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**Credit Risk Management and Profitability  
in Commercial Banks in Sweden**

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## Abstract

Credit risk management in banks has become more important not only because of the financial crisis that the world is experiencing nowadays but also the introduction of Basel II. Since granting credit is one of the main sources of income in commercial banks, the management of the risk related to that credit affects the profitability of the banks. In our study, we try to find out how the credit risk management affects the profitability in banks. The main purpose of our study is to describe the impact level of credit risk management on profitability in four commercial banks in Sweden. The study is limited to identifying the relationship of credit risk management and profitability of four commercial banks in Sweden. The results of the study are limited to banks in the sample and are not generalized for the all the commercial banks in Sweden. Furthermore, as our study only uses the quantitative approach and focuses on the description of the outputs from SPSS, the reasons behind will not be discussed and explained. The quantitative method is used in order to fulfill the main purpose of our study. We have used regression model to do the empirical analysis. In the model we have defined ROE as profitability indicator while NPLR and CAR as credit risk management indicators. The data is collected from the sample banks annual reports (2000-2008) and capital adequacy and risk management reports (2007-2008). The findings and analysis reveal that credit risk management has effect on profitability in all 4 banks. Among the two credit risk management indicators, NPLR has a significant effect than CAR on profitability (ROE). The analysis on each bank level shows that the impact of credit risk management on profitability is not the same. The credit risk management of Nordea and SEB has relatively similar impact on their profitability. While Handelsbanken's results indicate that NPLR and CAR are very weak or incapable of predicting ROE. In case of Swedbank NPLR and CAR explains the variances in ROE with very low probability. Basel II application has strengthened the negative impact of NPLR on ROE. Unlike effect of Basel I, CAR has positive and insignificant effect on ROE.

*Keywords:* credit risk management, profitability, banks, Basel II



## Abbreviations

Adj. $R^2$	Adjusted R-squared
BCBS	Basel Committee on Banking Supervision
CAR	Capital Adequacy Ratio
CCF	Credit Conversion Factors
Coef.	Coefficient
CRD	Capital Requirements Directives
FIRB	Foundation Internal Rating-based
FSA	Financial Supervisory Authority
ICAAP	Internal Capital Adequacy Assessment Process
IFRS	International Financial Reporting Standards
IRB	Internal Rating-based
LGD	Loss Given Default
N	Number (of Observations)
NI	Net Income
NPL	Non-performing Loan
NPLR	Non-performing Loan Ratio
PD	Probability of Default
P-value	Probability Value
$R^2$	R-squared
ROA	Return on Assets
ROE	Return on Equity
RORAC	Return on Risk Adjusted Capital
RWA	Risk Weighted Asset
SFSA	Swedish Financial Supervisory Authority
Signif.	Significance
TL	Total Loan
TSE	Total Shareholders' Equity



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# 1. Introduction

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*In this chapter, we present the background of the thesis followed by the problem statement. The discussion also contains the motivation for our thesis. Finally, we present the research question, the purpose of this thesis and limit the area of the study.*

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## 1.1 Background

The world has experienced remarkable numbers of banking and financial crises during the last thirty years. Caprio and Klingebiel (1997) have identified 112 systemic banking crises<sup>1</sup> in 93 countries since the late 1970s (Ibid.). Demirguc-Kunt and Detragiache (1998) have identified 30 major banking crises that are encountered from early 1980s and onwards. Though most of those were experienced in the developing countries, the authors have noted that three Nordic countries - Norway, Finland and Sweden - have also gone through similar crises in the late 1980s and early 1990s<sup>2</sup>. Interestingly, the majority of the crises coincided with the deregulatory measures that led to excessively rapid credit extension. In the long run, continuous increases in asset prices created bubble<sup>3</sup>. At some point, the bubble burst and the asset markets experienced a dramatic fall in asset prices coupled with disruption. Finally, widespread bankruptcies accompanied by non-performing loans, credit losses and acute banking crises were observed.

Very recently, the US subprime mortgage sector has observed one of the worst financial crises in 2007-2008. Subsequently, the global financial market is going through a turbulent situation. This has necessitated a close examination of the numerous issues related to the operation of financial markets to identify the root of the problem. Various issues such as the capital adequacy levels in the banking system, the role of rating agencies in financial regulation and the fair-value assessment of banking assets are the most debated ones. In response to the banking crises, significant reformations have been carried out in the banking regulatory system. The most important ones are Basel Accord(s), Basel I and II, which refer to the banking supervision accords issued by Basel Committee on Banking Supervision (BCBS).

Basel I, also known as 1988 Basel Accord, implemented a framework for a minimum capital standard of 8% for banks. This was enforced by law in the G 10<sup>4</sup> countries in 1992. Basel I with focus on credit risk considers the minimum capital requirement as the main tool to prevent banks from taking excessive risk. The main reason was the belief that a well-designed structure of incentives is more effective than structural controls. Basel I contributed to the financial stability by creating conditions for equal competitions amongst banks across borders. However, several issues such as lack of risk sensitive measures of the creditworthiness and weak incentives for banks to strengthen risk management system emerged as shortcomings. These stimulated significant opportunities for regulatory arbitrage such as the increase of off balance-sheet exposure. It was revealed that Basel I was unable to provide an adequate response to the changing global context.

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<sup>1</sup> Systemic risk is the risk of collapse of an entire system or entire market and not to any one individual entity or component of that system.

<sup>2</sup> Steigum (1992) and Vihriälä (1997) discusses on the Norwegian and Finnish cases

<sup>3</sup> Englund P. (1999), The Swedish Banking crisis: Roots and Consequences, Oxford review of Economic Policy, Vol. 15, no.3, pages 80-97.

<sup>4</sup> The Group of Ten consists of eleven industrial countries (Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom and the United States) which advise and co-operate on economic, monetary and financial matters.



Consequently, Basel II came into effect to better reflect banks' underlying risk and response to financial innovation like securitization. It was argued that Basel II improved risk management practices that were not evident in Basel I<sup>5</sup>.

Ironically, the frequency of crises did not decrease despite the introduction of successive reforms. Why? There are many contributing factors, mainly, political and economical conditions. It can thus be self evident that the improved risk management does not improve the banking business. Moreover, Jean-Charles Rochet (2008) states that key factors to successful reform are independence and accountability of banking supervisors. As long as banking supervisors represent political and economical interests of their respective countries, it is not possible to implement international regulation successfully.

The current global financial crisis indicates that risk management of the financial institutions is not adequate enough. This leads to the failure of the banks in highly challenging financial market. Furthermore, the discussion of financial crisis in mass media and among scholars mentions the *risk management as omissions* or *neglect* of risk measurement signals. They state that more attentive participants could avoid the tremendous affect of the financial meltdown<sup>6</sup>. Therefore, *Risk Management* as a discipline is being taken seriously nowadays<sup>7</sup>. Nevertheless, the financial storm teaches several key lessons which can assist to improve the risk management in future. As a result, risk has become a very challenging area of studies. This has motivated us to conduct our thesis on this area of interest.

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<sup>5</sup> Wahlstrom G (2009), Risk management versus operational action: Basel II in a Swedish Context, Management Accounting Research, Vol. 20, page 53-68.

<sup>6</sup> Joe Nocera, "Risk management and financial crisis", *Herald Tribune*, January 4, 2009

<sup>7</sup> A.E. Feldman Associates, Inc., US Consulting firm report "On financial crisis and its effect" <http://www.aefeldman.com> Accessed February 9, 2009



## 1.2 Problem Discussion

*“Keeping regulations too long is a danger,  
getting rid of them too quickly is another”*

*Lars Nyberg, Deputy Governor of the Sveriges Riksbank*

The banks of Sweden as well as the other countries of the EU are required to follow Basel II capital adequacy framework from 2007. The Basel II therefore replaced Basel I for international banks. Basel II aims to *build on a solid foundation of prudent capital regulation, supervision, and market discipline, and to enhance further risk management and financial stability*<sup>8</sup>.

The banking sector has become more complex over the last decades due to the development of financial security market. As a result, banks are getting involved in compound transactions without fully realizing the risk level. Consequently, the risk bearing side gets blurred and risk exposure splits on everybody. This causes systemic failure - the economical system of the countries breaks down. Government influences the situation and tries to stabilize economy through the regulatory mechanisms.

However, it is worth mentioning that regulatory and deregulatory transitions usually end up with the same result. For example, financial instabilities and crises all over the world, the US banking crises, Swedish banking crisis and so on. The exposed risk – the main and most difficult one to identify – is the credit risk in the particular current case. The importance of this risk is increased by the fact that it is linked to the problem of collateral. Therefore, it is in need of being deliberately examined and studied. For this reason, Basel II considers varieties of credit risk measurement techniques, wider than Basel I did. The goal is to improve the credit risk management quality without constraining banks' competitiveness.

Regulations should be interactive or flexible to be successful because of rapidly changing technological, political, and economical circumstances. Credit risk measurement tools presented in Basel II intended to be flexible. The banks can either choose from the proposed options or employ their own as long as it gives sound and fair results.

The importance of the credit risk management and its impact on profitability has motivated us to pursue this study. We assume that if the credit risk management is sound, the profit level will be satisfactory. The other way around, if the credit risk management is poor, the profit level will be relatively lower. Because the less the banks loss from credits, the more the banks gain. Moreover, according to Johan Sjömark from Credit Risk Management Department in Swedbank, *profitability is the indicator of credit risk management*. The central question is how significant is the impact of credit risk management on profitability. This thesis is an endeavor to find the answer.

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<sup>8</sup>Basel Committee on Banking Supervision. "Implementation of Basel II: Practical Considerations". July 2004



Initially, we intend to describe not only the impact of credit risk management on profitability but also to determine how the banks in Sweden monitor and assess credit risk. Since we believe that credit risk management is a very complex issue, it requires a deliberate qualitative study supplemented with quantitative study to achieve the goal. However, it was not possible because of failure in primary data collection. Unfortunately, the respondent banks refused to participate in the survey and to disclose the required information. Therefore, we are left with the data available from the annual report to carry out our study based on the quantitative approach. We choose four well-known commercial banks in Sweden: Nordea, Handelsbanken, Swedbank and SEB.

### **1.3 Research question**

The discussed background and problem formulation make us to have the following research question:

*- How does credit risk management affect the profitability in commercial banks in Sweden?*

### **1.4 Purpose**

The purpose of the research is to describe the impact level of credit risk management on profitability in four commercial banks in Sweden.

### **1.5 Delimitation**

The research is limited on identifying the relationship of credit risk management and profitability of commercial banks in Sweden. Thus, the other risks mentioned in Basel Accords are not discussed. Due to the unavailability of information in annual reports, our sample only contains four largest commercial banks and their 9 years' annual reports from 2000 to 2008 respectively. Since the banks in sample rejected to participate in our internet based survey, the primary data was not possible to obtain. However, we were able to arrange one telephone interview with one of the risk control officers in Swedbank. Considering the above mentioned circumstances, the results of the study are limited to four commercial banks in the sample and are not generalized for the commercial banks in Sweden. Finally, as our study only uses the quantitative approach and focus on the description of the outputs from SPSS, we will not go deep to discuss the reasons and give our own explanation.



## 1.6 Disposition

### Chapter 1

• **INTRODUCTION:** *In this chapter, we present the background of the thesis followed by the problem statement. The discussion also contains the motivation for our thesis. Finally, we present the research question, the purpose of this thesis and limit the area of the study.*

### Chapter 2

• **METHODOLOGY:** *In this chapter, we widely describe the HOW part of our study. The chapter comprises research approach, sampling, data collection, data analyzing instruments and the description of applied regression model. The chapter is finalized by reliability and validity and limitation of our study.*

### Chapter 3

• **FRAMEWORK:** *In this chapter, we provide theoretical foundation to our study by presenting relevant literature.*

### Chapter 4

• **EMPIRICAL FINDINGS AND ANALYSIS:** *In this chapter, we present the results of our regression model. We analyze the results and describe the impact of credit risk management on profitability.*

### Chapter 5

• **CONCLUDING REMARKS:** *In this chapter, we conclude on our study and give suggestions for further studies.*



## 2. Methodology

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*In this chapter, we widely describe the HOW part of our study. The chapter comprises research approach, sampling, data collection, data analyzing instruments and the description of applied regression model. The chapter is finalized by reliability and validity and limitation of our study.*

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### 2.1 Research approach

Our study is conducted by using *deductive approach* as we refer to the research question and do not intend to go beyond it. Also, we base our research question on previously existed theories and studies in this area.

The method of our study is *quantitative*. We use regression model to analyze data collected from the annual reports of the sample banks. Based on the regression outputs we conduct the analyses and answer our research question. The analyses are presented by using *descriptive approach*. Since we only describe the regression results without providing further explanation on the issues.

### 2.2 Sampling

We have selected four major commercial banks in Sweden: Nordea, SEB, Svenska Handelsbanken and Swedbank. We have used annual reports from 2000 to 2008 of each bank to collect the data. Therefore, there are total 36 observations in the regression analysis. Theoretically, the number of observations should be 20:1 (20 observations per one independent variable) in the regression analysis and as low as 5:1<sup>9</sup>. In our case, we have 36 observations and two independent variables which are satisfactory with respect to standard.

### 2.3 Data Collection

The data source for our study is Annual Reports for 9 years, 2000-2008. Our study necessitates looking into credit risk management disclosure, financial statements and notes to financial statements within the annual reports of the sample banks. We interviewed Johan Sjömark, credit risk control department officer in Swedbank with 8 years of working experience in credit risk management. The interview helped us to enhance our regression model and has been limited to that. The interview answers have not been used to produce analysis or the conclusion of this paper. The interview questions are presented in the Appendix 1.

### 2.4 Data analyzing instruments

We use multiple regression analysis in our study: the relation of one dependant variable to multiple independent variables. The regression outputs are obtained by using SPSS. In addition, we apply MS Excel 2007 to confirm the accuracy of the results.

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<sup>9</sup> Princeton University. Data and Statistical Services online. [http://dss.princeton.edu/online\\_help/analysis/interpreting\\_regression.htm](http://dss.princeton.edu/online_help/analysis/interpreting_regression.htm). Accessed 2009-05-06.



## 2.5 Applied regression model

We have revealed from early studies that the determinant for profitability is ROE (Net Income/Total Shareholders' Equity) and for credit risk management are NPLR (Non-performing Loans/Total Loans) and CAR [(Tier I + Tier II)/Risk Weighted Assets] respectively. We use multiple regression model with two independent variables in this study.

In the regression model, we have considered the following:

### 2.5.1 *Dependent variable*

We have decided to use ROE as the indicator of the profitability in the regression analysis because ROE along with ROA has been widely used in earlier research. Initially, we have considered the ratios ROE and RORAC<sup>10</sup> (Profit after Tax/Risk Adjusted Capital). RORAC is a measure for relative performance of the banks and could have been used in our regression analysis. However, we have not used RORAC because it is usually used by the banks with internally available information, for example, risk-adjusted capital, and we do not have access to such required information. Therefore, we have decided to use ROE as the indicator of profitability. In this case, the required information is available in the annual reports of the banks under *Key figures* section.

### 2.5.2 *Independent variables*

We have chosen two independent variables namely NPLR and CAR because these two are the indicators of risk management which affect the profitability of banks. NPLR, in particular, indicates how banks manage their credit risk because it defines the proportion of NPL amount in relation to TL amount.

**NPLR.** NPLR is defined as NPLs divided by TLs. To calculate this ratio, we have used data provided in the annual reports of each bank. From 2000 until 2005, NPL amount has been presented using different names, such as, impaired loans, problem loans, doubtful claims and loan allowances.<sup>11</sup> However, the definitions of those are similar to the definition of NPLs. Banks provide more precise categorization of NPLs after the adoption of IFRS in 2005. NPL amount is provided in the *Notes* to financial statements under *Loans* section. TL amount, the denominator of the ratio, has been gathered by adding two types of loans: loans to institutions and loans to the public. We have collected the loan amount provided in the balance sheet of the banks in their annual reports<sup>12</sup>. Thus, calculation of the NPLR has been accomplished in following way:

$$\text{NPLR} = (\text{NPL amount}) \div (\text{TL amount})$$
$$790 \quad \div \quad 1478137 \quad = 0,05^{13}$$

**CAR.** CAR is regulatory capital requirement (Tier 1 + Tier 2) as the percentage of RWAs. We have chosen CAR as an independent variable and justified the choice in the literature review

<sup>10</sup> Return On Risk Adjusted Capital

<sup>11</sup> Excerpt from annual reports with definitions under Figure 23

<sup>12</sup> Excerpt from the annual report is presented under Figure 21 in appendix.

<sup>13</sup> Numbers are obtained from Handelsbanken Annual Report 2007



section of this study. CAR is taken from the banks' annual reports under *Key figures*<sup>14</sup> section. We have not done any calculation to obtain CAR.

We find it useful for our study to discuss if the adoption of Basel II has influenced the credit risk management and its effect on profitability in four banks.

### 2.5.3 Regression analysis explained

The regression analysis is conducted to find out the following:

- The relationship between credit risk management and profitability in four banks: we use 9 year period (2000-2008) for 4 banks which in total gives 36 observations;
- The relationship between credit risk management and profitability in each bank: we use 9 year period (2000-2008) for each bank which in total gives 9 observations;
- The Basel II application affect in four banks: we use 2 years before (2005-2006) and 2 years after (2007-2008) the adoption of new regulation for all four banks which in total gives 8 observations.

We have employed the multivariate regression model which is presented below:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon$$

Standard	Our application
Y – the value of dependent variable;	Y: ROE- profitability indicator
$\alpha$ – the constant term;	
$\beta$ – the coefficient of the function;	
X – the value of independent variables:	X <sub>1</sub> : NPLR –credit risk management indicator X <sub>2</sub> : CAR –credit risk management indicator
$\varepsilon$ – the disturbance or error term.	

Thus the regression equation becomes:

$$ROE = \alpha + \beta_1 NPLR + \beta_2 CAR + \varepsilon$$

It is the regression function which determines the relation of X (NPLR and CAR) to Y (ROE).  $\alpha$  is the constant term and  $\beta$  is the coefficient of the function<sup>15</sup>, it is the value for the regression equation to predict the variances in dependent variable from the independent variables. This means that if  $\beta$  coefficient is negative, the predictor or independent variable affects dependent variable negatively: one unit increase in independent variable will decrease the dependent variable by the coefficient amount. In the same way, if the  $\beta$  coefficient is positive, the dependent variable increases by the coefficient amount.  $\alpha$  is the constant value which dependent variable predicted to have when independent variables equal to zero (if  $X_1, X_2=0$  then  $\alpha=Y$ ). Finally,  $\varepsilon$  is the

<sup>14</sup> Excerpt from the Annual Report is presented under Figure 22 in Appendix

<sup>15</sup>  $\beta$  represents the *independent* contributions of each independent variable to the prediction of the dependent variable.



disturbance or error term, which expresses the effect of all other variables<sup>16</sup> except for the independent variables on the dependent variable that we use in the function.

Regression analysis output contains values which we discuss below:

$R^2$  is the proportion of variance in the dependent variable that can be predicted from independent variables. There is also adjusted  $R^2$  which gives more accurate value by avoiding overestimation effect of adding more variables to the function. So, high  $R^2$  value indicates that prediction power of dependent variable by independent variables is also high. Adjusted  $R^2$  is calculated using the formula  $1 - ((1 - R^2) * ((N - 1) / (N - k - 1)))$ <sup>18</sup>. The formula shows that if the number of observations is small the difference between  $R^2$  and adjusted  $R^2$  is greater than 1 since the denominator is much smaller than numerator. Adjusted  $R^2$  sometimes gives negative value. Since  $R^2$  is adjusted to find out how much fit probably happen just by luck: the difference is amount of fit by chance. Also, negative values of adjusted  $R^2$  occur if the model contains conditions that do not help to predict the response (ROE) or the predictors (NPLR and CAR) chosen are wrong to predict ROE.  $R^2$  is generally considered to be secondary importance, unless the primary concern is of using regression equation to make accurate predictions.  $R^2$  is an overall measurement of the strength of association, and does not reflect how any independent variable is associated with the dependent variable.

The Probability value (P-value) is used to measure how reliably the independent variables can predict the dependent variable. It is compared to the significance level which is typically 0,05. If the P-value is greater than 0,05, it can be said that the independent variable does not show a statistically significant relationship with the dependent variable.

The F-value calculated as  $(R^2/1)/((1-R^2/n-2))$  and associated P-value shall be looked at to measure the effect of the group of independent variables on dependent variable. The resulted F-value should be compared to the critical F-value ( $F_{v_1, v_2}$ ) which is taken from the F distribution table. Both  $V_1$  and  $V_2$  are called as degrees of freedom.  $V_1$  is number of independent variables and  $V_2$  is number of observations minus number of independent variable minus 1. For instance, in our case, we have two independent variables and 36 observations, then  $V_1=2$ , and  $V_2=n-k-1=36-2-1=33$ . Thus the critical value of  $F(3,32)$ <sup>20</sup> can be found in the distribution table accordingly. If the resulted F-value exceeds the critical F-value, it can be said that the regression as a whole is significant.

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<sup>16</sup> Variables that are not included in the function but could have effect on dependent variable

<sup>17</sup> k – number of independent variables

<sup>18</sup> UCLA Academic Technology Services. Annotated Stata Output. Regression Analysis. [http://www.ats.ucla.edu/stat/stata/output/reg\\_output.htm](http://www.ats.ucla.edu/stat/stata/output/reg_output.htm). Accessed 2009-05-06.

<sup>19</sup> n=number of observations

<sup>20</sup> Anerson. D.R & Sweeney. D.J & Williams. T.A (2008) Statistics for business and economics, 10th edition, F-distribution Table. pp.928



## 2.6 Reliability and validity

Reliability and validity are often used by the scientific researchers in their studies, both qualitative and quantitative. Reliability refers to the consistency and accuracy of the research results. In the quantitative research, reliability can be illustrated as the stability of the measurement over time, the similarity of the measurements during the given period, and also the degree to the same results of the measurement given repeatedly. Validity means the accuracy of the measurement of which it is intended to be measured and how truthful the results of the research are.<sup>21</sup>

In our study, we have collected the data from the peer reviewed scientific articles, journals, books, the audited annual reports by the authorized accounting firms. In addition, we have used the capital adequacy and risk management reports of banks to collect our data.

Furthermore, ROE and CAR are taken from the annual reports directly in order to avoid the mistakes of calculation. However, NPLR is not available for all the banks in the annual reports. So we have taken the amount of NPLs and the TLs from the financial statements and the related notes, and then, used the formula of NPLR (NPLs/TLs) to obtain the value. Moreover, interview with the credit risk officer helped us to ensure application of NPLR as an independent variable. To ensure the accuracy of the results, we have triple checked the data collection and calculation processes. Next, we have used the statistical analysis tool SPSS to obtain results and conduct analysis of the regression model that we have adopted in our study. The reliability of the SPSS results has been proved by many researchers in their studies. We have also used several articles to get the idea how to analyze the SPSS outputs. It is worth to mention that we have compared the regression analysis results of SPSS with the results of MS Excel to ensure correctness. Also, we have checked correlation between independent variable to prevent multicollinearity effect in our result. Thus, the theories, the findings and the results obtained through regression analysis of our study are replicable which consequently guarantee the reliability and validity of our study.

## 2.7 Limitations of the study

The study includes only four commercial banks in Sweden. Therefore, the results cannot be generalized to all commercial banks. The number of observations is very small which is not preferable while conducting studies of this kind. Moreover, only nine observations of each bank are used in the regression analysis which might not provide accurate results.

Nordea is not comparable to other banks in sample since it is twice as large as each of the other bank in the sample. Therefore, the analysis and the comparison of the banks are subjective to some extent. Moreover, unlike other three banks in the sample, the Swedish government is the major shareholder in Nordea. This might have introduced difficulties in comparability within the sample. In addition, this also can influence the credit risk management approach, described as more prudent than that in other banks.

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<sup>21</sup>Nahid Golafshani (2003) *Understanding Reliability and Validity in Qualitative Research*, The Qualitative Report Volume 8 Number 4 PP. 597-607 <http://www.nova.edu/ssss/QR/QR8-4/golafshani.pdf> accessed 2009-05-14



NPLs are subjective amount (years 2000-2004) since banks' annual reports have different names for such types of loans and definitions are not always provided. Therefore, some NPL amounts before year 2005 might not be accurate. Also, not many previous studies have treated NPLR as one of the variables in the regression models.

The number of independent variables could be more than two since there are other factors affecting ROE with the same prediction level. Additionally, the independent variables are chosen by our initiative and therefore the regression model might be subjective.

Finally, due to instability of current financial market it is not the ideal situation to conduct this type of analysis since ROE and NPLR are affected more than that of normal conditions.



### 3. Framework

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*In this chapter, we provide theoretical foundation to our study by presenting relevant literature.*

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#### 3.1 Previous Studies

##### 3.1.1 ROE – profitability indicator

ROE as an important indicator to measure the profitability of the banks has been discussed extensively in the prior studies. Foong Kee K. (2008) indicated that the efficiency of banks can be measured by using the ROE which illustrates to what extent banks use reinvested income to generate future profits.<sup>22</sup> According to Riksbank's Financial Report (2002)<sup>23</sup>, the measurement of connecting profit to shareholder's equity is normally used to define the profitability in the banks.

Furthermore, the paper "Why Return on Equity is a Useful Criterion for Equity Selection"<sup>24</sup> has mentioned that ROE provides a very useful gauge of profit generating efficiency. Because it measures how much earnings a company can get on the equity capital. The ROE is defined as the company's annual net income after tax divided by shareholder's equity. NI is the amount of earnings after paying all expenses and taxes. Equity represents the capital invested in the company plus the retained earnings<sup>25</sup>. Essentially, ROE indicates the amount of earnings generated from equity. The increased ROE may hint that the profit is growing without pouring new capital into the company. A steadily rising ROE also refers that the shareholders are given more each year for their investment. All in all, the higher ROE is better both for the company and the shareholders.<sup>26</sup> In addition, ROE takes the retained earnings from the previous periods into account and tells the investors how efficiently the capital is reinvested.

In accordance with the study Waymond A G. (2007), profitability ratios are often used in a high esteem as the indicators of credit analysis in banks, since profitability is associated with the results of management performance. ROE and ROA are the most commonly used ratios, and the quality level of ROE is between 15% and 30%, for ROA is at least 1%<sup>27</sup>.

The study of Joetta C (2007) presented the purpose of ROE as the measurement of the amount of profit generated by the equity in the firm. It is also mentioned that the ROE is an indicator of the efficiency to generate profit from equity. This capability is connected to how well the assets are utilized to produce the profits as well. The effectiveness of assets utilization is significantly tied to

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<sup>22</sup> Foong. K. K (2008) Return-on-equity ratio can show how efficient banks are. *Malaysian Institute of Economic Research*. <http://biz.thestar.com.my/news/story.asp?file=/2008/11/24/business/2590590&sec=business> accessed 2009-04-02

<sup>23</sup> Riksbank Financial Stability Report (2002), "The major Swedish banks in an international comparison", Issue 1

<sup>24</sup> Jensen Investment Management (2008) why return on equity is a useful criterion for equity selection [www.jenseninvestment.com/documents/WPIssue7\\_ROE\\_Aug08.pdf](http://www.jenseninvestment.com/documents/WPIssue7_ROE_Aug08.pdf) accessed 2009-04-03

<sup>25</sup> Retained earnings is calculated as net income minus dividend paid out.

<sup>26</sup> Jensen Investment Management (2008) why return on equity is a useful criterion for equity selection [www.jenseninvestment.com/documents/WPIssue7\\_ROE\\_Aug08.pdf](http://www.jenseninvestment.com/documents/WPIssue7_ROE_Aug08.pdf) accessed 2009-04-03

<sup>27</sup> Waymond. A .G (2007) Credit analysis of financial institutions 2nd Edition, Published by Euromoney Books pp.197



the amount of assets that the company generates for each dollar of equity.<sup>28</sup>

Thus, after we brought the evidence of ROE being used as the profitability indicator, we can move to the discussion of credit risk management indicators.

### ***3.1.2 Credit risk management indicators***

In response to recent corporate and financial disasters, regulators have increased their examination and enforcement standards. In banking sector, Basel II has established a direct linkage between minimum regulatory capital and underlying credit risk, market risk and corporate risk exposure of banks. This step gives an indication that Capital management is an important stage in risk mitigation and management. However, development of effective key risk indicators and their management pose significant challenge. Some readily available sources such as policies and regulations can provide useful direction in deriving key risk indicators and compliance with the regulatory requirement can be expressed as risk management indicators. A more comprehensive capital management framework enables a bank to improve profitability by making better risk-based product pricing and resource allocation.

The purpose of Basel II is to create an international standard about how much capital banks need to put aside to guard against the types of risk banks face. In practice, Basel II tries to achieve this by setting up meticulous risk and capital management requirements aimed at ensuring that a bank holds capital reserves appropriate to the risks the bank exposes itself to. These rules imply that the greater risk which bank is exposed to, the greater the amount of capital a bank needs to hold to safeguard its solvency.

The theoretical banking literature is, however, divided on the effects of capital requirements on bank behavior and consequently, on the risks faced by the institutions. Some academic works point toward that capital requirement clearly contributes to various possible measures of bank stability. On the contrary, other works conclude that capital requirements make banks riskier institutions than they would be in the absence of such requirements.

Jeitshko and Jeung (2005) have discovered numerous aspects that explain the differing implications of portfolio-management models for the responsiveness of bank portfolio risk to capital regulation. Results depend on banks being either value-maximizing or utility-maximizing firms; bank ownership (if limited liability) and whether banks operate in complete or incomplete asset markets. Moreover, the effects of capital regulation on portfolio decisions and therefore on the banking system's safety and soundness eventually depend on which perspective dominates among insurers, shareholders, and managers in the principal-agent interactions.

#### *Capital and profitability*

Theory provides contradictory forecast on whether capital requirements limit or enhance bank performance and stability. The soundness of the banking system is important because it limits

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<sup>28</sup> Joetta. C(2007) Credit risk management: how to avoid lending disasters and maximize earnings 3rd edition pp.144



economic downturn related to the financial anxiety. Also, it avoids unfavorable budgetary consequences for governments which often bear a substantial part of bailouts cost. Prudential regulation is expected to protect the banking system from these problems by persuading banks to invest prudently. The introduction of capital adequacy regulations strengthen bank and therefore, enhance the resilience of banks to negative shocks. However, these rules may cause a shift of providing loans from private sector to public sector. Banks can comply with capital requirement ratios either by decreasing their risk-weighted assets or by increasing their capital.

Goddard, Molyeux and Wilson (2004) analyzed the determinants of profitability of European banks. The authors found a considerable endurance of abnormal profits from year to year and a positive relationship between the capital-to-asset ratio and profitability.

Demirguc-Kunt and Huizinga (1999) examined how capital requirement alter the incentives that banks face. An increase in capital requirement necessitates banks to substitute equity for deposit financing, reduce shareholder's surplus. The decline in surpluses intensifies the probability of loss, driving a rise in the cost of intermediation to sustain profitability. In support of this hypothesis, authors have provided empirical evidence showing a significant effect on interest margins pursuant to higher capital holdings and the share of total assets held by banks. The evidence also supports higher net interest margins and more profitability for well-capitalized banks<sup>29</sup>. This is in harmony with the fact that banks with high capital ratio have low interest expenses due to less probable bankruptcy costs.

Samy and Magda (2009) focus on the impact of capital regulation on the performance of the banking industry in Egypt. The study provides a comprehensive framework to explicitly measure the effects of capital adequacy on two specific indicators of bank performance: cost of intermediation and profitability.

The results provide a clear illustration of the effects of capital regulations on the cost of intermediation and banks' profits. As CAR internalizes the risk for shareholders, banks increase the cost of intermediation, which supports higher return on assets and equity. These effects appear to increase progressively over time, starting in the period in which capital regulations are introduced and continuing 2 years after the implementation. Nonetheless, the evidence does not support the hypothesis of a sustained effect of capital regulations over time, or variation in the effects with the size of capital across banks.

The authors have concluded that a number of factors contributed positively to banks' profitability in the post-regulation period: higher capital requirements, the reduction in implicit cost, and the increase in management efficiency. Countering effects on banks' profitability were attributed to the reduction in economic activity and, to a lesser extent, to the reduction in reserves. An improvement of cost efficiency is not reflected in a reduction in the cost intermediation or an

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<sup>29</sup> Naceur Samy and Kandil Magda, The impact of capital requirements on banks' cost of intermediation and performance: The case of Egypt, *Journal of Economics & Business*, (2009), Vol. 61, 70-89.



improvement in profit. The effect of better efficiency is likely to have been absorbed in banks' fees and commissions.

### *Non-performing loans*

Why NPL occurs? The IMF<sup>30</sup> paper (2001) presents two main reasons for that: poor risk management and plain bad luck in form of external independent factors. The inflation, deregulation and special market conditions can lead to poor credit lending decision which in turn leads to NPLs. In fact, many NPL studies are conducted in the countries with financial market recession<sup>31</sup>.

In prior studies, NPL is usually mentioned in East Asian countries' macroeconomic studies, while they run into serious economic downturn, as one of the financial and economical distress indicators. Japan and China, are those of most mentioned in this regard<sup>32</sup>. Moreover, IMF working paper from December 2001 encourages better account of NPL for macroeconomic statistics which makes NPL to be widely used in macroeconomic statistics. Moreover, Hippolyte F. (2005) advocates that macroeconomic stability and economic growth are associated with declining level of NPLs, while the adverse macroeconomic situation is associated with rising scope of NPLs.

Ongoing financial crises suggest that NPL amount is an indicator of increasing threat of insolvency and failure. However, the financial markets with high NPLs have to diversify their risk and create portfolios with NPLs along with Performing Loans, which are widely traded in the financial markets. In this regard, Germany was one of the leaders of NPL markets in 2006 because of its *sheer size and highly competitive market*. Also, Czech Republic, Turkey and Portugal are noticeable NPL markets in EU according to Ernst & Young's Global Non-performing Loan report (2006).

Nonetheless, not many studies have done research on NPL market in Western Europe or Scandinavia. Empirical study of Petersson J et al. (2004), states that during the crises in the early 1990's in Sweden, the Swedish government created the workout units in order to improve the situation with loan losses in banks and succeeded. The same paper claims that no NPL market exists in Sweden since four major banks<sup>33</sup> showed loan losses below 0.25% for the year 2003. We wonder whether the situation has changed nowadays.

Brewer et al. (2006) use NPLR as a strong economic indicator. Efficient credit risk management supports the fact that lower NPLR is associated with lower risk and lower deposit rate. However it also implies that in long run, relatively high deposit rate increases the deposit base in order to fund relatively high risk loans and consequently increases possibility of NPLR. Therefore, the

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<sup>30</sup> International Monetary Fund

<sup>31</sup> World Bank Policy Research Working Paper 3769, November 2005

<sup>32</sup> Ernst&Young. Global Nonperforming Loan Report 2006.

<sup>33</sup> Paper presents banks: Föreningsparbanken, Handelsbanken, Nordea and SEB.



allocation of the available fund and its risk management heavily depend on how the credit risk is handled and diversified to decrease the NPL amount.

NPL is a probability of loss that requires provision. Provision amount is “accounting amount” which can be further, if the necessity rises, deducted from the profit. Therefore, high NPL amount increases the provision amount which in turn reduces the profit.

The above stated discussion proves that NPLR and CAR are reasonably considered as credit risk management indicators. Thereby, they can be used in our study.



## 3.2 Theories

### 3.2.1 Risks in banks

Risks are the uncertainties that can make the banks to loose and be bankrupt. According to the Basel Accords, risks the banks facing contain *credit risk, market risk and operational risk*. *Credit risk is the risk of loss due to an obligator's non-payment of an obligation in terms of a loan or other lines of credit.*<sup>34</sup> The Basel committee proposes two methodologies for calculating the capital requirements for credit risk, one is to measure the credit risk in a standardized manner and the other is subject to the explicit approval of the bank's supervisor and allows banks to use the IRB approach. *Market risk is defined as the risk of losses in on and off-balance sheet positions arising from movements in market prices.*<sup>35</sup> The capital treatment for market risk addresses the interest rate risk and equity risk pertaining to financial instruments, and the foreign exchange risk in the trading and banking books.<sup>36</sup> The value at risk (VaR) approach is the most preferred to be used when the market risk is measured. *Operational risk is defined as the risk of direct or indirect loss resulting from inadequate or failed internal processes, people and systems or from external events.* There are three approaches applied to the operational risk measurement: Basic Indicator Approach (BIA), Standardized Approach (SA), and Advanced Measurement Approach (AMA).

### 3.2.2 Credit risk management in banks

Bank loan is a debt, which entails the redistribution of the financial assets between the lender and the borrower. The bank loan is commonly referred to the borrower who got an amount of money from the lender, and need to pay back, known as the principal. In addition, the banks normally charge a fee from the borrower, which is the interest on the debt. The risk associated with loans is credit risk.

Credit risk is perhaps the most significant of all risks in terms of size of potential losses. Credit risk can be divided into three risks: default risk, exposure risk and recovery risk. As the extension of credit has always been at the core of banking operation, the focus of banks' risk management has been credit risk management. It applied both to the bank loan and investment portfolio. Credit risk management incorporates decision making process; before the credit decision is made, follow up of credit commitments including all monitoring and reporting process<sup>37</sup>. The credit decision is based on the financial data and judgmental assessment of the market outlook, borrower, management and shareholders. The follow-up is carried out through periodic reporting reviews of the bank commitments by customer. Additionally, "warning systems" signal the deterioration of the condition of the borrower before default, whenever possible.

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<sup>34</sup> Basel II (2006) International Convergence of Capital Measurement and Capital Standards, A Revised Framework Comprehensive Version.

<sup>35</sup> Basel II (2006) International Convergence of Capital Measurement and Capital Standards, A Revised Framework Comprehensive Version.

<sup>36</sup> Basel I [http://www.bnm.gov.my/guidelines/01\\_banking/01\\_capital\\_adequacy/02\\_basel1.pdf](http://www.bnm.gov.my/guidelines/01_banking/01_capital_adequacy/02_basel1.pdf) accessed 2009-03-14

<sup>37</sup> Joel Bessis (1998) Risk Management in Banking



Loans that are in default or close to being default become NPLs<sup>38</sup>. The terms of the default rate in loans are defined by each bank. Usually, loan becomes non-performing after being default for three months but this can depend on contract terms. NPLR shows the proportion of the default or near to default loans to the actual performing loans. It indicates the efficiency of the credit risk management employed in the bank. Therefore, the less the ratio the more effective the credit risk management.

### *Measurement of credit risk*

Usually, bank can project the average level of credit losses it can reasonably expect to experience. These losses are referred to:

- a. Expected Losses (EL): perceived as cost of business undertaking by financial institutions;
- b. Unexpected Losses (UL): losses above expected level when banks anticipate their occurrence though the timing and severity cannot be known beforehand. A few portions of unexpected losses might be absorbed by the interest rate charged on credit exposure although market will not support adequate prices to cover all unexpected losses.
- c. Loss Given Default (LGD): the amount of fund that bank can lose when the borrower defaults on a loan.

Therefore, capital is needed to cover the risks of such losses. Banks have an incentive to minimize capital they hold since reducing capital frees up economic resources that can be directed to profitable investment. In contrast, the less capital a bank holds, the greater is the likelihood that it will not be able to meet its own debt obligations, i.e. that losses in a given year will not be covered by profit plus available capital, and that the bank will become insolvent<sup>39</sup>. Accordingly, banks must carefully balance the risks and rewards of holding capital. A number of approaches exist to determine how much capital a bank should hold.

The IRB approach adopted by Basel II focuses on the frequency of bank insolvencies (the case of the bank failing to meet its senior obligations) arising from credit losses that supervisors are willing to accept<sup>40</sup>. Through IRB approach, the Basel Committee intended to develop a framework which is credible, prudentially sound and reflect healthy risk management practices. Banks have made use of internal rating systems for very long time as a means of categorizing their exposure into broad, qualitatively differentiated layers of risk<sup>41</sup>.

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<sup>38</sup> Special term dictionary for investors: [www.investopedia.com](http://www.investopedia.com), accessed on 2009-03-13

<sup>39</sup> An Explanatory Note on the Basel II IRB Risk Weight Functions, <http://www.bis.org/bcbs/irbriskweight>, accessed 2009-03-14

<sup>40</sup> <http://www.bis.org/bcbs/irbriskweight> accessed 2009-03-14

<sup>41</sup> Internal Rating-Based Approach, <http://www.bis.org>, Accessed on 13.03.09



### 3.2.3 *Bank Profitability*

In our study, we try to examine the *profitability* of the banks. The profitability in our case is presented and measured using ROE<sup>42</sup>. In other words, the amount of NI returned as a percentage of TSE. We choose it as profitability indicator because ROE comprises aspects of performance, such as profitability and financial leverage.

#### *ROE in banks*

The measurement of bank performance has been developed over time. At the beginning, many banks used a purely accounting-driven approach and focused on the measurement of NI, for example, the calculation of ROA<sup>43</sup>. However, this approach does not consider the risks related to the referred assets, for instance, the underling risks of the transactions, and also with the growth of off-balance sheet activities. Thus the riskiness of underlying assets becomes more and more important. Gradually, the banks notice that equity has become the scarce resource. Thereby, banks turn to focus on the ROE to measure the net profit to the book equity in order to find out the most profitable business and to do the investment.<sup>44</sup>

ROE is commonly used to measure the profitability of banks. The efficiency of the banks can be evaluated by applying ROE, since it shows that banks reinvest its earnings to generate future profit. The growth of ROE may also depend on the capitalization of the banks and operating profit margin. If a bank is highly capitalized through the risk-weighted capital adequacy ratio (RWCAR) or Tier 1 capital adequacy ratio (CAR), the expansion of ROE will be retarded. However, the increase of the operating margin can smoothly enhance the ROE<sup>45</sup>. ROE also hinges on the capital management activities. If the banks use capital more efficiently, they will have a better financial leverage and consequently a higher ROE. Because a higher financial leverage multiplier indicates that banks can leverage on a smaller base of stakeholder's fund and produce higher interest bearing assets leading to the optimization of the earnings.<sup>46</sup> On the contrary, a rise in ROE can also reflect increased risks because high risk might bring more profits. This means ROE does not only go up by increasing returns or profit but also grows by taking more debt which brings more risk. Thus, positive ROE does not only represent the financial strength. Risk management becomes more and more significant in order to ensure sustainable profits in banks.

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<sup>42</sup>Special term glossary: [www.investopedia.com](http://www.investopedia.com). Accessed on 13.03.09

<sup>43</sup> Return on Assets=NI/Total Assets

<sup>44</sup>Gerhard. S (2002) *Risk management and value creation in financial institutions* Illustrated edition, Published by John Wiley and Sons pp. 239

<sup>45</sup>Foong K. K (2008) Malaysian Institute of Economic Research: *Return-on-equity ratio can show how efficient banks are*

<sup>46</sup> Foong. K. K (2008) Malaysian Institute of Economic Research: *Return-on-equity ratio can show how efficient banks are* <http://biz.thestar.com.my/news/story.asp?file=/2008/11/24/business/2590590&sec=business> accessed 2009-04-02



### 3.3 Regulations

#### 3.3.1 *Swedish regulation of banks*

The Banking Companies Act which was published in 1987 required the commercial banks in Sweden to be incorporated either as public or private limited liability companies. Until now, all the existing commercial banks are registered as the public companies.<sup>47</sup> The “big four” commercial banks in Sweden are FöreningsSparbanken (Swedbank), Svenska Handelsbanken, Nordea and SEB. They dominate the Swedish financial market and account for approximately 80%<sup>48</sup> of the total assets in banking market. Most of the other commercial banks are established in the last decades. They are usually called niche banks with focus on the retail banking market. They mainly distribute the products and services online, for instance, ICA Bank, Resurs Bank and Forex Bank.

The Financial Supervisory Authority (FSA) and the Riksbank are responsible to supervise the banks in Sweden. FSA aims to promote the stability and the efficiency of the financial system, and to improve the consumer protection directly. It has three responsibilities: financial analysis, operative supervision, licensing and regulatory. The Riksbank has an overall responsibility to promote the function of the financial system (ibid.)

#### 3.3.2 *The Basel Accords*

The Basel Accords (Basel I and Basel II), issued by the Basel Committee on Banking Supervision (BCBS), refer to the banking supervision Accords recommended on banking laws and regulations. Basel I was first published in 1988 and enforced by law in 1992 by the G10 countries. Basel II, issued by BCBS in June 2004, is the new Basel Accord. The purpose of the Basel Accords is to establish an international standard in order to promote the safety and soundness of the financial system, to ensure adequate level of capital in international banking system, to enhance the competitive equality among the banks, and to guard against the financial and operational risks that banks face.<sup>49</sup>

### Capital requirement

Capital requirement is the standardized requirement for banks and other depository institutions which determines the level of liquidity required to be held for a certain level of assets. In other word, it is a bank regulation that sets a framework on how banks must handle their capital. These requirements are stipulated by regulatory agencies such as Bank for International Settlements to ensure that institutions are not involving in or holding investments that amplify the risk of default.

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<sup>47</sup> Briscoe.A (2001) The regulation of banking in Europe pp.156-161

<sup>48</sup> Banks in Sweden(2004) *Facts about the Swedish banking market*

<sup>49</sup> [www.bis.org](http://www.bis.org) accessed 2009-03-13



In addition, to guarantee that financial institutions have enough capital to sustain operating losses while honoring withdrawals.

Basel Committee on banking supervision, in 1988, introduced a capital measurement system which is generally referred to as the Basel Accord. This framework has been replaced by new and significantly more complex capital adequacy framework known as Basel II. Whilst Basel II considerably changes the calculation of the risk weights, it sets aside the calculation of capital alone.

To promote greater stability in the financial system, Basel II uses a three pillars concept:

- First pillar- minimum capital requirements (addressing risk)
- Second pillar- supervisory review
- Third pillar- market discipline

### **The First Pillar- Minimum Capital Requirements**

Minimum capital requirements are composed of three fundamental elements: a definition of regulatory capital, RWAs and the minimum ratio of capital to RWAs<sup>50</sup>.

Regulatory capital according to Basel Accord is the total of tier 1 (Core) capital and tier 2 (supplementary) capital. Utilizing regulatory capital as numerator, the capital ratio is calculated in relation to the denominator i.e. total RWAs. The capital ratio must be not less than 8% for total capital.

#### **Tier 1 capital**

The theoretical reason why the banks hold capital is that they provide protection against the unexpected losses which are not covered by the provisions, reserves and current year profit. Tier 1 capital is the core measurement of the bank's financial strength. It primarily includes equity capital and disclosed reserves. However, the irredeemable non-cumulative preferred stock and retained earnings may also be included.<sup>51</sup>

Tier 1 capital ratio refers a bank's core equity capital to its total RWAs which are the total assets held by bank weighted for credit risk.<sup>52</sup> The assets, for instance, cash has a 0% risk weight whereas the debentures might have a 100% risk weight. Each country may have its own discretion relating how financial instruments are counted in the calculation of the capital. Therefore, the legal frame work may vary in different legal systems.

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<sup>50</sup> The New Basel Capital Accord (2003) Consultative Document, [www.bis.org](http://www.bis.org) accessed 2009-04-01

<sup>51</sup> [www.bis.org](http://www.bis.org) accessed 2009-03-14

<sup>52</sup> [www.bis.org](http://www.bis.org) accessed 2009-03-14



## **Tier 2 capital**

Tier 2 capital measures a bank's financial strength with the second reliable form of financial capital. This was largely standardized in Basel I and remained untouched in the Basel II. Most countries around the world have implemented the standards in the local legislation. The classification of the Tier 2 capital is diversified, which is classified as the undisclosed reserves, revaluation reserves, general provisions and hybrid instruments and subordinated term debt in Basel I.<sup>53</sup>

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<sup>53</sup> [www.bis.org](http://www.bis.org) accessed 2009-03-14



## 4. Empirical Findings and Analysis

*In this chapter, we present the results of our regression model. We analyze the results and describe the impact of credit risk management on profitability.*

### 4.1 Overview of the banks studied

From the mid 1990s, the leading banking groups<sup>54</sup> of Sweden, such as, Nordea, Handelsbanken, SEB and Swedbank, have expanded the banking activities to international arena: mainly in Nordic and Baltic regions.<sup>55</sup> This expansion is to a certain extent due to the development of areas like life insurance, fund management and mortgage lending.

The “big four” banks together have a strong position in the Swedish financial market. As Figure 2 shows, 77% of deposit market belongs to these groups. The reason could be that these banks are operating for more than 100 years, and they have managed to gain trust and loyalty of the customers over this long period of time. Though these four banks have many characteristics in common, there are variations as well. For instance, they vary in terms of client-type, pricing of services and distribution channel. Therefore, it would be a mistake to refer to these banks as a homogeneous group. Instead, they compete with each other as well as with all other banks.<sup>56</sup>

**Table 1** Overview of banks studied

Bank Name	Ownership (%)	Total Assets (bln SEK)	Average number of Employees
<b>Nordea</b>	Swedish State – 19.9 Sampo Oyj – 15.3 Foreign Investors – 22.5	5 185 <sup>57</sup>	33 944
<b>SEB</b>	Investor AB – 20.7 Trygg Foundation – 9.6 Foreign Investors – 18.6	2 511	22 311
<b>Svenska Handelsbanken</b>	Oktogonen Found. – 10.6 Industrivärden – 10.4 Foreign Investors – 30	2 159	10 833
<b>Swedbank</b>	Institutional Investors – 44.6 Savings Bank found. – 19.3 Foreign Investor – 13.5	1 812	23 762

<sup>54</sup> The sample banks in this study can be referred as a “group” further in the text

<sup>55</sup> Swedish Bankers’ Association Report on Banks in Sweden. “Facts about the Swedish banking market”. Published in November 2008

<sup>56</sup> Swedish Bankers’ Association Report on Banks in Sweden. “Facts about the Swedish banking market”. Published in November 2008

<sup>57</sup> 389,054 mln EUR. Exchange rate is 1EUR = 10, 9631 SEK as Jan-Dec 2008. Annual Report, Nordea, 2008.

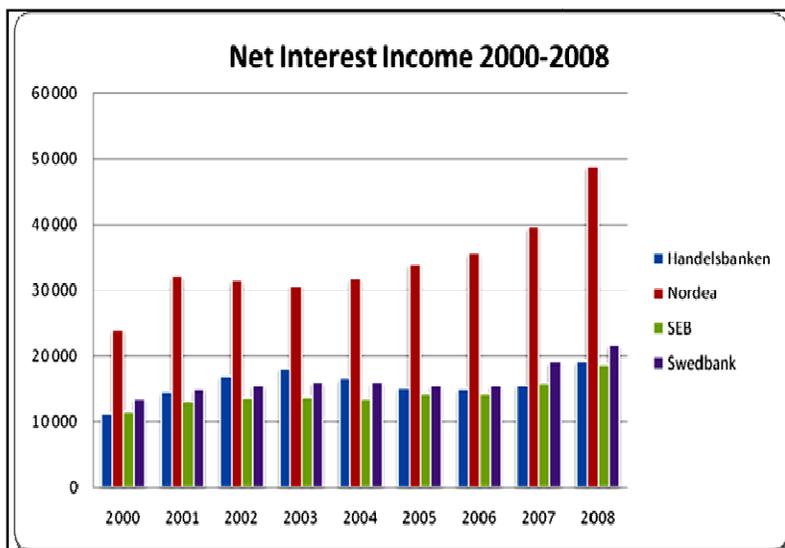
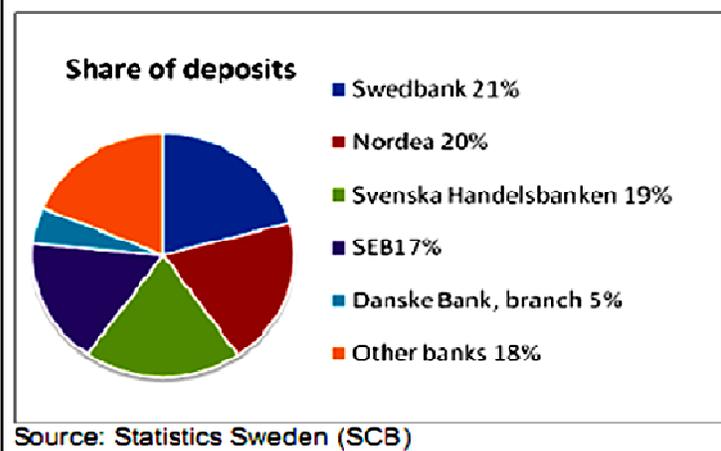


Figure 1 Net Interest Income in 4 banks 2000-2008

### Deposits from the public in Sweden, September 2008



Source: Statistics Sweden (SCB)

Figure 2 Share of deposits among banks in Sweden<sup>58</sup>

#### 4.1.1 Nordea

Nordea is the most recent name in Sweden, though the banking group was founded in 1820. Through the development of 188 years, it has now become the largest bank in Sweden with more than 1400 branches and 33944 employees. The mission of Nordea is to make it possible for customers to reach their goals and create superior values for shareholders and customers. Profit orientation acts as the foundation of Nordea, which strongly focuses on cost, risk and capital management.

The share of Nordea is listed on NASDAQ OMX, the exchanges in Copenhagen, Helsinki and Stockholm. Table 1 shows that the largest shareholder of Nordea is the Swedish state (19.9%), and the second largest (15.3%) is the Sampo Group (March 2009). The foreign investors own 22.5% of the shares.<sup>59</sup> According to Figure 1, the Net Interest Income of Nordea is approximately two times as large as that of the other three banks and it has been continuously increasing since 2003, which makes Nordea leading in most Nordic markets. It is worth mentioning that Nordea is different from the other banks in the sample in terms of size and ownership structure.

#### 4.1.2 SEB

Skandinaviska Enskilda Banken (SEB) was established in 1856 by Andre Oscar Wallenberg, as the first commercial bank in Sweden. After 120 merger and acquisitions in 150 years, SEB has now become one of the leading financial groups in Northern Europe with 22311 employees<sup>60</sup>. SEB puts focus primarily on institutions, companies and individual customers with demanding requirements according to the results and commitment. The business idea of SEB is to offer

<sup>58</sup> Source: Swedish Bankers' Association Report on Banks in Sweden. "Facts about the Swedish banking market". Published in November 2008

<sup>59</sup> <http://www.nordea.com/About%2bNordea/Nordea%2boverview/Facts%2band%2bfigures/1081354.html> accessed 2009-04-30

<sup>60</sup> See Table 1



financial services and manage the financial risks for both institutions and individuals. The goal is to create values for all the customers, shareholders and employees based on continuity, mutual respect, professionalism and commitment.<sup>61</sup>

The shares of SEB are listed in NASDAQ, OMX Stockholm Stock Exchange. From Table 1 we can see that the largest shareholder of SEB is Investor AB, which owns 20.7% of total shares. The second largest shareholder with 9.6% of the shares of SEB is the Trygg Foundation. It is worth to mention that the majority of SEB's shareholders (81.4%) are from Sweden - institutions and foundations (53%), Private persons (12.4%), Mutual funds (15.9%)<sup>62</sup>. The foreign shareholders only hold 18.6% shares of SEB. However, the Net Interest Income of SEB is the lowest one in comparison to other three banks, as presented in Figure 1.

#### 4.1.3 Svenska Handelsbanken

Handelsbanken was created in 1871 in Stockholm, as Stockholm Handelsbanken, by few influential individuals in Swedish financial market, eight former SEB board members. Louis Fraenckel, who joined Handelsbanken in 1893, stayed with the bank for 11 years and had significant impact on the bank's development. Handelsbanken became the second largest bank at the time he left it<sup>63</sup>. In 1914, following several major acquisitions, the bank expanded into other regions of Sweden and became Svenska Handelsbanken.

Nowadays Handelsbanken provides services in the whole banking area. It has 461 branches all over the world with 10833 employees. Handelsbanken is one of the oldest listed companies in Stockholm stock exchange since 1873. Handelsbanken sees its strengths in:

- Higher profitability than the average for its competitors for the past 36 year;
- Highest level of customer satisfaction for the past 18 years;
- The most cost effective universal bank in Europe for many years;
- Lower loan loss ratio than its competitors for a long time<sup>64</sup>

Handelsbanken's corporate philosophy is build on following principles: decentralization – the branch is the Bank, the customer focus rather than individual products, profitability is given higher priority than volumes, long-term perspective and Oktogonen – the Bank's profit sharing system.

Table 1 shows that 30% of its outstanding shares belong to foreign investors, and there are only two major Swedish shareholders holding 10.6% and 10.4%, respectively. It has the lowest portion of national major investors and highest portion of foreign investors among other banks in the sample. Also, the table shows that its total asset amount is very close (slightly lower) to SEB's total asset amount. As well, the average number of employees is twice lower than that of other three banks. Figure 1 presents the interest income over eight years in Handelsbanken along with

<sup>61</sup> <http://www.sebgroup.com> accessed 2009-04-30

<sup>62</sup> SEB Annual Report 2008.

<sup>63</sup> History of Svenska Handelsbanken. Published by the Handelsbanken.

<sup>64</sup> Official website of the bank: [www.handelsbanken.com](http://www.handelsbanken.com). Accessed 2009-04-30



other banks in the sample. We can see that its highest net interest income was achieved in 2008, in spite of the financial crisis. The lowest net interest income for the period was in year 2000. According to Figure 1, Handelsbanken performance level in terms of net interest income in comparison to its competitors, such as SEB and Swedbank, is satisfactory: slightly increasing and slightly decreasing over the period. Nevertheless, Handelsbanken among its peers is the only bank which has no significant write-downs caused by the current financial crisis.

#### **4.1.4 Swedbank**

Swedbank, formerly called as FöreningsSparbanken, is a leading banking group in Nordic-Baltic region. This bank has its historical roots in the savings bank movements and was established in 1820. It acts in many respects in line with the fundamental savings bank ideology that is to be a bank for everyone and to maintain a strong link within the local community. At present, Swedbank is serving 9.4 million retail customers and 540 thousand corporate customers through 419, 271 and 216 branches in Sweden, Baltic countries and Ukraine respectively. The aim of the bank is to be the service leader in the industry and to make its customers' life easier. In order to achieve this objective, its main strategy is building strong local presence by providing a full range of easy to use and competitively priced financial services. The values the group upholds are:

- Result-oriented - achieve good results in everything it does;
- Open - transparent and open in its communication;
- Innovative - willing to learn new things and change;
- Committed - jointly building a sustainable business<sup>65</sup>

Table 1 shows that institutional investors own 44.6% of the total shares where saving banks foundations and foreign investors owns 19.3% and 13.5% of the total share respectively. The group reported total assets of SEK 1,832 billion and average number of employees of 23,762 for the year ended 2008. Swedbank's total asset was lower by 27.84% than SEB's total asset and by 16.07% than Handelsbanken's total assets. The graph shows that Swedbank has been able to achieve a continuous increase in its net interest income during the period from 2000 to 2008. It can also be revealed from the graph that Swedbank earned a slightly higher net interest than that of Handelsbanken and SEB in those years. It is worth mentioning that in 2008 Swedbank has earned higher net interest income than that of Handelsbanken and SEB by utilizing less total assets than these two mentioned banks<sup>66</sup>.

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<sup>65</sup> Official website for the bank: [www.swedbank.com](http://www.swedbank.com) accessed 2009-04-30

<sup>66</sup> See Figure 1 Net Interest Income in 4 banks 2000-2008



## 4.2 The relationship between credit risk management and profitability in four banks

Table 2 and 3 present regression results for the profitability equation, discussed in methodology part, where ROE is dependent variable. Table 2 shows that NPLR affects ROE negatively. NPLR  $\beta$  coefficient is -4,965 which means that one unit increase in NPLR decreases ROE by 4,965 units while CAR is held constant. The statistical significance of NPLR on ROE is 0.004 which is less than 0.05. This means that NPLR predicts effect on ROE with 99,6% probability. CAR on the contrary has a positive  $\beta$  coefficient 0,21. This indicates that one unit increases in CAR will increase ROE by 0,21 units, holding NPLR constant. The statistical significance of CAR is 0,541 which is a sign of relatively low significance. It implies that CAR predicts ROE with 45,9% probability. Thus, the results of the analysis states that NPLR has negative and significant affect on ROE, meanwhile CAR has positive and insignificant affect on ROE in comparison to NPLR.

**Table 2** Coefficient summary table, 4 banks

<b>*ROE</b>	<b>Coef.</b>	<b>**Signif. (P-value)</b>	<b>N.</b>
NPLR	-4,965	0,004	36
CAR	0,21	0,541	36

**Table 3** Model summary table, 4 banks

<b>R<sup>2</sup></b>	<b>Adj. R<sup>2</sup></b>	<b>F</b>	<b>Model Signif. (P-value)</b>
0,251	0,206	5,532	0,008

\* ROE is independent variable; \*\*Statistically Significant at 0, 05=5%

Furthermore, Table 3 presents the figures for the whole equation.  $R^2$  represents the prediction level of variance in ROE by NPLR and CAR, which is 0,251. This means that 25,1% of ROE can be predicted from both NPLR and CAR. Between two independent variables NPLR more reliably predicts ROE. This fact can be confirmed by the results<sup>67</sup> of simple regression analysis conducted separately with each independent variable. The results show that NPLR has 24,2% predicting ability of ROE while CAR has only 2,9%.

Adjusted  $R^2$  (20,6%) avoids the overestimation effect of adding CAR as second independent variable to the model. Therefore, adjusted  $R^2$  is treated as more accurate value even though  $R^2$  is differing by 4,4% (25,1%-20,6%=4,5%).

According to the table of F-distribution, the critical value of F distribution at the 5% significant level is 3,32<sup>68</sup>. In Table 3, the statistic value of F is 5,532, which exceeds the critical value of F (3,32). Hence, the regression as whole is significant; this means that NPLR and CAR reliably predict ROE. Furthermore, the P-value (significance) is 0,008, which also indicates that ROE is predicted with 99,92% probability by NPLR and CAR together and shows a statistically significant relationship among them. Therefore, the F-value, associated with P-value proves that

<sup>67</sup> Will be discussed in Methodology part in details and depicted in appendix

<sup>68</sup> Anerson. D.R & Sweeney. D.J & Williams. T.A (2008) Statistics for business and economics, 10th edition, F-distribution Table. pp.928.



there is a significant relationship between the profitability measured as ROE and credit risk management measured as NPLR and CAR.

To conclude the analysis of the relationship between profitability and credit risk management in the four commercial banks in Sweden, CAR contributed positively to banks profitability, while NPLR showed negative effects. However, comparing these two factors, NPLR has more significant effect and CAR has small and insignificant effect on ROE. Overall, the results of our regression analysis show that credit risk management impact profitability on fairly significant level in four commercial banks. In order to get more comprehensive results and answer our research question, we examine how credit risk management effect profitability in each bank separately in the following sections.

### 4.3 The relationship between credit risk management and profitability in Nordea

Nordea defines its credit risk as *the risk of loss if counterparties fail to fulfill their agreed obligations and that the pledged collateral does not cover the claims.*<sup>69</sup> The Bank discloses that 90% of its RWAs is exposed to credit risk; therefore it is characterized as the largest risk. Each customer area and product area primarily bears the responsibility for managing credit risk in its operation. However, credit risk management framework (policies, instructions and guidelines) is consolidated and monitored by Group Credit and Risk Control Committee. The credit risk measurement is based on three parameters PD (probability of default), LGD (Loss given default), CCF (Credit conversion factors) with standardized and FIRB (Foundation Internal Rating Based)<sup>70</sup> approaches.

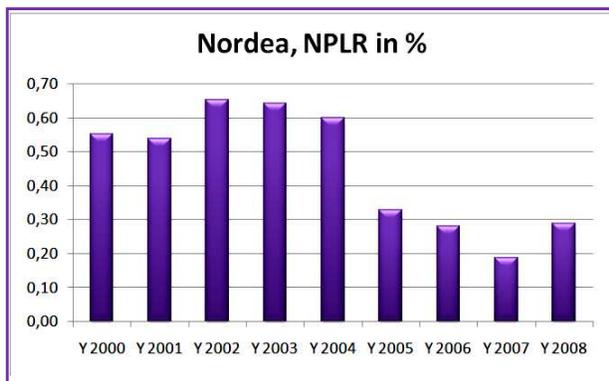


Figure 3 NPLR of Nordea 2000-2008, in %

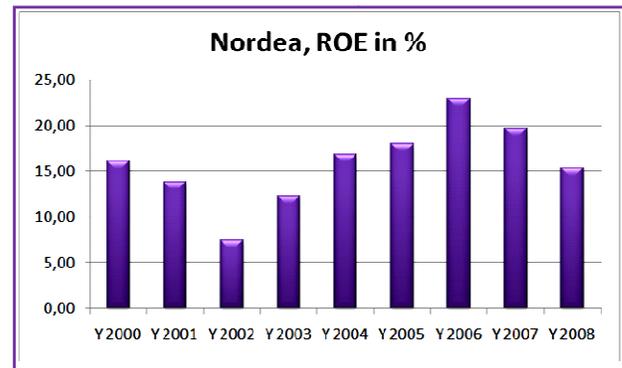


Figure 4 ROE of Nordea 2000-2008, in %

The credit risk is assessed continuously by units in charge on customer level and if the any customer deviates from the agreed conditions the measures are taken to minimize the probable credit losses. In case the customer is unable to repay its debt obligations for 90 days the credit

<sup>69</sup> Capital Adequacy and Risk management report (Pillar 3).Norea Group 2008.

<sup>70</sup> Measurement tools under Basel II



obligation becomes non-performing and if the situation cannot be improved afterwards the credit obligation becomes default. Nordea presents its NPLs under impaired loans and receivables.

The Figure 3 shows that NPLR has visible decline since 2005 till 2007. However, in 2008 the ratio has increased (0,19% to 0,29%)<sup>71</sup> by 10%. In comparison to other banks studied, Nordea's NPLR in year 2008 is lower than SEB's and Swedbank's and higher than Handelsbanken's NPLR<sup>72</sup>. All four banks have relatively higher NPLR in 2008 compared to previous years. We assume that this is caused by unstable financial market situation. Nordea has the highest TL amount<sup>73</sup> among the studied banks. NPL amount of Nordea is the second largest<sup>74</sup> in the group after SEB. Lower NPLR in relation to highest TL amount can be explained by its credit risk management strategy described above. Also because of its ownership characteristics, Nordea's NPLR has no sharp rise as in SEB and Swedbank in the sample.

Figure 4 shows that during the period from 2000 to 2008 Nordea had the lowest ROE in 2002 and comparing with the other banks as well.<sup>75</sup> This was due to the economic downturn, and the uncertainties on the equity market. The fall of equity-related revenues and interest rate, along with their influence on the deposit margin had a significant effect on the core income of Nordea. From 2003, Nordea put a lot of efforts to improve performance through the strategies of ensuring the capital efficiency and maintaining the credit portfolio quality. These in consequence led to the continuous increase in ROE till 2006. However, with the advent of the global financial crisis, the ROE decreased from 22,9% (2006) to 15,3% (2008).

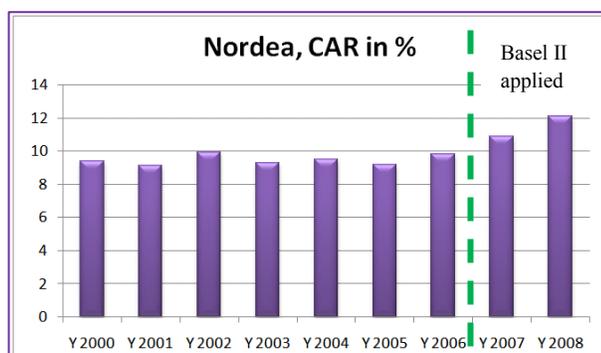


Figure 5 CAR of Nordea 2000-2008, in %

In June 2007, Nordea was given permission to follow Basel II CRD (Capital Requirements Directives). Further, Nordea decided to choose gradual transition to the new regulation: by applying IRB measurements to different types of credit portfolios at a time. The goal of Nordea's capital management is to increase returns to shareholders while keeping a prudent risk and return relationship. In order to keep strong capital position and to cover slightly increased RWA (from 204bln EUR to 213bln EUR), Nordea's recent capital policy has been structured to have lower

<sup>71</sup> Table 15 Ratios for SPSS analysis. Appendix 2

<sup>72</sup> NPLR in 4 banks. Appendix

<sup>73</sup> Total Loan Amount in 4 banks. Appendix

<sup>74</sup> Non-performing loan amount in 4 banks. Appendix

<sup>75</sup> ROE in 4 banks, Appendix 3



dividend payment along with active management of risk profile. The policy has an impact on the CAR level shown in Figure 5 as the highest in 2008.

Nordea has a very strong capital position with total capital ratio of 12,1% in 2008. Nordea maintains its target capital via its dividend payment rules as well as active management of its risk profile. In 2008, Nordea decreased the dividend payment level from 42% to 19%<sup>76</sup>, in order to reach the target CAR.

**Table 4** Coefficient summary table, Nordea

ROE	$\beta$ Coef.	Signif. (P-value)	N.
NPLR	-25,639	,008	9
CAR	-2,199	,115	9

**Table 5** Model summary table, Nordea

$R^2$	Adj. $R^2$	F	Model Signif. (P-value)
,718	,624	7,648	,022

The above Tables 4 and 5 present the regression analysis results of the profitability equation of Nordea. The coefficient (-25,639) shows that the NPLR has a strong negative effect on ROE in Nordea, which means that one unit increase of NPLR, ROE will decrease 25,639 units when CAR is held constant. The significance of NPLR is 0,008, which is less than 0,05. This refers that the NPLR can predict ROE with 99,2% probability. CAR also shows a negative effect on ROE in Nordea with a  $\beta$  coefficient of -2,199. This indicates that one unit increase in CAR will reduce ROE by 2,199 units, while the NPLR is held constant. The statistical significance of CAR is 0,115. It implies that CAR can predict ROE with 88,5% probability.

In Table 5,  $R^2$  (0,718) indicates the level of the prediction of NPLR and CAR on ROE, it means that 71,8% of ROE can be predicted by NPLR and CAR. It shows a high significant relationship between the profitability and credit risk management in Nordea. Furthermore, adjusted  $R^2$  is 62,4% and is considered as more reliable value for the model analysis.

According to the F-distribution table, the critical value of F distribution at 5% significant level is 5,14, in Table 5 the statistic value of F is 7,648, which is more than the critical value 5,14. Therefore, the regression of the equation for Nordea is significant; this means that NPLR and CAR can reliably predict ROE in Nordea. In addition, the P-value in Table 5 is 0,022, this reflects that the NPLR and CAR together predict 97,8% of ROE. Thus, the F-value associated with the P-value from the regression outputs show that there is significant relationship between the profitability and credit risk management in Nordea.

To sum up the analysis above, both NPLR and CAR have the negative effects on ROE, it refers that the credit risk management contribute a negative effect on the profitability in Nordea.

<sup>76</sup> Capital Adequacy and Risk management Report. Nordea, 2008

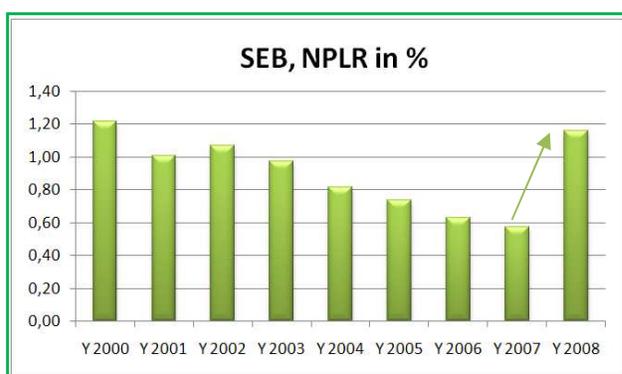


#### 4.4 The relationship between credit risk management and profitability in SEB

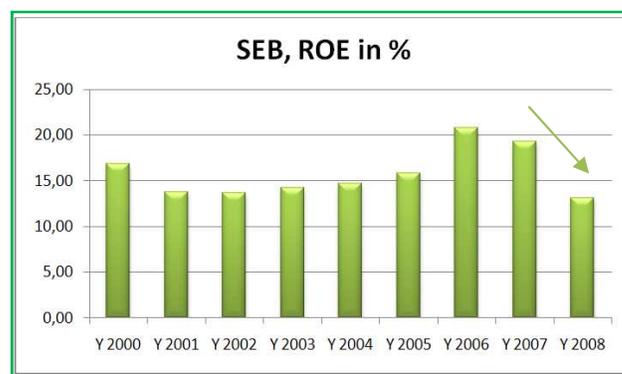
Risk management in SEB Group is a prior working area, and it is continuously developed, especially after the implementation of Basel II. The profitability of SEB depends on the capability to access, manage and price the risks that it is facing. Furthermore in order to meet the unforeseen problems, SEB puts a lot of efforts to maintain a sufficient capitalization. Therefore, SEB's risk policy is to identify, manage and monitor the risks and capital related issues in an early stage to ensure the financial stability. Credit risk is the main risk that SEB encounters; this can be shown in Figure 24 in Appendix.

*Credit risk in SEB refers to the risk of loss due to the failure of an obligor to fulfill its obligations towards SEB.*<sup>77</sup> It covers all claims and potential claims from different areas, such as firms, the other banks, institutions and individuals. IRB approach is applied for approximately 80% of the credit portfolio in SEB. Among them, the retail mortgage portfolios are reported according to IRB Advanced approach and the most corporate and inter-bank portfolios are reported in accordance with the IRB Foundation Approach.

In SEB, NPL refers to the loans that have passed due by more than 60 days and with insufficient collateral.<sup>78</sup> The Figure 19 in appendix illustrates the NPLR in the big four commercial banks. It is obvious that the NPLR of SEB is highest among the four banks. In 2008, SEB's NPLR increased dramatically comparing with the previous years (Figure 6) due to significant increase of the NPL amount in 2008 (12,963 SEK M) comparing to that in 2007 (7,619 SEK M). TL amount on the contrary dropped slightly (from 1,330,353 SEK M to 1,117,810 SEK M)<sup>79</sup>. The reasons, we assume, are the downturn economic situation and the worldwide financial crisis which to some extent led to high NPLR in 2008.



**Figure 6** NPLR of SEB 2000-2008, in %



**Figure 7** ROE of SEB 2000-2008, in %

Figure 7 shows stable increase in ROE till the year 2005, and reached the peak in 2006 (20,8%). However, ROE started to drop in 2007 and declined considerably in 2008 (from 19,3% to 13,1%).

<sup>77</sup> SEB's Annual reports 2008

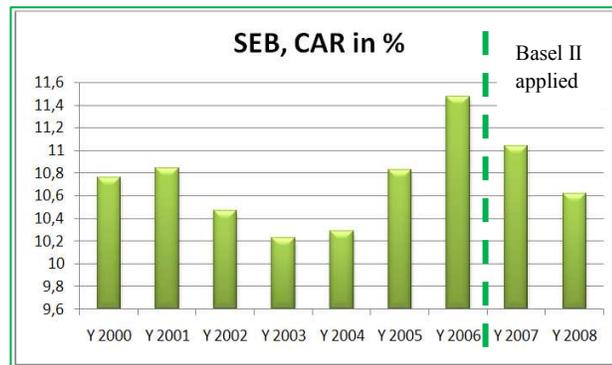
<sup>78</sup> SEB's Annual reports 2008

<sup>79</sup> SEB's Annual reports 2007 and 2008



This is because of the unprecedented financial turbulence, which brought higher risk and reduced the trust of the financial institutions, consequently had the negative effects on the profitability.

SEB uses the internally developed risk models to decide the capital requirement under the regulatory requirements of Basel II. Figure 8 shows that CAR was highest in 2006, 11.47%. After the Basel II application CAR decreased to 11,04 % and continued to decline in 2008. Bank explains this as the affect of applying Basel II with transitional rules.



**Figure 8** CAR of SEB 2000-2008, in %

In order to proactively strengthen SEB's capital base, the board of SEB uses a prudent policy and decided not to pay dividends to the shareholders in 2008. This gave a positive effect on the capital base and brought a strong capital buffer to face the impact from the uncertain economic environment.

Table 6 shows that NPLR has a negative effect on ROE with a  $\beta$  coefficient -4,483. This means that one unit increases in NPLR; ROE will decrease by 4,483 units, while CAR is held constant. The statistical significance of NPLR is 0,151, this tells that 84,9% of the variance of ROE can be predicted by NPLR. However, CAR has a visible positive effect on ROE. It refers if CAR increases one unit, ROE will increase 4,261 units, when NPLR is held constant. Comparing with NPLR, CAR has the significance 0,039, which indicates that the regression is significant, since it is lower than 0,05. CAR has a reliable prediction probability (96,1%) on ROE. Therefore, credit risk management (NPLR and CAR) in SEB has a considerable effect on the profitability.

R2 (0.763) represents the prediction level of ROE by NPLR and CAR together. It means that 76.3% of change in ROE can be predicted by NPLR and CAR, which shows that the credit risk management in SEB has a significant effect on its profitability. In addition, the Adjusted R<sup>2</sup> (68.4%) is considered a more reliable value for the regression analysis.



**Table 6** Coefficient summary table, SEB

ROE	$\beta$ Coef.	Signif. P-value	N.
NPLR	-4,483	,151	9
CAR	4,261	,039	9

**Table 7** Model summary table, SEB

$R^2$	Adj. $R^2$	F	Model Signif. P-value
,763	,684	9,662	,013

According to the F-distribution table, the critical value of F distribution at 5% significant level is 5,14 while in Table 7 the statistic F-value is 9.662, which is bigger than the critical F-value. Therefore, the regression of the equation for SEB is significant; this means that NPLR and CAR can reliably predict ROE in SEB. In addition, the P-value is 0.013, this reflects that the NPLR and CAR together predict 98.7% of the differences in ROE correctly. Thus, F-value and associated P-value show that there is significant relationship between the profitability and credit risk management in SEB.

To sum up the analysis above, the credit risk management has a substantial effect on the profitability in SEB. According the regression outputs, CAR has higher prediction ability than NPLR.

#### **4.5 The relationship between credit risk management and profitability in Svenska Handelsbanken**

Svenska Handelsbanken defines credit risk as “the risk of the Bank facing economic loss as the result of the Bank’s counterparties not being able to fulfill their contractual obligations”<sup>80</sup>. Handelsbanken identifies itself as highly selective bank in its choice of customers and borrowers. Bank follows its traditional *low risk tolerance conception* over the years and stays loyal to it. The Bank does not disregard its quality requirements for credit lending to achieve high loan volumes or higher returns.

As decentralized organization, branches of the Bank are responsible for credit lending decisions but credit limits are decided at higher organizational levels depending on the credit amount. Branches also bear full economic responsibility for granting the credit. The *local involvement* is another characteristic of the Bank’s credit risk management. Branches keep ongoing customer relationship with their clients. It gives them opportunity to have in-depth understanding of each individual customer’s current situation. Therefore, they can prevent significant credit losses since they become aware about the arising problem at the early stages. The Bank keeps its credit risks (loans and similar products) on the book rather than securitizing and selling them. By doing that Bank strengthens client’s loyalty and trust.

<sup>80</sup> Svenska Handelsbanken Report on Risk and Capital Management – information according to Pillar 3, 2008



From 2007 Swedish FSA granted permission to the Bank to use IRB approach of Basel II in credit risk measurement. The implementation of Basel II is approved to be gradually therefore the new regulation might not have significant effect on the credit risk management of the Bank in current period. Nevertheless, Figures 9 and 10 demonstrate (blue lines) that year 2008 relatively differs from previous years by sudden change: decrease in ROE and increase in NPLR. This might be caused by the effect of financial market situation.



Figure 9 NPLR of Handelsbanken 2000-2008, in %



Figure 10 ROE of Handelsbanken 2000-2008, in %

The Bank classifies NPLs as loans where interest, repayments or overdrafts have been due for payment for more than 60 days.<sup>81</sup> Despite the high loan amount in Handelsbanken in comparison to other banks<sup>82</sup>, NPLR is the lowest. This means that even if the Bank has high lending it has low loss in that lending, most probably, due to successful credit risk management strategy.

Furthermore, CAR is also noticeably ascended late two years after application of Basel II. The Bank discloses use of Foundation IRB approach for credit risk measurement and pending status for permission to use Advanced IRB approach in further periods. The Basel II transitional regulations period is planned to be ended in 2010.

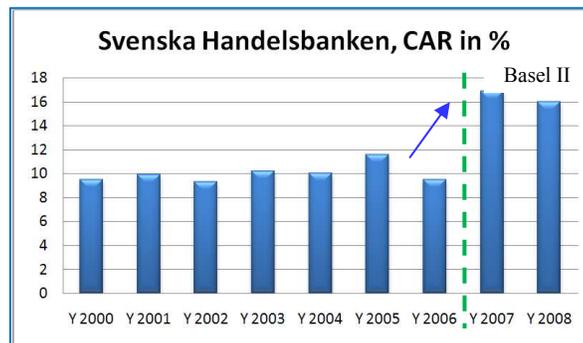


Figure 11 CAR of Handelsbanken 2000-2008, in %

<sup>81</sup> Svenska Handelsbanken. Annual Report 2008.

<sup>82</sup> Figure 16 Loans amount in 4 banks. Appendix.3



Figure 11 above depicts CAR of Handelsbanken over 9 years. After Basel II has been applied the CAR increased from 9,5% in 2006 to 16,9% in 2007, the Bank relates the increase with the new regulation and states that according to Basel I CAR would be 10,4%. The difference refers to calculation method of capital requirement. Pillar 2 in Basel II necessitates designing a model for bank's ICAAP and in this assessment the bank must take broader approach to risks. Therefore, CAR of Basel II has significant difference from CAR of Basel I.

Further regression analysis revealed very interesting facts. According to regression analysis, the  $\beta$  coefficient of NPLR is negative -7,794 (Table 8 and 9) which indicates that one unit increase in NPLR decreases ROE by 7,794 units however the statistical significance or the probability of such prediction is only about 28%. Statistically, this probability level indicates that prediction ability or the  $\beta$  coefficient of NPLR is by chance assigned the value of -7,794. It also indicates that there is no statistical relation between ROE and NPLR. This fact is very controversial to above mentioned analysis of all four banks where NPLR and ROE has statistically significant relations. Moreover, CAR's  $\beta$  coefficient is positive 0,210 which is explained as one unit increase in CAR increases ROE by 0,210 units. Yet the probability of this to happen is about 33% and statistically characterized as by chance relation between CAR and ROE.

**Table 8** Coefficient summary table, Handelsbanken

ROE	$\beta$ Coef.	Signif. (P-value)	N.
NPLR	-7,794	,716	9
CAR	,210	,665	9

**Table 9** Model summary table, Handelsbanken

$R^2$	Adj. $R^2$	F	Model Signif. (P-value)
,091	-,212	,301	,750

$R^2$  of the model is 0,91 which indicate that only 9% of the variations in ROE are explained by independent variables NPLR and CAR. Further, adjusted  $R^2$  -0,212 is the most interesting value to consider. The negative sign means that the model predictors do not explain the changes in ROE in this particular case. This fact makes Handelsbanken the only bank in the sample for which regression analysis results show that NPLR and CAR are not the appropriate predictors for ROE. There are some other predictors that might explain the relationship between profitability and credit risk management<sup>83</sup> more reliably.

F-distribution table shows the critical value of F is 5,14. In the model the statistic value of F is 0,301, which is less than critical value. Therefore, the regression of the equation for Handelsbanken is not statistically significant; this means that NPLR and CAR do not reliably predict ROE in Handelsbanken. Likewise, the whole regression model's probability value or the

<sup>83</sup> In case ROE is profitability indicator.



statistical significance is 0,750, much greater than 0.05 and confirms by chance relation of predictors and ROE.

To conclude, unlike other banks' analysis in the sample, Handelsbanken analysis clearly indicate that NPLR and CAR are not reliable predictors for ROE. The reason for that might be the different approach of the bank to the credit risk management and its decentralized structure. ROE, NPLR and CAR in 4 banks depicted in Figures 18, 19 and 20 in Appendix evidently prove relatively better performance of Handelsbanken than other banks. This is not coincidence; hence the Bank's primary goal is to be one step ahead of its customers and it is successfully achieving this goal.

#### **4.6 The relationship between credit risk management and profitability in Swedbank**

Credit Risk in Swedbank is defined as *the risk that a counterparty, or obligator, failing to meet contractual obligations to Swedbank and the risk that collateral will not cover the claim*<sup>84</sup>. Its credit policy stresses on having credit portfolios that are well diversified with low risk profile as well as high profitability. Swedbank attempts to achieve a low level of risk through lending to customers with a high debt service ratio, good collateral. At the same time, high profitability is achieved by, among other things, setting clear targets for return in relation to risk. Swedbank labels the group's credit risk as low and well diversified since it focuses on lending to a large number of private individual and diversification within and between sectors and regions. Approximately half of Swedbank's exposure stem from retail customers with historically low credit loss level, where 85%<sup>85</sup> of the portfolio is low risk.

In addition, Swedbank's internal risk rating system for loans measures, as accurately as possible, the risk that a customer will default and thereby estimate the losses that the group could face. Hence the system act as a business support tool and a risk control function. Moreover, Group Risk Control independently determines and illustrates Group's credit risk in both credit portfolios and credit process. Afterwards, using external expert analysis Group Risk Control proposes measures that can form the basis of group's strategic decision.

Each business unit is responsible for monitoring indicators and conditions implying that the level of credit risk in each undertaking has increased. Customized actions basing on the individual requirements of every specific case are taken in case of increased risk.

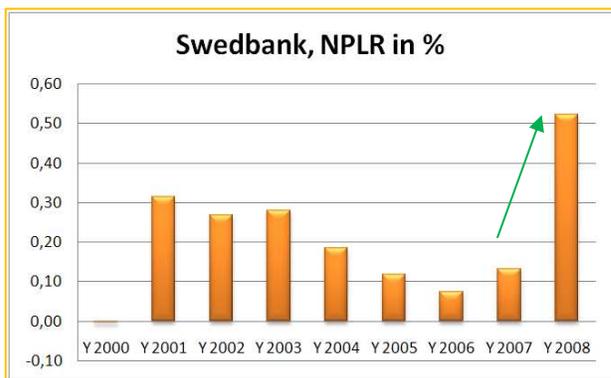
Nonetheless, Loans are classified as impaired loans (NPLs) if payments are unlikely to be made in accordance with contract items. Looking at the Figure 12, we can see that NPLR has shown a decreasing trend from the year 2001 till 2006, excluding the year 2003. In the backdrop of macroeconomic conditions and weaker economic development Swedbank has experienced an increase in NPLR in 2006. The dramatic event in global financial market left a mark by contributing to a sharp increase in NPLR from 2007 to 2008 (0.13% to 0.52%). Baltic banking,

<sup>84</sup> Risk and Capital Adequacy 2008, <http://www.swedbank.com/sst/inf/out/infOutWww1/0,,211597,00.html>, Accessed 2009-05-10

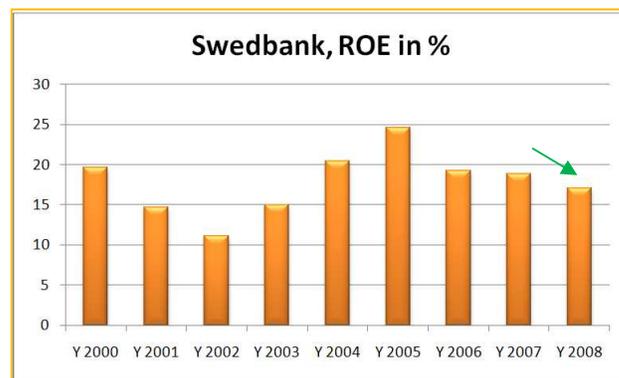
<sup>85</sup> Risk and Capital Adequacy 2008, <http://www.swedbank.com/sst/inf/out/infOutWww1/0,,211597,00.html>, Accessed 2009-05-10



primarily among private customers and real estate management companies, accounted for 76% of the increase in gross impaired loan (SEK5.7 bln out of SEK7.5bln).



**Figure 12** NPLR of Swedbank 2000-2008, in %



**Figure 13** ROE of Swedbank 2000-2008, in %

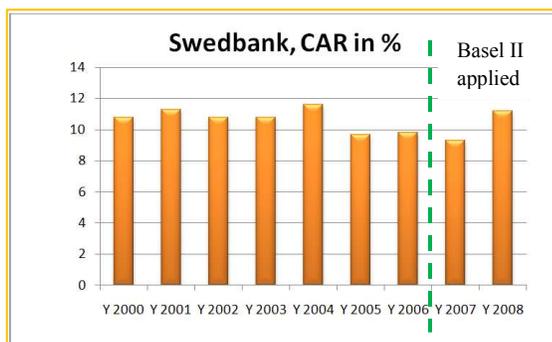
Swedbank has been able to maintain a low NPLR than that of SEB and Nordea during the years studied, with the exception of year 2008<sup>86</sup>. This can be explained by its policy of low risk profile with well diversification as described earlier.

Figure 13 shows that there are ups and downs in the ROE of Swedbank during the period from 2000 to 2008. Swedbank earned the lowest ROE in 2002 (11.2%) The reduction in the ROE was associated with the declining income from currency and stock market-related operations. However, to improve the condition, the bank focused on increased customer satisfaction, growth with cost control, competence development and good leadership etc. These efforts resulted in gradual increase in the ROE which reached the highest point in 2005(24.6%). It then started to decrease again from 2006 and the trend continued till 2008(17.1%). This is mostly due to the worldwide financial crisis. However, compared to other banks, Swedbank's ROE was the highest in the years 2003, 2004, 2005 and 2008<sup>87</sup>. There are various reasons that can justify the results. For example, Swedbank's ability to sustain large losses is dependent not only on the strength of the income statement but also on more qualitative factors such as risk management capabilities, internal governance and control.

In March 2007, Swedbank has received approval from the SFSA to apply IRB approach which is also used to calculate most of the capital requirement (except for Swedbank Finance) for credit risk. Three concepts, PD, LGD and EAD, are central to IRB system. However, Swedbank also maintains a capital buffer against unexpected losses to protect itself against credit loss that exceeds the anticipated level. Finally, capital requirement for the credit risk is worked out on the basis of PD, LGD, EAD and the type and size of the counterparty.

<sup>86</sup> Figure 19 NPLR in all 4 banks, Appendix 3.

<sup>87</sup> Figure 18 ROE in all 4 banks, Appendix 3



**Figure 14** CAR of Swedbank 2000-2008, in %

Capitalization of Swedbank is continuously monitored to ensure that it is at the desirable level according to both legal capital requirement and internal capital target. To achieve the preferred level, the bank adjusts the capital base through using measures such as new share issues, adjustment of dividend level and sales of various assets etc. Accordingly, in November 2008, Swedbank issued right shares of SEK 12.4 billion which strengthens its capital base. This, together with the increase in RWAs, is expressed by the increase in CAR in the Figure 14 from 2007 to 2008.

**Table 10** Coefficient summary table, Swedbank

ROE	$\beta$ Coef.	Signif. P-value	N.
NPLR	-10,481	,335	9
CAR	-,943	,646	9

**Table 11** Model summary table, Swedbank

$R^2$	Adj. $R^2$	F	Model Signif. P-value
,294	,058	1,248	,352

Table 10 above shows that NPLR  $\beta$  coefficient is -10,481 which means that one unit increase in NPLR decreases ROE by 10, 481 units, when Car held constant. The statistical significance of NPLR is 0,335 which is way above than 0.05. This means that NPLR predicts the variances in ROE with 66.5% probability. Similar to NPLR, CAR also has a negative  $\beta$  coefficient of -0,943. It can be explained as one unit of increase in CAR will decrease the ROE by 0,943 unit. And the significance level in this case is 0,646 which is also way beyond 0,05. This means that CAR can predict the changes in ROE with 35,4% probability. Therefore, we can state that both NPLR and CAR has negative effect on ROE while in this specific case NPLR more reliably predicts ROE than CAR.

Table 11 shows the value of  $R^2$  is 0,294 which pointed toward the predicting ability of NPLR and CAR on the differences in ROE is at 29,4%. Statistically such a low value for  $R^2$  indicates the relationship of ROE and NPLR, and CAR is by chance. Moreover, the large difference between  $R^2$  and adjusted  $R^2$  also confirms the possibility of by chance relationship. Specifically, adjusted  $R^2$  of 0,058 indicates 5,8% probability of true relation.



The resulted F-value in case of Swedbank is 1,248 whereas critical F-value is 5,14 and is higher than the resulted value. Hence, the regression equation as a whole is insignificant. The associated P-value in the table is 0,352 which means that NPLR and CAR can predict ROE with about 64% probability. Thus we can say that the relationship of ROE, NPLR and CAR is ambiguous: neither true nor by chance when it comes to Swedbank.

To conclude, the effect of credit risk management on profitability seem not to be clear in Swedbank. From above discussion, it can be said that NPLR is likely to have an effect on ROE more than CAR.

#### **4.7 Basel II application affect**

Basel II, new capital adequacy rules, came into force on February 2007 in Sweden. A new capital adequacy law and regulation, based on Basel II, issued by the Swedish SFSA also came into effect from February 1<sup>st</sup> 2007. In comparison with Basel I, Basel II is expected to reward banks by lowering its required capital reserve. There are, however, both positive and negative opinions of Basel II among the practitioners. Most commonly expressed positive opinions are that it confirms current banking practice that it measures risk with banks' own model and that Basel II creates more efficient internal systems and better management for controlling risk<sup>88</sup>. On the other hand, amongst the most frequently stated negative opinions are that theoretically derived models do not essentially work in practice, that there are different interpretations of this type of vague regulation and that the implementation of Basel II requires excessively large amount of resources (ibid). However, according to Basel Committee, more refined measurement of risk as outlined in Basel II can solve numerous problems facing by the banking industry.

Unlike Basel I, Basel II takes into account the differences among banks. For instance, if an individual bank can provide evidence to its national banking supervisor that its risk measuring models are adequately advanced, that bank is rewarded with lower capital requirement. Figure 20 in the appendix also confirms this by presenting lowest CAR for SEB, amongst the listed banks in this study, after Basel II effect (started from the year 2007).

Since Basel II involves major changes compared to the previous rules, it is applied in phases (the transition period) till 2011. The transition rules necessitate, among other thing, that the capital base must be no less than 95% (2007), 90% (2008) and 80% (2009) respectively of the capital required for credit and market risks calculated in accordance with the previous adequacy rules, Basel I<sup>89</sup>. Accordingly, the regression results of Basel II comparison, as presented below in tables 12 and 13 contain the effect of the transitional rules.

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<sup>88</sup> Wahlstrom G., 2009, Risk management vs. operational action: Basel II in a Swedish Context, Management Accounting Research, Vol 20, pp. 53-68.

<sup>89</sup> Risk and Capital Adequacy 2008, <http://www.swedbank.com/sst/inf/out/infOutWww1/0,,211597,00.html>, Accessed 2009-05-10.



**Table 12** Coefficient summary table, Basel II affect

ROE	$\beta$ Coef.		Signif. P-value		N.
	Before	After	Before	After	
NPLR	-3,084	-5,282	,536	,162	8
CAR	-,710	,075	,622	,870	8

**Table 13** Model summary table, Basel II affect

$R^2$		Adj. $R^2$		F		Model Signif. P-value	
Before	After	Before	After	Before	After	Before	After
,189	,428	-,135	,199	,584	1,872	,592	,247

Table 12 shows that NPLR has a  $\beta$  coefficient of -3.084 before the application of Basel II whereas it is -5.282 after the implementation of Basel II. These values imply that before the enforcement of Basel II, for every unit increase in NPLR, there is a 3,084 unit decrease in the predicted ROE, keeping the other variable CAR constant. On the other hand, after the introduction of Basel II, for one unit increase in NPLR, there is a 5,282 unit decrease in the predicted ROE, CAR being held constant.

The variable NPLR is not statistically significant as P-values for this coefficient (0.536 and 0,162 before and after, respectively) are larger than 0.05. This indicates that before the Basel II effect, NPLR could predict the variance in ROE with 46,4% probability. However, after Basel II application, NPLR predicts the variances in ROE with about 84% probability. CAR on the other hand has a negative coefficient (-0,710) before and a positive coefficient (0,076) after Basel II effect. Hence, for every unit increase in CAR, we expect a 0.71 unit decrease in ROE for the period prior to Basel II effect, while NPLR remain constant. And for every unit increase in CAR, a 0,075 unit increase in ROE is expected, being NPLR held constant. However, the variable CAR is not statistically significant, because p-values are much greater than 0.05 in both cases.

$R^2$  in Table 13 is the proportion of variance in ROE which can be predicted from NPLR and CAR. This value indicates that about 19% of the variances in ROE can be predicted from the variables (NPLR and CAR) for the period prior to Basel II. After the effect of new Basel Accord, NPLR and CAR can predict 42.8% of the variances in ROE.

However, adjusted  $R^2$  shows negative value -0,135 before and 0,199 after Basel II application. This implies that before its application, NPLR and CAR were not appropriate predictors of the changes in ROE since the value of adjusted  $R^2$  is negative. Nevertheless after Basel II application, picture has changed: NPLR and CAR predict the changes in ROE with higher probability (about 20%) than before.

According to the table of F-distribution, the critical F-value at 5% significant level is 5,79<sup>90</sup>. In Table 13 the statistic value of F is 0,584 before and 1,872 after the Basel II application. In both cases values are lower than the critical F-value, so the regression as whole is insignificant; this means that NPLR and CAR do not reliably predict ROE. Furthermore, the P-value (significance) is 0,592 and 0,247 respectively which implies before it was 40,8% and after 75,3% probability that NPLR and CAR predict variances of ROE in the regression model. Therefore, the F-value and

<sup>90</sup> Anerson. D.R & Sweeney. D.J & Williams. T.A (2008) Statistics for business and economics, 10th edition, F-distribution Table. pp.928.



associated P-value proves that there is not significant relationship between the profitability and credit risk management before and fairly significant after the application of Basel II.

To conclude, NPLR and CAR are weak predictors of the changes in ROE before implementing Basel II Accord, and have become stronger predictors of ROE after its application. It is worth to mention that the effect on CAR interestingly changes from negative to positive after the application of Basel II. Therefore, we can claim that Basel II application increased credit risk management (NPLR and CAR) effect on profitability (ROE). We assume this is because Basel II considers risks more comprehensively than Basel I. But, we must note that the sample size used for this comparison analysis is statistically very small and the banks have not implemented Basel II completely and are under transition period till 2011.



## 4.8 Summary of the findings

According to the analysis above, the main findings of our study are summarized as follows:

**Table 14** Summary of regression results

	All 4 banks	Nordea	SEB	Svenska Handelsbanken	Swedbank	Before Basel II	After Basel II
<b><math>\beta</math> of NPLR</b>	-4,965	-25,639	-4,483	-7,794	-10,481	-3,084	-5,282
<b><math>\beta</math> of CAR</b>	0,21	-2,199	4,261	0,210	-0,943	-0,710	0,075
<b>Adj. R<sup>2</sup></b>	0,206	0,624	0,684	-0,212	0,058	-0,135	0,199
<b>Signif.</b>	0,008	0,022	,013	0,750	0,352	0,592	0,247

The regression outputs of all four banks show that NPLR has negative and significant effect on ROE compared to CAR. It indicates that profitability is fairly affected by credit risk management in this banking group. Since banks have different characteristics and risk management policies, credit risk management affect profitability on different levels in each bank (Table 14). In Nordea, both NPLR and CAR show negative effect on ROE, while NPLR has relatively more negative effects on ROE ( $\beta$  coefficient is  $-25,639$ ). Thus, the credit risk management has negative effects on its profitability. In SEB, NPLR contributes in negative way, while CAR contributes in positive way toward ROE. Both of them have significant influence on ROE. Therefore, credit risk management affects profitability significantly in SEB. In Svenska Handelsbanken, the regression outputs clearly show that NPLR and CAR are not the reliable predictors of ROE. However, we can't claim if there is an effect of credit risk management on profitability or not. Because in case of Handelsbanken, there are might be different predictors than the ones we have used in our case (NPLR and CAR). In Swedbank, both NPLR and CAR have negative effect on ROE while NPLR affects ROE more than CAR. All in all, the credit risk management of Nordea and SEB has relatively similar impact on their profitability and is different from the case of Svenska Handelsbanken and Swedbank.

The analysis shows that the effect of NPLR on ROE has become stronger after Basel II regulation has been applied. Nevertheless, CAR seems to have very low impact on ROE after Basel II application. It is worth mentioning that the effect of Basel II on CAR of the banking group has an opposite impact on ROE compared to Basel I. Prior to the adoption of Basel II, however, NPLR and CAR appear to be not appropriate predictors of ROE because the Adjusted R<sup>2</sup> shows negative value ( $-0,135$ ) and the P-value ( $0,592$ ) remarkably exceeds the significant level of  $0,05$ .

The findings above consequently help us to understand and answer how the credit risk management affects profitability both on group and individual level.



## 5. Concluding remarks

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*In this chapter, we conclude on our study and give suggestions for further studies*

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The aim of our study is to determine the impact of credit risk management on profitability. It is important to note that our sample size though satisfactory is not credible enough to extend the results to all commercial banks and other financial institutions in Sweden. Therefore, the results refer only to the sample of the study.

The results obtained from the regression model show that there is an effect of credit risk management on profitability on reasonable level with 25,1% possibility of NPLR and CAR in predicting the variance in ROE. So, the credit risk management strategy defines profitability level to an important extent. Especially, NPL amount appears to be adding the most weight to that than CAR. However, separate analysis of each bank, considering the fact that the sample size are not on statistically satisfactory level, show that not all banks' NPLR and CAR define ROE. Handelsbanken's results indicate that NPLR and CAR are very weak or incapable of predicting the variance in ROE. This means that this bank's profitability has other predictors or variables that affect ROE more reliably than NPLR and CAR. We assume that it is related to Handelsbanken's decentralized structure and unique approach to credit risk management which keep the bank's NPLR on very low level over decade. Basel II application has strengthened the negative impact of NPLR on ROE. Unlike effect of Basel I, CAR has positive and insignificant effect on ROE.

Nevertheless, reasonable but not significant impact of NPLR and CAR on ROE in our study could be fairly validated by relevant previous studies. Samy and Magda (2009) study the impact of capital regulations on bank performance and show that 45,6% variances in ROE can be predicted by using a set of independent variables. They have used 15 independent variables while we have used two, and the only common independent variable is CAR. Their study suggests that higher capital requirement contributes positively to banks' profitability which is consistent with our findings. We think if more independent variables are added to our regression model, we could have achieved higher predicting ability ( $R^2$ ) of ROE by independent variables.

### ***Suggestions for further studies***

This study could be further developed by including more independent variables to the regression model and increasing the sample size. Also, we believe that the study could be further enhanced by examining Basel II affect on profitability in few years from now once the transitional period is over. Moreover, if this study is supplemented with qualitative study of credit risk management, the findings would be more objective and informative. At last, profitability indicator could be developed by adding other relevant dependent variable to grasp the whole variations in profitability.



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Official website of SEB: [www.seb.com](http://www.seb.com)



Official website of Svenska Handelsbanken: [www.handelsbanken.com](http://www.handelsbanken.com)

Official website of Swedbank: [www.swedbank.com](http://www.swedbank.com)

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## APPENDIX 1

### Interview questions

#### A. Profitability and regulatory effect

1. Do the effects of capital requirement of Basel II constrain you to go for high risk transaction?
2. How does capital requirement of Basel II affect profitability of your bank?
3. Which ratio in your opinion is a better indicator of profitability, ROE or RORAC, why?
4. Which factors do you think impact profitability the most? (i.e. risk management, strategy, regulations, market situation etc.)

#### B. Credit-risk management

5. In which situations can taking a higher risk for higher return be defended? By what arguments?
6. Which is the most common collateral? How sensitive is the collateral to market movements?
7. How do you think credit risk management helps to increase profitability of your bank?

#### *Non-performing loans*

8. What do you do with the loans that default to pay on time?
9. What are the criteria to classify performing loan as non-performing loan?
10. What are actions that you take after recognizing non-performing loan?
11. How are NPLs secured in general? (Are they handled by banks themselves or Auctioned, Kredit Inkassa, etc.)
12. What is the NPL percentage of your total lending? (current and average)
13. Which ratios in your opinion other than NPL ratio (non-performing loan/total loan) are indicators of better credit risk management, why?



## APPENDIX 2

Table 15 Required ratios for SPSS analysis

Nordea									
	Y 2000	Y 2001	Y 2002	Y 2003	Y 2004	Y 2005	Y 2006	Y 2007	Y 2008
NPLR	0,55	0,54	0,65	0,64	0,60	0,33	0,28	0,19	0,29
ROE	16,10	13,80	7,50	12,30	16,90	18,00	22,90	19,70	15,30
CAR	9,4	9,1	9,9	9,3	9,5	9,2	9,8	10,9	12,1
SEB									
	Y 2000	Y 2001	Y 2002	Y 2003	Y 2004	Y 2005	Y 2006	Y 2007	Y 2008
NPLR	1,21	1,01	1,07	0,97	0,82	0,74	0,63	0,57	1,16
ROE	16,90	13,80	13,70	14,20	14,70	15,80	20,80	19	13
CAR	10,76	10,84	10,47	10,23	10,29	10,83	11,47	11,04	10,62
Swedbank									
	Y 2000	Y 2001	Y 2002	Y 2003	Y 2004	Y 2005	Y 2006	Y 2007	Y 2008
NPLR	0,00	0,31	0,27	0,28	0,18	0,12	0,07	0,13	0,52
ROE	19,7	14,7	11,2	15	20,5	24,6	19,3	18,9	17,1
CAR	10,8	11,3	10,8	10,8	11,6	9,7	9,8	9,3	11,2
Handelsbanken									
	Y 2000	Y 2001	Y 2002	Y 2003	Y 2004	Y 2005	Y 2006	Y 2007	Y 2008
NPLR	0,17	0,24	0,17	0,12	0,09	0,05	0,05	0,05	0,11
ROE	22,20	18,40	14,60	14,90	16,60	17,90	20,90	23,30	16,20
CAR	9,5	9,9	9,3	10,2	10	11,6	9,5	16,9	16

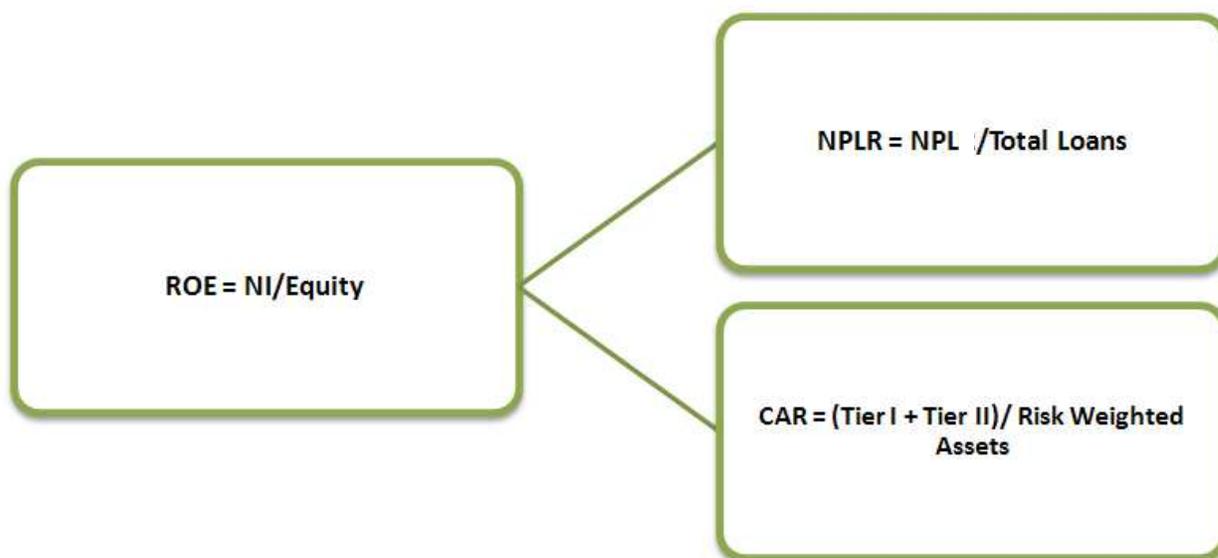


Figure 15 Regression Equation applied



## Regression analysis output in SPSS

Table 16 Regression results with NPLR and CAR as independent variables in 4 banks

Model Summary<sup>b</sup>

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,501 <sup>a</sup>	,251	,206	3,24791	,251	5,532	2	33	,008

a. Predictors: (Constant), CAR, NPLR

b. Dependent Variable: ROE

ANOVA<sup>b</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	116,706	2	58,353	5,532	,008 <sup>a</sup>
	Residual	348,114	33	10,549		
	Total	464,820	35			

a. Predictors: (Constant), CAR, NPLR

b. Dependent Variable: ROE

Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	16,816	3,837		4,382	,000					
	NPLR	-4,965	1,588	-,477	-3,127	,004	-,492	-,478	-,471	,974	1,026
	CAR	,210	,341	,094	,618	,541	,171	,107	,093	,974	1,026

a. Dependent Variable: ROE



**Table 17** Simple regression results with NPLR as independent variable in 4 banks

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,492 <sup>a</sup>	,242	,220	3,21823	,242	10,880	1	34	,002

a. Predictors: (Constant), NPLR

b. Dependent Variable: ROE

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	112,682	1	112,682	10,880	,002 <sup>a</sup>
	Residual	352,138	34	10,357		
	Total	464,820	35			

a. Predictors: (Constant), NPLR

b. Dependent Variable: ROE

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	19,127	,846		22,595	,000					
	NPLR	-5,123	1,553	-,492	-3,298	,002	-,492	-,492	-,492	1,000	1,000

a. Dependent Variable: ROE



**Table 18** Simple Regression results with CAR as independent variable in 4 banks

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,171 <sup>a</sup>	,029	,001	3,64306	,029	1,023	1	34	,319

a. Predictors: (Constant), CAR

b. Dependent Variable: ROE

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13,576	1	13,576	1,023	,319 <sup>a</sup>
	Residual	451,244	34	13,272		
	Total	464,820	35			

a. Predictors: (Constant), CAR

b. Dependent Variable: ROE

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	12,898	4,068		3,170	,003					
	CAR	,381	,377	,171	1,011	,319	,171	,171	,171	1,000	1,000

a. Dependent Variable: ROE



**Table 19** Regression results with NPLR and CAR as independent variables in Nordea

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,847 <sup>a</sup>	,718	,624	2,71643	,718	7,648	2	6	,022

a. Predictors: (Constant), NPLR, CAR

b. Dependent Variable: ROE

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	112,866	2	56,433	7,648	,022 <sup>a</sup>
	Residual	44,274	6	7,379		
	Total	157,140	8			

a. Predictors: (Constant), NPLR, CAR

b. Dependent Variable: ROE

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	49,223	13,805		3,566	,012					
	CAR	-2,199	1,194	-,488	-1,842	,115	,105	-,601	-,399	,668	1,497
	NPLR	-25,639	6,606	-1,029	-3,881	,008	-,748	-,846	-,841	,668	1,497

a. Dependent Variable: ROE



**Table 20** Regression results with NPLR and CAR as independent variables in SEB

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,874 <sup>a</sup>	,763	,684	1,51247	,763	9,662	2	6	,013

a. Predictors: (Constant), CAR, NPLR

b. Dependent Variable: ROE

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44,204	2	22,102	9,662	,013 <sup>a</sup>
	Residual	13,725	6	2,288		
	Total	57,929	8			

a. Predictors: (Constant), CAR, NPLR

b. Dependent Variable: ROE

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics		
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF	
1	(Constant)	-25,824	18,834		-1,371	,219						
	NPLR	-4,483	2,724	-,383	-1,646	,151	-,701	-,558	-,327	,729	1,372	
	CAR	4,261	1,624	,611	2,624	,039	,810	,731	,521	,729	1,372	

a. Dependent Variable: ROE



**Table 21** Regression results with NPLR and CAR as independent variables in Swedbank

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,542 <sup>a</sup>	,294	,058	3,79004	,294	1,248	2	6	,352

a. Predictors: (Constant), CAR, NPLR

b. Dependent Variable: ROE

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35,842	2	17,921	1,248	,352 <sup>a</sup>
	Residual	86,186	6	14,364		
	Total	122,029	8			

a. Predictors: (Constant), CAR, NPLR

b. Dependent Variable: ROE

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	30,065	19,693		1,527	,178					
	NPLR	-10,481	10,009	-,418	-1,047	,335	-,516	-,393	-,359	,740	1,351
	CAR	-,943	1,949	-,193	-,484	,646	-,406	-,194	-,166	,740	1,351

a. Dependent Variable: ROE



**Table 22** Regression results with NPLR and CAR as independent variables in Svenska Handelsbanken

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,302 <sup>a</sup>	,091	-,212	3,47381	,091	,301	2	6	,750

a. Predictors: (Constant), CAR, NPLR

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7,276	2	3,638	,301	,750 <sup>a</sup>
	Residual	72,404	6	12,067		
	Total	79,680	8			

a. Predictors: (Constant), CAR, NPLR

b. Dependent Variable: ROE

**Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	16,843	6,737		2,500	,047					
NPLR	-7,794	20,445	-,163	-,381	,716	-,245	-,154	-,148	,825	1,212
CAR	,210	,461	,195	,455	,665	,263	,183	,177	,825	1,212

a. Dependent Variable:

ROE



**Table 23** Regression results with NPLR and CAR as independent variables in 4 banks before Basel II

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,435 <sup>a</sup>	,189	-,135	3,05456	,189	,584	2	5	,592

a. Predictors: (Constant), NPLR, CAR

b. Dependent Variable: ROE

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10,903	2	5,452	,584	,592 <sup>a</sup>
	Residual	46,652	5	9,330		
	Total	57,555	7			

a. Predictors: (Constant), NPLR, CAR

b. Dependent Variable: ROE

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	28,166	13,432		2,097	,090					
	CAR	-,710	1,353	-,230	-,525	,622	-,343	-,228	-,211	,847	1,180
	NPLR	-3,084	4,638	-,291	-,665	,536	-,381	-,285	-,268	,847	1,180

a. Dependent Variable: ROE



**Table 24** Regression results with NPLR and CAR as independent variables in 4 banks after Basel II

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,654 <sup>a</sup>	,428	,199	2,80254	,428	1,872	2	5	,247

a. Predictors: (Constant), CAR, NPLR

b. Dependent Variable: ROE

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29,408	2	14,704	1,872	,247 <sup>a</sup>
	Residual	39,271	5	7,854		
	Total	68,679	7			

a. Predictors: (Constant), CAR, NPLR

b. Dependent Variable: ROE

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	18,932	6,112		3,097	,027					
	NPLR	-5,282	3,225	-,622	-1,638	,162	-,652	-,591	-,554	,793	1,262
	CAR	,075	,439	,065	,172	,870	,349	,077	,058	,793	1,262

a. Dependent Variable: ROE



### APPENDIX 3

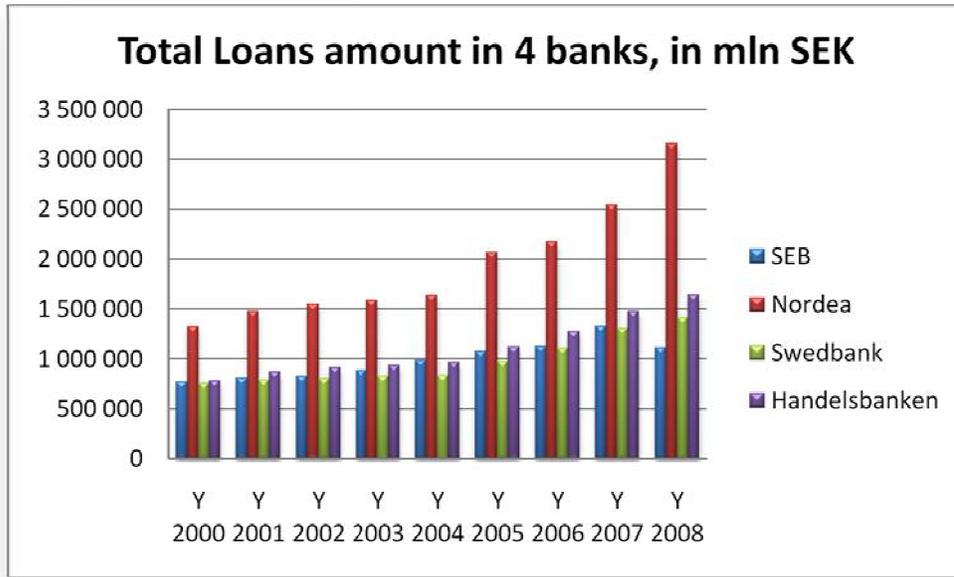


Figure 16 TLs amount in 4 banks, in mln SEK

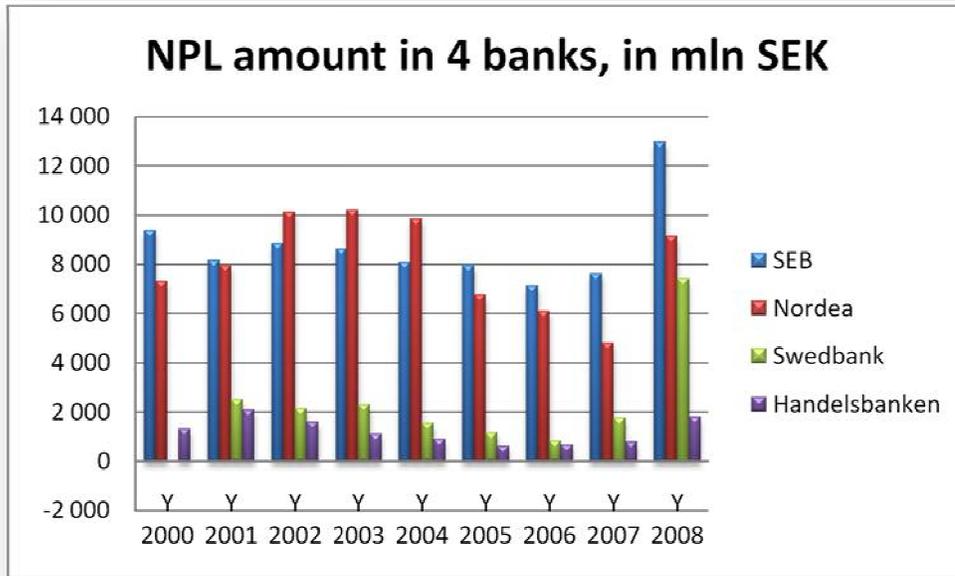


Figure 17 NPLs amount in 4 banks, in mln SEK

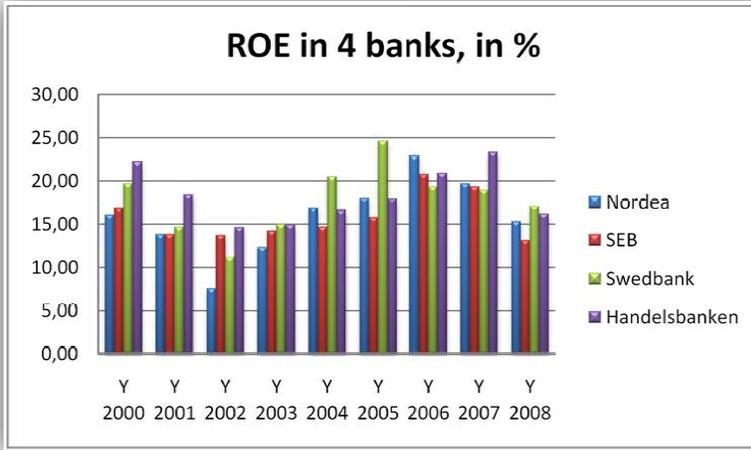


Figure 18 ROE of 4 banks 2000-2008, in %

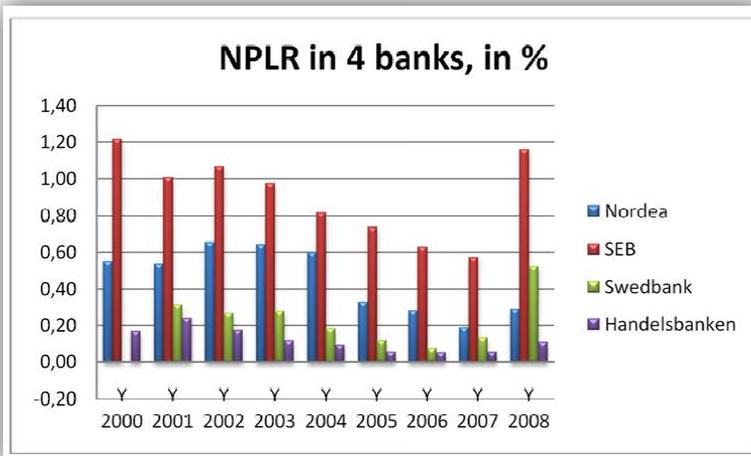


Figure 19 NPLR of 4 banks 2000-2008, in %

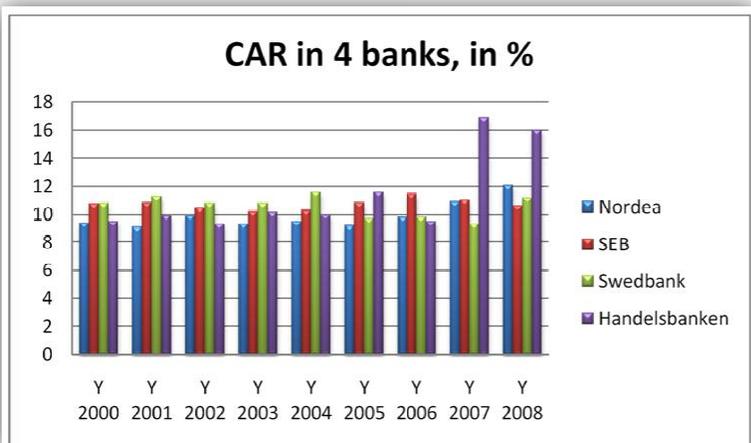


Figure 20 CAR of 4 banks 2000-2008, in %



## APPENDIX 4

### Excerpts and Graphs from Annual Reports

GROUP		2007
SEK m		
<b>ASSETS</b>		
Cash and balances with central banks		13 590
Treasury bills and other eligible bills	Note 17	33 702
Loans to credit institutions	Note 15	185 149
Loans to the public	Note 16	1 292 988

Figure 21 Excerpt from Handelsbanken Annual report 2007: Total Loan amount calculation

## Key figures and quarterly performance

Key figures for the Handelsbanken Group					
	2005	2004	2003	2002	2001
Profit before loan losses, SEK m	15 400	13 718	11 843	10 781	11 360
Loan losses/recoveries, SEK m	261	-167	-492	-392	-152
Write-downs/reversed write-downs of financial non-current assets, SEK m			199	-199	-
Operating profit, SEK m	15 665	13 553	11 550	10 190	11 208
Profit for the year, SEK m	11 365	9 860	8 116	7 282	8 290
Total assets, SEK m	1 580 733	1 316 789	1 260 454	1 277 514	1 174 521
Shareholders' equity, SEK m	65 651	61 372	56 835	52 192	48 112
Return on shareholders' equity, %	18.0	16.6	14.9	14.6	18.4
Return on shareholders' equity after standard tax, %	17.8	16.4	15.3	14.6	17.8
Return on total assets, %	1.08	1.05	0.90	0.83	0.99
Cost/income ratio, %	41.5	42.8	46.9	50.2	47.5
Loan loss ratio, %	-0.03	0.02	0.06	0.05	0.02
Bad debt reserve ratio, %	65.9	53.4	51.4	60.9	59.4
Proportion of bad debts, %	0.12	0.21	0.28	0.23	0.25
Capital ratio, %	11.6	10.0	10.2	9.3	9.9
Tier 1 capital ratio, %	7.6	7.6	7.3	6.4	6.1
Average number of employees	9 395	9 150	9 258	9 752	9 239
No. of branches in Sweden	455	453	453	456	458
No. of branches in other Nordic countries and Great Britain	128	120	101	96	93

Figure 22 Excerpt from Handelsbanken Annual Report 2005 (collection of ROE and CAR)

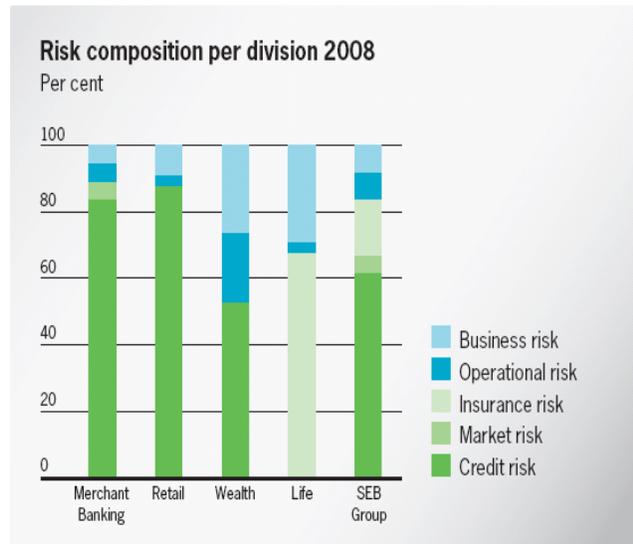
### Definitions and explanations

**NON-PERFORMING LOANS.** Loans where interest, repayments or overdrafts have been due for payment for more than 60 days.

#### DOUBTFUL CLAIMS

Claims which are overdue for payment by more than 60 days and loans for which other circumstances cause uncertainty as to their value and for which the value of their collateral does not cover both principal and accrued interest by a safe margin.

Figure 23 Excerpts from Annual reports: Handelsbanken 2007 and Swedbank 2002



(Source: SEB Annual Report 2008)

**Figure 24** SEB Risk compositions per division 2008