = \textit{Time to Maturity}_{it} \,/\, \textit{Maturity}_{i}$, *where* $\textit{Time to Maturity}_{it} = \textit{Maturity Date}_{i} - \textit{Date}_{t}$

[5] $\textit{Liquidity Proxy}_{it} = \textit{Relative Age}_{it} \times \textit{Total Amount Issued}_{i}$

Finally, our DID methodology relies on the parallel trend assumption. That is, the current yields for the mortgage/covered bonds and the government bond would follow the same path in the absence of the CBIA's introduction. In Figures 3 and 4 we show that the parallel trend assumption holds for most of our treatment dates. However, there may be cause for concern regarding the approval date. In such a scenario, we argue that our time-varying control variables for relative age and liquidity can serve to better meet the parallel trend assumption. We provide further discussion as to the potential source bias of this matter in the empirical implementation and results sections.

4.4 Empirical implementation

We implement our difference-in-differences methodology to the dataset in order to determine the effect of the CBIA through the DID estimators. These serve to estimate the differences in yields between the mortgage-backed securities/covered bonds and the government bond before and after the treatment dates; revealing whether the policy implementation had an increasing, decreasing, or no effect at all.

First, we analyze the effect of the CBIA at the law issue and law enforcement dates. For each of these two dates, we run a total of six regressions. Our baseline regression (1) is run without fixed effects or control variables. This serves to obtain an initial DID estimator on the sample. We then proceed to test whether the DID estimator withstands the inclusion of fixed effects. For our second regression (2), we control for bond-level fixed effects. This serves to account for time-invariant characteristics within bonds that may affect the estimation of the effect. For example, differences in maturity, fundamental differences between issuers such as their cover pool, amount outstanding, or investor pool. When including bond fixed effects, we no longer estimate the $Treatment_i$ variable. We then include (3) month-level fixed effects to control for aggregate time series trends that may affect the bond market in Sweden and its issuers. In our fourth regression (4) we include a control variable for the relative age of the bond. This regression also includes bond and month fixed effects. Then, we include a liquidity proxy as a control variable (5) to examine the model when factoring out differences in liquidity between bonds. This regression includes bond and month fixed effects as well. Finally, we run a regression including all fixed effects and control variables (6) to see if the DID estimator is significant under all conditions. We cluster robust standard errors at the bond-month level on all regressions.

Second, we analyze the effect of the CBIA at the application, approval, and first issue dates. As previously mentioned, the application, approval, and first issue dates vary by bank. To obtain estimates for the average effects at each of these dates, we average the control group by day before and after each treatment date. That is, we take an average of government bond's yield for each of the 160 days in the analysis window for each date. For example, we compute an arithmetic average of the observed current yields of the government bond at day -20 of the application time period for each bank, which becomes the current yield observation for the control group at day -20. After averaging the control group for each bank, we run five different regressions for each treatment date. The first regression (1) is our baseline regression which is run without the inclusion of fixed effects or control variables. Our second regression (2) includes bond fixed effects to account for differences between bonds as well as issuers. This is particularly important in these regressions as banks applied at different dates. The third regression (3) includes the control variable for relative age to control for variation between bonds at different points in their lifetime, as well as bond fixed effects. The fourth regression (4) that we run includes bond fixed effects and our liquidity proxy. Finally, regression (5) includes bond fixed effects and both control variables. We do not include month fixed effects in the regressions on the application, approval, and first issue dates. The reason being that we eliminate month-level time-invariant characteristics when averaging the control group across different points in time, relative to the treatment date of each bank. As we do not include month fixed effects, we estimate the $Post_t$ variable on all regressions. In addition, we only include bonds that were mentioned in press releases by banks and other news sources as subject to conversion. In these regressions, robust standard errors are also clustered at the bond-month level.

The time period for all of our regressions comprises a total of 160 trading days, equivalent to eight months. In other words, we conduct our regressions on the four months prior to the treatment date and the four months that follow. This time period is long enough to appreciate a persistent effect of the CBIA and short enough to accommodate the use of daily observations and prevent excessive overlap between dates.

For validity, our identification strategy rests on the parallel trend assumption (PTA). In Figures 3 and 4 we see that the PTA holds well for the law issue, law enforcement, application, and first issue dates. Conversely, there is a negative shock of 0.1 percentage points exhibited by the treatment group in the pre-treatment period of the approval date (Figure 4) at day -40. This shock could then lead to a biased and positive estimate of the treatment effect. As mentioned before, we attempt to mitigate this source of bias through the introduction of time-varying control variables for relative age and liquidity of the bonds. Regarding the law enforcement date, we see a positive shock in the treatment group in the post-treatment period. There is a sudden increase of 0.1 percentage points in current yields at approximately day 50 (Figure 3). While the PTA still holds well in the pre-treatment period for this date, the shock is seemingly unrelated to the treatment date and therefore could also lead to a biased and positive estimate of the treatment effect. In this case, control variables can also help to smooth this shock in the model. Nevertheless, we take this into account as a potential source of bias when developing our conclusions.

There are three main limitations of our empirical implementation that must be considered. The first involves the averaging of the control group for the application, approval, and first issue dates. Averaging daily yields of the government bond across time could introduce bias in our analysis by reducing or amplifying the effect on yields of the treatment group, thus affecting our DID estimator. However, this method allows us to study the aggregate effect on these bank-specific dates. The second limitation comes with overlaps across dates. For example, two months of the post-treatment period of the law issuance date overlap with the pre-treatment period of the law enforcement date. This could bias the DID estimator by corrupting the yields during the treatment period, but we consider that the amount of overlap is not sufficient to hide a significant effect completely. Additionally, it is more conservative to test a larger amount of dates where the effect could take place at the expense of some overlap between them. Third, we know which bonds were subject to conversion from the first issue date onwards from press releases by the banks and other sources. But there is lack of clarity as to the exact date of conversion of each individual bond. This somewhat weakens the study of the first issue date.

Besides the three limitations that are specific to our study, the difference-in-differences methodology presents some shortcomings in general. For example, Bertrand et al. (2004) find that the DID approach can severely understate standard errors. In fact, through the generation of placebo laws on female-wages in the US, they conclude that the DID methodology results in significant coefficients at the 5% level for 45% of the placebo laws. We control for this by (1) generating placebo laws and observing their effect and (2) clustering robust standard errors at the bond-month level. This procedure is furthered specified in the robustness section after the results.

4.5 Data description

Our purpose is to determine whether the Covered Bond Issuance Act had an effect on required yields of mortgage and covered bonds. To this end, we collect data on daily current yields for mortgage and covered bonds issued in Sweden that traded within the period of January 1, 2002 to December 31, 2008 from Thomson Reuters Datastream. We also collect data for the same time period on current yields for the government bond that represents our control group. The time period selected allows us to conduct our analysis for all the dates where we consider an effect of the policy implementation could have been observed.

To build our sample, we impose a series of restrictions. First, we choose mortgage-bonds issued by the 6 Swedish banks that applied for a covered bond issuing license before 2008. Second, we select bonds that mature after the date of enforcement of the CBIA. Third, we only use bonds with fixed coupon rates to avoid to differences in inflation risk within the sample. Fourth, we use bonds denominated in Swedish Krona to avoid differences in currency risk.

Given these restrictions, our dataset consists of 42 bonds issued by 6 institutions. In our dataset, we include information about the bonds' daily current yield, issuing bank, time to maturity, total amount issued in billion SEK, maturity date, and maturity in years. We also include an additional bond issued by the Swedish Government that traded throughout the entire period of our analysis, this serves as our control group in the difference-in-differences analysis. This bond meets all our criteria that is not specific to mortgage bonds. Table 2 in the appendix provides detailed information on the bonds included in our dataset.

We impose two further restrictions when conducting the regressions in our analysis. First, we exclude bonds for which there are less than 100 daily observations in our pre- and post-treatment period. The entire period consists of 80 days prior to the treatment date and 80 days after, for a total of 160 trading days (8 months). Excluding bonds with less than 100 observations ensures that the regression is run on bonds for which there is at least one month of daily yields before and after the treatment date. This means that for our analysis of the law issuance and enforcement date, we use 18 bonds and 19 bonds respectively. For our analysis of the application, approval, and first issue date, we impose a second restriction. In this case, we only use mortgage bonds declared as subject to conversion in press releases by the issuing banks and other news sources (labeled in Table 2). The reasoning being that if banks specify the bonds that would be converted, only these would exhibit an effect of the CB regulation in advance. Applying the restriction on observations per period to this part of the analysis as well, further reduces the sample to 16 bonds for the application date, 25 for the approval date, and 28 for the first issue date. This is shown in Table 3.

Outcome variable

In order to determine whether investors' required yields decreased with the introduction of CBIA, we face a choice of yield measures on which to run our DID regressions. These include conventional yield measures such as yield-to-maturity and current yield as well as others like the asset swap spread. Ultimately, we choose to use current yield in our analysis. Nevertheless, it is important to understand the benefits and limitations of each measure to be aware of how they might bias our conclusion.

Among the conventional yield measures, the two most common ones are yield-to-maturity (YTM) and current yield (CY). Yield-to-maturity is the more complete measure as it reflects the return of a bond if held to maturity. It takes into account a bond's coupon rate and payment schedule, its market price, and time to maturity. Required yields of mortgage and covered bonds could be accurately measured in terms of YTM. However, doing so would require adjusting the measure for different maturities of bonds to avoid differences in YTM purely based on this. There are various ways of achieving this. For example, the US Treasury reports Constant Maturity Rates (CMTs) by "interpolating yields from the daily yield curve." Others simply exclude bonds with a remaining life of less than six months to maturity, this helps to eliminate effects caused by the assumption that most bonds mature at par (Prokopczuk et al., 2013).

Current yield is the simplest yield measure as it expresses the ratio of the bond's coupon to its current market price. This ratio can be slightly modified to adjust for factors such as accrued interest and income tax rate. In Exhibit 1, we show how current yields provided by Datastream are calculated. Current yield considers the coupon rate as the unique source of return for a bondholder, potential capital gains or losses as well as interest income from reinvestment are ignored (Fabozzi, 2006). In this sense, one could argue that current yield is a short-term measure of a bond's returns, as it reflects the returns an investor would realize if the bond was held for one year. Additionally, current yield does not completely take care of differences in maturity that may distort yield spreads, but it is a more stable measure than YTM. This can be illustrated by the relationship between YTM and CY depending on whether a bond trades at a premium, at par, or at a discount, as CY is less sensitive to price changes.[6] Finally, current yield is particularly advantageous to our analysis as issuers commonly offer investors to exchange their maturing bonds for ones with a longer maturity at current yield (Sandström et al., 2013). In this sense, CY could be regarded as a more accurate measure of refinancing cost.

Others have used a less conventional approach in measuring covered bond yields and spreads. For example, Avesani et al. (2007) use an asset swap spread. This allows them to eliminate fixed interest rate risk. Furthermore, they argue that using this measure provides some advantages in terms of "liquidity and homogeneity." We refrain from using this measure due to the added complexity of constructing an appropriate asset swap spread for our study.

In summary, we choose current yield as a measure for investors' required yield in our analysis. While there are advantages and shortcomings of using this measure, we believe it can accurately portray the effect of the CBIA. In fact, an effect of the policy on bond yields should be reflected in disregard of the measure that is employed. It is also important to note that current yields in our sample are winsorized by month at the 1$^{\text{th}}$ and 99$^{\text{th}}$ percentile to avoid our results being driven by outliers.

[6] A bond trading at a discount exhibits Coupon Rate $<$ CY $<$ YTM; at a premium Coupon Rate $>$ CY $>$ YTM; and at par Coupon Rate = CY = YTM.

Summary statistics

In Table 4, we present summary statistics for the average current yields in our sample. The table is divided into six panels which correspond to the samples used in the main regressions of our paper, with the exception of Panel F, which presents summary statistics over the total sample. Panels A through E consist of time periods comprising 160 trading days (80 days prior and after the treatment date). Data on current yields for the mortgage/covered bonds (treatment group) and the government bond (control group) is reported in percentage points and collected from Thomson Reuters Datastream.

Panel A shows average current yields for the mortgage bonds and the government bond during the time period of the CBIA issue. We see a positive spread of 0.22% (22 basis points (bp)) between the treatment and control group during this period, which is to be expected. At the same time, the treatment group exhibited a lower minimum yield during this period, showing that some MBSs do trade below the government bond. However, this does not necessarily reflect an effect of the CBIA on mortgage bond yields. Similarly, Panel B shows a positive spread of 24 bp for the CBIA enforcement date sample. Again, we see a lower minimum for the mortgage bonds, a greater range in the yields, and also a larger standard deviation. We use 2,720 and 2,807 observations from the treatment group in Panel A and B respectively; and 160 from the control group in both panels. Therefore, the regressions are run on 2,880 and 2,967 observations per treatment date. It is also noteworthy that Panel A has an average number of observations per bond within its time window of 160, meaning that all the bonds used for the regressions have daily yields for all the days in the regression window. Conversely, Panel B has a small number of missing observations resulting in a mean of 156 per bond. In total, Panel A consists of 18 bonds and Panel B of 19.

Panel C shows the average yields for the application time period, i.e., the date when banks applied to the SFS for a covered bond issuing license. In this case, we see narrower spreads between the treatment and control group, which amount to 2 bp.

This is a considerable change when compared to previous panels. While this does not mean that the effect of the CBIA can be isolated to the application date, a decreasing trend in yields of mortgage bonds versus the government bond is visible. Panel D shows that the spread increases further during the approval time period, that is, when banks were granted a license by the SFS. Additionally, the dispersion is greater in this sample, reflected in a higher standard deviation of 73 bp. Regarding the first issue date, Panel E shows the largest negative spreads between the two groups, where mortgage/covered bonds traded 38 bp below the government bond on average. Once again, standard deviation increases for this sample to 81 bp, indicating a greater dispersion of yields. As previously described, the dates of application, approval, and first issue vary by bank. For this reason, we average the government bond by day with respect to each bank's dates, obtaining an average for the control group by day before and after each treatment date. The regressions are run on 2,560, 3,861, and 4,270 observations for the application, approval, and first issue date respectively. All bonds in Panel C have observations for each day in the time period while those in Panel D have 154 and the ones in Panel E have 152 on average. Panel C consists of 16 bonds, Panel D of 25, and Panel E of 28.

Panel F presents the average current yield for the mortgage/covered bonds and the government bond from January 1, 2002 to December 31, 2008. The total sample contains daily current yields for 43 bonds. Remarkably, we see that the mortgage/covered bonds traded slightly below the governments over this time period, at a spread of -4 bp. This can also be seen in Figure 2, where we plot the two types of bonds throughout the whole time period. Overall, the summary statistics for Panels A through E show a decreasing trend in mortgage/covered bond yields over the complete time period. This could be associated with the introduction of the covered bond regulatory framework or other market trends. We now turn to the regressions to specifically test the impact of the law.

5 Results

In this section, we test our hypothesis that the introduction of the CBIA led to a decrease in the required yield of mortgage and covered bonds. First, we run regressions for the law issue and enforcement dates. We then test banks' application, approval, and first issue dates. We focus our attention on the coefficient β_3. This coefficient is referred to as the DID estimator since it estimates the change in yield between the treatment and control group. We also examine whether our model sustains the inclusion of fixed effects and control variables. Finally, we discuss the robustness checks conducted.

5.1 Regressions

Law issue and enforcement dates

Table 5 shows the results for the six regressions on the law issue date. The baseline regression (1) yields a non-significant DID estimator of 6 bp. Including bond fixed effects does not change the estimator and neither does adding month fixed effects (2 and 3), but under these conditions the DID estimator is significant. Interestingly, indicating an increase in yields. Controlling for the relative age of the bonds lowers the estimator to 4 bp (4). The coefficient on the relative age variable is negative, meaning that bonds closer to maturity exhibit higher yields. Possibly because maturing bonds trade at lower volumes, which could imply lower liquidity. Additionally, the liquidity proxy control variable further lowers the estimator to -1 bp and makes it non-significant (5). The coefficient on the liquidity proxy is positive and significant at the 1% level, in this case, meaning that more liquidity is associated with higher yields. This is not in line with Prokopczuk et al.'s (2013) conclusions, where higher liquidity as measured by the proxy is associated with lower yields. In our case, this difference might come from the total amount issued for each bond, where bonds with lower total amounts issued do not necessarily exhibit lower liquidity, i.e. do not exhibit higher liquidity risk. Regressing on both control variables decreases the DID estimator further to -3 bp (6), but it remains non-significant. In summary, the model sustains the inclusion of fixed effects, but including control variables decreases the DID estimator and its significance. For this reason, we cannot conclude that the CBIA had an impact on yields at this date.

Table 6 shows the regression results for the law enforcement date. The baseline regression's DID estimator is 8 bp and non-significant (1). Including bond fixed effects lowers it to 3 bp (2), while month fixed effects have no further impact on the estimator (3) but they do make it significant at the 5% level. This could be due to the presence of time series trends in the bond market at this time period of analysis. Specifically, we see a positive shock of 10 bp during the post-treatment period, which might be the driver of a DID estimator indicating an increase in yields. Controlling for relative age shows no effect on the estimator as the control variable's coefficient is not significant (4). However, regressing on the liquidity proxy instead of relative age lowers the estimator to 1 bp and removes its significance (5). The liquidity proxy's coefficient is positive and significant. In this scenario, we see that controlling for liquidity may contribute to smooth the shock in the post-treatment period (Figure 3), hence eliminating effects driven by this shock. Regression number (6) shows that the DID estimator is non-significant under the inclusion of fixed effects and both control variables. The pattern is similar to that of the law issue date, where including fixed effects and control variables diminishes the observed impact of the CBIA on current yields. For this reason, we conclude that the legislation had no impact at this date.

Banks' application, approval, and first issue dates

Table 7 shows the regression results for the application date. The baseline regression yields a statistically non-significant estimator of -2 bp (1). Including bond fixed effects does not change the DID estimator (2). On the other hand, introducing the control variable for relative age makes it significant at the 5% level, indicating a decrease in yields of -3 bp (3). This is not the case when controlling for liquidity, which reduces the estimator to 1 bp and removes its significance (4). Likewise, including both control variables returns a non-significant estimator of 0.4 bp (5). It is noteworthy that the coefficient on the relative age variable is negative and significant, similar to previous regressions, suggesting that bonds further from maturity exhibit lower yields. In this model, the liquidity proxy is also significant and negative. This contrasts with the previous regressions and implies that higher liquidity is associated with lower yields, as Prokopczuk et al. (2013) find in their study. To sum up, the model shows no statistical significance when including control variables, therefore we conclude that the application date exhibits no impact from the CBIA on bond yields.

Table 8 shows the regression results for the approval date. The baseline regression returns a non-significant DID estimator of -7 bp (1). Including fixed effects and controlling for relative age increases the DID estimator to 0.6 bp and 0.5 bp respectively, but it remains non-significant (2 and 3). On the other hand, including the liquidity proxy variable in the regression (4) returns a significant DID estimator of 2 bp at the 5% level. This estimate further increases to 3 bp (at the 1% level) when including both variables (5). These estimates indicate an increase in yields at the date of approval. However, Figure 4 shows that there is a negative shock on yields in the pre-treatment period of 10 bp. Such a decrease before the treatment date could lead to a positive DID estimator that is biased by the shock, therefore not truly reflecting an effect of the legislation. This is similar to what we see in our estimates. Additionally, the inclusion of control variables does not appear to mitigate this violation of the parallel trend assumption. Due to this uncertainty, we cannot conclude that the CBIA had an effect on the date of approval.

Table 9 shows the regression results for the first issue date. The baseline regression yields a non-significant DID estimator of -7 bp (1). Including bond fixed effects (2) returns a significant DID estimator at the 1% level of -2 bp, hence showing a decrease in yields. This estimate sustains the inclusion of the relative age control variable and decreases further to -4 bp (3). When controlling for liquidity, the estimator increases to -2 bp (4). Regressing with both control variables returns an estimate of -3 bp (5). In these regressions, relative age and liquidity proxy are both negative and significant on their own but not together, indicating that differences in relative age have explanatory value. However, they do not influence the DID estimator to a great extent, meaning that the treatment effect is not driven by these differences. Overall, these estimates show that covered bonds exhibit lower yields than conventional mortgage bonds. Additionally, they indicate that the effect of the CBIA can be detected at the date of first issue. It is also worth nothing that mortgage and covered bonds exhibit negative spreads relative to the government bond throughout this time period of analysis (Figure 4). This means that they were already trading below the government bond at the date of first issue, which further increased the spread by driving yields to a lower level.

In summary, we can confirm our hypothesis that the covered bond legislation in Sweden led to a decrease in the yields of bonds issued with the purpose of financing mortgage lending, at the date of first issue. We now turn to our robustness checks to further evaluate our results.

Robustness checks

To increase the validity of our estimates, we apply two robustness checks. First, we cluster robust standard errors at the bond-month level. Second, we generate ten placebo dates to examine the identification power of our difference-in-differences methodology.

In order to prevent overestimating the significance of our DID estimators, we cluster our standard errors. Intuitively, we would cluster the standard errors at the bond level. However, in all our regressions we have fewer than 30 bonds and in three cases fewer than 20. This represents few clusters and may result in two issues, overfitting and over-rejection (Cameron and Miller, 2015). To solve this problem, we cluster at the bond-month level. Month refers to a generic month as opposed to a date month, e.g. January rather than January 2005. This solution contributes to more conservative estimates.

To further improve robustness, we regress on ten placebo dates. We generate two placebo dates per year for the years 2003 to 2007, for a total of ten. The regressions on these dates include bond and month fixed effects as well as controls for relative age and liquidity proxy. The results are shown in Table 10. Out of the ten placebo dates, three return significant DID estimators. These coefficients are -1 bp, 6 bp, and 4 bp at the 10%, 1%, and 1% significance level respectively. These results question the identification power of our DID methodology, as it returns significant effects on dates that are unrelated to the CBIA. However, we argue that the first coefficient does not question the validity of our first issue estimates indicating a decrease in yields. This is because it is the only negative significant coefficient generated by the placebo regressions, meaning that 1 out 10 placebos (10%) are generating significant estimates at the 10% level, which is to be expected. Regarding the other two coefficients, we consider that they can provide a further interpretation of the results at the date of approval. Our reasoning is that the estimates of the effect at the approval date are very similar in sign, magnitude, and significance to those generated at the placebo dates. This could serve to further discredit the validity of the approval date estimates, where an increase in yields was potentially driven by a shock during the pre-treatment period, rather than an effect of the CBIA.

To summarize, our model indicates a decrease in yields of 2-3 bp at the 1% significance level under the new regulatory framework and consequently a decrease in the mortgage financing cost for the issuing banks. It identifies this effect at the date that covered bonds were first issued by the banks. In terms of economic significance, a back-of-the-envelope calculation (excluding transactions costs) indicates that a decrease of 2 bp in current yields would roughly correspond to a decrease of 2% in mortgage financing cost for a bank issuing mortgage bonds at a 1% coupon rate, which is not unrealistic in a low interest environment. We also find unexpected results at the date of approval, which are not in line with our hypothesis and lack a clear theoretical explanation. We argue that these results could be driven by a shock in the pre-treatment period rather than a true effect of the CBIA. Our robustness checks are in line with this reasoning, as placebo dates generate very similar estimates to those produced at the date of approval. For that reason, we conclude that an effect of the CBIA can only be attributed to the date of first issue. Lastly, our findings contrast with previous literature, which had found no effect of the CBIA. Previous research, however, had not been conducted on the date of first issue by Swedish banks.

6 Conclusion

In this thesis, we analyze the potential impact that the introduction of the Covered Bond Issuance Act had on yields of mortgage and covered bonds. We identify a statistically significant decrease in yields of 2-3 bp at the date when covered bonds were first issued to the Swedish market, implying that an impact of the CBIA can be recognized at this date.

Previous literature and the nature of covered bonds would lead us to deem them safer than conventional mortgage bonds such as MBSs. For example, Carbó-Valverde et al. (2011) find that banks issuing MBSs prior to the crisis were more likely to be bailed out than banks issuing covered bonds, suggesting that financing through covered bonds could be safer. Moreover, as described by Sandström et al. (2013), the features of the Swedish covered bond legislation, including conservative rules on loan-to-value ratio and the types of assets that can be included in the cover pool, should imply that covered bonds are safer than mortgage bonds. Our results are in line with this literature and we hope they can provide evidence that covered bonds exhibit lower required yields than conventional mortgage bonds. Conversely, our findings do not accommodate Nord and Fagerström's (2006) conclusions that the CBIA had no effect. This is due to the fact that banks had not yet issued covered bonds at the time of their analysis and therefore, first issue dates had not been tested.

In summary, we confirm our hypothesis that the CBIA had an effect on the required yield of bonds issued with the purpose of mortgage financing. In doing so, our empirical results suggest that the new regulatory framework regarding covered bonds in Sweden served to decrease the financing cost of mortgage lending for Swedish banks.

6.1 Further research

Looking ahead, an interesting research path would be to test other aspects and implications of the law. One example would be to examine if the CBIA led to a change in the loan-to-value (LTV) ratio of assets in the cover pool backing mortgage bonds and covered bonds. According to the CBIA, covered bonds must be guaranteed by a specific cover pool. The law further specifies the maximum LTV ratio of the assets that comprise this cover pool. This implies that the cover pools of covered bonds are dynamic, where assets deteriorating in quality must be replaced by higher quality ones that meet the regulation's requirements. This contrasts with cover pools of MBSs, which are usually static. Hence, to deepen the understanding of why we experience a decrease in required yield when investors hold covered bonds instead of MBSs, it would be interesting to analyze if we can also see a change in LTV ratios. We would expect to see a decrease, as the maximum value of LTV is now regulated by the law and a decrease would reflect that covered bonds are safer, in line with what we find in this paper. It would be suitable to employ a similar empirical strategy to the one used in this paper, i.e. a difference-in-differences methodology. To do this, we would need data on cover pool assets' loan-to-value ratio, for both MBSs and covered bonds. If it adheres to the parallel trend assumption, a possible control group could be an asset-backed security backed by credit card loans or automobile loans, for which data on LTV ratios can be found. We would then regress ratio values before and after the CBIA and estimate the treatment effect.

From a more general standpoint, further research could also be conducted regarding the timing and speed at which new legislation is priced by investors in the capital markets. This would be relevant for stocks as well as fixed income securities and help to understand how long it takes for new regulation to have an effect.

7 References

Association of Swedish Covered Bond Issuers (ASCB). 2017. *Association of Swedish Covered Bond Issuers.* [Online]. [Accessed March 1 2017]. Available from: http://www.ascb.se.

Avesani, R.G., Garcia Pascual, A., and Ribakova, E., 2007. The Use of Mortgage Covered Bonds. International Monetary Fund Working Paper No. 07/20.

Becketti, S., 1989. The Prepayment Risk of Mortgage-backed Securities. *Economic Review - Federal Reserve Bank of Kansas City* 74(2), pp. 43-57.

Bernanke, B.S., 2009. The Future of Mortgage Finance in the United States. *B.E. Journal of Economic Analysis & Policy* 9(3), pp. 1-9.

Bertrand, M., E. Duflo, and S. Mullainathan 2004. How Much Should We Trust Differences-in-Differences Estimates? *Quarterly Journal of Economics* 119, pp. 249-275.

Cameron, A.C. and Miller, D.L., 2015. A Practitioner's Guide to Cluster-Robust Inference. *Journal of Human Resources* 50(2), pp. 317-372.

Carbó-Valverde, S., Rosen, R.J., and Rodríguez-Fernandez, F., 2011. Are Covered Bonds a Substitute for Mortgage-backed Securities? Federal Reserve Bank of Chicago Working Paper No. 2011-14.

Covered Bonds (Issuance) Act 2003. (SFS 2003:1223). Sweden: Swedish Financial Supervisory Authority (SFS).

Dattatreya, R.F. and Fabozzi, F.J. 2006. Risks Associated with Investing in Fixed Income Securities. In: Fabozzi, F.J. ed. *The Handbook of Fixed Income Securities.* New York: McGraw-Hill, pp. 21-29.

European Covered Bond Council (ECBC). 2016. *European Covered Bond Fact Book.* [Online]. 11th edition. Brussels: European Mortgage Federation – European Covered Bond Council. [Accessed May 2 2017]. Available from: http://ecbc.hypo.org/Content/default.asp?PageID=501.

Fabozzi, F.J. 2006. Bond Pricing, Yield Measures, and Total Return. In: Fabozzi, F.J. ed. *The Handbook of Fixed Income Securities.* New York: McGraw-Hill, pp. 73-105.

Fabozzi, F.J. and Jones F.J. 2006. The Primary and Secondary Bond Markets. In: Fabozzi, F.J. ed. *The Handbook of Fixed Income Securities.* New York: McGraw-Hill, pp. 31-52.

Fagerström, E. and Nord, J. 2006. *Uncovering covered bonds: The impact of a reform on the Swedish mortgage bond market.* M.Sc. thesis, Stockholm School of Economics.

Lucas, D.J., Fabozzi, J., Goodman, L.S., Montanari, A., and Peter, A., 2008. Covered Bonds: A New Source of U.S. Mortgage Loan Funding? *Journal of Structured Finance* 14(3), pp. 44-48.

Packer, F., Stever, R. and Upper, C., 2007. The covered bond market. *BIS Quarterly Review,* pp. 43-55.

Prokopczuk, M., Siewert, B.J., and Vonhoff, V., 2013. Credit risk in covered bonds. *Journal of Empirical Finance* 21, pp. 102-120.

Rosen, R., 2008. What are covered bonds? Federal Reserve Bank of Chicago, Chicago Fed Letter No. 257.

Sandström, M., Forsman, D., Von Rosen, J., and Fager Wettergren, J., 2013. The Swedish covered bond market and links to financial stability. *Sveriges Riksbank Economic Review* 2, pp. 1-28.

SEB. 2014. The Swedish covered bond market. [Online]. Sweden: SEB. [Accessed April 15 2017]. Available from: http://www.ascb.se/market-information/.

Swedish National Debt Office. 2017. *Swedish National Debt Office.* [Online]. [Accessed March 1 2017]. Available from: https://www.riksgalden.se.

8 Appendix

Figure 1

Swedish covered bond investors.

Share of total covered bonds outstanding held by investor type in Sweden from 2008 to 2013. Source: Statistics Sweden (SCB) as found in Sandström et al. (2013).

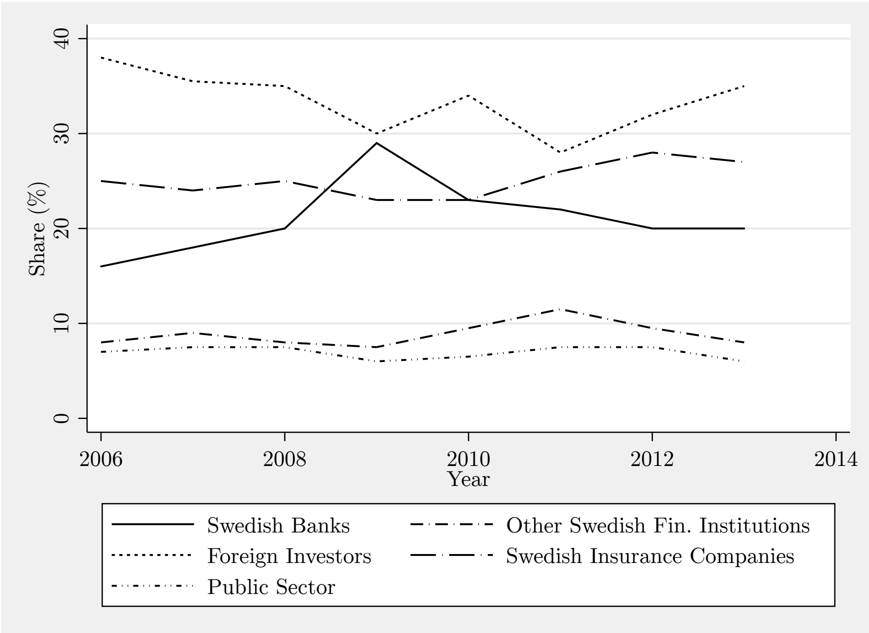


Figure 2

Mortgage and covered bond yields vs the government bond.

This figure shows the average current yields for the mortgage/covered bonds and the government bond in our sample between January 1, 2002 and December 31, 2008. The mortgage and covered bonds are labeled as the treatment group and the government bond is labeled as the control group. Data on current yields is collected from Thomson Reuters Datastream.

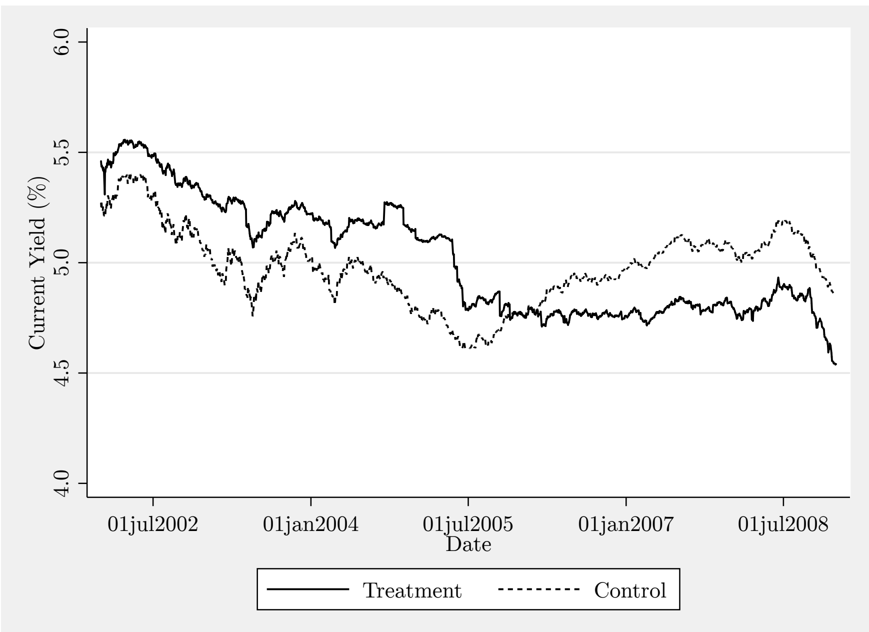
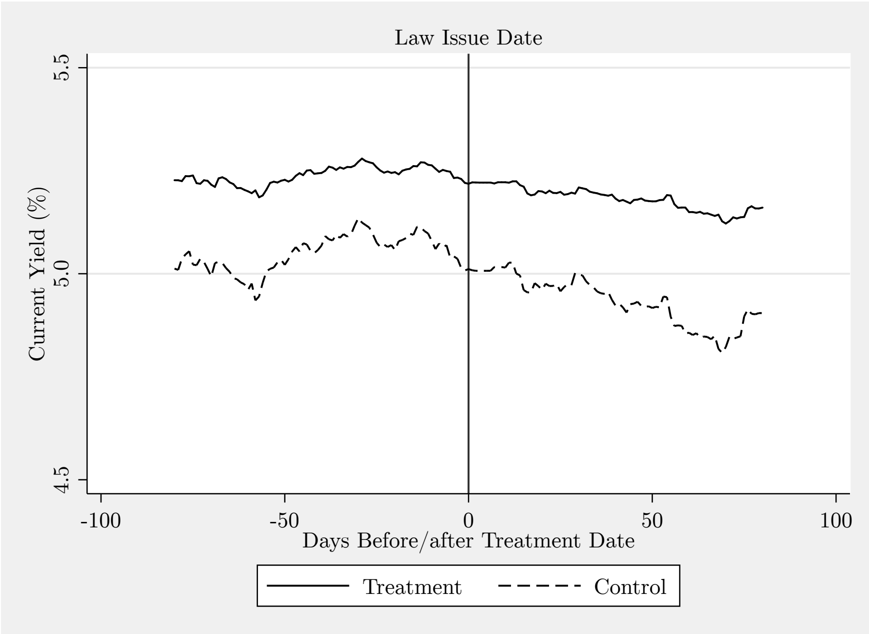


Figure 3

Law issue and enforcement dates.

These two graphs plot the current yields for the mortgage bonds and the government bond at the dates of issue and enforcement of the CBIA. The mortgage bonds are labeled as the treatment group and the government bond is labeled as the control group. The date of issue is December 18, 2003 and the date of enforcement is July 1, 2004. Data on current yields is collected from Thomson Reuters Datastream.



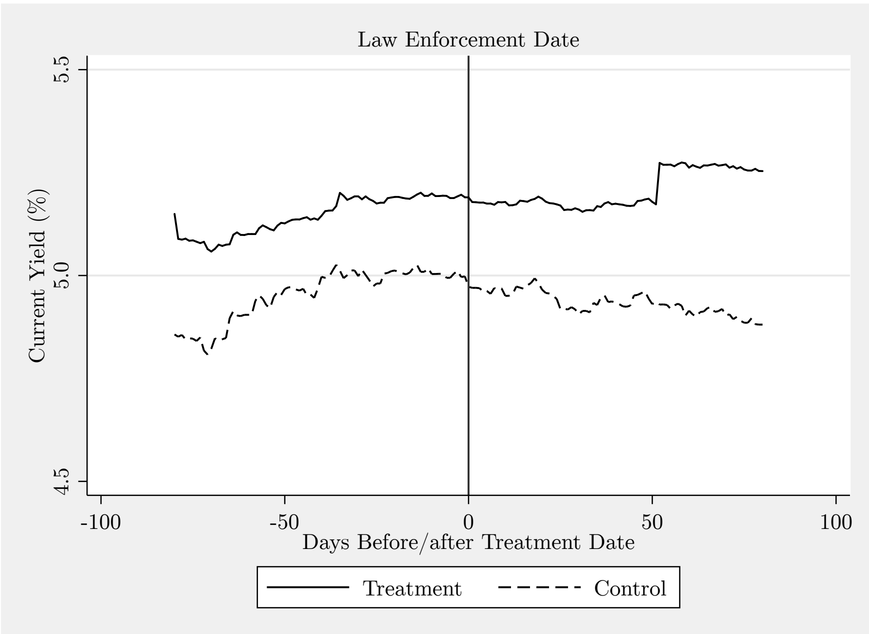
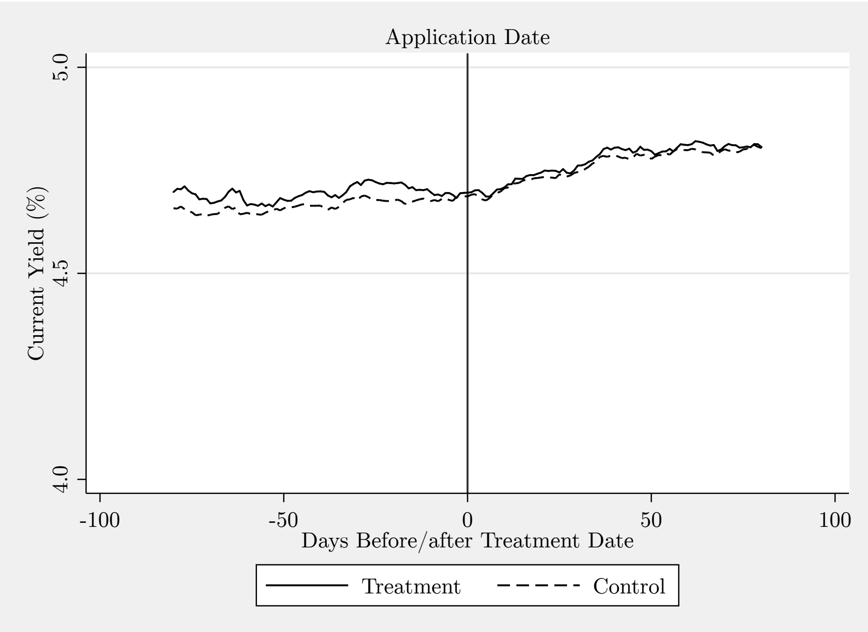


Figure 4

Application, approval, and first issue dates.

These three graphs plot the current yields for the mortgage/covered bonds and the government bond at the application, approval, and first issue dates of the banks. Application date refers to the date when a bank submits an application to the Swedish Financial Supervisory Authority (SFS) for a covered bond issuing license. Approval date refers to the date when a bank is granted a license by the SFS. First issue date is the date when a bank starts to issue covered bonds. The mortgage bonds/covered bonds are labeled as the treatment group and the government bond is labeled as the control group. The dates are specific to each bank, these graphs plot the average current yield in the time period before and after each date. Data on current yields is collected from Thomson Reuters Datastream.



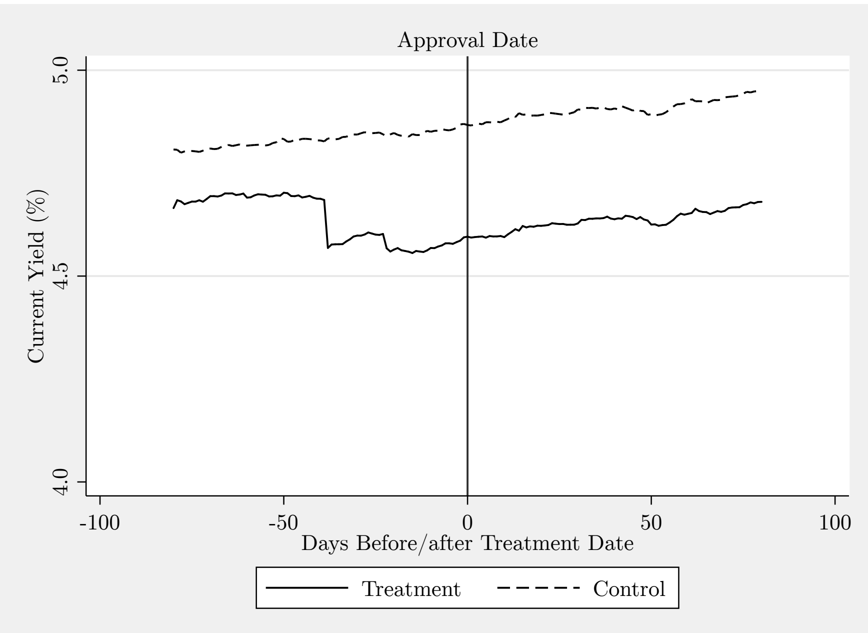


Figure 4 *(continued)*

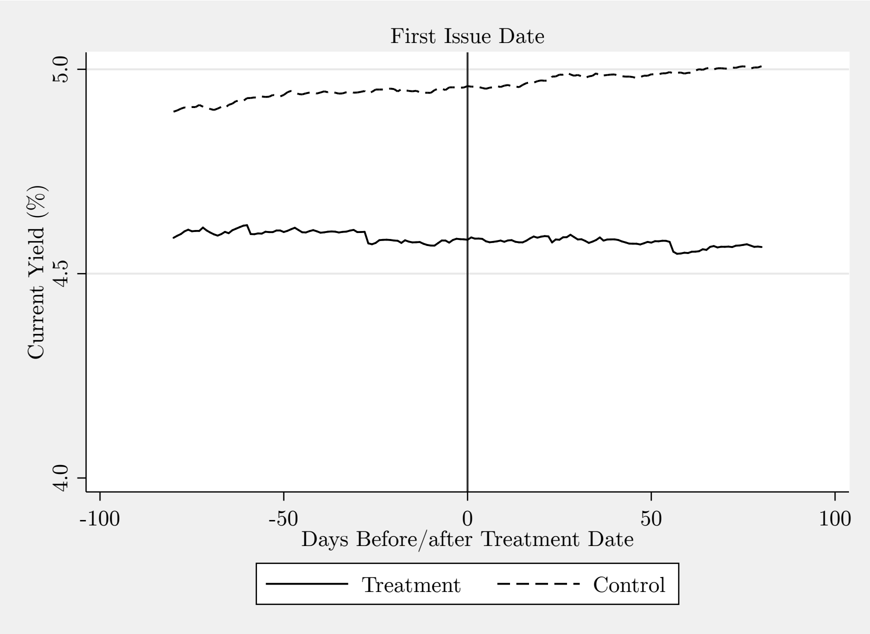


Table 1

Bank-specific dates.

This table provides the dates of application, approval, and first issue for each bank in our sample. Application date refers to the date when a bank submits an application to the Swedish Financial Supervisory Authority (SFS) for a covered bond issuing license. Approval date refers to the date when a bank is granted a license by the SFS. First issue date is the date when a bank starts to issue covered bonds. The information is obtained from news websites, banks' press releases, and banks' websites, where "n/a" stands for not available. These sources are shown below the table.

Bank	Application Date	Approval Date	First Issue Date
Stadshypotek	September 14, 2005	March 13, 2006	September 15, 2006
Swedbank Hypotek	n/a	September 14, 2007	April 21, 2008
Nordea Hypotek	n/a	December 12, 2005	June 30, 2006
SEB	February 9, 2006	August 29, 2006	March 23, 2007
Landshypotek	n/a	November 8, 2006	August 15, 2007
SBAB	October 13, 2005	March 31, 2006	May 23, 2006

Sources:

Euroinvestor. 2005. *Nordea Hypotek får tillstånd att emittera säkerställda obligationer.* [Press release]. [Accessed March 9 2017]. Available from: https://goo.gl/hyT6wH.

Landshypotek. 2007. *Landshypotek börjar emittera säkerställda obligationer.* [Press release]. [Accessed March 9 2017]. Available from: https://goo.gl/hFGZrQ.

My News Desk. 2006. *SEB BoLån lämnar in tillståndsansökan för att ge ut säkerställda obligationer.* [Press release]. [Accessed March 9 2017]. Available from: https://goo.gl/6ySGik.

News Cision. 2007. *Stadshypotek påbörjar utgivning av säkerställda obligationer.* [Press release]. [Accessed March 9 2017]. Available from: https://goo.gl/OrpJM8.

Nordea Hypotek. 2006. *Grundprospekt avseende program för kontinuerlig utgivning av säkerställda obligationer och icke säkerställda obligationer.* [Press release]. [Accessed March 9 2017]. Available from: https://goo.gl/G3rTaJ.

Nyhetsbyrån Direkt. 2005. Stadshypotek vill ge ut säkerställda obligationer. *Dagens Industri.* [Online]. September 14 2005. [Accessed March 9 2017]. Available from: https://goo.gl/fbd3oD.

SBAB. 2006. *Grundprospekt avseende obligationslåneprogram för kontinuerligt utgivning av säkerställda obligationslån.* [Online]. [Accessed March 9 2017]. Available from: https://goo.gl/RhLzDu.

SEB. 2007. *SEB BoLån konverterar till säkerställda obligationer.* [Press release]. [Accessed March 9 2017]. Available from: https://goo.gl/xZj4vI.

Stadshypotek. 2005. *Grundproskpekt: Program för utgivande av säkerställda bostadsobligationer.* [Press release]. [Accessed March 9 2017]. Available from: https://goo.gl/CjS3Ea.

Swedbank Hypotek. 2008. *Den 21 april ändras villkoren för obligationslån 166, 168, 173, 174, 175, 176 och 177.* [Press release]. [Accessed March 9 2017]. Available from: https://goo.gl/8gQ985.

Table 2

Bond information.

This table provides background information on the 43 bonds in our dataset. Converted stands for whether the bond was announced as subject to conversion to a covered bond. Total amount issued is measured at maturity for matured bonds and as of April, 2017 for active bonds. Credit ratings are provided by Moody's and collected from Bloomberg, where "n/a" stands for not available. The rest of the information is collected from Thomson Reuters Datastream, news websites, banks' press releases, and banks' websites.

Issuer	Issuer Dataset Number	Bonds Per Issuer	Bond Dataset Number	Bond Name	Bond ISIN	Coupon Type	Converted	Amount Issued (BSEK)	Maturity (yrs.)	Credit Rating
Stadshypotek	1	16	1	STADSHYPOTEK AB 2004 6% 21/06/17 1579	SE0001384843	Fixed	Yes	77.0	13	Aaa
			2	STADSHYPOTEK AB 2005 6% 18/06/14 1575	SE0001384801	Fixed	Yes	82.0	9	Aaa
			3	STADSHYPOTEK AB 2005 6% 15/06/11 1571	SE0001384769	Fixed	Yes	52.0	6	Aaa
			4	STADSHYPOTEK AB 2005 6% 21/03/12 1572	SE0001384777	Fixed	Yes	55.0	7	Aaa
			5	STADSHYPOTEK AB 2005 6% 19/12/12 1573	SE0001384785	Fixed	Yes	66.0	7	Aaa
			6	STADSHYPOTEK AB 2005 6% 18/09/13 1574	SE0001384793	Fixed	Yes	81.0	8	Aaa
			7	STADSHYPOTEK AB 2005 6% 18/03/15 1576	SE0001384819	Fixed	Yes	85.0	10	Aaa
			8	STADSHYPOTEK AB 2004 6% 16/12/15 1577	SE0001384827	Fixed	Yes	73.0	11	Aaa
			9	STADSHYPOTEK S1562 3 1/2% 15/09/04	SE0000545642	Fixed	No	2.0	5	n/a
			10	STADSHYPOTEK S1563 6% 15/06/05	SE0000622508	Fixed	No	10.0	5	n/a
			11	STADSHYPOTEK S1564 6% 15/03/06	SE0000707150	Fixed	No	10.0	6	n/a
			12	STADSHYPOTEK S1565 6% 20/12/06 S1565	SE0000790412	Fixed	No	10.0	5	Aaa
			13	STADSHYPOTEK S1566 6% 19/09/07 S1566	SE0000894917	Fixed	No	24.0	5	Aaa
			14	STADSHYPOTEK S1567 6% 18/06/08 S1567	SE0001011016	Fixed	No	40.0	5	Aaa
			15	STADSHYPOTEK AB 2003 6% 18/03/09 1568	SE0001078064	Fixed	No	37.0	6	Aaa
			16	STADSHYPOTEK AB 2003 6% 16/12/09 1569	SE0001182866	Fixed	No	63.0	6	Aaa
Swedbank Hypotek	2	5	17	SWEDBANK HYPOTEK AB 1997 6% 20/04/09 168	SE0000454803	Fixed	Yes	68.0	12	Aaa
			18	SWEDBANK HYPOTEK AB 2005 3 1/2% 16/06/10 174	SE0001426164	Fixed	Yes	86.0	5	Aaa
			19	SWEDBANK HYPOTEK AB 2006 4% 15/06/11 175	SE0001720582	Fixed	Yes	40.0	5	Aaa
			20	SWEDBANK HYPOTEK AB 2006 4 1/4% 20/06/12 176	SE0001956194	Fixed	Yes	67.0	5	Aaa
			21	SWEDBANK HYPOTEK AB 2008 4 3/4% 19/06/13 177	SE0002373696	Fixed	Yes	65.0	5	Aaa
Nordea Hypotek	3	7	22	NORDEA HYPOTEK 2005 3 1/4% 17/06/20 5521	SE0001542341	Fixed	Yes	64.0	15	Aaa
			23	NORDEA HYPOTEK 2005 3% 17/06/09 5522	SE0001571985	Fixed	Yes	55.0	4	Aaa
			24	NORDEA HYPOTEK 2006 3 3/4% 15/06/11 5523	SE0001720392	Fixed	Yes	46.0	5	Aaa
			25	NORDEA HYPOTEK 2007 4 1/4% 19/06/13 5525	SE0002331975	Fixed	Yes	63.0	6	Aaa
			26	NORDEA HYPOTEK 2004 3 1/4% 16/06/10 5519	SE0001426438	Fixed	Yes	59.0	6	Aaa
			27	NORDEA HYPOTEK 2005 3 1/4% 17/06/15 5520	SE0001542333	Fixed	Yes	63.0	10	Aaa
			28	NORDEA HYPOTEK 2006 4% 20/06/12 5524	SE0001957341	Fixed	Yes	52.0	6	Aaa
SEB	4	6	29	S-E-BANKEN BOLAN S559 5 1/4% 13/06/07 S0559	SE0000858383	Fixed	Yes	24.0	6	Aaa
			30	S-E-BANKEN BOLAN S560 4 3/4% 18/06/08 S0560	SE0001033192	Fixed	Yes	26.0	5	Aaa
			31	S E BANKEN BOLAN AB 2004 4 1/4% 16/06/09 562	SE0001162009	Fixed	Yes	30.0	5	Aaa
			32	S-E-BANKEN BOLAN S557 5 1/4% 16/06/04	SE0000513608	Fixed	No	1.0	5	n/a
			33	S-E-BANKEN BOLAN S558 6% 15/06/05	SE0000642001	Fixed	No	7.0	5	n/a
			34	S-E-BANKEN BOLAN S561 4 1/4% 21/06/06	SE0001071572	Fixed	Yes	10.0	3	n/a
Landshypotek	5	2	35	LANDSHYPOTEK 2002 5 1/4% 19/09/07 L5033	SE0000888752	Fixed	Yes	2.0	5	n/a
			36	LANDSHYPOTEK BANK 2003 5% 18/03/09 5035	SE0001127937	Fixed	Yes	2.0	6	n/a
SBAB	6	6	37	SBAB 1998 5 1/2% 17/12/08 S118	SE0000489122	Fixed	Yes	6.0	10	n/a
			38	SBAB 2004 4% 01/11/07 S121	SE0001282211	Fixed	Yes	0.2	3	n/a
			39	SBAB BANK PUBL AB 2005 4% 01/06/10 122	SE0001402009	Fixed	Yes	8.0	5	n/a
			40	SBAB BANK PUBL AB 2005 4% 13/04/11 123	SE0001627662	Fixed	Yes	3.0	6	n/a
			41	SBAB S119 5 1/2% 15/03/06	SE0000514291	Fixed	No	2.0	7	n/a
			42	SBAB S120 5% 15/06/05	SE0000968703	Fixed	No	9.0	5	n/a
Swedish Government	7	1	43	SWEDEN 2000 5 1/4% 15/03/11 1045	SE0000722852	Fixed	No	102.0	11	Aaa

Table 3

Bonds included in the regressions for each date.

This table shows the bonds that we utilize in the regressions for each treatment date after we impose our restrictions. For all regressions, we exclude bonds with less than 100 observations in the 160-day time period. For the application, approval, and first issue dates, we impose an additional restriction by excluding bonds that were not announced as subject to conversion. The top row shows the five dates included in our analysis. "Law" stands for the Covered Bond Issuance Act. The bottom row shows the total amount of bonds per date.

Law Issue	Law Enforcement	Application	Approval	First Issue
9	9	1	1	1
10	10	2	2	2
11	11	3	3	3
12	12	4	4	4
13	13	5	5	5
14	14	6	6	6
15	15	7	7	7
17	16	8	8	8
29	17	29	17	17
30	29	30	18	18
32	30	31	19	19
33	31	34	20	20
34	33	37	22	21
35	34	38	26	22
37	35	39	27	23
41	37	43	29	24
42	41		30	26
43	42		31	27
	43		35	29
			36	30
			37	31
			38	35
			39	36
			40	37
			43	38
				39
				40
				43
18	*19*	*16*	*25*	*28*

Table 4

Summary statistics.

This table shows summary statistics for the current yields of the mortgage/covered bonds and the government bond in our sample. The statistics for the current yields are reported in percentage points. These include the mean, standard deviation, minimum, median, and maximum. They are based on daily yields for the bonds and winsorized at the 1th and 99th percentile on a monthly basis. N is the number of daily observations. The mean observations per bond within a time period and the total number of bonds is also shown. Panels A through E present statistics for our five regression samples. Each time period consists of 160 days, 80 in the pre-treatment period and 80 in the post-treatment period. Bonds with less than 100 observations in the time period are excluded from Panels A through E. Bonds that were not announced as subject to conversion are excluded from Panels C through E. Application, approval, and first issue dates vary by bank, so the control group is averaged by day relative to each bank's date. Application is the date when a bank applies for a covered bond issuing license to the Swedish Financial Supervisory Authority (SFS). Approval is the date when license is granted by the SFS. First issue is the date when covered bonds are first issued to the market. "Law" stands for the Covered Bond Issuance Act. Data on current yields is collected from Thomson Reuters Datastream.

Time Period	Mean	Std. Dev.	Min.	Median	Max.	N	Mean Obs. per Bond	No. Bonds
Panel A: Law issue								
Mortgage bonds	5.21	0.60	3.48	5.31	5.80	2,720	160	17
Government bond	4.99	0.08	4.81	5.01	5.13	160	160	1
Panel B: Law enforcement								
Mortgage bonds	5.18	0.62	3.48	5.30	5.87	2,807	156	18
Government bond	4.94	0.05	4.81	4.95	5.03	160	160	1
Panel C: Application								
Mortgage bonds	4.73	0.47	3.75	4.96	5.33	2,400	160	15
Government bond	4.71	0.06	4.64	4.69	4.81	160	160	1
Panel D: Approval								
Mortgage bonds	4.63	0.73	3.16	4.97	5.91	3,701	154	24
Government bond	4.87	0.04	4.80	4.87	4.95	160	160	1
Panel E: First issue								
Mortgage / Covered bonds	4.58	0.81	3.06	4.69	5.97	4,110	152	27
Government bond	4.96	0.03	4.90	4.96	5.01	160	160	1
Panel F: Total sample								
Mortgage / Covered bonds	4.94	0.82	3.06	5.23	5.97	40,876	973	42
Government bond	4.98	0.17	4.59	4.98	5.42	1,827	1,827	1

Table 5

Regressions on the law issue date.

All regressions are run at the bond-day level *it*. Current yield is measured daily for all bonds. $Treatment_i$ is a dummy variable that denotes whether the bond is part of the control group, i.e. mortgage or covered bond. $Post\ Issue_t$ is a dummy variable that denotes whether the yield was observed after the law issuance date, which corresponds to December 18, 2003. The treatment period consists of 160 (80 before and 80 after the treatment date) trading days and bonds that do not have at least 100 observations in the time period are excluded from the regression. The control variables are measured at time t where $Relative\ Age_{it}$ is equal to bond i's time to maturity divided by its maturity and $Liquidity\ Proxy_{it}$ is a bond i's relative age times its total amount issued at maturity. Bond fixed effects are included for all regressions except the first one (1), month fixed effects are included for all regressions except the first two (1 and 2). Robust standard errors are clustered at the bond-month level and reported in parentheses. Three asterisks denote significance at the 1% level, two at the 5% level, and one at the 10% level.

Variable	Current Yield					
Regression	(1)	(2)	(3)	(4)	(5)	(6)
Treatment × Post Issue	0.060	0.060*	0.060***	0.035*	-0.014	-0.033
	(0.103)	(0.031)	(0.018)	(0.018)	(0.020)	(0.022)
Treatment	0.189**					
	(0.076)					
Post Issue	-0.116***	-0.116***				
	(0.031)	(0.031)				
Relative Age				-0.603***		-0.519***
				(0.201)		(0.194)
Liquidity Proxy					0.026***	0.025***
					(0.004)	(0.004)
Bond FE	No	Yes	Yes	Yes	Yes	Yes
Month FE	No	No	Yes	Yes	Yes	Yes
N	2,880	2,880	2,880	2,880	2,880	2,880

Table 6

Regressions on the law enforcement date.

All regressions are run at the bond-day level *it*. Current yield is measured daily for all bonds. $Treatment_i$ is a dummy variable that denotes whether the bond is part of the control group, i.e. mortgage or covered bond. $Post\ Enforcement_t$ is a dummy variable that denotes whether the yield was observed after the law issuance date, which corresponds to July 1, 2004. The treatment period consists of 160 (80 before and 80 after the treatment date) trading days and bonds that do not have at least 100 observations in the time period are excluded from the regression. The control variables are measured at time t where $Relative\ Age_{it}$ is equal to bond i's time to maturity divided by its maturity and $Liquidity\ Proxy_{it}$ is a bond i's relative age times its total amount issued at maturity. Bond fixed effects are included for all regressions except the first one (1), month fixed effects are included for all regressions except the first two (1 and 2). Robust standard errors are clustered at the bond-month level and reported in parentheses. Three asterisks denote significance at the 1% level, two at the 5% level, and one at the 10% level.

Variable	Current Yield					
Regression	(1)	(2)	(3)	(4)	(5)	(6)
Treatment × Post Enforcement	0.080	0.033	0.034**	0.034**	0.013	0.013
	(0.109)	(0.030)	(0.015)	(0.016)	(0.017)	(0.018)
Treatment	0.192**					
	(0.082)					
Post Enforcement	-0.022	-0.022				
	(0.029)	(0.029)				
Relative Age				-0.012		0.003
				(0.127)		(0.129)
Liquidity Proxy					0.008**	0.008***
					(0.003)	(0.003)
Bond FE	No	Yes	Yes	Yes	Yes	Yes
Month FE	No	No	Yes	Yes	Yes	Yes
N	2,967	2,967	2,967	2,967	2,967	2,967

Table 7

Regressions on the application date.

All regressions are run at the bond-day level *it*. Current yield is measured daily for all bonds. $Treatment_i$ is a dummy variable that denotes whether the bond is part of the control group, i.e. mortgage or covered bond. $Post\ Application_t$ is a dummy variable that denotes whether the yield was observed after the application date, i.e. the date a bank sends an application for a covered bond issuing license to the Swedish Financial Supervisory Authority. Application dates vary by bank so the control group is averaged by day relative to each bank's date. The treatment period consists of 160 (80 before and 80 after the treatment date) trading days and bonds that do not have at least 100 observations in the time period are excluded from the regression. Bonds that were not announced (by banks) as subject to conversion are excluded. The control variables are measured at time t where $Relative\ Age_{it}$ *is* equal to bond *i*'s time to maturity divided by its maturity and $Liquidity\ Proxy_{it}$ is a bond *i*'s relative age times its total amount issued at maturity. Bond fixed effects are included for all regressions except the first one (1). Robust standard errors are clustered at the bond-month level and reported in parentheses. Three asterisks denote significance at the 1% level, two at the 5% level, and one at the 10% level.

Variable	Current Yield				
Regression	(1)	(2)	(3)	(4)	(5)
Treatment × Post Application	-0.018	-0.018	-0.030**	0.011	0.004
	(0.084)	(0.015)	(0.014)	(0.007)	(0.008)
Treatment	0.030				
	(0.059)				
Post Application	0.097***	0.097***	0.084***	0.020**	0.018*
	(0.014)	(0.014)	(0.013)	(0.010)	(0.009)
Relative Age			-0.337***		-0.164***
			(0.093)		(0.062)
Liquidity Proxy				-0.019***	-0.018***
				(0.002)	(0.002)
Bond FE	No	Yes	Yes	Yes	Yes
N	2,560	2,560	2,560	2,560	2,560

Table 8

Regressions on the approval date.

All regressions are run at the bond-day level *it*. Current yield is measured daily for all bonds. $Treatment_i$ is a dummy variable that denotes whether the bond is part of the control group, i.e. mortgage or covered bond. $Post\ Approval_t$ is a dummy variable that denotes whether the yield was observed after the approval date, i.e. the date a bank is granted a license by the Swedish Financial Supervisory Authority. Approval dates vary by bank so the control group is averaged by day relative to each bank's date. The treatment period consists of 160 (80 before and 80 after the treatment date) trading days and bonds that do not have at least 100 observations in the time period are excluded from the regression. Bonds that were not announced (by banks) as subject to conversion are excluded. The control variables are measured at time t where $Relative\ Age_{it}$ is equal to bond i's time to maturity divided by its maturity and $Liquidity\ Proxy_{it}$ is a bond i's relative age times its total amount issued at maturity. Bond fixed effects are included for all regressions except the first one (1). Robust standard errors are clustered at the bond-month level and reported in parentheses. Three asterisks denote significance at the 1% level, two at the 5% level, and one at the 10% level.

Variable	Current Yield				
Regression	(1)	(2)	(3)	(4)	(5)
Treatment × Post Approval	-0.071	0.006	0.005	0.021**	0.032***
	(0.103)	(0.009)	(0.009)	(0.009)	(0.011)
Treatment	-0.199***				
	-0.072				
Post Approval	0.073***	0.073***	0.071***	0.026**	0.028**
	(0.005)	(0.005)	(0.006)	(0.012)	(0.012)
Relative Age			-0.039		0.286***
			(0.097)		(0.095)
Liquidity Proxy				-0.011***	-0.014***
				(0.003)	(0.003)
Bond FE	No	Yes	Yes	Yes	Yes
N	3,861	3,861	3,861	3,861	3,861

Table 9

Regressions on the first issue date.

All regressions are run at the bond-day level *it.* Current yield is measured daily for all bonds. $Treatment_i$ is a dummy variable that denotes whether the bond is part of the control group, i.e. mortgage or covered bond. $Post\ First\ Issue_t$ is a dummy variable that denotes whether the yield was observed after the first issue date, i.e. the date a bank starts to issue covered bonds. First issue dates vary by bank so the control group is averaged by day relative to each bank's date. The treatment period consists of 160 (80 before and 80 after the treatment date) trading days and bonds that do not have at least 100 observations in the time period are excluded from the regression. Bonds that were not announced (by banks) as subject to conversion are excluded. The control variables are measured at time t where $Relative\ Age_{it}$ is equal to bond i's time to maturity divided by its maturity and $Liquidity\ Proxy_{it}$ is a bond i's relative age times its total amount issued at maturity. Bond fixed effects are included for all regressions except the first one (1). Robust standard errors are clustered at the bond-month level and reported in parentheses. Three asterisks denote significance at the 1% level, two at the 5% level, and one at the 10% level.

Variable	Current Yield				
Regression	(1)	(2)	(3)	(4)	(5)
Treatment × Post First Issue	-0.066	-0.024***	-0.036***	-0.018***	-0.034***
	(0.110)	(0.006)	(0.005)	(0.006)	(0.007)
Treatment	-0.342***				
	(0.081)				
Post First Issue	0.047***	0.047***	0.029***	0.027***	0.026***
	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)
Relative Age			-0.448***		-0.415***
			(0.069)		(0.071)
Liquidity Proxy				-0.005***	-0.001
				(0.002)	(0.002)
Bond FE	No	Yes	Yes	Yes	Yes
N	4,270	4,270	4,270	4,270	4,270

Table 10

Regressions on placebo dates.

All regressions are run at the bond-day level *it*. Current yield is measured daily for all bonds. $Placebo_k$ is a dummy variable that denotes whether the bond is part of the control group, i.e. mortgage or covered bond. Two placebos per year are generated for all years from 2003 to 2007. $Post_t$ is a dummy variable that denotes whether the yield was observed after the placebo date. The treatment period consists of 160 (80 before and 80 after the treatment date) trading days and bonds that do not have at least 100 observations in the time period are excluded from the regression. The control variables are measured at time t where $Relative\ Age_{it}$ is equal to bond i's time to maturity divided by its maturity and $Liquidity\ Proxy_{it}$ is a bond i's relative age times its total amount issued at maturity. One regression is run per placebo date, which includes bond and month fixed effects as well as both control variables. The number of observations per regression varies as the restrictions applied to the dataset lead to variation in the sample size for each regression. Robust standard errors are clustered at the bond-month level and reported in parentheses. Three asterisks denote significance at the 1% level, two at the 5% level, and one at the 10% level.

Variable	Current Yield									
Regression on Placebo Date (k)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Placebo k × Post	-0.014	0.037	-0.023	-0.009	0.002	0.006	0.005	-0.010*	0.060***	0.036***
	(0.019)	(0.023)	(0.026)	(0.012)	(0.004)	(0.005)	(0.005)	(0.005)	(0.016)	(0.008)
Relative Age	-0.826***	0.001	-0.373**	-0.733***	0.412***	0.456***	0.174	-0.231**	1.433***	1.257***
	(0.167)	(0.168)	(0.173)	(0.150)	(0.070)	(0.078)	(0.108)	(0.098)	(0.167)	(0.135)
Liquidity Proxy	0.012***	-0.004	0.021***	0.027***	-0.006***	-0.007***	-0.001	0.001	-0.006***	-0.006***
	(0.004)	(0.003)	(0.004)	(0.005)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Bond FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2,240	2,240	2,880	2,880	4,480	4,480	4,846	4,878	4,922	4,800

Exhibit 1

Current yield formula.

This exhibit provides the formula used to calculate the current yields that are provided by Thomson Reuters Datastream.

$$\textit{Current yield} = \frac{g \times N \times (1\text{-}t_g)}{P \times E - A \times (1\text{-}t_g) + Q}, \tag{2}$$

where:

g = Coupon

N = Nominal value

t_g = Income tax rate / 100

P = Gross price

E = Expense rate factor

A = Accrued interest

Q = Amount to be paid, partly paid stock