The Treasurer's Guide to the Municipality
To my first teachers, my parents – Verica and Radovan. Mother, I thank you for instilling in me a thirst for knowledge and for laying down the solid ethical bedrock on which I stand today. Father, I thank you for teaching me the importance of perseverance in the face of adversity and for showing by example the importance of standing firm by your principles.

“Svojim prvim učiteljima, mojim roditeljima – Verici i Radovanu. Mama, hvala Ti što si u meni probudila želj za znanjem i postavila etički temelj na kome stojim i danas. Tata, hvala Ti što si me naučio kako ostati uporan, naročito kad se suočavam sa poteškoćama, i što si na svom primeru pokazao kako istrajati u svojim principima i sistemu vrednosti.”

To my loving baby brother Damjan, thank you for being a pillar of support but also a propelling force which pushes me forward in all aspects of life. I am happy to be able to call you my brother but also my oldest and best friend.

To my wonderful wife Helena, these pages are as much a credit to your hard work as they are to mine. As I spent many hours typing these words you had to shoulder the heavier responsibility of raising our wonderful children, for that I thank you. You motivate me every day to become a better father and husband. It is impossible to adequately put into words how much you mean to me. Thank you from the bottom of my heart.

To my son Leonhard and my daughter Valentina, I hope that one day when embarking on your own journeys you will find inspiration in these sentences. My paramount aim in life is to become the type of person which you would be proud of to call dad. I am very proud of you both and I love you very much.

This thesis is dedicated to all of you, but also to all previous scholars on whose shoulders I stand. I hope that I am able to add a pebble to the vast mountain of knowledge from which I have borrowed.
Acknowledgments

First and foremost I would like to thank my supervisor, Professor Pär Österholm, for his dedication, guidance and patience throughout this lengthy process. I am confident in saying that this would not have been possible without your contribution.

To my closest peer Martin Nordström, I am thankful for all the hours of mental jousting we experienced during these years and I look forward to the day when we are able to call each other “Doctor”.

To Associate Professor Niclas A Krüger, thank you for being a supportive senior and an excellent role model. As in all difficult endeavours it is not uncommon to feel inadequate. Your acknowledgment has helped me re-confirm my beliefs in my own abilities.

To Professor Lars Hultkrantz, Professor Dan Johansson and Mattias Bokenblom, thank you for encouraging me in choosing this path in life. Doing science entails treading down the road less travelled, which is often the hardest. By facing the many challenges associated with doing a doctorate I have grown both as an economist and as a person.

To all other colleagues at the Örebro University School of Business and Kommuninvest of Sweden, I thank you for all the encouragement and support over the years.
Abstract


This thesis presents a comprehensive empirical analysis of the current state of Swedish sub-sovereign finance from multiple perspectives, starting from the local and moving to the national. Financial risks may occur in a long line of financial obligations and transactions. Thus, for understanding the full scope of financial risks one perspective is not sufficient. From a societal perspective the question of sub-sovereign debt management is important since mismanagement may lead to substantial risks which may impact the lives of citizens by a weakening of the Swedish public programs. Sub-sovereign debt is mainly funded by issuing financial securities in both national and foreign capital markets. Understanding the market perception regarding the risk profile of Swedish sub-sovereigns may be beneficial in improving the funding conditions of the sector and in turn reduce the cost of public investments. Financial markets are however not stand-alone entities and are heavily impacted by the policy decisions of public institutions. Thus, monetary policy plays an important role in affecting financial markets and consequently the funding conditions of Swedish sub-sovereigns. Given the contemporary approach to monetary policy this effect may be somewhat different compared to what it has been historically. There are however reasons to suspect that the national policy decisions are in large part driven by international occurrences and by foreign governments through international spillovers. Thus, for understanding the interlinked nature of financial markets a wider perspective is needed. These are some of the areas which are investigated in this thesis.

Keywords: Bayesian VAR, Cointegration, Financial crisis, Intertemporal diversification, Risk premium decomposition, Roll-over risk, Small open economy, Spillovers, Spread, Unconventional monetary policy

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Introduction

Sub-sovereign governments are of particular importance in their ability to directly impact the lives of their constituents. This especially holds true for Sweden where a majority of the generous but costly social programs are supplied at the local level. Recently some areas of concern have started emerging which are putting a strain on the Swedish social programs, such as high levels of immigration and unemployment, an aging population and a housing shortage. Public sub-sovereign investments are in large parts financed by loans or by issuing debt securities on the capital market. Thus, questions regarding efficient financing, risk management and the effects of spillovers are becoming increasingly important for maintaining a stable municipal sector. The Swedish municipal bond market has grown significantly over the past years and is today the main source of funding for Swedish sub-sovereigns. As illustrated by Figure 1, the market share of direct and intermediary bond issuance through Kommuninvest of Sweden, the Swedish local government funding agency, has been increasing whilst the market share of the commercial banking sector has decreased.

Figure 1 Evolution of Market Shares from 2002 to 2016
Direct and intermediary bond issuance has been the sectors main source of funding since 2010 and as of 2012 Kommuninvest passed the commercial banks as the single largest funding channel. The Swedish municipal bond market is relatively young and for that reason there is value in conducting research which may help to foster a stable and efficient municipal sector.

This thesis presents essays which investigate different aspects of sub-sovereign financing in an effort to highlight potential dangers in the current state of affairs and to improve the funding conditions of Swedish sub-sovereigns. Financial risks can manifest in many different forms and can occur anywhere in a long chain of contractual claims and transactions. Thus, there are a number of interesting questions which can be answered from many different perspectives. One such question is from the perspective of the Swedish municipalities and how local governments manage the risks intrinsic to their debt portfolios during turbulent times. The 2008-2009 financial crisis manifested as a market-wide liquidity shock to the Swedish sub-sovereign sector mainly due to increased risk aversion of the Swedish commercial banks. Maturing bank loans had to be repaid in full and refinancing became unavailable. The crisis highlighted the need for a prudent debt management approach for the continued stability of the sector and that new methods for managing and monitoring the financial risks of Swedish sub-sovereigns are needed. Understanding how financial shocks manifest in the sector is also of importance for offsetting future crises. The increased risk aversion of the Swedish banks was brought about by increasing risks in the international financial markets. Shocks to market-wide liquidity and credit risk have a direct impact on the prices and yields of financial assets and securities. Investigating how financial risks affect municipal bond yields and the investor perception of the sector’s risk profile may be of great value in making the municipal bond market more efficient. Furthermore, it gives some clues where efforts should be directed for reducing the cost of funding in the sector.

The role of monetary policy should however not be underestimated in affecting financial markets. Government bonds are often used as reference securities and are important tools for managing risks. During recent years central banks have conducted an unconventional form of monetary policy by purchasing government bonds. Municipal and government bonds are in many aspects reasonable substitutes, both in terms of the underlying fundamentals which constitute the creditworthiness of the issuers and from a
regulatory point of view. Consequently, unconventional monetary policy has likely had an impact on municipal bond prices and yields. Understanding the role of monetary policy in affecting the municipal bond market is useful for policymakers at both the local and central levels of government.

The 2008-2009 financial crisis illustrated the interlinked nature of financial markets. This interdependence between countries suggests that the national perspective is too narrow when investigating financial risks. The interplay between sovereign states results in spillovers which may have an effect on both the real economy and markets. For instance, monetary policy in one country may spillover to another and consequently have a significant impact on the financial markets of the other country. This is a strong argument for bond market actors to be vigilant of not only the domestic policy decisions but also of the policies decisions of foreign governments and central banks. The areas outlined above are investigated in the four essays presented in this thesis with the hope that the findings will be of value for both researchers and policy makers.

In the interest of transparency it is worth noting that this thesis is a product of a collaboration between Kommuninvest of Sweden AB and Örebro University and has benefitted greatly by the exchange of resources between the two. The author’s doctorate has in part been funded by Kommuninvest of Sweden AB where the author has been employed as a financial analyst/researcher since October 2013.

**Key Concepts**

In this section some key concepts will be covered which are of importance for the theoretical and institutional frameworks.

Three of the four essays presented in this thesis are based on Kommuninvest specific loan and bond transaction data. Kommuninvest of Sweden AB is local government funding agency owned by Kommuninvest economic association which is a membership organization currently comprised of 277 member municipalities (out of 290 possible) and 11 member counties (out of 21 possible) (Kommuninvest of Sweden, 2018). All commitments entered into by the agency are collectively guaranteed by its members. Thus, the Kommuninvest creditworthiness is founded on a substantial share of the Swedish tax base. This is also reflected in the credit
rating of the organization. As of 2002 Kommuninvest has received the highest credit rating by Moody’s rating house (Aaa) and likewise from Standard and Poor’s since 2006 (AAA). The purpose of the organizations is to supply Swedish local governments with sustainable, reliable and cost-efficient financing which is achieved by issuing bonds on the international capital markets. This unique organizational structure and the pooling of risks makes Kommuninvest the single best representative of the collective creditworthiness of Swedish sub-sovereigns.

Using a proprietary data set of Kommuninvest issued loans allows for risk evaluation of the municipal specific debt portfolios. However, the classic approach of evaluating and managing financial risks employed by corporations and financial institutions are not appropriate in the case of local governments. Asset-liability management (ALM) is a strategy for managing the financial risks of an organization and entails matching the cash flows of assets and liabilities such that the impact of risk factor movement is reduced. ALM is concerned with reducing the risks associated with currencies and exchange rates, interest rates, commodities, market specific factors and liquidity, among others. This method originated in response to heavy regulation imposed on US insurance companies in the late 1970s and early 1980s (Financial Accounting Standards Board 1985; Ryan 2013). ALM is usually employed by financial institutions where the assets and liabilities are contractually defined which makes the matching of cash flows more manageable. For other institutions such as local governments managing these types of risks becomes more complicated for a number of reasons. Sub-sovereign debt is not necessarily tied to a specific investment project which makes it difficult to estimate the future cash flow of the assets. Furthermore, public investments generate assets which are usually illiquid and thus cannot be easily used to cover liabilities. Cochrane (2015) argues that although some of government assets are tangible, the bulk of assets are made up of the present value of an infinite stream of future tax revenues which are even more difficult to predict and internalize. For these types of institutions intertemporal diversification becomes a more appropriate method for minimizing liquidity and refinancing risk. Intertemporal diversification implies that the maturity structure of a debt portfolio is characterized by a relatively high degree of dispersion such that if funding dries up and markets become illiquid the cash flow generated by the assets is sufficient as to cover the maturing debt. Thus, the portfolio is structured in such a way that a manageable amount
of debt matures at each period. These concepts will be further covered in Essay I where a number of intertemporal diversification measures are proposed. These measures are useful for both the risk management of debt portfolios and for monitoring financial risks in the sector. The measures are then used in a panel data analysis where the municipal fixed effects are controlled for. Thus, variation in the measures are investigated both in between municipalities and across time.

The abovementioned Kommuninvest issued loans are in turn financed by the issuance of bonds. The Swedish municipal bond market is relatively young but has grown substantially over recent years. Thus, focus is now instead turned to the municipal bond market. When investigating the evolution of the Kommuninvest yield spread across time some technical considerations have to be addressed. The yield spread or credit spread is the yield differential between a bond versus a reference security, usually a swap contract or a government bond. However, calculating yield spreads by the direct matching of bond residual maturities is problematic. If there are large discrepancies between the residual maturities the spread may be significantly impacted. Direct matching also requires to follow bond pairs as they gradually mature and substituting the original pair when some residual maturity lower threshold is reached, resulting in a volatile yield spread which gradually contract and periodically jumps. A more robust method is to estimate yield curves for both security types, for each point in time such that the term of the yield spread can be held constant. There exists multiple interpolation methods but the two main types are spline techniques and parametric models such as the Nelson and Siegel (1987) model. In this thesis both the smoothing spline approach and the Nelson and Siegel (1987) model are employed, both of which come with advantages and disadvantages. The structural form of a spline results in a high degree of flexibility which maximizes accuracy and smoothness (Adams and van Deventer (1994), van Deventer and Imai (1997), van Deventer, Imai, and Mesler (2004)). However, this structure is also relatively complex and may be perceived as a black-box. The parametric models are less accurate since this family of models forces a particular functional form to the data. The advantages are that the method is more transparent and allows for the direct interpretation of the estimated parameters, something which is not possible in the smoothing spline approach.
Once the yield curves are estimated questions regarding interest rate dynamics arise. On the one hand, nominal interest rates are highly persistent and have been modelled as unit-root processes with cointegration techniques applied to them by numerous authors (King et al. (1991), Bremnes et al. (2001), Liu et al. (2008) and Tsong and Lee (2013)). On the other hand, there is theoretical and empirical support for treating nominal interest rates as stationary processes. Wu and Chen (2001) demonstrate that the standard unit-root tests have low power and when alternative tests are applied there is evidence in support of mean reversion in interest rates. Furthermore, Bansal and Yaron (2004) show that there is evidence in support of mean reversion in consumption growth which implies by the standard Euler equation that interest rates are stationary. Finally, Homer and Sylla (1996) show that nominal interest rates have historically resided in the range of 4 to 8 percent, which is not consistent with a unit-root process since such processes are not mean-reverting and have a strong tendency to significantly deviate from their initial values. Thus, it is unlikely that nominal interest rates would reside in such a narrow band over long periods of time if they were unit-root processes. These theoretical and empirical findings will be of use in modeling the time dynamics of interest rates in Essays II and III. This is done by using vector autoregressive models which take into account the dynamic relationship between multiple variables. In the general setting the system is structured in such a way that each current variable value is explained by the past values of all variables. Thus, the term “vector” indicates that it is a system of dynamic equations.

Using this type of method the yield spread can be decomposed into different risk premiums, something which is done in Essay II. Risk premiums can take many different forms. However, the most common risk factors discussed in the literature are liquidity and credit. Estimating such premiums is essentially a way to determine what the market price of different risks is by observing bond prices and yields. Here asset pricing theory can give some insights in constructing an appropriate empirical model. Acharya and Pedersen (2005) present a liquidity augmented capital asset pricing model which is built on the assumption that investors in equilibrium care about asset returns net of transaction costs (liquidity). In Essay II a more generalized version of this model is developed where the expected cost from credit losses is added (credit). This model demonstrates that both transaction costs and credit losses have an impact on bond yields. Fur-
thermore, correlations with market-wide liquidity and credit risk are also factored into the individual bond prices, in addition to market return correlation, and that these risk factors can affect asset prices through multiple channels.

The estimation of risk premiums in the domestic market is of value for understanding the domestic investor perspective and for improving funding conditions in the domestic market. However, the 2008-2009 financial crises clearly demonstrated the international nature of financial risks, implying that a wider perspective is needed for grasping the full scope of financial interactions. Some assumptions are usually made when investigating international spillovers. One such assumption is the small open economy which presupposes that the aggregate demand of a small open economy is insufficient as to have an effect on international prices and interest rate, i.e. the small open economy acts as a price taker on the global stage. In a vector autoregressive setting the small open economy assumption is expressed as block exogeneity. In a Bayesian vector autoregressive setting block exogeneity is modeled by introducing an additional hyperparameter to the standard Minnesota prior (Litterman (1986), Robertson and Tallman (1999) and Sims and Zha (1998)) as suggested by Villani and Warne (2003). By introducing this so called exogeneity tightness hyperparameter the impact of the small open economy on the larger economy is nullified. However, to model the spillover effects appropriately this assumption must be evaluated. In Bayesian statistics the Bayes factor is a corresponding approach to hypotheses testing and model selection in frequentist statistical inference (Kass and Raftery (1995)). Thus, the Bayes factor is an appropriate tool for evaluating the block exogeneity assumption. The small open economy assumption and block exogeneity is investigated in Essay IV. This is done by employing a Bayesian vector autoregressive model. This model is similar in its structure to the standard vector aggressive model but uses a Bayesian approach to inference. This implies, amongst other things, that parameters are viewed as being random instead of constant and that prior information is used to determine the dynamics of the system.
Summary of the Essays

Essay I: Intertemporal Diversification of Sub-Sovereign Debt

The first essay tackles the question of debt risk management from the perspective of the local governments and highlights the importance of investigating distributional characteristics of maturity structures in order to assess the financial risks intrinsic to debt. Historically the Swedish municipal debt portfolio has been characterized by a short maturity structure. This coupled together with the typical characteristics of public investments, such as long investment horizons and illiquidity in the assets, has introduced a severe asset-liability mismatch in the sector. The 2008-2009 financial crisis increased risk aversion in the Swedish commercial banking sector which at the time was one of the main funding channels of Swedish sub-sovereigns. Consequently, refinancing became unavailable and maturing municipal debt had to be repaid in full, thus, the crisis manifested as a liquidity shock to the sector. This essay presents a comprehensive empirical analysis of the municipal debt portfolio and how the 2008-2009 financial crisis affected the sector’s choice of maturity structure. In other words, how did the Swedish municipal sector manage this asset-liability mismatch when faced with a severe liquidity shock? Previous empirical research has primarily focused on the mean time to maturity of debt which does not sufficiently capture the risk profile of the particular portfolio. This paper contributes to the existing literature by further building on the findings of Missale and Blanchard (1994), Barro (1995, 1997) and Cestau (2010). A number of intertemporal dispersion measures are proposed as complements to the mean time to maturity, as to capture the dispersion of debt maturity across time. Intertemporal diversification is a risk management approach for reducing liquidity and refinancing risk, in particular in sectors where classical asset-liability management is not appropriate (Cochrane, 2015). It entails spreading out the maturity of debt across time such that if market illiquidity occurs repayment can be managed without refinancing. Even though the average time to maturity is often correlated with intertemporal diversification, it neglects important aspects of the maturity structure.

Municipality specific debt portfolios are constructed using a proprietary contract-level data set supplied by Kommuninvest of Sweden consist-
ing of all Kommuninvest issued loans from January 1998 to June 2016, for 274 out of 290 municipalities. The abovementioned data set is the basis for constructing the monthly intertemporal dispersion measures for each municipality. The measures are then used as dependent variables in a fixed-effects multiple regression model. The main results of the essay show that the local governments did rebalance their portfolios in response to the financial crisis but that the effect was not persistent. This result is consistent with Swedish municipalities perceiving Kommuninvest as a lender of last resort which was able to successfully mitigate the liquidity risk of the financial crisis, and is expected to do so again when faced with future crises. In addition, fiscal and financial variables such as debt-to-tax base ratio, tax base volatility and per capita income are associated with the characteristics of the debt maturity structure of Swedish municipalities, as well as macroeconomic factors such as the term structure of interest rates.

**Essay II: A Guarantee – Does the Obligee Agree? A Risk Premium Decomposition of Sub-Sovereign Bond Spreads**

The second essay looks at the Swedish municipal bond market and attempts to determine the perception amongst investors regarding the existence of a central government guarantee of the Swedish municipal sector. Two contradictory events occurring in the early 90’s introduced an ambiguity in assessing the financial risks in the sector. In 1991 the Swedish Local Government Act (Kommunallag (1991:900)) was revised which further decentralized the political power in Sweden. The revised regulation introduced requirements which emphasized the self-sustainability of the local governments. Consequently, the assessment of credit risk in the sector should be done by creditors and investors on a case-on-case basis. On the other hand, in 1992 the municipality of Haninge faced insolvency due to unforeseen costs of one of its subsidiaries which was resolved by a central government bail-out of the municipality. Thus, these two events signal two contradictory policy positions. To investigate if the Swedish municipal bond market believes in the existence of central government guarantee the five year yield spread between bonds issued by Kommuninvest and the Swedish government is decomposed into liquidity and credit risk premiums. A credit risk premium of zero implies that investors and creditors view the credit risk of Kommuninvest and the central government as being
the one and the same, thus believing in the existence of a central government guarantee. The risk premiums are estimated by selecting a number of both idiosyncratic and systematic liquidity and credit variables and decomposing the five year yield spread by variance decomposition in vector autoregressive setting. A theoretical credit and liquidity asset pricing model is developed which is a more generalized form of the liquidity augmented CAPM of Acharya and Pedersen (2005). The model is based on the assumption that investors care about asset returns net of transaction costs (liquidity) and expected costs from credit losses (credit). This theoretical model guides the selection of credit and liquidity variables and gives insights in regards to different channels of interaction. Yield curves are estimated for both Kommuninvest and government securities by smoothing spline and by the Nelson and Siegel (1987) model as a sensitivity analysis. The results show that the liquidity and credit risk premiums are of similar size, implying that creditworthiness and liquidity are equally important for improving the funding conditions of Swedish sub-sovereigns. Although, improving liquidity may be the simpler endeavor. Consequently, investors and creditors in general do not believe in the existence of a central government guarantee since the estimated credit risk premium is different from zero.

Essay III: The Relation between Municipal and Government Bond Yields in an Era of Unconventional Monetary Policy

This essay investigates the relationship between the five year municipal and government bond yields over the period February 2015 to January 2018, during which the Riksbank has conducted unconventional monetary policy by quantitative easing. The first part of the analysis consists of an event study where the short-run effect of the bond-purchase announcements of the Riksbank are investigated by looking at the day-to-day change in the yield following an announcement, also called the event window; see, for example, Meaning and Zhu (2011), D’Amico and King (2013) and De Rezende et al. (2015). However, portfolio reallocation is expected to take some time and full adjustment is unlikely to be achieved during this short window of time. Therefore, the second part of the analysis consists of an investigation of the dynamic relationship between the yields by estimating bivariate vector autoregressive models under two
assumptions: stationary yields and yield integrated of order one. The same bond data is used as in Essay II where yield curves are estimated using the Nelson and Siegel (1987) model in the main analysis and by the smoothing spline approach as a sensitivity analysis. The results from the event-study show that the accumulated short-run effect was to lower the government bond yield by approximately 40 to 50 basis points and the municipal yield by approximately 30 to 35 basis points, thus widening the spread. The results from the vector autoregressive analysis further supported these findings, i.e. that the initial decrease in the government yield widened the five year spread. However, after the initial four week period the effect becomes the opposite and the yield spread is lowered relative to its initial value. It is argued that these two security categories are in many ways reasonable substitutes. This is supported by the fact that both assets are classes as “Level 1” in the Basel III regulation regarding liquidity coverage ratio and that the creditworthiness of both issuers are founded on the Swedish tax base. Thus, the transmission mechanism can in part be attributed to the search for yield by investors which view these assets to be of similar quality (Rajan (2005), Borio and Zhu (2012), Bernanke (2013)).

**Essay IV: A Reasonable Assumption? The Small Open Economy and Block Exogeneity**

The fourth and final essay takes a more international perspective and focuses on the small open economy assumption. The assumption presupposes that the aggregate demand of the small open economy is insufficient in affecting global prices and interest rates. The small open economy assumption is often expressed as block exogeneity when modelling spillover effects between large and small open economies in a vector autoregressive setting. In Bayesian vector autoregressive models block exogeneity is modeled by introducing an additional hyperparameter in the prior distributions of the small open economy variable parameters in the larger economy equations. This so called tightness hyperparameter forces the parameters to take the value zero such that the large economy variables are unaffected by the variables of the small open economy. However, block exogeneity is often applied but rarely tested for and thus the possibility of Granger causality is overlooked. In this essay the block exogeneity assumption is scrutinized by first reproducing the work of Stockhammar and
Österholm (2017) and testing the assumption using Bayes factors (Kass and Raftery (1995)). These results show that in a number of cases the evidence goes against the block exogeneity assumption and that the evidence for a fully endogenous model does not seem to be strongly correlated with the actual size of the small open economy. For instance, in the case of Finland the evidence in favor of a fully endogenous model is consistently stronger than in the case of Australia even though the Australian economy is larger by approximately a factor of five. Thus, the block exogeneity assumption should be evaluated on a case-by-case basis and not be assumed simply based on the size of the small open economy. However, in many of the cases the evidence for and against a particular model is weak, at which point the choice of model is at the discretion of the researcher.

This approach is then used for an original application where spillovers in policy interest rates and unemployment rates between the US economy and a number of small open economies are investigated by employing the bivariate mean-adjusted Bayesian vector autoregressive model of Villani (2009). The results show that in the case of policy interest rates there are significant spillovers from the US to the small open economies. According to Rey (2016) the existence of policy interest rate spillovers is an argument against the autonomy assumption of international monetary policy. Previous research argues that spillovers in policy interest rates may operate through the exchange rate channel and that central banks face a tradeoff between closing the interest rate differential and experiencing movements in the exchange rate (Albagli et al. (2018)). Furthermore, the results show that there are also significant spillovers in unemployment rates between the US and the small open economies. Interestingly, the case of Norway stands out. Spillovers in policy interest rates between the US and Norway are similar in magnitude in both directions. In the case of unemployment rate spillovers there is positive to strong evidence in favor of a model where Norway is block exogenous, suggesting that Norway is a prime candidate in forecasting the US economy.
Shortcomings and Considerations for Future Research

A running theme in this thesis is the difficulty of doing empirical research when faced with limited data. When investigating the municipal debt portfolios the lack of a complete data set becomes an issue. An obvious shortcoming is that the available data set is an unbalanced panel where the number of represented municipalities is increasing over time. In addition, the data set does not include municipal loans issued by commercial banks or municipally issued debt securities. These concerns are addressed and controlled for by two separate subsample sensitivity tests in Essay I. An additional problem is the lack of detailed municipal asset level data which makes evaluating the actual magnitude of the asset-liability mismatch difficult. Thus, a more comprehensive data set of municipal debt combined with detailed data of municipal assets would be of value for future research.

When investigating the municipal bond market the data-availability issue persists. Direct transaction data of Kommuninvest and government securities would be useful for constructing more exact liquidity measures employed in Essay II. This type of transaction data is also more precise since it shows realized prices from actual trades rather than listed prices from market makers. Unfortunately, this type of data is unavailable to us and therefore we rely on data from Bloomberg. Furthermore, the lack of credit default swaps traded on Kommuninvest securities makes the assessment of the credit risk premium more difficult. Gaining access to such data would allow for a more liberal use of different liquidity and credit risk measures and would likely improve the estimations of Essays II and III.

The method applied for estimating credit and liquidity risk premiums in Essay II is somewhat novel. However, the results show that the responses in the Kommuninvest yield spread are not statistically significant to shocks in the Kommuninvest specific variables. This is likely due to the methodological framework chosen. Since the analysis focuses on investigating the Kommuninvest yields across time there is no cross-sectional variability. It is likely that the idiosyncratic variables primarily capture relative price differences across issuers and not price changes of one issuer across time. Although these limitations exist the results presented in Essay II still hold
since the systemic liquidity and credit variables yield statistically significant responses. An alternative method would be to expand the number of issuers and make use of the panel structure to control for both variation in the cross-section and across time which potentially could explain a larger share of the yield spread.

Finally, the use of Bayes factors as a method for model selection has been criticized over the years (Lindley, 1997). The critics argue that Bayes factors are unreliable as a model selection when there is a high discrepancy between the complexities of the two models. In Essay IV this issue does not pose a serious problem due to the models tested being almost identical with one hyperparameters difference.

**Concluding Remarks and Policy Recommendations**

The 2008-2009 financial crisis had a significant impact on the debt risk management of Swedish municipalities but the effect was not persistent. This result is consistent with local governments being of the opinion that intertemporal diversification is unnecessary and too costly to be justified. A wide use of short-term funding may lead to severe systemic risks which in turn could pose significant challenges when faced with future crises. The intertemporal dispersion measures presented in this thesis can be of value for policy makers in monitoring the municipal debt portfolios but can also be the basis for establishing new regulation and putting limits on municipal debt management.

The results from investigating the municipal bond market shows that improving liquidity and creditworthiness are of equal importance in reducing the yield spread of the municipal sector. Consequently, in general investors do not believe in the existence of a central government guarantee. Reducing the credit risk premium could potentially be achieved by expanding the member base of Kommuninvest. However, including new members could in fact decrease rather than increase the creditworthiness of Kommuninvest if the new members are of lesser credit quality compared to the weighted average of the current members. An increase in the number of members would likely increase the required issuing volume which could indirectly improve liquidity since volume and liquidity are
usually positively correlated. Furthermore, since issuing volume and liquidity are positively correlated there is support for centralizing funding to fewer markets rather than excessively diversifying internationally. Thus, there is a trade-off between improving liquidity and reducing exposure to other market specific risks. It is however difficult in predicting the size of such synergistic effects between issuing volume and liquidity. A more immediate approach is to target liquidity directly. This can be done by either increasing awareness amongst investors in regards to Kommuninvest by focusing on investor relations or by aiming for Kommuninvest securities to be included in well-known fixed income security indexes which would allow index tracking funds to hold Kommuninvest securities, thus improving the potential investor base. In addition, since the purpose of a market maker is to uphold liquidity, employing more market makers could potentially be beneficial in further reducing the liquidity risk premium.

Although the effect of conventional and unconventional monetary policy is difficult to disentangle it is shown that there is a clear connection between municipal and government bonds. This mechanism is in part attributed to the rebalancing of investor portfolios and that both asset types are viewed as being reasonable substitutes.

The estimated short-run effects and the long-run dynamics presented in this thesis give issuers guidance in developing proactive funding strategies in response to the policies of central banks. Coupling these findings together with the evidence of international spillovers in policy interest rates and unemployment rates give a strong incentive for issuers on the Swedish market to account for policy decisions of foreign governments and central banks.

The work presented in this thesis connects the dots by highlighting the interplay between the local, central and foreign governments from the perspective of sub-sovereign finance. My hope is that the content of this thesis will be of value for both the scientific community and for policy makers in fostering a stable and efficient sub-sovereign sector in Sweden.
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Publications in the series
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