

Report on Bachelor / Master Thesis

Institute of Economic Studies, Faculty of Social Sciences, Charles University in Prague

Student:	Andrea Lazukićová
Advisor:	doc. PhDr. Petr Teplý, Ph.D.
Title of the thesis:	The role of credit default swaps during the subprime mortgage crisis in 2007-2009

OVERALL ASSESSMENT (provided in English, Czech, or Slovak):

The thesis focuses on the role of credit default swaps during the subprime mortgage crisis 2007-2009 with special focus on mortgage-backed securities. The following hypotheses are tested using semi-annual data in 2005-2010 period:

- 1) The mortgage delinquency rate increased as the maturity of an underlying loan decreased.
- 2) The volume of subprime ("junk") mortgages increased as the volume of CDS increased.
- 3) The mortgage delinquency rate was higher in the 2006-2008 period than in the 2009-2011 period.

The results suggest that a delinquency rate of mortgages was higher for short-term loans. The volume of subprime loans increased along with the volume of issued CDS. Finally, a mortgage delinquency rate was lower in the 2006-2008 period than in 2009-2011 period.

Contribution

The topic of credit default swaps during the subprime mortgage crisis in 2007-2009 is currently highly examined field. For sure, the topic is very actual and interesting. But the exact contribution of the bachelor thesis is not clearly described. In the conclusion, the author states: „we contributed to the overall system of researches done about the subprime mortgage crisis by now. Being it as complex as it is, every model constructed and every variable proven statistically significant is a step closer to getting the complete picture. In order for it to be manageable, this thesis and all others aspire to offer reliable and complete information and by that support the prime main goal: to prevent a similar world scale collapse from happening again.“. I cannot fully agree with this statement and from my point of view, the contribution should be described more precisely.

Methods

Hypotheses 1 and 2 are tested using probit model with dependent variable delinquency rate on single-family residential mortgages which were booked in domestic offices. Altogether, three probit models are constructed. The explanatory variables include in the first model different business districts (sovereigns, portfolio or structured, non-financial firms, financial firms, ABS&MBS, multiple sectors and other). The second model describes the probability of mortgage delinquency based on the maturity of the underlying loan. The final model elaborates the relationship between mortgage delinquency and tranches-based allocation of swaps depending on their official rating. Explanatory variables included investment grade, below investment grade, AAA/AA, A/BBB and non-rated loans.

For all models it should be stated at which point the mortgage is considered to be delinquent.

In the third model specification I would expect better description of individual explanatory variables. From my point of view for example the group AAA/AA is a subgroup of investment grade, ie the investment grade includes the AAA and AA rating. Therefore, the inclusion of these two explanatory variables within one model does not make sense.

Hypothesis 3 is examined based on a simple plot of mortgage delinquency rate between years 2005 and 2011. From my point of view, this should be rather included only in descriptive statistics rather than tested as a separate hypothesis or research question.

Generally, I would expect more detailed descriptive statistics of the data used in the models. Interesting information could be for example the time evolution of percentage of mortgages covered by

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CDS and what was the delinquency rate of CDS covered mortgages compared to non-covered mortgages. The thesis includes only the evolution of the mortgage delinquency rate over time and then notional values of CDS divided into groups based on the used explanatory variables. But no direct link between mortgage delinquency rate and CDS can be found. I guess that the data on mortgage delinquency rate are of all mortgages and not only on those covered by CDS, therefore the split on those covered and non-covered by CDS would be relevant for the analysis.

Moreover, I do not fully understand why the models are constructed in the presented way. Why are the explanatory variables not combined within one model? Why the models do not include standard control variables like borrower and loan characteristics, regional housing and economic conditions, also inclusion of time dummies of the loan origination could lead to better results.

The results of the models are presented in a clear manner, but I'm not really convinced about a correct interpretation of them. Hypothesis 1 - The mortgage delinquency rate increased as the maturity of an underlying loan decreased is not rejected based on the fact that the coefficient of explanatory variable „Up to and including 1 year“ is significantly positive, while the coefficient of variable „Over 5 years“ is significantly negative. But the author does not deal with the magnitude of estimated coefficients, which are both close to zero (the coefficient of „Up to and including 1 year“ is $3.167e-08$ and the coefficient of „Over 5 years“ is $-6.326e-08$). The statistical significance based on p-value might be present, but the real impact (economic significance) based on the estimated coefficient is arguable. The same holds true for the estimation of hypothesis 2 - The volume of subprime („junk“) mortgages increased as the volume of CDS increased. The hypothesis is not rejected, because the coefficient of explanatory variable „Below investment grade“ significantly increases the mortgage delinquency rate. But the coefficient is only $3.139e-07$, therefore its real impact on mortgage delinquency seems to be negligible.

I suspect there might be a problem with multicollinearity in the model, because the model includes intercept and all groups of defined explanatory variables (for example when the model is estimated based on maturity of the underlying loan, among explanatory variables are included „Up to and including 1 year“, „Over 1 year and up to 5 years“ and „Over 5 years“ – I guess one of them should be excluded). The potential multicollinearity might be also the reason, why the estimated coefficients are so low.

The theory behind the expected results is clear, but I suspect that the defined models are not really appropriate for the data. I guess the author did not fully understand the topic and the estimation method, which is not sufficiently described and robust. The models do not include the standard control variables and potentially suffer from multicollinearity. Therefore, the results are biased. Moreover, I miss any robustness check and any statistics dealing with model accuracy.

Literature

The literature review is rather weak and I think this part could be prepared more thoroughly. Among literature, only 4 papers are reviewed and by simple googling you can find also other papers dealing with the examined topic. Moreover, the whole thesis uses only 16 sources. Improvement of the literature review could lead to higher accuracy of the whole research.

Manuscript form

The thesis is written in English with only minor typing or grammar errors. The structure as well as the format of the thesis is in general adequate. The only bigger mistake is the absence of numbering and

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correct description of graphs and tables and its sources (I guess, R-studio is a statistical software, not a source of any data used in the thesis).

Summary and suggested questions for the discussion during the defense

The thesis is rather weak. Introductory part is written in a satisfactory manner, but the literature review as well as the econometric part are not well prepared. **From my point of view, the thesis is at this stage defensible (with suggested grade E) only in case the author will be able to answer my questions, which follow from the above mentioned unclarities presented in the thesis.** Successful defense should be based on the fact, whether the author will explain all unclear parts of the thesis, mainly in the used methodology and presented results.

Therefore, I suggest the following questions for the discussion during the defense:

- 1) Describe how the papers for literature review were selected; based on which key. Why is the literature review based only on 4 papers, despite the fact that CDS is a widely examined topic after the subprime mortgage crisis in 2008?
- 2) At which point the mortgage is considered to be delinquent?
- 3) What is the evidence about the link between the delinquency rate of mortgages and the CDS coverage based on your data?
- 4) Describe the used estimation method and how the accuracy of the used models was tested, including potential multicollinearity. Why did you choose probit model as estimation method and not for example logit model? Did you perform any robustness tests?
- 5) Explain the choice of explanatory variables. Why are the standard control variables like borrower and loan characteristics, regional housing and economic conditions not included in the estimation?
- 6) Discuss your results not only by looking at their statistical significance, but also considering the magnitude of estimated significant coefficients in the models.
- 7) Comment on the contribution of the thesis.
- 8) Describe further research opportunities in this field.

In case the author will not be able to explain my questions in a satisfactory manner during the defense and it will show that my concerns about the inaccuracy of the of the whole thesis are justified, I suggest the thesis should be rewritten and resubmitted.

SUMMARY OF POINTS AWARDED (for details, see below):

CATEGORY	POINTS
<i>Contribution (max. 30 points)</i>	14
<i>Methods (max. 30 points)</i>	10
<i>Literature (max. 20 points)</i>	9
<i>Manuscript Form (max. 20 points)</i>	18
TOTAL POINTS (max. 100 points)	51
GRADE (A – B – C – D – E – F)	E

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NAME OF THE REFEREE: *PhDr. Karolína Vozková*

DATE OF EVALUATION: *22.5.2019*



Referee Signature

EXPLANATION OF CATEGORIES AND SCALE:

CONTRIBUTION: *The author presents original ideas on the topic demonstrating critical thinking and ability to draw conclusions based on the knowledge of relevant theory and empirics. There is a distinct value added of the thesis.*

Strong Average Weak
30 15 0

METHODS: *The tools used are relevant to the research question being investigated, and adequate to the author's level of studies. The thesis topic is comprehensively analyzed.*

Strong Average Weak
30 15 0

LITERATURE REVIEW: *The thesis demonstrates author's full understanding and command of recent literature. The author quotes relevant literature in a proper way.*

Strong Average Weak
20 10 0

MANUSCRIPT FORM: *The thesis is well structured. The student uses appropriate language and style, including academic format for graphs and tables. The text effectively refers to graphs and tables and disposes with a complete bibliography.*

Strong Average Weak
20 10 0

Overall grading:

TOTAL	GRADE
91 – 100	A
81 - 90	B
71 - 80	C
61 – 70	D
51 – 60	E
0 – 50	F