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The impact of sovereign rating actions on banks' ratings and share prices in developed and emerging countries

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The Impact of Sovereign Rating Actions on Banks' Ratings and Share Prices in Developed and Emerging Countries

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Abstract

This thesis analyses the effects of sovereign rating actions on banks in developed and emerging market countries using sovereign ratings data from S&P, Moody's and Fitch spanning 1999 to 2011. I use ordered probit modelling to analyse the impact of sovereign rating actions on bank ratings in emerging markets, and find that bank ratings are associated with very high probabilities of being upgraded (downgraded) following sovereign rating upgrades (downgrades). Local-privately owned banks are most likely to follow sovereign upgrades, whilst foreign owned banks are most likely to follow sovereign downgrades. Using an event day methodology I find that European sovereign rating actions have significant spillover effects into the share prices of banks from other European countries i.e. a cross-border effect. Negative rating actions by S&P have a very immediate and negative impact on the bank share prices, whilst the effects are more delayed following negative rating actions by Moody's. Negative outlook and watch signals are found to be informative also. The effects from Fitch are weaker, with evidence that the markets mostly anticipate Fitch negative rating actions. Negative rating actions to emerging market sovereigns have significant negative impacts on the home-country bank share prices from all three agencies, and the effects are more pronounced following negative changes to outlook and watch for S&P and Fitch. Only S&P positive signals have positive effects on bank share prices in emerging markets.

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Table of Contents

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List of Tables

Chapter 1: Introduction

In the context of the US subprime crisis (2007-9) and the European debt crisis (2010-13), credit rating agencies (CRAs) have been under the spotlight and their actions have been featured in the media like never before. Unfortunately, much of this media discussion is ill-informed and there is a need for new research to promote a stronger evidence base for making intelligent judgements about CRAs and the merits of their roles and actions.

The CRAs have suffered serious scrutiny over recent years. Initially, this was due to some instances where they misinterpreted the risks of some issuers. For instance, the CRAs failed to predict the sudden collapse of the US energy corporation Enron at the beginning of this century. S&P, Moody's Investors Service (Moody's) and Fitch all rated Enron at investment grade just four days before its collapse (Duff and Einig, 2009). More recently, they failed to correctly assess the risks associated with mortgage backed securities and collateralized debt obligations which contributed to the US subprime mortgage crisis. Since 2010, the CRAs have been heavily criticised by European politicians for untimely downgrades of many euro-zone sovereigns, which are thought to have exacerbated an already downward trend in the markets. There are also concerns with the issuer-pays business model where issuers seeking credit ratings pay the CRAs for providing an assessment. Two problems can arise from this. The first is that the issuer can shop around for better credit ratings (most issuers have ratings from more than one CRA), which leads to an issuer having multiple ratings. The second is that there is an obvious potential conflict of interest for the CRA. For example, is a CRA likely to give an issuer a poor credit rating when they are paying them lots of money to rate them? These are all reasons why the credibility of CRAs and the ratings they provide are constantly questioned.

Sovereign credit ratings represent an assessment of a government's ability and willingness to meet their financial obligations, and foreign-currency sovereign ratings

represent an assessment of a government's ability and willingness to generate the foreign exchange necessary to meet their foreign obligations. The demand for sovereign credit ratings has increased greatly over the last three decades. For instance, Standard and Poor's Corporation (S&P) has increased its coverage from seven rated sovereigns in 1975 to 128 in December 2012. The more recent growth has come predominantly from emerging markets where countries' governments seek sovereign credit ratings in order to attract foreign investment. Indeed, sovereign ratings serve a gate-keeping function for emerging markets to access global financial markets, and they also represent a rating ceiling for the non-sovereigns in the country (non-sovereign issuers are rarely rated better than their home sovereign's rating). CRAs are key players in the current global economy because their views are highly regarded by market participants and their influence increased due to regulations such as the Basel II accord which ties credit ratings to the capital requirements of banks and other financial institutions. The sovereign ceiling is a serious issue for the banks and other financial institutions that seek credit ratings since they are highly unlikely to receive a better credit rating than their home country, which could affect their cost of capital depending on movements to the sovereign rating.

The sovereign credit rating environment has changed somewhat over the years. Developed countries were associated with high investment grade sovereign ratings which were very stable through time. This was in contrast with emerging markets that were associated with much poorer quality sovereign ratings that were very unstable. This situation has changed due to the European sovereign debt crisis and economic growth e.g. of Brazil, Russia, India, China and South Africa (i.e. BRICS countries). Some euro-zone sovereigns in particular Portugal, Ireland, Italy, Greece and Spain (or PIIGS) have been repeatedly downgraded, despite being previously rated at the high end of the rating scale or benefiting from improving credit rating quality until around 2007/2008. A particularly serious problem

during the European sovereign debt crisis is large banks' holdings of European sovereign bonds. This caused the sovereign debt problems to be transmitted through to the financial sector and banks.

The theme of this thesis is to investigate the link between sovereign credit ratings and banks in the global economy. In particular, I will study how closely linked bank ratings are to their corresponding sovereign rating, and also how sovereign ratings can affect the market value of banks. The specific research questions to be studied in this thesis are as follows.

The first topic (in Chapter 3) considers 'what is the impact of sovereign rating actions on bank ratings in emerging markets?' Specifically I identify how often banks are rated at or above or below their corresponding sovereigns' rating, and also estimate the probability of a bank rating upgrade (downgrade) following an upgrade (downgrade) to its corresponding sovereign rating. I also investigate the effect that the sovereigns' 'watchlist' status has on the future rating change probabilities for banks. I identify potential differences in policies between different CRAs, namely, S&P, Moody's and Fitch. I also investigate whether bank ratings have different sensitivities to sovereign ratings depending on their ownership status or whether or not they are publicly listed.

The second topic (in Chapter 4) considers 'what is the impact of sovereign rating actions on bank share prices during the European sovereign debt crisis?' Specifically I identify how the markets' perception of a bank's value changes with sovereign rating changes. The issue that has been raised recently is how banks are exposed to the sovereign debt of foreign governments i.e. exposed to government debts of foreign countries. I look at the effect of sovereign rating actions on banks across borders, and consider all types of rating actions in the analysis, not just rating upgrades and downgrades i.e. consider outlook and watch also.

The third and final topic (in Chapter 5) investigates 'what is the impact of sovereign rating actions on bank share prices in emerging markets?' This third topic is on a similar theme to the second but differs in prior hypotheses and in the countries under investigation. The third topic focuses specifically on emerging market countries, similar to the first topic. In this topic I consider how sovereign rating changes impact on the share prices of banks based in the same country as the sovereign rating, whilst the second topic looks at the cross border effect (in Europe).

The sovereign rating dataset used in Chapters 4 and 5 is obtained directly from CRA publications, and supplied by my supervisors. The sovereign and bank rating datasets used in Chapter 3 are from InteractiveData Credit Ratings International and accessed via my supervisors. I focus on long-term foreign-currency ratings in each chapter. The credit ratings data focuses on the ratings by the three largest global CRAs, namely: S&P, Moody's and Fitch, who share the vast majority of the sovereign ratings business worldwide. The bank ratings are issuer ratings or senior unsecured debt ratings. Emerging market countries are identified according to the World Bank's country classification, according to GNI per capita. All low-income and middle-income countries are classified as emerging market countries.

The structure of the thesis is as follows. Chapter 2 provides an overview of three elements: (i) the credit ratings industry; (ii) a literature review of the most relevant research to the topics covered in this thesis, and an identification of gaps in the literature; and (iii) a brief review of methodological issues. Each element provides an underpinning for the three empirical chapters.

Chapter 3 studies the impact of sovereign ratings on bank ratings in emerging market countries. I find that emerging market bank ratings are highly likely to be upgraded (downgraded) following upgrades (downgrades) to their corresponding sovereign rating. I find the effect to be stronger for upgrades than for downgrades, i.e. banks are more likely to

be upgraded following sovereign upgrades than they are of being downgraded following sovereign downgrades. I also find Fitch to be the most likely to upgrade (downgrade) banks following an upgrade (downgrade) to their corresponding sovereign, whilst I find Moody's to be the least likely to do so. I also highlight important differences between banks with different ownership status, while identifying that the above effects are not driven by state-owned banks.

Chapter 4 studies the impact of sovereign rating actions on bank share prices during the European sovereign debt crisis. Unsurprisingly, the banks are found to have severe downward pressure on their share prices during the sample period, but I find that negative sovereign rating actions have an additional detrimental impact. Negative actions by S&P seem to induce the strongest and most immediate impact on bank share prices. The impact of negative actions by Moody's have the strongest impact on bank share prices over a longer term. I find that the impact of negative rating actions (regardless of which CRA) is stronger when the rating action conveys new rating information to the market i.e. compared to the rating information of the other CRAs. Negative events which are clustered have a stronger impact on the bank share prices, compared to events which are isolated.

Chapter 5 studies the impact of sovereign rating actions on bank share prices in emerging market countries. I find that positive sovereign rating actions by S&P induce positive share price reactions in banks based in the same country, whilst no such conclusion can be drawn for Moody's and Fitch. I find that the bank share prices react more to negative news by Moody's and Fitch compared to S&P, whilst negative sovereign rating actions by Fitch are the least anticipated.

Chapter 6 concludes the thesis and discusses the main results from the study and their implications. It also discusses some limitations and directions for future research.

This thesis provides an important contribution to the credit ratings literature through investigating the behaviour of the CRAs and their impact on banks in the global economy. The thesis draws important results that, until now the literature has failed to address. The results will be of particular interest for the regulation of the CRAs, and for the users of their ratings to gain a better understanding of their behaviour and how they affect banks. The potentially interested parties include investors, banks, financial institutions, CRAs, issuers (both sovereign and banks), and fund managers who will find the implications drawn in this thesis give them a better understanding of the importance of sovereign credit ratings in the current global economy.

Chapter 2: A Review of the Credit Ratings Industry, Prior Literature Review and Relevant Methods

2.1. Introduction

This chapter aims to provide three elements which serve as a foundation for the empirical chapters. Firstly, Section 2.2 of the chapter provides a review of the key fundamentals of the credit rating industry which are of relevance to this thesis. Secondly, Section 2.3 of this chapter provides a literature review which discusses prior related work and which identifies gaps within the prior literature. Thirdly, Section 2.4 of this chapter offers a brief review of core methodological issues which support the more detailed coverage of specific methods within each of the empirical Chapters 3 to 5. For a more thorough and excellent account of the credit ratings business and the main body of underlying literature, I refer the reader to Alsakka (2010).

2.2. The credit ratings business

Section 2.2 provides an overview of the credit ratings business inherent in bank ratings and sovereign ratings. I provide an account of how credit rating agencies (CRAs) convey their opinions on issuers' creditworthiness and how the opinions may change through time. I briefly cover the different types of credit ratings that CRAs can provide, and then conclude the section by explaining the philosophy of CRAs' methodology and how they mitigate the tension between rating stability and accuracy.

A credit rating represents an assessment given by a CRA on an issuer's ability and willingness to meet its debt obligations. Another way of looking at ratings is that they are opinions on the default probability of issuers. Many different types of entities seek credit ratings, but the two types of credit ratings that are of interest in this thesis are bank ratings

and sovereign ratings. A bank rating, as the name suggests, is a CRAs opinion of a bank's ability and willingness to meet its debt obligations, whilst a sovereign rating is a CRA's opinion on a government's ability and willingness to meet its debt obligations. The CRAs represent their opinion according to a categorical scale, called the rating scale. For Standard and Poor's Corporation (S&P) and Moody's Investors Service (Moody's) for instance the top of the scale, which represents the best possible rating and therefore the opinion of very low default probability, is represented by AAA and Aaa, respectively. This scale works down in steps towards D and C, respectively, for issuers who have defaulted. The credit rating of an issuer doesn't always stay at the same category, for instance if an issuer's default probability seems to improve then its rating can move away from the D/C category towards the AAA/Aaa, which would represent an improvement in creditworthiness. Likewise, a deterioration in an issuer's perceived default risk would mean that its rating will move away from the AAA/Aaa towards the D/C category.

CRAs can give different types of ratings to the same issuer. Firstly, there are short-term and long-term credit ratings, which rate an issuer's ability to meet a debt obligation of no more than 12 months' maturity, and more than 12 months' maturity, respectively. Credit ratings are also split into local-currency and foreign-currency, which represent ratings for the issuer depending on the currency of their debt issuance. The difference between local- and foreign-currency ratings is of particular importance for sovereigns. It's accepted that a government is less likely to default on its debt if the repayment is required in its local currency. This is because a government can impose taxes or print money in order to obtain the necessary payment in their local currency, but cannot do this in a foreign currency agreement. There are also deposit ratings and financial strength ratings for banks, which are distinct from the debt ratings.

This thesis focuses on three CRAs, namely: S&P, Moody's and Fitch. These are the three largest global CRAs and hold the vast majority of the sovereign credit ratings business worldwide, i.e. S&P, Moody's and Fitch hold 99.20% of market for government securities ratings out of all nine Nationally Recognized Statistical Rating Organizations (NRSROs) (US SEC, 2012). As was mentioned earlier, a CRA's opinion on an issuer's default probability is represented on a rating scale. The long-term rating scale utilized by S&P consists of 23 categories: AAA, AA+, AA, AA-, A+, A, A-, BBB+, BBB, BBB-, BB+, BB, BB-, B+, B, B-, CCC+, CCC, CCC-, CC, R, SD, D. The long-term rating scale utilized by Moody's consists of 21 categories: Aaa, Aa1, Aa2, Aa3, A1, A2, A3, Baa1, Baa2, Baa3, Ba1, Ba2, Ba3, B1, B2, B3, Caa1, Caa2, Caa3, Ca, C. The long-term rating scale utilized by Fitch consists of 20 categories. AAA, AA+, AA, AA-, A+, A, A-, BBB+, BBB, BBB-, BB+, BB, BB-, B+, B, B-, CCC, CC, C, D.[1]

As I mentioned above, an issuer's assigned rating category is not static and does not remain indefinitely. It's usually the case that an issuer moves up or down or in both directions on the rating scale over time. Let us consider the rating scale of S&P. If S&P adjusts an issuer's rating to A+ from A, then this is said to be an upgrade, as it's a positive adjustment to the issuer, moving it closer towards the top rating category (AAA). This particular example is regarded as a one-notch upgrade, since it has only moved up one category. An issuer may be upgraded by more than one-notch if the CRA decides to do so. If the opposite happens, and S&P adjusts the issuer to A-, from A, this is said to be a downgrade, as it's a negative adjustment of the issuer on the rating scale. Again, this is an example of a one-notch downgrade, but an issuer may be downgraded by more than one-notch. The same principles apply for Moody's and Fitch.

[1] Note that pre- 2006 Fitch's long-term rating scale had four additional categories of CCC+, CCC-, DDD, and DD.

The three CRAs have different policies on how they assess an issuer's credit worthiness. S&P's long-term Issuer Credit Ratings (ICR) represents a forward-looking opinion about the overall creditworthiness of an issuer to meet its financial obligations, and is calculated as the probability of default only. S&P's ICRs do not consider the issuer's standing in the event of bankruptcy or liquidation (Standard and Poor's, 2012). S&P apply no sovereign ceiling, and say that non-sovereign ratings may be higher when the non-sovereign issuer has stronger credit characteristics than the sovereign and when the risk of the sovereign limiting access to foreign exchange needed for debt service is less than the risk of sovereign default. S&P state that non-sovereign issuers are generally rated the same as or below the level of their home sovereign, even though they apply no sovereign ceiling (Standard and Poor's, 2008).

Moody's states that its long-term issuer ratings reflect both the likelihood of default on contractually promised payments and the expected financial loss suffered in the event of default on debt with maturities of one year or more. For bank issuers, Moody's also assigns Bank Deposit Ratings (BDRs) and Bank Financial Strength Ratings (BFSRs). Long-term BDRs reflect a bank's ability to repay its deposit obligations in full and also reflects the financial loss of the default. BFSRs reflect Moody's opinion of a bank's intrinsic safety and soundness, and do not take into account the probability of timely payment. Moody's assigns country ceilings for foreign-currency which indicates the highest possible rating that can be achieved by a foreign-currency denominated issue subject to the monetary sovereignty of that country. Moody's also assigns ceilings for BDRs (Moody's Investors Service, 2013). However, the sovereign rating is the rating of government debt and is commonly different to the country ceiling.

Fitch's long-term issuer ratings or Issuer Default Ratings (IDRs) assess an issuer's relative vulnerability to default on its financial obligations (or probability of default). IDRs

also address relative vulnerability to bankruptcy, administrative receivership or similar concepts, although Fitch does recognize that issuers may also make pre-emptive and therefore voluntary use of such mechanisms. IDRs are also presented alongside Recovery Ratings (RRs). For bank issuers, Fitch also publishes Support Ratings (SRs) and Viability Ratings (VRs). SRs are Fitch's judgement on whether or not a bank would receive external support if it's needed. VRs express Fitch's views on the intrinsic creditworthiness of banks. Fitch also publish country ceilings which reflect their judgement regarding the risk of capital and exchange controls being imposed by the sovereign that would prevent or impede the private's sectors ability to generate the foreign exchange necessary for their foreign currency obligations. The ceiling represents a maximum limit for the foreign currency issuer rating of most, but not all, issuers in a given country (Fitch Ratings, 2013). Similar to Moody's, the sovereign government debt rating is distinct from the country ceiling.

The credit ratings supplied by CRAs involve what's called a 'Through the Cycle' rating philosophy (Altman and Rijken, 2006). This means that the ratings represent a forward-looking view of the issuer risk of default over a long-term of one or more business cycles. 'Through the Cycle' ratings are employed so that they are more stable through time i.e. they don't change frequently and rating reversals are rare. These features are of great importance since unstable ratings would be a nightmare for portfolio management when subject to ratings-based regulation or governance (see Cantor et al., 2007). CRAs only adjust an issuer's rating when they believe that there has been a permanent change to its creditworthiness. One problem that arises from the 'Through the Cycle' methodology is that some users of credit ratings (e.g. hedge funds or short-term investors) wish for them to reflect an issuer's current situation more accurately (i.e. a 'point-in-time' philosophy).

The CRAs reduce this tension between rating stability and accuracy by having supplemental information in their ratings judgement called 'outlook' and 'watch'. An issuer

may be placed on positive, negative, or developing watch, which gives an indication that the CRA is seriously considering upgrading, downgrading, or changing the issuers rating, typically with an ex-ante horizon of 90 days. Watch is regarded as a very strong indicator that an issuer's credit rating will be changed in the near future. Similarly to watch, an issuer can be placed on positive, negative, stable or developing outlook, which indicates the CRA is expecting the issuer's rating to be upgraded, downgraded, remain stable, or to change in either direction in the medium-term, typically between 12 to 18 months. Outlook and watch status do not imply that a future rating change in that direction is guaranteed, nor is there any certainty about the time horizon at which a rating change or rating confirmation action would occur. Indeed, it is argued that outlook and/or watch serve an economic function, for example in motivating a debt issuer to take action to avoid a rating downgrade or ensure a rating upgrade (see Bannier and Hirsch, 2010; Boot et al., 2006). Rating changes can occur without any prior outlook or watch signal.

2.3. Literature review

This section provides a review of the prior empirical studies that are relevant to this thesis. The relevant studies consider the following topics:

i. The determinants of sovereign credit ratings, split sovereign ratings, sovereign rating migrations and their importance in the global economy;
ii. Bank ratings;
iii. How credit rating actions, in particular sovereign ratings, have an impact on financial markets;
iv. The credit rating agencies and their regulation.

2.3.1. Sovereign ratings

Foreign-currency sovereign ratings represent assessments of the ability and willingness to generate the foreign exchange necessary to meet the government's obligations. Historically, the CRAs have not revealed the method they use in their rating assessments, although they are becoming more transparent. For instance, S&P state that they use a combination of qualitative and quantitative information to rate business and government issuers (Standard and Poor's, 2011). The lack of transparency in CRAs' assessments of sovereigns led to many empirical studies seeking to reveal their methodologies. Such studies are typically able to map sovereign ratings well with a combination of economic and financial fundamental indicators.

Cantor and Packer (1996) found that sovereign issuers had received better credit ratings by Moody's and S&P with higher figures of GDP per capita and GDP growth. They also found sovereign credit ratings to be inversely related to inflation rate and external debt-to-export ratio. Trevino (1999) extends the above study and provides similar results. A notable outcome from Trevino (1999) is that sovereign issuers from the same geographic region as the CRA tend to have better ratings, which is explained as CRAs having a better understanding of nearby sovereigns, and also introduces the 'home bias' hypotheses. Monfort and Mulder (2000) and Mulder and Perrelli (2001) find the following macroeconomic indicators to be significant contributors in explaining sovereign ratings: the total debt-to-exports ratio, rescheduling history, inflation rate, export growth, fiscal balance-to-GDP, growth rate of GDP, and the share of investment to GDP.

Hu et al. (2002) find that countries with past default history, lower reserves, higher inflation, a higher debt to GNP ratio, being a non-industrial country and a higher ratio of debt service to exports are subject to lower quality sovereign ratings. Afonso (2003) confirms the findings of Hu et al. (2002) by finding countries with a history of default and higher ratio of

debt-to-exports are subject to lower quality sovereign ratings. Afonso (2003) also identifies four factors that are most important in determining sovereign ratings, which are: GDP per capita, level of economic development, real growth rate and inflation rate. Alexe et al. (2003) find financial depth and efficiency (represented by the ratio of the domestic credit provided by the banking sector to the GDP), GDP per capita, debt-to-export ratio, political stability, exchange rate and fiscal balance to be significant determinants of sovereign ratings.

Bissoondoyal-Bheenick (2005) finds that GNP per capita and inflation rate are the main factors in determining sovereign ratings since they are forward looking indicators of default risk, which is what credit ratings represent. The author stresses that the significance of economic indicators vary depending on the development of the country under consideration, for instance the real exchange rate, net exports/GDP, foreign reserves, and unemployment are insignificant indicators for the highly rated sovereigns, whilst current account balance and the level of foreign reserves, GNP per capita and inflation rate are important indicators for determining sovereign ratings for countries with low creditworthiness.

Bennell et al. (2006) find that countries with high levels of external debt-to-exports, high rates of inflation, and having a history of default are associated with lower quality sovereign ratings. Higher levels of fiscal balance, GDP growth, GDP per capita and industrial countries are linked to better sovereign ratings. Mellios and Paget-Blanc (2006) find that per capita income, government revenue, real exchange rate, inflation rate, default history and a country's development level are significant determinants of sovereign ratings.

Afonso et al. (2007) highlight important differences between different economic indicators that affect short-run and long-run sovereign rating performance. They find changes to GDP per capita, GDP growth, government debt, and government balance to be short-run determinants of sovereign ratings. The long-run determinants include government effectiveness, external debt, default history and foreign reserves. Alsakka (2010) finds that

GDP per capita, inflation rate, foreign reserves and default history are all common factors considered by six international CRAs in assigning emerging market sovereign ratings. The author also highlights important inter-agency differences in their sovereign ratings methodologies for instance external debt is positively related to sovereign ratings for Fitch, GDP growth and fiscal balance is negatively related to sovereign ratings for Moody's, and current account balance is positively related to sovereign ratings for S&P. [2]

2.3.2. Inter-agency differences in sovereign ratings and bank ratings

An important point to consider is potential differences in the behaviour of the difference CRAs. If each CRA has exactly the same methodologies then why is there a need for so many CRAs? In Section 2.2, I mention some differences in the policies between S&P, Moody's and Fitch, however, the amount of studies focusing on the differences in their methodologies is relatively few. In fact, it was Alsakka (2010) that first highlighted important differences in the CRAs methodologies in sovereign ratings. It is evident that the CRAs often use the same key financial and economic indicators, but the weightings that they place on them varies. Alsakka (2010) finds that the CRAs are very keen on using both quantitative and qualitative factors in their downgrading of emerging market sovereign ratings, whilst qualitative factors are more important in sovereign upgrades. The author puts this down to greater reputational risks associated with CRAs incorrectly downgrading a sovereign as opposed to an incorrect upgrade. Increased GDP per capita and foreign exchange reserves are found to increase (decrease) the probability of upgrades (downgrades) for S&P, Moody's and Fitch.[3] Decreased reserves-to-foreign debt and GDP growth are considered in sovereign downgrades by Moody's. S&P's sovereign downgrade decisions are driven by a weakening exchange rate and investments relative to GDP.

[2] Alsakka (2010) provides results for three other CRAs, but I only report the results for S&P, Moody's and Fitch since they are the CRAs that I focus on in this thesis.
[3] And also for Capital Intelligence (CI), but I do not consider CI in this thesis.

The different methodologies employed by the CRAs can be observed through their rating disagreements or 'split ratings'. Hill et al. (2010) find that the CRAs often disagree in their rating of sovereigns, but that the level of disagreement is often confined to one- or two-notches. They find external debt and external balance to be significant for S&P and Moody's, inflation is significant for S&P only, and the fiscal balance is significant for Moody's only. Alsakka and ap Gwilym (2012a) explain that the number of sovereign rating disagreements between six international CRAs can be put down to the varying methodologies employed. The number of sovereign rating disagreements is found to be larger for speculative grade issuers compared to investment grade issuers since their information quality is said to be more opaque. They also find that split sovereign ratings have an effect on the future rating changes i.e. a CRA that rates sovereign *s* lower than another CRA is more likely to upgrade the sovereign (within one year), whilst the CRA that rates sovereign *s* higher than the other CRA is more likely to downgrade sovereign *s*.

Alsakka and ap Gwilym (2012a) highlight the information opaqueness driving a larger amount of split sovereign ratings between speculative grade issuers compared to investment grade issuers, which is in line with Barton (2006) who also finds the amount of split ratings to be higher for issuers with lower credit ratings. This information opaqueness is of particular importance for bank ratings, since the assets of banks can be difficult to interpret from the outside, for instance from the standpoint of a CRA. Morgan (2002) investigates the relative opaqueness of U.S. banks by looking at the amount of bank rating disagreements as a proxy for opaqueness. The author finds that the mean gap between the ratings of banks by S&P and Moody's is about four times larger than for non-bank issuers. Split ratings are 18% more likely to occur for bank issues compared to non-bank issues. Only insurance companies are found to incur more split ratings. The split ratings in banks are traced back to the bank's

assets, where loans and trading assets are a significant source of disagreement, whilst fixed assets are inversely related to the amount of split ratings.

Iannotta (2006) also examines the amount of bank rating disagreement compared to other industries as a measure of relative opaqueness using a European sample. The probability of a split rating is found to be 20% more likely when the issuer is a bank. Contrary to Morgan (2002), Iannotta (2006) doesn't find insurance companies subject to more rating disagreement than banks. The findings of the last two studies mentioned in this section, indicates that a CRAs job in assessing the creditworthiness of banks is particularly difficult compared with other industries, whilst both studies focus on bank ratings in developed countries. Alsakka and ap Gwilym (2012a) highlight that the job of the CRA in assessing sovereign ratings is more problematic for speculative grade issuers, of which there are more in emerging market countries i.e. there are more speculative grade sovereign issuers in emerging markets compared to in developed countries. This is a key reason for the motivation in Chapter 3, when I analyse the link between sovereign ratings and bank ratings in emerging market countries. The evidence from the literature suggests that this link could be strong, however, no study exists that specifically examines this.

The split rating research has motivated further analysis of the lead-lag behaviour of CRAs i.e. does a certain CRA tend to rate issuers better than another CRA, or is a certain CRA generally more likely to downgrade (upgrade) an issuer before another CRA. The amount of studies in this area is very small, with only one study that I'm aware of that looks into the lead-lag behaviour of CRAs in sovereign ratings. Johnson (2004), Güttler and Wahrenburg (2007) and Güttler (2011) all examine the lead-lag behaviour of CRAs in the corporate ratings sector. Alsakka and ap Gwilym (2010) analyse the lead-lag behaviour of CRAs in sovereign ratings. Among the three largest CRAs (S&P, Moody's and Fitch) they find that Moody's tends to assign the highest ratings, whilst S&P tends to assign the lowest

ratings, although the split ratings tend to be confined to one- or two-notches. Moody's also is the most stable with their sovereign ratings, whilst S&P is the most volatile, which highlight differences in their rating philosophies. Moody's seem to place more emphasis on rating stability, compared to S&P that is more concerned with rating accuracy. They find that a rating change to sovereign *s* by CRA *a*, leads to an increased probability of CRA *b* to also change the rating of sovereign *s* in the same direction. Finally, Moody's tends to be the first mover in upgrading sovereigns, whilst S&P tends to be the first mover in downgrading sovereign ratings.

2.3.3. Market impact of credit rating actions

This section reviews the large literature on the market impact of CRAs' rating actions. The literature varies with the type of rating actions i.e. corporate rating actions or sovereign rating actions. The studies also vary in the type of instrument they attempt to find whether or not rating actions impact upon i.e. stock prices, credit default swap (CDS) spreads, bond yields, and foreign exchange rates and so on. Cantor and Packer (1996) find a cumulative drop in bond spreads of 1.3% in the two-days surrounding positive announcements by Moody's and S&P and a cumulative rise of 0.9% in the two-days surrounding negative announcements. They find evidence that Moody's sovereign rating changes has a stronger impact on bond yields than S&P's actions, and also sovereign rating actions to speculative grade sovereigns has a stronger impact compared to investment grade sovereigns.

Dichev and Piotroski (2001) investigate the long-run stock returns of U.S. firms following bond rating changes by Moody's. They find no reliable indication of any long-run abnormal returns following upgrades, whilst downgrades are followed by substantial negative abnormal returns of about 10-14% in the first year following a downgrade, and can persist to be negative for up to three years. They also find shorter-term impacts of rating

announcements i.e. a significant abnormal return of -1.97% in a three-day window surrounding downgrades, and a significant abnormal return of 0.48% following upgrades.

Steiner and Heinke (2001) find that downgrades in the German Eurobond market cause significant negative abnormal returns for bond prices on day zero and in the four days following the downgrade. They also find negative abnormal returns in the 90 days leading up to a downgrade, which they describe as the CRAs lagging the market. Negative watch actions are not anticipated by the markets, and induce significant negative abnormal returns.

Kaminsky and Schmukler (2002) determine whether sovereign ratings affect their own bond and stock markets. They find bond yield spreads increase by two percentage points, and average stock returns decrease by one percentage point following a downgrade to the domestic sovereign rating. Changes to outlook are found to be at least as important as actual rating changes. Changes in a sovereign rating trigger changes in bond yield spreads and stock prices in other countries and the effect is stronger when the countries are closer together i.e. in the same world region.

Richards and Deddouche (2003) analyse the impact of bank rating changes on bank stock prices in emerging markets. They find negative bank returns in the 35 weeks leading up to downgrades, but they are not positive ahead of upgrades. This means the CRAs are lagging the market in the case of downgrades but not for upgrades. They find no hard evidence of a price reaction to either upgrades or downgrades, but they do suffer from using weekly stock price data (instead of daily data) and they also have very few observations of actual rating changes i.e. 219 total rating changes observations, but only 15 'clean' upgrades and 43 'clean' downgrades, as they define it.

Norden and Weber (2004) study the impact of rating actions to corporate issuers on their CDS spreads and stock prices. They find that both markets anticipate downgrades by S&P, Moody's and Fitch and this starts between 90-60 days prior the announcement day.

They find significant negative returns in stock prices around negative rating actions but not around positive actions. Negative watch actions by Moody's and S&P are associated with significant abnormal performance in the expected direction in both markets, whilst downgrades are not. Neither negative watch actions nor downgrades by Fitch are associated with significant abnormal performance in either market. Hull et al. (2004) find that negative watch announcements by Moody's to a set of U.S. corporate issuers lead to a significant impact on their CDS spreads, whilst negative outlooks and actual downgrades do not. The CDS market anticipates all three types of negative rating actions. They find little evidence around positive rating actions linked to CDS changes, similar to Norden and Weber (2004).

Sy (2004) investigates whether sovereign credit ratings predict financial crises. The author finds that sovereign ratings fail to predict currency crisis, and are instead downgraded following such crisis. The author argues that sovereign ratings are instead a predictor of sovereign default and not of currency crisis, and shows that debt crisis and currency crisis are not closely correlated. Distressed debt events are defined as when sovereign bonds spreads exceed 10%, and that downgrades, outlook and watch can help predict this in the next year.

Brooks et al. (2004) finds that foreign-currency sovereign rating downgrades by S&P induce significant negative abnormal returns on the day of downgrades, but no significant positive abnormal returns is found around upgrades. They find different market reactions to the rating changes of other CRAs. Negative and significant share price reactions are found in the two-day window around downgrades by S&P and Fitch, whilst it's insignificant for Moody's. No significant and positive reaction is found in response to any CRA in the two-day event window surrounding upgrades. Their finding suggests that S&P is the leader CRA in sovereign ratings and provide the most timely assessments.[4] Fitch appears to be reacting to what is already known in the markets due to strong pre-event cumulative abnormal returns.

[4] They also analyse rating actions by Thomson. But this CRA no longer exists since it was absorbed by Fitch in 2000.

This study fails to model the market impact of outlook and watch, which needs be addressed since they are valuable predictors of future rating changes, i.e. Alsakka and ap Gwilym (2009) find that watch has a strong influence on increasing probability of a future rating change of a sovereign, and also negative watch is found to have a stronger market impact than actual downgrades (Steiner and Heinke, 2001; Norden and Weber, 2004).

In 2000, the U.S. Securities and Exchange Commission (SEC) introduced the Regulation Fair Disclosure (Reg FD) in which all publicly traded companies must release material information to all investors at the same time. Jorion et al. (2005) investigate whether or not Reg FD had an effect on the information content of CRAs. Basically, have CRAs lost access to non-publicly available information due to the Reg FD. They analyse the effects of rating actions by S&P, Moody's and Fitch on taxable corporate bonds issued by U.S. firms on their stock prices pre- and post-Reg FD. They find that downgrades have a significantly stronger impact on the stock prices in the three-day window surrounding them post-Reg FD compared to pre-Reg FD, although both are statistically significant and negative at -6.93% and -4.57%, respectively. The impact of upgrades is also found to be significant post-FD at 1.42%. They conclude that the Reg FD has given the CRAs an informational advantage over the public and that it has given them extra privileges to gain non-publicly available information compared to the pre-Reg FD era.

Gande and Parsley (2005) investigate whether sovereign rating actions can have cross border spillover effects on other countries' credit spreads. They find that negative sovereign events in one country significantly widen the credit spreads of all dollar denominated sovereign debt, whilst no impact is found for positive sovereign rating actions. They find that, on average, a one-notch downgrade of a sovereign bond is associated with a 12 basis point increase in spreads of sovereign bonds of other countries, assuming a 6% yield on U.S. Treasury of comparable maturity. The impact becomes stronger when other countries have

also been subject to recent rating changes, and that the spillover transmission mechanism is stronger through capital than through trade-flow linkages.

Ferreira and Gama (2007) look at potential cross border stock market spillover effects of sovereign rating actions. Sovereign downgrades by S&P are found to induce significant negative abnormal returns in another country's stock market, and the effect is stronger when the countries are geographically closer, and if they are both emerging market countries. The effect is insignificant in the case of upgrades. A one-notch sovereign downgrade is found to decrease the two-day stock market return of another country by 51 basis points on average.

Hooper et al. (2008) investigate the impact of sovereign rating actions on international financial markets. Sovereign downgrades have a detrimental effect on the U.S. Dollar (USD) denominated national stock indices, whilst upgrades have no significant effect. In fact a one-notch downgrade causes a 1.59% fall in USD denominated stock returns, which is driven through both the local currency denominated stock indices and foreign exchange market. Sovereign downgrades are also found to increase the volatility of the USD denominated stock returns, which is driven through the foreign exchange market. They find that outlook assessments are also important in the USD denominated stock returns, but not so for the change in volatilities.

Ismailescu and Kazemi (2010) examine the impact of emerging market sovereign rating actions on their own CDS spreads and find results that are quite contradictory of prior studies. Positive sovereign rating events are found to induce a very immediate and significant decline of CDS spreads, whilst no impact is found with negative sovereign rating actions. They explain that this may be because upgrades are more informative in emerging markets, and that the CDS market is found to anticipate negative sovereign events. Negative sovereign rating actions are found to induce spillover effects into other countries CDS spreads when the event country has a poor sovereign rating, whilst the spillover effects from positive sovereign

rating actions depend on the sovereign rating of the non-event country. Their results are contradictory to those of previous studies on CDS e.g. Norden and Weber (2004) and Hull et al. (2004) who find that negative rating actions hold more non-publicly available information compared to positive rating actions. The different results are driven by the different sample periods and that Norden and Weber (2004) and Hull et al. (2004) use corporate rating actions whilst Ismailescu and Kazemi (2010) utilise sovereign rating actions, which have experienced an upgrade trend in general in the 2001-2009 time period that they analyse.

Hill and Faff (2010) investigate how sovereign rating changes by S&P, Moody's and Fitch affect their domestic stock market prices. They find significant negative abnormal returns in the two-days surrounding negative sovereign rating actions during crisis periods at -2.23%. This is also associated with a significant and negative pre-event abnormal return at -7.90%. Actual downgrades are associated with stronger two-day event window abnormal returns at -3.14%, whilst negative watch/outlook changes are associated with an insignificant two-day abnormal return surrounding the event during crisis periods. Negative changes to watch/outlook has a stronger effect than downgrades in normal market conditions (i.e. non-crisis periods). They also find that positive sovereign rating actions induce a significant two-day abnormal return of 0.25% in non-crisis periods, which is mainly driven by S&P outlook announcements. S&P is found to provide the most 'timely' assessments during crisis periods compared to Moody's and Fitch, whilst also providing the most timely assessments outside of crisis periods for IMF non-advanced countries, whilst Moody's seems to be the leading agency in IMF advanced countries.

Arezki et al. (2011) investigate the spillover effects of European sovereign rating actions on European financial markets during the 2007-2010 crisis period. Their main result is that negative sovereign rating actions not only affect the markets of the domestic country but also other euro-zone countries, suggesting that CRAs' announcements could stimulate

financial instability. They find that downgrades in general have positive spillover effects to other countries markets while negative outlook assignments have negative spillover effects. Rating news from the larger European sovereigns has stronger spillover effects than rating news from Eastern European and peripheral European countries. They also find S&P to be the most important CRA in terms of containing more information in their assessment changes, with Fitch having the weakest spillover effects. Moody's lies in between the other two CRAs.

Alsakka and ap Gwilym (2012b) analyse the impact of sovereign rating actions on the foreign exchange spot market. Interestingly, they find that sovereign rating actions by Fitch have the most timely impact on the affected country's exchange rate, and the markets react strongly to negative outlook by S&P. Moody's (S&P) has an informational lead in upgrades in developed (emerging) countries and downgrades in emerging (developed) countries. In contrast with other studies, upgrades are associated with significant currency appreciations for the affected country by each CRA, and also to positive watch from Moody's and Fitch. This is not surprising because 'good' or 'bad' news is inverted depending on which country's exchange rate ones looking at i.e. an exchange rate is arguably two prices not one. They highlight important cross-border spillovers, where significant spillover effects are found in the Europe-Central Asia region by each CRA (except for positive actions by Fitch). Only rating actions by Fitch spillover to other countries in Latin America, and positive actions by Moody's and negative actions by both S&P and Moody's spillover to other countries in East Asia, Pacific and South Asia region. Only negative sovereign rating actions by S&P and Fitch have significant spillover effects in the Middle East-Africa region. Their study highlight important factors with the credit ratings industry and their market impact, where the opinions of S&P, Moody's and Fitch should be studied, and not just the one CRA.

Christopher et al. (2012) investigate whether emerging market sovereign rating changes affect regional stock and bond market interdependencies. Positive sovereign rating or outlook changes have a long-run positive effect on the home country's and regional countries' stock market returns thus increasing their co-movements. Downward sovereign rating revisions are also found to improve the returns of the regional stock markets but not the domestic stock market since international investors shift their funds away from the affected stock market to other markets in the region. Negative rating and outlook sovereign rating changes are found to have a negative impact on the bond market of the domestic country and also the bond market of other countries in the region, thus increasing their co-movements. Positive sovereign rating changes shift funds away from the regional bond markets into the affected country, thus improving the bond market in the affected country and being detrimental to the other countries in the region's bond markets, and so the co-movements become weaker.

Afonso et al. (2012) look at the impact of European sovereign rating actions by S&P, Moody's and Fitch on the home country and cross-border government bond yields and CDS spreads. Negative rating actions by S&P have the strongest impact in the two-day event window on the domestic sovereign yields, whilst Moody's followed by Fitch has the stronger impact on domestic sovereign CDS spreads. Only positive actions by S&P have a beneficial effect on domestic CDS spreads in the two-day event window. Actual downgrades are important by S&P and Fitch for the domestic yield spread but for only S&P and Moody's for CDS spreads. Negative outlook adjustments are important by S&P for domestic yield spreads, but for Moody's for domestic CDS spreads. Interestingly, positive outlook adjustments from all CRAs have a positive effect on domestic CDS spreads. Sovereign rating actions are found to have significant spillover effects into other countries' yield spreads, but

not into the CDS, and the effect is stronger when the affected country has a lower sovereign rating quality than the non-event country (i.e. the spillover country).

Alsakka and ap Gwilym (2013) compare the foreign exchange market's reaction to a sample of European and Central Asian sovereign rating actions before (2000-2006) and after (2006-2010) the start of the financial crisis period. Negative sovereign rating actions have a stronger spillover effect into other countries exchange rates during the crisis period than prior, from all three CRAs (S&P, Moody's and Fitch). Negative sovereign rating actions by Moody's on the domestic exchange rate are insignificant in the pre-crisis period, but become strong during the crisis period, whilst the impact of negative actions by S&P on the domestic exchange rates is stronger in the pre-crisis period. The impact of Fitch's negative actions is strong pre- and during the crisis. The impact of outlook and watch is greater on exchange rates both for the affected country and cross-border than actual rating changes. Moody's positive rating actions are the most immediately informative in the crisis period for the domestic exchange rate, whilst positive S&P actions have a strong long-term impact during the crisis period. In terms of the spillover effect, there is no significant impact pre-crisis with positive actions by any CRA, whilst Moody's positive signals have a strong positive spillover effect during the crisis in the short-term, whilst positive signals by Fitch have a strong effect in the long-term.

Dittmar and Yuan (2008) consider whether sovereign bonds benefit corporate bonds in emerging market countries. Over one-fifth of the information contained in corporate bond spreads can be explained by innovations in the sovereign bond market, and a one standard deviation change in the sovereign bond spread is found to induce a significant long-run (more than 50 days) impact on the corporate bond yields. They also find that a new sovereign bond issue has significant economical beneficial impact on the domestic corporate bond yields. They say that a sovereign bond market improves the domestic bond market through spanning

enhancement, improved price discovery, and improved liquidity, and that a less economically free the country is the more the sovereign bond market improves the price discovery, whilst the more economically free the country is the more the sovereign bond market improves the liquidity of the corporate bonds.

Kim and Wu (2008) determine how sovereign ratings by S&P in emerging markets affect their financial sector development and international capital inflows. Improvements in the foreign-currency long-term sovereign ratings increase the capitalization of both private and public bond markets, and the sovereign rating ceiling is found to be prominent as high-quality foreign-currency private bond issuers are only rated the same as the sovereign, and not above, which places further emphasis on private bond markets benefiting from improvements in the sovereign rating. Improvements in the foreign-currency long-term sovereign rating also improve international capital inflows in the form of foreign-direct investment, international banking flows and portfolio flows. Foreign-currency ratings are found to be much more important to improve international capital inflows than the local-currency ratings.

Kim and Wu (2011) investigate the pattern of international banking inflows from the G7 countries into emerging markets around long-term emerging market sovereign rating actions. Improvements in both foreign-currency (FC) and local-currency (LC) sovereign ratings lead to significant improvements in international bank flows from developed countries to the emerging markets. A single-notch upgrade to the FC sovereign rating can improve the bank financing to the emerging markets by $470 million from France, $720 million from Germany, $184 million from Italy, $812 million from Japan, $901 million from the U.S.. Outlooks are also found to be important for international bank flows. Their evidence also suggests that in general sovereign rating improvements in one region draw bank inflows away from other world regions into the affected region.

2.3.4. Economic function of credit ratings and regulation

So far, this chapter has covered the CRAs' business, their sovereign rating methodologies and determinants, some inter-agency differences and finally the market impact of credit ratings. This section will review some of the economic functions of credit ratings and also discuss the regulation of the CRAs. Section 2.3.3 highlighted the importance of credit ratings in the global economy due to their impact either in the domestic market (for sovereign ratings) and even the spillover effects cross-border. The literature shows that it's important to consider more than one CRA when assessing the impact of their ratings, and also Cantor et al. (2007) show that most fund managers and plan sponsors use multiple CRA ratings in their investment decisions.

Boot et al. (2006) provide a rationale for credit ratings because they serve as coordination mechanisms and that the value comes from their monitoring role and from their use from institutional investors. They also give support that credit ratings provide a 'gateway' for issuers to access public debt markets and help disseminate information to relatively uninformed investors. They find CRAs' use of negative watch to be a useful monitoring tool, since the issuer must take sufficient corrective measures to avoid being downgraded. The information contained in CRAs' assessments are undoubtedly valued in the markets and much of this is traced back to the fact that CRAs have access to non-publicly available data, and some regulatory reforms in the last few years has only increased the information content of credit ratings, e.g. the Regulation of Fair Disclosure (see Jorion et al., 2005, in Section 2.3.3). Duff and Einig (2009) find that despite the CRA's questionable performance in rating structured finance products that came to light during the US subprime mortgage crisis, CRAs' opinions are highly valued by credit market participants and they serve as an important intermediary between issuers and investors by reducing information asymmetries between them.

The Bank of England (2011) recognises that the most pervasive function of CRAs' rating assessments is their use for calculating the capital requirements of banks, securities firms and insurance companies, which mainly comes down to the Basel II accord. The main issue with credit ratings that have come to light recently is the overreliance upon them in the global economy and their reliability i.e. credit ratings are hardwired into a range of regulatory and investment processes, which can lead to cliff effects or destabilisation of markets when downgrades occur since this can lead to triggered forced selling by fund managers for instance (Bank of England, 2011).

The IMF (2010) highlights that sovereign default is the most pressing risk facing the global economy and the BIS (2011) emphasises concerns about the euro area sovereign debt problems leading to tighter funding conditions for European banks. Sovereign debt problems can affect banks through various channels, including: (i) direct losses on sovereign debt holdings; (ii) lower collateral values for wholesale and central bank funding; (iii) reduced benefits that banks derive from government guarantees; and (iv) lower bank ratings. Credit ratings are also taken into account for securities held in the banking book due to the Basel II Accord, and so directly corresponds to point (i) above (Bank of England, 2011). Blundell-Wignall (2012) shows that European banks are heavily exposed to the sovereign debt of their home country, and also to the sovereign debts of other countries. The author states that the cross-border exposures of EU banks to the sovereign debts of the peripheral countries (Greece, Portugal, Ireland etc.) is relatively small, yet the uncertainty of the sovereign debt crisis of these peripherals spreading to the larger countries is causing destabilisation in EU banks. The exposures of EU banks to the sovereign debt of France, Spain and Italy is substantial at 15%, 19% and 25%, respectively, of core Tier-1 capital.

One problem concerning the credit ratings business is the issuer-pays principle (although this is not such an issue with sovereign issuers since they don't pay for their

ratings). This is when an issuer seeking a credit rating pays a CRA for their assessment, generally referred to as solicited ratings and brings with it an obvious conflict of interest between the CRA and issuer. Poon et al. (2009) find that solicited bank ratings are significantly higher than unsolicited bank ratings, and that in some cases the solicitation factor is more important than the financial profile of the bank to explain differences in their ratings. Bannier et al. (2010) find evidence that the difference between solicited and unsolicited bank ratings may be due to the relative opaqueness of banks, and could therefore point towards conservatism on behalf of the CRA in assigning unsolicited ratings, which could be explained by the CRAs not having access to private information in assessing unsolicited ratings. Jiang et al. (2012) also find evidence of inflated ratings with the issuer-pays model. Mathis et al. (2009) proposes a platform-pays model where the issuer has to go through a 'central platform' when interested in receiving a credit rating, whose purpose is to cut-off direct commercial links between the issuer and CRA. Moral hazard problems could still be a concern even in this kind of setting if the 'central platform' was a publicly run entity (Bank of England, 2011).

Bolton et al. (2012) find that CRA competition can reduce efficiency since it allows issuers to shop around for the most desirable rating, this is called 'rating shopping' and is seen as one of the main problems with credit ratings business. The authors suggest that the three main areas that need to be covered in regulation are to: (i) try to stop issuers from influencing the CRAs; (ii) prevent rating shopping; and (iii) monitor the quality of the rating methodology. The Cuomo plan addresses the first point by forcing the issuer to pay for the rating assessment before actually receiving it, but this does not sort out the rating shopping problem. Bongaerts at al. (2012) find no evidence for 'rating shopping' to have any significant effect on bond prices, thus the addition of a third rating holds no extra market relevant information over ratings from just two CRAs. They do find an important certification

effect of having a third rating from Fitch, when S&P and Moody's has the bond rated either side of the investment/speculative grade boundary. Becker and Milbourn (2011) find that the introduction of a third major CRA (Fitch) has decreased the overall credit quality and the information content of the ratings from S&P and Moody's. Their findings prompt a warning for regulators that increased competition in the credit ratings business may in fact be harmful, since it dilutes the reputational concerns that CRAs have to give accurate credit assessments.

There are obvious problems that are inherent in the credit ratings business and the main difficulty faced by regulators is to determine what measures should be put in place. The main aim is to reduce the reliance on credit ratings in regulation, and to better regulate the CRAs themselves. Problems such as mechanistic trigger-selling effects (the certification role) that downgrades have must be addressed to reduce the destabilizing and spillover effects of rating downgrades on financial markets. The U.S. SEC has been increasing its demand for the NRSROs to increase the transparency of their rating methodologies and to reduce conflicts of interest, which are issues that the CRAs themselves have been tackling of late i.e. in separating the core rating business from their other business activities. They are also trying to reduce the reliance on ratings in regulation. The EU has put in place similar measures to the U.S. SEC and requires all CRAs operating within Europe to register and now have the CRAs under direct supervision from the newly created European Securities Market Authority (ESMA). The Financial Stability Board (FSB) has similar aims.

2.4. Methodological issues

This section describes some methodological issues concerning the three empirical chapters that follow (Chapters 3, 4 and 5). I review the most widely accepted econometric approaches in the credit ratings literature. I have discussed the findings of the relevant literature in Section 2.3, whilst I only consider the econometrics of the studies here. In

Chapter 3, I analyse the impact of sovereign rating actions on bank ratings in emerging markets and I'll cover the relevant empirical issues in Section 2.4.1. In Chapters 4 and 5, I look at the impact of sovereign rating actions on bank share prices in Europe and emerging markets, respectively, and discuss the relevant empirical issues in Section 2.4.2.

2.4.1. For Chapter 3

In Section 2.3, I have given an account of the relevant literature to the theme of this thesis. Section 2.3.1 and 2.3.2 discuss the relevant literature on modelling sovereign ratings and bank ratings. The empirical studies I've mentioned use a variety of different statistical methods in order to map sovereign credit ratings. This is of great importance for this thesis, since I need to select the most appropriate method to model bank rating changes in Chapter 3. The credit rating scale is referred to as a discrete and ordinal scale i.e. the gap between adjacent rating classifications is not the same throughout. This fact has brought about some speculation about the most appropriate method to map sovereign ratings. In general, the types of methodologies used have varied from ordinary least squares (OLS) regressions, to ordered probit models and logistic regressions.

Many studies have used OLS regressions when modelling credit ratings, but this model in particular treats the dependent variable as continuous, or as a variable that has equal distances between adjacent groups. Employing this type of technique when dealing with the discrete and ordinal nature of credit ratings is going to cause serious errors in inferences and produce biased estimators (Park, 2005; Bennell et al., 2006). Cantor and Packer (1996), Monfort and Mulder (2000), Afonso (2003), Alexe et al. (2003), and Butler and Fauver (2005) are some studies that employed OLS regressions to map sovereign credit ratings. Ordered probit modelling has been argued to be much more appropriate than OLS for mapping ratings (Trevino and Thomas, 2001; Bissoondoyal-Bheenick, 2005). Logistic

regression has also been used in the credit ratings literature, for example by Mellios and Paget-Blanc (2006), Vazza et al. (2005) and Fuertes and Kalotychou (2007). Some studies find that the ordered probit model outperforms/or is preferred to the logit model in modelling credit ratings due to less restrictive assumptions on the error term and also since economists prefer the normality assumption of probit estimations.

For the empirical analysis in Chapter 3, I decide to follow some of the more recent studies i.e. Alsakka and ap Gwilym (2010) and Hill et al. (2010) and utilise the ordered probit model as it accounts for the discrete and ordinal nature of credit ratings and credit rating changes. Another advantage of employing the ordered probit model over OLS is that it allows me to calculate the economic significance of changes to the sovereign rating on the probability of a future bank rating change, referred to as the marginal effects (see Livingston et al., 2008; Alsakka and ap Gwilym, 2010). Rating upgrade and downgrade models will also be estimated separately in each empirical chapter since they are found to be driven by different factors and this is a common approach in the literature (Fuertes and Kalotychou, 2007; Livingston et al., 2008; Alsakka and ap Gwilym, 2009).

2.4.2. For Chapters 4 and 5

Chapters 4 and 5 in this thesis consider the impact of sovereign rating actions on the share prices of banks. The two chapters differ by the countries used in the samples. Chapter 4 looks at the effect in Europe, and specifically during the recent financial crisis time period, whilst Chapter 5 looks at the effect in emerging market countries. The type of methodology employed will be the standard event study type. Section 2.3.3 gives an account of the most relevant studies that investigate the market impact of credit ratings. Firstly, I need to find an appropriate method for calculating the abnormal returns for the sample of banks.

An important point is to look at an appropriate size event window to observe the abnormal returns (or cumulative abnormal returns) of the banks. Gande and Parsley (2005) suggest examining a short event window of only 2 days i.e. days t=0 and t=1. This limits the effects of other events happening at the same time contaminating the results. Holthausen and Leftwich (1986) argue that results over such short time windows are not sensitive to different methods for calculating the abnormal returns. Hill and Faff (2010) utilised the mean-adjusted method for calculating the abnormal returns, whilst purely for robustness, also used the market and index model, and the implications drawn are not altered with the different models. For these reasons I decide that the mean-adjusted returns is the most appropriate method to use to determine the bank abnormal returns in Chapters 4 and 5. I also follow standard event study methodology and examine the pre-event and post-event time windows surrounding sovereign credit events. Following Brooks et al. (2004) and Hill and Faff (2010), the abnormal return test statistics are taken from Boehmer et al. (1991) in order to account for event-induced variance.

2.5. Conclusions

Chapter 2 has addressed all the relevant material regarding the credit rating business and the literature that is relevant for this thesis. In Section 2.2, I provided an account of some of the processes inherent in the credit rating business and in CRAs' methodologies. Firstly, a credit rating is a CRA's assessment of an issuer's creditworthiness, and is denoted by a single value on the credit rating scale. The three CRAs that I focus upon are S&P, Moody's and Fitch since they represent the vast amount of the global credit ratings business for sovereign ratings (99.20%). I explained how these three CRAs have variations in their rating methodologies: (i) S&P focus on the probability of default; (ii) Moody's considers the loss given default as well as probability of default; and (iii) Fitch presents Recovery Ratings

alongside Issuer Default Ratings. Then I explained the 'Through the Cycle' rating philosophy and how the CRAs mitigate the tension between rating stability and accuracy with outlook and watch.

Section 2.3 presents a review of the literature which is most relevant for this thesis. Firstly, I review studies that aim to map the determinants of sovereign credit ratings, and then studies that focus on differences between CRAs. Information opacity is thought to be one of the main driving forces behind CRAs assessing issuers differently to each other i.e. split ratings. Indeed, the rating of emerging market sovereign issuers and of banks is found to be more problematic since the information quality from emerging market countries is poor compared to developed countries, and for banks their assets are harder to determine compared to other industries which make them particularly difficult to rate. This is why split ratings are common for emerging market sovereigns and for banks (Alsakka and ap Gwilym, 2012; Morgan, 2002; Iannotta, 2006).

This leads to a gap in the literature to determine how sovereign ratings affect bank ratings in emerging markets. It's more tricky for CRAs to assess the creditworthiness of emerging market sovereigns, and also more difficult to assess the creditworthiness of banks. So one can imagine that assessing the creditworthiness of emerging market banks is particularly problematic for the CRAs. This along with the fact that sovereign ratings are seen in most cases as a ceiling for other issuer's ratings from the same country makes the topic of Chapter 3 an interesting study. Shen at al. (2012) and Caporale et al. (2012) find that the sovereign rating has a significant relationship with the domestic banks' ratings.

There is a large amount of studies that examine the market impact of credit ratings. The CRAs argue that they have access to private information (which isn't available to the public), in which case the credit rating actions should have an impact on the market, visible in share prices, bond yields, CDS spreads or foreign-exchange rates. However, the literature is

silent on the effects of sovereign ratings actions on the share prices of banks. Chapter 3 looks at the effect of sovereign rating actions on bank ratings, whilst Chapters 4 and 5 study the effects of sovereign rating actions on bank share prices in Europe and in emerging markets, respectively. This is of particular importance due to the recent financial crisis where large banks are found to be highly exposed to the sovereign debts of their own country's government and particularly in Europe, to the sovereign debts of foreign governments. An overreliance upon ratings in regulation can force trigger selling for fund managers following downgrades for example which can destabilize markets, and also affect a bank's capital requirements due to the use of ratings in the Basel II.

The CRAs have also suffered serious scrutiny recently, in particular from Europe, with ministers complaining about ill-timed downgrades, and that the CRAs failed to predict the crisis, and that they have downgraded some European sovereigns too fast and too harshly and that they have exacerbated the crisis (see House of Lords, 2011). There has been some defending for the CRAs, which say that they are merely reflecting how bad the situation is in some of the European countries, and that CRAs ratings tend to follow the news rather than precede it. It's also obvious that CRAs are not the only market participants that failed to predict this crisis, and it is questioned whether they are being used as convenient scapegoats (House of Lords, 2011; Bank of England, 2011). Chapters 4 and 5 will provide in-depth examinations of the impact that CRAs actions have in the market and whether the criticisms are justified or not.

Chapter 3: The Impact of Sovereign Rating Actions on Bank Ratings in Emerging Markets

3.1. Introduction

Sovereign ratings have been a focus of widespread attention during 2010-12, most obviously in the case of Euro-Zone sovereigns including Greece and Spain and in the downgrading of the USA and France by Standard & Poor's (S&P) in August 2011 and January 2012, respectively. The IMF (2010) highlighted that sovereign credit risk is one of the main current threats to global economic stability. Related to this, Duggar et al. (2009) identify that 71% of defaults by rated corporates and sub-sovereigns in emerging markets have occurred during sovereign crises. They also suggest that sovereign credit risk is a key factor in corporate defaults outside sovereign credit events. This chapter aims to investigate to what extent sovereign rating actions affect the credit ratings of banks in the same country. The chapter models: (i) the effects of sovereign credit rating upgrades, downgrades and watch status on bank credit ratings; and (ii) how bank ownership influence the sensitivity of bank ratings to recent sovereign rating changes. The chapter aims to provide insights into the rating policies applied by the world's largest credit rating agencies (CRAs).[5]

A crucial factor motivating the analysis is the notion of the sovereign rating 'ceiling'. This means that generally the sovereign rating represents the highest achievable rating for non-sovereigns within that country. Although the largest CRAs no longer apply this ceiling as an absolute rule (e.g. Borensztein et al., 2007, refer to sovereign ceiling 'lite'), it is still the prevailing situation in the vast majority of cases. For example, many non-sovereigns were downgraded in August 2011 following the USA downgrade. The sovereign ceiling inevitably has a greater impact on non-sovereign ratings in countries with lower sovereign ratings. For

[5] A modified version of this chapter has been published as follows: Williams, G., Alsakka, R., ap Gwilym, O., 2013. The impact of sovereign rating actions on bank ratings in emerging markets. Journal of Banking and Finance 37, 563-577.

example, if the sovereign has a speculative grade rating, the potential rating scale for a non-sovereign issuer in that country is compressed. This chapter focuses on emerging markets, where the effect of the sovereign ceiling is much more apparent.

Sovereign rating changes and outlook/watch signals affect bond and stock markets in emerging markets. The literature also shows that these effects are not only significant at the domestic level, since sovereign rating news is found to affect markets in other countries. In particular, negative sovereign rating news causes significant spillovers into other countries' stock and bond markets, while positive news has an insignificant effect. The effects are more prominent when the countries are geographically close (e.g. Kaminsky and Schmukler, 2002; Brooks et al., 2004; Gande and Parsley, 2005; Ferreira and Gama, 2007). Section 2.3 provides an in-depth review of the literature on the economic and market impact of sovereign rating actions.

The large growth in debt issuers has increased the demand for ratings and the influence of the CRAs in capital markets. The credibility of CRAs has been questioned over the past few years, in particular during the 2007 US subprime mortgage crisis (e.g. see Mathis et al., 2009; Alsakka and ap Gwilym, 2010). Yet, the CRAs still control the gateway into capital markets for bond issuers, as well as providing debt market participants with valuable signals due to their access to private information. In general, the vast majority of studies on credit ratings have used data from a single agency (usually Moody's or S&P). More recently, a few studies have highlighted important inter-agency differences (e.g. Hill et al., 2010).

This chapter contributes to the literature by examining the effects of sovereign rating actions on bank ratings. To the best of my knowledge, there is no prior research that studies these aspects. I consider the economic significance of detected relationships by calculating the effects of changes in the independent variables (sovereign rating change and sovereign watch status) on the probability of bank rating upgrades and downgrades of one and two or

more notches, and the probability of no rating change, i.e. the marginal effects (see Livingston et al., 2008). I utilise a large dataset of emerging market bank ratings from the three global CRAs, namely Moody's, S&P and Fitch. Several robustness checks are performed using sub-samples by agency, bank ownership and time periods.

The main results are as follows. Emerging market banks have very high probabilities of being upgraded (downgraded) soon after an upgrade (downgrade) to their corresponding sovereign rating. These effects are fairly consistent for all three CRAs, although some results imply that Moody's is the least likely to migrate bank ratings simultaneously with the sovereign rating. State, foreign, and local privately-owned bank ratings are all affected very strongly, although local privately-owned bank ratings are the most sensitive to sovereign upgrades, and foreign-owned bank ratings are the most sensitive to sovereign downgrades.

The rest of the chapter is organised as follows. Sections 3.2 and 3.3 discuss the data and methodology, Section 3.4 presents the empirical results and Section 3.5 concludes the chapter.

3.2. Data

The dataset consists of end of month long-term (LT) foreign-currency (FC) ratings for sovereigns and banks in 54 emerging countries. The bank and sovereign ratings data is sourced from the InteractiveData Credit Ratings International database. The sample is based on selecting emerging market banks which are rated by at least one of the three largest CRAs (Moody's, S&P and Fitch) during the period 30th November 1999 to 31st December 2009. An 'emerging market' is defined by using the World Bank's country classification, according to the countries' GNI per capita. The World Bank classifies countries into four different categories: low-income (LI); lower middle income (LMI); upper middle income (UMI) and high-income (HI). All LI, LMI and UMI economies are categorized as emerging markets.

A strict duration of three months is used throughout the sample, whereby any bank rating action which is more than three months later than the most recent relevant sovereign action, is omitted. There are two reasons behind this choice. First, due to the research question, I need to place a restriction on the time elapsed between the sovereign and the bank rating actions. Bank rating actions which are more than three months later than a sovereign action are very likely to be driven by other factors. Second, the CRAs have an ex-ante target of 90 days to take action once an issuer is placed on watch (Hamilton and Cantor (Moody's), 2005; Klaar and Riley (Fitch), 2005; Vazza et al. (S&P), 2005).[6]

Following Alsakka and ap Gwilym (2010), actual rating changes are identified according to a 20-point numerical rating scale (Aaa/AAA = 1, Aa1/AA+ = 2, Aa2/AA = 3 … Caa3/CCC- = 19, Ca/CC, C/SD-D = 20) by notches on the basis of monthly intervals. Table 3.1 summarises the dataset. There are 514 observations for 178 banks from 36 countries rated by Moody's. There are 440 observations for 151 banks from 40 countries rated by S&P, and 796 observations for 278 banks from 41 countries rated by Fitch. This gives a total of 1,750 end of month observations. S&P is the agency most likely to rate the bank the same as the sovereign, with almost 80% of banks' observations rated at the sovereign ceiling. Moody's is the agency least likely to assign the same rating to the bank and sovereign with just over 55% of Moody's observations with the banks rated at the sovereign ceiling. Also, Moody's is the most likely to assign a lower rating to the bank than the sovereign, whilst Fitch is the most likely to rate a bank higher than the sovereign.

There are 189 (105) bank upgrades (downgrades) by Moody's, 234 (154) by S&P, and 423 (247) by Fitch. There are also 103 (23) sovereign upgrades (downgrades) by Moody's, 116 (72) by S&P, and 103 (54) by Fitch (see Table 3.2). These statistics reflect the strong upgrade trend in emerging markets during this time period (in particular pre-2007),

[6] The second reason is actually more important in sample construction. In reality, the bank and sovereign rating actions are normally within less than one month of each other.

which can be explained by higher commodity prices, higher oil and natural gas prices and larger pools of inexpensive skilled labour which fuelled the economic growth (e.g. Chambers, 2006).

Table 3.2 also summarises the sovereign watch actions, and identifies 42 (15) positive (negative) cases of watch status by Moody's, 0 (19) by S&P, and 9 (18) by Fitch. These figures highlight differences in the policies of the three CRAs. Moody's assigns positive watch most frequently, whilst S&P tends not to put a sovereign on positive watch status due to their rating policy, however S&P assigns negative watch most frequently.[7] This is in line with Alsakka and ap Gwilym (2010), where Moody's is found to be the leader of the three CRAs in upgrading sovereigns, whilst S&P tends to be the first mover in downgrading sovereigns. I also find that sovereigns that have been on positive watch are subsequently upgraded more often than those on negative watch are subsequently downgraded. For Moody's, the 42 positive watch cases led to 38 rating upgrades (33 within 3 months), and for Fitch the 9 positive watch cases led to 8 rating upgrades (all within 3 months). In the case of downgrades, 15 negative watch sovereign actions led to 6 rating downgrades (5 within 3 months) by Moody's, 19 led to 11 (9 within 3 months) by S&P, and 18 led to 9 (5 within 3 months) by Fitch. This is in line with Alsakka and ap Gwilym (2009), whereby sovereigns on positive watch have a greater probability of subsequently being upgraded within 12 months than sovereigns that have been on negative watch of subsequently being downgraded do.

From Table 3.3, of the 189 (105) bank upgrades (downgrades) by Moody's, 180 (73) of them are linked to sovereign upgrades (downgrades). For S&P, of 234 (154) bank upgrades (downgrades), 231 (154) are linked to sovereign upgrades (downgrades). For Fitch, of 423 (247) bank upgrades (downgrades), 422 (222) are linked to sovereign upgrades (downgrades). These statistics give an indication of the strength of the link between sovereign

[7] There is only one occasion, ever, when S&P has placed a sovereign on watch for possible upgrade (Ukraine for one week in July 2010). However, this observation isn't in the sample since it ends in December 2009.

and bank rating changes. From the total of 846 (506) bank upgrades (downgrades) from the three CRAs, only 4 (12) are linked to sovereign downgrades (upgrades), suggesting that banks are highly likely to have a rating change in the same direction as the sovereign.

Using BankScope, the ownership status of the 425 rated banks is identified, to investigate whether ratings of state-owned banks behave differently to those of foreign or local privately-owned banks. From Table 3.1 there are 74 state-owned banks in the sample, 41 rated by Moody's, 40 by S&P, and 39 by Fitch. There are 136 foreign-owned banks, 50 rated by Moody's, 37 by S&P and 103 by Fitch, and 125 local privately-owned banks, 50 rated by Moody's, 50 by S&P, and 74 by Fitch.[8] I also use BankScope to determine whether the banks are listed or not (see Table 3.1). The sample is also split into pre-crisis and crisis periods (see Table 3.4). The pre-crisis period is 30th November 1999 - 31st December 2006 and the crisis period is 1st January 2007 - 31st December 2009. This captures any differences between rating events before and during the recent financial crisis. There are far more observations in the pre-crisis period, and the bank rating upgrades clearly dominate over bank downgrades in this period, with 165 (76) upgrades (downgrades) by Moody's, 174 (107) by S&P, and 352 (160) by Fitch. During the crisis period, bank upgrades and downgrades are more evenly matched, with 24 (29) upgrades (downgrades) by Moody's, 60 (47) by S&P, and 71 (87) by Fitch.

3.3. Methodology

The impact of sovereign rating actions on bank ratings is examined by employing the ordered probit modelling approach. This is a widely accepted approach in credit ratings literature, since the model accounts for the discrete, ordinal nature of credit ratings and rating changes (e.g. Nickell et al., 2000; Hu et al., 2002; Wendin and McNeil, 2006; Alsakka and ap

[8] The ownership of the remaining 90 banks could not be identified in BankScope as clearly belonging to one of our three categories.

Gwilym, 2009). The model estimates the upgrade, downgrade and no rating change probabilities in bank credit ratings. The rating changes are identified by notches (0, 1, and 2 or more) using the 20-point rating scale. The specification of the ordered probit model is defined as follows:

$$\Delta y^{*}_{i,a,t} = \sum_{n=0}^{2} \beta_1 Sch\_n_{i,a} + \beta_2 pw_{i,a} + \beta_3 w_{i,a} + \beta_4 rating_{i,a} + \varepsilon_i; \quad \varepsilon_i \sim N(0, 1) \qquad (3.1)$$

$\Delta y^{*}_{i,a,t}$ is an unobserved latent variable linked to the observed ordinal response categories $y_{i,a,t}$ by the measurement model:

$$y_{i,a,t} = \begin{bmatrix} 0 \text{ if } y^{*}_{i,a,t} \le \mu_1 \text{ (no rating change)} \\ 1 \text{ if } \mu_1 < y^{*}_{i,a,t} \le \mu_2 \text{ (rating upgrade/downgrade of 1 notch)} \\ 2 \text{ if } \mu_2 < y^{*}_{i,a,t} \text{ (rating upgrade/downgrade of 2 or more notches)} \end{bmatrix}$$

Where μ_m represent thresholds to be estimated using the maximum likelihood estimation (MLE), along with parameters β_1, β_2, β_3, and β_4 subject to the constraint that $\mu_1 < \mu_2$.

i = 1, ...54 countries, a = Moody's, S&P or Fitch, t = 1,...,109 months, and n = 0, 1, 2 or more notch rating change.

$y_{i,a,t}$ is an ordinal variable; $BUP_{i,a,t}$ or $BDN_{i,a,t}$. $BUP_{i,a,t}$ ($BDN_{i,a,t}$) = 1, 2 if a bank from country i is upgraded (downgraded) by 1, 2 or more notches, respectively, by agency a in month t; 0 otherwise.

$Sch\_n_{i,a} \equiv SUP\_n_{i,a}$ or $SDN\_n_{i,a}$. $SUP\_n_{i,a}$ ($SDN\_n_{i,a}$) is a dummy variable taking the value of 1 if an emerging sovereign i is upgraded (downgraded) by n notches by agency a, up to 3 months prior to month t, with n = 1 for a 1 notch upgrade (downgrade), and n = 2 for a 2 or more notch upgrade (downgrade); 0 otherwise.

$pw_{i,a} \equiv PW_{i,a}$ or $NW_{i,a}$. $PW_{i,a}$ ($NW_{i,a}$) is a dummy variable taking the value of 1 if an emerging sovereign i was previously (in its previous rating action, which has a maximum 3 month 'lookback' period due to the rating agencies target of 90 days to take action once an issuer rating is placed on watch) placed on positive (negative) watch by agency a, up to 3 months prior to month t; 0 otherwise.

$w_{i,a} \equiv pw_{i,a}$ or $nw_{i,a}$. $pw_{i,a}$ ($nw_{i,a}$) is a dummy variable taking the value of 1 if an emerging sovereign i was on positive (negative) watch, by agency a, up to 3 months prior to month t; 0 otherwise.

$rating_{i,t} = 1, 2, ..., 19, 20$. This is the transformed (numerical) rating of sovereign i by agency a, in month t. This is a control variable to account for the economic situation in the country at the time of the bank rating action.

I follow recent literature in examining the upgrade and downgrade models separately, as they have been found to be driven by different factors (e.g. Livingston et al. 2008; Alsakka and ap Gwilym, 2009). The dependent variables (bank upgrade / bank downgrade) are always related to the independent variables (sovereign rating information) through the same rating agency and country. Each dependent variable observation is no more than three months later than the independent variables. I expect sovereign rating actions to significantly affect bank ratings, and I expect positive coefficients for sovereign upgrades (downgrades), since I expect them to induce bank upgrades (downgrades).[9] I also expect positive coefficients for the positive (negative) watch variables, because if the sovereign has recently been on positive (negative) watch status, I expect the sovereign to subsequently be upgraded (downgraded), which in turn will induce bank upgrades (downgrades). Further, I calculate the marginal effects (MEs) to estimate the economic significance of each independent variable (Livingston

[9] Note that negative sovereign events are denoted by a '1' (a dummy variable), not '-1'.

et al., 2008). The marginal effects show the impact of a sovereign rating action (rating change, watch) by agency *a* on country *i* on the probability of bank rating changes of 0, 1, or 2 or more notches by agency *a* on banks from country *i*.

3.4. Empirical results

3.4.1. Table 3.5 – Whole sample

Table 3.5 presents the results for equation 3.1 for the whole sample. In the upgrade model I find that sovereign upgrades of 1, 2 or more notches and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 63.23% (19.30%) of being upgraded by 1 (2 or more) notches, and an 82.53% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has an increased probability of 87.13% of being upgraded by 2 or more notches, and 44.31% (42.82%) decreased probabilities of being upgraded by 0 (1) notches. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be upgraded than banks in countries with better sovereign ratings.

In the downgrade model I find that sovereign downgrades of 1, 2 or more notches, previous sovereign rating action being on positive watch and the latest sovereign rating action being on positive watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 25.98% (26.74%) of being downgraded by 1 (2 or more) notches, and a 55.72% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has increased probabilities of 62.24% of also being downgraded by 2 or more notches, and 55.77% (6.46%) decreased probabilities of being downgraded by 0 (1) notches. If the previous sovereign rating action was put on

positive watch, then a bank has decreased probabilities of 33.13% (7.04%) of being downgraded by 1 (2 or more) notches, and a 40.17% increased probability of remaining at the same rating. If the latest sovereign rating action was put on positive watch, then a bank has decreased probabilities of 20.18% (6.67%) of being downgraded by 1 (2 or more) notches, and a 26.86% increased probability of remaining at the same rating.

The results shows that sovereign downgrades are statistically insignificant in the bank upgrade model, and likewise sovereign upgrades are statistically insignificant in the bank downgrades model. This means that emerging market banks are rarely upgraded following sovereign downgrades, and similarly, rarely downgraded following sovereign upgrades. The marginal effects for sovereign upgrades in the bank upgrade model are economically greater than they are for sovereign downgrades in the bank downgrade model. This means that emerging market banks are more likely to be upgraded following a sovereign upgrade than they are of being downgraded following a sovereign downgrade. The difference in marginal effects can also be explained by the fact that there are more upgrades in the sample than downgrades (for both banks and sovereigns). There are 1,244 observations in the upgrade model compared to 904 in the downgrade model.

3.4.2. Table 3.6 – Agency comparisons

Table 3.6 presents the results for the sovereign rating factors that affect bank upgrades and bank downgrades for the sample split by agency (Moody's, S&P and Fitch). The upgrade model for Moody's shows that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 36.90% (42.68%) of being upgraded by 1 (2 or more) notches, and a 79.58% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has

increased probabilities of 15.38% (61.31%) of being upgraded by 1 (2 or more) notches, and a 76.69% decreased probability of remaining at the same rating.

In the downgrade model for Moody's, sovereign downgrades of 1, 2 or more notches, previous sovereign rating action on negative watch, latest sovereign rating action being on positive watch and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 14.65% (13.60%) of being downgraded by 1 (2 or more) notches, and a 28.25% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has increased probabilities of 16.66% (17.47%) of being downgraded by 1 (2 or more) notches, and a 34.13% decreased probability of remaining at the same rating grade. If the previous sovereign rating action was put on negative watch, then a bank has increased probabilities of 9.91% (7.91%) of being downgraded by 1 (2 or more) notches, and a 17.82% decreased probability of remaining at the same rating. If the latest sovereign rating action was put on positive watch, then a bank has decreased probabilities of 13.77% (7.16%) of being downgraded by 1 (2 or more) notches, and a 20.93% increased probability of remaining at the same rating. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be downgraded than banks in countries with better sovereign ratings.

In the upgrade model for S&P, sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 70.71% (7.68%) of being upgraded by 1 (2 or more) notches, and a 78.39% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has an increased probability of 98.03% of being upgraded by 2 or more notches, and decreased probabilities of 15.09% (82.93%) of being upgraded by 0 (1) notches.

In the downgrade model for S&P, sovereign downgrades of 1, 2 or more notches, previous sovereign rating action on negative watch and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 26.56% (26.38%) of being downgraded by 1 (2 or more) notches, and a 52.95% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 66.67% of being downgraded by 2 or more notches, and decreased probabilities of 28.35% (38.32%) of being downgraded by 0 (1) notches. If the previous sovereign rating action was put on negative watch, then a bank has decreased probabilities of 9.90% (8.19%) of being downgraded by 1 (2 or more) notches, and an 18.09% increased probability of remaining at the same rating. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be downgraded than banks in countries with better sovereign ratings.

In the upgrade model for Fitch, sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 78.46% (17.29%) of being upgraded by 1 (2 or more) notches, and a 95.75% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has an increased probability of 99.65% of being upgraded by 2 or more notches, and decreased probabilities of 28.74% (70.91%) of being upgraded by 0 (1) notches.

The downgrade model for Fitch shows that sovereign downgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 20.09% (22.67%) of being downgraded by 1 (2 or more) notches, and a 53.76% decreased probability of remaining at the same rating grade. If a sovereign has been

downgraded by 2 or more notches, then a bank has an increased probability of 87.78% of being downgraded by 2 or more notches, and decreased probabilities of 45.99% (41.79%) of being downgraded by 0 (1) notches.

Comparing the results from the three agencies show that Moody's is the agency that is least likely to change a banks rating in the same direction as the sovereign, compared to S&P and Fitch, since the marginal effects of Moody's are economically smaller than they are for S&P and Fitch, in particular in the bank downgrade model. Fitch on the other hand is the agency that is most likely to change a banks rating in the same direction since its marginal effects are economically greater than they are for the other two agencies (although only marginally larger than S&P).

3.4.3. Table 3.7 – Ownership comparison

Table 3.7 presents the results of the sovereign rating factors that affect bank upgrades and downgrades and the sample is split according to the banks ownership.[10] BankScope was used to gather the ownership information. Table 3.1 shows that there are 74 state owned banks, 136 foreign owned banks and 125 local privately-owned banks in the sample. That leaves 90 banks from the whole sample that the ownership data was unavailable.

The upgrade model for state owned banks shows that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 67.34% (17.67%) of being upgraded by 1 (2 or more) notches, and an 85.01% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has an increased probability of 87.79% of being

[10] Banks ownership is split into three categories, state owned banks, foreign owned banks and local privately-owned banks. Local owned banks will be used to define the latter of the three ownership types from this point onwards.

upgraded by 2 or more notches, and decreased probabilities of 34.47% (53.32%) of being upgraded by 0 (1) notches.

The downgrade model for state owned banks shows that sovereign upgrades of 1, 2 or more notches and the latest sovereign rating action being on negative watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 31.97% (19.00%) of being downgraded by 1 (2 or more) notches, and a 50.97% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has increased probabilities of 19.21% (34.18%) of being downgraded by 1 (2 or more) notches, and a 53.39% decreased probability of remaining at the same rating. If the latest sovereign rating action was put on negative watch, then a bank has increased probabilities of 19.58% (12.93%) of being downgraded by 1 (2 or more) notches, and a 32.51% decreased probability of remaining at the same rating.

The upgrade model for foreign owned banks shows that sovereign upgrades of 1, 2 or more notches, previous sovereign rating action being on positive watch and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has an increased probability of 57.22% (25.12%) of being upgraded by 1 (2 or more) notches, and an 82.34% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 84.49% of being upgraded by 2 or more notches, and decreased probabilities of 48.83% (35.66%) of being upgraded by 0 (1) notches. If the previous sovereign rating action was put on positive watch, then a bank has increased probabilities of 10.88% (6.23%) of being upgraded by 1 (2 or more) notches, and a 17.11% decreased probability of remaining at the same rating. The sovereign rating is significant

which means that banks in countries with poor sovereign ratings are more likely to be upgraded than banks in countries with better sovereign ratings.

The downgrade model for foreign owned banks shows that sovereign downgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 37.62% (32.95%) of being downgraded by 1 (2 or more) notches, and a 70.57% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 87.20% of being downgraded by 2 or more notches, and decreased probabilities of 57.40% (29.80%) of being downgraded by 0 (1) notches.

The upgrade model for local privately-owned banks shows that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 68.02% (22.53%) of being upgraded by 1 (2 or more) notches, and a 90.55% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has an increased probability of 95.35% of being upgraded by 2 or more notches, and decreased probabilities of 44.49% (50.86%) of being upgraded by 0 (1) notches.

The downgrade model for local privately-owned banks shows that sovereign downgrades of 1, 2 or more notches and the latest sovereign rating action being on positive watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 17.07% (17.69%) of being downgraded by 1 (2 or more) notches, and a 34.76% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 51.09% of

being downgraded by 2 or more notches, and decreased probabilities of 48.78% (2.31%) of being downgraded by 0 (1) notches. If the latest sovereign rating action was put on positive watch, then a bank has decreased probabilities of 30.99% (11.28%) of being downgraded by 1 (2 or more) notches, and a 42.27% increased probability of remaining at the same rating.

Comparing the results of banks with different ownership status, shows that foreign owned banks are most likely to be downgraded following sovereign downgrades, since the marginal effects are economically greater. Local privately-owned banks are most likely to be upgraded following a sovereign upgrade, with foreign owned banks being the least likely according to the marginal effects. Foreign owned banks are very similarly affected by sovereign upgrades and sovereign downgrades, since the marginal effects are very similar. State and local owned banks are far more likely to be upgraded following sovereign upgrades, rather than downgraded following sovereign downgrades compared to foreign owned banks.

3.4.4. Table 3.8 – Listed/unlisted comparison

Table 3.8 presents the results of the sovereign rating factors that affect bank upgrades and downgrades for a sample split into listed and unlisted banks. The listed/unlisted information was gathered from BankScope. From Table 3.1, there are 174 listed banks, and 239 unlisted banks in the sample, out of total number of 425 banks. The data was unavailable for 12 banks.

The upgrade model for listed banks shows that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 69.94% (23.98%) of being upgraded by 1 (2 or more) notches, and an 84.92% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2

or more notches, then a bank has an increased probability of 87.07% of being upgraded by 2 or more notches, and decreased probabilities of 52.72% (34.35%) of being upgraded by 0 (1) notches.

The downgrade model for listed banks shows that sovereign downgrades of 1, 2 or more notches and the latest sovereign rating action being on negative watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 29.13% (29.98%) of being downgraded by 1 (2 or more) notches, and a 59.11% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 78.07% of being downgraded by 2 or more notches, and decreased probabilities of 59.53% (18.54%) of being downgraded by 0 (1) notches. If the latest sovereign rating action was put on negative watch, then a bank has increased probabilities of 8.89% (5.03%) of being downgraded by 1 (2 or more) notches, and a 13.92% decreased probability of remaining at the same rating.

The upgrade model for unlisted banks shows that sovereign upgrades of 1, 2 or more notches and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 69.94% (23.98%) of being upgraded by 1 (2 or more) notches, and a 93.92% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, a bank has an increased probability of 97.60% of being upgraded by 2 or more notches, and decreased probabilities of 41.53% (56.07%) of being upgraded by 0 (1) notches. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be upgraded than banks in countries with better sovereign ratings.

The downgrade model for unlisted banks shows that sovereign downgrades of 1, 2 or more notches, previous sovereign rating action being on positive watch and the latest sovereign rating action being on positive watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 24.49% (24.42%) of being downgraded by 1 (2 or more) notches, and a 48.90% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has decreased probabilities of 3.72% (50.94%) of being downgraded by 1 (2 or more) notches, and a 52.66% decreased probability of remaining at the same rating. If the previous sovereign rating action was put on positive watch, then a bank has decreased probabilities of 35.93% (7.84%) of being downgraded by 1 (2 or more) notches, and a 43.77% increased probability of remaining at the same rating. If the latest sovereign rating action was put on positive watch, then a bank has decreased probabilities of 37.78% (10.02%) of being downgraded by 1 (2 or more) notches, and a 47.80 increased probability of remaining at the same rating.

Comparing the results of listed versus unlisted banks shows that unlisted banks are more likely to be upgraded following a sovereign upgrade since the marginal effects are economically greater. However, unlisted banks are less likely to be downgraded following a sovereign downgrade, compared to listed banks, since the marginal effects are economically smaller. Also, positive sovereign watch (both previous and latest) significantly reduce the probability of unlisted banks being downgraded within three months, whilst these effects are insignificant for listed banks. The latest sovereign rating action being on negative watch significantly increases the probability of banks being downgraded within three months, whereas this effect is insignificant for unlisted banks.

3.4.5. Table 3.9 – Bank to sovereign rating comparison

Table 3.9 presents the results of the sovereign rating factors that affect bank upgrades and downgrades for a sample split into banks rated equal to (at the sovereign ceiling), below and above the sovereign rating. Table 3.1 shows that in 65.54% of the observations, banks are rated at the sovereign ceiling, with 23.66% where the banks have a lower rating than the sovereign, and only 10.80% where the banks have a better rating than the sovereign.

The upgrade model for banks rated equal to the sovereign prior to the latest sovereign rating action shows that sovereign upgrades of 1, 2 or more notches and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 82.91% (12.19%) of being upgraded by 1 (2 or more) notches, and a 95.11% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has an increased probability of 98.85% of being upgraded by 2 or more notches, and decreased probabilities of 43.42% (55.42%) of being upgraded by 0 (1) notches. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be upgraded than banks in countries with better sovereign ratings.

The downgrade model for banks rated equal to the sovereign shows that sovereign downgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging markets banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 36.40% (36.53%) of being downgraded by 1 (2 or more) notches, and a 72.93% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 85.69% of being downgraded by 2 or more notches, and decreased probabilities of 63.30% (22.39%) of being downgraded by 0 (1) notches.

The upgrade model for banks rated below the sovereign prior to the latest sovereign rating action shows that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 36.38% (39.16%) of being upgraded by 1 (2 or more) notches, and a 75.54% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has an increased probability of 72.78% of being upgraded by 2 or more notches, and decreased probabilities of 48.98% (23.79%) of being upgraded by 0 (1) notches.

The downgrade model for banks rated below the sovereign shows that sovereign downgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging markets banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 13.12% (26.28%) of being downgraded by 1 (2 or more) notches, and a 39.41% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has increased probabilities of 9.18% (30.40%) of being downgraded by 1 (2 or more) notches, and a 39.58% decreased probability of remaining at the same rating.

The upgrade model for banks rated above the sovereign prior to the latest sovereign rating action shows that sovereign upgrades of 1, 2 or more notches and the prior sovereign rating action being on positive watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 47.40% (30.73%) of being upgraded by 1 (2 or more) notches, and a 78.13% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has an increased probability of 77.92% of being upgraded by 2 or more notches, and decreased probabilities of 61.46% (16.46%) of being upgraded by 0 (1) notches. If the previous sovereign rating action was put on positive

watch, then a bank has increased probabilities of 8.35% (13.93%) of being upgraded by 1 (2 or more) notches, and a 22.28% decreased probability of remaining at the same rating.

The downgrade model for banks rated above the sovereign shows that sovereign downgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging markets banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 22.84% (24.39%) of being downgraded by 1 (2 or more) notches, and a 47.23% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 87.12% of being downgraded by 2 or more notches, and decreased probabilities of 38.74% (48.38%) of being downgraded by 0 (1) notches.

The results of Table 3.9 show that banks rated at the sovereign ceiling are the most sensitive to movements in the sovereign rating, both for upgrades and downgrades, compared to banks rated below and above the sovereign. This is because the marginal effects are economically greater for these banks. Banks that are rated above the sovereign are more likely to follow changes in the sovereign rating compared to banks that are rated below the sovereign rating, which means that banks that are rated below the sovereign level are the least sensitive to changes in the sovereign rating.

3.4.6. Table 3.10 – Pre-crisis/crisis comparison

Table 3.10 presents the results of sovereign rating factors that affect bank upgrades and downgrades for a sample split into the pre-crisis and crisis sub-samples. The pre-crisis sample covers the period 30/11/1999-31/12/2006, and has a total of 1332 observations. The crisis sample covers the period 1/1/2007-31/12/2009, and a total of 418 observations. The number of bank upgrades far outweighs the number of bank downgrades in the pre-crisis

sample, with 691 upgrades and 343 downgrades. In the crisis sample there are more bank downgrades (163) than upgrades (155).

The upgrade model for the pre-crisis period shows that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 61.64% (24.82%) of being upgraded by 1 (2 or more) notches, and an 86.46% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has an increased probability of 89.29% of being upgraded by 2 or more notches, and decreased probabilities of 43.21% (46.07%) of being upgraded by 0 (1) notches. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be upgraded than banks in countries with better sovereign ratings.

The downgrade model for the pre-crisis period shows that sovereign downgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging markets banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 31.76% (34.34%) of being downgraded by 1 (2 or more) notches, and a 66.10% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 70.96% of being downgraded by 2 or more notches, and decreased probabilities of 67.96% (3.00%) of being downgraded by 0 (1) notches.

The upgrade model for the crisis period shows that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 72.88% (10.70%) of being upgraded by 1 (2 or more) notches, and an 83.59% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2

or more notches, then a bank has an increased probability of 99.63% of being upgraded by 2 or more notches, and decreased probabilities of 48.10% (51.52%) of being upgraded by 0 (1) notches.

The downgrade model for the crisis period shows that sovereign downgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging markets banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 19.02% (19.29%) of being downgraded by 1 (2 or more) notches, and a 38.31% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 45.33% of being downgraded by 2 or more notches, and decreased probabilities of 36.86% (8.48%) of being downgraded by 0 (1) notches.

The results of Table 3.10 shows that banks are less likely to be downgraded following sovereign downgrades during the crisis period compared to the pre-crisis period, since the marginal effects are economically smaller. However, the banks are affected by sovereign upgrades similarly during both time periods, compared to sovereign downgrades.

3.4.7. Table 3.11 – Listed banks, agency comparison

Table 3.11 presents the results of the sovereign rating factors that affect listed bank upgrades and downgrades split by agency. For listed banks rated by Moody's, the results of the upgrade model shows that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 34.39% (44.52%) of being upgraded by 1 (2 or more) notches, and a 78.91% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has

increased probabilities of 16.42% (62.53%) of being upgraded by 1 (2 or more) notches, and a 78.94% decreased probability of remaining at the same rating.

The results of the downgrade model for Moody's shows that sovereign downgrades of 1, 2 or more notches and the previous sovereign rating action being on negative watch are statistically significant in determining the future rating changes of emerging markets banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 13.14% (19.38%) of being downgraded by 1 (2 or more) notches, and a 32.52% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has increased probabilities of 15.34% (28.64%) of being downgraded by 1 (2 or more) notches, and a 43.98% decreased probability of remaining at the same rating. If the previous sovereign rating action was put on negative watch, then a bank has increased probabilities of 9.87% (12.56%) of being downgraded by 1 (2 or more) notches, and a 22.43% decreased probability of remaining at the same rating.

For listed banks rated by S&P, the results of the upgrade model shows that 1 notch sovereign upgrades are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 53.04% (11.19%) of being upgraded by 1 (2 or more) notches, and a 64.23% decreased probability of remaining at the same rating.

The results of the downgrade model for S&P shows that 1 notch sovereign downgrades, previous sovereign rating action being on negative watch, latest sovereign rating action being on negative watch and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 30.79% (15.64%) of being downgraded by 1 (2 or more) notches, and a 46.43% decreased probability of remaining at the same rating. If the previous sovereign rating action was put on negative watch, then a

bank has decreased probabilities of 13.06% (6.29%) of being downgraded by 1 (2 or more) notches, and a 19.34% increased probability of remaining at the same rating. If the latest sovereign rating action was put on negative watch, then a bank has decreased probabilities of 11.47% (5.57%) of being downgraded by 1 (2 or more) notches, and a 17.04% increased probability of remaining at the same rating. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be downgraded than banks in countries with better sovereign ratings.

For listed banks rated by Fitch, the results of the upgrade model shows that 1 notch sovereign upgrades, previous sovereign rating action on positive watch and the latest sovereign rating action being on positive watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 24.96% (14.61%) of being upgraded by 1 (2 or more) notches, and a 39.57% decreased probability of remaining at the same rating. If the previous sovereign rating action was put on positive watch, then a bank has an increased probability of 72.55% of being upgraded by 2 or more notches, and decreased probabilities of 24.48% (48.08%) being upgraded by 0 (1) notches. If the latest sovereign rating action was put on positive watch, then a bank has decreased probabilities of 58.11% (9.73%) of being upgraded by 1 (2 or more) notches, and a 67.84% increased probability of remaining at the same rating.

The results of the downgrade model for Fitch shows that 1-notch sovereign downgrades, previous sovereign rating action on negative watch and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 6.90% (11.99%) of being downgraded by 1 (2 or more) notches, and an 18.88% decreased probability of remaining at the same rating. If the previous sovereign rating action was put on

negative watch, then a bank has decreased probabilities of 11.06% (9.07%) of being downgraded by 1 (2 or more) notches, and a 20.13% increased probability of remaining at the same rating. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be downgraded than banks in countries with better sovereign ratings.

Comparing the results in Table 3.11 show that Moody's is the agency most likely to upgrade a listed bank following a sovereign upgrade compared with S&P and Fitch, with Fitch being the least likely to do so. On the other hand, S&P is the most likely to downgrade a listed bank following a sovereign downgrade, with Fitch being the least likely again.

3.4.8. Table 3.12 – Unlisted banks, agency comparison

Table 3.12 presents the results of the sovereign rating factors that affect unlisted bank upgrades and downgrades split by agency. For unlisted banks rated by Moody's, the results of the upgrade model shows that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 38.34% (40.94%) of being upgraded by 1 (2 or more) notches, and a 79.28% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has increased probabilities of 16.20% (56.82%) of being upgraded by 1 (2 or more) notches, and a 73.02% decreased probability of remaining at the same rating.

The results of the downgrade model for Moody's shows that sovereign downgrades of 1, 2 or more notches and the previous sovereign rating action being on negative watch are statistically significant in determining the future rating changes of emerging markets banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 21.29% (21.25%) of being downgraded by 1 (2 or more) notches, and a 42.54% decreased

probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has increased probabilities of 21.03% (23.73%) of being downgraded by 1 (2 or more) notches, and a 44.76% decreased probability of remaining at the same rating. If the previous sovereign rating action was put on negative watch, then a bank has increased probabilities of 15.72% (12.08%) of being downgraded by 1 (2 or more) notches, and a 27.80% decreased probability of remaining at the same rating.

For unlisted banks rated by S&P, the results of the upgrade model shows that 1-notch sovereign upgrades and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 25.47% (8.17%) of being upgraded by 1 (2 or more) notches, and a 33.65% decreased probability of remaining at the same rating. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be upgraded than banks in countries with better sovereign ratings.

The results the downgrade model for S&P shows that previous sovereign rating action being on negative watch and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If the previous sovereign rating action was put on negative watch, then a bank has decreased probabilities of 17.82% (20.50%) of being downgraded by 1 (2 or more) notches, and a 38.32% increased probability of remaining at the same rating. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be downgraded than banks in countries with better sovereign ratings.

For unlisted banks rated by Fitch, the results of the upgrade model shows that 1-notch sovereign upgrades and the previous sovereign rating action on positive watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 25.70% (13.07%) of

being upgraded by 1 (2 or more) notches, and a 38.77% decreased probability of remaining at the same rating. If the previous sovereign rating action was put on positive watch, then a bank has an increased probability of 31.73% of being upgraded by 2 or more notches, and decreased probabilities of 19.00% (12.74%) being upgraded by 0 (1) notches.

The results of the downgrade model for Fitch shows that sovereign downgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 18.02% (29.38%) of being downgraded by 1 (2 or more) notches, and a 47.39% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 71.17% of being downgraded by 2 or more notches, and decreased probabilities of 45.15% (26.02%) of being downgraded by 0 (1) notches.

The results in Table 3.12 show that Moody's is more likely to upgrade unlisted banks following sovereign upgrades, whilst Fitch is most likely to downgrade unlisted banks following sovereign downgrades.

3.4.9. Table 3.13 – State owned banks, agency comparison

Table 3.13 presents the results of the sovereign rating factors that affect state owned bank upgrades and downgrades split by agency. For state owned banks rated by Moody's, the results of the upgrade model shows that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 40.31% (45.84%) of being upgraded by 1 (2 or more) notches, and an 86.15% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then

a bank has increased probabilities of 2.67% (72.48%) of being upgraded by 1 (2 or more) notches, and a 75.15% decreased probability of remaining at the same rating.

The results of the downgrade model for Moody's shows that 1 notch sovereign downgrades are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 23.78% (28.77%) of being downgraded by 1 (2 or more) notches, and a 52.55% decreased probability of remaining at the same rating.

For state owned banks rated by S&P, the results of the upgrade model shows that no independent variable is statistically significant in determining the future rating changes of emerging market banks. The downgrade model is similar, where no independent variable is statistically significant.

For state owned banks rated by Fitch, the results of the upgrade model shows that 1 notch sovereign upgrades and the previous sovereign rating action being on positive watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 30.65% (7.77%) of being upgraded by 1 (2 or more) notches, and a 38.41% decreased probability of remaining at the same rating. If the previous sovereign rating action was put on positive watch, then a bank has an increased probability of 59.98% of being upgraded by 2 or more notches, and decreased probabilities of 11.27% (48.72%) of being upgraded by 0 (1) notches.

The results of the downgrade model for Fitch shows that sovereign downgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has an increased probability of 42.32% of being downgraded by 2 or more notches, and decreased probabilities of 41.58% (0.74%) of being downgraded by 0 (1) notches. If a sovereign has

been downgraded by 2 or more notches, then a bank has an increased probability of 87.43% of being downgraded by 2 or more notches, and decreased probabilities of 32.37% (55.06%) of being downgraded by 0 (1) notches.

3.4.10. Table 3.14 – Foreign owned banks, agency comparison

Table 3.14 presents the results of the sovereign rating factors that affect foreign owned bank upgrades and downgrades split by agency. For foreign owned banks rated by Moody's, the results of the upgrade model shows that sovereign upgrades of 1, 2 or more notches and the previous sovereign rating action being on positive watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 36.26% (40.86%) of being upgraded by 1 (2 or more) notches, and a 77.12% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has increased probabilities of 31.93% (52.13%) of being upgraded by 1 (2 or more) notches, and an 84.05% decreased probability of remaining at the same rating. If the previous sovereign rating action was put on positive watch, then a bank has increased probabilities of 18.31% (5.64%) of being upgraded by 1 (2 or more) notches, and a 23.95% decreased probability of remaining at the same rating.

The results of the downgrade model for Moody's shows that sovereign downgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 18.94% (40.62%) of being downgraded by 1 (2 or more) notches, and a 59.57% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has increased probabilities of 16.15%

(43.78%) of being downgraded by 1 (2 or more) notches, and a 59.93% decreased probability of remaining at the same rating.

For foreign owned banks rated by S&P, the results of upgrade model shows that 1 notch sovereign upgrades are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 40.18% (13.42%) of being upgraded by 1 (2 or more) notches, and a 53.60% decreased probability of remaining at the same rating.

The results of the downgrade model for S&P shows that sovereign downgrades of 1, 2 or more notches, previous sovereign rating action being on negative watch and the sovereign rating grade are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 35.61% (18.20%) of being downgraded by 1 (2 or more) notches, and a 53.81% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 46.16% of being downgraded by 2 or more notches, and decreased probabilities of 22.73% (23.42%) of being downgraded by 0 (1) notches. If the previous sovereign rating action was put on negative watch, then a bank has decreased probabilities of 18.99% (6.36%) of being downgraded by 1 (2 or more) notches, and a 25.35% increased probability of remaining at the same rating. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be downgraded than banks in countries with better sovereign ratings.

For foreign owned banks rated by Fitch, the results of the upgrade model shows that 1 notch sovereign upgrades and the previous sovereign rating action being on positive watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of

22.98% (17.80%) of being upgraded by 1 (2 or more) notches, and a 40.79% decreased probability of remaining at the same rating. If the previous sovereign rating action was put on positive watch, then a bank has an increased probability of 49.54% of being upgraded by 2 or more notches, and decreased probabilities of 22.27% (27.27%) of being upgraded by 0 (1) notches.

The results of the downgrade model for Fitch shows that sovereign downgrades of 1, 2 or more notches and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 36.12% (18.99%) of being downgraded by 1 (2 or more) notches, and a 55.11% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 96.63% of being downgraded by 2 or more notches, and decreased probabilities of 40.82% (55.82%) of being downgraded by 0 (1) notches. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be downgraded than banks in countries with better sovereign ratings.

The results in Table 3.14 show that Moody's is most likely to upgrade foreign owned banks following sovereign upgrades, compared to S&P and Fitch. However, Fitch is most likely to downgrade foreign owned banks following sovereign downgrades, according to the marginal effects.

3.4.11. Table 3.15 – Local privately-owned banks, agency comparison

Table 3.15 presents the results of the sovereign rating factors that affect local privately-owned bank upgrades and downgrades split by agency. For local owned banks rated by Moody's, the results of the upgrade model shows that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging

market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 39.21% (48.79%) of being upgraded by 1 (2 or more) notches, and an 88.00% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has increased probabilities of 6.49% (73.94%) of being upgraded by 1 (2 or more) notches, and an 80.43% decreased probability of remaining at the same rating.

The results of the downgrade model for Moody's shows that 2 or more notch sovereign downgrades are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 2 or more notches, then a bank has increased probabilities of 14.27% (34.29%) of being downgraded by 1 (2 or more) notches, and a 48.57% decreased probability of remaining at the same rating.

For local owned banks rated by S&P, the results of the upgrade model shows that all the independent variables are insignificant. The results of downgrade model shows that the sovereign rating is the only significant independent variable. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be downgraded than banks in countries with better sovereign ratings.

For local owned banks rated by Fitch, the results of the upgrade model shows that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 73.70% (15.32%) of being upgraded by 1 (2 or more) notches, and an 89.03% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has an increased probability of 99.21% of being upgraded by 2 or more notches, and decreased probabilities of 22.20% (77.01%) of being upgraded by 0 (1) notches.

The results of the downgrade model for Fitch shows that sovereign downgrades of 1, 2 or more notches and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 13.72% (33.68%) of being downgraded by 1 (2 or more) notches, and a 47.40% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 75.74% of being downgraded by 2 or more notches, and decreased probabilities of 48.33% (27.41%) of being downgraded by 0 (1) notches. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be downgraded than banks in countries with better sovereign ratings.

The results in Table 3.15 show that Fitch is most likely to upgrade local privately-owned banks following sovereign upgrades. Fitch is also most likely to downgrade local privately-owned banks following sovereign downgrades.

3.4.12. Table 3.16 – Banks rated = sovereign, agency comparison

Table 3.16 presents the results of the sovereign rating factors that affect bank that are rated equal to the sovereign rating of being upgraded and downgraded, split by agency. For banks rated equal to the sovereign by Moody's, the results of the upgrade model shows that sovereign upgrades of 1, 2 or more notches and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 68.85% (18.71%) of being upgraded by 1 (2 or more) notches, and an 87.56% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has increased probabilities of 23.22% (66.37%) of being upgraded by 1 (2 or more) notches, and an 89.59% decreased probability of remaining at the same rating. The sovereign rating is

significant which means that banks in countries with poor sovereign ratings are more likely to be upgraded than banks in countries with better sovereign ratings.

The results of the downgrade model for Moody's shows that sovereign downgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 20.70% (29.46%) of being downgraded by 1 (2 or more) notches, and a 50.15% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has increased probabilities of 22.83% (38.73%) of being downgraded by 1 (2 or more) notches, and a 61.56% decreased probability of remaining at the same rating.

For banks rated equal to the sovereign prior to the latest sovereign rating action by S&P, the results of the upgrade model shows that 1 notch sovereign upgrades and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 47.56% (7.83%) of being upgraded by 1 (2 or more) notches, and a 55.39% decreased probability of remaining at the same rating. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be upgraded than banks in countries with better sovereign ratings.

The results of the downgrade model for S&P shows that sovereign downgrades of 1, 2 or more notches, previous sovereign rating action being on negative watch, latest sovereign rating action being on negative watch and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 20.04% (22.19%) of being downgraded by 1 (2 or more) notches, and a 42.23% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an

increased probability of 66.01% of being downgraded by 2 or more notches, and decreased probabilities of 21.64% (44.37%) of being downgraded by 0 (1) notches. If the previous sovereign rating action was put on negative watch, then a bank has decreased probabilities of 11.49% (10.12%) of being downgraded by 1 (2 or more) notches, and a 21.60% increased probability of remaining at the same rating. If the latest sovereign rating action was put on negative watch, then a bank has decreased probabilities of 4.71% (6.25%) of being downgraded by 1 (2 or more) notches, and a 10.96% increased probability of remaining at the same rating. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be downgraded than banks in countries with better sovereign ratings.

For banks rated equal to the sovereign prior to the latest sovereign rating action by Fitch, the results of the upgrade model shows that sovereign upgrades of 1, 2 or more notches and the previous sovereign rating action being on positive watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 59.14% (11.28%) of being upgraded by 1 (2 or more) notches, and a 70.42% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has an increased probability of 98.40% of being upgraded by 2 or more notches, and decreased probabilities of 18.98% (79.42%) of being upgraded by 0 (1) notches. If the previous sovereign rating action was put on positive watch, then a bank has decreased probabilities of 14.93% (2.99%) of being upgraded by 1 (2 or more) notches, and a 17.93% increased probability of remaining at the same rating.

The results of the downgrade model for Fitch shows that sovereign downgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has

increased probabilities of 41.90% (29.27%) of being downgraded by 1 (2 or more) notches, and a 71.17% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has then a bank has an increased probability of 96.57% of being downgraded by 2 or more notches, and decreased probabilities of 51.49% (45.08%) of being downgraded by 0 (1) notches.

The results in Table 3.16 shows that banks that have the same as the sovereign are most likely to follow sovereign upgrades by Moody's and Fitch compared to S&P, whilst they are the most likely to follow sovereign rating downgrades by Fitch only.

3.4.13. Table 3.17 – Banks rated below sovereign, agency comparison

Table 3.17 presents the results of the sovereign rating factors that affect banks that are rated below the sovereign rating of being upgraded and downgraded, split by agency. For banks rated below the sovereign prior to the latest sovereign rating action by Moody's, the results of the upgrade model shows that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 14.43% (57.56%) of being upgraded by 1 (2 or more) notches, and a 72.00% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has increased probabilities of 3.59% (61.47%) of being upgraded by 1 (2 or more) notches, and a 65.06% decreased probability of remaining at the same rating.

The results of the downgrade model for Moody's shows that the previous sovereign rating action being on negative watch is statistically significant in determining the future rating changes of emerging market banks. If the previous sovereign rating action was put on negative watch, then a bank has increased probabilities of 22.26% (38.80%) of being

downgraded by 1 (2 or more) notches, and a 61.06% decreased probability of remaining at the same rating.

For banks rated equal to the sovereign prior to the latest sovereign rating action by S&P, the results of the upgrade model shows that none of the independent variables are significant in determining the future rating changes of emerging market banks. There are insufficient observations to run the downgrade model for S&P.

For banks rated equal to the sovereign prior to the latest sovereign rating action by Fitch, the results of the upgrade model shows that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 62.67% (30.41%) of being upgraded by 1 (2 or more) notches, and a 93.08% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has an increased probability of 84.80% of being upgraded by 1 notches, and decreased probabilities of 26.38% (58.42%) of being upgraded by 0 (1) notches.

The results of the downgrade model for Fitch shows that 2 or more notch sovereign downgrades is statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 56.43% of being downgraded by 2 or more notches, and decreased probabilities of 34.82% (21.62%) of being downgraded by 0 (1) notches.

The results in Table 3.17 show that Fitch is more likely than Moody's to upgrade banks with worse ratings than the sovereign, after upgrading the sovereign.

3.4.14. Table 3.18 – Pre-crisis period, agency comparison

Table 3.18 presents the results of the sovereign rating factors that affect bank upgrades and downgrades in the pre-crisis period, split by agency. For banks in the pre-crisis

period rated by Moody's, the results of the upgrade show that sovereign upgrades of 1 and 2 or more notches are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 29.57% (45.19%) of being upgraded by 1 (2 or more) notches, and a 74.77% decreased probability of remaining at the same rating. If a sovereign has been upgraded by 2 or more notches, then a bank has increased probabilities of 16.92% (55.50%) of being upgraded by 1 (2 or more) notches, and a 72.42% decreased probability of remaining at the same rating.

The results of the downgrade model shows that sovereign downgrades of 1, 2 or more notches, previous sovereign rating action being on negative watch and the latest sovereign rating action being on negative watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 24.68% (43.41%) of being downgraded by 1 (2 or more) notches, and a 68.09% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has increased probabilities of 25.58% (42.74%) of being downgraded by 1 (2 or more) notches, and a 68.32% decreased probability of remaining at the same rating. If the previous sovereign rating action was put on negative watch, then a bank has increased probabilities of 17.11% (11.30%) of being downgraded by 1 (2 or more) notches, and a 28.41% increased probability of remaining at the same rating. If the latest sovereign rating action was put on negative watch, then a bank has decreased probabilities of 11.14% (3.17%) of being downgraded by 1 (2 or more) notches, and a 14.31% increased probability of remaining at the same rating.

For banks in the pre-crisis period rated by S&P, the results of the upgrade shows that 1 notch sovereign upgrades are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank

has increased probabilities of 35.42% (11.77%) of being upgraded by 1 (2 or more) notches, and a 47.19% decreased probability of remaining at the same rating.

The results of the downgrade model for S&P shows that 1 notch sovereign downgrades, previous sovereign rating action being on negative watch and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 9.28% (16.67%) of being downgraded by 1 (2 or more) notches, and a 25.95% decreased probability of remaining at the same rating. If the previous sovereign rating action was put on negative watch, then a bank has decreased probabilities of 16.59% (15.02%) of being downgraded by 1 (2 or more) notches, and a 31.61% increased probability of remaining at the same rating. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be downgraded than banks in countries with better sovereign ratings.

For banks in the pre-crisis period rated by Fitch, the results of the upgrade model shows that 1 notch sovereign upgrades are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 29.43% (15.38%) of being upgraded by 1 (2 or more) notches, and a 44.81% decreased probability of remaining at the same rating.

The results of the downgrade model for Fitch show that sovereign downgrades of 1, 2 or more notches and the latest sovereign rating action being on negative watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 24.13% (32.69%) of being downgraded by 1 (2 or more) notches, and a 56.82% decreased probability of remaining at the same rating. If a sovereign has been downgraded by 2 or more notches, then a bank has an increased probability of 84.64% of being downgraded 2 or more

notches, and decreased probabilities of 54.08% (30.55%) of being downgraded by 0 (1) notches. If the latest sovereign rating action was put on negative watch, then a bank has decreased probabilities of 9.52% (4.73%) of being downgraded by 1 (2 or more) notches, and a 14.25% increased probability of remaining at the same rating.

The results in Table 3.18 shows that in the pre-crisis period Moody's has been more likely to upgrade banks following sovereign upgrades compared to S&P and Fitch. Both Moody's and Fitch have been more likely to downgrade banks following sovereign downgrades in the pre-crisis period than S&P.

3.4.15. Table 3.19 – Crisis period, agency comparison

Table 3.19 presents the results of the sovereign rating factors that affect bank upgrades and downgrades in the crisis period, split by agency. For banks in the crisis period rated by Moody's, the results of the upgrade model shows that 1 notch sovereign upgrades is statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 58.78% (10.66%) of being upgraded by 1 (2 or more) notches, and a 69.45% decreased probability of remaining at the same rating.

The results of the downgrade model for Moody's shows that the sovereign rating is statistically significant in determining the future rating changes of emerging market banks. This means that banks in countries with poor sovereign ratings are more likely to be downgraded than banks in countries with better sovereign ratings.

For banks in the crisis period rated by S&P, the results of both the upgrade and downgrade models shows that all the independent variables are insignificant in determining the future rating changes of emerging market banks.

For banks in the crisis period rated by Fitch, the results of the upgrade model shows that 1 notch sovereign upgrades and the sovereign rating are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been upgraded by 1 notch, then a bank has increased probabilities of 7.48% (11.54%) of being upgraded by 1 (2 or more) notches, and a 19.02% decreased probability of remaining at the same rating. The sovereign rating is significant which means that banks in countries with poor sovereign ratings are more likely to be upgraded than banks in countries with better sovereign ratings.

The results of the downgrade model for Fitch shows that 1 notch sovereign downgrades and the latest sovereign rating action being on negative watch are statistically significant in determining the future rating changes of emerging market banks. If a sovereign has been downgraded by 1 notch, then a bank has increased probabilities of 14.17% (23.56%) of being downgraded by 1 (2 or more) notches, and a 37.72% decreased probability of remaining at the same rating. If the latest sovereign rating action was put on negative watch, then a bank has an increased probability of 27.12% of being downgraded by 2 or more notches, and decreased probabilities of 25.73% (3.39%) of being downgraded by 0 (1) notches.

The results in table 3.19 show that Moody's was most likely to upgrade banks following sovereign upgrades during the crisis period. Fitch was the most likely to downgrade banks following sovereign downgrades during the crisis period.

3.5. Conclusion

For emerging market countries, I use the ordered probit modelling approach to analyse the effects of sovereign rating actions on the rating change probabilities of banks in the same country. The sample consists of sovereign and bank rating actions from the three largest global credit rating agencies, for 425 banks in 54 emerging market countries.

The most consistent result through most of the estimations is the strong effect sovereign upgrades (downgrades) have on the probability of future bank upgrades (downgrades). The marginal effects are generally economically greater for upgrades than they are for downgrades, for instance, if an emerging sovereign has been upgraded (downgraded) by 1 notch in the previous three months, then a bank has increased probabilities of a rating upgrade (downgrade) of 1, and 2 or more notches as follows: Moody's: 36.90% (14.65%), and 42.68% (13.60%); S&P: 70.71% (26.56%), and 7.68% (26.38%); and Fitch: 78.46% (20.09%), and 17.29% (33.67%), respectively. The marginal effects are stronger for S&P and Fitch than they are for Moody's, for both upgrades and downgrades. This suggests that Moody's is the agency that is least likely to change bank ratings in the same way as the corresponding sovereign rating. I also find that Moody's and S&P are more likely to downgrade banks in countries with poorer sovereign ratings than banks in countries with better sovereign ratings.

Local privately-owned banks are found to be more sensitive to sovereign upgrades, meanwhile foreign owned banks are found to be the most sensitive to sovereign downgrades whilst state owned and local privately-owned bank are roughly similarly likely to be downgraded following sovereign downgrades. There's evidence that the three agencies have different policies regarding adjusting bank ratings with sovereign ratings depending on the characteristics of the banks. The probabilities that bank ratings are upgraded (downgraded) following sovereign upgrades (downgrades) by Moody's is fairly similar regardless of the

ownership of the bank, whilst Fitch is more likely to upgrade local privately-owned bank following sovereign upgrades than they are of upgrading state or foreign owned banks following sovereign upgrades. Unfortunately there are insufficient observations for a clear comparison between banks of different ownerships rated by S&P.

Listed banks are found to be less sensitive to sovereign upgrades compared to banks that aren't listed, whilst listed banks are the most sensitive to sovereign downgrades. The evidence shows that Moody's adjustment of bank ratings following sovereign ratings doesn't depend on whether the bank is listed or not, whilst S&P are more likely to upgrade listed banks following sovereign upgrades than they are of doing the same to banks that aren't listed. There is mild evidence to suggest that Fitch is less likely downgrade listed banks following sovereign downgrades than they are of downgrading unlisted banks following sovereign downgrade.

Banks that are rated the same as their home sovereign are the most sensitive to both sovereign upgrades and downgrades, compared to banks that are rated better or worse than the sovereign. Banks rated better than the sovereign are more sensitive to sovereign downgrades compared to banks that have a worse rating than the sovereign, whilst they are both roughly equally sensitive to sovereign upgrades. I find that banks are less likely to follow sovereign rating downgrades during the crisis period.

This chapter shows that emerging market banks are very strongly tied to their corresponding sovereign rating actions. Emerging market banks are found to be more sensitive to sovereign rating upgrades than downgrades, apart from foreign owned banks that are more sensitive to downgrades compared to state and local privately-owned banks. Listed banks are found to be more sensitive to sovereign downgrades and slightly less sensitive to sovereign upgrades compared to banks that aren't listed. Banks that are constrained by the sovereign ceiling (and therefore rated the same as their home sovereigns' rating) are the most

sensitive to adjustments to the sovereign rating, whether they're sovereign upgrades or downgrades, whilst banks that are rated better than their home sovereign rating are more sensitive to sovereign downgrades compared to banks that have a poorer rating than their home sovereign.

This chapter has examined in detail the extent that the credit ratings of emerging market banks are affected by their home sovereigns' rating. There is clear evidence that the credit rating agencies policies have the bank and sovereign ratings closely linked. This chapter has highlighted important differences as to how the link between bank ratings and sovereign ratings vary depending on the ownership structure and financial soundness of the banks.

Table 3.1 - Descriptive Statistics of the data sample for the banks

		Moody's	S&P	Fitch	Total
No. of Countries		36	40	41	54
No. of rated banks		178	151	278	425
State-owned banks		41	40	39	74
Foreign-owned banks		50	37	103	136
Local-owned banks		50	50	74	125
Listed banks		85	66	113	174
Unlisted banks		86	81	161	239
Whole sample	Observations	514	440	796	1750
	Upgrades	189	234	423	846
	Downgrades	105	154	247	506
	No Change	220	52	126	398
State-owned	Observations	136	118	120	374
	Upgrades	58	85	72	215
	Downgrades	14	27	36	77
	No Change	64	6	12	82
Foreign-owned	Observations	139	124	257	520
	Upgrades	56	54	133	243
	Downgrades	27	51	83	161
	No Change	56	19	41	116
Local-owned	Observations	136	108	215	459
	Upgrades	47	58	121	226
	Downgrades	31	39	60	130
	No Change	58	11	34	103
Listed banks	Observations	514	440	796	768
	Upgrades	80	72	179	331
	Downgrades	50	70	115	235
	No Change	117	27	58	202
Unlisted banks	Observations	255	256	437	948
	Upgrades	103	155	237	495
	Downgrades	53	78	132	263
	No Change	99	23	68	190
Banks = sovereign	Observations	285	343	519	1147
	Upgrades	115	166	291	572
	Downgrades	57	138	155	350
	No Change	113	39	73	225
Banks < sovereign	Observations	179	75	160	414
	Upgrades	51	54	61	166
	Downgrades	31	11	70	112
	No Change	97	10	29	136
Banks > sovereign	Observations	50	22	117	189
	Upgrades	23	14	71	108
	Downgrades	17	5	22	44
	No Change	10	3	24	37

This table presents summary statistics for the dataset, which comprises the three largest global credit rating agencies. The sample consists of end of month long-term foreign-currency ratings from emerging market countries during the period November 1999 to December 2009. Emerging market countries are defined using the World Bank classification of GNI per capita. All securities markets in the low-income (LI), lower middle income (LMI) or upper middle income (UMI) countries are viewed as emerging countries. State, foreign, and local-owned banks were identified using BankScope, as well as the listed and unlisted information. Banks = sovereign, banks < sovereign, and banks > sovereign refer to banks that are rated the same as the sovereign, worse than the sovereign, and banks rated better than the sovereign, respectively.

Table 3.2 - Descriptive statistics of the data sample for the sovereigns

		Moody's	S&P	Fitch	Total
Sovereign rating actions	Upgrade	103	116	103	322
	Downgrades	23	72	54	149
	Positive Watch	42	0	9	51
	Negative Watch	15	19	18	52
	Total	183	207	184	574

This table presents summary statistics for emerging market sovereign rating actions by the three largest global credit rating agencies in the period November 1999 to December 2009.

Table 3.3 - Descriptive statistics for sovereign watch and the link between sovereign and bank ratings

	Moody's	S&P	Fitch	Total
No. of sovereigns having been on positive Watchlist subsequently being upgraded	42 obs. of positive Watchlist leading to 38 upgrades (33 within three months)	S&P doesn't assign positive Watchlists for sovereign ratings (refer to footnote 3)	9 obs. of positive Watchlist leading to 8 upgrades (8 within three months)	51 obs. of positive Watchlist leading to 46 upgrades (41 within three months)
No. of sovereigns having been on negative Watchlist subsequently being downgraded	15 obs. of negative Watchlist leading to 6 downgrades (5 within three months)	19 obs. of negative Watchlist leading to 11 downgrades (9 within three months)	18 obs. of negative Watchlist leading to 9 downgrades (5 within three months)	52 obs. of negative Watchlist leading to 26 downgrades (19 within three months)
No. of bank upgrades linked to sovereign upgrades	180 out of 189 bank upgrades linked sovereign upgrades	231 out of 234 bank upgrades linked sovereign upgrades	422 out of 423 bank upgrades linked sovereign upgrades	833 out of 846 bank upgrades linked sovereign upgrades
No. of bank downgrades linked to sovereign downgrades	73 out of 105 bank downgrades linked sovereign downgrades	154 out of 154 bank downgrades linked sovereign downgrades	73 out of 105 bank downgrades linked sovereign downgrades	222 out of 247 bank downgrades linked sovereign downgrades

This table presents the changes to watch of the sovereigns in the sample period, and also the link between bank and sovereign rating actions. The 'link' between the bank and sovereigns means that the banks and sovereigns are rated by the same credit rating agency, from the same emerging market country, and also the bank rating change never lies more than three months away from the sovereign rating action.

Table 3.4 - Descriptive statistics of the data sample for the banks split into the pre-crisis and crisis periods

		Moody's	S&P	Fitch	Total
Banks pre-crisis	Observations	406	325	601	1332
	Upgrades	165	174	352	691
	Downgrades	76	107	160	343
	No Change	165	44	89	298
Banks crisis	Observations	108	115	195	418
	Upgrades	24	60	71	155
	Downgrades	29	47	87	163
	No Change	55	8	37	100

This table presents summary statistics for emerging market bank rating changes, split into two time periods, namely, pre-crisis and crisis. The pre-crisis period covers November 1999 to December 2006, and the crisis period covers January 2007 to December 2009.

Table 3.5 - Estimation results of Eq. (3.1): Whole sample

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	2.79	8.83**	-82.53	63.23	19.30	0.20	0.66				Whole sample
SUP_2≤	3.53	9.98**	-44.31	-42.82	87.13	0.04	0.11				
SDN_1	0.71	3.42				3.50	11.24**	-52.72	25.98	26.74	
SDN_2≤	-0.33	-0.56				2.22	10.34**	-55.77	-6.46	62.24	
PW	0.02	0.17				-3.13	-2.22*	40.17	-33.13	-7.04	
NW	-0.57	-3.09				-0.05	-0.46				
pw	-0.13	-0.37				-0.69	-2.81**	26.86	-20.18	-6.67	
nw	-0.91	-3.93				0.04	0.33				
Rating	0.05	2.83**	-3.57	3.30	0.27	0.02	3.14				
	Pseudo R² (%)		43.32	*#Obs.*	1244	*Pseudo R² (%)*		29.45	*#Obs.*	904	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The dependent variable is *BUP* (*BDN*) (which equals 1 or 2 if an emerging bank from country *i* was upgraded (downgraded) by agency a by 1 or 2 or more notches, respectively, in month *t*; 0 otherwise). *SUP_1* (*SUP_2*) is a dummy variable equal to 1 if sovereign *i* was upgraded by 1 (2 or more) notches, up to 3 months prior to month *t*, 0 otherwise. *SDN_1* (*SDN_2*) is if sovereign *i* was downgraded 1 (2 or more) notches, up to 3 months prior to month *t*, 0 otherwise. *PW* (*NW*) is the previous sovereign rating's watch status. *pw* (*nw*) is the current sovereign rating's watch status. *Rating* is the sovereign rating according to the 20-point numerical rating scale (see Section 3.2). The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect).

**Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 3.6 - Estimation results of Eq. (3.1): Agency comparisons

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	2.56	8.93**	-79.58	36.90	42.68	0.00	0.00				
SUP_2≤	2.71	8.91**	-76.6	15.38	61.31	0.14	0.31				
SDN_1	0.50	0.81				0.77	3.81**	-28.25	14.65	13.60	
SDN_2≤						0.92	3.5**	-34.13	16.66	17.47	
PW	0.05	0.31				-0.89	-3.63				Moody's
NW						0.49	2.22*	-17.82	9.91	7.91	
pw	0.32	3.03				-0.69	-2.52*	20.93	-13.77	-7.16	
nw	0.07	0.12				-0.04	-0.17				
Rating	0.02	0.71				0.07	2.11*	-2.21	3.40	0.80	
	Pseudo R² (%)		33.12	*#Obs.*	409	*Pseudo R² (%)*		21.87	*#Obs.*	325	
SUP_1	2.66	5.57**	-78.39	70.71	7.68						
SUP_2≤	4.90	4.78**	-15.09	-82.93	98.03						
SDN_1						3.76	6.75**	-52.95	26.56	26.38	
SDN_2≤						2.16	4.09**	-28.35	-38.32	66.67	
PW											S&P
NW						-0.58	-3.16**	18.09	-9.90	-8.19	
pw											
nw						-0.27	-3.65				
Rating	0.00	-0.05				0.14	3.79**	-4.02	3.48	2.54	
	Pseudo R² (%)		43.49	*#Obs.*	286	*Pseudo R² (%)*		27.64	*#Obs.*	206	
SUP_1	4.17	10.43**	-95.75	78.46	17.29						
SUP_2≤	6.40	13.27**	-28.74	-70.91	99.65						
SDN_1						3.75	8.18**	-53.76	20.09	33.67	
SDN_2≤						3.14	8.68**	-45.99	-41.79	87.78	
PW	0.00	0.01									Fitch
NW						-0.11	-0.54				
pw	-3.65	-3.63									
nw						0.19	0.94				
Rating	-0.01	-0.17				-0.04	-3.34				
	Pseudo R² (%)		60.41	*#Obs.*	549	*Pseudo R² (%)*		29.26	*#Obs.*	373	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The estimations in this table are split according to the agency. For variable definitions see Table 3.5 or Section 3.3. The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect).
**Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 3.7 - Estimation results of Eq. (3.1): Ownership comparison

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	2.92	5.11**	-85.01	67.34	17.67	-0.64	-3.05				
SUP_2≤	3.41	5.26**	-34.47	-53.32	87.79						
SDN_1						3.38	4.06**	-50.97	31.97	19.00	
SDN_2≤						3.59	3.05**	-53.39	19.21	34.18	
PW	-0.25	-3.06									State-owned
NW						-0.55	-3.63				
pw	0.30	0.50				-3.14	-3.92				
nw						0.85	2.44*	-32.51	19.58	12.93	
Rating	0.05	3.33				0.05	3.52				
	Pseudo R² (%)		34.94	*#Obs.*	297	*Pseudo R² (%)*		33.23	*#Obs.*	159	
SUP_1	2.79	6.53**	-82.34	57.22	25.12	0.95	3.67				
SUP_2≤	3.35	6.48**	-48.83	-35.66	84.49	0.05	0.08				
SDN_1						2.35	8.35**	-70.57	37.62	32.95	
SDN_2≤						3.48	6.93**	-57.40	-29.80	87.20	
PW	0.55	2.54*	-17.11	10.88	6.23						Foreign-owned
NW	-0.03	-0.04				-0.14	-3.05				
pw	-3.20	-3.42				0.34	0.82				
nw						0.10	0.40				
Rating	0.06	2.51*	-2.23	3.75	0.48	0.04	3.36				
	Pseudo R² (%)		40.79	*#Obs.*	359	*Pseudo R² (%)*		41.59	*#Obs.*	277	
SUP_1	3.38	9.3**	-90.55	68.02	22.53	-0.63	-3.19				
SUP_2≤	4.20	8.08**	-44.49	-50.86	95.35	0.34	0.43				
SDN_1						0.93	4.07**	-34.76	17.07	17.69	
SDN_2≤						3.74	4.51**	-48.78	-2.31	51.09	
PW	-0.47	-3.60				-0.85	-3.17				Local-owned
NW						0.18	0.97				
pw	0.30	0.51				-3.16	-2.51*	42.27	-30.99	-11.28	
nw						-0.27	-3.21				
Rating	0.00	-0.05				-0.04	-3.14				
	Pseudo R² (%)		45.09	*#Obs.*	329	*Pseudo R² (%)*		22.28	*#Obs.*	233	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The estimations in this table are split according to bank ownership (see Section 3.2). For variable definitions see Table 3.5 or Section 3.3. The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect).

**Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 3.8 - Estimation results of Eq. (3.1): Listed/unlisted comparison

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	2.93	10.02**	-84.92	55.23	29.69	-0.27	-0.65				
SUP_2≤	3.45	8.8**	-52.72	-34.35	87.07						
SDN_1	3.18	3.82				3.74	9.68**	-59.11	29.13	29.98	
SDN_2≤	0.56	0.79				2.80	8.37**	-59.53	-18.54	78.07	
PW	0.29	3.31									Listed
NW	0.01	0.02				-0.15	-3.16				
pw	0.13	0.30				-0.22	-0.77				
nw						0.36	2.49*	-13.92	8.89	5.03	
Rating	0.04	3.63				0.00	-0.07				
	Pseudo R² (%)		40.88	*#Obs.*	533	*Pseudo R² (%)*		32.41	*#Obs.*	437	
SUP_1	3.79	8.22**	-93.92	69.94	23.98	0.41	0.99				
SUP_2≤	4.62	8.85**	-41.53	-56.07	97.60	0.50	3.01				
SDN_1	0.92	3.44				3.37	6.7**	-48.90	24.49	24.42	
SDN_2≤						3.90	6.53**	-52.66	3.72	50.94	
PW	-0.24	-3.28				-3.26	-2.18*	43.77	-35.93	-7.84	Unlisted
NW						0.09	0.63				
pw	0.53	0.94				-3.35	-2.71**	47.80	-37.78	-10.02	
nw	0.19	0.33				-0.25	-3.58				
Rating	0.05	2.23*	-3.61	3.33	0.28	0.04	3.64				
	Pseudo R² (%)		45.78	*#Obs.*	685	*Pseudo R² (%)*		28.50	*#Obs.*	453	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The estimations in this table are split into listed and unlisted banks (see Section 3.2). For variable definitions see Table 3.5 or Section 3.3. The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect).

**Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 3.9 - Estimation results of Eq. (3.1): Bank to sovereign rating comparison

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	3.94	11.06**	-95.11	82.91	12.19	0.55	3.00				
SUP_2≤	5.30	11.93**	-43.42	-55.42	98.85	-0.14	-0.26				
SDN_1						2.45	13.35**	-72.93	36.40	36.53	Banks = sovereign
SDN_2≤						3.48	11.32**	-63.30	-22.39	85.69	
PW	-0.02	-0.09									
NW						0.07	0.75				
pw	-0.77	-0.99				-0.10	-0.29				
nw						0.06	0.53				
Rating	0.10	3.97**	-3.50	3.34	0.16	-0.01	-0.41				
	Pseudo R² (%)		59.40	*#Obs.*	793	*Pseudo R² (%)*		42.63	*#Obs.*	587	
SUP_1	2.35	6.76**	-75.54	36.38	39.16	0.40	3.17				
SUP_2≤	2.36	5.45**	-48.98	-23.79	72.78	0.08	0.15				
SDN_1	0.40	0.75				3.03	5.38**	-39.41	13.12	26.28	Banks < sovereign
SDN_2≤						3.05	3.41**	-39.58	9.18	30.40	
PW	-0.19	-0.71				-3.02	-3.84				
NW	0.49	0.75				0.41	3.50				
pw	0.47	3.04									
nw	-0.50	-0.95				0.38	3.68				
Rating	0.00	0.16				0.04	3.24				
	Pseudo R² (%)		24.51	*#Obs.*	316	*Pseudo R² (%)*		13.08	*#Obs.*	217	
SUP_1	3.54	8.16**	-78.13	47.40	30.73						
SUP_2≤	4.32	10.47**	-61.46	-16.46	77.92						
SDN_1						3.42	3.59**	-47.23	22.84	24.39	Banks > sovereign
SDN_2≤						3.04	3.9**	-38.74	-48.38	87.12	
PW	3.48	2.22*	-22.28	8.35	13.93						
NW						-0.62	-3.15				
pw	0.34	0.81				-0.24	-0.45				
nw						0.10	0.19				
Rating	0.05	0.97				0.07	3.70				
	Pseudo R² (%)		59.44	*#Obs.*	135	*Pseudo R² (%)*		26.25	*#Obs.*	100	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The estimations in this table are split depending on the rating of the bank compared to the sovereign prior to the latest rating action. So the bank can be rated the same as the sovereign (banks = sovereign), banks rated worse than the sovereign (banks < sovereign), and banks rated better than the sovereign (banks > sovereign). For variable definitions see Table 3.5 or Section 3.3. The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect). **Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 3.10 - Estimation results of Eq. (3.1): Pre-crisis/crisis comparison

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	3.07	11.32**	-86.46	61.64	24.82						
SUP_2≤	3.58	11.37**	-43.21	-46.07	89.29						
SDN_1						2.01	10.58**	-66.10	31.76	34.34	
SDN_2≤						2.80	9.75**	-67.96	-3.00	70.96	
PW	-0.10	-0.66				-0.41	-0.83				Pre-crisis
NW						0.06	0.57				
pw	0.14	0.41				-0.54	-3.63				
nw	-0.51	-3.09				-0.22	-3.94				
Rating	0.04	2.23*	-3.35	3.05	0.30	0.02	0.67				
	Pseudo R² (%)		40.61	*#Obs.*	989	*Pseudo R² (%)*		38.86	*#Obs.*	641	
SUP_1	2.89	5.51**	-83.59	72.88	10.70						
SUP_2≤	5.80	6.4**	-48.10	-51.52	99.63						
SDN_1						3.06	4.96**	-38.31	19.02	19.29	
SDN_2≤						3.48	3.17**	-36.86	-8.48	45.33	
PW	-0.40	-3.01									Crisis
NW	0.66	0.86				0.28	0.87				
pw	-0.10	-0.15				-0.72	-3.89				
nw						0.55	3.88				
Rating	0.03	0.74				0.03	3.27				
	Pseudo R² (%)		58.43	*#Obs.*	255	*Pseudo R² (%)*		15.89	*#Obs.*	263	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The estimations in this table are split into the pre-crisis (30/11/1999-31/12/2006) and crisis (1/1/2007-31/12/2009) periods. For variable definitions see Table 3.5 or Section 3.3. The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect).

**Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 3.11 - Estimation results of Eq. (3.1): Listed banks, agency comparison

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	2.50	7.2**	-78.91	34.39	44.52						
SUP_2≤	2.70	6.37**	-78.94	16.42	62.53						
SDN_1						0.89	2.98**	-32.52	13.14	19.38	
SDN_2≤						3.20	3.54**	-43.98	15.34	28.64	
PW	0.25	3.14									Moody's
NW						0.62	2.25*	-22.43	9.87	12.56	
pw	0.42	3.03				-0.05	-0.17				
nw						0.42	3.38				
Rating	0.04	3.03				0.07	3.91				
	Pseudo R² (%)		34.74	*#Obs.*	197	*Pseudo R² (%)*		18.70	*#Obs.*	167	
SUP_1	3.92	3.62**	-64.23	53.04	11.19						
SUP_2≤	2.04	3.30									
SDN_1						3.44	4.48**	-46.43	30.79	15.64	
SDN_2≤											
PW											S&P
NW						-0.59	-2.17*	19.34	-13.05	-6.28	
pw											
nw						-0.52	-2.17*	17.04	-11.47	-5.57	
Rating	-0.03	-0.42				0.18	2.62**	-5.39	3.05	2.34	
	Pseudo R² (%)		26.49	*#Obs.*	99	*Pseudo R² (%)*		25.07	*#Obs.*	97	
SUP_1	3.28	4.14**	-39.57	24.96	14.61						
SUP_2≤											
SDN_1						0.54	2.73**	-18.88	6.90	11.99	
SDN_2≤											
PW	2.39	4.95**	-24.48	-48.08	72.55						Fitch
NW	-0.89	-3.38				-0.53	-2.83**	20.13	-11.06	-9.07	
pw	-3.98	-2.72**	67.84	-58.11	-9.73						
nw						0.28	3.00				
Rating	0.05	3.86				0.21	5.96**	-7.56	2.92	4.64	
	Pseudo R² (%)		27.91	*#Obs.*	237	*Pseudo R² (%)*		13.20	*#Obs.*	173	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The estimations in this table are for listed banks split according to agency. For variable definitions see Table 3.5 or Section 3.3. The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect). **Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 3.12 - Estimation results of Eq. (3.1): Unlisted banks, agency comparison

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	2.57	5.63**	-79.28	38.34	40.94						
SUP_2≤	2.60	6.01**	-73.01	16.20	56.82						
SDN_1						3.13	4.54**	-42.54	21.29	21.25	
SDN_2≤						3.19	3.1**	-44.76	21.03	23.73	
PW	-0.17	-0.67				-0.37	-0.67				Moody's
NW						0.73	2.25*	-27.80	15.72	12.08	
pw	0.10	0.21									
nw	0.33	0.51				-0.20	-0.63				
Rating	0.00	0.11				0.06	3.89				
	Pseudo R² (%)		31.50	*#Obs.*	202	*Pseudo R² (%)*		22.01	*#Obs.*	152	
SUP_1	3.20	2.71**	-33.65	25.47	8.17						
SUP_2≤											
SDN_1						0.51	3.81				
SDN_2≤											
PW											S&P
NW						-3.13	-3.86**	38.32	-17.82	-20.50	
pw											
nw						-0.53	-3.87				
Rating	0.07	2.31*	-3.24	0.44	0.80	0.16	4.06**	-4.31	0.04	4.27	
	Pseudo R² (%)		7.38	*#Obs.*	178	*Pseudo R² (%)*		12.59	*#Obs.*	101	
SUP_1	3.22	4.51**	-38.77	25.70	13.07						
SUP_2≤											
SDN_1						3.43	5.01**	-47.39	18.02	29.38	
SDN_2≤						2.31	5.63**	-45.15	-26.02	71.17	
PW	3.21	2.89**	-19.00	-12.74	31.73						Fitch
NW						0.23	0.93				
pw	-0.64	-3.30									
nw						-0.24	-0.92				
Rating	0.00	-0.05				-0.03	-0.78				
	Pseudo R² (%)		16.83	*#Obs.*	305	*Pseudo R² (%)*		21.76	*#Obs.*	200	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The estimations in this table are for unlisted banks split according to agency. For variable definitions see Table 3.5 or Section 3.3. The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect). **Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 3.13 - Estimation results of Eq. (3.1): State-owned banks, agency comparison

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	2.96	6.61**	-86.15	40.31	45.84						
SUP_2≤	2.96	7.5**	-75.15	2.67	72.48						
SDN_1						3.63	4.48**	-52.55	23.78	28.77	
SDN_2≤						0.91	3.61				
PW	-0.22	-0.70				-0.03	-0.05				Moody's
NW						-0.15	-0.77				
pw	0.70	3.79				0.07	3.06				
nw											
Rating	0.02	0.35									
	Pseudo R² (%)		30.40	*#Obs.*	122	*Pseudo R² (%)*		23.15	*#Obs.*	78	
SUP_1	0.99	0.82									
SUP_2≤	3.97	3.06									
SDN_1						0.42	0.60				
SDN_2≤											
PW											S&P
NW											
pw											
nw						0.50	3.02				
Rating	-0.03	-0.57				0.01	0.11				
	Pseudo R² (%)		8.06	*#Obs.*	91	*Pseudo R² (%)*		3.23	*#Obs.*	33	
SUP_1	3.42	2.04*	-38.41	30.65	7.77						
SUP_2≤											
SDN_1						3.62	3.11**	-41.58	-0.73	42.32	
SDN_2≤						3.14	2.67**	-32.37	-55.06	87.43	
PW	2.12	2.14*	-11.27	-48.72	59.98						Fitch
NW						-0.55	-3.71				
pw	-0.38	-0.37									
nw						3.05	3.73				
Rating	0.08	3.50				0.00	-0.08				
	Pseudo R² (%)		21.83	*#Obs.*	84	*Pseudo R² (%)*		24.46	*#Obs.*	48	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The estimations in this table are for state-owned banks split according to agency. For variable definitions see Table 3.5 or Section 3.3. The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect). **Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 3.14 - Estimation results of Eq. (3.1): Foreign-owned banks, agency comparison

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	2.44	4.16**	-77.12	36.26	40.85						
SUP_2≤	2.89	4.52**	-84.05	31.93	52.13						
SDN_1						3.67	3.85**	-59.57	18.94	40.62	
SDN_2≤						3.69	2.58**	-59.93	16.15	43.78	
PW	0.61	2.37*	-23.95	18.31	5.64						Moody's
NW						-0.27	-3.14				
pw	-0.72	-0.85				0.23	0.52				
nw						0.15	0.35				
Rating	0.07	3.76				0.02	0.34				
	Pseudo R² (%)		35.55	*#Obs.*	112	*Pseudo R² (%)*		21.29	*#Obs.*	83	
SUP_1	3.62	2.74**	-53.60	40.18	13.42						
SUP_2≤											
SDN_1						3.88	4.99**	-53.81	35.61	18.20	
SDN_2≤						3.82	2*	-22.73	-23.42	46.16	
PW											S&P
NW						-0.83	-3.26**	25.35	-18.99	-6.36	
pw											
nw						-0.55	-3.47				
Rating	-0.01	-0.23				0.26	4.92**	-6.86	4.20	2.66	
	Pseudo R² (%)		22.06	*#Obs.*	73	*Pseudo R² (%)*		33.91	*#Obs.*	70	
SUP_1	3.27	4.04**	-40.79	22.98	17.80						
SUP_2≤											
SDN_1						2.22	4.73**	-55.11	36.12	18.99	
SDN_2≤						4.57	4.95**	-40.82	-55.82	96.63	
PW	3.57	3.59**	-22.27	-27.27	49.54						Fitch
NW	-0.70	-3.02				0.31	0.84				
pw											
nw						-0.46	-0.94				
Rating	-0.01	-0.19				0.10	2.44*	-2.46	3.93	0.53	
	Pseudo R² (%)		18.01	*#Obs.*	174	*Pseudo R² (%)*		56.82	*#Obs.*	124	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The estimations in this table are for foreign-owned banks split according to agency. For variable definitions see Table 3.5 or Section 3.3. The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect).

**Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 3.15 - Estimation results of Eq. (3.1): Local privately-owned banks, agency comparison

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	3.11	7.11**	-88.00	39.21	48.79						
SUP_2≤	3.19	6.7**	-80.43	6.49	73.94						
SDN_1						0.56	3.76				
SDN_2≤						3.31	2.55*	-48.57	14.27	34.29	
PW	-0.40	-3.34									Moody's
NW											
pw	0.73	3.51									
nw						0.15	0.39				
Rating	-0.04	-0.84				0.06	3.52				
	Pseudo R² (%)		37.48	*#Obs.*	105	*Pseudo R² (%)*		10.56	*#Obs.*	89	
SUP_1	3.25	3.88									
SUP_2≤											
SDN_1						0.74	3.86				
SDN_2≤											
PW											S&P
NW						-0.16	-0.35				
pw											
nw											
Rating	0.07	3.03				0.17	2.29*	-4.69	0.46	4.23	
	Pseudo R² (%)		7.61	*#Obs.*	69	*Pseudo R² (%)*		12.38	*#Obs.*	50	
SUP_1	3.50	8.47**	-89.02	73.70	15.32						
SUP_2≤	5.61	7.44**	-22.20	-77.01	99.21						
SDN_1						3.40	3.62**	-47.40	13.72	33.68	
SDN_2≤						2.40	4.32**	-48.33	-27.41	75.74	
PW	-0.17	-0.23									Fitch
NW						0.18	0.45				
pw	-2.44	-3.81									
nw						0.23	0.64				
Rating	0.06	3.21				-0.15	-2.65**	5.61	-2.10	-3.52	
	Pseudo R² (%)		51.94	*#Obs.*	155	*Pseudo R² (%)*		16.67	*#Obs.*	94	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The estimations in this table are for local-owned banks split according to agency. For variable definitions see Table 3.5 or Section 3.3. The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect).

**Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 3.16 - Estimation results of Eq. (3.1): Banks rated = sovereign, agency comparison

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	3.21	5.6**	-87.56	68.85	18.71						
SUP_2≤	3.90	6.31**	-89.59	23.22	66.37						
SDN_1						3.37	5.59**	-50.15	20.70	29.46	
SDN_2≤						3.76	5.12**	-61.56	22.83	38.73	
PW	0.46	3.73									Moody's
NW						0.39	3.60				
pw	-0.53	-0.61				-0.39	-3.07				
nw						0.35	3.61				
Rating	0.11	2.9**	-3.25	3.19	0.06	0.01	0.30				
	Pseudo R² (%)		52.45	*#Obs.*	222	*Pseudo R² (%)*		27.36	*#Obs.*	185	
SUP_1	3.79	4.72**	-55.39	47.56	7.83						
SUP_2≤											
SDN_1						3.57	5.5**	-42.23	20.04	22.19	
SDN_2≤						2.16	3.65**	-21.64	-44.37	66.01	
PW											S&P
NW						-0.78	-4.5**	21.60	-11.49	-10.12	
pw											
nw						-0.43	-2.5*	10.96	-4.71	-6.25	
Rating	0.07	2.39*	-3.46	0.95	0.51	0.18	3.71**	-4.12	3.00	3.11	
	Pseudo R² (%)		21.08	*#Obs.*	201	*Pseudo R² (%)*		29.36	*#Obs.*	173	
SUP_1	2.46	6.55**	-70.42	59.14	11.28						
SUP_2≤	5.78	8.69**	-18.98	-79.41	98.40						
SDN_1						2.66	6.18**	-71.17	41.90	29.27	
SDN_2≤						4.51	6.44**	-51.49	-45.08	96.57	
PW	-0.68	-2.42*	17.93	-14.93	-2.99						Fitch
NW						0.34	3.84				
pw	-3.73	-3.87									
nw						-0.20	-0.71				
Rating	0.02	0.64				0.01	0.17				
	Pseudo R² (%)		47.65	*#Obs.*	370	*Pseudo R² (%)*		55.27	*#Obs.*	229	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The estimations in this table are for banks rated equal to the sovereign (banks = sovereign) prior to the latest rating action, split according to agency. For variable definitions see Table 3.5 or Section 3.3. The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect).

**Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 3.17 - Estimation results of Eq. (3.1): Banks rated worse than sovereign, agency comparison

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	2.17	4.28**	-72.00	14.43	57.56						
SUP_2≤	2.01	3.66**	-65.06	3.59	61.47						
SDN_1						-0.06	-0.10				
SDN_2≤						0.43	0.90				
PW	-0.16	-0.63				-0.14	-0.26				Moody's
NW						3.84	4.28**	-61.06	22.26	38.80	
pw	0.69	3.19									
nw	0.21	0.30				-0.17	-0.19				
Rating	-0.06	-3.41				0.02	0.34				
	Pseudo R² (%)		21.83	*#Obs.*	143	*Pseudo R² (%)*		28.54	*#Obs.*	96	
SUP_1	3.06	3.26									
SUP_2≤	3.69	3.25									
SDN_1											
SDN_2≤											
PW											S&P
NW											
pw											
nw											
Rating	0.00	-0.04									
	Pseudo R² (%)		5.06	*#Obs.*	64	*Pseudo R² (%)*			*#Obs.*		
SUP_1	3.67	6.03**	-93.08	62.67	30.41						
SUP_2≤	3.03	5.96**	-26.38	-58.42	84.80						
SDN_1						0.63	3.91				
SDN_2≤						3.58	2.96**	-34.82	-21.62	56.43	
PW	3.03	3.45									Fitch
NW						-0.50	-3.05				
pw	-3.24	0.75									
nw						0.20	0.58				
Rating	0.07	3.63				-0.08	-3.75				
	Pseudo R² (%)		45.23	*#Obs.*	109	*Pseudo R² (%)*		5.18	*#Obs.*	102	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The estimations in this table are for banks rated worse than the sovereign (banks < sovereign) prior to the latest rating action, split according to agency. For variable definitions see Table 3.5 or Section 3.3. The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect).

**Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 3.18 - Estimation results of Eq. (3.1): Pre-crisis period, agency comparison

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	2.36	7.39**	-74.77	29.57	45.19						
SUP_2≤	2.44	7.12**	-72.42	16.92	55.50						
SDN_1						2.00	4.82**	-68.09	24.68	43.41	
SDN_2≤						2.02	4.74**	-68.32	25.58	42.74	
PW	0.09	0.51				-0.13	-0.23				Moody's
NW						0.80	2.54*	-28.41	17.11	11.30	
pw	0.12	0.36				-0.29	-0.69				
nw	0.21	0.35				-0.58	-2.48*	14.31	-11.14	-3.17	
Rating	0.01	0.21				0.00	-0.11				
	Pseudo R² (%)		30.67	*#Obs.*	330	*Pseudo R² (%)*		33.21	*#Obs.*	241	
SUP_1	3.45	4.53**	-47.19	35.42	11.77						
SUP_2≤											
SDN_1						0.81	3.6**	-25.95	9.28	16.67	
SDN_2≤											
PW											S&P
NW						-0.90	-5.34**	31.61	-16.59	-15.01	
pw											
nw						-0.26	-3.40				
Rating	0.04	3.14				0.21	4.14**	-6.81	2.22	4.58	
	Pseudo R² (%)		13.59	*#Obs.*	218	*Pseudo R² (%)*		18.07	*#Obs.*	151	
SUP_1	3.42	5.93**	-44.81	29.43	15.38						
SUP_2≤											
SDN_1						3.94	6.1**	-56.82	24.13	32.69	
SDN_2≤						3.25	6.5**	-54.08	-30.55	84.64	
PW	0.43	3.44									Fitch
NW						0.12	0.67				
pw	-0.09	-0.19									
nw						-0.40	-3.96*	14.25	-9.52	-4.73	
Rating	0.04	3.87				0.03	0.49				
	Pseudo R² (%)		14.79	*#Obs.*	441	*Pseudo R² (%)*		40.98	*#Obs.*	249	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The estimations in this table are for banks in the pre-crisis (30/11/1999-31/12/2006) period, split according to agency. For variable definitions see Table 3.5 or Section 3.3. The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect).

**Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 3.19 - Estimation results of Eq. (3.1): Crisis period, agency comparison

	Upgrade					Downgrade					
	coefficient	*t*-stat	Marginal effects (%)			coefficient	*t*-stat	Marginal effects (%)			
			0	1	2≤			0	1	2≤	
SUP_1	2.32	4.31**	-69.45	58.78	10.66						
SUP_2≤											
SDN_1						0.30	0.85				
SDN_2≤						-0.07	-0.09				
PW	-0.03	-0.09									Moody's
NW											
pw	0.31	0.45				-0.54	-3.35				
nw						-0.12	-0.32				
Rating	0.01	0.14				0.12	2.16*	-4.16	2.34	3.82	
	Pseudo R² (%)		36.94	*#Obs.*	79	*Pseudo R² (%)*		6.96	*#Obs.*	84	
SUP_1	3.63	3.47									
SUP_2≤											
SDN_1						0.87	3.49				
SDN_2≤											
PW											S&P
NW						-0.12	-0.17				
pw											
nw											
Rating	0.01	0.11				0.08	3.78				
	Pseudo R² (%)		19.12	*#Obs.*	68	*Pseudo R² (%)*		6.55	*#Obs.*	55	
SUP_1	0.52	3.96*	-19.02	7.48	11.54						
SUP_2≤											
SDN_1						3.10	3.05**	-37.72	14.17	23.56	
SDN_2≤											
PW											Fitch
NW						0.42	0.38				
pw											
nw						0.92	2.06*	-25.73	-3.39	27.12	
Rating	-0.13	-3.08**	4.76	-3.90	-2.86	-0.03	-0.68				
	Pseudo R² (%)		6.94	*#Obs.*	108	*Pseudo R² (%)*		7.75	*#Obs.*	124	

This table reports estimation results of Eq. (3.1) with robust standard errors using data from Moody's, S&P, and Fitch. The estimations in this table are for banks in the crisis (1/1/2007-31/12/2009) period, split according to agency. For variable definitions see Table 3.5 or Section 3.3. The estimations of the impact of each variable on the probability of a rating change are also reported (marginal effect).

**Significant at 1% level; *significant at 5% level. The estimates of the two threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Chapter 4: The Impact of Sovereign Rating Actions on Bank Share Prices during the European Sovereign Debt Crisis

4.1. Introduction

The European sovereign debt crisis has dominated international financial market sentiment in recent times. Sovereign rating actions by credit rating agencies (CRAs) have attracted huge attention (e.g. Alsakka and ap Gwilym, 2011; House of Lords, 2011). There remain widespread concerns over the transmission of the debt crisis from the sovereigns to the financial sector. One major channel for this is the European banking sector holdings of government debt of the home country and of other countries. Blundell-Wignall (2012) finds that the cross-border exposure of European banks to sovereign debt of Greece, Italy, France and Spain are substantial at US$ 30,564m, US$ 181,587m, US$ 142,714m, and US$ 78,988m, respectively, as of September 2011.

The source of the European sovereign debt crisis is traced back to the banking crisis which began in 2007 to 2008 following the US subprime mortgage crisis. Many governments committed vast resources to guarantee and rescue financial institutions to avoid large banking institutions from collapsing (Gerlach et al., 2010). This led to increasing public debt which investors perceived as a credit risk transfer from the banking sector to governments e.g. the sovereign bond spreads for Ireland started to increase after the government extended a guarantee to the banking system (Sgherri and Zoli, 2009). Concerns about sovereign debt raised doubts about the strength of some European banks, due to their exposures to the sovereign debt of their own country and also to the sovereign debt of other countries. For example, the exposure of Greek (Italian) banks to Greek (Italian) sovereign debt represents 212% (161%) of their Tier 1 capital, whilst the exposure of German banks to the sovereign debt of Spain and Italy is 14% and 22% of their Tier 1 capital, respectively, as of December

2011 (see Table 4.1). Ferreira and Gama (2007) and Sy (2009) suggest that there could be rating-based triggers in bank regulations that could link bank stability to European sovereign debt.

Previous chapters have discussed how the CRAs have come under close scrutiny in recent years. Some notable instances include the CRAs being criticised for having serious flaws in their rating methodology because they failed to correctly model the risk profiles of structured finance products. Many argued that this exacerbated the US subprime crisis. More recently, the CRAs have been criticised of untimely downgrades of euro-zone sovereigns. The UK House of Lords report (2011) argues that the criticisms are largely unjustified since the CRAs are highlighting the seriousness of the situation with euro-zone sovereign debt.

The perceived problems that have been raised with the CRAs and their role within the financial system have led to several policy actions. The International Organization of Securities Commissions (IOSCO) revised the Code of Conduct Fundamentals for Credit Rating Agencies in 2008 to address issues of independence, conflict of interest, transparency and competition. Also, CRAs operating in Europe must now register with the European Securities and Markets Authority (ESMA). The Basel committee of the BIS reviewed the role of external ratings in the capital adequacy framework. The main objective of policy changes has been to reduce the impact of rating actions in financial markets due to their hardwiring in financial contracts and cliff effects.

This chapter investigates the effects of sovereign rating actions by S&P, Moody's and Fitch on the share prices of European banks during the 2007-2011 financial crisis. I hope to discover, despite the ongoing criticisms of the CRAs and policy changes, how markets participants perceive their rating actions. It has generally been found in the literature that markets respond more to negative sovereign rating actions than they do to positive sovereign rating actions (refer to Chapter 2 for a detailed review of previous studies on the market

impact of sovereign rating actions), which means that only rating downgrades convey new information to the market. The sovereign rating data used in this chapter consists mainly of rating downgrades and negative changes to outlook and watch, because the sample considers a sovereign debt crisis period. There is also evidence in the literature of negative sovereign rating actions in one country having significant spillover effects into other nearby countries and financial markets (see Gande and Parsley, 2005; Ferreira and Gama, 2007; Arezki et al., 2011).

An important point to consider is whether the recent criticism of CRAs has a consequence of them losing their credibility in the markets? If this were true I would not expect to find that the sovereign rating actions have any significant impact on bank share prices. Such a finding would suggest that the CRAs have not exacerbated the crisis. If sovereign rating changes are found not to impact bank share prices, then perhaps the recent policy changes have been successful in reducing the reliance on credit ratings. My expectation is however, that sovereign rating actions during the European sovereign debt crisis have an impact on bank share prices, which would show that investors value their opinions.

To the best of my knowledge, this is the first study that examines the effect of sovereign rating actions on share prices of banks. I evaluate these effects for banks from different countries to the sovereign receiving the rating action. In addition, I investigate the relative impact of three types of rating actions: rating changes, outlook signals and watch events. The outlook and watch signals have been found to be at least as important as rating changes in their market impact (e.g. Kaminsky and Schmukler, 2002; Sy, 2004; Hill and Faff; 2010; Afonso et al.,2012). However, most prior research on CRAs' actions has centred on actual rating changes only, with little emphasis placed on outlook and watch.

The main results are as follows. Firstly, and unsurprisingly, I show that the average returns of the European banks in the sample have been negative over the 2007 to 2011 period. The results shows that negative rating actions from each CRA negatively impact on the bank share prices. The effect is strongest for negative rating actions by S&P whilst the reaction is more delayed following Moody's rating actions. Negative outlook and watch actions are also found to influence bank share prices, in particular for S&P. Specific sovereign rating actions that are defined as conveying new rating information to the market have a stronger impact on bank share prices.

The remainder of this chapter is organised as follows. Section 4.2 discusses the data and methodology. Section 4.3 presents the empirical results and Section 4.4 concludes the chapter.

4.2. Data and methodology

4.2.1. Credit data

I investigate abnormal stock returns for a set of European banks around the timings of all sovereign rating actions for European countries by S&P, Moody's and Fitch during the period 1st January 2007 to 19th September 2011. The credit dataset includes long-term (LT) foreign-currency (FC) sovereign ratings, outlooks and watchlists. The study focuses on all sovereign rating actions, not only the credit rating level. The data is sourced from S&P, Moody's and Fitch publications, with assistance from my supervisors. Actual rating changes are identified according to mapped 20-point numerical ratings. This is a rating scale that only includes actual ratings (AAA/Aaa = 20, AA+/Aa1 = 19, AA/Aa2 = 18 …CCC-/Caa3 = 2, CC/Ca, SD-S/C = 1) by notches on the basis of daily intervals. To identify positive and negative rating actions, a 58-point numerical rating scale is used; this is a comprehensive credit rating (CCR) scale that incorporates both the actual ratings and credit outlook and

watch, as follows: AAA/Aaa = 58, AA+/Aa1 = 55, AA/Aa2 = 52 ...CCC-/Caa3 = 4, CC/Ca, SD-D/C = 1, and I add '+2' for positive watch, '+1' for positive outlook, '-1' for negative outlook, '-2' for negative watch, and '0' for stable outlook and no watch/outlook assignments (see Sy, 2004).[11] A positive rating action would be one that moves up the 58-point scale e.g. to 47 from 43, and a negative rating action would be one that moves down the 58-point scale e.g. to 54 from 58.

I also employ a logit-type transformation of the above 58-point numerical rating scale to address possible non-linearity, as follows (see Sy, 2004):

$$LCCR_t = ln\left[\frac{CCR_t}{59 - CCR_t}\right] \qquad (4.1)$$

CCR_t is the rating according to the 58-point numerical rating scale. In this case, a non-zero change in the logarithmic comprehensive 58-point numerical rating defines the event of interest: 'positive', an upgrade resulting from an upward move in the letter credit rating of the sovereign and/or from a favourable signal in the credit outlook/watch; 'negative', a downgrade resulting from a downward move in the letter credit rating of the sovereign and/or from an unfavourable signal in the credit outlook/watch.

Outlook and watch signals are defined as follows. *Negative watch* signals include placing sovereign *s* on watch for possible downgrade, and the action of confirming the rating of sovereign *s* after being on watch for possible upgrade (with no rating change). *Positive watch* signals include placing sovereign *s* on watch for possible upgrade, and the action of confirming the rating of sovereign *s* after being on watch for possible downgrade (with no

[11] Using the CCR rating scale, the same numerical score may represent different credit status. For example, issuers rated AAA with negative watch and AA+ with positive outlook carry the same numerical score '56'. However, migrations between such states (with the same numerical score) would be extremely unlikely and there are no such cases in the data sample.

rating change). *Negative outlook* signals contain changes to negative outlook from stable/positive outlook, and changes to stable outlook from positive outlook. *Positive outlook* signals contain changes to positive outlook from stable/negative outlook, and changes to stable outlook from negative outlook (all cases with no actual rating change).

4.2.1.1. S&P rating actions

The S&P credit data includes sovereign rating actions for 19 countries, 10 of which are in the euro-zone, eight other European Union members and I also include Iceland due to its financial difficulties during the sample period. There are a total of 102 S&P rating actions for the 19 countries within this relatively short sample period, averaging over five rating actions per country in less than five years. There are 40 (8) downgrades (upgrades) by S&P (Rows 3 + 12 + 13 and 2 + 11 of Table 4.2), most of which are by one-notch. However, there are two cases of three-notch rating changes in the sample period, when S&P downgraded Greece in April 2010 and June 2011. There are seven cases of two-notch downgrades, e.g. Portugal was downgraded to BBB from A- in March 2011. Estonia and the Czech Republic were both upgraded by two notches in August 2011. The dataset also comprises: 47 (15) negative (positive) outlook adjustments; and 26 (0) negative (positive) watch announcements (see Rows 6 + 12, 5 + 11, 9 + 13 and 8 of Table 4.2). There is only one occasion, ever, when S&P has placed a sovereign on watch for possible upgrade (Ukraine for one week in July 2010) and this does not meet the sampling criteria.

The majority of signals in this S&P sample are announced in isolation, although combined-signals for a given sovereign (i.e. actual rating change and watch/outlook signal simultaneously) occur in 33.33% (34/102) of cases (see Row 14 of Table 4.2). The majority of signals are announced individually, i.e. for one sovereign on a given day, although multiple-sovereign events (i.e. rating actions for more than one sovereign in a given day)

occur in 25.49% (26/102) of cases (see Row 16). All multiple sovereign events on a single day are of the same type i.e. they all are negative signals, or they are all positive signals, which avoids having positive and negative rating actions occurring on the same day for the event day analysis.[12]

There are five observations (for Estonia in April 2009, Lithuania in August 2009, Greece in March 2010, and for Iceland in March 2010 and May 2011) when the status of sovereigns was changed to negative outlook from negative watch (with no rating change), which is consider to be a positive rating action (since it moves up the 58-point scale). As expected, negative rating actions dominate positive rating actions in the sample, due to the time window of 2007-11. 72.55% (74/102) of the observations are negative rating actions (see Rows 17 and 18 of Table 4.2). This reflects the downward pressure on sovereign ratings due to the increased indebtedness, larger deficits, slower economic growth and austerity measures across Europe at this time.

4.2.1.2. Moody's rating actions

The Moody's credit data includes sovereign rating actions for 17 countries, 11 of which are in the euro-zone, five European Union members and Iceland. There are a total of 84 Moody's rating actions for the 17 countries, averaging to almost five rating actions per country in less than five years. There are 32 (5) downgrades (upgrades) by Moody's (Rows 3 + 12 + 13 and 2 + 11 in Table 4.2), most of which are by one-notch. However, there are eight cases of two-notch downgrades, five cases of three-notch downgrades and two cases of four notch downgrades. There is one case of a five-notch rating change when Moody's downgraded Ireland to Baa1 from Aa2 with negative outlook in December 2010. Each of the five upgrades in the sample was by one-notch. The dataset also comprises: 38 (11) negative

[12] All multiple sovereign rating events that occur on a single day are taken as one observation in the univariate analysis below which avoids having more than one of a banks' return in a given window which would contaminate the univariate results. This is one factor that yields a different number of observations between the univariate and regression analysis.

(positive) outlook adjustments; and 20 (3) negative (positive) watch announcements (see Rows 6 + 12, 5 + 11, 9 + 13 and 8 of Table 4.2).

The majority of signals in this sample are announced in isolation, although combined-signals for a given sovereign (i.e. actual rating change and watch/outlook signal simultaneously) occur in 29.76% (25/84) of cases (see Row 14 of Table 4.2). The majority of signals are announced individually, although multiple-sovereign events occur in 28.57% (24/84) of cases (see Row 16). There are two days in the sample period where Moody's assigned positive and negative rating actions to different sovereigns on the same day. On 23rd April 2009 Latvia and Lithuania were both downgraded by one and two notches, respectively, with negative outlook, which are negative signals. On the same day, Estonia was taken off negative watch and placed on negative outlook, with no rating change, which is considered to be a positive rating action (since it moved up the 58-point scale). On 5th April 2011 Portugal was downgraded with negative watch, which is a negative signal, while Bulgaria was taken off positive outlook and placed on positive watch which is a positive signal.[13]

There are two observations (for Estonia in April 2009 and for Hungary in August 2010) when a sovereign status was changed to negative outlook from negative watch (with no rating change), which is considered to be a positive rating action. As expected, negative rating signals dominate positive rating signals in the sample. 76.19% (64/84) of the observations are negative rating actions (see Rows 17 and 18 of Table 4.2).

4.2.1.3. Fitch rating actions

The Fitch credit data includes sovereign rating actions for 17 countries, 9 of which are in the euro-zone, 7 European Union members and Iceland. There are a total of 80 Fitch rating

[13] These five observations are taken out of the univariate analysis (see Sections 4.2.2 and 4.3.1) to avoid contaminating the results. Following Footnote 12 above, this is a second reason for a discrepancy in the number of observations between the univariate and regression analysis for Moody's only.

actions for the 17 countries, averaging to over four rating actions per country in less than five years. There are 34 (9) downgrades (upgrades) by Fitch (Rows 3 + 12 + 13 and 2 + 11 in Table 4.2), most of which are by one-notch. However, there are six cases of two-notch downgrades and five cases of three-notch downgrades. There is one case of a four-notch rating change when Fitch downgraded Greece to CCC from B+ in July 2011. There are eight cases of a one notch upgrade, and one case of a two notch upgrade. The dataset also comprises: 38 (14) negative (positive) outlook adjustments; and 10 (2) negative (positive) watch announcements (see Rows 6 + 12, 5 + 11, 9 + 13 and 8 of Table 4.2).

The majority of signals in this sample are announced in isolation, although combined-signals for a given sovereign (i.e. actual rating change and watch/outlook signal simultaneously) occur in 33.75% (27/80) of cases (see Row 14 of Table 4.2). The majority of signals are announced individually, although multiple-sovereign events occur in 23.75% (19/80) of cases (see Row 16). All multiple sovereign events on a single day in the sample are of the same type i.e. they all are negative signals, or they are all positive signals.

There are three observations (Latvia in December 2008, Iceland in December 2009 and Ireland in April 2011) where its status was changed to negative outlook from negative watch (with no rating change), which we consider to be a positive rating action. As expected, negative rating signals dominate positive rating signals in the sample. 66.25% (53/80) of the observations are negative rating actions (see Rows 17 and 18 of Table 4.2).

4.2.2. Banks, share prices, abnormal returns and univariate analysis

In Chapter 3, I found that bank ratings are strongly influenced by the sovereign rating from the same country. This is one reason why I choose to investigate the reaction of bank share prices to sovereign rating actions, instead of looking at stock indexes. Another reason is that many banks are heavily exposed to the sovereign debts of European governments such as

Greece and Italy. The banks in the sample are the European banks that were included in the 2011 EU stress test and this information was gathered from SNL. Table 4.3 contains the bank information. There are a total of 91 banks, from 21 European countries included in the EU stress test. However, some are excluded for the following reasons: (a) bank is not listed, hence no share price information; or (b) thinly traded shares.[14] This reduces the sample to 51 banks, from 16 countries. The daily share price data was collected using Thomson One Banker and spans 2nd January 2006 to 6th October 2011. The share price data spans a longer timeframe than the credit data in order to calculate the abnormal returns. The share prices for TT Hellenic Postbank SA, Caixabank SA and Caja Ahorros Del Mediterraneo (see Rows 23, 42 and 43) were only available from 5th June 2006, 10th October 2007 and 28th July 2008, respectively.

The share prices are quoted in Euros, which are transformed into log returns. I carefully consider an appropriate method to calculate the abnormal returns. Holthausen and Leftwich (1986) argue that the results over short time windows immediately around the event date are not sensitive to different measures of abnormal returns. Hill and Faff (2010) prefer the mean-adjusted returns to calculate the abnormal returns in their study and as robustness use a market model and index model and find that the conclusions drawn doesn't alter. With this in mind, I decide on using the mean-adjusted returns to calculate the abnormal returns, which I also report alongside raw returns. The mean daily return for each bank prior to a sovereign rating event is calculated using 200 daily observations for the period t = -230 to t = -30.[15] This represents the expected daily return (ER). Daily abnormal returns (AR) are calculated for each day in the event window as follows:

[14] Illiquid shares are identified when the share prices were transformed into log returns, and so banks were deleted from the sample when the returns were zero more for more than 50% of observations e.g. Landesbank Hessen-Thuringen Giro which exhibited returns of zero more often than non-zero returns.

[15] In the event of a bank holiday, I take the next available share price.

$$AR_{it} = R_{it} - ER_{it} \quad (4.2)$$

Where:

$i = 1, 51$ (banks)

AR_{it} = abnormal log return of bank i at time t.

R_{it} = log return of bank i at time t.

ER_{it} = expected log return of bank i at time t.

The event days are the sovereign credit events. The abnormal returns are based on possible international spillovers i.e. the impact of a credit event for sovereign A on banks in countries B, C, D, etc. Several countries represented in Table 4.3 were not subject to any sovereign rating action up to the end of the sample period (although they have been subsequently).

Abnormal returns/raw returns are cumulated over consecutive days to give cumulative abnormal returns/cumulative raw returns (CARs/CRRs). I evaluate the CARs/CRRs over the pre-event (-10, -1), event (0, +1) and the post-event (+2, +11) windows, where 0 represents the actual event day, $t = 0$. Gande and Parsley (2005) suggest the short two-day (0, +1) event window to reduce contamination from other credit events. The pre-event (-10, -1) window will capture market anticipation of rating announcements (Hull et al., 2004), and the post-event (+2, +11) window will capture possible longer term or delayed impacts of the sovereign credit events on the bank share prices. Standard errors are calculated following Boehmer et al. (1991) standardized cross-sectional test, to account for event induced variance.[16]

The credit ratings sample is considers a time period unlike most other in the literature due to the high number of negative sovereign rating actions in developed economies. There is an issue of the sheer volume of sovereign rating actions to relatively few countries in such a

[16] I utilize the Dow Jones Stoxx Europe 600 index to calculate the standardized residual.

short time window. This gives rise to a large number of events being clustered, where if a sovereign rating action (at time $t = 0$) is preceded by other rating actions within the 10 trading days before it, either by the same agency or by the others. The same issue arises if sovereign rating actions occur in the post-event window of other sovereign rating actions. As part of the robustness checks, I split the sample into independent and clustered sovereign rating actions (see Gande and Parsley, 2005; Hill and Faff, 2010), in order to account for the clustering of events. An independent event is when sovereign *s* experiences a rating action with no other rating action given to sovereign *s* by any of the three main rating agencies (S&P, Moody's and Fitch), within the (-10, +11) window (21 trading days). A clustered event for sovereign *s* is when it has received another rating action within 21 trading days by any of the three agencies. e.g. on 29th September 2008 S&P downgraded Iceland to A- from A with negative watch, and on the 30th September 2008 Fitch downgraded Iceland to A- from A+ with negative watch, whilst also on 30th September 2008 Moody's put Iceland on negative watch from stable outlook.

I only split the sample into independent and clustered sub-samples for negative rating actions since the amount of positive rating actions is relatively small in comparison. Rows 19 and 20 of Table 4.2 show that the amount of independent compared to clustered events are roughly half-to-half for each agency.[17]

I anticipate that positive rating actions will have positive effects on the bank's returns, and that negative rating actions will have negative effects on the bank's returns.

[17] There are cases where there are independent and clustered events occurring on the same day. These are taken out of the sub-sample of the univariate analysis in Section 4.3.1.

4.2.3. Regression model

I conduct multivariate analysis of the rating factors that affect the CARs of banks around the time of sovereign rating actions. The model is as follows:

$$CAR_{it} = \alpha + \beta_1 \Delta CCR_{st} + \beta_2 EC\ CCR_{st} + \beta_3 BC\ CCR_{bt} + \beta_4 Newinfo_{st} + \beta_5 Sameday\ event_{ct} + \beta_6 Regional\ lagged_{rt} + \beta_7 Lagged_{bt} + \beta_8 Sameday_{bt} + \beta_9 Days_{rt} + \beta_{10} y_t + \varepsilon_{it} \quad (4.3)$$

CAR_{it} is the mean-adjusted cumulative abnormal returns of bank i in the event window t: (0, +1). Gande and Parsley (2005) suggest the short two-day (0, +1) event window to avoid the event window contamination problem. ΔCCR is the 1-day change in the 58-point comprehensive credit rating (CCR) scale (see Section 4.2.1) for sovereign s at event date t. I only model negative rating actions since the number of positive signal in the sample is comparatively small. For ease of interpretation, the absolute value of ΔCCR is used in the regression. *EC CCR* (*BC CCR*) is the level of the event country (s) (bank's country (b)) comprehensive credit rating. These are used as a proxy to control for the financial conditions of bank country (b) and event country (s). This allows the impact of sovereign credit news to vary with the credit rating (i.e. the financial position) of the event (bank) country.

Newinfo is a dummy variable that takes the value of one if the sovereign s's rating action provides new information i.e. a rating action to sovereign s in the opposite direction to its previous rating action received by any of the three agencies, or a rating action that takes sovereign s to a new rating level, in this case to a rating level according to the 20-point numerical scale (see Section 4.2.1) that's below the prevailing lowest rating by any of the three agencies since Eq. (4.3) models negative sovereign events only. *Sameday event* is the net total change in LCCR (see Section 4.2.1 for definition) of one or more sovereign rating event that occurs on the same day as sovereign s by any agency. If a sovereign event that

happens on the same day as the event to sovereign *s*, and that sovereign event is to a country where bank *i* is based, then this will be given the value of zero, and is captured instead in the variable *Sameday* which I will discuss below. *Sameday event* is split into *Nsameday event* (*Psameday event*) if the net total change in LCCR is negative (positive). The absolute value of *Nsameday event* is employed for ease of interpretation.

Regional lagged is the net total change in LCCR of all sovereign rating events by all agencies that occur for the sample countries in the 10 days (-10, -1) preceding the event to sovereign *s*. Similarly to the *Sameday event* variable if a lagged event occurs for a sovereign where bank *i* is based in then the change in LCCR for that country will be taken out, and instead will be capture in the *Lagged* variable which I'll discuss below. *Regional lagged* is split into *Nregional lagged* (*Pregional lagged*) if the net total change in LCCR is negative (positive). The absolute value of *Nregional lagged* is employed for ease of interpretation.

Lagged is the net total change in LCCR of bank *i*'s country's sovereign (*b*) by all three agencies in the 10 days preceding the event to sovereign *s*. This is split into *Nlagged* (*Plagged*) if the net total change in LCCR is negative (positive). The absolute value of *Nlagged* is used for ease of interpretation.[18] *Sameday* is the net total change in LCCR of bank *i*'s country's sovereign by all three agencies if the sovereign *b* experiences a sovereign rating action on the same day as sovereign *s*. *Sameday* is split into *Nsameday* (*Psameday*) if the net total change in LCCR of sovereign *b* is negative (positive). The absolute value of *Nsameday* is used for ease of interpretation.[19]

Following Hill and Faff (2010) and Jorion et al. (2005), *Days* is defined as the natural logarithm of the number of days that has elapsed since the most recent sovereign rating action for all sovereigns in the sample (*r*) in the same direction to the event to sovereign *s* regardless of the credit rating agency (in this case the number of days that has elapsed between two

[18] Please note that there are insufficient observations for *Plagged* to be included in the estimations.
[19] Please note that there are insufficient observations for *Psameday* to be included in the estimations.

negative sovereign rating actions). The first negative sovereign event in a series of negative rating actions (with no positive rating actions in between) is set to the highest value. The regression controls for the time fixed effects with y_t: a full set of year dummies. This rules out any overall time trend explanations.

The methodology employed is similar to Gande and Parsley (2005) since the sample considers event days only i.e. the ΔCCR_{st} variable consists of non-zero values only. This is an important point to consider in the interpretation of the results in the following section.

In order to obtain robust estimators to any potential heteroscedasticity and/or autocorrelation in the residuals, a White correction is performed on the standard deviation of the estimated coefficients in all equations (Gande and Parsley, 2005; Ferreira and Gama, 2007; Arezki et al., 2011). The banks are controlled for with clustered robust standard errors.

4.3. Empirical results

4.3.1. Univariate analysis

This section discusses the results on banks' share price reactions to S&P, Moody's and Fitch sovereign rating actions, which are presented in Tables 4.5, 4.6 and 4.7, respectively. I consider the effects of sovereign rating actions on the share prices of banks from the same country as the sovereign but also on banks from different countries (i.e. spillover effects). The following sub-sections discuss the mean-adjusted CARs unless otherwise stated.

4.3.1.1. S&P positive rating actions

Panel A of Table 4.5 presents the CARs of banks for periods around positive rating actions. From Table 4.2, there are a total of 28 positive rating events giving 1,313 observations of bank CARs. For the whole period, I report a pre-event CAR of -0.52% which

is significant, and a post-event CAR of -0.15% and significant. The event window CAR is -0.05% and insignificant. This is slightly more positive than the -0.13% average daily return for the banks in the sample over the whole time period (see Table 4.4). The raw returns are very slightly more negative in value than the mean-adjusted returns, which mean that the average returns are slightly negative in the 200 day estimation period. The result gives an indication of the strong downward trend in stock prices in the sample period. The very weak negative CAR in the event window does give an indication that positive sovereign rating actions have a modest positive effect on the bank share prices.

I split the positive rating actions by year and find that the CARs are all positive and significant in 2007 and 2009 in each of the three windows, with event window CARs of 0.73% and 0.53%, respectively. Both coefficients aren't as (positively) strong as the pre-event window CARs of 1.78% and 1.31%, respectively, but the t-statistic is stronger in 2009 due to larger standard errors in the pre-event returns. The pre- and post-event windows CAR in 2011 display the largest negative values of -3.79% and -1.17%, respectively, which are both significant. The event window CAR of -0.32% is insignificant, which again provides evidence that the share prices react only modestly to positive sovereign rating actions. Looking at the raw returns shows that the average returns in the 200 day estimation period are negative leading up to the positive rating actions in each yearly sub-sample apart from 2007 and 2010 where they are slightly positive.

4.3.1.2. S&P negative rating actions

Panel B of Table 4.5 presents the CARs of banks surrounding negative sovereign rating actions for the whole time period and also yearly sub-samples. The whole time period consists of 74 negative rating actions (see Table 4.2) resulting in 3,065 bank CARs. The event window CAR is -0.77% and significant. This is significantly more negative than the

average daily return for the banks during the sample period of -0.13%.[20] It's also stronger than the pre- and post-event window CARs of -0.61% and -0.24%, respectively, but both are significant. These figures show that the bank share prices have reacted negatively to the negative sovereign rating actions as a whole, and that smaller CAR in the pre-event window indicates that the markets did not fully anticipate the rating news, and that the rating actions themselves contained new and valuable information. The raw returns are more negative than the mean adjusted returns indicating the average bank returns are negative in the 200 day estimation period.

In 2007, the pre- and post-event CARs are -0.72% and -0.81%, respectively, both significant, are stronger than the event window CAR of -0.14%, also significant, suggesting that the negative sovereign rating actions were less informative in this year than in the sample as a whole. The CARs are more negative in 2008 compared to 2007, with pre-event and event window CARs of -3.15% and -1.47%, respectively, both significant. The post-event CAR is insignificant in 2008. This suggests slight anticipation by the markets or information leakage of the rating actions, whilst still providing valuable information on the day of the signal. In 2009 the pre- and post-event CARs are both positive and significant, whilst the event window CAR is highly negative and significant at -1.39%, which provides evidence of strong market reaction to negative sovereign rating actions in 2009. We find the opposite in 2010, where the event window CAR is insignificant, whilst the pre-event CAR is -0.47% and significant and the post-event CAR is 0.34% and significant. In 2011, the post-event CAR is the most negative at -2.17% and significant, compared to the pre-event and event CARs of -0.90% and -0.41%, respectively, both significant. This suggests anticipation/information leakage theory of rating action, but more long run effects following the rating action, which may indicate delay in markets' responses to the rating actions. The raw returns are more negative than the

[20] Cumulating the average daily return of the banks during the sample period to two days, to match the event window CAR yields -0.26%. The -0.77% event window CAR in this case is almost three times as strong.

mean-adjusted returns in each year indicating the average bank returns are negative in the 200 day estimation period apart from in 2007.

As part of the robustness tests for negative rating actions, it is important to consider independent versus clustered events (see Section 4.2.2 for definition of clustered and independent events). Panel C of Table 4.5 presents the CARs surrounding independent negative sovereign rating actions. For all years of independent negative events, I report a pre-event widow CAR of -0.55% and significant, and an event window CAR of -0.22%, which is also significant. This finding supports previous studies suggesting that rating news follows swiftly after bad news, or they are anticipated or the information has leaked prior the announcement date. The insignificant and positive post-event CAR suggests that the causality is from the rating action to the markets, and so the independent events still contain important information over the initial anticipation/leaked news.

Panel D presents the results for clustered negative rating actions. I report significant pre-event, event and post-event window CARs of -1.57%, -1.20% and -0.90%, respectively. This suggests stronger market reactions to clustered rating actions than to independent rating signals. This is in line with Hill and Faff (2010) who find that copycat events have stronger market impact than new information credit events.

It could be argued that the independent events would have a stronger market impact than the clustered events, since independent events should provide more new and valuable information since they are more unexpected. Clustered events move in the same direction as each other (and it's usually negative rating actions that cluster), and so after the initial movement one could expect no further market impact. However, my results don't support this theory. The results of Panels C and D show that the markets react more strongly to clustered rating events than they do to independent events. The explanation can be drawn from the credit data itself. The severe negative rating actions experienced by Greece, Iceland, Ireland,

Portugal and Spain, by all three agencies in this time period, are often heavily clustered. The highly significant and negative CARs in Panel D may be indicating how strongly the negative rating actions experienced by these countries have been transmitted into the banking sector. e.g. on 6th October 2008, S&P downgraded Iceland to BBB from A- with negative outlook, on 8th October 2008 Fitch downgraded Iceland to BBB- from A- with negative watch, and also on 8th October 2008 Moody's downgraded Iceland to A+ from AA+ with negative watch. This is just one example of very severe negative rating actions experienced by one sovereign by the three main agencies within two days of each other. The results of Panel D show that these types of credit events have had a significant impact on the European banking sector. The significantly negative pre-event CAR suggests that the banks were already facing downward pressure on their share prices or that the news is anticipated or there was some information leakage prior the rating action. The raw returns are more negative than the mean-adjusted returns so the banks were already facing downward pressure prior the rating actions, and that it's not only the credit rating agencies that are causing the downward trend.

I've split the sample to negative rating actions to Greece, Ireland, Italy, Portugal and Spain only in Panel E. The reason for focusing on sovereign rating actions for these countries specifically is because these are the euro-zone countries that have been in the spotlight of the sovereign debt crisis in recent times. There have been a total of 31 rating actions by S&P for these countries since 2009 (no signals in 2007 and 2008), 30 of which were negative signals, and only one positive signal. The one positive signal is when Greece's sovereign rating was changed to BBB+ with negative outlook, from BBB+ with negative watch on 16th March 2010. I present significant pre- and post-event CARs of -0.22% and -0.44%, respectively. The event window CAR is much stronger at -0.99% which is also significant, which gives an indication of the strength and importance of the rating actions given to these countries in this time period. These results were expected to be strong due to the severity of the actions

applied to these sovereign ratings. For instance, since 2009 Ireland and Spain both lost their AAA rating, Greece lost its investment grade status and Portugal has been modified to BBB- from AA- over the time period.

Finally, I split the credit sample to changes to outlook and watch only in Panel F, to investigate whether the share prices have reacted more strongly to these types of signals compared to actual downgrades. I report significant pre-event, event and post-event window CARs of -0.84%, -0.46% and -0.46%, respectively. This gives a CAR of -1.76% over the -10 to +11 event window, which is stronger than the 21-day CAR for all negative rating actions of -1.62%. The pre-event window CAR is more negative here than in the case of all negative rating actions as in Panel B at -0.61%, this suggests that negative outlook and watch actions happen soon after more distressing times than actual downgrades do. The 12-day event and post-event windows is stronger in Panel B at -1.01% compared with -0.92% suggesting that the bank share prices respond more strongly to downgrades than to negative changes to outlook and watch.

4.3.1.3. Moody's positive rating actions

Table 4.6 presents the average CARs of banks surrounding credit rating actions by Moody's. Panel A presents the CARs surrounding positive rating actions. I report significant event and post-event window CARs of -0.5% and -2.28%, respectively. The pre-event window CAR is insignificant. The sign on the coefficients are different to the expected, but it's not surprising considering the sample period. It paints the same picture as for the positive credit rating actions by S&P described above (Section 4.3.1.1). The raw returns are very nearly the same as the mean-adjusted returns, which means that the average bank returns in the 200-day estimation period are around zero leading up to positive events by Moody's, whilst they were negative leading up to positive rating actions by S&P.

The event window CAR is much less negative in value than the post-event window CARs in each year (except 2009, since there are no observations). This suggests that the positive rating actions by Moody's have modest positive but short lived effects on the bank share prices. The sample period severely restricts the number of positive rating action observations so the suggestions are somewhat tentative.

4.3.1.4. Moody's negative rating actions

In Panel B of Table 4.6, I report significant event and post-event window CARs of -0.17% and -1.08%, respectively, surrounding negative sovereign rating actions by Moody's. for the whole time period and also yearly sub-samples. The pre-event window CAR is positive and insignificant. The raw returns are more negative than the mean-adjusted indication that the bank returns were negative leading up to the events on average. Contrary to S&P the pre-event window CAR is insignificant and positive which doesn't support the anticipation/information leakage prior to negative rating actions hypotheses. The post-event window is the most negative and suggests that the negative news by Moody's takes time to spill-through into the bank share prices, unlike S&P where the reaction is much quicker. The total effect by Moody's is smaller than by S&P, where the 21-day CAR is -0.87% compared to -1.62% for all negative events, which suggest S&P rating news is more timely and contains more important information.

The yearly subsamples of negative rating actions in Panel B show that the event window CAR is negative and significant in 2008 and 2011 at -0.12% and -0.43%, respectively. The pre-event window is negative and significant in 2007, 2008 and 2011 at -0.94%, -0.65% and -0.49%, respectively. The pre-event window CAR is positive and significant in 2009 at 2.26%. The post-event CAR is only negative and significant in 2008 and 2011 at -5.30% and -1.65%, respectively. The post-event window CAR is positive and

insignificant in 2009 and 2010, and negative and insignificant in 2007. The raw returns are more negative than the mean-adjusted returns in each year except 2007. The results of Panel B through the years show that the markets reacted modestly to negative rating actions made by Moody's, with some mixed evidence on the market's anticipation. The post-event CARs are weak, apart from the events in years 2008 and 2011 which produced strong negative returns in the longer run. The event window CAR is only stronger (more negative or less positive) than the pre and post-event window CARs in 2009 and 2010.

Panel C of Table 4.6 presents the CARs surrounding independent negative sovereign rating actions by Moody's (see Section 4.2.2 for definition). I report a significant event window CAR of -0.11%, which is weaker than the post-event window CAR of -0.19%, but this is insignificant. The pre-event window CAR is positive and significant at 0.51%. The raw returns are more negative than the mean-adjusted indication that the bank returns were negative leading up to the independent and negative events. The total 21-day CAR of independent negative events by Moody's is 0.21%, which indicates that the bank share prices haven't reacted substantially to the independent negative rating actions by Moody's, which is contrary to the 21-day CAR of -0.62% around the same type of signals by S&P. Also, all types of negative signals by Moody's has a 21-day CAR of -0.87%, indicating much weaker reactions to independent events than to non-independent events.

Panel D of Table 4.6 presents the CARs surrounding clustered negative sovereign rating actions. I report significant pre-event, event and post-event window CARs of 0.00%, -0.44% and -1.81%, respectively. This gives a 21-day CAR of -2.25%. This indicates significant bank share price reactions to clustered negative rating actions by Moody's. The negative returns following negative Moody's rating actions are therefore driven by clustered events. The implications are similar to those drawn out from Panel B above, which doesn't support the anticipation/information leakage prior to negative rating actions hypotheses. The

post-event window is the most negative and again shows that the negative news by Moody's takes time to spill-through into the bank share prices. The raw returns are again more negative than the mean-adjusted CARs. The 21-day CAR (-2.25%) surrounding clustered negative rating actions by Moody's is again weaker than it is for S&P at -3.67%.

Panel E of Table 4.6 presents the CARs surrounding the negative rating actions to Greece, Ireland, Italy, Portugal and Spain only. There have been a total of 31 rating actions by Moody's for these countries since 2007, 30 of which were negative signals, and only one positive signal. The one positive signal is when Greece's outlook was changed to positive on 11th January 2007. We have 29 negative rating actions to these particular countries in Panel E (Portugal was downgraded with negative watch on 5th April 2011 but is taken out of this sample since Bulgaria was put on positive watch on the same day), which gives us 1,477 bank CARs. I report significant pre-event, event and post-event window CARs of -0.28%, -0.24% and -0.06%, respectively. The raw returns are more negative indicating negative bank returns in the 200-day estimation period. The pre-event window mean-adjusted return supports the anticipation/information leakage prior to negative rating actions hypotheses. Although this may be reaction to negative news from other agencies since they are so heavily clustered for these particular countries. The event and post-event window CARs does show that the bank share prices are still reacting to Moody's signals though.

Panel F of Table 4.6 presents the CARs surrounding negative outlook and watch signals only. I report a significant post-event window CAR of -0.64%. The pre-event and event window CARs are insignificant. This suggests that negative changes to outlook and watch only are less anticipated than downgrades, and shows modest long run share price reactions.

4.3.1.5. Fitch positive rating actions

Panel A of Table 4.7 presents the average CARs of banks for periods surrounding positive rating actions by Fitch. In Table 4.2 there are a total of 27 positive rating events, giving 1,304 observations of bank CARs. For the whole period, I report significant pre-event, event and post-event window CARs of -0.73%, -0.40% and -0.36%, respectively. The raw returns are very similar to the mean-adjusted returns indicating that the bank returns were roughly zero in the 200-day estimation periods. There is no evidence to suggest that the positive rating actions by Fitch have positive effects on the bank share prices. This is mainly down to the sample period, which is not ideal to analyse the effects of positive rating actions due to the strong downward trend of the markets.

I report that the only significant and positive event window CAR is in 2008 at 0.37%, whilst the post-event window CAR is positive and significant in 2008, 2009 and 2010 at 1.34%, 1.04% and 1.25%, respectively. The pre-event window CARs are negative in all sample years. Splitting the sample by year does show some positive and significant reaction to positive Fitch rating actions, but cannot be confirmed for the sample as a whole. Comparing the raw returns and mean-adjusted returns gives different outcomes. The raw returns are more positive than the mean-adjusted in 2007, 2009 and 2010, but are more negative in 2008 and 2011.

4.3.1.6. Fitch negative rating actions

Panel B of Table 4.7 presents the CARs of banks surrounding negative sovereign rating actions by Fitch for the whole time period and also yearly sub-samples. The whole time period consists of 53 negative rating actions resulting in 2,113 bank CARs. I report significant pre-event, event and post-event window CARs of -0.77%, -0.21% and -0.09%, respectively. The raw returns are more negative than the mean-adjusted indicating the mean

bank returns are negative in the 200-day estimation period. The significant pre-event window CAR supports that negative signals by Fitch either follows swiftly after bad news or that anticipation/leakage of credit information occurs prior the announcement. The weaker post-event window CAR suggests that the causality runs from the rating news to the market.

I report significant and negative event window CARs in 2008 and 2011, only, at -0.94% and -0.45%, respectively. The pre-event window CARs are negative and significant in 2007, 2008 and 2011 at -0.33%, -1.34% and -1.67%, respectively. The post-event window CARs are negative and significant in 2008, 2010 and 2011 at -2.96%, -1.10% and -0.36%, respectively. The raw returns are more negative than the mean-adjusted returns in 2008, 2009 and 2011, and more positive than the mean-adjusted returns in 2007 and 2010.

Panel C of Table 4.7 presents the CARs surrounding independent negative sovereign rating actions made by Fitch. I report significant pre-event, event and post-event window CARs of -1.62%, 0.20% and 1.98%. This is a 21-day CAR of 0.56%, and shows that independent negative Fitch rating actions have an insignificant negative impact on the bank share prices. The pre-event CAR shows that the rating action occurs either swiftly after bad news or that anticipation/leakage of information prior the independent announcement. The raw returns are more negative (less positive) than the mean-adjusted returns indicating that the average bank returns in the 200-day estimation period are negative.

Panel D of Table 4.7 presents the CARs surrounding clustered negative sovereign rating actions. I report significant pre-event, event and post-event window CARs of -0.16%, -0.44% and -1.49% and significant. The pattern suggest little anticipation/leakage of information prior to clustered events by Fitch. Whilst the reaction is stronger in the 11 day window from the event day onwards, suggesting slight delayed response to the announcements by Fitch. The raw returns are again more negative than the mean-adjusted returns indicating the average bank returns are negative in the 200-day estimation period.

Panel E of Table 4.7 presents the CARs surrounding the negative rating actions to Greece, Ireland, Italy, Portugal and Spain only. There have been a total of 25 rating actions by Fitch for these countries since 2007, with only three positive signals for Greece, Portugal and Ireland in March 2007, May 2007 and April 2011, respectively. Panel E presents the mean bank CARs surrounding the 22 negative rating actions to these particular countries. I report a significant pre-event window CAR of -0.85% along with an insignificant event window CAR of -0.01%. The post-event window is positive and significant at 1.07%. The results suggest anticipation/leakage of rating action information occurs prior to the announcement, but I suggest that the announcement occurs after bad news is already incorporated in the share prices. This is due to the highly clustered nature of rating events that have occurred to these countries. The 21-day CAR is 0.23%, so the total effect is positive in the full 21-day window. The raw returns are more negative than the mean-adjusted returns suggesting negative average bank returns in the 200-day estimation period.

Panel F of Table 4.7 presents the mean bank CARs surrounding negative outlook and watch signals only. I report significant pre- and post-event window CARs of -0.93%, and 2.08%, respectively. The event window CAR is insignificant, but is negative. These types of signals by Fitch are found to have positive implications on the bank share prices in the post-event period, and the pre-event window CAR indicates that these signals are following bad news or anticipation/leakage of information has occurred prior the announcement. I suggest that the markets have overreacted prior the announcement which gives the positive post-event CAR. The raw returns are again more negative than the mean-adjusted returns.

4.3.1.7. Univariate results overview

In this section I will give an overview of the results reported in Section 4.3.1, with in-depth comparisons of results between agencies. Negative signals by S&P are found to have

more impact on the bank share prices than Moody's and Fitch, with an event window CAR of -0.77% compared to -0.17% and -0.21%, respectively. There is stronger evidence that suggests markets anticipate or leakage of information occurs or that the negative rating actions follow bad news for Fitch rating actions compared to S&P and Moody's, with a pre-event window CAR of -0.77% compared to -0.61% and 0.38%. The longer-run effects following negative rating news is more prominent for Moody's than S&P or Fitch due to the post-event window CAR of -1.08% compared to -0.24% or -0.09%. The abnormal returns are most negative in the 21-days surrounding S&P negative rating actions with a 21-day CAR of -1.62% compared to -0.87% and -1.07% for Moody's and Fitch, respectively.

Independent negative events have less impact on the bank share prices than clustered negative events for each of the three agencies. The event window CARs for independent (clustered) events are -0.22% (-1.20%) for S&P, -0.11% (-0.44%) for Moody's, and 0.20% (-0.44%) for Fitch. This is in-line with the findings of Hill and Faff (2010) who find that new events lead to a lesser reaction than copycat events in crisis periods. There is evidence that independent events are less anticipated than clustered events, for S&P and Moody's at least, with pre-event window CARs for independent (clustered) events of -0.55% (-1.57%) for S&P, and 0.51% (0.00%) for Moody's. Clustered events are found to induce the strongest two-day event window share price reaction for each agency compared with all other sub-samples of rating news. Again, the share price impact is strongest in the event window following clustered events from S&P, compared to Moody's and Fitch. Clustered events by S&P displays the strongest 21-day window CAR at -3.67% compared to all other samples and sub-samples from S&P or Moody's and Fitch.

Negative outlook and watch actions by S&P significantly affect the bank share prices in the two-day event window with a CAR of -0.46% whilst the same type of rating actions by Moody's seem to impact the bank share prices in the longer-term with post-event window

CAR of -0.64%. I suggest that negative outlook and watch signals by Fitch seem to either follow soon after bad news or that market anticipation/leakage of information occurs prior the credit announcement due to the -0.93% pre-event window CAR. The share price reaction to negative outlook and watch has a similar pattern to that of all negative signals whereby the signals by S&P have the strongest immediate impact, Moody's more in the long run, and Fitch signals are anticipated. The 21-day CAR around negative outlook and watch actions is strongest for S&P at -1.76% compared to -0.09% for Moody's and 0.98% for Fitch.

The results from each sample and sub-sample of negative events from the univariate analysis (Panels B to F in Tables 4.5 to 4.7) shows that S&P has the most immediate and significant impact on the bank share prices, whilst there is more of a delayed response to negative rating actions by Moody's. The markets tend to anticipate negative rating actions by Fitch or that Fitch signals tend to follow bad news or that the credit information is leaked prior to the announcement.

4.3.2. Regression analysis

This section discusses the results of Eq. (4.3) that analyses the rating factors that affect bank returns. The estimations consider negative sovereign rating actions only since there are comparatively few observations for positive rating actions. Panel A presents estimation results for all negative sovereign rating actions, whilst Panels B and C focus on actual downgrades only (according to the 20-point numerical scale) and negative changes to outlook or watch only (with no actual downgrade), respectively.

Table 4.8 presents estimates of the coefficients of Eq. (4.3) for S&P, Moody's and Fitch separately, over the period January 2007 to September 2011. Negative (positive) coefficients on the variables indicate a stronger (weaker) impact on bank returns since I expect the bank share prices to be negatively affected by the negative sovereign rating

actions. The key findings are as follows. First, across all negative rating events in Panel A, the models capture 10.16%, 6.84%, and 12.84% of the cross-sectional variation in the reactions to sovereign rating actions by S&P, Moody's, and Fitch, respectively. The ΔCCR variable is negative and significant for S&P, Moody's and Fitch when all negative rating actions are considered in Panel A. This means that the larger the negative rating action to sovereign s according to the 58-point comprehensive credit rating scale (CCR), the stronger the impact is on bank returns. The negative and significant ΔCCR holds for S&P and Moody's in the downgrade only model, but not for Fitch. This suggests that an actual downgrade by Fitch has a stronger effect on bank returns than negative changes to outlook and watch. The ΔCCR variable is negative and significant for S&P in the outlook/watch model in Panel C, whilst it's positive and significant for Moody's. This suggests that a negative change to watch has a stronger (weaker) effect than negative changes to outlook for S&P (Moody's).

The results shows that the level of event country's sovereign rating is more important than the level of the banks' country's sovereign rating by comparing the *EC CCR* and *BC CCR* variables in Panel A of Table 4.8. The *EC CCR* is negative (positive) and significant for S&P and Moody's (Fitch) which means negative sovereign rating actions to countries with better sovereign rating quality (e.g. both Spain and Ireland were rated at AAA/Aaa by the three agencies at the start of the sample period) has a stronger (weaker) impact on bank returns compared to countries with poorer quality sovereign ratings. This result also suggests that S&P and Moody's sovereign ratings are followed more by investors in their rating of countries that are in relatively good financial situations, compared to Fitch sovereign ratings that seem to hold more information in rating countries in relatively worse financial positions. The *BC CCR* is insignificant for each agency in Panel A of Table 4.8. This means that the share price reaction of banks is not dependent on the financial position of the banks' home

country i.e. the share price reaction of a bank based in Germany to a negative rating change to Spain's sovereign rating isn't statistically different to the share price reaction of a Polish or Greek bank to the same rating change to Spain's sovereign.

The sub-samples in Panels B and C shows that actual downgrades by S&P and Moody's (Fitch) has a stronger (weaker) impact on bank returns when the event country has better sovereign ratings. Downgrades by S&P have stronger impacts on banks based in countries with better sovereign ratings. Negative changes to outlook or watch by S&P (Moody's) has a weaker (stronger) impact on banks when the event country has better sovereign ratings. Negative changes to outlook or watch by Fitch has weaker impacts on banks based in countries with better sovereign ratings.

Negative sovereign rating actions as a whole and actual downgrades that convey new rating information to the market induce a stronger impact on banks regardless of agency compared to rating actions that don't (see Section 4.2.3 for definition of *Newinfo*), this is due to the negative and significant *Newinfo* variable in Panels A and B for each agency. This indicates that a rating action that takes sovereign *s* to a new lowest rating (according to the 20-point numerical scale), or that is the first negative rating action to sovereign *s* when its most recent action previously was a positive action (regardless of agency) has a stronger effect on bank share prices. The *Newinfo* variable is positive (negative) and significant for the outlook/watch model in Panel C for Moody's (Fitch) which means that negative changes to outlook or watch has a stronger (weaker) impact on bank share prices if the action presented new rating information to the market.

Negative sovereign rating actions has a stronger (weaker) impact on banks by S&P (Moody's and Fitch) if they occur on the same day as a negative net sovereign rating change of the sample countries. This means that negative sovereign rating changes by S&P has an exacerbating effect when other negative rating news happens on the same day, whilst the

impact is dampened for Moody's and Fitch. If there is a positive net sovereign rating change in the sample countries on the same day as a negative sovereign rating action by S&P (Moody's) then this weakens (strengthens) the impact of the action. Negative rating actions the three agencies that follow after 10 days of negative rating trend in the sample sovereigns have a stronger impact on the banks due to the negative and significant *Nregional lagged* in Panel A for each agency. This suggests that negative rating actions exacerbate an already downward trend in a region and this transmits into a stronger decline in bank share prices. I find the opposite when the region is experiencing a positive sovereign rating trend with positive and significant *Pregional lagged* coefficients for each agency in Panel A. The positive regional sovereign rating trend dampens the impact negative sovereign rating action has on bank share prices.

The results shows that the banks in the sample are affected by the spillover effects of sovereign rating news from countries that they are not based in, instead of reacting mainly to sovereign rating actions in their home country. This is due to weak *Nlagged* and *Nsameday* variables which control for the sovereign events (which may have happened in the last 10 days or on the same day as the event for sovereign *s*) of country *b* where bank *i* is based in. Only *Nsameday* is negative and significant for Fitch in Panel A, which means that negative sovereign rating action to sovereign *s* by Fitch that occurs on the same day as one or potentially more negative sovereign rating action to sovereign *b* (where bank *i* is based in) has a stronger effect on the banks' return.

The negative and significant *Days* variable for S&P and Moody's in Panel A shows that the longer amount of time that has spanned since the most recent negative sovereign rating action in the region, the stronger the impact the negative rating action has on the banks. This means that negative events that occur in quick succession to each other don't have as strong an effect on the banks compared to the actions that are more spread out.

4.4. Conclusion

The European sovereign debt crisis brought increased attention to the role of credit rating agencies and the links between sovereign and banking risks during crises. This is the first study to assess the reaction of the share prices of large European banks to European sovereign rating actions by S&P, Moody's and Fitch for the period 2007-11. In particular, this is the first study to directly assess the impact of a sovereign rating change to country *a*, on the share prices of banks in countries *b*, *c*, *d* on so on i.e. the cross-border effect. There is no clear evidence that sovereign rating actions are a driving force for falling bank share prices. Share prices fall significantly on the days of sovereign rating actions; it is plausible that CRA rating actions produce reactions because the markets continue to believe that the CRAs' views reflect private or price-relevant information. However, there is ample evidence that prices were also falling prior to the negative rating news. Therefore, the view that the CRAs' actions worsened the crisis, which was expressed by many European politicians and commentators, is only partly justified by these findings.

This investigation makes an important contribution toward understanding how equity markets perceive and evaluate the credibility of sovereign rating actions by each of the main three CRAs during the current sovereign debt crisis. Significant differences are identified in the impact of rating actions across the three CRAs. The evidence shows that sovereign rating actions by each agency impact on bank share prices. I find negative rating actions by S&P to have the most immediate impact on bank share prices whilst negative rating actions by Moody's tend to take longer to spillover into the bank share prices. The actions by Fitch tends to lie somewhere in between.

Independent rating events have less impact on bank share prices than clustered events, which is somewhat strange as independent events should be providing more new information to the markets than clustered events (since clustered events follow each other). The results of

the regression analysis shows that the strength of the banks' returns surrounding a negative rating change increases as the size of the negative rating action increases. In this sample there have been some sovereigns that have suffered from large changes in their ratings in one hit e.g. the largest one-day sovereign rating change by one agency in the sample, is when Moody's adjusted Ireland to BBB+ with negative outlook from AA with negative watch, which is a 14 notch negative change according to the 58-point comprehensive credit rating scale. These large one-day adjustments has a stronger effect on bank share prices than the smaller adjustments. The strength of the impact is found to be dependent on the financial position of the event sovereign. For S&P and Moody's the impact of negative rating changes is stronger when the event country has a better sovereign rating. The opposite is true for Fitch. This means that the impact of a negative rating action to sovereign in country *a*, on banks based in countries *b* and *c* becomes stronger the better the sovereign rating quality of country *a*. The opposite is true for Fitch.

Rating changes that provide new country specific rating information have a stronger impact on bank share prices e.g. if S&P downgrades Greece to BB+ whilst Moody's and Fitch still rate it at Baa and BBB, respectively, this is regarded as a new information event since S&P has taken Greece to its new lowest rating grade compared to Moody's and Fitch. These types of events have a stronger impact on bank share prices. Another example of a type of new rating information event is if Moody's adjusts Spain's outlook to negative from stable (a negative rating action, with no actual rating change), when Spain's most recent sovereign rating event previously was when Fitch upgraded it to AA (a positive rating action). This is also a new rating information event since the negative action follows a positive action.

The sensitivity of bank share prices to negative rating actions is highly reliant on other sovereign rating news in the region around the same time. Other negative sovereign events happening on the same day as negative sovereign event by S&P (Moody's and Fitch)

increases (decreases) the impact on bank share prices, whilst a negative event by all three agencies that follows a negative trend in the regions' sovereign ratings (within 10 days) has a stronger impact. Positive rating news in the region in most cases has a dampening effect on the impact negative news has on bank share prices. The evidence shows that negative rating actions in one country do drive down the share prices of banks in other countries. The regression controls for factors associated with the banks' country's sovereign rating, in case it's these factors that are driving the bank returns, but almost all these variables are insignificant.

In this chapter I have specifically looked at the sensitivities of large European banks to sovereign rating news of other countries. The evidence show that rating changes do affect the share prices of banks, although the returns are generally negative in this sample time period regardless of rating actions. The time period and countries in the sample has provided a unique opportunity to study these effects in more detail than would have been possible in the past due to the nature of European debt crisis. This chapter has shown how strong spillover effects from credit rating news into the financial sector can be and will be of interest to many market participants, such as regulators, financial institutions, issuers (corporates and sovereigns), credit risk managers and investment managers. Rating agencies will also be interested from a reputational perspective.

Table 4.1 - Country banking exposure to sovereign debt of Greece, Portugal, Spain, Ireland, Italy and Hungary

Exposure to Greece	Tier 1 Capital	Exposure to Portugal	Tier 1 Capital
Greece	212%	Portugal	130%
Cyprus	129%	Belgium	10%
Belgium	21%	Luxemburg	10%
Portugal	6%	Germany	3%
Luxemburg	6%	Spain	3%
Germany	5%	France	2%
France	4%	Netherlands	1%
Italy	2%	United Kingdom	1%
Other	0%	Other	0%
Exposure to Spain	Tier 1 Capital	Exposure to Ireland	Tier 1 Capital
Spain	152%	Ireland	42%
Germany	14%	Cyprus	9%
Belgium	13%	Portugal	3%
Luxemburg	12%	Belgium	2%
Italy	4%	Finland	1%
France	3%	France	1%
Netherlands	2%	Germany	1%
United Kingdom	1%	Slovenia	1%
Other	0%	Other	0%
Exposure to Italy	Tier 1 Capital	Exposure to France	Tier 1 Capital
Italy	161%	France	49%
Luxemburg	94%	Netherlands	29%
Belgium	85%	Slovenia	19%
Germany	22%	Cyprus	13%
France	18%	Germany	13%
Portugal	6%	Belgium	11%
Austria	5%	United Kingdom	9%
Spain	5%	Spain	5%
Other	2%	Other	1%

NOTE: 2011 EU banking system stress test.
Source: Blundell-Wignall (2012).

Table 4.2 - Descriptive statistics

		S&P	Moody's	Fitch
1	No. of countries	19	17	17
2	Upgrades (solo)	8	4	8
3	Downgrades (solo)	6	8	8
4	Total rating changes (solo)	14	12	16
5	Positive outlook signals (solo)	15	10	13
6	Negative outlook signals (solo)	21	17	18
7	Total outlook signals (solo)	36	27	31
8	Positive watch signals (solo)	0	3	2
9	Negative watch signals (solo)	18	17	4
10	Total watch signals (solo)	18	20	6
11	Upgrades and positive outlook signal	0	1	1
12	Downgrades and negative outlook signal	26	21	20
13	Downgrades and negative watch signal	8	3	6
14	Total combined-signals for a given sovereign (actual rating change and watch/outlook signal simultaneously)	34	25	27
15	Total sovereign credit signals (Rows 4 + 7 + 10 + 14)	102	84	80
16	Number of single event days	76	60	61
	Two events	8*2=16	7*2=14	3*2=6
	Three events	2*3=6	2*3=6	3*3=9
	Four events	1*4=4	1*4=4	1*4=4
17	Total positive signals	28	20	27
18	Total negative signals	74	64	53
19	Independent negative events	35	34	24
20	Clustered negative events	39	30	29

This table presents summary statistics for the dataset, which consists of long-term foreign-currency ratings, outlooks and watch for sovereigns rated by S&P, Moody's and Fitch during the period 1st January 2007 to 19th September 2011.

Note: Actions which involve moving to negative outlook from negative watch (with no rating change) are regarded as a positive signal in Row 17. There are five such cases for S&P, two for Moody's and three for Fitch. This explains why adding up the negative credit signals in Rows 3 + 6 + 9 + 12 + 13 ≠ Row 18, and adding up the positive credit signals in Rows 2 + 5 + 8 + 11 ≠ Row 17. See Section 4.2.2 for definition of independent and clustered events.

Table 4.3 - Banks in sample

	Bank Name	Country
1	Erste Group Bank AG	Austria
2	Raiffeisen Bank International AG	Austria
3	Dexia	Belgium
4	KBC Groep NV	Belgium
5	Bank of Cyprus Public Company Limited	Cyprus
6	Marfin Popular Bank Public Company Limited	Cyprus
7	Danske Bank A/S	Denmark
8	Jyske Bank AS	Denmark
9	Nordjyske Bank A/S	Denmark
10	Sydbank A/S	Denmark
11	Pohjola Pankki A	Finland
12	BNP Paribas	France
13	Credit Agricole SA	France
14	Societe Generale	France
15	Commerzbank AG	Germany
16	Deutsche Bank AG	Germany
17	Landesbank Berlin Holding AG	Germany
18	Agricultural Bank of Greece SA	Greece
19	Alpha Bank SA	Greece
20	Bank Of Piraeus SA	Greece
21	EFG Eurobank Ergasias SA	Greece
22	National Bank of Greece SA	Greece
23	TT Hellenic Postbank SA	Greece
24	Allied Irish Banks PLC	Ireland
25	Bank of Ireland	Ireland
26	Irish Life & Permanent Group Holdings PLC	Ireland
27	Banca Monte dei Paschi	Italy
28	Banco Popolare	Italy
29	Intesa Sanpaolo	Italy
30	UBI Banca	Italy
31	Unicredit	Italy
32	DNB Nor ASA	Norway
33	PKO Bank SA	Poland
34	Banco BPI SA	Portugal
35	Banco Comercial Portugues	Portugal
36	Banco Bilbao Vizcaya Argentaria SA	Spain
37	Banco de Sabadell SA	Spain
38	Banco Pastor SA	Spain
39	Banco Popular Espanol SA	Spain
40	Banco Santander SA	Spain
41	Bankinter SA	Spain
42	Caixabank SA	Spain
43	Caja Ahorros Del Mediterraneo	Spain
44	Nordea Bank AB	Sweden
45	SE Banken	Sweden
46	Svenska Handelsbanken AB	Sweden
47	Swedbank AB	Sweden
48	Barclays PLC	United Kingdom
49	HSBC Holdings PLC	United Kingdom
50	Lloyds Banking Group PLC	United Kingdom
51	Royal Bank of Scotland Group PLC	United Kingdom

This table presents the banks and their country of origin which are included in our sample to determine the market impact. The 51 banks were part of the 2011 EU stress test which actually consisted of 91 banks. 40 banks were excluded because: (a) not listed; or (b) illiquid shares.

I gathered share prices for these banks for the period 2nd January 2006 to 6th October 2011. The share price time window is larger than the ratings in order to calculate the abnormal returns. Three of the 51 banks did not have share prices available for this whole period: (a) TT Hellenic Postbank SA (Row 23) from 5th June 2006; (b) Caixabank SA (Row 42) from 10th October 2007; (c) Caja Ahorros Del Mediterraneo (Row 43) from 28th July 2008. I include these three banks in the sample from the soonest date available in order to increase the sample size.

Table 4.4 - Average daily returns of sample banks and Stoxx 600 index over sample period

Year/s	2007	2008	2009	2010	2011	07-11
Sample banks	-0.0005	-0.0044	0.0012	-0.0009	-0.0022	-0.0013
Stoxx 600 index	0.0000	-0.0024	0.0010	0.0005	-0.0003	-0.0002

This table presents the average daily returns of 49 out of the total of 51 banks from the total sample shown above in Table 4.3 since Caixabank SA and Caja Ahorros Del Mediterraneo aren't available for the whole time period of 1/1/2007 till 6/10/11. The table also presents the average daily return of the Dow Jones Stoxx Europe 600 index during the same time period.

Table 4.5 - Banks' average cumulative returns around S&P rating actions

		Mean-adjusted returns			Raw returns			
	N	Pre-event	Event	Post-event	Pre-event	Event	Post-event	
Panel A: Positive rating events								
All events	1313	-0.0052	-0.0005	-0.0015	-0.0064	-0.0008	-0.0027	coeff
		-4.41**	-0.87	-2.40*	-5.52**	-1.33	-1.94	t-stat
2007	97	0.0178	0.0073	0.0039	0.0195	0.0076	0.0056	coeff
		11.26**	7.34**	2.17*	12.75**	6.95**	2.70**	t-stat
2008	197	-0.0056	0.0025	-0.0060	-0.0151	0.0006	-0.0155	coeff
		-0.84	-0.46	-1.69	-5.55**	0.44	-5.87**	t-stat
2009	254	0.0131	0.0053	0.0242	0.0089	0.0045	0.0200	coeff
		3.12**	4.56**	5.43**	3.18**	3.53**	6.63**	t-stat
2010	510	-0.0023	-0.0048	-0.0084	0.0027	-0.0038	-0.0034	coeff
		-0.47	-4.01**	-6.32	2.08*	-4.25**	-2.40*	t-stat
2011	255	-0.0378	-0.0032	-0.0117	-0.0430	-0.0043	-0.0170	coeff
		-13.67**	-1.95	-2.94**	-14.56**	-2.53**	-3.43**	t-stat
Panel B: Negative rating events								
All events	3065	-0.0061	-0.0077	-0.0024	-0.0124	-0.0089	-0.0087	coeff
		-10.20**	-12.81**	-5.43**	-10.26**	-13.53**	-7.65**	t-stat
2007	341	-0.0072	-0.0014	-0.0081	-0.0043	-0.0008	-0.0052	coeff
		-6.31**	-2.32*	-6.14**	-3.84**	-1.61	-3.60**	t-stat
2008	695	-0.0315	-0.0147	-0.0026	-0.0407	-0.0165	-0.0118	coeff
		-13.63**	-9.11**	-0.02	-16.16**	-9.39**	-4.72**	t-stat
2009	754	0.0192	-0.0139	0.0126	0.0057	-0.0166	-0.0009	coeff
		5.21**	-10.48**	3.97**	1.61	-10.49**	-0.28	t-stat
2010	612	-0.0047	0.0005	0.0034	-0.0062	0.0002	0.0018	coeff
		-4.13**	0.33	2.17*	-3.98**	0.26	1.19	t-stat
2011	663	-0.0090	-0.0041	-0.0217	-0.0130	-0.0049	-0.0257	coeff
		-6.11**	-4.66**	-11.81**	-6.86**	-3.93**	-11.01**	t-stat
Panel C: Independent negative rating events								
All events	1304	-0.0055	-0.0022	0.0015	-0.0081	-0.0027	-0.0011	coeff
		-8.25**	-4.86**	0.14	-7.28**	-4.78**	-1.05	t-stat
2007	341	-0.0072	-0.0014	-0.0081	-0.0043	-0.0008	-0.0052	coeff
		-6.31**	-2.32*	-6.14**	-3.84**	-1.61	-3.60**	t-stat
2008	98	-0.0154	-0.0049	0.0433	-0.0234	-0.0065	0.0353	coeff
		-6.07**	-2.24*	11.70**	-10.05**	-2.81**	9.25**	t-stat
2009	151	0.0064	-0.0015	-0.0050	-0.0016	-0.0031	-0.0129	coeff
		0.30	-1.18	-2.43*	-0.40	-2.57**	-3.93**	t-stat
2010	459	-0.0070	0.0009	0.0057	-0.0100	0.0003	0.0027	coeff
		-4.68**	1.50	2.90**	-5.42**	0.27	1.51	t-stat
2011	255	-0.0038	-0.0081	-0.0058	-0.0077	-0.0089	-0.0097	coeff
		-1.32	-8.37**	-2.47*	-2.19*	-5.03**	-3.44**	t-stat

Table 4.5 continued

	N	Mean-adjusted returns			Raw returns			
		Pre-event	Event	Post-event	Pre-event	Event	Post-event	
Panel D: Clustered negative rating events								
All events	1458	-0.0157	-0.0120	-0.0090	-0.0245	-0.0137	-0.0178	coeff
		-10.29**	-10.48**	-8.29**	-12.13**	-11.35**	-9.36**	t-stat
2007	0							coeff
								t-stat
2008	547	-0.0318	-0.0155	-0.0160	-0.0412	-0.0174	-0.0253	coeff
		-10.88**	-7.95**	-5.83**	-13.66**	-8.44**	-9.17**	t-stat
2009	401	-0.0024	-0.0224	0.0225	-0.0189	-0.0257	0.0060	coeff
		-0.37	-10.28**	5.12**	-3.47**	-9.44**	1.32	t-stat
2010	153	0.0024	-0.0005	-0.0037	0.0052	0.0001	-0.0009	coeff
		0.23	-1.50	-0.58	1.93	0.05	-0.30	t-stat
2011	357	-0.0137	0.0004	-0.0360	-0.0181	-0.0005	-0.0404	coeff
		-6.30**	0.79	-13.25**	-7.53**	-0.29	-11.87**	t-stat
Panel E: Negative rating events to specific countries								
All events	1318	-0.0022	-0.0099	-0.0044	-0.0087	-0.0112	-0.0109	coeff
		-3.94**	-11.50**	-4.81**	-4.97**	-10.43**	-5.48**	t-stat
2007	0							coeff
								t-stat
2008	0							coeff
								t-stat
2009	553	0.0104	-0.0180	0.0025	-0.0010	-0.0203	-0.0089	coeff
		2.87**	-11.12**	0.63	-0.26	-9.95**	-2.35*	t-stat
2010	306	-0.0232	-0.0031	0.0064	-0.0245	-0.0034	0.0050	coeff
		-13.91**	-2.40*	2.28*	-12.63**	-2.31*	2.37*	t-stat
2011	459	-0.0035	-0.0047	-0.0198	-0.0075	-0.0055	-0.0238	coeff
		-3.09**	-5.27**	-9.43**	-4.67**	-3.73**	-8.03**	t-stat
Panel F: Negative outlook and watch signals								
All events	1351	-0.0084	-0.0046	-0.0046	-0.0122	-0.0054	-0.0084	coeff
		-8.00**	-6.08**	-2.54*	-7.09**	-7.19**	-5.20**	t-stat
2007	292	-0.0081	-0.0021	-0.0078	-0.0056	-0.0016	-0.0052	coeff
		-6.37**	-3.46**	-5.34**	-4.48**	-2.82**	-3.22**	t-stat
2008	247	-0.0285	-0.0216	0.0183	-0.0357	-0.0230	0.0110	coeff
		-8.37**	-8.14**	5.80**	-9.86**	-9.03**	3.13**	t-stat
2009	302	0.0020	-0.0114	-0.0237	-0.0076	-0.0134	-0.0333	coeff
		0.99	-8.13**	-5.44**	-1.36	-7.83**	-6.35**	t-stat
2010	357	0.0071	0.0086	0.0052	0.0050	0.0082	0.0032	coeff
		3.25**	10.82**	3.16**	2.68**	8.93**	1.63	t-stat
2011	153	-0.0330	0.0004	-0.0203	-0.0361	-0.0002	-0.0235	coeff
		-7.46**	0.68	-5.00**	-6.05**	-0.15	-5.65**	t-stat

This table presents the results of the average bank cumulative abnormal returns (CARs) and average bank cumulative raw returns (CRRs) around the time of sovereign rating actions by S&P in the period 1st January 2007 to 19th September 2011. I report the 10-day pre-event (-10, -1), the two-day event (0, +1) and the 10-day post-event (+2, +11) window CARs and CRRs. Mean-adjusted returns calculations are specified in Section 4.2.2. *t*-statistics are the Boehmer at al. (1991) standardized cross-sectional *t*-statistics.

** Significant at the 1% level; * significant at 5% level.

Table 4.6 - Banks' average cumulative returns around Moody's rating actions

		Mean-adjusted returns			Raw returns			
	N	Pre-event	Event	Post-event	Pre-event	Event	Post-event	
Panel A: Positive rating events								
All events	647	-0.0005	-0.0005	-0.0228	-0.0002	-0.0005	-0.0225	coeff
		-0.10	-2.57*	-16.87**	-0.15	-0.69	-15.93**	t-stat
2007	194	0.0000	0.0007	-0.0096	0.0039	0.0015	-0.0057	coeff
		0.15	0.20	-7.08**	3.59**	2.20*	-4.49**	t-stat
2008	147	0.0031	-0.0036	-0.0178	-0.0019	-0.0046	-0.0228	coeff
		0.51	-3.86**	-7.76**	-0.82	-4.73**	-10.14**	t-stat
2009	0							coeff
								t-stat
2010	204	0.0000	0.0024	-0.0247	0.0037	0.0031	-0.0210	coeff
		0.50	3.24**	-11.17**	1.58	2.35*	-10.00**	t-stat
2011	102	-0.0075	-0.0042	-0.0513	-0.0130	-0.0053	-0.0568	coeff
		-1.98*	-5.36**	-10.48**	-3.03**	-2.05*	-10.46**	t-stat
Panel B: Negative rating events								
All events	2785	0.0038	-0.0017	-0.0108	-0.0030	-0.0031	-0.0176	coeff
		0.93	-6.37**	-11.22**	-2.63**	-6.76**	-12.62**	t-stat
2007	49	-0.0094	0.0022	-0.0003	-0.0083	0.0024	0.0007	coeff
		-4.15**	1.70	-0.09	-3.95**	1.95	0.31	t-stat
2008	398	-0.0065	-0.0012	-0.0530	-0.0178	-0.0035	-0.0643	coeff
		-3.72**	-2.01*	-13.83**	-6.18**	-2.29*	-16.49**	t-stat
2009	706	0.0226	-0.0014	0.0047	0.0110	-0.0037	-0.0069	coeff
		7.70**	-1.67	1.06	4.02**	-3.29**	-2.01*	t-stat
2010	765	0.0025	0.0004	0.0024	0.0000	-0.0001	-0.0001	coeff
		1.36	0.24	1.23	-0.03	-0.12	-0.09	t-stat
2011	867	-0.0049	-0.0043	-0.0165	-0.0097	-0.0053	-0.0212	coeff
		-2.42*	-9.38**	-9.88**	-4.54**	-7.97**	-8.95**	t-stat
Panel C: Independent negative rating events								
All events	1416	0.0051	-0.0011	-0.0019	-0.0023	-0.0026	-0.0093	coeff
		2.13*	-2.58**	-1.62	-1.44	-4.15**	-5.38**	t-stat
2007	49	-0.0094	0.0022	-0.0003	-0.0083	0.0024	0.0007	coeff
		-4.15**	1.70	-0.09	-3.95**	1.95	0.31	t-stat
2008	148	0.0018	0.0062	-0.0103	-0.0095	0.0039	-0.0216	coeff
		-1.31	0.86	-2.03*	-2.48*	1.83	-5.96**	t-stat
2009	454	0.0117	-0.0060	-0.0054	0.0007	-0.0082	-0.0164	coeff
		3.36**	-4.81**	-1.54	0.18	-5.98**	-3.78**	t-stat
2010	408	0.0107	0.0018	0.0146	0.0071	0.0010	0.0109	coeff
		6.32**	2.35*	7.35*	3.71**	1.28	5.43**	t-stat
2011	357	-0.0064	-0.0018	-0.0131	-0.0129	-0.0031	-0.0196	coeff
		-2.45*	-3.04*	-6.70*	-3.79**	-2.65**	-7.53**	t-stat

Table 4.6 continued

	N	Mean-adjusted returns			Raw returns			
		Pre-event	Event	Post-event	Pre-event	Event	Post-event	
Panel D: Clustered negative rating events								
All events	1219	0.0000	-0.0044	-0.0181	-0.0049	-0.0054	-0.0230	coeff
		-2.05*	-8.76**	-11.48**	-2.88**	-8.22**	-10.98**	t-stat
2007	0							coeff
								t-stat
2008	150	-0.0206	-0.0106	-0.0527	-0.0330	-0.0130	-0.0650	coeff
		-4.41**	-4.02**	-9.00**	-5.66**	-4.23**	-10.28**	t-stat
2009	202	0.0370	-0.0015	-0.0023	0.0282	-0.0033	-0.0111	coeff
		6.40**	-0.88	-0.78	6.11**	-1.95	-1.92	t-stat
2010	357	-0.0068	-0.0011	-0.0114	-0.0082	-0.0014	-0.0128	coeff
		-4.91**	-1.42	-5.34**	-4.76**	-1.27	-6.27**	t-stat
2011	510	-0.0039	-0.0061	-0.0188	-0.0075	-0.0069	-0.0224	coeff
		-1.01	-10.41**	-7.66**	-2.72**	-8.85**	-6.22**	t-stat
Panel E: Negative rating events to specific countries								
All events	1477	-0.0028	-0.0024	-0.0006	-0.0070	-0.0032	-0.0048	coeff
		-2.00*	-7.53**	-3.62**	-4.24**	-6.08**	-3.38**	t-stat
2007	0							coeff
								t-stat
2008	0							coeff
								t-stat
2009	304	-0.0046	0.0049	0.0186	-0.0113	0.0036	0.0119	coeff
		-1.38	3.92*	5.52**	-2.39*	2.65**	4.24**	t-stat
2010	561	-0.0008	-0.0014	0.0018	-0.0031	-0.0018	-0.0006	coeff
		-0.93	-1.77	0.41	-2.04*	-2.44*	-0.29	t-stat
2011	612	-0.0037	-0.0069	-0.0124	-0.0083	-0.0078	-0.0170	coeff
		-1.22	-12.03**	-7.56**	-2.91**	-10.03**	-6.85**	t-stat
Panel F: Negative outlook and watch								
All events	1364	0.0067	-0.0012	-0.0064	-0.0013	-0.0028	-0.0143	coeff
		1.13	-1.86	-4.56**	-0.72	-4.10**	-6.98**	t-stat
2007	49	-0.0094	0.0022	-0.0003	-0.0083	0.0024	0.0007	coeff
		-4.15**	1.70	-0.09	-3.95**	1.95	0.31	t-stat
2008	199	-0.0063	0.0124	-0.0612	-0.0181	0.0101	-0.0730	coeff
		-2.87**	5.22**	-9.89**	-4.74**	5.07**	-11.89**	t-stat
2009	402	0.0274	-0.0093	0.0107	0.0116	-0.0125	-0.0052	coeff
		7.46**	-2.83**	5.17**	2.59**	-8.05**	-1.19	t-stat
2010	408	0.0004	-0.0007	0.0040	-0.0022	-0.0012	0.0014	coeff
		-0.61	-1.35	3.08**	-1.09	-1.27	0.85	t-stat
2011	306	-0.0013	-0.0005	-0.0080	-0.0049	-0.0012	-0.0115	coeff
		-2.19*	-3.34**	-3.79**	-2.57*	-2.53*	-4.40**	t-stat

This table presents the results of the average bank cumulative abnormal returns (CARs) and average bank cumulative raw returns (CRRs) around the time of sovereign rating actions by Moody's in the period 1st January 2007 to 19th September 2011. I report the 10-day pre-event (-10, -1), the two-day event (0, +1) and the 10-day post-event (+2, +11) window CARs and CRRs. Mean-adjusted returns calculations are specified in Section 4.2.2. *t*-statistics are the Boehmer at al. (1991) standardized cross-sectional *t*-statistics.

** Significant at the 1% level; * significant at 5% level.

Table 4.7 - Banks' average cumulative returns around Fitch rating actions

		Mean-adjusted returns			Raw returns			
	N	Pre-event	Event	Post-event	Pre-event	Event	Post-event	
Panel A: Positive rating events								
All events	1304	-0.0073	-0.0040	-0.0036	-0.0074	-0.0040	-0.0037	coeff
		-7.35**	-9.93**	-4.87**	-6.95**	-9.15**	-2.52*	t-stat
2007	291	-0.0089	0.0002	-0.0103	-0.0063	0.0007	-0.0077	coeff
		-8.04**	0.30	-8.21**	-5.58**	1.46	-6.11**	t-stat
2008	197	-0.0122	0.0037	0.0134	-0.0219	0.0018	0.0036	coeff
		-3.13**	2.31*	3.28**	-6.73**	1.63	1.07	t-stat
2009	51	-0.0200	-0.0007	0.0104	-0.0075	0.0018	0.0229	coeff
		-4.88**	-0.55	2.28*	-2.09*	2.51*	5.71**	t-stat
2010	357	-0.0039	-0.0079	0.0125	0.0009	-0.0069	0.0174	coeff
		-0.71	-9.29**	7.13**	0.51	-7.46**	8.51**	t-stat
2011	408	-0.0052	-0.0078	-0.0230	-0.0083	-0.0085	-0.0262	coeff
		-2.33*	-11.75**	-9.47**	-3.64**	-9.67**	-7.37**	t-stat
Panel B: Negative rating events								
All events	2113	-0.0077	-0.0021	-0.0009	-0.0132	-0.0032	-0.0064	coeff
		-7.77**	-3.34**	-4.51**	-9.19**	-4.88**	-4.57**	t-stat
2007	194	-0.0033	0.0074	0.0001	-0.0013	0.0078	0.0021	coeff
		-2.14*	12.38**	0.58	-0.57	13.51**	1.40	t-stat
2008	547	-0.0134	-0.0094	-0.0296	-0.0223	-0.0112	-0.0385	coeff
		-4.28**	-6.25**	-11.83**	-6.55**	-7.44**	-13.23**	t-stat
2009	454	0.0012	-0.0005	0.0455	-0.0114	-0.0030	0.0329	coeff
		-0.53	-1.38	13.02**	-3.08**	-1.75	10.24**	t-stat
2010	408	-0.0007	0.0045	-0.0110	0.0000	0.0046	-0.0101	coeff
		-1.12	6.25**	-6.67**	0.01	5.47**	-6.45**	t-stat
2011	510	-0.0167	-0.0045	-0.0036	-0.0201	-0.0052	-0.0071	coeff
		-7.83**	-6.02**	-2.22*	-7.15**	-4.14**	-2.43*	t-stat
Panel C: Independent negative rating events								
All events	949	-0.0162	0.0020	0.0198	-0.0227	0.0007	0.0135	coeff
		-8.90**	3.97**	6.26**	-9.04**	0.79	6.67**	t-stat
2007	194	-0.0033	0.0074	0.0001	-0.0013	0.0078	0.0021	coeff
		-2.14*	12.38**	0.58	-0.57	13.51**	1.40	t-stat
2008	198	-0.0422	0.0031	0.0074	-0.0494	0.0017	0.0002	coeff
		-7.93**	0.66	0.74	-8.10**	1.12	0.08	t-stat
2009	302	-0.0074	-0.0001	0.0649	-0.0243	-0.0035	0.0480	coeff
		-2.39*	-1.10	14.48**	-4.79**	-1.56	11.35**	t-stat
2010	153	-0.0115	0.0025	-0.0072	-0.0098	0.0028	-0.0049	coeff
		-5.08**	2.43*	-2.83**	-3.79**	2.38*	-2.09*	t-stat
2011	102	-0.0239	-0.0053	-0.0120	-0.0257	-0.0056	-0.0139	coeff
		-2.98**	-4.34**	-2.74**	-2.33*	-3.02**	-1.49	t-stat

Table 4.7 continued

	N	Mean-adjusted returns			Raw returns			
		Pre-event	Event	Post-event	Pre-event	Event	Post-event	
Panel D: Clustered negative rating events								
All events	1063	-0.0016	-0.0044	-0.0149	-0.0062	-0.0053	-0.0195	coeff
		-2.50*	-4.99**	-9.35**	-3.68**	-5.26**	-10.75**	t-stat
2007	0							coeff
								t-stat
2008	299	-0.0006	-0.0153	-0.0449	-0.0105	-0.0173	-0.0548	coeff
		0.09	-6.15**	-13.99**	-2.63**	-7.87**	-15.41**	t-stat
2009	152	0.0184	-0.0011	0.0070	0.0144	-0.0019	0.0031	coeff
		3.88**	-0.84	2.15*	3.98**	-0.78	0.86	t-stat
2010	204	0.0088	0.0090	-0.0139	0.0098	0.0092	-0.0128	coeff
		3.89**	9.88**	-5.64**	4.29**	8.44**	-5.86**	t-stat
2011	408	-0.0149	-0.0044	-0.0015	-0.0188	-0.0051	-0.0054	coeff
		-7.73**	-4.75**	-0.74	-8.52**	-3.39**	-1.92	t-stat
Panel E: Negative rating events to specific countries								
All events	1067	-0.0085	-0.0001	0.0107	-0.0129	-0.0010	0.0063	coeff
		-6.68**	-0.19	4.89**	-6.65**	-1.12	3.63**	t-stat
2007	0							coeff
								t-stat
2008	50	-0.1404	0.0150	0.0055	-0.1483	0.0134	-0.0024	coeff
		-12.46**	4.00**	1.08	-10.46**	3.61**	-0.32	t-stat
2009	354	0.0037	-0.0015	0.0392	-0.0049	-0.0032	0.0306	coeff
		0.11	-1.42	9.48**	-1.21	-1.78	8.07**	t-stat
2010	357	-0.0018	0.0034	-0.0076	-0.0027	0.0032	-0.0082	coeff
		-1.45	4.77**	-4.65**	-1.41	3.66**	-5.14**	t-stat
2011	306	-0.0088	-0.0051	-0.0001	-0.0121	-0.0057	-0.0033	coeff
		-5.69**	-4.50**	0.07	-6.36**	-2.97**	-1.06	t-stat
Panel F: Negative outlook and watch								
All events	799	-0.0093	-0.0017	0.0208	-0.0186	-0.0036	0.0114	coeff
		-4.14**	-1.13	4.90**	-7.02**	-3.27**	5.25**	t-stat
2007	97	0.0216	0.0055	-0.0076	0.0222	0.0056	-0.0070	coeff
		8.79**	7.87**	-3.66**	9.21**	8.40**	-3.24**	t-stat
2008	247	-0.0392	-0.0029	-0.0103	-0.0451	-0.0041	-0.0162	coeff
		-7.68**	-0.99	-4.47**	-8.30**	-1.82	-6.01**	t-stat
2009	251	0.0049	-0.0031	0.0802	-0.0172	-0.0075	0.0581	coeff
		0.24	-2.39*	16.86**	-2.95**	-2.92**	12.23**	t-stat
2010	51	-0.0002	0.0036	-0.0164	-0.0029	0.0031	-0.0190	coeff
		-0.43	2.83**	-4.88**	-0.90	1.78	-4.43**	t-stat
2011	153	-0.0067	-0.0039	0.0038	-0.0095	-0.0045	0.0011	coeff
		-3.11**	-3.74**	0.79	-3.88**	-4.12**	0.36	t-stat

This table presents the results of the average bank cumulative abnormal returns (CARs) and average bank cumulative raw returns (CRRs) around the time of sovereign rating actions by Fitch in the period 1st January 2007 to 19th September 2011. I report the 10-day pre-event (-10, -1), the two-day event (0, +1) and the 10-day post-event (+2, +11) window CARs and CRRs. Mean-adjusted returns calculations are specified in Section 4.2.2. *t*-statistics are the Boehmer at al. (1991) standardized cross-sectional *t*-statistics.

** Significant at the 1% level; * significant at 5% level.

Table 4.8 - Regression analysis of bank share price reactions to negative sovereign rating actions

	S&P		Moody's		Fitch	
	coefficient	t-stat	coefficient	t-stat	coefficient	t-stat
Panel A: Negative actions						
Constant	0.0297	4.86**	0.0328	6.49**	-0.0019	-0.26
ΔCCR	-0.0021	-9.48**	-0.0009	-8.36**	-0.0007	-3.61**
EC CCR	-0.0005	-8.44**	-0.0004	-8.18**	0.0001	2.30*
BC CCR	-0.0001	-1.92	-0.0001	-1.42	0.0000	0.17
Newinfo	-0.0050	-3.14**	-0.0090	-10.10**	-0.0031	-3.17**
Nsameday event	-0.0138	-4.11**	0.0044	2.57*	0.0214	6.95**
Psameday event	0.0546	7.83**	-0.0305	-6.33**		
Nregional lagged	-0.0087	-7.50**	-0.0035	-6.50**	-0.0059	-5.74**
Pregional lagged	0.0349	4.97**	0.0201	6.84**	0.0438	10.80**
Nlagged	-0.0050	-1.55	0.0002	0.10	0.0008	0.09
Nsameday	-0.0190	-1.26	-0.0035	-0.76	-0.0276	-2.13*
Days	-0.0030	-3.29**	-0.0028	-6.22**	-0.0001	-0.25
Year	Yes		Yes		Yes	
Cluster	51		51		51	
R^2	10.16%		6.84%		12.84%	
Obs.	3568		3085		2557	
Panel B: Downgrades only						
Constant	0.0856	6.32**	0.0431	5.32**	0.0149	1.52
ΔCCR	-0.0026	-6.58**	-0.0020	-10.49**	0.0002	1.03
EC CCR	-0.0007	-6.02**	-0.0005	-6.40**	0.0002	2.99**
BC CCR	-0.0002	-2.47*	-0.0001	-0.56	-0.0002	-1.28
Newinfo	-0.0148	-8.19**	-0.0071	-4.56**	-0.0089	-5.24**
Nsameday event	-0.0198	-6.32**	0.0020	0.77	0.0296	6.98**
Psameday event	-0.0387	-1.83	-0.0315	-6.25**		
Nregional lagged	-0.0115	-5.87**	0.0007	0.47	-0.0083	-4.28**
Pregional lagged	-0.2170	-5.85**	0.0444	7.70**	0.0204	4.05**
Nlagged	-0.0070	-1.94	0.0108	3.82**	-0.0127	-1.00
Nsameday	-0.0234	-2.32*	-0.0204	-3.51**	-0.0272	-3.53**
Days	-0.0044	-2.38*	-0.0020	-3.43**	-0.0001	-0.08
Year	Yes		Yes		Yes	
Cluster	51		51		51	
R^2	8.62%		20.11%		25.70%	
Obs.	1923		1543		1647	
Panel C: Negative changes to outlook/watch only						
Constant	-0.0100	-2.25*	-0.0085	-2.15*	-0.0238	-2.77**
ΔCCR	-0.0078	-4.56**	0.0109	6.89**	0.0011	0.42
EC CCR	0.0001	2.51*	-0.0003	-3.54**	0.0001	0.79
BC CCR	0.0001	1.90	0.0000	-0.65	0.0006	5.53**
Newinfo	0.0006	0.30	-0.0083	-6.26**	0.0228	6.34**
Nsameday event	-0.0048	-0.98	0.0075	1.49	-0.0034	-0.47
Psameday event	0.0665	3.30**				
Nregional lagged	-0.0118	-9.94**	-0.0032	-5.32**	-0.0034	-2.95**
Pregional lagged	0.0858	12.10**	-0.0137	-1.98	0.0755	11.18**
Nlagged	-0.0102	-2.04*	0.0006	0.22	0.0254	3.09**
Nsameday	0.0047	0.21	0.0163	0.73	-0.0259	-1.83
Days	-0.0001	-0.20	0.0033	6.61**	-0.0085	-6.42**
Year	Yes		Yes		Yes	
Cluster	51		51		51	
R^2	29.45%		9.87%		14.32%	
Obs.	1645		1542		910	

This table presents the coefficient estimates of Eq. (4.3) using data samples of European countries rated by S&P, Moody's and Fitch during January 2007 to September 2011. CAR_{it}: the dependent variable, is the mean-adjusted cumulative abnormal return of bank i in the two-day event window (0, +1) around negative sovereign rating actions at time t. ΔCCR is the 1-day change in the 58-point numerical comprehensive credit rating (CCR) scale of sovereign s at time t. The absolute value ΔCCR is employed for ease of interpretation. *EC CCR* is the level of the event country comprehensive credit rating. *BC CCR* is the level of the bank's country's comprehensive credit rating. *Newinfo* is a dummy variable that indicates whether a rating action provides new rating information specific to the event country. *Nsameday* (*Psameday*) *event* accounts for a negative (positive) net total change in LCCR (see Section 4.2) of other European sovereign rating actions that also occur on event day t=0. The absolute value of *Nsameday* is employed for ease of interpretation. *Nregional* (*Pregional*) *lagged* captures the negative (positive) net total change in LCCR in the 10 days (t=-10, -1) preceding the event date t=0. The absolute value of *Nregional* is employed for ease of interpretation. *Nlagged* captures the negative net total change in LCCR of bank i's home sovereign rating in the 10 days preceding an event. *Nsameday* captures the negative change in LCCR of bank i's home sovereign rating if it occurs on the same day as another event. *Days* is the natural logarithm of the number of days that has elapsed since the latest European sovereign rating change which must be in the same direction as the one on day t=0. Panel A relates to all negative rating actions, Panel B relates to downgrades only and Panel C relates to negative changes to outlook or watch only. Full sets of year dummy variables included. *Cluster* represents the number of banks in the estimations. I apply Huber-White clustered robust standard errors.

** Significant at 1% level; * significant at 5% level.

Chapter 5: The Impact of Sovereign Rating Actions on Bank Share Prices in Emerging Markets

5.1. Introduction

Sovereign ratings are very important in the current global economy and are attracting huge attention due to the European Sovereign debt crisis. As is found in Chapter 4, sovereign rating changes have significant impacts on the share prices of large banks in European countries. The main channel for the impacts seen in Chapter 4 is through bank holdings of European government debt. The European sovereign debt crisis is very much a rare phenomenon with respects to developed countries sovereign ratings. Until the recent crisis, developed countries have been associated with very high and stable sovereign ratings, but the crisis period has shown how the dependence on credit ratings in regulations can have extra detrimental effects on some of the worlds' largest banks.

The sovereign ratings market has grown rapidly over the past few decades, for example the number of sovereigns rated by S&P increased from 7 in 1975 to 128 by June 2012. The growth in sovereign issuers seeking sovereign credit ratings has come mainly from emerging market countries that want to attract foreign direct investment. As has been highlighted in Chapter 3, sovereign ratings are very important for bank ratings in emerging markets, where the ratings of banks are very strongly linked to the sovereign rating of their home government. Also, emerging market sovereign ratings are highly unstable and generally of poorer quality than those of developed countries, although the European sovereign debt crisis has changed this situation somewhat. The results in Chapter 4 gives motivation to this chapter, where I seek to find the impact of sovereign rating actions on bank share prices in emerging markets. Whilst many studies investigate the market impact of sovereign rating

actions (see Chapter 2), there is none, to the best of my knowledge that investigates the effects in this manner.

In Chapter 3, I found bank rating migrations to be closely linked to their home sovereigns rating movements, but does this translate to a change in the perceived value of the banks? This chapter aims to answer this question by looking at the impact of sovereign rating actions on the share prices of banks in emerging markets. The methodology in this chapter follows closely that in Chapter 4. The difference comes from the sample of countries used, where they are emerging market countries as defined by countries GNI per capita according to the world bank, as in Chapter 3. Also this chapter focuses on sovereign rating actions on banks from the 'event' country only, and not cross-border effects. This is because the emerging market countries in this chapter are not as inter-linked as the European sample in Chapter 4, i.e. Argentinean banks are not as likely to be exposed to the sovereign debts of Chile, Brazil or Russia, as a British bank is of being exposed to the sovereign debt of Greece, Italy and Spain.

The emerging market sovereign rating data spans the period 1st January 2001 to 30th September 2011, and consists of sovereign rating changes as well as changes to outlook and watch. The key findings are as follows. Positive sovereign rating actions by S&P has positive impacts on bank share prices, whilst negative sovereign rating actions by Fitch has a stronger impact on the banks compared to S&P and Moody's. Bank share prices react more strongly to sovereign rating actions that convey new rating information. The sovereign rating trend in nearby countries also has an effect on the bank share prices.

The remainder of the chapter is organised as follows. The next section explains the data sample and presents the abnormal returns calculation and regression model. The empirical results are discussed in section 5.3. Finally, section 5.4 concludes the chapter.

5.2. Data and methodology

5.2.1. Sample selection

This chapter investigates the effects of emerging market sovereign rating actions on the share prices of their home banks. The initial sample is selected according to the countries' GNI per capita in the World Bank's country classification (see Chapter 3). The emerging market banks must have liquid bank share prices in order to perform the event-day methodology. Using DataStream the share prices were gathered for all the listed banks from countries that met the emerging market criteria with share prices available from January 2000 onwards.[21] The final sample consists of 19 emerging market countries (see Table 5.1 for list of emerging market countries) that were selected due to liquid bank share price data.[22] There are a total of 277 banks from these 19 emerging market countries.

The credit dataset includes daily long-term (LT) foreign-currency (FC) sovereign ratings consisting of rating changes, and changes to outlooks and watch by S&P, Moody's and Fitch from 1st January 2001 to 30th September 2011.[23] The data is verified by using S&P, Moody's and Fitch publications.

5.2.2. Credit data

The same rating grade classification is described here as in Chapter 4, Section 4.2.1, but I briefly repeat it here. Actual rating changes are identified according to a mapped 20-point numerical ratings, a rating scale that only includes actual ratings (AAA/Aaa = 20, AA+/Aa1 = 19, AA/Aa2 = 18 …CCC-/Caa3 = 2, CC/Ca, SD-S/C = 1) by notches on the basis of daily intervals. To identify positive and negative rating actions, a 58-point numerical rating scale is employed; a comprehensive credit rating (CCR) scale that incorporates both

[21] The share price data was gathered for both active and inactive banks in their local currencies. There was virtually no liquid bank share prices pre- 2000 therefore I focus solely on the post- 2000 time period.
[22] There is still an issue of thin trading with many of the banks in the sample of 19 countries which is addressed in Section 5.2.3.
[23] The credit data was available for only 18 out of the 19 emerging market countries for Fitch since it doesn't rate Pakistan, whilst S&P and Moody's do.

the actual ratings and credit outlook and watch, as follows: AAA/Aaa = 58, AA+/Aa1 = 55, AA/Aa2 = 52 …CCC-/Caa3 = 4, CC/Ca, SD-D/C = 1, and I add '+2' for positive watch, '+1' for positive outlook, '-1' for negative outlook, '-2' for negative watch, and '0' for stable outlook and no watch/outlook assignments (see Sy, 2004).[24] A positive credit signal would be one that moves up the 58-point scale e.g. to 47 from 43, and a negative credit signal would be one that moves down the 58-point scale e.g. to 54 from 58.

The above 58-point numerical rating scale undergoes a logit-type transformation to address possible non-linearity, as follows (see Sy, 2004):[25]

$$LCCR_t = ln\left[\frac{CCR_t}{59-CCR_t}\right]$$

CCR_t is the rating according to the 58-point numerical rating scale. In this case, a non-zero change in the logarithmic comprehensive 58-point numerical rating defines the event of interest: 'positive', an upgrade resulting from an upward move in the letter credit rating of the sovereign and/or from a favourable signal in the credit outlook/watch; 'negative', a downgrade resulting from a downward move in the letter credit rating of the sovereign and/or from an unfavourable signal in the credit outlook/watch.

Outlook and watch signals are defined as follows. *Negative watch* signals include placing sovereign *s* on watch for possible downgrade, and the action of confirming the rating of sovereign *s* after being on watch for possible upgrade. *Positive watch* signals include placing sovereign *s* on watch for possible upgrade, and the action of confirming the rating of sovereign *s* after being on watch for possible downgrade. *Negative outlook* signals contain changes to negative outlook from stable/positive outlook, and changes to stable outlook from

[24] See Footnote 11, in Chapter 4.
[25] Note that this is the same as Equation 4.1.

positive outlook. *Positive outlook* signals contain changes to positive outlook from stable/negative outlook, and changes to stable outlook from negative outlook.

5.2.2.1. S&P rating actions

From Table 5.2, the S&P credit data includes sovereign rating actions for 19 emerging market countries. There are a total of 182 S&P sovereign rating actions for these emerging countries from 1st January 2001 to 30th September 2011. This amount of sovereign rating actions is reduced to 154 due to the unavailability of bank share data for Bulgaria, Romania and Russia for roughly half of the time period.[26] Another reason for the loss of more credit data was due to the new presidency and capital crisis in Pakistan in 2008, where trading of shares appears to have stopped from mid-September 2008 to mid-December 2008, therefore the observations are restricted to before this time period. Also, the 2011 Egyptian revolution appears to have stopped trading of bank shares from 28th January 2011 to 23rd March 2011. Therefore rating actions to Egypt during and after this time are omitted.

There are 47 (21) upgrades (downgrades) by S&P (Rows 3 + 12 + 13 and 2 + 11 of Table 5.2), most of which are by one-notch. However, there are four cases of multiple-notch rating changes in the sample period, where S&P downgraded Argentina by three notches on 30th October 2001, downgraded Indonesia by two notches on 23rd April 2002, upgraded Indonesia by three notches on 5th September 2002, and upgraded Argentina by four notches on 1st June 2005.

The dataset also comprises: 57 (40) positive (negative) outlook adjustments; and 2 (8) positive (negative) watch announcements (see Rows 6 + 12, 5 + 11, 9 + 13 and 8 of Table

[26] There was insufficient bank share data for Bulgaria, Romania and Russia pre-May 2006, June 2004 and December 2004, respectively.

5.2).[27] The majority of signals in this sample are announced in isolation, although combined-signals for a given sovereign (i.e. actual rating change and watch/outlook signal simultaneously) occur in 13.64% (21/154) of cases (see Row 14 of Table 5.2). There is one observation (for Argentina on 6th June 2001) where the status of the sovereign rating was changed to negative outlook from negative watch (with no rating change), which is consider to be a positive credit signal, since it moves up the 58-point CCR scale.

64.29% (99/154) of the rating actions are positive, compared to 35.71% (55/154) being negative signals. These statistics reflect the strong upgrade trend in emerging markets during this time period (in particular pre-2007), which can be explained by higher commodity prices, higher oil and natural gas prices and larger pools of inexpensive skilled labour which fuelled the economic growth (e.g. Chambers, 2006).

5.2.2.2. Moody's rating actions

From Table 5.2, the Moody's credit data includes sovereign rating actions for 19 emerging market countries. There are a total of 147 Moody's sovereign rating actions for these emerging countries from 1st January 2001 to 30th September 2011. This amount of sovereign rating actions is reduced to 122 for the same reasons as explained in Section 5.2.2.1. There are 43 (9) upgrades (downgrades) by Moody's (Rows 3 + 12 + 13 and 2 + 11 of Table 5.2), most of which are by one-notch. However, there are six cases of multiple-notch rating changes in the sample period, where Moody's downgraded Argentina by two notches on 12th October 2001, downgraded the Philippines by two notches on 7th February 2005, upgraded Poland by two notches on 4th November 2002, upgraded Argentina by three notches on 20th August 2003, upgraded Thailand by two notches on 26th November 2003, and upgraded Chile by two notches on 7th July 2006.

[27] The two positive watch signals by S&P in the sample are in actual fact two occasions where a sovereign rating was taken off negative watch to stable outlook with no rating change, which from the definition in Section 5.2.2, is regarded as a positive watch signal.

The dataset also comprises: 37 (12) positive (negative) outlook adjustments; and 25 (6) positive (negative) watch announcements (see Rows 6 + 12, 5 + 11, 9 + 13 and 8 of Table 5.2). The majority of signals in this sample are announced in isolation, although combined-signals for a given sovereign occur in 8.20% (10/122) of cases (see Row 14 of Table 5.2). 81.97% (100/122) of the rating actions are positive, compared to 18.03% (22/122) being negative signals.

5.2.2.3. Fitch rating actions

From Table 5.2, the Fitch credit data includes sovereign rating actions for 18 emerging market countries. There are a total of 149 Fitch sovereign rating actions for these emerging countries from 1st January 2001 to 30th September 2011. This amount of sovereign rating actions is reduced to 128 for the same reasons as explained in Section 5.2.2.1. There are 38 (19) upgrades (downgrades) by Moody's (Rows 3 + 12 + 13 and 2 + 11 of Table 5.2), most of which are by one-notch. However, there are five cases of multiple-notch rating changes in the sample period, where Fitch downgraded Argentina by two notches on 11th July 2001, downgraded Argentina by three notches on 12th October 2001, downgraded Romania by two notches on 10th November 2008, upgraded Turkey by two notches on 3rd December 2009, and upgraded Argentina by five notches on 12th July 2010.

The dataset also comprises: 42 (31) positive (negative) outlook adjustments; and 4 (7) positive (negative) watch announcements (see Rows 6 + 12, 5 + 11, 9 + 13 and 8 of Table 5.2). The majority of signals in this sample are announced in isolation, although combined-signals for a given sovereign occur in 10.16% (13/128) of cases (see Row 14 of Table 5.2). 64.06% (82/128) of the rating actions are positive, compared to 35.94% (46/128) being negative signals.

5.2.3. Banks, share prices, abnormal returns and univariate analysis

The chapter uses standard event day methodology to examine the reaction of emerging market bank share prices to their home country's' sovereign rating actions. The bank share price sample was gathered according to their home country's GNI per capita, as explained in Section 5.2.1. The objective with the bank share price collection was to make it as large as possible, in terms of the amount of banks in the sample and the cross-section of banks across different countries. One criterion was there had to be at least two banks per country at any given moment with available share price data. The final bank sample is 277 banks from 19 emerging market countries (see Section 5.2.1). The bank data is unbalanced by country, where there are more banks from one country than there are from others e.g. there are eight Argentinean banks in the sample compared to thirteen Chinese banks. The bank data is also unbalanced by country and time in some cases, where there can be more banks in the sample for a country in a certain year, than for the same country in another year. This is mainly due to banks changing from being active to inactive, or more banks coming into existence in the later years e.g. 14 Chinese banks in 2010 compared to only four Chinese banks in 2003.

The share prices are quoted in their local currencies and are transformed into log returns. I follow the same methodology employed in Chapter 4 and use the mean-adjusted returns to calculate abnormal returns, which I also report alongside raw returns (see Chapter 4, Section 4.2.2 for further details). The mean daily return for each bank prior to a sovereign rating event is calculated using 200 daily observations for the period t = -230 to t = -30, where t = 0 is the event day (i.e. a sovereign credit signal).[28] This represents the expected daily return (ER). Daily abnormal returns (AR) are calculated for each day in the event window as follows:

[28] In the event of a bank holiday, the next available share price is taken.

$$AR_{it} = R_{it} - ER_{it} \quad (5.1)$$

Where:

$i = 1, 277$ (banks)

AR_{it} = abnormal log return of bank i at time t.

R_{it} = log return of bank i at time t.

ER_{it} = expected log return of bank i at time t.

Similarly to Chapter 4, abnormal returns/raw returns are cumulated over consecutive days to give cumulative abnormal returns/cumulative raw returns (CARs/CRRs). CARs/CRRs are evaluated over the pre-event (-10, -1), event (0, +1) and the post-event (+2, +11) windows, where 0 represents the actual event day, $t = 0$. Gande and Parsley (2005) suggest the short two-day (0, +1) event window to reduce contamination from other credit events. The pre-event (-10, -1) window will capture market anticipation of rating announcements (Hull et al., 2004), and the post-event (+2, +11) window will capture possible longer term or delayed impacts of the sovereign credit events on the bank share prices. Standard errors are calculated following Boehmer et al. (1991) standardized cross-sectional test, to account for event induced variance.[29]

An important point to consider with sovereign rating actions and their effect on bank share prices is the clustering of sovereign rating actions, which is of particular importance in crisis periods e.g. during the Argentinean crisis of 1999 to 2002, the sovereign rating suffered from five negative rating actions in total from the three largest agencies between the 19th March 2001 to 28th March 2001. There are six cases in the credit sample where a sovereign

[29] The MSCI All Countries World Index is utilised to calculate the standardized residual.

rating receives a signal by two agencies on the same day e.g. Argentina by Moody's and Fitch on 28th March 2001 and 12th October 2001, Brazil by Moody's and Fitch on 26th June 2002, the Philippines by S&P and Fitch on 11th July 2005, and Thailand by S&P and Fitch on 19th September 2006 and 1st December 2008. For each case out of the six, the sovereign ratings received negative signals by both agencies involved. Clustered negative rating actions were found to be important in Chapter 4, where the bank share price reaction was found to be strongest around clustered rating actions for each agency.

Similar to Chapter 4, it's important to distinguish between the clustered events and independent events. For clustered events the bank share price may be reacting to the previous rating actions and not the most recent, or maybe reacting due to anticipation of a credit signal. An independent event is when sovereign *s* experiences a credit signal with no other credit signal given to sovereign *s* by any of the three main rating agencies (S&P, Moody's and Fitch), within the (-10, +11) window (21 trading days). A clustered event for sovereign *s* is when it has received another credit signal within 21 trading days by any of the three agencies.

The sample is split into independent and clustered signals for both positive and negative events. From Table 5.2, negative events are more likely to be clustered compared to positive events as a percentage of total negative and positive events, respectively: i.e. 40.00% (22/55), 54.55% (12/22), and 36.96% (17/46) of the total negative signals from S&P, Moody's and Fitch, respectively, are clustered. Whilst 21.21% (21/99), 24.00% (24/100), and 26.83% (22/82) of the total positive signals are clustered.

Another robustness check splits the sample according to how frequently the bank shares are traded. There is an issue where some banks are very thinly traded, i.e. more than half of the observations in the 200-day estimation period have no daily returns. To test whether the results are being driven by the thin trading, a sub-sample is filtered according to the amount of daily returns available in the 200-day estimation period (t = -230 to t = -30). If

there are fewer than 100 daily returns available in an estimation period then the observation is excluded (see Holthausen and Leftwich, 1986).

5.2.4. Regression model

A multivariate analysis is conducted to determine the factors that affect the CARs of banks around the time of sovereign rating actions. I estimate separate models for positive and negative sovereign rating actions. The models are as follows:

$$CAR_{it} = \alpha + \beta_1 \Delta CCR_{st} + \beta_2 CCR_{st} + \beta_3 Newinfo + \beta_4 Spillover + \beta_5 Lagged_{st} + \beta_6 Days_{st} + \beta_{11} y_t + \varepsilon_{it} \quad (5.2)$$

CAR_{it} is the mean-adjusted cumulative abnormal return of bank i in the event time t: (0, +1). Gande and Parsley (2005) suggest the short two-day (0, +1) event window to avoid the event window contamination problem. ΔCCR_{st} is the 1-day change in the 58-point numerical comprehensive credit rating (CCR) scale (see Section 5.2.2) for sovereign s at event date t. For ease of interpretation, I use the absolute value of ΔCCR in the negative model. CCR_{st} is the level of the country's comprehensive credit rating immediately prior to the event, which controls for the financial conditions of the country during the event time, t. This allows the impact of the sovereign credit news to vary with the credit rating (i.e. the financial position) of the country under consideration.

Newinfo is a dummy variable that takes the value of one if the sovereign rating action provides new information i.e. a rating action to sovereign s in the opposite direction to the previous rating action received by any of the three agencies, or a rating action that takes sovereign s to a new rating level, either below the prevailing lowest rating by another agency or above the prevailing highest rating by another agency. *Spillover* is the net total change in LCCR (see Section 5.2.2 for definition) by which all countries in the same world region (as

defined in Table 5.1) as sovereign s (excluding cumulative ΔLCCR of the event sovereign s) were re-rated by all agencies in the 10 trading days prior to the rating action at time t. I actually split this into two variables *Pspillover* and *Nspillover* which is when the net total change in LCCR is positive or negative, respectively. The absolute value of *Nspillover* is used for ease of interpretation. *Lagged* is the net total change in LCCR of sovereign s by all agencies in the 10 trading days prior to the rating action at time t. *Lagged* is also split into two variables *Plagged* and *Nlagged* for when the net total change in LCCR is positive or negative, respectively. The absolute value of *Nlagged* is used for ease of interpretation. Following Hill and Faff (2010) and Jorion et al. (2005), *Days* is defined as the natural logarithm of the number of days between two successive rating actions in the same direction to sovereign s regardless of the credit rating agency which adjusted sovereign s's rating previously. The first event of a series of rating actions in the same direction by all agencies is set to the highest value. The regression controls for the time fixed effects with y_t: a full set of year dummies. This rules out any overall time trend explanations.

The methodology employed is similar to Gande and Parsley (2005) since the sample considers event days only i.e. the ΔCCR_{st} variable consists of non-zero values only. This is an important point to consider in the interpretation of the results in the following section.

In order to obtain robust estimators to any potential heteroscedasticity and/or autocorrelation in the residuals, a White correction is performed on the standard deviation of the estimated coefficients in all equations (Gande and Parsley, 2005; Ferreira and Gama, 2007; Arezki et al., 2011). The banks are controlled for with clustered robust standard errors.

5.3. Empirical results

5.3.1. Univariate analysis

This section discusses the results on banks' share price reactions to S&P, Moody's and Fitch sovereign rating actions, which are presented in Tables 5.3, 5.4 and 5.5, respectively. I consider the effects of sovereign rating actions on the share prices of banks from the same emerging market country as the sovereign only. The following sub-sections discuss the mean-adjusted CARs unless otherwise stated.

5.3.1.1. S&P positive rating actions

There are a total of 1,286 bank CAR observations in Row 1 of Table 5.3 surrounding 99 positive rating actions by S&P (see Row 16 from Table 5.2). The results show a significant CAR in the pre-event and event windows of 1.78% and 0.91%, respectively, whilst it's insignificant in the post-event window. These figures show that the positive rating actions by S&P to the emerging market countries have a positive and significant impact on their share prices in the two-day event window. There is also evidence of the markets anticipating the positive credit event due to the positive and significant CAR in the pre-event window.

Row 2 of Table 5.3 provides a robustness check for the average CAR results surrounding positive rating actions by S&P, to make sure that the conclusions drawn out above aren't being driven by thinly traded shares in the dataset (see Section 5.2.3). The results of Row 2 do not change any of implications drawn above. The coefficients are slightly weaker than for Row 1, but are still significant.

Row 3 presents the average CARs around positive changes to outlook and watch only (with no actual rating change), to see if these types of signals alone have an impact on the share prices. Compared to the original positive rating actions of Row 1 discussed above, the

coefficient in the post-event window is now significant as well as in the other two windows. The pre-event window CAR is slightly stronger at 1.85%, whilst the event window CAR is slightly weaker at 0.77%. The evidence shows that the share prices do react to positive changes to outlook and watch, and so these indicators are adding new information to the markets. The significant post-event window CAR of 1.06% suggests that the information impacts the share prices for longer than upgrades.

The results of the positive and independent signals (see Section 5.2.3 for definition) in Row 4 are very similar to the results of all positive signals in Row 1. The pre-event and event window average CARs of 1.67% and 0.93%, respectively, are significant whilst the post-event window average CAR is insignificant. Almost 80% of the S&P positive signals are independent (see Rows 16 and 20 from Table 5.2). The other 20% of the positive signals are clustered and the average CARs for these signals are presented in Row 5. The event window average CAR is the only significant coefficient at 0.81%. This suggests that positive and clustered signals by S&P have a positive and significant impact on the bank share prices but are not as strongly anticipated by the markets as the independent and positive signals are. The pre-event window average CAR of 2.26% for positive and clustered signals is stronger than it is for the positive and independent signals, but it is insignificant.

The raw returns coefficients in Rows 1, 2, 3, 4, and 5 in each of the three windows are always larger in value than the mean-adjusted coefficients. This means that the returns leading up to positive rating actions by S&P (in the t = -230 to t = -30 estimation period) are positive. The raw average CARs are significant in each event window for all samples and sub-samples of positive signals, and the main difference to the mean-adjusted results is that the post-event window average CAR is stronger than the event-window CAR.

5.3.1.2. S&P negative rating actions

Row 6 of Table 5.3 presents the average CARs of banks for periods around negative rating actions. From Table 5.2, there are a total of 55 negative rating events giving 641 bank CAR observations. The results show significant average CAR in the pre-event and post-event windows of -4.67% and 1.68%, respectively, whilst it's insignificant in the event window. These figures show that the negative rating actions by S&P to the emerging market countries are strongly anticipated by the markets. The pre-event anticipation may be too strong, which leads to the positive and significant post-event window returns. Row 7 of Table 5.3 provides a robustness check for thin trading (see Section 5.2.3). The pre-event window average CAR is now slightly stronger at -4.96% and significant, whilst the post-event window CAR is now insignificant. Taking thin trading into account means that the returns are only significant in the pre-event window. This, again, suggests that the markets anticipate negative rating actions by S&P.

Row 8 presents the average CARs around negative changes to outlook and watch only (with no actual rating change). The main difference to the main findings above (from Row 6) is that the event window average CAR of -1.10% is now significant which means that negative changes to outlook and watch by S&P are more informative than actual rating downgrades.

The results and implications from the negative and independent signals are no different to those drawn out for the full sample of negative events. 40% of the total negative signals by S&P are clustered (see Rows 17 and 19 of Table 5.2; see Section 5.2.3 for definition) and this gives a significant event window average CAR of -1.69%, as well as the strongest pre-event window CAR of -5.86%. The negative and clustered events have a stronger impact in the two-day event window than the independent events do.

The raw returns coefficients in Rows 6, 7, 8, 9, and 10 in each is always slightly more negative than the mean-adjusted coefficients. This means that the returns of the banks are generally negative leading up to (in the t = -230 to t = -30 estimation period) negative rating actions by S&P. This makes the post-event window average mean-adjusted CARs slightly more positive than the raw returns.

5.3.1.3. Moody's positive rating actions

There are a total of 1,186 bank CAR observations in Row 1 of Table 5.4 surrounding 100 positive rating actions by Moody's (see Row 16 from Table 5.2). The results show a significant CAR in the pre-event and event windows of -0.48% and -0.28%, respectively, whilst it's insignificant in the post-event window. These figures show that the positive rating actions by Moody's have a negative impact on the bank share prices in the 10-day pre-event window and two-day event window. This is contrary to the expectation that positive rating actions will have a positive impact on the bank share prices. The raw CRRs are 0.66%, -0.05%, and 1.12% in the pre-event, event and post event windows, respectively. This means that the banks' returns leading up to the positive signals (in the t = -230 to t = -30 estimation period) are positive. The negative and significant mean-adjusted average CARs in the pre-event and event windows suggest that the returns prior to the positive rating actions have been too optimistic and therefore become negative surrounding the credit signal. The implications do not change after controlling for thin trading in the sub-sample reported in Row 2.

The post-event window CAR of 0.81% surrounding positive changes to outlook and watch only (see Row 3 of Table 5.4), suggest that these types of rating actions have a longer term positive impact on the bank share prices, compared to actual upgrades which do not. The pre-event and event window CARs are insignificant. The average CARs are insignificant

in all three windows surrounding positive and independent signals (see Row 4 in Table 5.4). The event and post-event window CARs of -0.77% and 0.76%, respectively, and are significant (see Row 5 in Table 5.4) around the times of positive and clustered credit signal by Moody's. This shows signs of volatility in the bank share prices around these signals due to the change in sign of returns from the event window to post-event window CAR.

The raw returns coefficients in Rows 1, 2, 3, 4, and 5 in each of the three windows are always more positive than the mean-adjusted coefficients. This means that the returns leading up to positive rating actions by Moody's (in the t = -230 to t = -30 estimation period) are positive. The raw average CARs are all positive and significant in the post-event windows showing that the bank returns are positive in the 10-days following the signals, but these are generally not abnormally significant due to the positive returns in the estimation period.

5.3.1.4. Moody's negative rating actions

There are a total of 225 bank CAR observations in Row 6 of Table 5.4 surrounding 22 negative rating actions by Moody's (see Row 17 from Table 5.2). The pre-event window average CAR is –4.44% and event window average CAR is 0.89%, and both are significant. This shows strong anticipation of the negative credit signal in the 10-days leading up to the event and is still strong in the two-day event window. This shows that the negative credit signal was not full anticipated by the markets. The post-event window CAR is insignificant. The raw CRRs are slightly more negative than the mean-adjusted returns in each window suggesting that the returns leading up to the event in the estimation period were slightly negative also. Controlling for thin trading only makes the coefficients slightly stronger, but the implications do not change (see Row 7 in Table 5.4).

The sub-sample containing negative changes to outlook and watch in Row 8 doesn't change the implications drawn above. The pre-event and event window average CARs are -

4.00% and -0.63%, respectively (both are significant). They are slightly weaker than for the sample as a whole, suggesting that the share price reaction to negative changes to outlook and watch by Moody's may not be quite as strong as for actual downgrades. But nevertheless, they are significant.

The negative and independent signals do not have a significant impact on the bank share prices in any window (see Row 9 in Table 5.4), whilst the negative and clustered signals do. The pre-event and event window average CARs are -7.89% and -1.34% for the negative and clustered events. These are much stronger than for the sample as a whole, indicating that the bank share prices are more strongly affected by rating events that are clustered.

The raw returns coefficients in Rows 6, 7, 8, and 10 in each window is more negative than the mean-adjusted coefficients. This means that the returns of the banks are generally negative leading up (in the t = -230 to t = -30 estimation period) to negative rating actions by Moody's. However, for the negative and independent events the raw CRR coefficients in the three windows are larger (more positive) than the mean-adjusted CAR coefficients. This means that the returns of the banks are positive in the estimation period leading up to the independent events.

5.3.1.5. Fitch positive rating actions

There is a total of 946 bank CAR observations in Row 1 of Table 5.5 surrounding 82 positive rating actions by Fitch (see Row 16 from Table 5.2). The event window CAR is -0.77% and significant, whilst the pre-event and post-event windows are insignificant. This indicates that the positive rating actions by Fitch have a negative and significant impact on bank share prices in the two-day event window, which is contrary to the expectation. The

implications do not change in the sub-sample controlling for thin trading in Row 2 of Table 5.5.

The sub-sample containing positive changes to outlook and watch only in Row 3 have negative and significant effects on the bank share prices in the two-day event and 10-day post-event windows with average CARs of -1.24% and -1.66%, respectively. The positive and independent signals don't change the implications drawn from the full sample with negative and significant event window average CAR of -0.32%. Positive and clustered signals have a positive and significant pre-event CAR of 1.16%, whilst it's negative and significant in the event window at -1.91%. The positive and significant pre-event window CAR perhaps is not surprising since these are positive and clustered signals so it may be the reaction to other rating events rather than anticipation of the Fitch signal.

The corresponding raw CRRs in each sample and sub-sample of positive events in Rows 1, 2, 3, 4, and 5, in each of the three windows are always more positive (or less negative) than the mean-adjusted CARs. This indicates positive mean returns for the banks in the estimation period leading up to the positive signals.

5.3.1.6. Fitch negative rating actions

There are a total of 473 bank CAR observations in Row 6 of Table 5.5 surrounding 46 negative rating actions by Fitch (see Row 17 from Table 5.2). The results indicate that the negative signals negatively and significantly affect the share prices of banks, with an event window average CAR of -0.78. This event window CAR becomes even stronger in the sub-sample controlling for thin trading in Row 7 with a coefficient of -1.26%. The pre-event and post-event window CARs are insignificant in both samples.

The event window average CAR is -1.33% which is significant in the sub-sample for negative changes to outlook and watch only in Row 8, indicating that these types of signals

by Fitch hold more valuable information than actual downgrades. The result in the negative and independent sub-sample is again similar with a significant event window CAR of -0.47%. The pre-event and post-event window CARs are insignificant in both sub-samples. The pre-event and event window average CARs are significant for negative and clustered signals, at -5.52% and -1.35%, respectively (see Row 10 in Table 5.5). This shows that the negative and clustered signals have the strongest impact on the bank share prices, in the expected direction.

The raw returns in each sample and sub-sample of negative signals in Rows 6, 7, 8, 9, and 10 in each window is more negative (or less positive) than the corresponding mean-adjusted coefficients. This means that the returns of the banks are generally negative leading up (in the t = -230 to t = -30 estimation period) to negative rating actions by Fitch. However, the abnormal returns are still significant in the all event windows.

5.3.1.7. Univariate results overview

In this section, I will discuss and compare the univariate results in Tables 5.3, 5.4 and 5.5 surrounding sovereign rating actions by S&P, Moody's and Fitch. Only positive rating actions by S&P are found to have a positive and significant effect on bank share prices in the two-day event window, with a two-day CAR of 0.91%. The event window bank CARs surrounding Moody's and Fitch positive rating actions are negative. There is evidence that positive rating actions by S&P are either anticipated or follow swiftly after bad news or leakage of information occurs prior the rating announcement, due to the pre-event window CAR of 1.78%. There is no evidence of this prior to Moody's or Fitch positive rating actions. The 21-day window CAR surrounding positive S&P rating actions is 3.12%, compared to -0.78% and -0.89% around positive rating actions by Moody's and Fitch, respectively.

Moody's has a far higher weight in positive rating actions compared to negative rating actions at 81.97% (see Table 5.2) in the sample period compared to S&P (64.29%) or Fitch (64.06%), which suggest that Moody's is comparatively more active in releasing good news compared to S&P or Fitch. The evidence shows that positive rating actions by Moody's doesn't induce positive bank share price reaction, and I suggest that the markets are fully anticipating these rating actions since they may be anticipating Moody's to release good news.

The evidence suggests that bank share prices react more to positive changes to outlook or watch, than they do to actual rating upgrades. For S&P, the two-day event window CAR surrounding these types of actions is 0.77%, which is weaker than for the whole sample of positive events with two-day event window CAR of 0.91%, but the post-event window is stronger at 1.06% compared to 0.43%. There is also evidence that bank share prices react to positive changes to outlook or watch by Moody's with a post-event window CAR of 0.81%. Positive and independent rating events by S&P are found to induce a greater bank share price reaction than positive and clustered events do, due to a stronger event-window CAR of 0.93% compared to 0.81%. There are no positive and significant CARs in the event window surrounding positive and independent or clustered rating actions by either Moody's or Fitch.

The results of negative rating actions by Fitch have the greatest impact on bank share prices. The event window CAR are -0.67%, -0.89%, and -0.78% for Fitch. The two-day CAR is stronger for Moody's but the evidence suggests that Moody's actions are anticipated whilst Fitch actions are not due to pre-event window CARs. Negative outlook or watch adjustments have a stronger effect compared to downgrades for S&P and Fitch with event window CARs of -1.10% and -1.33%, respectively. These types of actions by Moody's have a weaker effect than downgrade due to an event window CAR of -0.63%. The event window CAR is only significant around negative and independent actions by Fitch, whilst the evidence suggests

that the markets anticipate these actions by S&P. The bank share price reaction is strong for each agency around negative and clustered actions, and is strongest for S&P, suggesting that S&P is more informative during sovereign crisis/distress periods.

5.3.2. Regression analysis

This section discusses the results of the Equation (5.2) that analyse the rating factors that affect the bank returns. I perform separate estimations of Eq. (5.2) estimates for positive sovereign rating actions and negative sovereign rating actions. From Table 5.2 there are 99 (55), 100 (22) and 82 (46) positive (negative) sovereign rating actions by S&P, Moody's and Fitch, respectively.

Table 5.6 presents the results of Eq. (5.2) around positive rating actions. Positive (negative) coefficients on the variables indicate stronger (weaker) effects on bank returns (since I expect positive sovereign rating actions to have a positive effect on bank returns). The key findings are as follows. First, across all positive rating events in Panel A, the models capture 11.82%, 6.77%, and 10.34% of the cross-sectional variation in the reactions to sovereign rating actions by S&P, Moody's, and Fitch, respectively. The ΔCCR variable is negative and significant for Moody's when all positive rating actions are considered in Panel A. This means that as the size of the positive action increases (watch is stronger than outlook, downgrade is stronger than watch, then multiple notch downgrades are stronger than single notch downgrades), the impact on the bank returns becomes weaker. This indicates that a smaller rating change i.e. positive changes to outlook or watch have the strongest impact on bank returns. This supports the univariate results from Table 5.4 for Moody's where the two-day event window CAR is less negative around positive changes to outlook or watch, than for the positive rating actions as a whole. The ΔCCR variable for Moody's is insignificant in

Panel C of Table 5.6 so there is no significant difference in the reactions of bank returns to positive changes to outlook compared to positive changes to watch.

The *CCR* variable is insignificant for all three agencies in Panel A of Table 5.6, which means that the impact of positive sovereign rating actions on bank returns doesn't depend on how good or poor a country's sovereign credit rating is, however splitting the positive actions into upgrades and outlook/watch in Panels B and C yields contrasting results. Upgrades by Moody's (Fitch) has a stronger (weaker) impact on bank returns in countries with better sovereign credit rating, whilst positive changes to outlook/watch by Moody's has a weaker effect on bank returns in countries with better sovereign credit ratings. The *Newinfo* variable is positive and significant for each agency which means that sovereign rating actions that contain new information (see Section 5.2.4 for definition) have stronger effects on the bank returns than rating actions that do not meet the *Newinfo* criteria. This means that investors value a rating agencies opinion when they adjust a sovereigns' rating in the opposite direction to its previous action (by any agency), or if the sovereign rating level is taken to a new high compared to what the other two agencies rate the sovereign. The significant of the *Newinfo* variable disappears in Panels B and C for Moody's and Fitch, whilst it remains to be positive and significant for S&P in both panels.

I find that the stronger the positive sovereign rating (*Pspillover*) trend is in countries from the same world region as the event sovereign (see Table 5.1), the stronger effect positive sovereign rating actions by each agency has on bank returns. This suggests a spillover effect of good sovereign rating news in neighbouring countries inducing stronger bank share price reactions in banks from the event sovereigns' country. The *Pspillover* variable becomes negative and significant for positive changes to outlook and watch by Fitch, which means that the bank share price reaction to positive changes to outlook and watch by

Fitch is weaker when neighbouring countries are experiencing a positive sovereign rating trend.

I report that *Nspillover* is negatively (positively) related to bank returns for Moody's (Fitch) which means that the stronger the negative sovereign rating trend is in countries from the same world region as the event sovereign, the weaker (stronger) the effect positive sovereign rating actions have on bank returns. This means that when neighbouring countries to the event sovereign are experiencing negative sovereign rating trend, positive rating actions by Moody's (Fitch) induce a weaker (stronger) reaction in bank share prices. The significance and sign of the *Nspillover* variable vary when the sample is split into upgrades and positive changes to outlook/watch in Panels B and C, whilst interpretation remains the same as above.

The *Plagged* variable is insignificant for the three agencies which means that the impact of positive rating actions on bank returns is not affected by previous positive rating actions to the event sovereign by any or all of the three agencies in the previous 10 trading days. *Plagged* becomes positive and significant for Moody's and Fitch in the upgrade only model, which means that sovereign rating upgrades by Moody's and Fitch has a stronger impact on bank share prices if the event sovereign has experienced a positive net rating action trend over the 10 previous trading days. *Plagged* is negative and significant for S&P in the positive outlook/watch only model which means that positive changes to outlook and watch by S&P has a weaker impact on bank share prices if the event sovereign has experienced a positive net rating action trend over the 10 previous trading days.

I report that *Nlagged* is positive and significant for S&P which means that positive rating actions by S&P has a stronger impact on bank share prices if the event sovereign has experienced negative net rating actions from all agencies in the previous 10 trading days. This result supports the positive and significant *Newinfo* variable for S&P discussed above,

where the positive rating action has gone against the negative actions that recently preceded it. The impact of positive rating actions as a whole and for outlook/watch only (in Panels A and C of Table 5.6) on bank share prices isn't affected by the number of days that have passed since the most recent positive rating change. The *Days* variable is positive and significant for Moody's and Fitch in the upgrade only model in Panel B which means that as the number of days elapsed since sovereign *s*'s previous rating action in the same direction (positive action in this case) increases then upgrades by Moody's and Fitch induce a stronger bank share price reaction.

Table 5.7 presents the results of Eq. (5.2) around negative sovereign rating actions. Negative (positive) coefficients on the variables indicate stronger (weaker) impact on bank returns since this model is for negative rating actions, and so I expect negative bank reactions. First, the models in Panel A (for all negative rating actions) capture 9.31%, 32.18%, and 18.04% of the cross-sectional variance in the reactions to sovereign rating actions by S&P, Moody's and Fitch, respectively. I report that as the strength of negative rating action by Moody's increases (watch stronger than outlook, downgrade stronger than watch, and multiple notch downgrades stronger still), the impact on bank returns increases, due to the negative and significant coefficient on ΔCCR.[30] This suggests that for Moody's actual downgrades has a stronger impact on bank returns than negative changes to outlook and watch.

The *CCR* variable is negative and significant for Fitch indicating that banks in countries with better sovereign ratings suffer more from undesirable sovereign rating announcements compared to banks that are based in countries with poorer sovereign ratings. The *CCR* variable remains negative and significant in both sub-samples for Fitch in Panels B and C. The *CCR* variable is positive (negative) and significant for Moody's in the downgrade

[30] Note that the absolute value of ΔCCR is employed.

(outlook/watch) only model in Panel B (C) which means that banks based in countries with better sovereign ratings suffer less (more) from downgrades (negative outlook/watch) than banks based in countries with poorer countries are. The impact of any or all types of negative sovereign rating news by S&P on bank share prices doesn't vary depending on how good or bad the sovereign rating of the banks home country is.

I report a positive (negative) and significant coefficient on the *Newinfo* variable indicating that negative rating actions by S&P (Moody's/Fitch) that convey new information has a weaker (stronger) impact on bank returns. This suggests that negative rating actions by S&P are highly valued by investors regardless of whether they contain new rating information compared to Moody's or Fitch, or not, whilst negative rating actions by Moody's or Fitch has a stronger impact when they do provide new rating information compared to the other two agencies. The significant of the *Newinfo* variable disappears in the two sub-samples in Panels B and C for S&P and Moody's whilst it remains negative and significant for Fitch.

Pspillover is positive and significant for S&P and Moody's which means that negative rating actions that happen during recent positive sovereign rating trend in countries in the same world region as the event sovereign have a weaker effect on bank share prices. This indicates that positive rating trend in nearby countries dampen the impact of negative rating actions by S&P or Moody's on bank share prices. *Pspillover* remains positive and significant for S&P only in the downgrade only and outlook/watch only models in Panels B and C of Table 5.7. The results suggest that there are negative sovereign rating events in regional countries for S&P and Fitch, actually weakens the effect of a negative sovereign event on bank share prices for S&P and Fitch, whilst negative sovereign news by Moody's in these times have an exacerbating effect on the bank share prices due to the negative and significant

Nspillover variable. The *Nspillover* variable remains positive and significant for S&P and Fitch in the outlook/watch model whilst it's positive for S&P in the downgrade only model.[31]

The *Plagged* and *Nlagged* variable are both insignificant in each model for each agency. *Days* is negative and significant for S&P, which means that the impact of a negative rating action by S&P that follows another negative rating action (by any agency) becomes stronger when the time elapsed between the two events is longer. The *Days* variable is positive and significant in the downgrade (outlook/watch) only model for Moody's (Fitch) which means that the impact of these types of actions by the corresponding agency have weaker impacts on bank share prices when the time elapsed since the most recent negative action to the event sovereign is longer.

5.4. Conclusion

In this chapter, I have investigated the effects of sovereign rating actions by S&P, Moody's and Fitch on bank share prices using a sample of 19 emerging market countries. The emerging market sample was obtained according to countries' GNI per capita in the World Banks country classification, where all low-income and middle-income countries are considered to be emerging. An emerging market country has to be rated by at least one of the agencies, and also have sufficient bank share prices data to calculate the returns. There is evidence that sovereign rating actions do impact bank share prices and means that markets do value the rating agencies' views, and that the impacts vary considerably between agencies. There is also evidence that the markets anticipate some of the rating events.

The results of the univariate analysis show that positive rating actions by S&P are informative in emerging market countries due to significant cumulative abnormal bank returns of 0.91% in the two-day event window ($t = 0, +1$). The evidence shows that positive

[31] Note that the absolute value of *Nspillover* is employed.

adjustments to outlook and watch by S&P are also important, and a difference is found between independent and clustered events. The bank abnormal returns are found to be positive prior to positive rating actions by S&P indicating to modest anticipation/leakage of information or rating news lagging market. There is very little evidence of abnormal positive bank share price reactions to positive rating actions by Moody's and Fitch. Negative rating actions by Moody's are found to have the strongest short-term impact, whilst negative rating actions by Fitch are strongest in the longer-run. There is far more evidence of anticipation/information leakage prior to S&P and Moody's negative actions than there is for Fitch, such that it seems markets value negative rating actions by Fitch more than by S&P and Moody's.

I perform regression estimations to determine the rating factors that affect the reaction of bank share prices to sovereign rating actions. I find that sovereign rating actions that convey new rating information increases the impact of both positive and negative sovereign rating actions on bank returns (except for negative actions by S&P). The impact of different types of sovereign rating actions on bank share prices is found to vary depending on how good or bad the banks home sovereign rating level is, which is used as a proxy for the financial position of the country, however the sign fluctuates. Negative sovereign rating actions by Fitch are found to be more important in countries with better sovereign ratings whilst actual downgrades by Moody's are more important for banks in countries with poorer sovereign ratings. I find evidence that positive changes to outlook/watch by Moody's, has a stronger impact on bank share prices than actual upgrades do, whilst negative changes to outlook/watch by Moody's has weaker impacts on bank share prices than actual downgrades, which support the results of the univariate analysis.

I find that the sovereign rating trend of countries from the same world region as the event sovereign significantly alters the impact sovereign rating actions has on bank share

prices. The regional sovereign rating actions' is found to be more important than the recent rating trend in the actual event sovereign. Regions experiencing positive sovereign rating trend seem to increase (dampen) the impact of positive (negative) sovereign rating action of the event country on the bank share prices. The spillover effect is more mixed when the region is experiencing negative sovereign rating pressure. The spillover variables give an indication of how closely linked emerging market economies are to countries nearby and how their sovereign rating activity affects each other.

Prior studies involving the market impact of sovereign rating changes generally don't find that positive rating actions significantly affect the markets. This study shows that positive sovereign rating actions have a positive and significant impact on bank share prices in emerging markets. The result of the univariate analysis shows that only positive actions by S&P are significant. The regression estimations shows that it's important to consider many rating factors to determine whether these actions have an effect as well as the sovereign rating trends of countries from the same world region as the event sovereign.

This study makes a unique contribution to the existing literature on sovereign credit ratings in modelling their impact on bank share prices in emerging markets. With the ongoing regulatory changes in the credit rating industry, the evidence will interest many market participants, such as regulators, financial institutions, issuers (corporates and sovereigns), credit risk managers and investment managers. Rating agencies will also be interested from a reputational perspective.

Table 5.1 - Regional classification of emerging countries

Latin America	Europe	Asia	Middle East and Africa
Argentina	Bulgaria	China	Egypt
Brazil	Poland	India	South Africa
Chile	Romania	Indonesia	
Colombia	Russia	Malaysia	
Mexico	Turkey	Pakistan	
		Philippines	
		Thailand	

No rating data is available for Pakistan by Fitch otherwise each country is rated by all three agencies.

Table 5.2 - Descriptive statistics for credit data

		S&P	Moody's	Fitch
1	No. of countries	19	19	18
2	Upgrades (solo)	39	38	36
3	Downgrades (solo)	8	4	8
4	Total rating changes (solo)	47	42	44
5	Positive outlook actions (solo)	49	32	40
6	Negative outlook actions (solo)	31	11	23
7	Total outlook actions (solo)	80	43	63
8	Positive watch actions (solo)	2	25	4
9	Negative watch actions (solo)	4	2	4
10	Total watch actions (solo)	6	27	8
11	Upgrades and positive outlook action	8	5	2
12	Downgrades and negative outlook action	9	1	8
13	Downgrades and negative watch action	4	4	3
14	Total combined-actions for a given sovereign (actual rating change and watch/outlook action simultaneously)	21	10	13
15	Total sovereign rating actions (Rows 4 + 7 + 10 + 14)	154	122	128
16	Total positive actions	99	100	82
17	Total negative actions	55	22	46
18	Clustered positive events	21	24	22
19	Clustered negative events	22	12	17
20	Independent positive events	78	76	60
21	Independent negative events	33	10	29

This table presents summary statistics for the dataset, which consists of long-term foreign-currency ratings, outlooks and watch for emerging market sovereigns rated by Standard and Poor's, Moody's and Fitch during the period 1st January 2001 to 30th September 2011.

Note: Actions which involve moving to negative outlook from negative watch (with no rating change) are regarded as a positive action in Row 17. There is one such case for S&P. This explains why adding up the negative rating actions in Rows 3 + 6 + 9 + 12 + 13 ≠ Row 17, and adding up the positive rating actions in Rows 2 + 5 + 8 + 11 ≠ Row 16, for S&P only. See Section 5.2.3 for definition of independent and clustered events.

Table 5.3 - Average cumulative returns around S&P rating actions

			Mean-adjusted returns			Raw returns			
		N	Pre-event	Event	Post-event	Pre-event	Event	Post-event	
1	Positive actions	1248	0.0178	0.0091	0.0043	0.0272	0.011	0.0137	coeff
			4.51**	6.67**	0.85	9.11**	7.43**	5.34**	t-stat
2	Positive actions with thin trading adjustment	1025	0.0140	0.0083	0.0048	0.0253	0.0106	0.0161	coeff
			4.45**	6.15**	0.76	9.06**	8.12**	5.86**	t-stat
3	Positive outlook and watch actions only	696	0.0185	0.0077	0.0106	0.0286	0.0097	0.0208	coeff
			3.12**	3.23**	2.57*	7.27**	5.19**	6.00**	t-stat
4	Positive independent actions	1006	0.0167	0.0093	0.0041	0.0268	0.0114	0.0142	coeff
			4.36**	5.99**	0.63	8.37**	6.85**	4.88**	t-stat
5	Positive clustered actions	242	0.0226	0.0081	0.0055	0.0289	0.0093	0.0117	coeff
			1.44	2.93**	0.69	3.73**	2.89**	2.18*	t-stat
6	Negative actions	641	-0.0467	-0.0067	0.0168	-0.0568	-0.0087	0.0067	coeff
			-7.66**	-1.89	1.97*	-9.91**	-3.10**	1.43	t-stat
7	Negative actions with thin trading adjustment	513	-0.0496	-0.0062	0.012	-0.0593	-0.0081	0.0024	coeff
			-6.93**	-1.69	0.92	-9.01**	-2.55*	0.46	t-stat
8	Negative outlook and watch actions only	457	-0.0490	-0.0110	0.0137	-0.0568	-0.0125	0.0059	coeff
			-6.22**	-2.10*	2.40*	-8.60**	-3.77**	1.33	t-stat
9	Negative independent actions	411	-0.0400	-0.0010	0.0130	-0.0497	-0.0029	0.0034	coeff
			-5.05**	0.06	2.38*	-7.03**	-0.89	0.72	t-stat
10	Negative clustered actions	230	-0.0586	-0.0169	0.0234	-0.0694	-0.0190	0.0127	coeff
			-6.61**	-3.32**	0.37	-7.15**	-3.70**	1.26	t-stat

This table presents the results of the average bank cumulative abnormal returns (CARs) and average bank cumulative raw returns (CRRs) around the time of sovereign rating actions by S&P to 19 emerging market countries in the period 1st January 2001 to 30th September 2011. I report the 10-day pre-event (-10, -1), the two-day event (0, +1) and the 10-day post-event (+2, +11) window CARs and CRRs. Mean-adjusted returns calculations are specified in Section 5.2.3. *t*-statistics are the Boehmer at al. (1991) standardized cross-sectional *t*-statistics.

** Significant at the 1% level; * significant at 5% level.

Table 5.4 - Average cumulative returns around Moody's rating actions

			Mean-adjusted returns			Raw returns			
		N	Pre-event	Event	Post-event	Pre-event	Event	Post-event	
1	Positive actions	1186	-0.0048	-0.0028	-0.0002	0.0066	-0.0005	0.0112	coeff
			-2.00*	-2.58**	-0.46	2.59**	-0.39	4.52**	t-stat
2	Positive actions with thin trading adjustment	970	-0.0109	-0.0022	-0.0012	0.0019	0.0003	0.0117	coeff
			-3.91**	-2.10*	-0.61	0.76	0.28	4.38**	t-stat
3	Positive outlook and watch actions only	676	-0.0025	-0.0011	0.0081	0.0084	0.0011	0.0190	coeff
			-0.84	-0.92	2.03*	2.55*	0.67	5.71**	t-stat
4	Positive independent actions	888	-0.0043	-0.0011	-0.0028	0.0064	0.0010	0.0080	coeff
			-1.31	-1.10	-1.70	2.23*	0.75	2.76**	t-stat
5	Positive clustered actions	298	-0.0063	-0.0077	0.0076	0.0070	-0.0050	0.0208	coeff
			-1.77	-3.28**	2.36*	1.33	-1.98*	4.38**	t-stat
6	Negative actions	225	-0.0444	-0.0089	0.0015	-0.0474	-0.0095	-0.0015	coeff
			-4.44**	-4.06**	-0.26	-5.80**	-3.18**	-0.18	t-stat
7	Negative actions with thin trading adjustment	160	-0.0542	-0.0098	-0.0099	-0.0568	-0.0103	-0.0126	coeff
			-5.36**	-3.34**	-1.60	-6.08**	-2.70**	-1.26	t-stat
8	Negative outlook and watch actions only	139	-0.0400	-0.0063	-0.0046	-0.0418	-0.0067	-0.0065	coeff
			-3.80**	-2.29*	-0.75	-4.60**	-1.71	-0.59	t-stat
9	Negative independent actions	87	0.0104	-0.0019	-0.0230	0.0117	-0.0016	-0.0216	coeff
			1.91	-0.92	-1.28	1.18	-0.32	-1.30	t-stat
10	Negative clustered actions	138	-0.0789	-0.0134	0.0169	-0.0846	-0.0145	0.0112	coeff
			-7.63**	-4.58**	1.24	-7.97**	-3.97**	1.28	t-stat

This table presents the results of the average bank cumulative abnormal returns (CARs) and average bank cumulative raw returns (CRRs) around the time of sovereign rating actions by Moody's to 19 emerging market countries in the period 1st January 2001 to 30th September 2011. I report the 10-day pre-event (-10, -1), the two-day event (0, +1) and the 10-day post-event (+2, +11) window CARs and CRRs. Mean-adjusted returns calculations are specified in Section 5.2.3. *t*-statistics are the Boehmer at al. (1991) standardized cross-sectional *t*-statistics.

** Significant at the 1% level; * significant at 5% level.

Table 5.5 - Average cumulative returns around Fitch rating actions

			Mean-adjusted returns			Raw returns			
		N	Pre-event	Event	Post-event	Pre-event	Event	Post-event	
1	Positive actions	946	0.0009	-0.0077	-0.0021	0.0131	-0.0053	0.0101	coeff
			0.06	-5.06**	-1.20	4.64	-3.39**	3.72**	t-stat
2	Positive actions with thin trading adjustment	749	0.0016	-0.0086	-0.0025	0.0152	-0.0059	0.0111	coeff
			-0.31	-5.44**	-1.07	5.62**	-3.78**	4.05**	t-stat
3	Positive outlook and watch actions only	487	-0.0022	-0.0124	-0.0166	0.0102	-0.0100	-0.0043	coeff
			-1.87	-6.75**	-4.45**	3.29**	-5.68**	-1.22	t-stat
4	Positive independent actions	675	-0.0034	-0.0032	-0.0029	0.0085	-0.0008	0.0090	coeff
			-1.42	-2.69**	-1.72	2.52*	-0.49	2.75**	t-stat
5	Positive clustered actions	271	0.0116	-0.0191	-0.0001	0.0246	-0.0165	0.0129	coeff
			2.22*	-4.76**	0.72	4.81**	-4.76**	2.63**	t-stat
6	Negative actions	473	-0.0066	-0.0078	0.0088	-0.0171	-0.0099	-0.0017	coeff
			-1.20	-3.08**	0.84	-2.68**	-3.47**	-0.27	t-stat
7	Negative actions with thin trading adjustment	348	-0.0063	-0.0126	0.0139	-0.0174	-0.0148	0.0028	coeff
			-1.16	-3.98**	1.12	-2.49*	-4.20**	0.38	t-stat
8	Negative outlook and watch actions only	291	-0.0129	-0.0133	-0.0090	-0.0190	-0.0145	-0.0151	coeff
			-1.52	-3.73**	-1.95	-2.70**	-4.09**	-2.23*	t-stat
9	Negative independent actions	308	0.0195	-0.0047	0.0000	0.0104	-0.0065	-0.0091	coeff
			0.57	-2.07*	0.61	1.36	-2.02*	-1.06	t-stat
10	Negative clustered actions	165	-0.0552	-0.0135	0.0253	-0.0684	-0.0161	0.0121	coeff
			-4.91**	-2.30*	1.37	-6.61**	-2.93**	1.32	t-stat

This table presents the results of the average bank cumulative abnormal returns (CARs) and average bank cumulative raw returns (CRRs) around the time of sovereign rating actions by Fitch to 18 emerging market countries in the period 1st January 2001 to 30th September 2011. I report the 10-day pre-event (-10, -1), the two-day event (0, +1) and the 10-day post-event (+2, +11) window CARs and CRRs. Mean-adjusted returns calculations are specified in Section 5.2.3. *t*-statistics are the Boehmer at al. (1991) standardized cross-sectional *t*-statistics.

** Significant at the 1% level; * significant at 5% level.

Table 5.6 - Estimation results of Eq. (5.2) for positive sovereign rating actions

	S&P		Moody's		Fitch	
	coefficient	*t*-stat	coefficient	*t*-stat	coefficient	*t*-stat
Panel A: Positive actions						
Constant	0.0239	2.14*	-0.0179	-1.37	-0.0693	-4.66**
ΔCCR	0.0008	0.40	-0.0025	-2.10*	-0.0017	-1.76
CCR	-0.0002	-1.29	-0.0002	-1.45	-0.0001	-0.35
Newinfo	0.0103	3.45**	0.0138	3.89**	0.0214	4.65**
Pspillover	0.1266	5.59**	0.0357	4.19**	0.0522	3.02**
Nspillover	-0.0021	-0.04	-0.0793	-2.34*	0.1752	2.48*
Plagged	-0.0200	-0.53	-0.0187	-0.70	0.0532	1.36
Nlagged	0.2474	3.09**	-0.0069	-0.41		
Days	-0.0015	-1.18	0.0006	0.82	0.0011	0.84
Year	Yes		Yes		Yes	
Cluster	267		247		228	
R^2	11.82%		6.77%		10.34%	
Obs.	1248		1186		946	
Panel B: Upgrades only						
Constant	0.0578	2.02*	-0.0708	-4.93**	-0.0575	-2.91**
ΔCCR	0.0012	0.34	-0.0012	-0.71	-0.0021	-1.26
CCR	0.0001	0.43	0.0006	2.73**	-0.0008	-2.13*
Newinfo	0.0096	2.38*	-0.0062	-0.81	0.0102	1.34
Pspillover	0.1033	4.09**	-0.0217	-1.42	0.0882	2.13*
Nspillover	0.1685	2.88**	0.2990	3.65**	0.1316	1.89
Plagged	-0.0099	-0.22	0.3573	3.96**	0.3002	2.65**
Nlagged						
Days	-0.0044	-1.67	0.0082	3.12**	0.0086	3.33**
Year	Yes		Yes		Yes	
Cluster	228		234		207	
R^2	6.66%		18.47%		25.07%	
Obs.	552		510		459	
Panel C: Positive changes to outlook/watch only						
Constant	-0.0055	-0.48	-0.0179	-1.00	-0.2124	-3.67**
ΔCCR	0.0502	7.30**	0.0078	1.80	0.0115	1.74
CCR	-0.0005	-1.72	-0.0005	-2.19*	0.0003	1.23
Newinfo	0.0145	2.98**	0.0070	1.18	-0.0038	-0.60
Pspillover	0.1587	4.64**	0.0531	4.34**	-0.0278	-2.07*
Nspillover	-0.0578	-0.72	-0.1333	-3.70**	1.8168	2.86**
Plagged	-0.2135	-3.16**	-0.0346	-0.90	-0.0263	-0.44
Nlagged	0.0492	0.54	-0.0080	-0.47		
Days	-0.0032	-1.65	-0.0003	-0.26	-0.0007	-0.37
Year	Yes		Yes		Yes	
Cluster	256		227		171	
R^2	27.81%		10.90%		20.59%	
Obs.	696		676		487	

This table presents the coefficient estimates of Eq. (5.2) using data samples of emerging market countries rated by S&P, Moody's and Fitch during January 2001 to September 2011. CAR_{it}: the dependent variable, is the mean-adjusted cumulative abnormal return of bank i in the two-day event window (0, +1) around positive sovereign rating actions at time t. ΔCCR is the 1-day change in the 58-point numerical comprehensive credit rating (CCR) scale of sovereign s at time t (see Section 5.2.2). *CCR* is the level of the event country's comprehensive credit rating. *Newinfo* is a dummy variable that indicates whether a rating action provides new information. *Pspillover* (*Nspillover*) is a positive (negative) net total change in LCCR in the past 10 trading days from all agencies of the countries in the same world region (as defined in Table 5.1) as the country experiencing a sovereign rating action. The absolute value of *Nspillover* is employed for ease of interpretation. *Plagged* (*Nlagged*) is a positive (negative) net total change in LCCR of sovereign s in the last 10 trading days from all agencies. The absolute value of *Nlagged* is employed for ease of interpretation. *Days* is the natural logarithm of the number of days between two successive rating events of the same sovereign in the same direction by any agency. Panel A relates to all positive rating actions, Panel B relates to upgrades only and Panel C relates to positive changes to outlook or watch only. Full sets of year dummies included. *Cluster* represents the number of banks in the estimations. I apply Huber-White clustered robust standard errors.
** Significant at 1% level; * significant at 5% level.

Table 5.7 - Estimation results of Eq. (5.2) for negative sovereign rating actions

	S&P		Moody's		Fitch	
	coefficient	t-stat	coefficient	t-stat	coefficient	t-stat
Panel A: Negative actions						
Constant	-0.0049	-0.30	0.1375	4.35**	0.0166	0.89
ΔCCR	-0.0002	-0.08	-0.0137	-2.47*	-0.0006	-0.27
CCR	0.0003	0.81	-0.0018	-1.10	-0.0019	-3.07**
Newinfo	0.0321	3.95**	-0.0271	-2.01*	-0.0304	-2.81**
Pspillover	0.1757	3.80**	0.1580	3.73**	0.0290	0.94
Nspillover	0.0450	2.89**	-1.0957	-2.28*	0.0426	3.05**
Plagged					-0.2759	-1.85
Nlagged	0.0016	0.04	-0.0744	-1.94	-0.0071	-0.83
Days	-0.0071	-2.86**	-0.0001	-0.04	-0.0001	-0.04
Year	Yes		Yes		Yes	
Cluster	223		120		188	
R^2	9.31%		32.18%		18.04%	
Obs.	641		225		473	
Panel B: Downgrades only						
Constant	0.0346	0.75	-0.2092	-4.62**	0.0338	1.49
ΔCCR	0.0015	0.32	0.0183	2.30*	-0.0041	-2.66**
CCR	0.0007	0.78	0.0062	3.79**	-0.0016	-2.22*
Newinfo	0.0108	0.77	-0.0002	-0.01	-0.0480	-2.60*
Pspillover	0.4196	2.05*				
Nspillover	-0.1319	-2.40*			0.5088	1.20
Plagged						
Nlagged	-0.0938	-1.57			-0.0129	-1.33
Days	-0.0130	-2.14*	0.0278	5.10**	0.0004	0.13
Year	Yes		Yes		Yes	
Cluster	98		49		117	
R^2	8.87%		43.05%		20.73%	
Obs.	184		86		182	
Panel C: Negative changes to outlook/watch only						
Constant	0.0219	0.87	0.4793	2.99**	-0.0783	-3.01**
ΔCCR	-0.0700	-4.69**	0.0241	0.99	0.0481	3.85**
CCR	0.0010	1.51	-0.0089	-2.55*	-0.0036	-4.33**
Newinfo	0.0198	1.40	-0.1002	-1.96	-0.0384	-2.77**
Pspillover	0.2498	4.20**			0.0603	1.48
Nspillover	0.0711	3.43**	-0.9346	-1.26	0.0623	4.19**
Plagged					-0.1313	-0.83
Nlagged	0.3201	1.23	-0.1904	-0.79	0.2393	0.91
Days	-0.0011	-0.49	0.0014	0.11	0.0113	2.33*
Year	Yes		Yes		Yes	
Cluster	221		118		180	
R^2	18.23%		30.79%		28.53%	
Obs.	457		139		291	

This table presents the coefficient estimates of Eq. (5.2) using data samples of emerging market countries rated by S&P, Moody's and Fitch during January 2001 to September 2011. CAR_{it}: the dependent variable, is the mean-adjusted cumulative abnormal return of bank i in the two-day event window (0, +1) around negative sovereign rating actions at time t. ΔCCR is the 1-day change in the 58-point numerical comprehensive credit rating (CCR) scale of sovereign s at time t (see Section 5.2.2). The absolute value ΔCCR is employed for ease of interpretation. *CCR* is the level of the event country's comprehensive credit rating. *Newinfo* is a dummy variable that indicates whether a rating action provides new information. *Pspillover* (*Nspillover*) is a positive (negative) net total change in LCCR in the past 10 trading days from all agencies of the countries in the same world region (as defined in Table 5.1) as the country experiencing a sovereign rating action. The absolute value of *Nspillover* is employed for ease of interpretation. *Plagged* (*Nlagged*) is a positive (negative) net total change in LCCR of sovereign s in the last 10 trading days from all agencies. The absolute value of *Nlagged* is employed for ease of interpretation. *Days* is the natural logarithm of the number of days between two successive rating events of the same sovereign in the same direction by any agency. Panel A relates to all negative rating actions, Panel B relates to downgrades only and Panel C relates to negative changes to outlook or watch only. Full sets of year dummies included. *Cluster* represents the number of banks in the estimations. I apply Huber-White clustered robust standard errors.
** Significant at 1% level; * significant at 5% level.

Chapter 6: Thesis Conclusions

The US subprime mortgage crisis in 2007 led to the credit rating agencies (CRAs) coming under close scrutiny. The CRAs were accused of being tardy in their downgrading of structured finance products. The subprime mortgage crisis led to a banking crisis whereby governments around the globe, in particular in Europe and the US, where forced to provide bail-out packages to try to save their countries' financial systems. This led to a huge increase in public debt, which in turn has led to the European sovereign debt crisis. The CRAs have been criticised of downgrading European sovereigns too quickly and harshly, which is said to have exacerbated the crisis according to European politicians.

Chapter 2 discussed some of the main factors inherent in the credit ratings business. The 'through the cycle' rating philosophy is among the most important aspects in the business. CRAs' opinions are forward looking views about an issuer's creditworthiness and are intended to be stable through time i.e. the credit ratings shouldn't change much through time, as opposed to a 'point in time' philosophy. One of the worst things a CRA can do is to downgrade an issuer and then soon afterwards to change their minds and upgrade them back to the previous level, called 'rating reversal'. This has serious implications for fund managers for example whose investment decisions can be directly tied to credit ratings. It can also have serious implications for banks since their capital requirements are tied to their credit ratings according to the standardised approach under the Basel II accord. CRAs will therefore tend to only downgrade an issuer when they are absolutely sure that they won't have to reverse that downgrade action in the near future. In this sense, CRAs typically follow what is already known in the market, and that downgrades really only point out to market participants what they already know. In this type of scenario the market are leading CRA's actions and so the argument is that one doesn't expect CRAs actions to have any market impact. Nevertheless, many studies (see Chapter 2), find strong market reactions around the times of credit rating

announcements or actions. This can arise from the fact that CRAs have access to non-publicly available information. In general, studies have found that markets respond more to negative rating news than they do to positive rating news.

As I mentioned above, banks' capital requirements can be tied to their clients' credit ratings, and studies have found (e.g. Morgan, 2002, and Iannotta, 2006, in Section 2.3.2) that CRAs have a particularly difficult time in assessing a bank's creditworthiness. This is revealed via a relatively high number of rating disagreements (split ratings) observed in bank ratings compared to most other industries. This is unsurprising since a bank's assets are difficult to observe due to the high percentage of financial assets compared to fixed assets, and this is explained as a bank's assets being relatively opaque. The literature has also found emerging market countries to be more opaque than developed countries, and again this is evident in the higher proportion of split ratings observed in emerging market sovereign ratings. A CRA's job can therefore be more challenging when assessing banks compared to most other industries, or when assessing emerging market countries compared to developed countries. Sovereign ratings represent a ceiling for most other issuers in the country, with very few issuers able to pierce the sovereign rating ceiling. This provides a connection between the sovereign rating of a country and their domestic non-sovereign issuers' ratings. The European sovereign debt crisis has also increased market participants' awareness of banks' exposures to the sovereign debt of their home countries and also of other countries.

The primary aim of this thesis is to examine the relationship between banks and sovereign ratings. The prior literature is largely silent on this subject. Whilst many studies have analysed bank ratings or sovereign ratings, none have explicitly set out to fully capture the dynamics of the relationship between them. I do this in Chapter 3. The European sovereign debt crisis has made it necessary for market participants and regulators to better understand credit ratings, and their implications. In Chapters 4 and 5, I examine how

sovereign rating news spills over into bank share prices in Europe and in emerging markets, respectively.

Chapter 3 investigates the impact of sovereign rating actions on bank ratings in emerging markets. The sample consists of monthly long-term foreign-currency bank and sovereign ratings from S&P, Moody's and Fitch for 54 emerging market countries, spanning November 1999 to December 2009. I employ an ordered probit modelling approach to examine how sensitive emerging market bank ratings are to upgrades and downgrades to their home sovereign's rating, and also to changes to the sovereign's watch status. I also analyse the probability of sovereign rating actions inducing bank rating changes i.e. the marginal effects, which is unique to this study. Firstly, more than 50% of the observations (65.54%) had the bank rated the same as their home sovereign's rating, indicating the strength of the sovereign ceiling effect in emerging markets during the sample period. The results show that sovereign upgrades (downgrades) have a strong effect on bank ratings. The marginal effects analysis shows that banks have a significantly increased probability of being upgraded (downgraded) soon after their home sovereign is upgraded (downgraded). The effects are found to be generally stronger for upgrades compared to downgrades i.e. emerging market banks are more likely to be upgraded following sovereign upgrades than they are of being downgraded following sovereign downgrades. This is probably a consequence of the chosen sample period, which saw a strong upgrade trend in emerging market sovereign ratings.

Local-privately owned banks are the most sensitive to sovereign upgrades, whilst foreign owned banks are the most sensitive to sovereign downgrades. Listed banks are found to be more (less) sensitive to sovereign downgrades (upgrades) than banks that are not publicly listed. Banks that are rated the same as the sovereign rating are the most sensitive to sovereign upgrades and downgrades compared to banks either rated below or above the sovereign. I find that the effects vary across the three CRAs, with Fitch and S&P displaying a

stronger tendency to adjust bank ratings in-line with sovereign rating adjustments compared to Moody's.

Another interesting finding is that banks have been less likely to be downgraded during the recent crisis period (2007-2009) compared to the pre-crisis period (1999-2006). This could be indicating that the CRAs have been paying more attention to the sovereign ratings during the crisis period in emerging markets and there may be a longer time lapse between the sovereign being downgraded and the banks following. Another potential explanation is that during the crisis period, banks that are rated worse than the sovereign, pre-sovereign downgrade, become rated the same as the sovereign after the sovereign is downgraded. This means that these types of banks are not downgraded following the sovereign downgrade which can explain the weaker marginal effects during the crisis period compared to the pre-crisis period. This indicates that the banks are more likely to be rated the same as the sovereign during the recent crisis period than in the pre-crisis period.

Chapter 4 investigates the impact of sovereign rating actions on bank share prices during the European sovereign debt crisis. There are many studies (see Chapter 2) that examine the market impact of sovereign rating actions however none directly examine the impact in this way. The ongoing scrutiny of the CRAs and the exposures of large banks to government debts make this an important topic which offers potential to deliver a better understanding of the impacts of CRAs' announcements on the economy. The dataset consists of daily long-term foreign-currency sovereign ratings by S&P, Moody's and Fitch of European countries spanning January 2007 to September 2011. The data also consists of daily share prices of 51 European banks that were part of the 2011 EU stress test. Using an event day methodology, I examine the impact of a sovereign rating action to country *a* on bank share prices in countries *b, c, d,* and so forth i.e. the 'spillover' effect of sovereign rating actions on the share prices of banks from other countries. Negative sovereign rating actions

have dominated positive sovereign rating actions in Europe in this time period, and so Chapter 4 mainly focuses on the impact of negative sovereign rating actions. I also look at the impact of changes to outlook and watch on bank share prices as well as actual rating changes. A univariate analysis models the bank's abnormal returns in three event windows i.e. a 10-day pre-event window, a 2-day event window, and a 10-day post-event window. A multivariate analysis analyses the rating factors that affect the banks' returns.

Negative sovereign rating actions from each CRA are found to induce significant abnormal bank returns. Negative actions by S&P have the most immediate spillover effect on bank share prices, whilst negative actions by Moody's have the strongest impact in the longer term i.e. over the 10-day post-event window. Most of the impact surrounding negative actions by Fitch happens in the pre-event window which suggests that negative sovereign rating actions by Fitch tend to lag the market compared to those from the other two CRAs. The CRAs were accused of exacerbating the current financial crisis with their action, and while the evidence of Chapter 4 provides some support for this, the bank returns are highly negative in this time period regardless of the CRAs' actions. The latter aspect can be observed in the average daily returns of the banks over the whole sample period and in the pre-event window returns. For S&P and Fitch, the pre-event window abnormal returns are negative and significant, which suggests that the market perceptions about the banks are already negative prior to the rating actions.

The results suggest that banks' share prices are more sensitive to sovereign rating changes when these changes are heavily clustered, i.e. more than one negative sovereign rating event happening in a short time-frame. Stronger share price reactions of banks around negative sovereign rating actions are found for stronger rating actions, according to the 58-point comprehensive credit rating scale. Negative sovereign rating actions by S&P and Moody's have a stronger effect on bank share prices for higher rated event sovereigns (prior

to the rating adjustment), however, the opposite is true for Fitch. I take account of the fact that the bank share prices may be reacting to changes to its home country's sovereign rating, but the results still hold.

In Chapter 3, I find that bank ratings are strongly linked with their domestic sovereign rating in emerging markets, and in Chapter 4 I find that bank share prices react to sovereign rating actions from S&P, Moody's and Fitch in Europe. Therefore in Chapter 5 I investigate the impact of sovereign rating actions on bank share prices in emerging markets. The methodology employed in Chapter 5 is similar to that in Chapter 4, however, the sovereign and bank sample is different, and I examine the impact of the sovereign rating actions on the domestic bank share prices, rather than the cross border effect examined in Chapter 4. The sample in Chapter 5 allows for a more thorough investigation on the impact of positive sovereign rating actions compared to Chapter 4, and additional elements are included in the model specifications. The data consists of daily long-term foreign-currency sovereign ratings by S&P, Moody's and Fitch from 19 emerging market countries spanning January 2001 to September 2011. Similar to Chapter 4, I employ an event-day methodology and perform a univariate investigation and a multivariate regression analysis.

The results of Chapter 5 show that the bank share prices do react to rating actions to their home sovereigns rating but the impact does vary considerably across the three CRAs. Positive sovereign rating actions by S&P are found to induce significant positive bank returns. The effect is found to be significant regardless of the type of positive rating action by S&P i.e. upgrade, change to outlook, or change to watch. There is evidence that positive actions by S&P lags the market somewhat or that some anticipation or leakage of information occurs prior to the rating announcement. I find negative abnormal returns surrounding positive actions by Moody's and Fitch, which is a somewhat strange outcome. This can be explained by the raw returns which are positive in many of the three windows surrounding

these events suggesting that the returns were positive but not abnormally positive. Contrary to the findings associated with positive sovereign rating actions, negative sovereign rating actions by Moody's and Fitch are found to be more informative compared to S&P. Negative actions by Moody's have the strongest short-term impact, whilst negative actions by Fitch have the strongest longer-term impact. There is also evidence that negative actions by Moody's and S&P are lagging the market or anticipated more than negative actions by Fitch. The impact of both positive and negative actions is stronger when they contain new rating information to the market (compared to rating information revealed by the other CRAs). The sovereign rating trend in the same region as the event country is found to have a significant effect in particular when the region is experiencing a recent positive trend. Regions experiencing a positive sovereign rating trend seem to increase (dampen) the impact of positive (negative) sovereign rating actions of the event country on the bank share prices.

This thesis provides important insights on the link between banks and sovereign ratings in developed and in emerging markets. Specifically, the findings of this thesis contributes substantial new evidence on the impact of sovereign ratings actions on: (i) bank ratings in emerging market countries; (ii) bank share prices in developed countries; and (iii) bank share prices in emerging market countries. In addition to the contribution to the academic literature, the findings of this thesis have important practical implications serving as a tool for regulators, politicians, investors, CRAs, banks, financial institutions, issuers, and fund managers to gain a better understanding of the economic functions of sovereign ratings in the global economy.

The CRAs have come under close scrutiny during the recent financial crisis, firstly because they failed to correctly assess the risks associated with structured finance products, where the CRAs were accused of rating these products too high and were too slow to downgrade them. During the European sovereign debt crisis the CRAs have been accused by

politicians of downgrading European sovereigns too fast and too far, and were accused of exacerbating the crisis. There has been widespread tension between politicians, regulators and the CRAs recently with much of the attention focused on reducing the reliance and hardwiring of credit ratings in financial contracts and for CRAs to increase the transparency of their methodologies. The aim is to reduce the impact CRA announcements have in the global economy, in particular to reduce the effects of downgrades, which can send shockwaves through the financial system. This thesis has provided evidence that the CRAs announcements are highly valued by market participants in emerging and developed countries, and that sovereign downgrades have a negative impact on bank share prices, although there is also substantial evidence of negative abnormal bank returns prior to the rating announcements, which suggests that the CRAs are merely giving an indication of market sentiment, and that the CRAs are reacting to information already known in the market.

The evidence suggests that the three largest CRAs serve an economic function in the global economy, with evidence that all three provide valuable information links between sovereigns and banks in developed countries. S&P seems to take the informational lead over the other two in emerging markets, whilst Moody's and Fitch are important when it comes to negative rating announcements. The results from the event-studies in Chapters 4 and 5 give an indication to S&P's stronger focus on rating accuracy, and Moody's emphasis on rating stability. Chapter 4 shows that negative rating actions by S&P have the strongest and most immediate spillover effect into bank share prices compared to Moody's and Fitch, whilst in Chapter 5 shows that positive rating actions by S&P have a stronger impact than Moody's and Fitch. A possible explanation for this is due to different country and time period samples between Chapters 4 and 5. Chapter 4 utilises a European sample during the recent crisis period which saw a highly negative sovereign rating trend, whilst Chapter 5 utilises an

emerging market sample starting from 2000, the countries of which experienced a highly positive sovereign rating trend. S&P therefore, can be thought of a being the leading agency according to a regions sovereign rating trend. If the trend is positive then S&P's positive actions will be more valuable compared to Moody's and Fitch, and if the trend is negative, then negative actions by S&P will be more valuable to the market compared to Moody's and Fitch.

A limitation of this thesis is the use of end of month ratings data in Chapter 3. However for the purposes of Chapter 3, I doubt that the choice between monthly and daily ratings data would yield significantly different results. Due to the large amount of sovereign rating actions in developed countries observed during the recent crisis, a future study could examine the link between sovereign and bank ratings in developed countries. At the time of conducting the study in Chapter 3, this wouldn't have been realistic because sovereign rating actions for the developed markets were quite infrequent prior to 2008. The use of mean-adjusted returns in Chapter 4 is not a perfect method to calculate the expected return due to the sheer number of sovereign rating actions seen in the crisis time period, which occupy the 200-day averaging period used. Further robustness test could be performed using a different length of averaging period, say 100-days, or the use of a different equilibrium model for the expected return, such as the market model.

Chapter 5 suffers from some restrictions arising from illiquid bank shares in some emerging market countries. A future study could benefit from better share price data from the emerging markets countries as they continue to grow and develop their financial systems and securities' trading volumes. A suggestion for future work is to incorporate CDS data into the event-day study in order to capture the pre-event (or pre-rating action) market perceptions of the sovereign and banks, since CDS is an immensely liquid information source for default risk, especially when compared with credit rating changes. The credit rating data in this thesis

has focused solely on foreign-currency sovereign ratings, whilst it would be interesting to investigate the link between it and the local-currency ratings and the market impact of local-currency sovereign ratings. Another direction for future research is to look at Bank Financial Strength Ratings that Moody's provide, and see whether sovereign turmoil can spillover into Moody's opinion of a bank's intrinsic safety and soundness, and not only their ability to make their debt repayment on time and in full.

References

Afonso, A., 2003. Understanding the determinants of government debt ratings: evidence for the two leading agencies. Journal of Economics and Finance 27, 56-74.

Afonso, A., Furceri D., Gomes, P., 2012. Sovereign credit ratings and financial markets linkages: application to European data. Journal of International Money and Finance 31, 606-638.

Alsakka, R., 2010. Sovereign credit ratings in emerging countries. PhD Thesis, Aberystwyth University, UK.

Alsakka, R., ap Gwilym, O., 2009. Heterogeneity of sovereign rating migrations in emerging countries. Emerging Markets Review 10, 151-165.

Alsakka, R., ap Gwilym, O., 2010. Leads and lags in sovereign credit ratings. Journal of Banking and Finance 34, 2614-2626.

Alsakka, R., ap Gwilym, O., 2011. Sovereign rating actions: is the criticism justified? Intereconomics 46, 248-253.

Alsakka, R., ap Gwilym, O., 2012a. The causes and extent of split sovereign credit ratings in emerging markets. Emerging Markets Finance and Trade 48, 5-25.

Alsakka, R., ap Gwilym, O., 2012b. Foreign exchange market reaction to sovereign credit news. Journal of International Money and Finance 31, 845-864.

Alsakka, R., ap Gwilym, O., 2013. Rating agencies' signals during the European sovereign debt crisis: market impact and spillovers. Journal of Economic Behavior and Organization 84, 144-162.

Altman, E. I., Rijken, H., 2006. A point-in-time perspective on through-the-cycle ratings. Financial Analysts Journal 62, 54-70.

Arezki, R., Candelon, B., Amadou, N., 2011. Sovereign rating news and financial markets spillovers: evidence from the European debt crisis. IMF Working Paper No. 11/68.

Bank of England, 2011. Whither the credit ratings industry? Financial Stability Paper No. 9.

Bannier, C., Hirsch, C., 2010. The economic function of credit rating agencies – what does the watchlist tell us? Journal of Banking and Finance 34, 3037–3049.

Bannier, C., Behr, P., Güttler, A., 2010. Rating opaque borrowers: why are unsolicited ratings lower? Review of Finance 14, 263-294.

Barton, A., 2006. Split credit ratings and the prediction of bank ratings in the Basel II environment. PhD Thesis, University of Southampton, UK.

Becker, B., Milbourn, T., 2011. How did increased competition affect credit ratings? Journal of Financial Economics 101, 493-514.

Bennell, J., Crabbe, D., Thomas, S., ap Gwilym, O., 2006. Modelling sovereign credit ratings: neural networks versus ordered probit. Expert Systems with Applications 30, 415-425.

BIS, 2011. Global growth and sovereign debt concerns drive markets. BIS Quarterly Review, September.

Bissoondoyal-Bheenick, E., 2005. An analysis of the determinants of sovereign ratings. Global Finance Journal 15, 251-280.

Blundell-Wignall, A., 2012. Solving the financial and sovereign debt crisis in Europe. OECD Journal: Financial Market Trends 2011/2.

Boehmer, E., Musumeci, J., Poulsen, A., 1991. Event-study methodology under conditions of event induced variance. Journal of Financial Economics 30, 253-72.

Bolton, P., Freixas, X., Shapiro, J., 2012. The Credit Ratings Game. Journal of Finance 67, 85-111.

Bongaerts, D., Cremers, K., Goetzmann, W., 2012. Tiebreaker: certification and multiple credit ratings. Journal of Finance 67, 113- 152.

Boot, A., Milbourn, T., Schmeits, A., 2006. Credit ratings as coordination mechanisms. Review of Financial Studies 19, 81-118.

Borensztein, E., Cowan, K., Valenzuela, P., 2007. Sovereign ceiling lite? The impact of sovereign ratings on corporate ratings in emerging market economies. IMF Working Paper, vol. 75.

Brooks, R., Faff, R., Hillier, D., Hillier, J., 2004. The national market impact of sovereign rating changes. Journal of Banking and Finance 28, 233-250.

Butler, W., Fauver, L., 2005. Legal and economic determinants of sovereign credit ratings. Working Paper, University of South Florida.

Cantor, R., Packer, F., 1996. Determinants and impact of sovereign credit ratings. Federal Reserve Bank of New York Economic Policy Review, October, 1-15.

Cantor, R., ap Gwilym, O., Thomas, S., 2007. The use of credit ratings in investment management in the US and Europe. Journal of Fixed Income 17, 13-28.

Caporale, G., Matousek, R., Stewart, C., 2012. Ratings assignments: lessons from international banks. Journal of International Money and Finance 31, 1593-1606.

Chambers, J., 2006. Emerging markets sovereigns hike the upgrade trail. Standard and Poor's Research, New York, September.

Christopher, R., Kim, S., Wu, E., 2012. Do sovereign credit ratings influence regional stock and bond market interdependencies in emerging countries? Journal of International Financial Markets, Institutions and Money 22, 1070-1089.

Dichev, I., Piotroski, J., 2001. The long-run stock returns following bond ratings changes. Journal of Finance 56, 173-203.

Dittmar, F., Yuan, K., 2008. Do sovereign bonds benefit corporate bonds in emerging markets? Review of Financial Studies 21, 1983-2014.

Duff, A., Einig, S., 2009. Understanding credit ratings quality: evidence from UK debt market participants. The British Accounting Review 41, 107-119.

Duggar, E., Emery, K., Gates, D., Paulo, S., Lemay, Y., Cailleteau, P., 2009. Emerging market corporate and sub-sovereign defaults and sovereign crises: perspectives on country risk. Moody's Investors Service, February.

Ferreira, M., Gama, P., 2007. Does sovereign debt ratings news spill over to international stock markets? Journal of Banking and Finance 31, 3162-82.

Fitch Ratings, 2013. Definitions of ratings and other forms of opinion. February. www.fitchratings.com

Fuertes, A., Kalotychou, E., 2007. On sovereign credit migration: a study of alternative estimators and rating dynamics. Computational Statistics and Data Analysis 51, 3448-3469.

Gande, A., Parsley, D., 2005. News spillovers in the sovereign debt market. Journal of Financial Economics 75, 691-734.

Gerlach, S., Schulz, A., Wolff, G., 2010. Banking and sovereign risk in the euro area. Deutsche Bundesbank, Discussion Paper, No. 09/2010.

Güttler, A., 2011. Lead-lag relationships and rating convergence among credit rating agencies. Journal of Credit Risk 7, 95-119.

Güttler, A., Wahrenburg, M., 2007. The adjustment of credit ratings in advance of defaults. Journal of Banking and Finance 31, 751-767.

Hamilton, D., Cantor, R., 2005. Rating transitions and defaults conditional on rating outlooks revisited: 1995-2005. Moody's Investors Service, December.

Hill, P., Faff, R., 2010. The market impact of relative agency activity in the sovereign ratings market. Journal of Business Finance and Accounting 37, 1309-1347.

Hill, P., Brooks, R., Faff, R., 2010. Variations in sovereign credit quality assessments across rating agencies. Journal of Banking and Finance 34, 1327-1343.

Holthausen, R., Leftwich, R., 1986. Stock price effects of bond rating changes. Journal of Financial Economics 17, 57-89.

Hooper, V., Hume, T., Kim, J., 2008. Sovereign rating changes - do they provide new information for stock markets? Economic Systems 32, 142-166.

House of Lords, 2011. Sovereign credit ratings: shooting the messenger? European Union committee, 21st Report of Session 2010-2012, HL Paper 189, London, UK.

Hu, Y., Kiesel, R., Perraudin,W., 2002. The estimation of transition matrices for sovereign credit ratings. Journal of Banking and Finance 26, 1383-1406.

Hull, J.C., Predescu, M., White, A., 2004. The relationship between credit default swap spreads, bond yields, and credit rating announcements. Journal of Banking and Finance 28, 2789-2811.

Iannotta, G., 2006. Testing for opaqueness in the European banking industry: evidence from bond credit ratings. Journal of Financial Services Research 30, 287-309.

IMF, 2010. Meeting new challenges to stability and building a safer system." IMF Global Financial Stability Report, April 2010.

Ismailescu, I., Kazemi, H., 2010. The reaction of emerging market credit default swap spreads to sovereign credit rating changes. Journal of Banking and Finance 34, 2861-2873

Jiang, J., Stanford, M., Xie, Y., 2012. Does it matter who pays for bond ratings? Historical evidence. Journal of Financial Economics 105, 607-621.

Johnson, R., 2004. Rating agency actions around the investment-grade boundary. The Journal of Fixed Income 13, 25-38.

Jorion, P., Liu, Z., Shi, C., 2005. Informational effects of regulation FD: evidence from rating agencies. Journal of Financial Economics 76, 309-330.

Kaminsky, G., Schmukler, S., 2002. Emerging markets instability: do sovereign ratings affect country risk and stock return. World Bank Economic Review 16, 171-195.

Kim, J., Wu, E., 2008. Sovereign credit ratings, capital flows and financial sector development in emerging markets. Emerging Markets Review 9, 17-39.

Kim, J., Wu, E., 2011. International bank flows to emerging markets: Influence of sovereign credit ratings and their regional spillover effects. Journal of Financial Research 34, 331-364.

Klaar, A., Riley, D., 2005. Fitch sovereign rating outlook and Watch study. Fitch Ratings, November.

Livingston, M., Naranjo, A., Zhou, L., 2008. Split bond ratings and rating migration. Journal of Banking and Finance 32, 1613-1624.

Mathis, J., McAndrews, J., Rochet, J-C., 2009. Rating the raters: Are reputation concerns powerful enough to discipline rating agencies? Journal of Monetary Economics 56, 657-674.

Mellios, C., Paget-Blanc, E., 2006. Which factors determine sovereign credit ratings? European Journal of Finance 12, 361-377.

Monfort, B., Mulder, C., 2000. Using credit ratings for capital requirements on lending to merging market economies: possible impact of a new Basel Accord. IMF Working Paper, No. 69, International Monetary Fund.

Moody's Investors Service, 2013. Rating symbols and definitions. February. www.moodys.com

Morgan, P., 2002, Rating banks: Risk and uncertainty in an opaque industry. American Economic Review 92, 874-888.

Mulder, C., Perrelli, R., 2001. Foreign currency credit ratings for emerging market economies. IMF Working Paper, No. 01/191, International Monetary Fund.

Nickell, P., Perraudin, W., Varotto, S., 2000. Stability of rating transitions. Journal of Banking and Finance 24, 203-227.

Norden, L., Weber, M., 2004. Informational efficiency of credit default swap and stock markets: the impact of credit rating announcements. Journal of Banking and Finance 28, 2813-2843.

Park, H., 2005. Categorical dependent variable models using SAS, STATA, LIMDEP, and SPSS. Working Paper, Indiana University, USA. www.indiana.edu/~statmath.

Poon, W., Lee, J., Gup, B., 2009. Do solicitations matter in bank credit ratings? Results from a study of 72 countries. Journal of Money, Credit and Banking 41, 285-314.

Richards, A., Deddouche D., 2003. Bank rating changes and bank stock returns: puzzling evidence from the emerging markets. Journal of Emerging Market Finance 2, 337-363.

Sgherri, S., Zoli, E., 2009. Euro area sovereign risk during the crisis. IMF Working Paper, No. 09/222.

Shen, C., Huang, Y., Hasan, I., 2012. Asymmetric benchmarking in bank credit rating. Journal of International Financial Markets, Institutions and Money 22, 171-193.

Skreta, V., Veldkamp, L., 2009. Ratings shopping and asset complexity: a theory of rating inflation. Journal of Monetary Economics 56, 678-695

Standard and Poor's, 2008. Sovereign credit ratings: a primer, May. www.standardandpoors.com

Standard and Poor's, 2011. General criteria: principles of credit ratings, February. www.standardandpoors.com

Standard and Poor's, 2012. Standard & Poor's ratings definitions, June. www.standardandpoors.com

Sy, A., 2004. Rating the rating agencies: anticipating currency crises or debt crises? Journal of Banking and Finance 28, 2845-2867.

Sy, A., 2009. The systematic regulation of credit rating agencies and rated markets. World Economics 10, 69-108.

Trevino, L., 1999. Modelling the information content of sovereign credit ratings. PhD Thesis, University of Southampton, UK.

Trevino, L., Thomas, S., 2001. Local versus foreign currency ratings: what determines sovereign transfer risk? The Journal of Fixed Income 11, 65-76.

U.S. Securities and Exchange Commission, 2012. Summary report of commission staff's examinations of each Nationally Recognized Statistical Rating Organization. Section 15E Examinations Summary Report, November.

Vazza, D., Leung, E., Alsati, M., Katz, M., 2005. CreditWatch and ratings outlooks: valuable predictors of ratings behaviour. Standard and Poor's, May.

Wendin, J., McNeil, A., 2006. Dependent credit migrations. Journal of Credit Risk 2, 87-114.