

**The Political Economy of Credit Rating Agencies.
The Case of Sovereign Ratings**

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The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others.

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To Aylan

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Abstract

This thesis investigates the social and economic importance of Credit Rating Agencies (CRAs), concentrating on the case of sovereign ratings. By viewing CRAs as an influential institution within the context of neoliberalism and financialization, the thesis offers some new insights regarding the way sovereign ratings are formed and the way they come to affect macroeconomic processes and outcomes. The experience of the European Monetary Union (Eurozone) serves as the case study. The recent and still ongoing European crisis and the flawed institutional structure of the Eurozone make this case study to be of special interest. The thesis consists of three broad parts. The first part sets the background of the thesis. As such it contains some analytical reflections on how to conceptualize CRAs. It also includes a chapter that discusses in detail the institutional arrangements of the Eurozone and the associated stylized facts. The second part consists of two econometric chapters. By employing a dataset based on the original twelve Eurozone countries and on the period from 1999 to 2012, the first chapter decomposes the determinants of sovereign ratings and seeks for evidence of systematically panicked reactions from CRAs. In turn, the second chapter utilizes a panel probit model and investigates the statistical and economic significance of sovereign ratings in explaining episodes of extreme capital flow movements. The third part establishes a two country stock flow consistent model and explores the linkages between sovereign rating movements, the financial market and the constraints for fiscal policy. By separating between a weak country and a strong country, the model shows how following a recessionary shock, the rating downgrade of the weak country can

affect the liquidity preference of investors. Such influence deepens the already ongoing recession by amplifying the financial constraints the weak government faces and by forcing it to implement fiscal austerity.

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Abbreviation List

BIS	Bank for International Settlements
CBOE	Chicago Board Options Exchange
CDO	Collateralized Debt Obligation
CRA	Credit Rating Agency
DSGE	Dynamic Stochastic General Equilibrium
EC	European Commission
ECB	European Central Bank
ECSC	European Coal and Steel Community
EMU	European Monetary Union
ESI	Economic Sentiment Indicator
EU	European Union
FDI	Foreign Direct Investment
FE	Fixed Effects
FESSUD	Financialization, Economy, Society and Sustainable Development
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
IFS	International Financial Statistics
ILO	International Labour Organization
IMF	International Monetary Fund
IV	Instrumental Variables
LLR	Lender of Last Resort
LM	Lagrange Multiplier
MBS	Mortgage-Backed Security
MFI	Monetary Financial Institution
NCB	National Central Bank
NRSRO	Nationally Recognized Statistical Rating Organization
OLS	Ordinary Least Squares
RE	Random Effects
REER	Real Effective Exchange Rate
SEC	Securities and Exchange Commission

SFC	Stock Flow Consistent
SGP	Stability and Growth Pact
SPV	Special Purpose Vehicle
UK	United Kingdom
US	United States
VAR	Vector Autoregression
VIF	Variance Inflation Factor
VIX	Volatility Index
WGI	Worldwide Governance Indicators

Preface

As with any other piece of written work, a PhD thesis is first of all a product of the author. As such it reflects his research interests, his skills and his capacities. As once put by Professor George Krimpas from the University of Athens, a PhD thesis is meant to show the world that the researcher behind it is capable of “dancing ballet”.¹

A thesis, however, echoes more than that. Across the various research questions, and the numerous literature and methodological discussions, one can also find reflections of the social, economic and political background of when the thesis was written. In that sense a PhD thesis is also a product of its time. As such it cannot but embrace the roots, motivations and agonies of the author- as these unfold in real time- as well as the debates and “hot” questions of its era.

In particular, living in times of great economic turbulence, and coming from Greece, a country that has suffered from the European malaise as no other in the continent, my thesis inevitably came to engage with the agenda of its day. The collapse of economic growth, the sky-rocketing of unemployment, the rise in income inequality, the shrinkage of space for public policy; these were all real issues seeking for real answers. It was such concerns that primarily acted as a navigator throughout my PhD journey.

Somewhere along that journey I came across some pieces on the topic of Credit Rating Agencies (CRAs). Left on the margin of the larger debate and analysis of how neoliberal capitalism works, it felt to me that there was

¹ The point was made in one of our seminar discussions in Athens, at the time when I was preparing my PhD proposal.

something more to be said. What are those organizations? How can they be in a position to determine the access to finance for entire governments and tell them what to do? Why should we accept their judgement as right? I took up the challenge, channeling my thoughts and energy in that direction. The result is now materialized into three years of work and a few hundreds of pages aligned behind this one.

All in all, living in Europe at the times of the crisis, one cannot but still be angry at the social realities of today. Realities that kill democracy in the name of “solidarity”, attack the welfare state in the name of “sound finances” and deplete peoples’ incomes in the name of “fostering full employment”. Realities that force disinvestment in the name of “investment”, and that push economies into depression in the name of “growth”. On what has to do with economics, one can think of those realities as reflecting nothing more but the voices of defunct economists, as Keynes would put it. While a PhD thesis is certainly not enough to change the world, it can nevertheless make a step towards disturbing such voices.

University of Leeds,

September 2015

Chapter 1- Introduction

While initially established as evaluators of corporate bonds, Credit Rating Agencies (CRAs) have now emerged as powerful institutions capable of controlling the terms of financing for entire countries. Acting as a voice of authority within the nexus of power of neoliberal capitalism, CRAs are in a position to determine not only the cost of financing for sovereigns, but also to prescribe the “right” set of policies. While the power of such institutions was at an earlier stage transmitted mainly toward developing countries, it can nowadays be felt by parts of the developed world too. In particular, the flawed institutional structure of the Eurozone, with no monetary institution acting as a Lender of Last Resort (LLR) for the governments of member states, has made the latter dependent upon the private market, and hence upon institutions such as the CRAs.

Against this background, my thesis aims to contribute by reflecting on a particular set of research questions: is the judgement of CRAs a technical or a political issue? How does this reflect on the actual ratings they have been prescribing to Eurozone member states? Are sovereign ratings able to influence movements of capital flows across Eurozone? What is their impact in triggering episodes of sudden stops of capital inflows in Europe? How does their influence transmit towards constraints for fiscal policy? What does this imply for economic policies and growth?

To provide answers to the above issues, my thesis employs a set of econometric techniques, while it also attempts to utilize a macroeconomic mathematical model. More precisely, the first two research projects employ

linear and probit panel data models, focusing on the original twelve countries of Eurozone² and the period from 1999 to 2012. In addition, the third project is based on an open economy stock-flow consistent framework.

The rest of the chapter sets the outline of the thesis. The following section goes into more detail in the discussion of how did CRAs emerge, and in what ways are they capable of influencing the decisions of market participants. This is followed by a quick outline of Eurozone dynamics, and some notes on the causes of the European crisis. The next section then illustrates in a nutshell how the current thesis contributes to existing knowledge, by outlining the key features of each of the associated research projects.

1.1 The Particular Importance of Credit Rating Agencies

The background idea of this thesis is developed in Chapter 2. In particular, I argue that CRAs are institutions that matter within the context of neoliberal capitalism and financialization. Although those agencies have been operating for approximately one hundred years, it was only in recent decades that they came to be important for market participants. As discussed more thoroughly in Chapter 2, the process of disintermediation, the globalization of capital flow movements, along with the fact that CRAs became 'hardwired' into financial regulation across the world, were all factors that underpinned the rise of the status of those agencies. As a result, rather than just providing an opinion as they claim, CRAs got in a position that enabled them to affect both borrowers

² These include: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain.

and lenders. By dictating the terms of access to finance and the subsequent cost of financing, CRAs came to play the role of the gatekeeper and impose their frame of thought to borrowers seeking a favourable rating (Sinclair, 1994; 2005). Furthermore their attachment with financial legislation enabled them to affect portfolio decisions of investors in a compulsory way. In addition their role as certifiers of the quality of credit allowed them to create a deceptive feeling of stability to market participants. By evaluating and providing scores for all different sorts of debt instruments, CRAs created a comfort that made investors neglect the uncertainties behind different debt categories (Carruthers, 2013). Such reliance on CRAs' products involved, either implicitly or explicitly, the adoption of the agencies' viewpoint in economic analysis.

Chapter 2 also discusses the particular importance of sovereign ratings, as compared with other rating categories. Most notably, sovereign ratings are closer to the traditional activities of CRAs' in terms of the opaqueness surrounding sovereign debt instruments, while they also relate with an environment which is relatively free of moral hazard considerations. These factors imply that sovereign ratings are to a great extent immune to the popular critique that followed the 2008 crash in the US, a critique that pointed out the high complexity of the rated instruments, as well as the conflicts of interest that arose between CRAs and the entities they rated. In that sense sovereign ratings allow us to move the discussion to a deeper level. Additionally, sovereign ratings provide a ceiling for all other categories of ratings within a country, and therefore link directly with the macroeconomic level. Furthermore by being nothing more but the evaluation of a government's capacity and willingness to repay its debt, sovereign ratings are the most direct expression of CRAs' power

upon the state. Such power translates into a constraint for fiscal policy and national sovereignty.

1.2 The Current Realities of Eurozone

Throughout the last five years Eurozone has been experiencing a major economic crisis. Such crisis has involved the collapse of GDP growth and the sky-rocketing of unemployment, especially across the countries of the Eurozone periphery (for a detailed illustration of stylized facts see Chapter 3). What is primarily important to note here is that times of economic turbulence are a crucial ingredient for a study such as the current one. Such periods provide the required scenery, with sharp rating fluctuations, and volatile economic movements, that as such can allow the researcher to draw some valuable inference about the true role and importance of CRAs.

Other than that, Chapter 3 provides a thorough discussion of the causes behind the European malaise, as seen from different standpoints. Outlined here in brief, mainstream accounts³ point out the dynamics of financial integration that came along with the introduction of the Euro. They also discuss the domestic weaknesses of deficit countries, such as the deterioration of their competitiveness throughout the last decade. On the other hand, heterodox scholars take the debate to a deeper level. Pointing out the underlying realities of falling labour income shares and rising income inequality, they show how

³ Across this thesis, the term ‘mainstream’ is used as a label for those authors who conduct their analysis within the broader neoclassical framework (including here the New Keynesian framework). Heterodox would then group everybody else. While the distinction is not comprehensive enough to classify certain streams of economic literature (e.g. Austrian economists), it is mainly employed for the practical purpose of organizing and separating the literatures discussed throughout the current thesis.

certain European countries came to follow a debt-led growth, while others shifted to an export-led regime. As they stress, both growth patterns were the two sides of the same coin, and as such came to support each other. Furthermore, in examining the drawbacks of the institutional arrangements of the European Monetary Union (EMU), heterodox researchers stress the fact that with the establishment of the European Central Bank (ECB), unemployment was abandoned as a policy objective. They also point out the lack of coordination between monetary and fiscal policy at the European level.

Most importantly heterodox scholars argue that for EMU states the adoption of the Euro came to be similar to the adoption of a foreign currency, so that in essence EMU states were downgraded to the status of developing countries (see for instance De Grauwe, 2011a). With powerless national central banks, and no European institution willing to back them up by acting as a LLR, those economies came to be tremendously exposed to the sentiments of the financial market, and thus to institutions such as the CRAs.

1.3 What is there to Learn out of this Thesis?

The contribution of this thesis is empirical and analytical in nature, and separates into three chapters (Chapters 4, 5 and 7). The first two of these chapters employ linear and non-linear panel data econometrics, while the third one sets-up a stock flow consistent macroeconomic model and runs a set of numerical simulations.

To start with, Chapter 4 investigates econometrically the hypothesis that there exists a non-quantitative part behind CRAs' analyses, related with

panicked reactions on their behalf. The background idea draws on Keynesian theory. In particular, given that Keynesian uncertainty creates the impossibility of accurate economic forecasting, due to the non-repetitive and non-uniform nature of economic events, and the subsequent inexistence of the required set of knowledge for conducting such forecasting, there is no reason why to think of CRAs as an exception. Contrary to what they claim for themselves, and despite their possible access to relatively large amounts of data, CRAs are not capable of fully grasping and quantifying the uncertainties behind unfolding events. Even more, if the argument is right, it also implies that there is no reason why not to think of CRAs as being potentially liable to feelings of euphoria and panic.

Chapter 4 provides some important affirmative evidence for my hypothesis. Focusing on the post-crisis period and on the European periphery⁴, I show how the actual sovereign rating downgrades of all three main rating agencies (Standard and Poor's, Moody's and Fitch) are found to be systematically exaggerated, as compared with the macroeconomic variables that are supposed to matter for CRAs. My methodology involves fixed and random effects panel data econometrics, while for my purposes I utilize a number of benchmark models.

Following this, Chapter 5 employs a panel probit model and investigates the significance of sovereign ratings in triggering episodes of extreme capital flow movements. In conjunction with Chapter 4, my emphasis is in exploring that part of sovereign rating movements that reflects exaggerated reactions by CRAs. Results are affirmative for episodes of sudden stops of capital inflows,

⁴ Throughout the current thesis, the term 'European periphery' refers to Greece, Italy, Ireland, Spain and Portugal.

and hold for all the three CRAs. Moreover, they hold both for net and gross flows, while in contrasting total with non-FDI flows they appear to be stronger in the case of the latter. In addition, they appear to be robust to a number of model specifications and tests. Most notably, given the unavoidable arbitrariness that to an extent governs any definition of a binary variable, I set-up two alternative specifications for the sudden stop variable, and repeat all relevant regressions.

Furthermore, Chapter 7 establishes a two country open economy stock flow consistent model and provides the first attempt in literature to illustrate analytically the macroeconomic effects of sovereign ratings. By building a framework that approximates the north and south dichotomy of the Eurozone, the model connects the movements of ratings with the dynamics of the financial market and the constraints for fiscal policy. More specifically, the model encompasses an endogenous sovereign rating mechanism that links sovereign rating movements of the southern economy with the development of the country's debt to GDP ratio and its accumulated GDP growth. The southern economy also includes an endogenous fiscal policy, with its overall public expenditure being a function of its tax revenues and the amount of new debt it can issue. Most importantly, my model shows how following a recessionary shock, a severe sovereign rating downgrade of the south can come to influence the liquidity preference of investors. Such influence makes investors from both countries shift their wealth away from southern bills, and towards cash. This move impedes the access of the government to financial resources and forces it to implement fiscal austerity, eventually deepening the ongoing recessionary spiral. Interestingly, the recession is not only deepened as a result of the

downgrade but also comes to affect negatively both countries of the model. Besides the baseline scenario, a number of alternative closures are also considered: under the first one, households shift their wealth towards northern bills (instead of cash) when the southern bills get downgraded. Moreover, following the insights of Chapter 4, another scenario allows CRAs to get exaggeratedly 'nervous' once the southern downgrade occurs. Additionally, the chapter includes a sensitivity analysis of all key parameters of the model, while it also considers an extension of the model with fluctuating prices.

Chapter 2- Theoretical Background

2.1 Introduction

Credit Rating Agencies (CRAs) have emerged as powerful institutions in the context of neoliberal capitalism. With deregulated financial markets and globalised capital flow movements, and following their attachment with financial regulation, those institutions have risen as an important voice of authority, affecting the decision making of both borrowers and lenders. While on one hand they have been performing the role of the gatekeeper for those seeking access to the financial market, they have also managed to create a false feeling of stability and security to investors.

Although there is a plethora of CRAs across the globe (IMF, 2010 reports more than 70 credit rating entities), there are three major 'players' that dominate the market, namely Fitch Ratings (Fitch), Moody's Investors Service (Moody's), and Standard & Poor's (S&P). It is the implications of these three agencies that will be studied throughout this thesis.

All the three major agencies are private entities mainly belonging to US based corporations. In particular S&P is part of McGraw Hill Financial, Moody's belongs to Moody's Corporation while Fitch belongs to Fitch Group, a jointly owned subsidiary of Paris- based Fimalac, S.A. and New York- based Hearst Corporation⁵. Other than financial services, the above corporations are connected with the media industry (Hearst Corporation) as well as with education and book publication services (McGraw Hill).

⁵ All information has been drawn from the agencies' websites.

The three CRAs were initially established as evaluators of corporate debt (for a historical outline see White, 2013). Indicatively, White (2013) writes that Moody's started in 1909 by publishing a manual with ratings of US railroad bonds. Similarly S&P and Fitch entered the corporate bond rating business shortly after. In the post-war era their activities also came to encompass sovereign debt, with most of the countries obtaining a sovereign rating for the first time throughout the 1980s and the 1990s (for detailed evidence see the discussion below).

The rest of this chapter goes deeper into the analysis of CRAs: it first outlines some of the most important technicalities related with sovereign ratings, while it then illustrates the mainstream perception on the emergence of CRAs. Following it discusses the issues of conflict of interest and moral hazard as well as the corresponding critiques that CRAs faced after the outbreak of the 2007 financial crisis. It then presents a more complete account of how to view those agencies by means of history and power. Lastly it discusses the particular importance of sovereign ratings and presents some supporting empirical evidence.

Table 2.1. Sovereign Credit Rating Categories

	credit quality		S&P		Moody's		Fitch	
			long term	short term	long term	short term	long term	short term
Investment Grade	highest		AAA		Aaa		AAA	
	very high		AA+	A-1+	Aa1	P1	AA+	F1+
			AA		Aa2		AA	
			AA-		Aa3		AA-	
	high		A+	A-1	A1		A+	F1 or F1+
			A		A2		A	F1
			A-	A-2	A3	P1 or P2	A-	F2 or F1
	good		BBB+		Baa1	P2	BBB+	F2
			BBB	A-3	Baa2	P2 or P3	BBB	F3 or F2
			BBB-		Baa3	P3	BBB-	F3
Speculative Grade	speculative		BB+		Ba1		BB+	
			BB	B	Ba2		BB	B
			BB-		Ba3		BB-	
	highly speculative		B+		B1	Not Prime	B+	
			B		B2		B	
			B-		B3		B-	
	substantial credit risk		CCC+		Caa1		CCC+	
			CCC	C	Caa2		CCC	C
			CCC-		Caa3		CCC-	
	very high level of credit risk		CC		Ca		CC	
exceptionally high levels of credit risk		C		C		C		
under regulatory supervision		R						
Selective/ Restricted Default		SD				RD	RD	
Default		D				D	D	

Source: author's elaboration, based on S&P, Moody's and Fitch websites

2.1 Methodology behind Sovereign Ratings

CRAs claim that their aim is to provide investors and the public with an independent opinion about the quality of credit of individual sovereigns (S&P, 2012). Attaching alphabetical scores to sovereigns (see Table 2.1) and claiming to be forward looking, CRAs attempt to assert a sovereign's capacity and willingness to pay in full and on time its existing and future debt obligations (see for instance Fitch, 2014). Quoting Bhatia (2002), all three agencies define default as:

- Failure to pay a material sum of interest or principal on a debt instrument on its due date or within applicable principal or interest grace periods, as stipulated in the governing debt structure; or
- Rescheduling, exchange, or other restructuring of a debt instrument conducted in a manner deemed to be coercive, involuntary, and distressed, as determined on a case-by-case basis by each agency.

In order to assess the creditworthiness of a sovereign issuer, CRAs estimate either the probability of default, or the expected loss in the case of such event (Fitch and S&P follow the former methodology, while Moody's follows the latter; see S&P, 2002; Moody's, 2008; Fitch, 2014). For such purposes, CRAs employ a wide range of variables, including economic, political and institutional ones (for a summary see IMF, 2010). For instance, S&P (S&P, 2011) attaches a score to five different groups of variables. These include: i) a political score, reflecting institutional effectiveness and political risk; ii) an economic score, which expresses the economic structure and growth prospects of the economy; iii) an external score, reflecting external liquidity and the

international investment position; iv) a fiscal score, standing for fiscal performance and flexibility; and v) a monetary score. Furthermore, all three agencies emphasize the fact that their analysis is based upon both qualitative and quantitative considerations.

CRAs provide separate ratings for both the short and the long run. In addition, all of them provide ratings for sovereign debt denominated both in local and foreign currency⁶. Moreover, they separate between issuer ratings (also known as sovereign ratings) and debt ratings, with the first evaluating the general credit quality of a sovereign and the second providing specific ratings for particular debt instruments (Bhatia, 2002). Fitch also provides an extra category of ratings, named as ‘country ceilings’. These aim to capture the ‘transfer & convertibility’ risk, as related with the imposition of exchange controls upon the private sector (for more see Fitch, 2014). Similar ratings are provided by S&P as well. Apart from the above, the three agencies provide forward looking estimations of what rating changes to expect in the future, with the “review/ watch” notification reflecting possible developments within the next 90 days, and the “outlook” announcement providing a similar idea for a two years horizon (IMF, 2010).

2.2 The Mainstream View

According to the mainstream perception, there are two kinds of benefits arising from the activities of CRAs. The first has to do with the reduction of the

⁶ However, Moody’s has recently asserted that the importance of distinguishing between local and foreign currency ratings has now faded away due to the process of financial integration (see Moody’s, 2012). Similarly S&P (2013: 5) points out that local and foreign currency ratings are practically the same for members of a monetary union.

risk arising out of the information asymmetries between lenders and borrowers, while the second is related to the 'certification' role that CRAs play in the market.

To begin with the logic of the first argument, relevant authors (Boot *et al.*, 2006; IMF, 2010; Deb *et al.*, 2011; Canuto *et al.*, 2012) state that without CRAs there would be an adverse selection problem in capital markets (for some cornerstone papers on adverse selection see Stiglitz and Weiss, 1981 and Greenwald *et al.*, 1984). This would be the case because a borrower would generally be in a position to know more about the project (s)he would like to fund, as compared with the potential lender. Under such circumstances, and in view of the high cost of individually collecting information about the borrower, the lender would either not participate in the market at all, or require a relatively high risk premium to compensate for the information asymmetry. Moreover, those who would be willing to pay high interest rates might do so because they might perceive the probability of paying back the loan to be quite low. This means that the prevalence of high interest rates in the market might result in the overall worsening of the quality of borrowers (hence the term adverse selection).

However, the picture can be quite different if all investors together pay somebody else to collect the necessary information for them. This is where the CRAs step in, being taken as a 'trusted and independent third party' (Deb *et al.*, 2011: 5). More specifically, by making use of economies of scale CRAs are in a position to collect information and monitor borrowers at a much lower cost than the individual investor. As a result, it becomes easier for borrowers to issue debt- since investors will now require lower risk premia- while the

liquidity of the market increases thanks to the augmented number of lenders that is now willing to participate in funding activities (IMF, 2010)⁷.

According to the second argument, CRAs play the role of certification of debt instruments. This is of course enforced by ratings' hardwiring into the regulatory system (also see the discussion below). In particular, by establishing different grades of ratings, such as the investment and speculative grades, CRAs set the standards for the liquidity requirements of financial institutions, the conditions for eligibility to access the capital market, the portfolio composition of hedge funds and so on (see Deb *et al.*, 2011; Ryan, 2012). In that sense, certification is thought to facilitate transactions by setting some clear standards and by promoting transparency. Furthermore, as discussed by Deb *et al.*, certification helps to solve a moral hazard between individual investors and the agents they appoint to manage their portfolios, since the former can now keep track of the latter's investment actions based on some clear parameters.

2.3 Conflicts of Interest and Moral Hazard

Criticisms of CRAs are far from new. Rather, CRAs were one of the first players to be blamed for the financial crisis of 2007/8. For instance Crotty (2009) points out that the way ratings were attributed to Mortgage-Backed Securities (MBS) and Collateralised Debt Obligations (CDOs)- with CRAs receiving an income fee from the issuers of such securities- gave rise to conflicts of interest. Since CRAs' income was streaming from the issuers, the agencies

⁷ Interestingly, it can be seen that such a line of thought is identical with the way mainstream scholars view the usefulness of a bank in the case of banking credit (see for instance Diamond, 1984; 1996).

had an incentive to be 'nice' to them by attributing inflated ratings to their securities (for a similar account see for instance Lannoo, 2015).

As observed by White (2010), the 'issuer pays' scheme arose in the States during the early 1970s, replacing the previous 'investor pays' model. White lists a number of possible explanations as to why such a shift occurred. One scenario is that in view of the uprising widespread use of the photocopy machine, CRAs were afraid of a free riding behaviour on the part of the investors who would now be in a position to photocopy the rating manuals from their friends. Another view is that CRAs might have realized that due to their incorporation into financial legislation, ratings were something like a 'blessing' for bond issuers. This would imply that issuers would be happy to pay something in order to ensure the acceptability of their papers.

Whatever the cause of the switch of the CRAs' payment scheme it is by now well established that credit ratings played a key role in fuelling of subprime mortgage lending (see for instance Crotty, 2009; White, 2010). It was their triple-A status, standing as guarantees of their quality, that made those toxic securities marketable. Nonetheless, as noticed by White (2010), in comparison with the traditional bond rating activities of CRAs, there were now three main differences. First, the agencies themselves got actively involved into the design of the securities they rated by prescribing to the issuers what kind of mortgages and what size of tranches would earn favourable ratings. Secondly, the oligopolistic structure of the mortgage-related securities market gave the issuers the power to threaten the agency they were doing business with that they could easily move to one of its competitors. Third, CRAs had no prior experience with the products they were asked to evaluate (on this also see

Arestis, 2009). As a result CRAs failed to fully appreciate the correlations between the performances of the underlying assets in products such as MBSs.

Interestingly, there is now some analytical support for the notion that moral hazard arises under the 'issuer pays' scheme. By building a mathematical model Bolton *et al.* (2012) show that competition in the ratings market can prove to be counterproductive since it can facilitate 'rating-shopping' for securities issuers. In addition these authors point out that important issuers- either in terms of repetition or size of issues - tend to get inflated ratings. The second point has also been supported econometrically. Indicatively, Hau *et al.* (2013) show that bank characteristics exhibit a significant influence over the ratings received by banks. In particular, Han and his colleagues show that there is a positive correlation between the size of banks and the ratings they earn. Secondly they show a positive link between the volumes of business related with asset-backed securities that banks give to CRAs and the ratings those banks obtain. Eving and Hau (2013) extend such results for the ratings of the issued securities themselves. As with the previous paper they point out the existence of more favourable ratings for the products of the big issuers. They also show that such effects became more severe right before the financial crisis of 2007/8.

All things considered, the aforementioned critical voices against the CRAs are on the right side. The accumulated evidence suggests that conflicts of interest were definitely a reality, and that the operations of CRAs in evaluating toxic securities had a clear impact on the financial crash of 2007/8. However this narrative is to a certain extent incomplete. The main logical implication of the discussion- as conducted so far- is that ratings ought to be earned in 'fair'

terms, rather than being bought. Then one can go on arguing on how the regulatory framework needs to be reformed in order to achieve such an aim (see for instance the discussion in Chapter 8). As developed so far however the narrative does not touch any of the deeper questions: Why do CRAs carry such an important weight as institutions? Under what circumstances did CRAs come to be taken so seriously by market participants, and what were the processes underlying such a development? Was it a technical or a socio-political process? Do CRAs reflect a neutral standpoint of economic knowledge, or do they act as the enforcer of a particular set of ideas? Are sovereign ratings just another category of rating products, or are there any further implications to consider?

The rest of this chapter attempts to provide some reflections on the above questions. This is done by allowing the concepts of history and power to enter the picture.

2.4 An Alternative Perception of CRAs

As illustrated earlier, the mainstream view of CRAs as agents that can deal with information asymmetry issues has some merit if the question looking for an answer is what gives birth to those institutions. However, grasping the full picture of CRAs requires an understanding of their development within a specific historical context.

For purposes of this thesis, the historical context of interest is the neoliberal era. As discussed amongst others by Harvey (2010), the starting point of neoliberalism is conventionally identified at the late 1970s and early

1980s with the election of Ronald Reagan and Margaret Thatcher in the US and the UK respectively, and the prevalence of 'free market' policies as the guide for macroeconomic management. As pointed out by Harvey, some of the key features of neoliberalism included the direct confrontation with organized labour and the rolling back of the welfare state, the globalization of capitalist production and financial markets, the rise of privatisations of public assets, and the deindustrialisation of traditional production centres. Moreover as noted in Fine (2012) and Bayliss *et al.* (2015), contrary to the popular free market rhetoric, state intervention was not reduced but rather transformed throughout the neoliberal era. In that regard, the promotion of neoliberalism was greatly facilitated by the interference of the state in the economy. Furthermore as argued by those authors, while neoliberalism has involved a common core of policies and features across countries, such as the trend for privatisations, its actual application has not been a homogenous and perfectly synchronized process, but has rather taken a wide variety of forms across time and space.

As asserted by a number of authors (indicatively see FESSUD, 2011; Fine, 2012; Bayliss *et al.*, 2015) most dominant feature of the neoliberal era has been the process of financialization, a process broadly associated with the 'increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of the domestic and international economies' (Epstein, 2005: 3). As put forward by FESSUD (2011) and Fine (2012), besides the large-scale growth of financial markets, some of the most essential dimensions of financialization have included the deregulation of the financial sector (also see Blecker, 2005 and Harvey, 2010), the expansion of consumer credit (for further discussion see Cynamon and Fazzari, 2008), and the birth of

new and opaque financial products (see Varoufakis, 2011). Financialization has also affected the priorities of non-financial corporations, by shifting their focus towards a short-term profit horizon, and by pushing them to derive a bigger part of their profits from financial rather than productive activities (such developments relate with what has come to be known as shareholder-value orientation; for some key articles, see Lazonick and O'Sullivan, 2000; Stockhammer, 2004; Orhangazi, 2008). Furthermore, financial globalization has contributed towards the escalation of income inequality and the stagnation of the wage share of income across countries (for further discussion, see for instance ILO, 2008).

FESSUD (2011) argues that although the experience of financialization was more evident in the Anglo-Saxon world, it nevertheless came to affect other parts of the world as well (for the case of Europe, see the discussion in the following chapter). While the associated processes and transformations took place in a heterogeneous way across time and across the different geographical regions, Fine (2012) and Bayliss *et al.* (2015) point out the slowdown in economic growth as the most common outcome across advanced economies.

It may come as no surprise that the importance of CRAs was augmented in the environment of neoliberal capitalism. First, throughout the past few decades the rise of financial markets and the emergence of new financial products reduced the relative importance of traditional forms of credit creation through banks. Often labelled as disintermediation, such transition took place on both sides of the balance sheet (see Sinclair, 2005 and Dymski, 2006). On one hand it involved borrowers shifting from traditional loans to instruments such as bonds, while on the other it involved depositors moving away from the

traditional low-return deposits and towards more attractive destinations such as money- market mutual funds. In that way however disintermediation created a gap on who was to evaluate and monitor potential and existing borrowers. While in traditional banking the bank would establish a one to one relationship with each of its debtors, and would therefore operate itself a department that would complete such tasks, the same could not be done in financial markets. Given the high degree of portfolio diversification in instruments such as mutual funds, and the short-term horizon of this kind of investments, the credit evaluation and monitoring costs would be prohibitive both for individual investors and fund managers. In that way the ground became fertile for CRAs to appear as 'neutral' and 'independent' evaluators of debtors' profiles (also see Sinclair, 2005).

Nonetheless, it would be fair to argue that the connection between CRAs and financial markets is not a deterministic one, as implicitly assumed by the mainstream perspective outlined earlier. As pointed out by Sinclair (2005) financial markets have survived and flourished in the past without attributing much importance to those institutions. In that regard, Sinclair suggests that the increase in the volume of cross-country capital flow movements that took place since the 1980s can be seen as another factor behind the rise of CRAs' importance. At the same time, the collapse of the Bretton-Woods system and the move towards a regime of floating exchange rates, re-exposed countries and firms to exchange rate volatility and further amplified the uncertainties surrounding cross-border capital movements (Dymski, 2010). Furthermore, the opening of new countries to foreign capital as a means for attracting funding for development and infrastructure projects, created for investors the need for

further information with regards to the creditworthiness of previously unknown borrowers. Such information was provided by CRAs (Sinclair, 2005).

On top of the above, CRAs became hardwired into financial regulation, therefore affecting in a compulsory manner the behavior of individual and institutional investors. Even though the process of connecting investment decisions with CRAs had started long ago, with the US regulators originally forcing banks to hold investment graded bonds during the 1930s, it was only after the mid-1970s that the three agencies were recognized as official indicators of creditworthiness in that country (see Sinclair, 2005; White, 2010). As outlined in White (2010), in 1975 the Securities and Exchange Commission (SEC) announced the 'nationally recognized statistical rating organization' (NRSRO) which grouped together S&P, Moody's and Fitch. By that time, not only banks, but also insurance companies and broker-dealer institutions, such as securities firms, were required to use the ratings of the three CRAs as the benchmark for setting their minimum capital requirements. Moreover, as of the early 1990s the regulatory scope of the SEC expanded by making the use of NRSRO ratings compulsory for money market mutual funds as well.

At the level of international regulation, the Bank for International Settlements (BIS) and the European Union (EU) have been incorporating ratings as determinants of the capital adequacy requirements for banks and other financial institutions since the establishment of Basel II in 2004 (for more details on European regulation see Lannoo, 2010 as well as the discussion in Chapter 8).

All in all, the exposure of entire countries to the global financial markets also meant an exposure to those institutions that were now in a position to

influence the movements of capital flows, i.e. to the CRAs. As a result there was an exponential increase in the amount of countries that started applying for sovereign ratings. As shown in Figure 2.1 for the case of Moody's, the total number of countries that obtained a sovereign rating for the first time over-doubled throughout the 1980s, and reached record-highs during the decade of the 1990s.

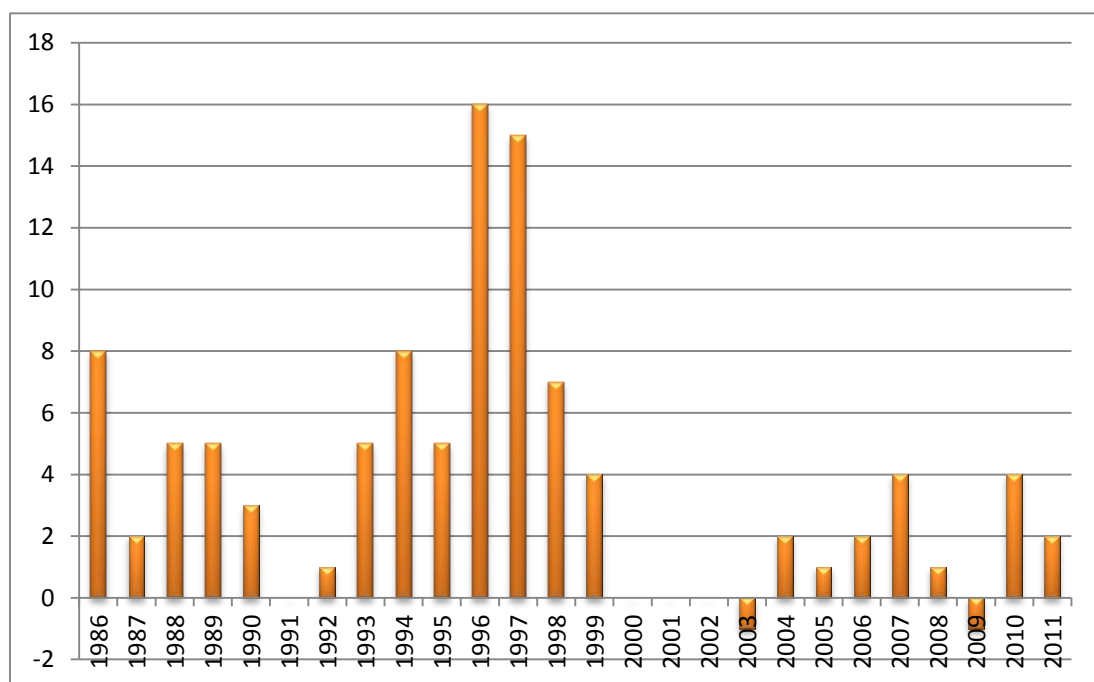


Figure 2.1. Number of Countries to obtain a sovereign rating from Moody's for the first time.

notes: 1) between 1949 and 1985, 13 countries in total had started obtaining a rating; 2) Iran, Micronesia, Moldova and Turkmenistan withdrew from their ratings in 2001, 2003, 2009 and 2010 respectively.

Source: author's elaboration based on Moody's (2012)

Furthermore, the performance of CRAs in providing accurate and well-timed information to investors was not as promising as the agencies were claiming for themselves. As the richness of the crisis episodes around the world throughout the 1980s and 1990s testifies, CRAs did not manage to prevent bubbles from building up and financial crises from taking place (for a detailed

account of crisis episodes of that era see Leijonhufvud, 2007 and Dymski, 2006; 2010). In those grounds CRAs came to be widely criticized, especially in the aftermath of the East Asian crisis in the late 1990s (see for instance Ferri *et al.*, 1999). Nonetheless those voices of critique did not manage to reduce the reliance on CRAs throughout the decade that followed.

2.4.1 A New Source of Authority

As a result of the above developments, CRAs have been placed in an authoritative position, affecting both borrowers and lenders. While as pointed out by Sinclair (2005) such authority may have been ‘camouflaged’, as compared with other seemingly more imperative institutions such as the IMF and the World Bank, due to the agencies’ existence as private entities, the unfolding of the processes of neoliberalism and financialization has given significant power to those agencies. Needless to say, the recognition of such power does not aim to suggest CRAs as the new “commanders of the universe”, but rather to highlight their active participation to the otherwise complex and evolving nexus of authority.

In order to understand CRAs’ power, it is important to conceptualize authority not only as a set of legally binding actions of governments, but also as a social process that involves intentionality and voluntary compliance (Sinclair, 1994; 2005). In that regard, Sinclair points out that a nongovernmental entity can acquire an authoritative status, pushing towards a situation of ‘governance without a government’, or even more towards a ‘government without a

governance' (1994: 136). Such a view suggests that CRAs' importance goes beyond their usage as a point of reference in financial legislation.

More specifically, it can be said that CRAs have been performing the role of the gatekeeper by exercising power over rated entities, based on the latter's need to access the financial market. As a consequence rated entities have not only found themselves in the need to comply with the agencies' views, but have also re-shaped the way they think and act (also see Kundu, 2001 and Cooley, 2003). Based on the notion of structural power, this means that those in need of a favourable rating come to adopt the conceptual framework of CRAs and thus limit their range of choices in what would be considered to be acceptable (Sinclair, 1994).

The above implies that CRAs do not only care about 'getting the numbers right', but also get involved in evaluating the overall effectiveness of management- with the term effectiveness linking here with financial prudence. From the side of borrowers it means that '[m]akers of public policy, like corporate executives that want access to cheap finance, must acknowledge the structural power of disintermediated finance and incorporate debt security markets into their policy agendas and market plans at the earliest stages, and not as an afterthought' (Sinclair, 1994: 142).

It would of course be fair to argue that before coming to seek for a favourable rating, potential borrowers were in the need of going through a similar process with the individual banks where they would apply for credit. Notice however that by the time the process of creditworthiness assessment shifts from banks to CRAs, a significant centralization of power comes to take place. While in the first stage the evaluation of creditworthiness is something

that solely concerns one bank out of many on the one hand and the credit applicant on the other (assuming away the extreme cases of borrowers' blacklisting), in the latter it comes to be conducted by a few institutions whose voice matters for a broader range of market participants. Although in the prior case a rejection from a bank would not necessarily prevent a potential borrower from applying for credit elsewhere, in the case of CRAs, a bad rating can come to be seen as a sort of stigma and therefore place a more severe obstacle in accessing the financial market.

On what has to do with lenders, other than the compulsory actions they would often have to take as a result of ratings' attachment to financial regulation, their decision-making came to be affected by CRAs in one more way. This relates with the concept of Keynesian uncertainty and its associated implications. In particular, as Keynesian uncertainty exists as something fundamentally different from calculable risk (see Keynes, 1936; 1937; also see the discussion in Chapter 4 of the current), it also creates the ground for the emergence of what Keynes labels as social conventions. '[E]stablished as the outcome of the mass psychology of a large number of ignorant individuals' (Keynes, 1936: 154), social conventions are primarily constructed in order to satisfy peoples' need for stability (also see Setterfield, 2003). Being artificial and fragile in nature, those conventions are structured over the assumption that the normality of the past can be used to predict the future (Keynes, 1937).

Based on such remarks, it can be argued that throughout the last few decades CRAs actively contributed to the maintenance of a deceptive feeling of safety and stability in the market. In view of investors' ignorance of what the future will bring, CRAs and their role as certifiers of the quality of credit

managed to fill this gap. As a result, CRAs managed to make uncertainty look as if it could be converted to calculable risk, so that investors could choose the debt instruments to fund based on their 'ratings preferences' (also see Carruthers, 2013). As Carruthers writes, those agencies essentially managed to create the impression of homogeneity across all different debt instruments they rated, making a triple-A CDO to seem like a triple-A corporate bond. In that regard CRAs masked the underlying uncertainty. Nonetheless, it was precisely this uncertainty that became apparent in the 2007/08 crash- an uncertainty that 'lurked beneath the surface and undermined the equivalences rating agencies were trying to construct' (Carruthers, 2013: 542).

All in all, the rise of the influence of CRAs was neither a technical nor a neutral development. By taking them into account borrowers and lenders also had to adopt the agencies' understanding of the workings of the economy, in either an implicit or an explicit way. Such an understanding was to a great extent underpinned by ideas related with neoliberalism, such as the ideas of balanced budgets, inflation targeting etc.⁸ In that regard, CRAs acted as an additional enforcer of neoliberalism, especially towards rated sovereigns (also see Sinclair, 2005 as well as the discussion below).

One way of showing the attachment of CRAs to the set of neoliberal ideas is by observing and recording their reactions to events throughout real time. Probably the most straightforward way of doing that could be by observing how CRAs respond to governments that openly oppose neoliberal policies. Here one of the most recent and indicative examples could be to see the reaction of CRAs

⁸ While as pointed out by Bayliss *et al.* (2015) neoliberalism relates with a wide spectrum of ideas which are not always consistent with each other, it would be fair to argue that some of those ideas as for instance the ones outlined in the current text were at the core of the neoliberal ideology.

in the follow-up of the election of the anti-austerity SYRIZA government in Greece in January 2015⁹. In particular, shortly after its election, SYRIZA initiated a negotiation process with its European and international creditors aiming to terminate austerity and privatizations. The government's ambition was to re-establish some basic welfare provisions, such as free access to public hospitals, and put back in place some labour legislation aiming to support the employees and the unions (e.g. re-establishment of the minimum wage)¹⁰. In view of such developments the reaction of all three CRAs was unanimous in downgrading the already low rating score of the country. S&P downgraded Greece three times within five months (with the actual rating falling from B- to CCC-), while Moody's and Fitch conducted two consecutive downgrades each throughout the same period (Moody's rating score fall from Caa1 to Caa3; Fitch's rating dropped from B to CC)¹¹. By the summer of 2015 all three CRAs had placed Greece's rating score at the bottom of the speculative grade range, right above the default zone.

Another way to show CRAs' attachment to the neoliberal frame of thought is by looking at the variables those agencies use in order to derive their ratings. For instance it can be easily shown that when designing sovereign ratings, the attitude of CRAs on several macroeconomic variables converges to that of mainstream economics. Indicatively, inflation is constantly associated with structural problems in government's finances, without any serious

⁹ SYRIZA is an acronym standing for the words 'Coalition of the Radical Left' in Greek.

¹⁰ For an indicative article on SYRIZA's agenda, see 'Hope begins today: the inside story to SYRIZA's rise in power', by Paul Mason, *The Guardian* online, accessed at <http://www.theguardian.com/world/2015/jan/28/greek-people-wrote-history-how-syriza-rose-to-power> on the 15th of September 2015

¹¹ All information can be found in CRAs' websites; for a quick overview see here <http://countryeconomy.com/ratings/greece>

consideration of the distributional benefits that might arise (for a relevant discussion, see S&P, 2011; Fitch, 2014; Moody's, 2013; also see the evidence provided in Chapter 4). Furthermore, there is a quite hostile view against budget deficits, which rather than being taken as a potential tool for stabilizing and stimulating the economy- as suggested for example by the functional finance literature (see Lerner, 1943; Arestis *et al.* 2001; Arestis and Sawyer, 2013)- are constantly viewed as a reflection of government's inability to tax its citizenry. In that way however CRAs might be missing out the fact that the tolerance of a budget deficit in the short-run might be making public debt more sustainable in the medium to long-run due to the growth prospects it might be creating. In a similar vein, Chapter 4 offers some new evidence showing how CRAs' appreciation of public debt converges to the widely criticized perception of Reinhart and Rogoff (2010) who identify it as a harmful determinant for economic growth, once its ratio over GDP exceeds the 90% threshold.

2.5 The Particular Importance of Sovereign Ratings

There are four distinct features of sovereign ratings. First, sovereign ratings are closer to CRAs' traditional activities, for instance in terms of opaqueness of the debt instruments that are rated. Secondly, and related with the first, sovereign ratings provide us with a good opportunity to analyse an environment where the conflicts of interest discussed earlier do not exist (not on the same scale at least), therefore making it easier to draw conclusions about the way ratings can affect the macroeconomy even under the 'good case scenario' of no false incentives. For instance with reference to the Eurozone

debt crisis, White (2013) states that the criticisms against CRAs have been distinctly different from the attacks the agencies faced in the aftermath of the 2007/08 crash, so that rather than being criticized for being too generous CRAs came to be criticized for acting too precipitously. Third, sovereign ratings provide a ceiling for the ratings of most of the entities existing in the country concerned (Lannoo, 2015). This implies some strong correlation and causality from sovereign to all other ratings. Fourth, as pointed out by Sinclair (1994), the lack of effective regulation at the international level implies that the agencies have to attribute a higher emphasis on sovereigns' willingness to repay, rather than focusing exclusively on their capacity to do so (as a matter of fact there is a whole stream of literature focusing on the incentives of sovereigns not to repay their debt to international lenders; see for instance Eaton and Gersovitz, 1981; Eaton *et al.*, 1986; Bulow and Rogoff, 1989).

As shown earlier the rise of CRAs' importance has affected the mindset of market participants, with the agencies acting as an additional enforcer of neoliberalism. At the level of public governance such development has come to threaten the degree of states' independence, by narrowing down the range of public choices and hence limiting the idea of democracy itself. Sinclair (2005) lists a number of relevant examples. At the level of local government, he discusses the cases of Philadelphia, Detroit and the Australian states, all of which faced situations of financial distress during the early 1990s. He points out that cuts in public spending and the encouragement of privatizations were common ground in all three cases. In a similar fashion, considering the cases of Australia, Canada and Japan, Sinclair argues that in all three cases CRAs came to blame budget deficits as the primary cause of low growth rates and

unemployment. To add a more recent example, Brazil was downgraded to junk (speculative) status by S&P in September 2015 (its rating dropped to BB+ from BBB-)¹². As in the above cases, S&P accompanied the downgrade with a report (S&P, 2015) that was essentially encouraging the Brazilian government to move towards further budget cuts.

The discussion here is not meant to imply that governments and international institutions such as the ones that comprise the ‘Troika’ nowadays (IMF-ECB-EC) were relieved from any political responsibility. Quite the opposite: as mentioned by Sinclair (2005), governments often found downgrades to be a quite convenient political cover for applying austerity and privatization policies that they would not be able to promote otherwise. Furthermore one could argue that the consolidation of CRAs’ power was actually accelerated by those political forces that ideologically subscribe to neoliberal ideas and the perception that capital markets provide a more efficient means of public financing as compared with the national central bank (for instance Toporowski, 2010 mentions that such perception prevailed in the construction of the ECB).

2.5.1 Empirical Evidence

On what has to do with the actual pressure of sovereign ratings towards the state, this can mainly be felt at two levels, namely at the level of sovereign

¹² For a relevant report see ‘Brazil downgraded to junk rating by S&P, deepening woes’, by Walter Brandimarte, *Reuters* online, accessed at <http://www.reuters.com/article/2015/09/10/us-brazil-ratings-s-p-idUSKCNORA06120150910> on the 19th of September 2015

debt interest rates and the level of capital flows. Before discussing the explicit empirical evidence, it is important to note that irrespectively of whether sovereign ratings lead or follow the market, their effects upon interest rates and capital flows could still be justified to the extent that their ‘certification role’ holds true, i.e. to the degree that prudential regulation requires several institutional investors such as pension funds to hold securities above a certain rating grade (usually above B++). Amongst others, this is pointed out by Carruthers (2013) who argues that such regulation ‘led to unintended *synchronization* and *correlation* of the economic decisions of an otherwise uncoordinated set of actors’ (2013, 539; emphasis in the original).

At the econometric terrain both the interest rate and capital flow channels have been investigated, with most of the scholars so far focusing on the link with interest rates. To outline a few, Reisen and Maltzan (1999) investigate the connection between sovereign ratings and sovereign bond interest rates over the period 1989- 1997, with an emphasis given to emerging markets. According to their findings although rating events do not exhibit any significance when the three main rating agencies (Standard and Poor’s, Moody’s and Fitch) are considered in isolation, they come to be statistically significant when taken in conjunction. Furthermore, the authors report an asymmetry between upgrades and downgrades, arguing that while in both cases the market leads the ratings, it is only in the case of downgrade announcements that the bond yields keep on responding to the event. In a similar fashion, Gande and Parsley (2004a) identify asymmetric spillover effects, with upgrade events of a given country being statistically insignificant towards the sovereign credit spreads of other countries, and downgrades being associated with an increase

in spreads. They also highlight the importance of cumulative rating events, arguing that rating announcements should not be considered in isolation across time.

Coming to more recent works and moving closer to the context of the Eurozone crisis, Arezki *et al.* (2011) confirm the existence of spillover effects of rating downgrades across European financial markets during the period 2007 to 2010. Moreover, by examining the case of Greece the researchers point out a qualitative difference across downgrades. In particular, they argue that although in general spillovers depend on the type of the announcements, the source country experiencing the downgrade and the CRA from which the announcement comes from, such effects tend to become of a more systematic nature once the country's rating reaches the speculative range (BB+ or lower). Furthermore, Afonso *et al.* (2011a) employ a dataset of daily observations for fifteen years (1995- 2010) for twenty four EU countries. Similarly with the previous authors, their results suggest the existence of an asymmetry, with government bond yield spreads mainly reacting to downgrades. In addition, they report a persistence effect in the sense that a country that was downgraded less than six months before face higher spreads than a country that has the same rating but without experiencing similar events during the previous six months period. Moreover, De Santis (2012) focuses exclusively in the crisis period, employing daily observations from early September 2008 and up to early August 2011. By studying the spillover effects arising from Greece, De Santis argues that the Greek downgrades have significantly contributed to the escalation of spreads of other European countries with weak fundamentals,

such as Ireland, Italy, Portugal and France. The author also reports some bidirectional effects between spreads and ratings.

Regarding the connection between sovereign ratings and capital flows, Gande and Parsley (2004b) investigate the issue for the period 1996- 2002, by focusing exclusively on the reactions of net portfolio flows (the focus on portfolio flows has the merit that it allows the authors to run their regressions with monthly data). Their findings suggest an asymmetric effect, with sovereign downgrades causing significant capital outflows from the country under consideration, but with upgrades remaining highly insignificant. Moreover, controlling for a number of surrounding factors, such as country size and legal traditions, Gande and Parsley report some importance for the level of corruption. They therefore claim that the less corrupted the country, the smaller will be the negative implication of a downgrade upon the flows of capital. More recently, Kim and Wu (2008) employ a dataset of 51 emerging countries, focusing on the time-span 1995- 2003. Studying the effects of different kinds of sovereign ratings on capital flows in conjunction with their effects upon domestic financial development Kim and Wu report a positive link between foreign currency long-term ratings and international capital flows. However, their results are quite surprising when it comes to all the other categories of sovereign ratings. In particular, the authors find a negative effect of local currency long-term ratings upon capital flows. According to their explanation this is due to the fact that as the domestic financial market of a country improves, it comes to rely less on foreign capital flows. Similarly, they report a negative link between capital flows and short-term ratings in both foreign and domestic currency. This is in turn explained by arguing that an

improvement in short-term ratings encourages sovereigns to switch from long to short term finance, therefore creating a more fragile environment.

Chapter 5 of the current further contributes to this stream of literature. By focusing on episodes of sudden stops of capital, the chapter offers new evidence regarding the influence of sovereign ratings on capital flow movements. In comparison with the abovementioned papers, some of the key differences are the following: First, Chapter 5 focuses exclusively on EMU countries, and considers more recent dynamics, including the ones of the current crisis. Secondly, rather than following Gande and Parsley (2004b) and Kim and Wu (2008) in examining continuous capital flow fluctuations, Chapter 5 concentrates on the occurrence of sudden stop episodes. As argued by Calvo *et al.* (2004) it is mainly this kind of capital flow movements that relate with financial crises. Hence, by isolating the determinants of such events one might be able to detect some results that are otherwise camouflaged.

In the broader picture, it is also interesting to note that the vast majority of the econometric work done so far comes from mainstream scholars, and there are no particular efforts to link any concrete empirical findings with the broader macroeconomic dynamics and constraints that arise. In that sense, one of the innovative elements of this thesis is the attempt to couple the political economy considerations on CRAs with the associated econometric literature.

2.6 Conclusion

This chapter surveys the methodology of CRAs in designing sovereign ratings, the mainstream view on what gives rise to those institutions, as well as

the existing critiques with regard to their role in the 2007/08 crisis. It then provides a more complete account of CRAs, by grounding the discussion on the historical context of neoliberalism and financialization.

Some of the key features that underpinned the rise of the importance of CRAs have been the process of disintermediation, with traditional forms of bank credit being replaced by new and often opaque financial instruments. In addition the collapse of the Bretton-Woods system and the globalization of capital flow movements raised exchange rate volatility significantly and strengthened the uncertainties associated with international capital flow movements. Those developments were also coupled with the attachment of CRAs to financial legislation, initially in the US, and then on a global scale.

As a result of the above, CRAs came to influence the behaviour of both borrowers and lenders, often in a compulsory way. By facing CRAs as the gatekeeper for accessing the financial market, rated entities were forced to adopt the conceptual framework of CRAs and in that sense limit their choices to what would be considered to be acceptable by those agencies. At the same time, lenders came to rely on a deceptive feeling of safety and stability that was created by CRAs, whereby financial uncertainties were masked in a way that made them look similar with calculable risk.

Furthermore, the chapter points out the particular significance of sovereign ratings. Most notably, by providing a ceiling to all other categories of ratings within a country, sovereign ratings are linked directly with the macroeconomic environment. In addition, they provide the clearest link between CRAs' power and the state. Given the role of CRAs as an enforcer of the neoliberal paradigm, such power has often translated into a contraction of the

range of public choices, and into significant financial constraints for national governments. The latter is further explored in a more analytical manner in Chapter 7 of the current.

Chapter 3- Eurozone as a Case Study

3.1 Introduction

Following a period of fragile growth that started with the introduction of the Euro in 1999, Eurozone entered into a severe and still ongoing crisis that hit especially hard the peripheral countries of the monetary union. As shown in Figures 3.1 to 3.6, the growth regime of the early 2000s was based on growing trade imbalances between EMU member states, with core countries such as Germany maintaining robust current account surpluses and periphery states such as Greece running permanent trade deficits (interestingly Germany was running a deficit from the introduction to the Euro in 1999 and up to the second quarter of 2001). From the side of deficit countries, those imbalances were also reflected on rising external debt positions. The crisis that followed involved the collapse of GDP growth and the sky-rocketing of unemployment. Especially during the 2008/2009 period, it also comprised of mounting public debt to GDP ratios for the countries of the European periphery, as well as rising budget deficits, mainly as a result of governments' efforts to support their banking systems. As it can be seen in the figures below, despite the partial recovery in the post- 2009 era, real GDP growth is still stagnant for most European countries, while unemployment still remains at record heights, especially for Greece and Spain.

A background of economic turbulence such as the above is highly important for a study that aims to study the macroeconomic effects of sovereign ratings. This is because it is mainly during such periods that one can observe

clusters of sovereign rating movements. In that regard, Eurozone offers us with an appealing and up-to-date case study. While as outlined in Chapters 2 and 4, the literature on sovereign ratings has been so far focused mainly on developing countries, it is interesting to see how it can be extended at the terrain of Europe.

Moreover, Eurozone offers us with an institutional set-up that puts EMU member states in a position that to a great degree resembles the status of developing countries. With the control of the currency being detached from national central banks, and with no European institution functioning as a Lender of Last Resort (LLR) for member states, EMU countries are left exposed to the sentiment of the private market. In conjunction with the discussion of Chapter 2, it can be said that as long as CRAs are important in affecting such sentiment, they also come to be important in dictating the terms of finance for those countries.

The rest of the chapter goes deeper into the discussion of the causes of the Eurozone crisis, and the linkages with CRAs. Contrasting the views of mainstream and heterodox scholars, the chapter suggests that the institutional developments of the EMU, as well as the experience of financialization in Europe have been two key factors that contributed to the observed imbalances and the subsequent crisis.

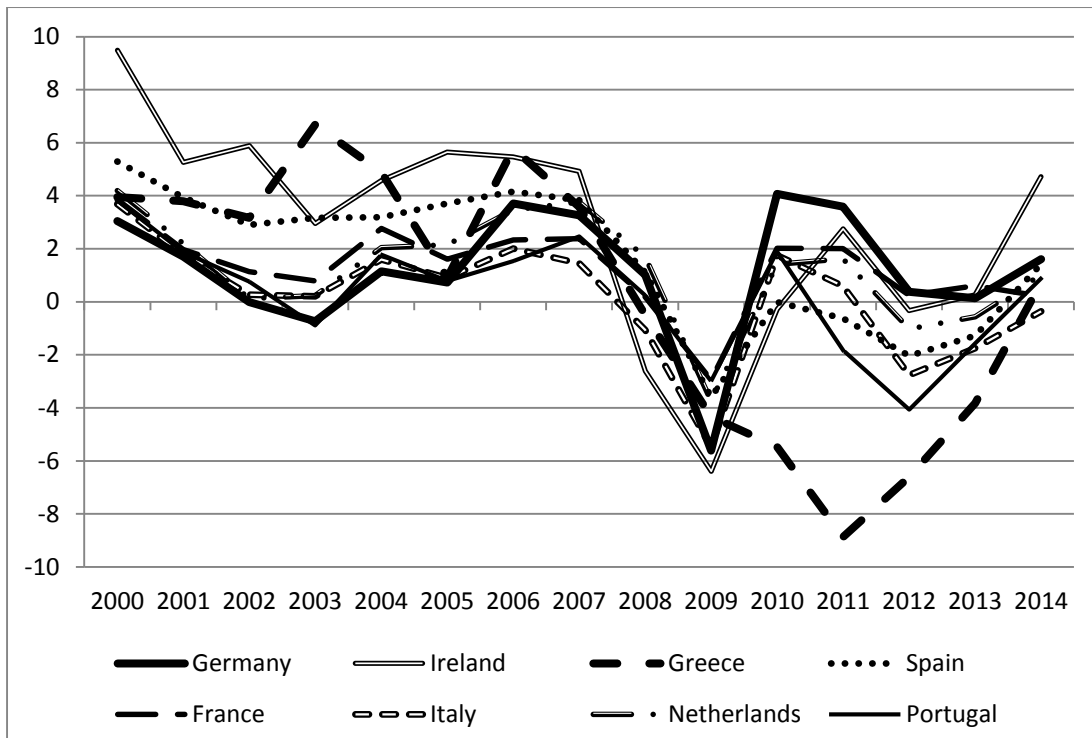


Figure 3.1. Real GDP growth of selected EMU countries (source: Eurostat; % units)

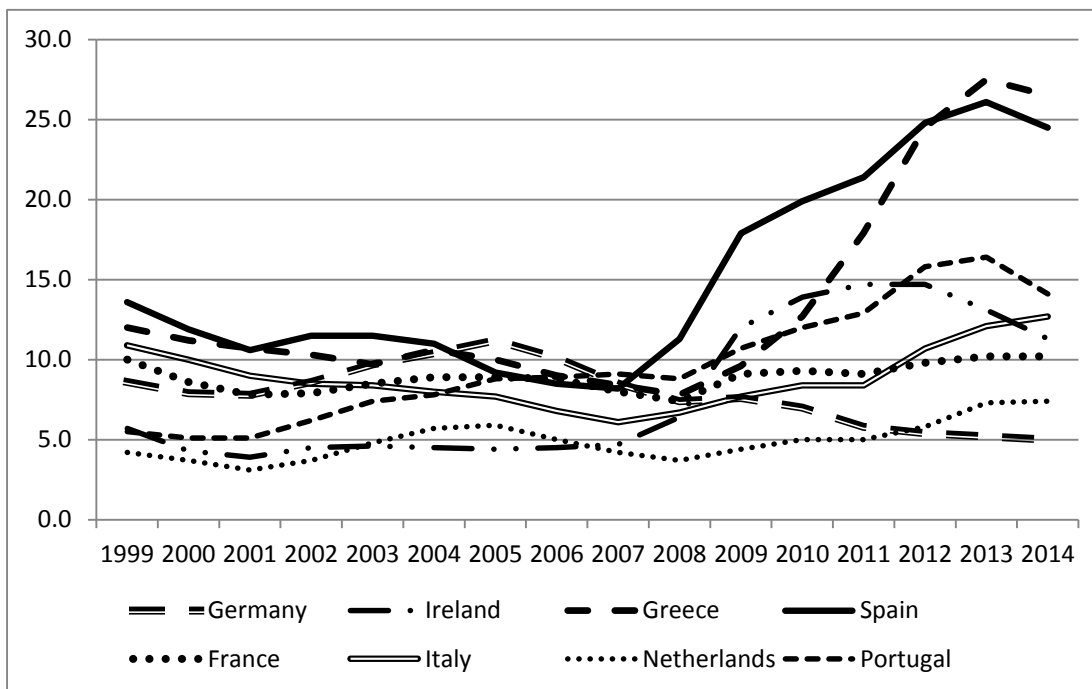


Figure 3.2. Total unemployment rate of selected EMU countries (source: Eurostat; % units)

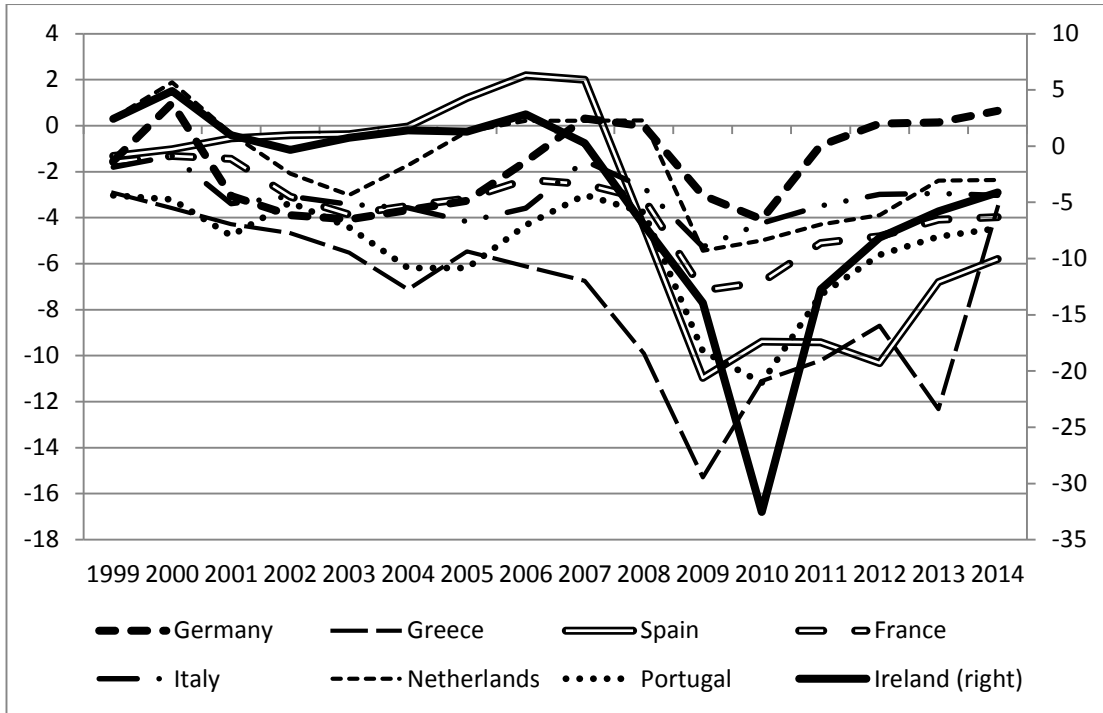


Figure 3.3. Fiscal balance over GDP of selected EMU countries (source: Eurostat; % units)

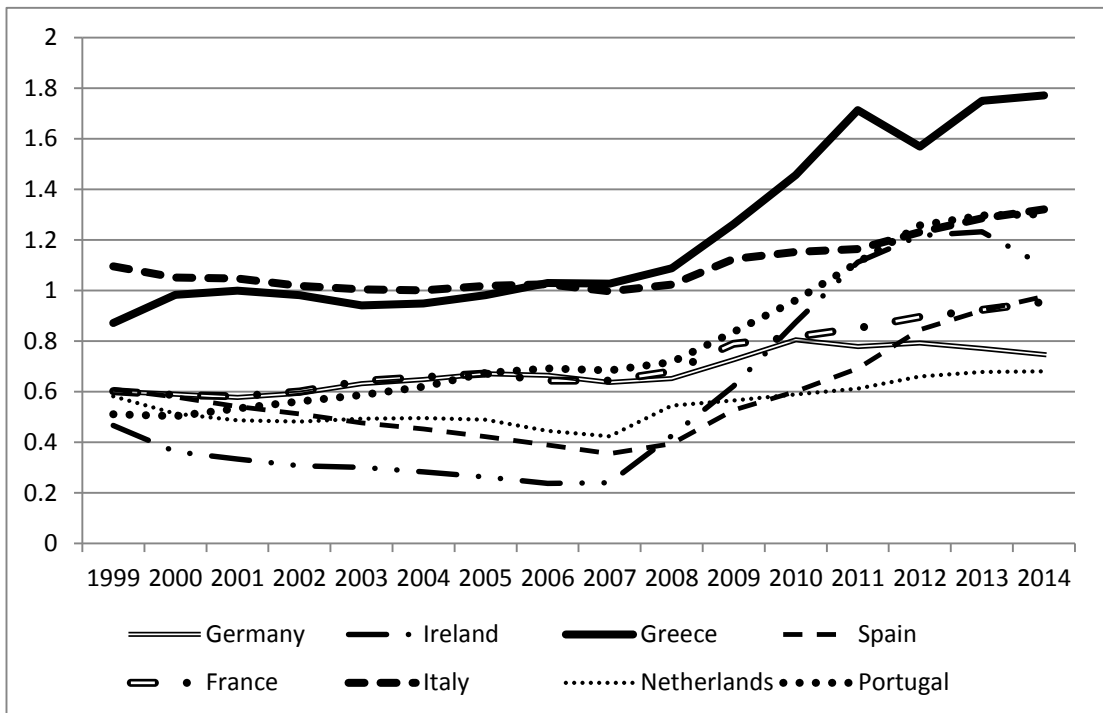


Figure 3.4. Public debt to GDP of selected EMU countries (source: Eurostat; % units)

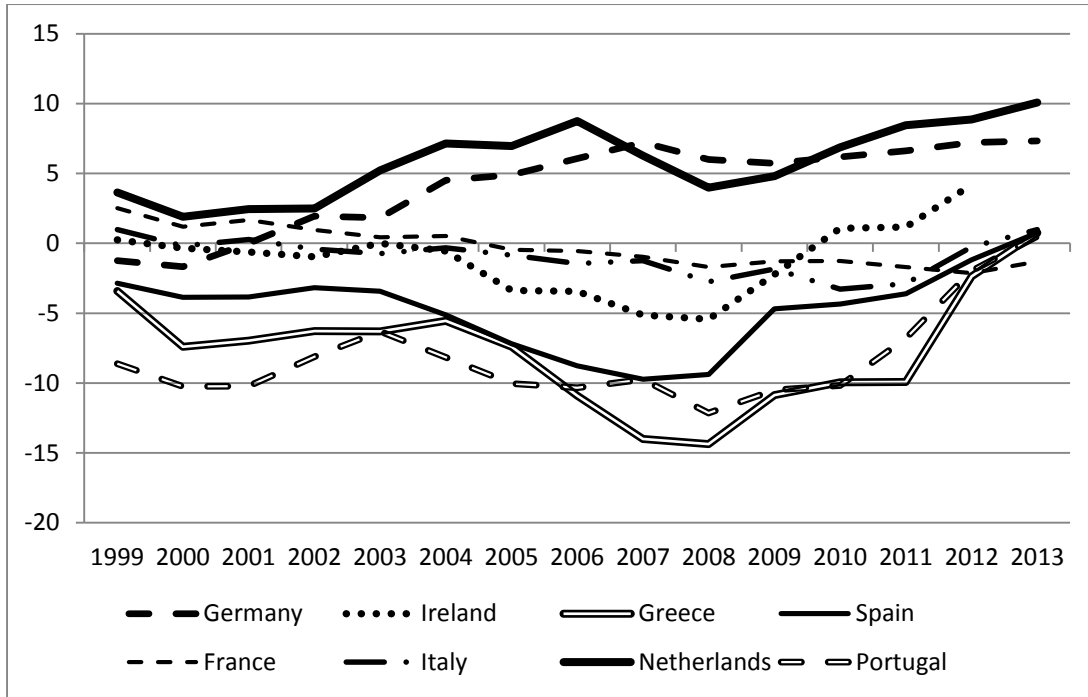


Figure 3.5. Current Account Balance over GDP of selected EMU countries (source: Eurostat; % units)

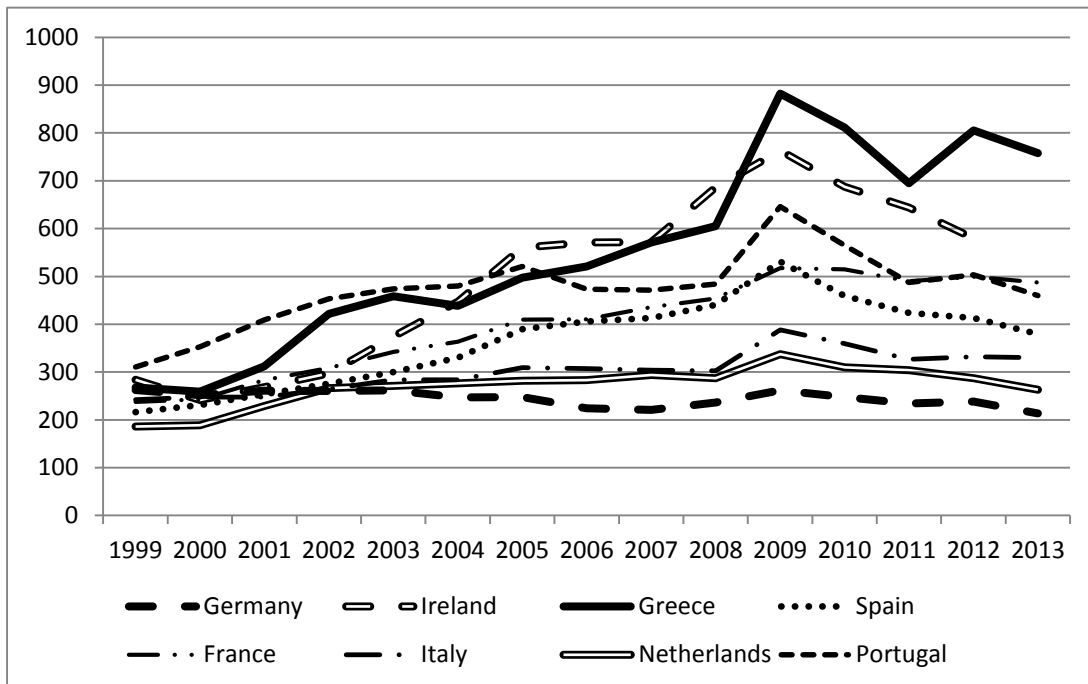


Figure 3.6. External Debt of selected EMU countries (source: Eurostat; % units)

3.2 Mainstream Reflections

Mainstream accounts of the European crisis mainly emphasize the dynamics of financial integration that came along with the launch of the Euro project and the domestic weaknesses of deficit countries, most notably linking with the deterioration of their competitiveness positions. Outlining here a few indicative papers, Hale and Obstfeld (2014) argue that a direct product of financial integration in the Euro area were the historically low interest rates for peripheral countries. Those rates allowed peripheral member states to borrow funds from the banks of core European countries such as Germany, to a level that came to inflate their economies and generate credit booms. Interestingly Hale and Obstfeld also show that the lending of banks of the European core towards the south was highly complemented by borrowing from outside the EMU so that in the overall those banks ended up with highly fragile balance sheets. In a similar fashion, Lane (2013) argues that the creation of the Euro- the “vanguard of the financial globalization boom” as he calls it (2013: 2) - had a bigger impact on debt rather than equity capital movements.

Sanchez and Varoudakis (2013) of the World Bank state that it was the demand booms in peripheral countries- initially generated by low interest rates- that primarily created the external imbalances in European periphery countries, rather than the fall of their competitiveness positions. This is in agreement with Gros and Alcidi (2013) who mention that the falling competitiveness of peripheral countries was mostly a symptom of excessive credit supply from the core rather than the problem itself.

From their side Jaumotte and Sodsriwiboon (2010) argue that although facilitated by European financial integration, capital flows were essentially driven by the falling saving rates in recipient countries. At the same time Jaumotte and Sodsriwiboon assert that wage rigidity in peripheral countries contributed to current account deficit positions that were beyond what the fundamentals of those countries could justify. Similarly Chen, Milesi-Ferretti and Tressel (2012) claim that the capital inflows towards the European deficit countries helped to sustain the appreciating real effective exchange rates (the reverse of competitiveness) of those countries rather than allowing them to adjust to levels that would ensure the sustainability of their external positions. In conjunction with the nominal and real appreciation of the Euro and in face of the augmented competition coming from Asian countries, especially from China, Chen and his colleagues assert that the result was a persistent deterioration in the exports performance of those countries.

3.3 A Deeper Account of the Crisis

By contrasting the above narrative with the empirical reality, one can indeed spot such regularities across the deficit countries, namely historically low interest rates, credit booms, as well as deteriorating competitiveness positions. Nonetheless there might be more to be said if one goes deeper into the European economic dynamics of the last few decades. If that is true it means that what are observed at first sight might be the symptoms rather than the actual causes of the crisis.

In what follows I move towards a broader discussion, separating it into three parts. First I outline the institutional developments associated with the establishment of the Euro and the corresponding implications. Following, I discuss the dimension of financialization into the European reality. I then show how such developments contributed to the observed trade imbalances across Europe.

3.3.1 Institutional Developments

Seen from a historical perspective, the creation of the Euro has been the most recent development of the process of economic and financial integration in Europe, a process that started with the creation of the European Coal and Steel Community (ECSC) and the establishment of the European Economic Community (EEC) during the 1950s (for an analytical historical account see Arestis *et al.*, 2001). Originally launched in 1999 when eleven EU member states locked their currencies against the Euro, the design of Eurozone has been based upon two pillars, namely the Maastricht Treaty of 1991 that set the entrance criteria and the Stability and Growth Pact (SGP) of 1997 which established its operation rules.

As outlined in Arestis *et al.* (2001), the Maastricht criteria embody the targets for exchange rate, inflation, interest rates and public finances, as perceived to be desirable by the EU. For instance the inflation level of any candidate country must not exceed the average inflation rate of the three community nations with the lowest inflation by 1.5%, the budget deficit must be equal or lower than 3% of the country's GDP, and the overall government debt

must not be greater than 60% of GDP. In addition, the SGP guidelines set the following cornerstone rules: i) political independence of the ECB; ii) rule of no bailout of national government deficits; iii) prohibition of monetary financing of government deficits; and iv) member states to avoid 'excessive' budget deficits, with the term excessive connecting here with the Maastricht threshold of 3%.

Although the above mentioned rules and guidelines might seem to be a technical issue, this is not the case. In particular, as argued by a number of authors (e.g. Lucarelli, 2011/12; Fitoussi and Saraceno, 2013; Palley, 2013), the framework of Eurozone has been strongly biased in favour of the neoliberal ideology. At a theoretical level, this means that Eurozone has been built upon a paradigm that views capitalism as an inherently stable system and markets as mechanisms capable of providing an efficient allocation of resources, of achieving full employment, and of maximizing social welfare- provided they are left to operate freely.

In the context of Eurozone, Arestis *et al.* (2001) and Palley (2013) point out that following the establishment of the Maastricht Treaty and the formation of the European Central Bank (ECB), full employment has been lost as an explicit policy objective, and has been entirely replaced by the pursuing of low inflation. Such shift has been a direct product of the perception of long-term unemployment as a supply side phenomenon, and the consequent degradation of the importance of demand side fiscal and monetary policies (Arestis *et al.*, 2001). Moreover, such development has been greatly facilitated by the fact that the ECB has been granted independence from any sort of democratically elected authorities.

From a distributional perspective, the exclusive focus of the ECB upon low inflation and price stability has acted in favour of the interests of the financial sector by maintaining the real value of money (Lapavitsas *et al.*, 2010a). From a policy effectiveness point of view, it has kept ECB's attention away from controlling the expansion of credit and the creation of financial bubbles, therefore contributing to financial instability (De Grauwe, 2009). Moreover, rather than responding to the actual inflation rates of individual member states, the ECB has been designing policy responses based on the average inflation of the Euro area, therefore failing to address the divergence in price and wage levels between Eurozone countries (Laski and Podkaminer, 2012). Such divergence has been further supported by the lack of coordination between monetary and fiscal policy at a European level (Panico and Purificato, 2013), and by the absence of a political union capable of coordinating the various wage policies of the member states (De Grauwe, 2009). In addition, the application of monetary policy by the ECB has remained highly uncoordinated with banking supervision which in turn has remained in the hands of national authorities (see De Grauwe, 2009; Chick and Dow, 2012). As a result, De Grauwe points out a collective failure of European monetary policy in controlling the behaviour of the banking system, a failure that was further enforced by the process of financial deregulation (Chick and Dow, 2012).

Additionally, it can be argued that the limitations posed by the Maastricht Treaty on government deficit and debt (3% and 60% respectively) are nothing but arbitrary figures (Arestis *et al.*, 2001). In effect, such figures impede the operation of automatic stabilizers (Arestis *et al.* 2001; Laski and Podkaminer, 2012), therefore leading to a weaker fiscal stabilization and

greater economic instability. Even more, as mentioned by Toporowski (2010) and Bellofiore (2013) what matters is not the absolute or relative to GDP levels of public debt and deficit, but rather those levels that a Central Bank (CB) is willing to refinance.

In that regard, it is apparent that the issue of monetary and fiscal independence is a function of the CB's willingness to re-purchase public debt. It can therefore be said that the most important drawback of the introduction of the Euro has been the subsequent loss of sovereignty for the Eurozone member states. This means that national central banks cease to act as the manager of government's debt, with no institutional substitute taking over at a central level (since the ECB is prohibited from acting as a lender of last resort (LLR) for member states). Hence the actual probability of default, which would otherwise be either impossible or very remote, is brought into the picture (see for instance Lucarelli, 2011/12; Kelton and Wray, 2009). The Euro comes to be a foreign currency for Eurozone member states (Wray, 2003; Papadimitriou *et al.*, 2010); in that sense the latter are downgraded to the status of those developing countries that do not control the currency in which their debt is issued (De Grauwe, 2011a). In view of such a setup, Eurozone member states can only raise funds via commercial banks and financial markets, which however cease to view those countries' government debt as a necessarily safe asset (Chick and Dow, 2012). In such an environment, financial markets acquire an enormous power vis-a-vis Eurozone governments, with the latter's debt becoming prone to forces of contagion and self-fulfilling prophecies (De Grauwe, 2011a; 2011b). Moreover, to the extent that Chapter 2 is right in pointing out the amplified influence of CRAs over the past few decades, the power of financial markets

transmits towards those institutions as well. For instance, if CRAs come to believe that the level of debt of a Eurozone member state is unsustainable they can react by downgrading that country. Such event can in turn make investors withdraw their capital from the country, causing a liquidity crisis and an increase in interest rates (for some explicit evidence on the connection between ratings and capital flows, see Chapter 5 of the current). Most importantly, as long as the ECB abstains from acting as an LLR, there is nothing to prevent the liquidity crisis from turning into a solvency crisis, so that investors can then claim that they were right to pull out their money (De Grauwe, 2011a). In the words of De Grauwe (2011a: 7) 'the country has become insolvent because investors fear insolvency'.

All in all, the loss of EMU member states' monetary autonomy and their subsequent downgrade to the level of developing countries bring into the fore a set of CRA related research questions that so far have been concentrated on developing countries. What do European sovereign ratings reflect? How do they affect European cross border capital movements? How do they constrain the policy making of European governments? Reflections towards this direction are essential in order to fully understand the impact of Eurozone's flawed institutional structure as well as the current European reality and constraints. In that sense the empirical and analytical contributions of this thesis (Chapters 4,5 and 7), as well as the accompanying policy reflections (see Chapter 8) aim to add some value to the literature related with European developments.

3.3.2 Financialization

Although financialization has been more apparent in countries such as the US and the UK, similar developments have also been observed throughout continental Europe in the last three decades. As in the US, financialization came to be stimulated by the prevalence of neoliberal policies. In particular, as shown by Palley (2013), the introduction of the neoliberal paradigm since the early 1980s led to a significant decline of the wage share and to rising income inequality across Europe. In such an environment, Palley asserts that amongst other factors, credit and asset price bubbles were one of the main means to sustain aggregate demand and postpone economic stagnation.

For Frangakis and Huffschmid (2006) the environment of declining growth and rising income inequality has also been an important factor relating to the financialization of the investment process. In particular, as Frangakis and Huffschmid point out, such developments gave rise to the accumulation of profits which rather than being recycled in the real economy were either driven outside the country under consideration or invested in domestic financial assets.

Another dimension of financialization is pointed out by Frangakis (2009) who argues that since the early 1980s the European financial system has been turning from a traditional bank-based towards a market-led one, therefore coming closer to the Anglo-Saxon model. As discussed by the author, financial markets did not only increase in absolute terms, but also in relation to GDP. According to her evidence the size of financial markets across the Eurozone increased by more than four times during the period 1980-2006. Indicatively the stock of equities rose from 8% to 82% of GDP across the Eurozone

Table 3.1. Moody's and S&P: Branch Establishment in Europe

	Moody's	Standard and Poor's
France (Paris)	1988	Affiliation 1990; acquired 1995
Germany (Frankfurt)	1991	1992
Italy (Milan)	1999	1999
Spain (Madrid)	1993	Affiliation 1992; acquired 1994
Ireland (Dublin)	2000	
Czech Republic	Affiliation 2000	
Sweden (Stockholm)		Affiliation 1988; acquired 1990
UK (London)	1986	1984

Source: author's elaboration based on Sinclair (2005: 28)

between 1980 and 2006. Similarly, the stock of government debt securities grew from 13% to 61% (Frangakis, 2009: 59). Most importantly, the move towards a market-based financial system removed to a great extent the credit risk analysis function from banks by assigning it to CRAs, who now faced an increasing demand for their products (Lannoo, 2010; also see the discussion in Chapter 2 above). A reflection of such a development is the fact that rating agencies started setting up their branches across continental Europe

throughout the late 1980's and early 1990's, a period when the transition from bank-based to market-based finance was blooming (see Table 3.1).

Interestingly, Frangakis and Huffs Schmid (2006) show how EU policies facilitated the rise in the importance and scope of the financial sector. More specifically the process of privatization of financial institutions and of significant parts of public social security systems, along with the creation of a single European financial market managed to increase the attractiveness and range of speculative activities. In addition, as pointed out earlier, the imposition of strict limits on public deficits and debt by the Maastricht treaty made it difficult for the member states to apply the fiscal policy required to absorb private sector surpluses, therefore pushing the latter to circulate into the financial sphere.

All in all, as mentioned by Frangakis and Huffs Schmid (2006) the results of the above developments were: i) a shift of corporate financing towards a short-term horizon (also see the discussion in Chapter 2), ii) a significant rise in financial instability, which was further augmented by the intensified exposure of EU securities markets to US stock market fluctuations (see Toporowski, 2009), and iii) the further enhancement of the political power of capital, which on the threat of leaving the country could push for lower taxes, cuts in social benefits, etc. Moreover, as discussed by Toporowski (2009) the process of financial deregulation fostered cross country mergers and acquisitions of financial firms, therefore obscuring the task of national regulators.

3.3.3 Trade Imbalances

The institutional structure of the Eurozone, along with the process of financialization, resulted in increasing income inequality and the fall of the labour share of income across the continent. Furthermore, although the introduction of the Euro integrated monetary policy, it did not manage to promote real economic convergence across member states (for further discussion see De Grauwe, 2009; Chick and Dow, 2012; Laski and Podkaminer, 2013; Bellofiore, 2013). In view of the countries' heterogeneous production structures, such developments gave rise to either the accumulation of debt or the expansion of exports towards the debt-led countries (see for instance Sapir, 2009; Lapavitsas *et al.*, 2010a; Hein, 2011; Palley, 2013; Bellofiore, 2013). In that regard, peripheral countries such as Greece and Spain came to follow a debt-led growth pattern, while core countries such as Germany came to pursue an export-led strategy.

Out of the commonalities of the debt-led countries, Hein (2011) points out a relatively high real GDP growth, along with an increasingly negative financial balance of the private sector of each of those countries. Furthermore, Hein writes that the public sector contributed negatively to the domestic financial balance in these countries, but to a different extent, namely more significantly in countries like Greece, but only marginally to countries like Ireland. In addition, with the exception of Ireland, in all countries domestic growth of debt-led consumption was associated with a rise in current account deficits.

On the other hand, a key difference across debt-led countries was the composition of their debt structures. As pointed out by Lapavitsas *et al.* (2010b), while in Greece public debt had been continuously ballooning since

the introduction of the Euro, in Spain the prime accumulator of debt had been the private sector, with the country's public debt remaining relatively flat up until the financial upheaval of 2008. Furthermore although there was an increase in the proportion of debt held by foreign investors in both countries, the trend was more intense in Greece with the portion of non-resident holders of (overall) debt reaching 51% in 2009 (see Lapavitsas *et al.*, 2010b: 8, 21).

Concerning the distinctive elements of the export-led countries, Hein (2011) states that all of these were linked with current account surpluses, while some countries such as Belgium and Sweden also demonstrated increases in wealth-income ratios and/or in residential property prices. Moreover, the growth of domestic demand was either relatively moderate, as in the case of Austria and Belgium, or very weak as for example in Germany. In that sense, Hein notices that the export-led regime came at a price, since- with the exception of Sweden- all other countries achieved lower real GDP growth rates than the debt-led ones.

All in all, export-led countries have often been labelled as 'free-riders' (see for instance Horn *et al.*, 2009; Bellofiore, 2013) in the sense that while achieving high competitiveness thanks to the depression of their domestic wages (Lucarelli, 2011/12; Bibow, 2012), they came to be dependent upon the absorbing capacity of debt-led countries, for the export of their commodities and capital. As being the two sides of the same coin, the debt and export-led growth patterns came to be mutually reinforced and sustained (Horn *et al.*, 2009).

3.4 Conclusion

This chapter outlines some key stylized facts associated with the dynamics of Eurozone and the recent crisis. Stagnant and falling GDP growth, and huge rises in unemployment have been two of the most prominent post-crisis developments, especially for the countries of the European periphery. Furthermore, the chapter discusses the causes of the recent European malaise, as seen from different perspectives. While mainstream accounts focus on the dynamics of financial integration that followed the establishment of the Euro and on domestic weaknesses of particular EMU countries, heterodox scholars go deeper into the institutional and macroeconomic developments of recent decades. Most notably the flawed institutional set-up of the monetary union along with the process of financialization contributed to the emergence of significant trade imbalances across Europe and to the crisis that followed.

With regards to CRAs, the economic turbulence in Europe and the lack of an LLR institution for the governments of Eurozone member states provide us with an interesting case study and bring to the fore a topic which so far has been mainly explored in relation to the developing countries.

Chapter 4- Crises, Panics, and Credit Rating Agencies: Evidence from Europe

4.1 Introduction

Although widely criticized for their involvement in the 2007/08 financial crash, the role of Credit Rating Agencies (CRAs) in the Eurozone crisis has received relatively little attention. This chapter attempts to close this gap by focusing attention on the behaviour of CRAs in the build-up and playing-out of the Eurozone crisis. In particular, the key hypothesis of this chapter is that in face of uncertainty- understood here in the Keynesian sense- there is no reason why CRAs should not be thought to be liable to feelings of euphoria and panic, similar with all other economic agents. Based on such a perspective, this chapter contributes to existing literature by showing that since the commence of the European crisis in 2009, the downgrades of the sovereign ratings of the crisis-hit peripheral countries of Eurozone have been highly exaggerated, as compared with the macroeconomic variables CRAs are supposed to follow.

The methodology employed involves linear panel data models for the original twelve countries of Eurozone and for the time span 1999 to 2012. Moreover the focus of the chapter is on the three main rating agencies, namely Standard and Poor's (S&P), Moody's and Fitch. The key part of the results obtained holds across a number of model specifications. Such results are quite similar across all the three CRAs, while they also pass a number of robustness checks.

The rest of the chapter is organized as follows: the next section outlines the literature and the theory related with the project, while section three outlines the relevant data. Following, section four discusses the econometric methodology employed. Section five presents the main body of the results. It also includes a number of robustness checks. Section six concludes. Across all the regressions of the current, the software employed is “StataSE 12”.

4.2 Literature Review & Theoretical Background

There has already been a voluminous literature studying the determinants of sovereign ratings. So far this literature has been mainly focused on developing countries, due to the rich amount of rating fluctuations recorded there. Presented here with a chronological order, Cantor and Packer (1996) is the first and most cornerstone piece in this stream of papers. Using a sample of forty-nine countries, Cantor and Packer report eight variables as the most significant determinants of sovereign ratings, namely per capita income, GDP growth, inflation, fiscal balance, external balance, external debt, economic development and default history. Applying standard OLS techniques the authors report some R^2 measurements close to 90%. Such results are taken up by Ferri, Liu and Stiglitz (1999) who focusing on the countries affected by the East Asian crisis, extend the list of explanatory variables by adding short-term external debt as another possible determinant. Further supporting evidence is provided by Afonso (2003), who studies the ratings of eighty-one countries for 2001. Interestingly, Afonso conducts both a linear and a logarithmic transformation of the alphabetical scores of the ratings. His rationale is that

rating scores can improve more easily at the bottom of the scale, compared with the higher notches where a further increase comes to be more demanding.

Other papers include Eliasson (2002) and Alexe *et al.* (2003), with the second incorporating public debt, domestic credit and foreign reserves, as well as political variables such as government effectiveness and political stability. Following, Borio and Packer (2004) stress the importance of external debt and the implications that arise in conjunction with the size and the default history of a country. Bissoondoyal-Bheenick (2005) studies a sample of ninety-five countries in the context of an ordered response model. Other than the introduction of labour market variables (unemployment, unit labour costs), what stands out in his work is his finding that the relevance and significance of the reported variables differ as one moves from higher to lower rated countries. The ordered response model is taken up by Bissoondoyal-Bheenick *et al.* (2005) who also include the number of mobile phones of a country as an index of technological development. Sutton (2005) focuses on thirty-two developing countries and incorporates a European Union dummy in his regressions. Moreover, Butler and Fauver (2006) provide a thorough account of legal and political variables that matter in rating scores. Other than the government effectiveness and political stability variables discussed earlier, Butler and Fauver also incorporate corruption, regulatory quality, voice of the people and the rule of law in their regressions. These variables are part of the Worldwide Governance Indicators database constructed by the World Bank and are available online¹³.

¹³ See here <http://data.worldbank.org/data-catalog/worldwide-governance-indicators>

More recently, Afonso and Gomes (2010) study the importance of fiscal imbalances in shaping sovereign ratings. Employing both a linear and an ordered response model, their results come to the affirmative but with significant differences across countries. Based on a similar methodology, Afonso *et al.* (2007; 2011b) separate between the short and long run determinants of sovereign ratings. Their results suggest fluctuations of variables such as GDP per capita and public debt as important short-run variables, while variables like government effectiveness and foreign reserves stand as long term determinants. In addition, Canuto *et al.* (2012) confirm the importance of domestic credit and trade openness. Furthermore, Gartner *et al.* (2011), Eissfeller *et al.* (2014) and Vernazza and Nielsen (2015) provide evidence supporting the idea that the sovereign ratings of the Eurozone periphery have been exaggeratedly downgraded since the outbreak of the crisis in 2009, without however supplementing it with a theoretical narrative as to what might explain the systematic appearance of such results across the different countries.

Of all the papers cited in the above literature, the Ferri *et al.* (1999) paper is the one that provides the ground for the research question of the current chapter. This is because Ferri and his colleagues are the first to investigate the possibility of procyclicality in sovereign ratings. More specifically, while they recognize that quantitative and qualitative elements can inform the formation of actual sovereign ratings, only the quantitative factors can be captured econometrically. Qualitative factors, while they may be important, may reflect any sort of *ad hoc* country-specific information. Their results come to be on the affirmative for countries that were hit by the East

Asian crisis (e.g. Indonesia, Malaysia), implying that rating agencies had a tendency to provide inflated ratings prior to the crisis and to exaggeratedly downgrade those countries following the crisis' outbreak. For all those countries, they also report a convergence between actual and generated ratings for the post-crisis period. This development is explained in terms of the counter-effects that rating downgrades can have on the macroeconomic fundamentals as a result of their incorporation in financial legislation and is related with the idea of a self-fulfilling prophecy mechanism. In the broader picture, the econometric evidence is used by the writers to suggest that CRAs tend to attach a higher weight to the qualitative segment of their analysis. Even more, they claim that such procyclicality can be understood in terms of CRAs' incentive to become more conservative after failing to predict the crisis, so as to rebuild their reputation.

The Ferri *et al.* (1999) paper is strongly criticized by Mora (2006). In particular, by extending the Ferri *et al.* sample Mora argues that sovereign ratings tend to be sticky rather than procyclical. Although her results confirm the inflation of ratings prior to the East Asian crisis, the author points out that there is no empirical support for the idea that CRAs tend to exaggeratedly downgrade countries during the crisis period. From a technical perspective, Mora criticizes the work of Ferri *et al.* for their choice to use Random Effects in their panel data regressions, a methodology which as the author argues is hard to justify in view of the possible correlation of the country specific effect with the regressors (also see the discussion in Appendix B). Furthermore she questions their choice of using the minimum rather than the average rating of each time period as their left-hand variable, pointing out the loss of information

and the mismatch with right-hand variables that occurs. In addition she states that in those cases where the ratings generated by the model of Ferri et alia differ from the actual ones, there might be some misspecification issues such as non-linearity of the regressors, data-timing problems or omitted variables.

The above points of critique are very important since they reveal the weaknesses in the methodology that guides this empirical project. In this sense, my prime concern is to safeguard my approach against them. Coming to the theoretical terrain, what makes my approach different from previous papers is my understanding of what is reflected on the qualitative part of CRAs analysis. Most notably, in contrast with Ferri *et al.* (1999) who link the qualitative part and therefore the exaggerated mood of CRAs with false incentives, my suggestion is that CRAs' temper is better viewed as a function of Keynesian uncertainty and its associated implications.

To begin with, it is essential to show how Keynesian uncertainty is a concept fundamentally different from calculable risk. Pointing out Keynes's own definition, Keynes writes (1937, 241):

'By "uncertain" knowledge, let me explain, I do not mean merely to distinguish what is known for certain from what is only probable. The game of roulette is not subject, in this sense, to uncertainty; nor is the prospect of a Victory bond being drawn. Or, again, the expectation of life is only slightly uncertain. Even the weather is only moderately uncertain. The sense in which I am using the term is that in which the prospect of a European war is uncertain, or the price of copper and the rate of interest twenty years hence, or the obsolescence of a new invention, or the position of private wealth-owners in the social system in 1970. About these matters there is no

scientific basis on which to form any calculable probability whatever. We simply do not know.'

Shackle (1955) would identify cases such as the game of the roulette as repetitive and uniform performances. What is common in those cases is that we can obtain knowledge by observing the outcomes of a numerous series of events. Such knowledge can take the form of frequency ratios, and can be applied whenever the decision-maker is about to re-conduct the experiment. In contrast however with such performances, Shackle points out the possibility of having to decide in a 'crucial', or else 'non-divisible non-seriable' experiment. In this case, the experiment can never be repeated under identical circumstances because its performance cannot exclude the possibility of permanently altering the surrounding environment (Shackle points the example of a chess move). Here, the employment of frequency ratios can be of no help, and thus no calculations of future scenarios' pros and cons can be conducted in a genuine way (also see Lawson, 1988). This is the sort of experiments associated with what Shackle labels as 'true uncertainty'. It is what Keynes has in mind when he talks about the prospect of a European war and the price of copper after twenty years. Such experiments are the most relevant with real economic life, and with actions like investment (for further discussion also see Carvalho, 1988; Crotty, 1994). Although the true nature of such experiments might manage to get camouflaged during tranquil periods, episodes of crisis act in a revealing way for the uncertainty that lies beneath them (Carruthers, 2013).

Even more, the existence of uncertainty gives rise to what Keynes calls 'animal spirits' (see Keynes, 1936, 1937, and in particular the celebrated

Chapter 12 of the *General Theory*). ‘Animal spirits’ is a term that links with the idea that people often follow their instinct when making investment choices. Or, as expressed by Keynes it is a term that relates with acting based on spontaneous optimism, rather than on mathematical expectations. Put in a social context, ‘animal spirits’ correspond to the idea that investors and the public are liable to feelings of euphoria and panic.

If the above thoughts have some merit, they can also be applied to the case of CRAs. More precisely, it can be claimed that there is no reason why CRAs’ judgments should be thought capable of escaping the implications of Keynesian uncertainty. Similar with all other economic agents, CRAs also face the impossibility of accurately providing forecasts of the future. Although possibly capable of collecting larger sets of information than individual investors, CRAs are still unable to fully grasp the information that would be required for generating probability estimates of future default episodes, irrespectively of what they claim for themselves. Given the non-uniform and non-repetitive nature of economic defaults, the quintessence of uncertainty implies that such probabilities do not exist, neither in advance nor in posteriori.

In that regard, my hypothesis is that due to the existence of Keynesian uncertainty, there is nothing to prevent CRAs from getting excessively excited and depressed as with everybody else. Hence, my proposition is that any systematic evidence of exaggerated reactions on behalf of CRAs can be interpreted as a reflection of amplified feelings of euphoria and panic, or as Michailidou *et al.* (2012) put it, as evidence of ‘animal spirits’.

4.3 Data Outline

For the purposes of the current I construct a panel wherein the space dimension includes the original twelve Eurozone countries while the time dimension runs from 1999q1 to 2012q4. Both the time and the country dimensions are selected in a way that allows the minimization of the relative heterogeneity of my database in terms of prevailing institutions and economic development (e.g. the first quarter of 1999 coincides with the introduction of the Euro in all countries of the sample but Greece¹⁴).

There are several reasons why the case study of Eurozone is of special interest. First, there is a gap in literature in that most of the abovementioned studies either focus on developing entities or amalgamate developing and developed countries in their samples. Although CRAs claim that they apply the same model for all sovereigns (see discussion below), it would make sense to expect the weights of the different variables to vary across different families of countries and throughout different time periods, therefore making the study of Eurozone dynamics of special interest.

Secondly, as discussed in Chapter 3 the institutional set-up of the Eurozone offers us a peculiar case of a monetary union without a corresponding fiscal and political integration. Along with the prohibition of the ECB to act as an LLR for sovereign debt, such reality downgrades Eurozone states to the status of developing countries (De Grauwe, 2011a), so that a research topic which has so far focused on developing economies now becomes relevant within a European context too.

¹⁴ While Greece officially joined the Euro in 2001, the Drachma to Euro exchange rate was permanently fixed on the 19th of June 2000.

In conjunction with the above, the Eurozone provides us with one of the most recent and important crisis episodes. As pointed out earlier, incorporating crisis episodes is crucial for the project due to the fact that outside a crisis rating fluctuations are scarce. Furthermore, since the vast majority of downgrades have clustered around peripheral countries, it is these countries that are especially important for the current project (for an illustration of the S&P ratings see Figure 4.1)¹⁵.

4.4 Methodology

4.4.1 Econometric Methodology

In the context of panel data methods, it is quite common amongst the studies explaining sovereign ratings to employ either Fixed Effects (FE) or Random Effects (RE) to capture the country specific heterogeneity. A brief illustration of the two estimators is offered in Appendix B of the current chapter. When working with panel data, the routine way of choosing between FE and RE is fitting both and then conducting the Hausman Test. This test looks at the difference between the coefficients estimates of the two models. If the RE assumption of independence of the country specific effects from the regressors holds true, the two estimators should not differ significantly (H_0). In contrast if there is a difference, the RE method is rejected. With this said, it is often the case that the Hausman test rejects the RE approach, so that the only way to

¹⁵ The ratings of Moody's and Fitch provide a similar picture. For an illustration of the Moody's ratings for a selection of Eurozone countries, see Figure 7.1 in chapter 7.

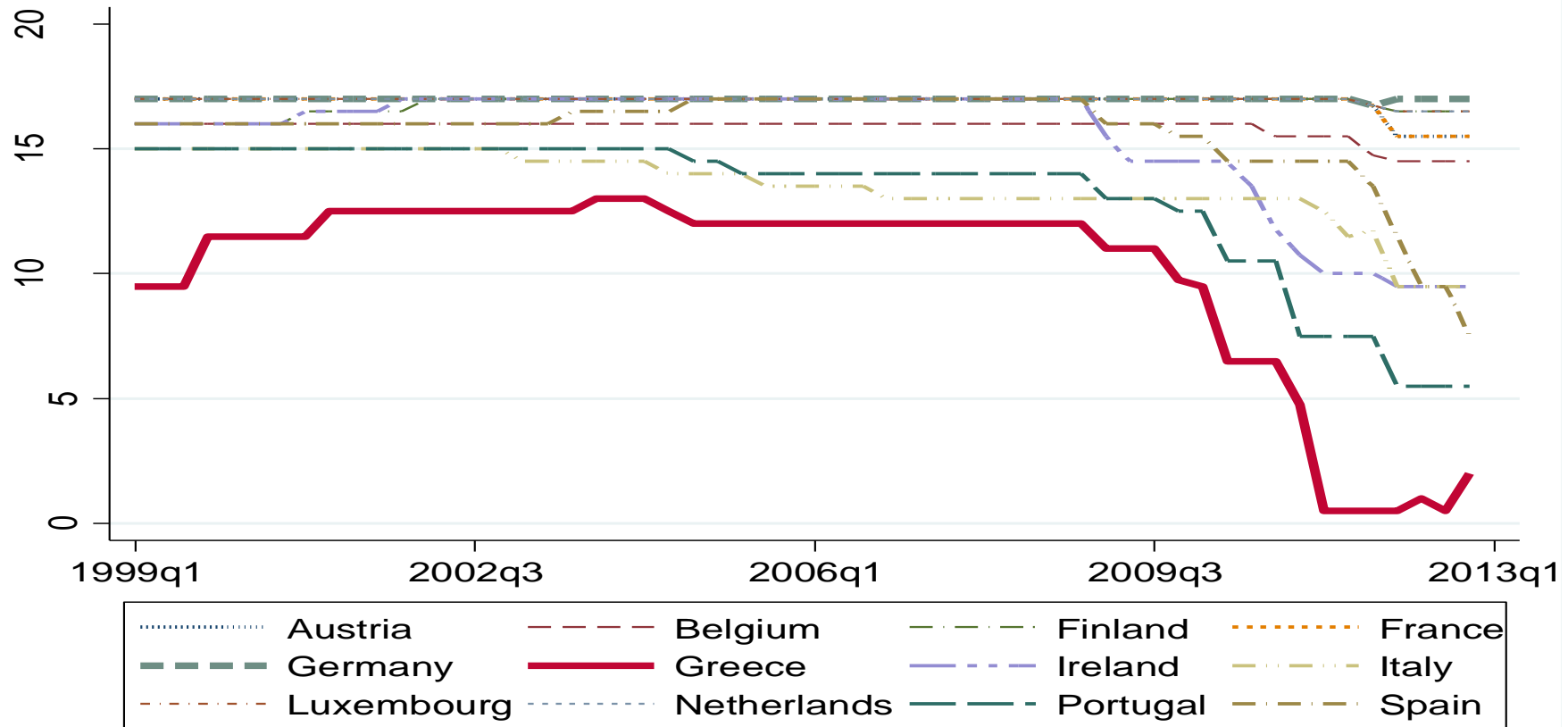


Figure 4.1. Standard and Poor's sovereign ratings for the original twelve Eurozone countries (1999- 2012); elaboration is based on the numerical transformation of ratings to a 1-17 scale, with 17 corresponding to AAA and 1 corresponding to any rating from CCC+ and below (source: S&P websites and author's elaboration)

avoid rejecting it is by modifying it. A way of doing so is by introducing the time-averages of the regressors in the initial equation. This is originally done by Mundlak (1978). More recently, it has been generalized by Hadjivassiliou (2011), while it has been brought into the context of sovereign rating determinants by Afonso *et al.* (2011b). In particular, following here the methodology of Afonso *et al.* (2011b), if the original RE equation we want to estimate is

$$R_{it} = \beta X_{it} + \lambda Z_i + a_i + \mu_{it} \quad (4.1)$$

where R_{it} is the quantitative measurement of the rating, X_{it} and Z_i are the sets of time varying and time invariant variables respectively, a_i is the country specific error, and μ_{it} is the independent across time and space disturbance, the idea is to express a_i as

$$a_i = \eta \bar{X}_i + \varepsilon_i \quad (4.2)$$

where by definition ε_i is uncorrelated with the regressors. Now we can re-write the original equation as

$$R_{it} = \beta X_{it} + \lambda Z_i + \eta \bar{X}_i + \varepsilon_i + \mu_{it} \quad (4.3)$$

which can then be re-written as

$$R_{it} = \beta(X_{it} - \bar{X}_i) + (\eta + \beta)\bar{X}_i + \lambda Z_i + \varepsilon_i + \mu_{it} \quad (4.4)$$

Afonso and his colleagues claim that under this specification $\delta = \eta + \beta$ can be interpreted as expressing the long term effect of the regressors upon the ratings, while β can be seen as capturing the short-term effects. Moreover, as the authors write, this transformation can be considered to be successful if the coefficients η are significant and if the new equation satisfies the Hausman test, i.e. if there is no more correlation between the regressors and the new country specific error ε_i .

Satisfying the Hausman test means of course that the vector of coefficients β comes to be the same both for FE and the modified RE. This supports Mundlak (1978) who argues that the choice between FE and RE is essentially an imaginary dilemma which evaporates once RE is properly modified. Hence the only difference between the two approaches is the fact that the modified RE explains the country specific heterogeneity by the time-averages of the regressors, while in the case of FE all heterogeneity is amalgamated in one country specific term. In addition RE provides the advantage that it allows us to include any sort of additional time invariant measurements we might wish to test.

Although in the models of the current chapter I mainly include time-varying regressors, I want to preserve the space for time invariant measurements too. Hence in what follows I run the regressions using both methods and jointly report their results.

4.4.2 Model Specification Strategy

Since the purpose of the chapter is to test for evidence of amplified movements of sovereign ratings, I need to keep a certain measurement of reality as fixed and contrast the ratings against it. Notice however that what I need to specify is not a model that reflects the social and economic reality in terms of how I do conceptualize it, but rather in terms of what variables, criteria and rules are supposed to matter for CRAs (this is a methodological mistake that can be found for instance in Eissfeller *et al.*, 2014). It would also be futile to aim for a model specification that would follow the routine path of maximizing the fitness of the econometric model to the actual ratings, since in that case I would be essentially adjusting the image of the real world to the image of the ratings. On the other hand, it is still important to come up with some reasonable degree of fitness (captured here by the ' R^2 - within' measurement), so as to protect the results against the potential issue of omitted variables.

Although CRAs often publish and update documents that provide key insights of how they derive their sovereign ratings (see for example Fitch, 2014; Moody's, 2013; S&P, 2013), they never reveal the precise model they follow. This is instead approximated by the literature reported above that aims to capture the variables that matter for sovereign ratings. Given the relatively high R^2 values reported in most of those articles, and the meaningful economic significance for the variables they incorporate, I use some of the most cornerstone and recent of those papers as my benchmark. Against such benchmark I then contrast the actual ratings produced by the three CRAs. My strategy involves the adoption of three different models for sovereign ratings.

Since any benchmark model is to an extent arbitrary, the idea of using more than one model specifications simply intends to provide some robustness for the results. Based on the above:

- I first specify the *Basic Model*, based on Cantor and Packer (1996), the first and most cornerstone paper of the relevant literature. This model includes six time-varying explanatory variables: per capita income, real GDP growth, inflation, fiscal balance, external balance and external debt.
- I update the model by considering an extra set of six explanatory variables, based on two of the most recent and complete papers of that literature (Afonso *et al.*, 2011b and Canuto *et al.*, 2012). The new model is labelled as the *Extended Model*; on top of the abovementioned six variables, it also includes public debt, foreign reserves, trade openness, unemployment, domestic credit and government effectiveness. Other than the fact that this model includes what other scholars have found to be significant, it is also worth mentioning that this specification encompasses variables from all the families of variables that CRAs claim to use for their analyses. Note that the precise categorizations are similar but not identical; for instance S&P, 2013 uses a classification of five families, separating between political, economic, external, fiscal, and monetary variables.
- I narrow down the Extended Model by dropping out those variables that are statistically insignificant and that exhibit high levels of multicollinearity; the main criterion used to detect multicollinearity is the Variance Inflation Factor, VIF; following Baum, 2006 10 is taken as the threshold VIF value. The new model is named as the *Specific Model*. In conjunction with what was discussed above, it is important to mention that this Specific Model does

not aim to be “the model” for Eurozone ratings, but simply to remove the unnecessary noise of the Extended Model so as to produce more accurate standard errors for the regressors already suggested.

Let me also note that the three papers utilized for these models also incorporate some time-invariant measurements, namely the level of economic development of each country, countries’ default history as well as some dummies that account for geographical discrepancies. Those variables were not taken up in the current case simply because my area of investigation is the Eurozone, which is by definition a set of developed countries (at least up to the crisis), with no recent defaults occurring for any of the member-states since the formation of the EU in 1991. To account for geographical heterogeneity I included a dummy for European periphery countries (Greece, Ireland, Italy, Spain and Portugal), which nonetheless did not exhibit any remarkable level of statistical significance (see below).

In all the regressions, all right hand variables are included with a lag, so as to tackle contemporaneous endogeneity.¹⁶ Moreover, I use the Huber-White heteroskedasticity robust estimator. Note that when the robust option is included in Stata, observations are also automatically clustered by country. Furthermore, all regressions are repeated for all the three main CRAs (S&P, Moody’s and Fitch).

Essentially, the approach developed aims in capturing evidence of exaggerated downgrades in sovereign ratings based on the residuals of the above models and interpret such evidence as a reflection of panicked behaviour

¹⁶ For the sake of completeness I also tried to run a FE GMM version of the Specific Model, using the six dimensions of public governance of the World Bank as instruments for the budget deficit and the public debt. For an analytical discussion and illustration of the results see Appendix C in the end of the chapter.

from the side of CRAs. In that sense the key criterion for confirmative evidence is the following

$$\textit{econometric rating} - \textit{actual rating} > 0 \quad (4.5)$$

Having established such condition, it is quite straightforward to see that the bigger the continuous time interval the condition is satisfied in a country, the more systematic the evidence in support of the hypothesis.

A note of caution should be added here: it would be fair to argue that trying to give a reading to the residuals of a model can be questioned on the grounds that we cannot really know what lies behind them. At the same time, it is known from theory that the phenomena linked with uncertainty are by definition unmeasurable, so that any attempt to quantify and plug them into an econometric model would create a serious issue of inconsistency. Hence, although my methodology can empirically support the existence of exaggerated drops in European sovereign ratings, it cannot exclude any alternative interpretation of the results.

Tables 4.1 and 4.2 provide the pairs of correlations and the summary statistics of all the explanatory variables. The precise description of all the variables along with the related data sources are reported in Appendix A of the chapter.

4.4.3 Numerical Transformation of Ratings

Table 4.1. Correlation Matrix

	Per Capita Income	Real GDP Growth	Inflation Rate	Fiscal Balance	External Balance	External Debt	Public Debt	Reserves	Unemployment	Government Effectiveness	Trade Openness	Credit to GDP	Liabilities of MFIs to NCB
Per Capita Income	1.00												
Real GDP Growth	0.08	1.00											
Inflation Rate	-0.02	0.31	1.00										
Fiscal Balance	0.29	0.41	0.26	1.00									
External Balance	0.63	0.19	-0.21	0.44	1.00								
External Debt	0.31	-0.28	-0.03	-0.51	-0.30	1.00							
Public Debt	-0.57	-0.34	-0.07	-0.53	-0.40	0.01	1.00						
Reserves	-0.56	-0.07	0.03	-0.01	-0.23	-0.33	0.33	1.00					
Unemployment	-0.41	-0.28	-0.16	-0.53	-0.35	0.25	0.45	0.16	1.00				
Government Effectiveness	0.38	0.27	-0.15	0.50	0.64	-0.38	-0.63	-0.23	-0.41	1.00			
Trade Openness	0.92	0.09	0.08	0.22	0.47	0.46	-0.54	-0.52	-0.32	0.24	1.00		
Domestic Credit	0.28	-0.33	-0.20	-0.37	-0.04	0.47	-0.23	-0.31	0.14	-0.08	0.30	1.00	
Liabilities of MFIs to NCB	-0.04	-0.44	-0.16	-0.46	-0.11	0.49	0.44	-0.11	0.57	-0.31	0.03	0.23	1.00

Source: Eurostat, IMF IFS and author's elaboration

Table 4.2. Summary Statistics

	Full Sample (1999q1- 2012q4)			Pre-Crisis Sub-Sample (1999q1- 2008q3)			Post-Crisis Sub-Sample (2008q4- 2012q4)		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
Per Capita Income	672	29.53	13.26	468	28.04	12.19	204	32.93	14.92
Real GDP Growth	660	0.40	0.71	456	0.65	0.56	204	-0.14	0.71
Inflation Rate	660	0.57	0.27	456	0.62	0.23	204	0.46	0.31
Fiscal Balance	672	-2.51	4.33	468	-1.06	3.11	204	-5.82	4.91
External Balance	660	0.05	5.94	456	0.12	6.12	204	-0.11	5.54
External Debt	648	368.34	159.36	444	330.88	132.90	204	449.86	180.70
Public Debt	624	67.35	31.82	420	61.03	29.02	204	80.36	33.41
Reserves	660	9.67	7.67	456	9.82	8.11	204	9.35	6.59
Unemployment	672	7.97	3.84	468	7.20	2.66	204	9.73	5.29
Government Effectiveness	672	1.48	0.51	468	1.54	0.50	204	1.36	0.51
Trade Openness	660	172.96	216.98	456	167.00	207.73	204	186.28	236.33
Domestic Credit	664	118.51	42.47	460	106.24	33.69	204	146.17	47.07
Liabilities of MFIs to NCB	659	3.19	4.34	455	2.03	1.39	204	5.78	6.85
	Full Sample (1999q1- 2012q4)			Periphery Countries Subsample (1999q1- 2012q4)			Core Countries Subsample (1999q1- 2012q4)		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
Per Capita Income	672	29.53	13.26	280	22.23	7.92	392	34.74	13.84
Real GDP Growth	660	0.40	0.71	275	0.35	0.84	385	0.45	0.61
Inflation Rate	660	0.57	0.27	275	0.65	0.31	385	0.52	0.22
Fiscal Balance	672	-2.51	4.33	280	-4.57	5.07	392	-1.03	2.95
External Balance	660	0.05	5.94	280	-5.03	4.34	380	3.79	3.81
External Debt	648	368.34	159.36	280	432.18	156.54	368	319.76	143.76
Public Debt	624	67.35	31.82	260	79.83	34.68	364	58.44	26.23
Reserves	660	9.67	7.67	280	11.43	9.79	380	8.37	5.27
Unemployment	672	7.97	3.84	280	9.94	4.55	392	6.56	2.39
Government Effectiveness	672	1.48	0.51	280	1.03	0.45	392	1.80	0.23
Trade Openness	660	172.96	216.98	280	102.76	72.34	380	224.68	267.74
Domestic Credit	664	118.51	42.47	272	128.51	48.20	392	111.57	36.48
Liabilities of MFIs to NCB	659	3.19	4.34	267	4.38	6.31	392	2.38	1.73

Source: Eurostat, IMF IFS and author's elaboration

As shown earlier, sovereign ratings are reported in alphabetical scores by all three CRAs. Thus, in order to be able to use them for my analysis I need to convert them into numbers. This is usually done by using some sort of linear numerical scales.¹⁷ The precise configuration (i.e. whether it is going to be 1 to 17 or 5 to 100) does not matter since the numbers are of an ordinal nature. However there can be some issues related with the efficiency of econometric estimations. This is pointed out by Afonso *et al.* (2007) who suggest putting all observations below B- into the same category. As they note, due to the relevant scarcity of such observations it can be hard to estimate efficiently the threshold points between these bottom rating categories.

In the case of the current project, it can be seen that there are indeed very few observations below B- (based on the average ratings of the three agencies, there are only 7 out of the 576 observations where the ratings are in the 'substantial credit risk' territory or below). Hence, following Afonso and his colleagues, I also adopt the 1 to 17 scale for my estimations (see Table 4.3).

Other than that, I also utilize the credit outlook and 'watch' scores provided by CRAs. These are forward looking estimations of what rating changes to expect in the future, with the "review/ watch" notifications reflecting possible developments within the next 90 days, and the "outlook" announcements providing a similar idea for a two years horizon. For my purposes I convert outlook scores into an extra 0.5 point which is added or subtracted to the actual rating. Similarly the review/ watch notifications correspond to an extra 0.25. Whenever outlook and credit watch scores

¹⁷ Non-linear numerical transformations can also be found in literature (see for instance Ferri *et al.*, 1999, Afonso, 2003 and Afonso *et al.*, 2007). However as Afonso *et al.* (2007) report, results do not change much compared as with the linear specification.

Table 4.3. Numerical Transformation of Sovereign Ratings

credit quality	S&P	Moody's	Fitch	1-17 scale
	long term	long term	long term	
highest	AAA	Aaa	AAA	17
very high	AA+	Aa1	AA+	16
	AA	Aa2	AA	15
	AA-	Aa3	AA-	14
high	A+	A1	A+	13
	A	A2	A	12
	A-	A3	A-	11
good	BBB+	Baa1	BBB+	10
	BBB	Baa2	BBB	9
	BBB-	Baa3	BBB-	8
speculative	BB+	Ba1	BB+	7
	BB	Ba2	BB	6
	BB-	Ba3	BB-	5
highly speculative	B+	B1	B+	4
	B	B2	B	3
	B-	B3	B-	2
substantial credit risk	CCC+	Caa1	CCC+	1
	CCC	Caa2	CCC	
	CCC-	Caa3	CCC-	
very high level of credit risk	CC	Ca	CC	
exceptionally high levels of credit risk	C	C	C	
Selective/ Restricted Default	SD		RD	
Default	D		D	
Outlook/ Watch conversion				
Positive Outlook	0.5			
Credit Watch- Developing	0.25			
Stable	0			
Credit Watch- Negative	-0.25			
Negative Outlook	-0.5			

Source: CRAs' websites and author's elaboration

Table 4.4. Basic Model

	S&P RE	S&P FE	Moody's RE	Moody's FE	Fitch RE	Fitch FE
Per Capita Income	0.051	0.05	0.056	0.057	0.056	0.06
	(0.9)	(0.87)	(0.9)	(0.89)	(1.01)	(1.02)
Real GDP Growth	0.794**	0.785*	0.900*	0.891*	0.725*	0.710*
	(1.99)	(2.02)	(1.88)	(1.9)	(1.93)	(1.96)
Inflation	-1.158**	-1.142*	-1.496**	-1.482*	-0.982	-0.968
	(-2.00)	(-1.97)	(-2.13)	(-2.11)	(-1.64)	(-1.60)
Fiscal Balance	0.063	0.056	0.091	0.084	0.072	0.063
	(0.82)	(0.72)	(1.06)	(0.97)	(0.94)	(0.8)
External Balance	-0.260***	-0.260**	-0.335***	-0.334**	-0.286***	-0.284**
	(-2.79)	(-2.79)	(-2.68)	(-2.69)	(-2.87)	(-2.88)
External Debt	-0.008**	-0.008**	-0.006*	-0.007*	-0.006**	-0.007*
	(-2.33)	(-2.40)	(-1.71)	(-1.80)	(-2.07)	(-2.20)
Per Capita Income (Time Average)	0.006		0.02		0.014	
	(0.05)		(0.17)		(0.1)	
Real GDP Growth (Time Average)	2.558		0.845		1.854	
	(1.12)		(0.44)		(0.87)	
Inflation (Time Average)	-7.503		-6.409		-8.229	
	(-1.33)		(-1.28)		(-1.43)	
Fiscal Balance (Time Average)	0.049		0.056		0.104	
	(0.21)		(0.28)		(0.45)	
External Balance (Time Average)	0.261		0.284*		0.223	
	(1.45)		(1.71)		(1.1)	
External Debt (Time Average)	0.003		0.001		0.001	
	(0.43)		(0.15)		(0.2)	
Constant	19.456***	17.327***	19.587***	17.036***	19.996***	16.655***
	(7.71)	(16.08)	(8.83)	(12.66)	(7.98)	(14.63)
N	626	626	626	626	626	626
rho	0	0.746	0	0.688	0	0.756
r2_overall	0.659	0.102	0.587	0.05	0.642	0.067
r2_between	0.843	0.005	0.846	0.133	0.814	0.053
r2_within	0.404	0.404	0.364	0.364	0.397	0.397

Notes: The dependent variable is the numerical equivalent of the sovereign rating of the respective CRA; RE and FE stand for Random and Fixed Effects respectively; regressions are based on the xtreg routine in STATA; heteroskedasticity robust standard errors are used; all variables are defined in Appendix A; all time varying right hand variables are included with a lag; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.

overlap, I only take into account the former since, as pointed out by the three CRAs, it is supposed to be of a more enduring nature.¹⁸

4.5 Results

4.5.1 Basic Model

Starting with the Basic Model, we can see in Table 4.4 that the overall fitness of the model ranges from 0.36 to 0.4 (throughout all comparisons I use the ' R^2 -within' of each FE model as a measurement of fitness). In addition, as discussed in the methodology section earlier, both the modified RE and the FE models give almost identical results. Concerning the signs and significances, we can see that for all specifications real GDP growth, inflation, external balance and external debt are the most significant variables. Furthermore, we observe that with the exception of external balance, the signs of all other variables are meaningful.

Most interestingly, we can observe in Figures 4.2 and 4.3 that for all peripheral countries of Eurozone the model supports the hypothesis that the panic element of CRAs' behaviour has played an active role behind the recent downgrades of their sovereign ratings. In particular we can see that for Greece and Portugal the actual ratings of all three rating agencies were significantly inflated prior to the crisis, followed by an exaggerated panic once the Eurozone

¹⁸ Note that in the case of Moody's publicly available credit outlook and watch scores are only reported from 2003 and on. Nonetheless, due to the relevant stability of European ratings in the 1999- 2002 period this lack of data should not have an important implication on my results.

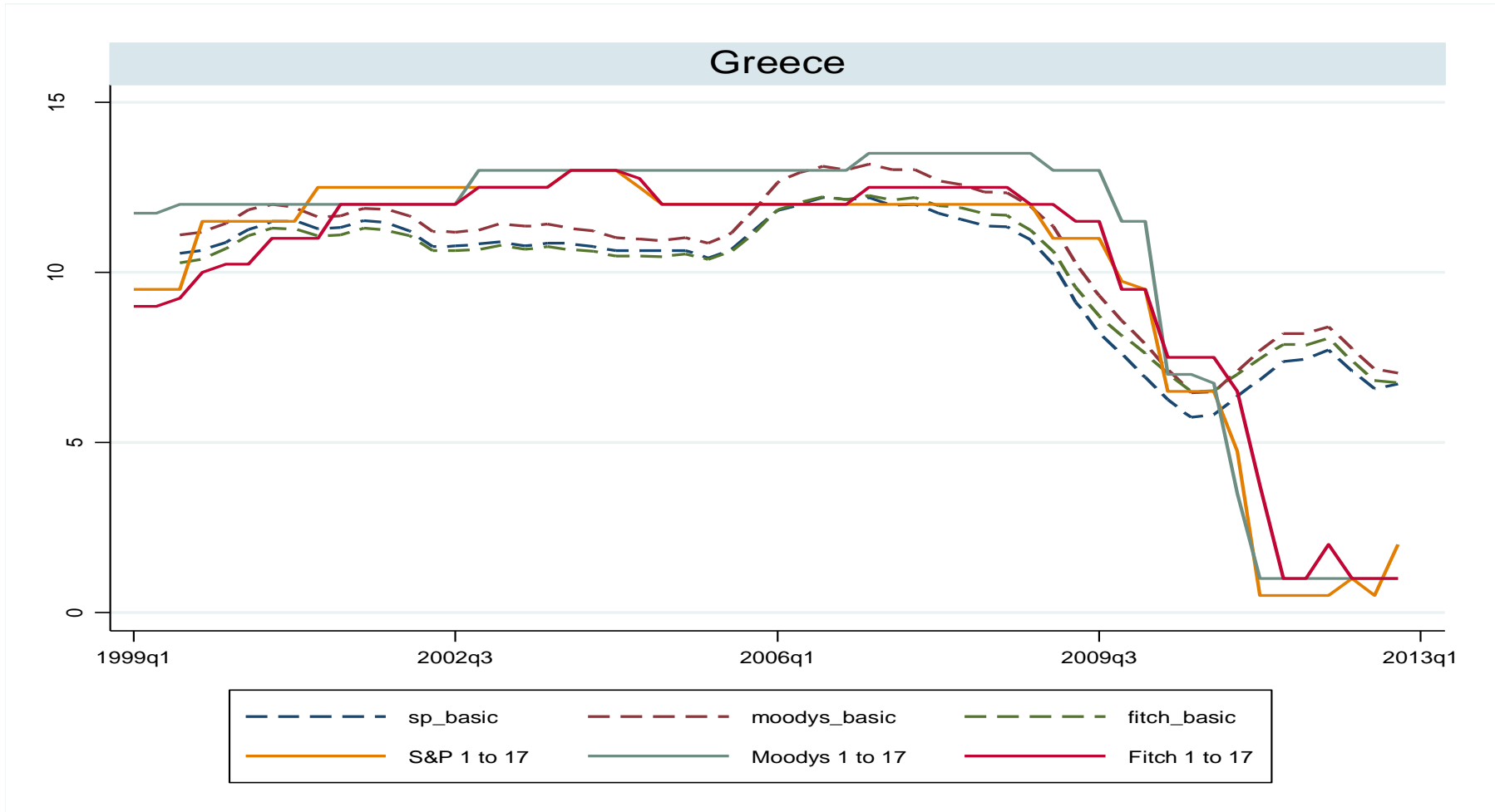


Figure 4.2. Comparison of the basic model for the three rating agencies (dashed lines) with the actual ratings for Greece (source: CRAs' websites and author's elaboration)

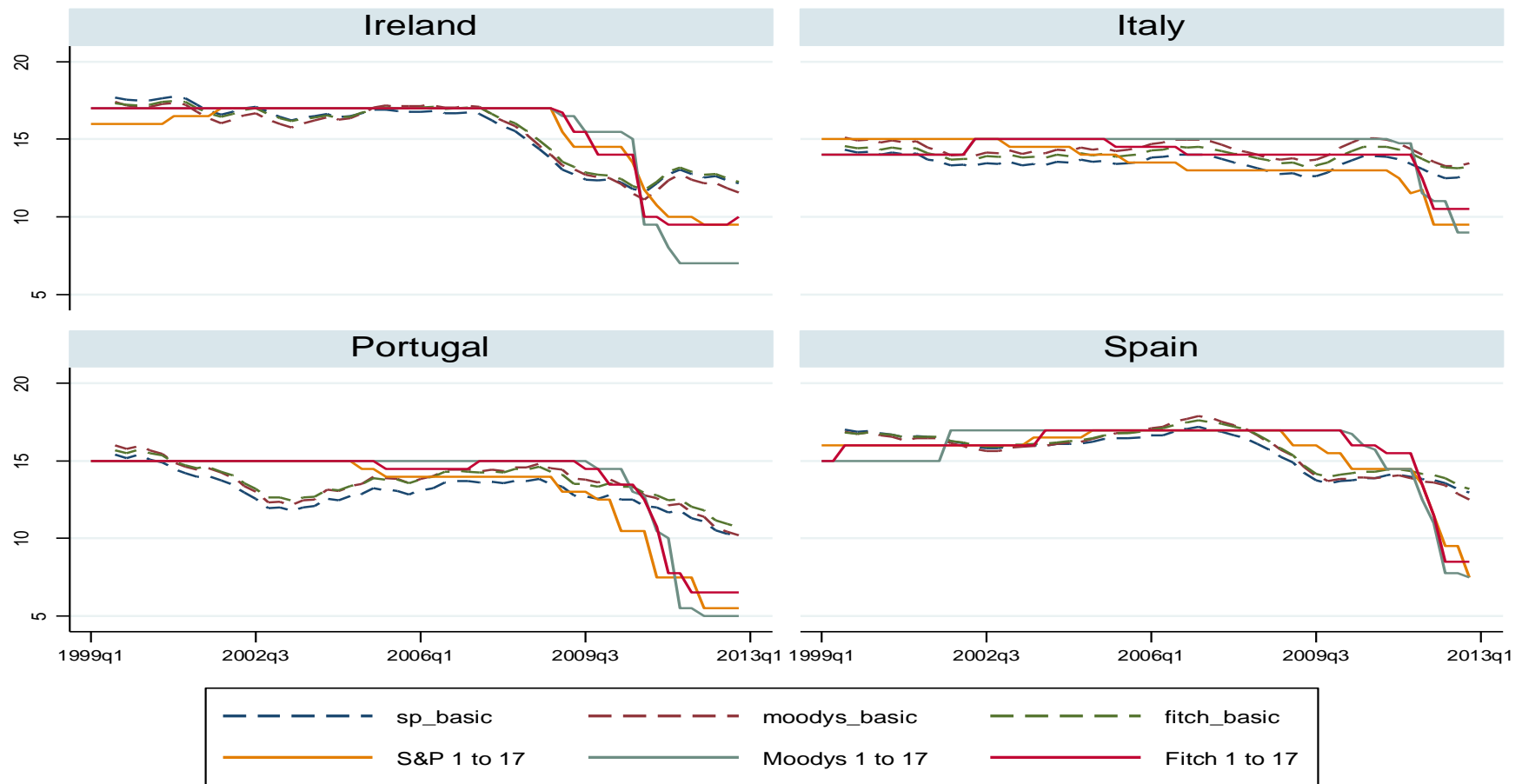


Figure 4.3. Comparison of the basic model for the three rating agencies (dashed lines) with the actual ratings for four peripheral countries (source: CRAs' websites and author's elaboration)

crisis broke out. For the other three countries, namely Italy, Ireland and Spain it seems that although there was no remarkable inflation of their rating scores before 2009, the outburst of the crisis triggered a similarly amplified reaction of CRAs against them. Of course such results are quite preliminary in the sense that the gap between actual and generated ratings can be due to a misspecification of the model. However their systematic repetition across all crisis-hit countries can be taken as a first indication in support of my hypothesis.

4.5.2 Extended & Specific Models

Given that their overall specifications are quite similar, the Extended and Specific models are jointly reported here (see Tables 4.5 and 4.6 respectively). As mentioned earlier, the only difference between the two is that in the Specific model the most insignificant and correlated variables are dropped out. To start with, we can see that for all three rating agencies, the fitness of these models is significantly improved compared with the Basic one, driving the R^2 -within to values between 0.81 and 0.85 (the reduction of R^2 -within is quite minimal when we move from the Extended to the Specific model).

The question of primary interest here is to check whether the post-crisis gap between the actual and generated ratings reported above narrows down as a result of the specification improvement. As illustrated in Figures 4.4 to 4.9, despite the fact that the gap partly shrinks, the models still offer robust evidence to the affirmative of my hypothesis. This can be easily seen in the cases of Greece, Spain and Italy, where the actual ratings are significantly lower

Table 4.5. Extended Model

	S&P RE	S&P FE	Moody's RE	Moody's FE	Fitch RE	Fitch FE
Per Capita Income	-0.002	-0.002	-0.006	-0.006	0.014	0.014
	(-0.06)	(-0.06)	(-0.11)	(-0.11)	(0.41)	(0.42)
Real GDP Growth	0.425***	0.425**	0.472**	0.472**	0.375**	0.375**
	(2.66)	(2.68)	(2.29)	(2.32)	(2.43)	(2.45)
Inflation	-0.822***	-0.822***	-1.226***	-1.226***	-0.817**	-0.817**
	(-3.91)	(-3.94)	(-3.30)	(-3.34)	(-2.34)	(-2.36)
Fiscal Balance	-0.153***	-0.153***	-0.161***	-0.161**	-0.132**	-0.132**
	(-4.01)	(-4.05)	(-2.91)	(-2.94)	(-2.45)	(-2.48)
External Balance	0.046	0.046	0.009	0.009	-0.001	-0.001
	(1.09)	(1.1)	(0.14)	(0.14)	(-0.02)	(-0.02)
External Debt	0	0	0.001	0.001	0	0
	(0.18)	(0.18)	(0.45)	(0.45)	(0.19)	(0.19)
Public Debt	-0.090***	-0.090***	-0.101***	-0.101***	-0.081***	-0.081***
	(-7.63)	(-7.70)	(-8.05)	(-8.13)	(-7.32)	(-7.39)
Foreign Reserves	-0.019	-0.019	-0.026	-0.026	-0.019	-0.019
	(-0.68)	(-0.69)	(-0.62)	(-0.63)	(-0.56)	(-0.56)
Unemployment	-0.322***	-0.322***	-0.376***	-0.376***	-0.311***	-0.311***
	(-4.83)	(-4.88)	(-4.08)	(-4.12)	(-3.71)	(-3.75)
Government Effectiveness	1.164	1.164	0.612	0.612	0.472	0.472
	(1.4)	(1.41)	(0.76)	(0.76)	(0.72)	(0.73)
Trade Openness	0.006**	0.006*	0.007*	0.007*	0.004*	0.004
	(2.06)	(2.08)	(1.95)	(1.97)	(1.67)	(1.68)
Domestic Credit	0.001	0.001	0	0	0	0
	(0.07)	(0.07)	(0.04)	(0.05)	(0.01)	(0.01)
Per Capita Income (Time Average)	0.512***		0.519***		0.490***	
	(11.82)		(8.63)		(12.86)	
Real GDP Growth (Time Average)	-7.821***		-8.426***		-7.764***	
	(-4.89)		(-5.15)		(-4.88)	
Inflation (Time Average)	1.538***		2.720***		1.615***	
	(4.24)		(5.04)		(3.95)	
Fiscal Balance (Time Average)	-0.655***		-0.553***		-0.627***	
	(-6.14)		(-4.76)		(-5.43)	
External Balance (Time Average)	-0.429***		-0.415***		-0.404***	
	(-6.63)		(-5.84)		(-7.56)	
External Debt (Time Average)	-0.022***		-0.024***		-0.022***	
	(-5.54)		(-5.73)		(-5.91)	
Public Debt (Time Average)	0.045*		0.055**		0.026	

	(1.71)		(2.11)		(1.03)	
Foreign Reserves (Time Average)	0.087		0.105		0.1	
	(1.27)		(1.48)		(1.54)	
Unemployment (Time Average)	0.622***		0.628***		0.549***	
	(6.03)		(4.85)		(4.51)	
Government Effectiveness (Time Average)	2.137***		2.102***		2.093***	
	(2.69)		(3.13)		(3.57)	
Openness (Time Average)	-0.011***		-0.012***		-0.010***	
	(-3.42)		(-3.35)		(-3.58)	
Domestic Credit (Time Average)	(omitted)		(omitted)		(omitted)	
Constant	5.047	21.466***	6.535	23.411***	7.751	21.932***
	(0.95)	(14.2)	(1.26)	(12.64)	(1.52)	(20.35)
N	592	592	592	592	592	592
rho	0	0.958	0	0.949	0	0.931
r2_overall	0.937	0.512	0.899	0.4	0.919	0.499
r2_between	1	0.488	1	0.361	1	0.451
r2_within	0.851	0.851	0.816	0.816	0.815	0.815

*Notes: The dependent variable is the numerical equivalent of the sovereign rating of the respective CRA; RE and FE stand for Random and Fixed Effects respectively; regressions are based on the xtreg routine in STATA; heteroskedasticity robust standard errors are used; all variables are defined in Appendix A; all time varying right hand variables are included with a lag; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.*

Table 4.6. Specific Model

	S&P RE	S&P FE	Moody's RE	Moody's FE	Fitch RE	Fitch FE
Real GDP Growth	0.550***	0.546***	0.471***	0.467**	0.395***	0.391**
	(3.33)	(3.29)	(2.89)	(2.89)	(2.92)	(2.92)
Inflation	-0.907***	-0.875***	-1.372***	-1.337**	-0.843**	-0.809*
	(-3.72)	(-3.61)	(-3.06)	(-3.04)	(-2.15)	(-2.11)
Fiscal Balance	-0.128***	-0.132***	-0.165***	-0.169***	-0.127**	-0.132**
	(-3.69)	(-3.79)	(-3.34)	(-3.41)	(-2.47)	(-2.54)
Public Debt	-0.089***	-0.090***	-0.099***	-0.100***	-0.082***	-0.082***
	(-7.33)	(-7.31)	(-8.25)	(-8.52)	(-7.44)	(-7.68)
Unemployment	-0.301***	-0.302***	-0.377***	-0.376***	-0.317***	-0.317***
	(-6.61)	(-6.44)	(-5.27)	(-5.35)	(-4.97)	(-5.00)
Trade Openness	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***
	(3.82)	(3.91)	(4.31)	(4.38)	(5.05)	(5.07)
Periphery Dummy	-1.152*		-0.767		-0.626	
	(-1.74)		(-1.15)		(-0.93)	
Real GDP Growth (Time Average)	0.985		-0.377		-0.116	
	(0.76)		(-0.30)		(-0.09)	
Inflation (Time Average)	-7.759**		-6.679*		-8.084**	
	(-2.07)		(-1.86)		(-2.15)	
Fiscal Balance (Time Average)	0.248		0.350*		0.275	
	(1.26)		(1.75)		(1.35)	
Public Debt (Time Average)	0.057***		0.070***		0.044***	
	(3.37)		(5.07)		(3.22)	
Unemployment (Time Average)	0.315***		0.381***		0.310***	
	(3.42)		(4.54)		(3.77)	
Openness (Time Average)	-0.006**		-0.006**		-0.006***	
	(-2.32)		(-2.57)		(-2.60)	
Constant	22.666***	22.840***	22.910***	24.449***	23.863***	22.623***
	(9.85)	(38.47)	(10.4)	(33.31)	(10.57)	(41.52)
N	604	604	604	604	604	604
rho	0	0.939	0	0.934	0	0.931
r2_overall	0.87	0.477	0.841	0.426	0.854	0.46
r2_between	0.893	0.404	0.876	0.373	0.885	0.397
r2_within	0.837	0.837	0.811	0.811	0.812	0.812

*Notes: The dependent variable is the numerical equivalent of the sovereign rating of the respective CRA; RE and FE stand for Random and Fixed Effects respectively; regressions are based on the xtreg routine in STATA; heteroskedasticity robust standard errors are used; all variables are defined in Appendix A; all time varying right hand variables are included with a lag; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.*

than the econometrically generated ones, while also exhibiting sharper movements. Similarly we can also observe an important difference in the slopes of the ratings of Portugal and Ireland, with the actual ones being significantly steeper in most of the cases. It is also worth noting that the results are highly similar across all three rating agencies.

Those findings give rise to some important insights. Based on them we can claim that CRAs have indeed exhibited significantly panicked reactions since the outset of the Eurozone crisis in 2009. In particular, the downgrades of the peripheral Eurozone states have clearly been more exaggerated compared to what macro 'fundamentals' would justify. This observation holds true both in terms of actual volume as well as speed (slope) of downgrading activity.

These results seem to confirm on one hand the findings of Ferri *et al.* (1999) on the procyclicality of sovereign ratings. In addition their systematic appearance is consistent with the hypothesis of the chapter in terms of interpreting them: if it is true that Keynesian uncertainty exists and if it therefore holds that people tend to exhibit feelings of panic, there is no reason why CRAs should not be suspected of doing the same. In the absence of the full set of information required for conducting accurate forecasting, CRAs are liable to panicked reactions same with every other economic agent. Although such behaviour might not be observable at first sight during periods of tranquillity, my results show that it becomes conspicuous during times of crisis and economic turbulence.

Concerning the models' coefficients and signs, it is mainly the Specific Model that can offer some reliable insights, since it is much clearer in terms of multicollinearity than the extended one (under the Specific Model all variables

hold VIF values below 10; see Table 4.7). Thus, other than the fact that all six time-varying variables of the Specific Model exhibit some robust significance, we can also see that five of them appear with meaningful signs.

Table 4.7. Levels of Multicollinearity Across the Different Models

	Basic Model	Extended Model	Specific Model	Bonus Model
External Debt	21.68	27.8		
Per Capita Income	20.77	57.08		
Inflation	5.54	7.78	5.77	5.82
External Balance	3.48	3.87		
Fiscal Balance	3.03	4.62	2.57	2.57
Real GDP Growth	1.66	1.8	1.67	1.78
Government Effectiveness		15.34		
Trade Openness		14.63	1.68	1.88
Domestic Credit		14.34		
Public Debt		12.15	7.81	12.81
Unemployment		8.99	6.58	8.45
Foreign Reserves		4.09		
MFI Liabilities to NCB				2.97
RR Public Debt				2.97
Mean VIF	9.36	14.37	4.34	4.91

Notes: based on FE regressions on the S&P ratings; multicollinearity measured by the Variance Inflation Factor- VIF; the value of 10 is used as a threshold (see Baum, 2006)

Source: Eurostat, IMF IFS and author's elaboration

Only exception is fiscal balance that systematically appears with a minus¹⁹. Although surprising at first sight, such result might be due to the fact that even triple-A countries such as Germany had been occasionally running increasing budget deficits (see above). Furthermore, out of all the variables related with external trade that had been included in the Extended Model (namely, external

¹⁹ In view of the relatively high correlation between fiscal balance and public debt I also tried to run the model without the latter. However the sign of fiscal balance did not change.

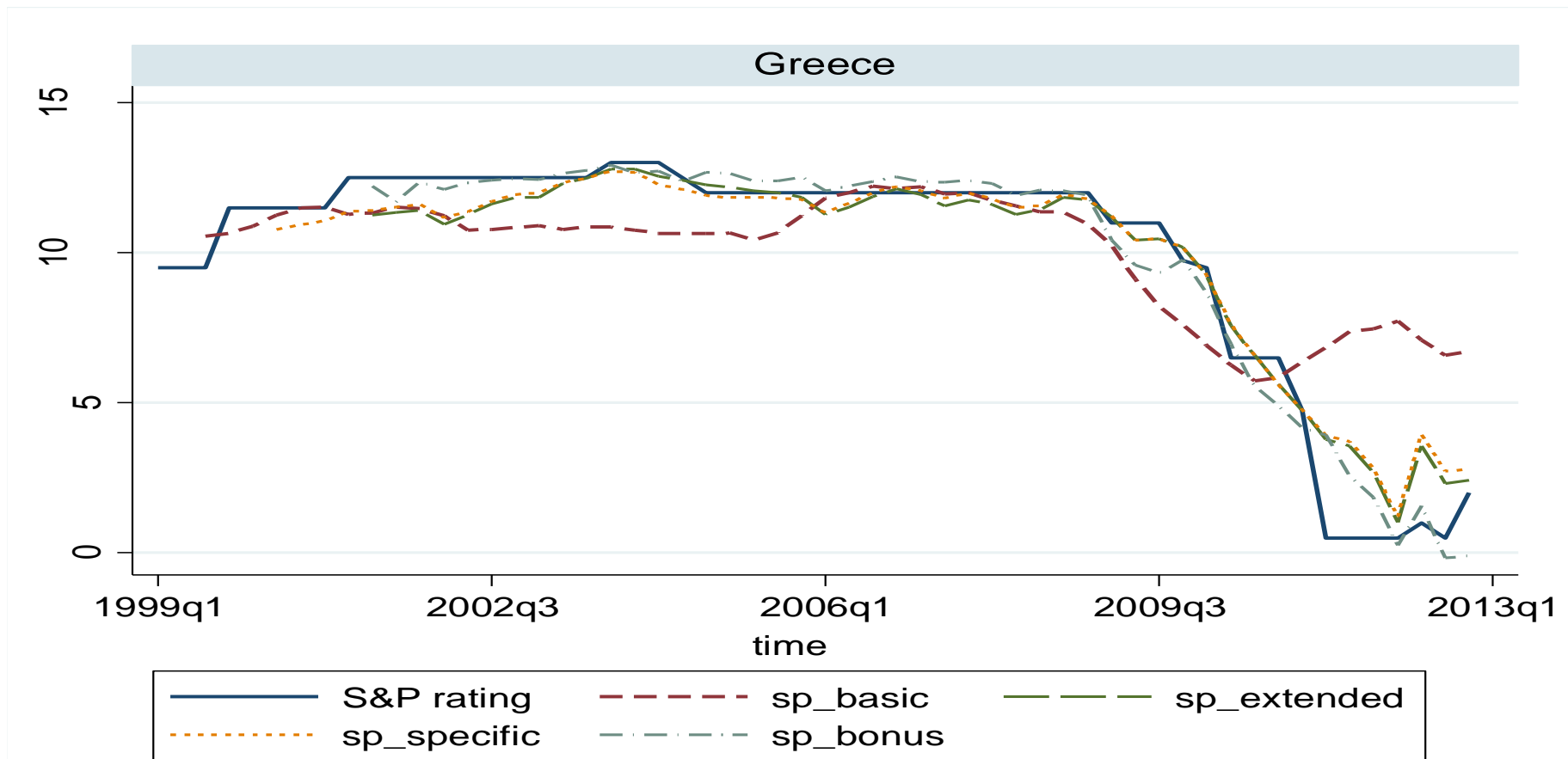


Figure 4.4. Comparison of the basic, extended, specific and bonus models with the actual Standard and Poor's ratings for Greece (source: S&P website and author's elaboration)

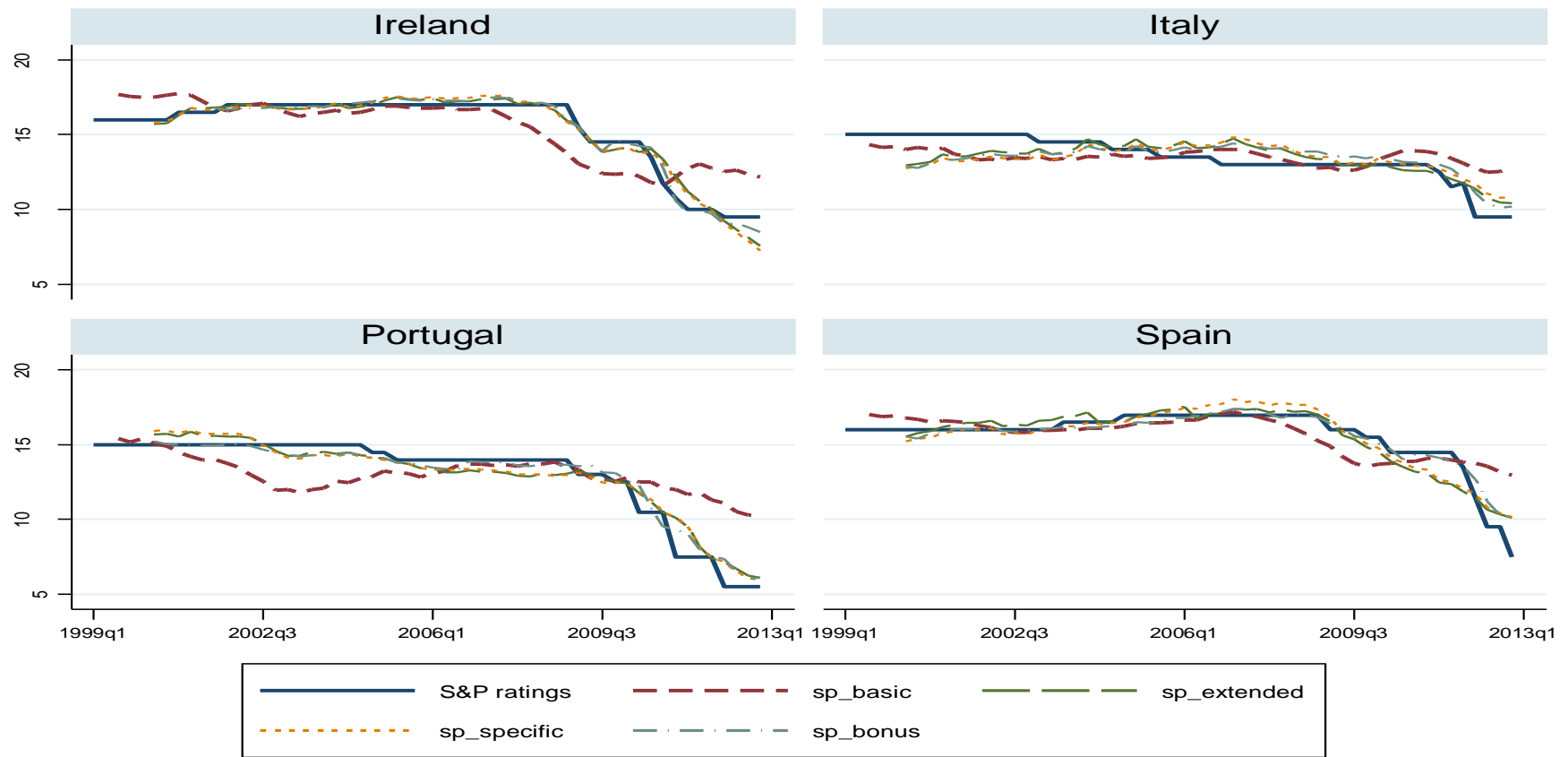


Figure 4.5. Comparison of the basic, extended, specific and bonus models with the actual Standard and Poor's ratings for four peripheral countries (source: S&P website and author's elaboration)

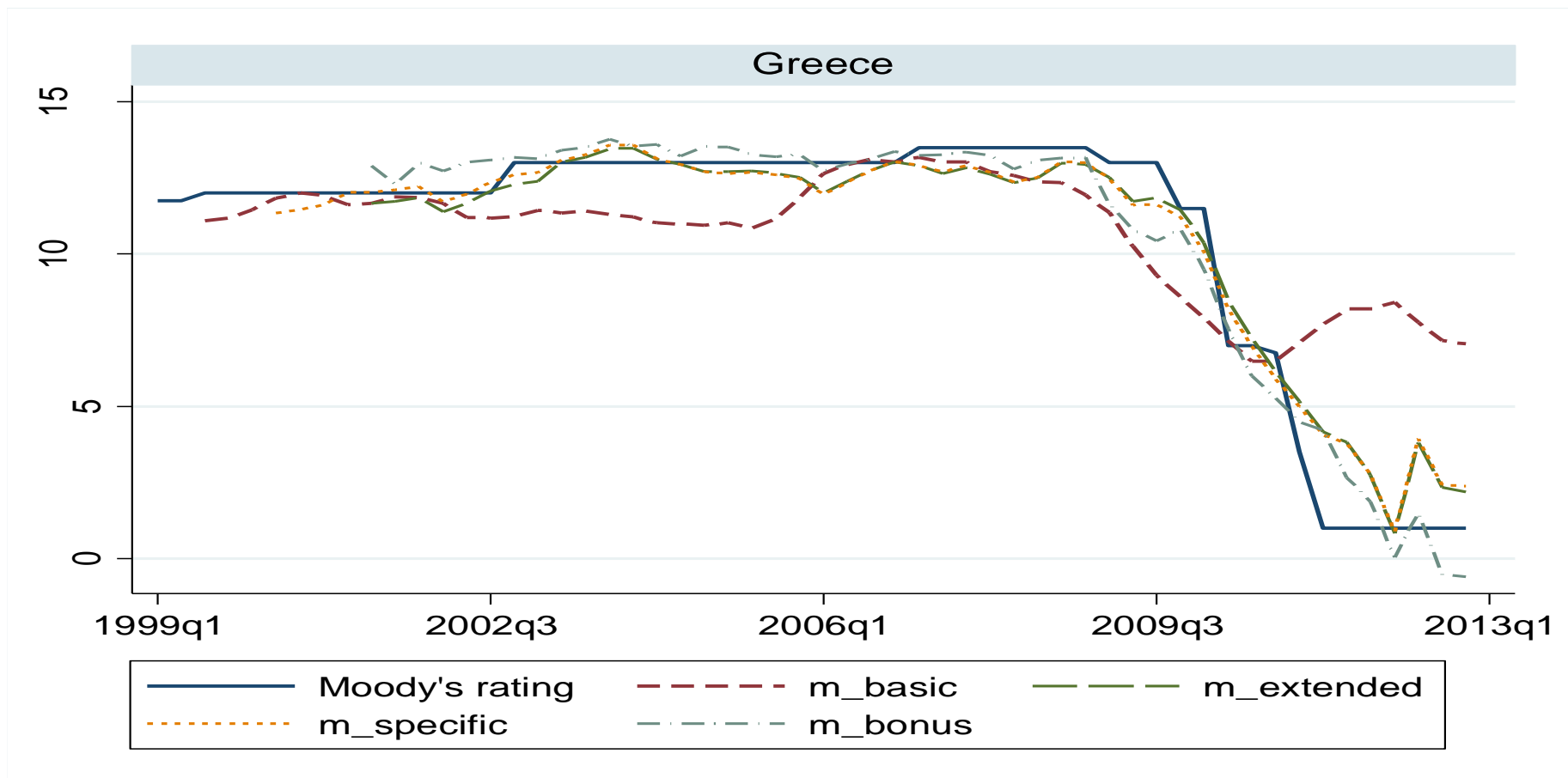


Figure 4.6. Comparison of the basic, extended, specific and bonus models with the actual Moody's ratings for Greece (source: Moody's website and author's elaboration)

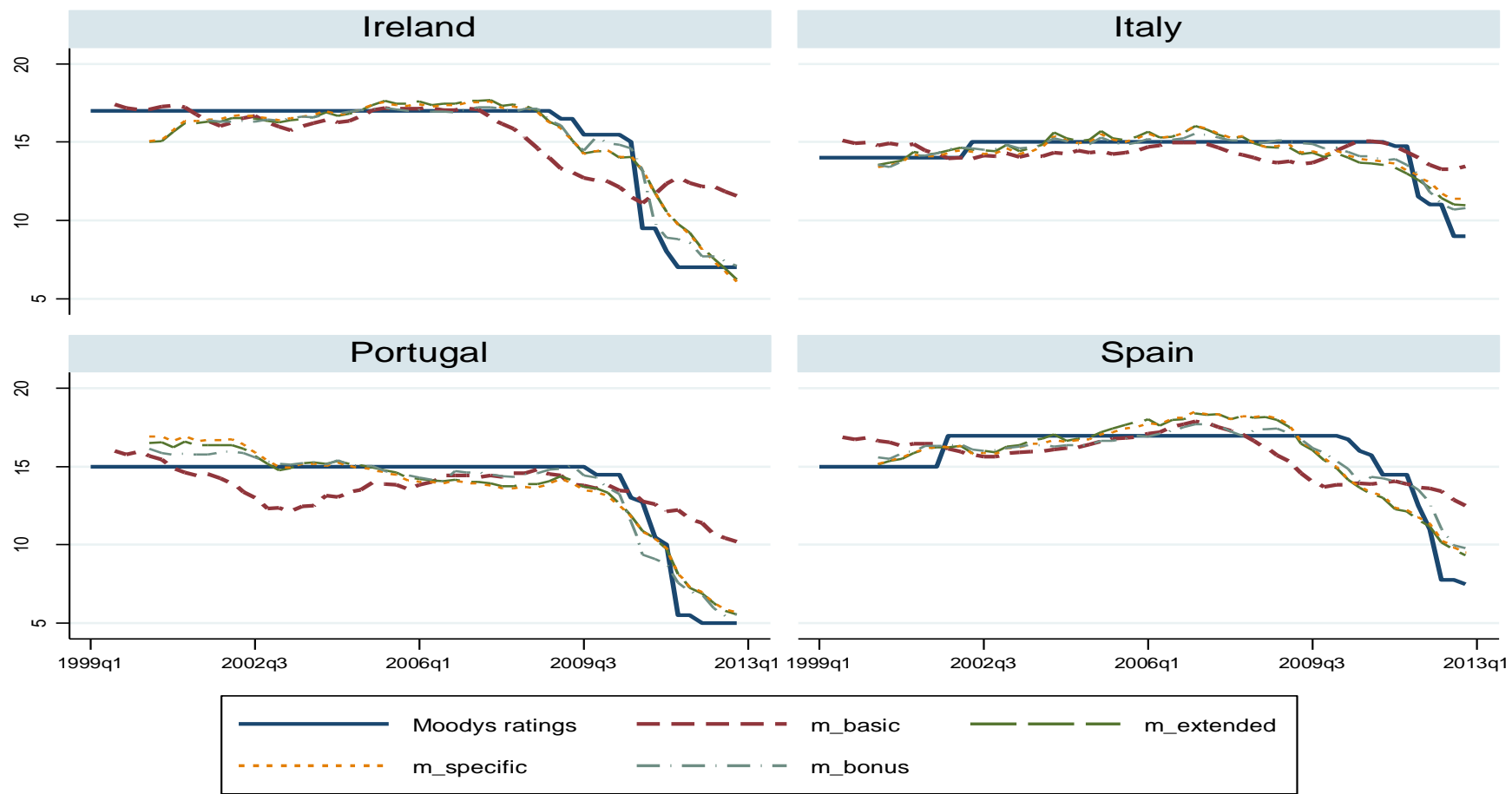


Figure 4.7. Comparison of the basic, extended, specific and bonus models with the actual Moody's ratings for four peripheral countries (source: Moody's website and author's elaboration)

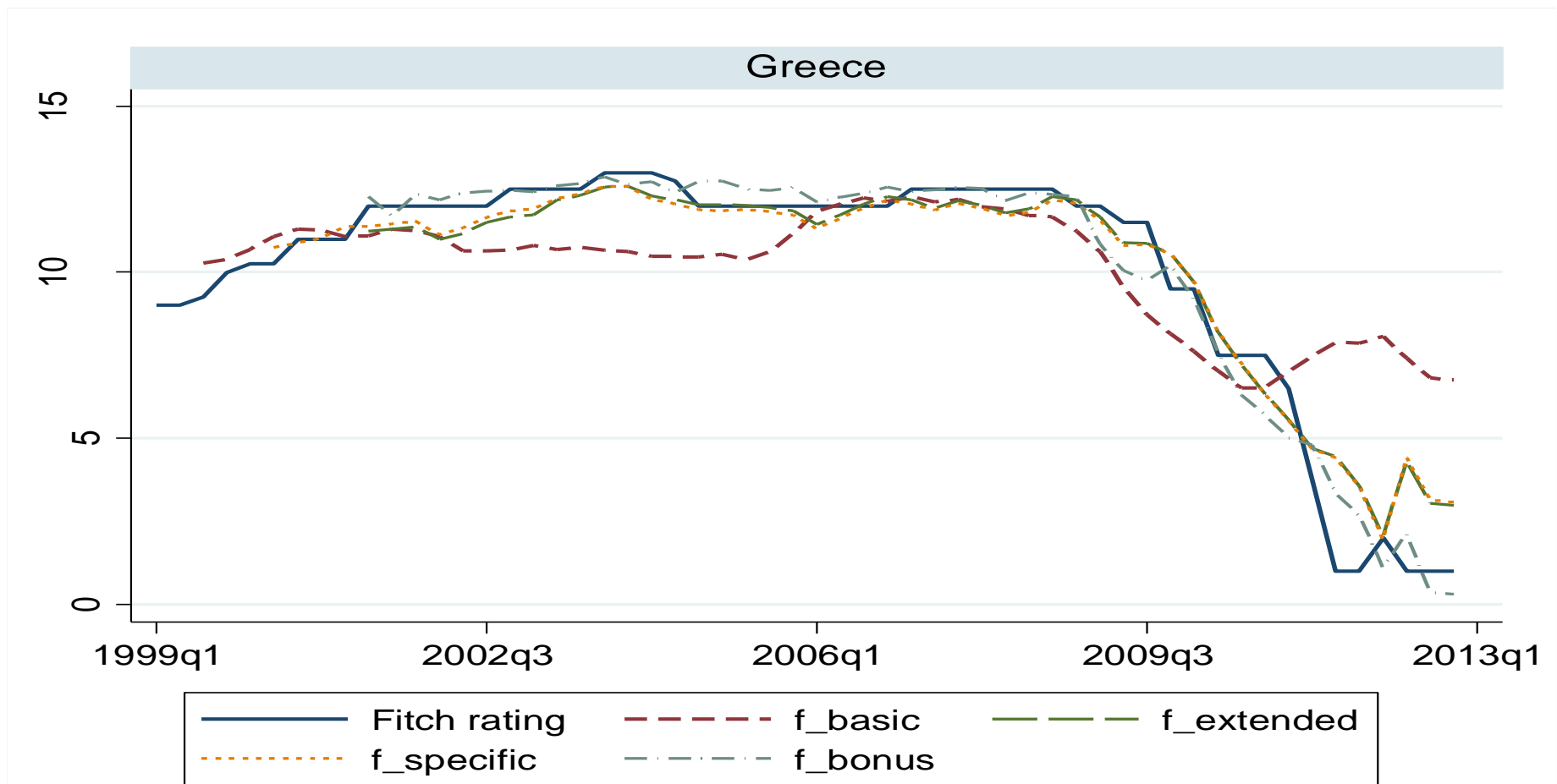


Figure 4.8. Comparison of the basic, extended, specific and bonus models with the actual Fitch ratings for Greece (source: Fitch website and author's elaboration)

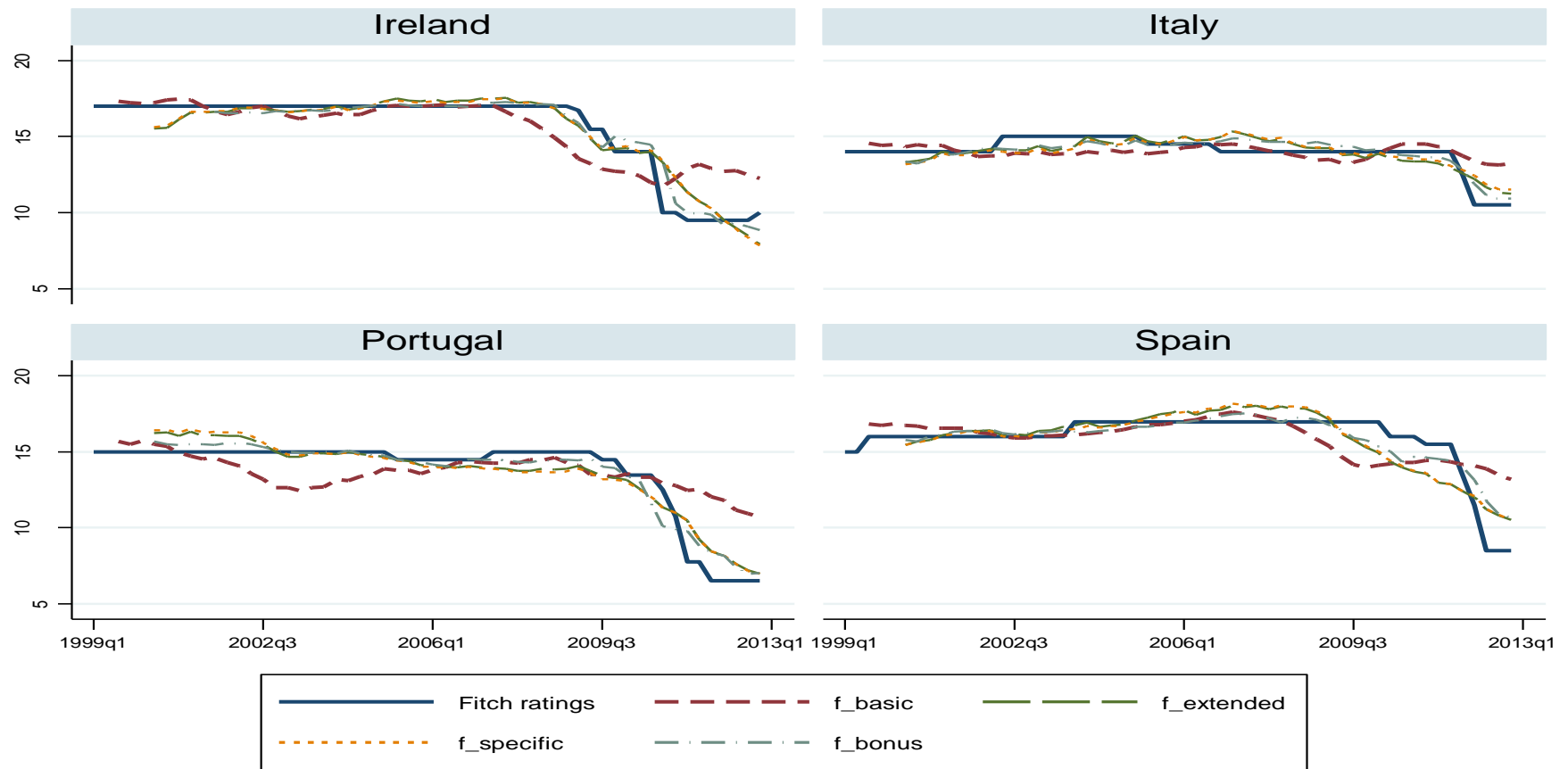


Figure 4.9. Comparison of the basic, extended, specific and bonus models with the actual Fitch ratings for four peripheral countries (source: Fitch website and author's elaboration)

balance, external debt, and trade openness), it was only openness that retained its statistical significance. This might be a reflection of the fact that although individual Eurozone member states have been quite open to international trade, Eurozone as a whole has been a relatively closed economy, with most of the trade conducted amongst member states. Lastly the periphery dummy, although with a negative sign as expected, did not exhibit any noteworthy significance. This might be because as discussed in Chapter 3, despite all five peripheral countries being in a debt crisis, it was different categories of debt that were ballooning in each country prior to 2009.

4.5.3 Further Robustness Checks

Two robustness checks are conducted here in order to further test the validity of the above results. First I try to see if the gap between actual and generated ratings is retained when I introduce two new variables into the specified models. Secondly, I test whether the results change significantly once I control for cross-sectional dependence (in its strong form).

4.5.3.1 Additional Insights from the Post Crisis World

Other than seeking for evidence of panicked reactions, there is also the interesting question of what else might matter for sovereign ratings. To answer the question I consider two variables that have not been taken up in relevant literature yet. In that fashion I expand the Specific Model by introducing i) an interactive term between public debt and a dummy that takes the value of 1

when public debt is higher than 90% of GDP (labelled as RR Public Debt)²⁰, and ii) a variable measuring the proportion of financial institutions' liabilities to the National Central Bank (NCB) in each country over the amount of total assets of such institutions (hereafter labelled as LiabToNCB). The intuition behind RR Public Debt reflects the hypothesis that CRAs do not necessarily follow some objective scientific measurements of the macroeconomy²¹, but are liable to certain habits of thought possibly related with what Keynes describes as social conventions. In that regard it connects with the discussion conducted in Chapter 2. Concerning the second variable, it will be shown that LiabToNCB can be taken as a multi-faceted variable, associated with financial distress, public interventions and political turmoil at the same time.

First, the perception that public debt is harmful for economic growth if exceeding the Reinhart and Rogoff threshold of 90% has not been proven to lie upon any objective scientific basis. Other than the celebrated critique of Reinhart and Rogoff's paper by Herndon *et al.* (2014), there remain three issues to point out. First correlation does not in any sense prove causality. Hence even if the negative correlation between public debt and growth was empirically robust, it would still be possible to use it in favour of conflicting narratives. That is, there is no reason why a high debt ratio should cause low growth, and not the other way around, i.e. low growth resulting in a high public debt ratio. Secondly, even if there were such threshold in public debt, there is no economic theory to justify a certain figure against another (i.e. why should the turning point be close to 90% and not let's say to 110%). Third, it can even

²⁰ I'm grateful to Prof. Malcolm Sawyer for pointing out the idea to construct such measurement.

²¹ There can of course be the question of whether such measurements exist at the first place.

be claimed that budget deficits, and correspondingly an increasing public debt are necessary for getting out of a recessionary spiral due to the state's capacity to run in a counter-cyclical manner (see for instance Lerner, 1943; Papadimitriou *et al.*, 2010; Arestis and Sawyer, 2013). It is in that sense that I argue that the perception of public debt as being harmful for growth once it exceeds 90% of GDP is nothing but a habit of thought.

Coming to the inclusion of the LiabToNCB variable I claim that such variable captures some key dynamics that are related with a crisis and a recession. Literally speaking LiabToNCB measures the liquidity provisions or else bailouts conducted by national and international authorities to support the domestic banking systems²². Interestingly such provisions have not only been a feature of the crisis hit peripheral countries, but were also part of the rescue packages towards banks of core Eurozone countries during the 2008/9 phase (see Figure 4.10).

Seen in the broader picture though, LiabToNCB does not only capture banking bailouts, but also reflects situations of financial distress that precede liquidity provisions, as well as the political cost that usually comes along for national governments (for a detailed outline of the recent financial distress experienced by European banks, see Van Rixtel and Gasperini, 2013). Moreover, in view of the central importance of the banking sector behind the recent economic turbulence, one can argue that those dynamics have been a key feature of the European crisis. As such they are also reflected- at least

²² Note that in the case of countries under the so called 'Troika' (IMF-ECB-EC) mechanism, liquidity provisions are channelled to banks through the National Central Banks of Eurozone member states.

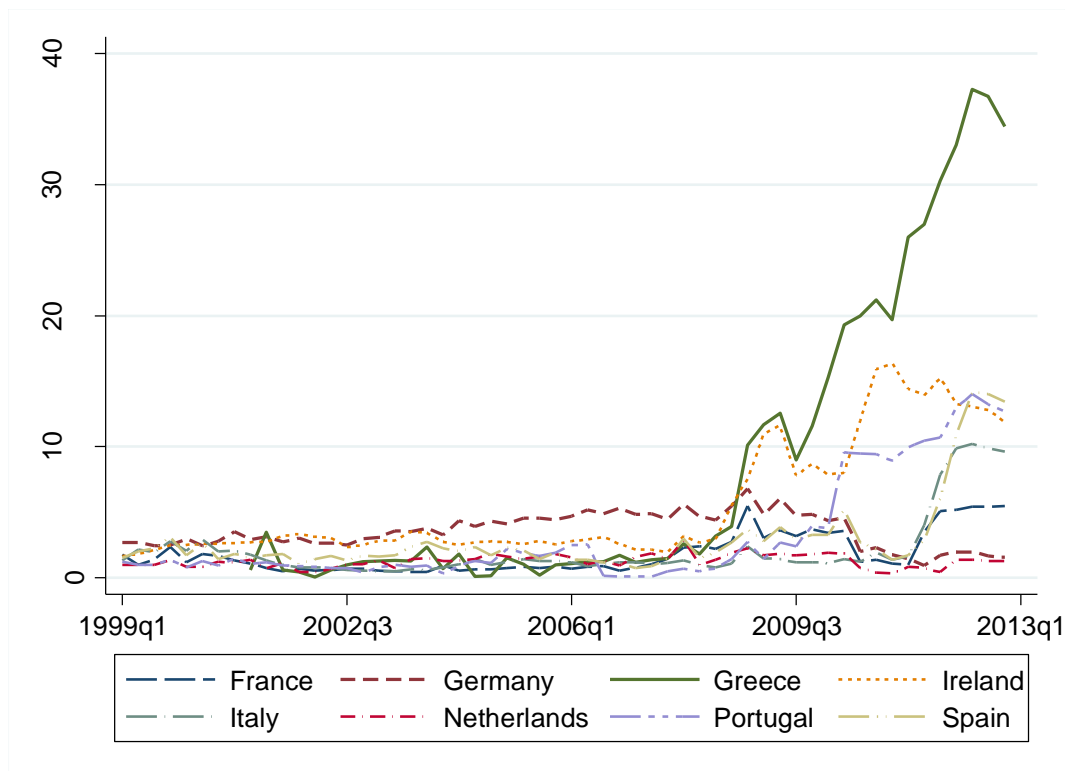


Figure 4.10. Liabilities of MFIs to National Central Banks over MFIs' total assets for selected EMU countries (source: Eurostat and author's calculations)

indirectly- on real GDP growth. Hence the significant negative correlation (close to -0.4) that LiabToNCB exhibits with real GDP growth should come as no surprise (see the correlation matrix above). Nonetheless I argue here that compared with GDP growth, which by construction amalgamates the dynamics of the entire economy, LiabToNCB offers a better trade-off between the general and the specific.

But how does LiabToNCB relate with the determinants of sovereign ratings? A way to interpret some possible significance here could be to state that it is a variable that CRAs look at before attributing their ratings. However this would be quite a frivolous way of interpreting econometric results. Instead

it seems to be more plausible to argue that it is the abovementioned package of information that CRAs look at. Although it is relatively straightforward that financial distress should be associated with uneasy feelings on the side of CRAs, the interesting question is to see how those agencies react to public interventions aiming to rescue and support domestic banking institutions. Here, S&P (2013: 22) notes that in view of the associated political cost required for such interventions, the overall success of such projects is far from obvious²³. Hence a negative sign of LiabToNCB would be an indicator that CRAs are not convinced by the projects and trajectories announced by European and international authorities, such as the ECB and the IMF, at least at the time when these become effective. This should not necessarily be taken as an indication that CRAs follow a different economic paradigm, but rather that those agencies are more “nervous” about the actual course of events.

Let me label the new model as ‘Bonus Model’. As shown by Table 4.8, both variables prove to be highly significant and with the anticipated signs (minus for both)²⁴. These results are consistent across all three CRAs. Moreover, under all three agencies the R^2 -within now gets values that range from 0.88 to 0.90. In particular, the fact that public debt’s importance is aggravated once its ratio over GDP exceeds the 90% Reinhart and Rogoff threshold allows us to suspect that CRAs are indeed liable to habits of thought.

²³ The success of bailout projects, and especially the political terms they come along, can of course be questioned in several fronts, such as the implications and effectiveness of the associated austerity measures. However in the current chapter I limit the discussion on how such projects are perceived by CRAs.

²⁴ For the economy of space Table 4.8 only reports the modified RE regressions for each rating agency. I also tried to introduce the two new variables into broader econometric specifications such as the Extended Model. In all cases the variables retained their significances and signs.

Table 4.8. Bonus Model

	S&P RE		Moody's RE		Fitch RE	
		w Cr. Sect. Averages		w Cr. Sect. Averages		w Cr. Sect. Averages
Real GDP Growth	0.200***	0.410***	0.068	0.169	0.026	0.180*
	(3.21)	(2.77)	(0.6)	(0.83)	(0.3)	(1.76)
Inflation	-0.784***	-0.162	-1.276***	-0.635**	-0.756***	-0.227
	(-4.46)	(-0.74)	(-5.19)	(-2.54)	(-4.02)	(-0.96)
Fiscal Balance	-0.057***	-0.056***	-0.088**	-0.048	-0.053	-0.024
	(-2.93)	(-3.21)	(-2.49)	(-1.52)	(-1.45)	(-0.96)
Public Debt	-0.046***	-0.034***	-0.046***	-0.037***	-0.035***	-0.032***
	(-3.73)	(-2.81)	(-3.89)	(-3.60)	(-3.11)	(-3.13)
Unemployment	-0.180***	-0.164***	-0.248***	-0.208***	-0.190***	-0.158***
	(-3.36)	(-3.96)	(-4.64)	(-5.00)	(-4.91)	(-4.61)
Trade Openness	0.001	0.004***	0.001	0.002*	0.001	0.002**
	(1.26)	(2.9)	(0.69)	(1.87)	(1.39)	(2.27)
MFI Liabilities to NCB	-0.195***	-0.184***	-0.211***	-0.212***	-0.200***	-0.196***
	(-8.74)	(-8.10)	(-5.35)	(-5.60)	(-8.88)	(-9.66)
RR Public Debt	-0.013**	-0.014**	-0.020***	-0.020***	-0.016***	-0.016***
	(-2.28)	(-2.34)	(-3.73)	(-3.81)	(-3.00)	(-3.01)
Periphery Dummy	-1.117**	-1.049**	-0.633*	-0.575*	-0.585	-0.537
	(-2.52)	(-2.30)	(-1.81)	(-1.69)	(-1.60)	(-1.49)
Real GDP Growth (Time Average)	5.419***	5.359***	4.055***	4.033***	4.365***	4.279***
	(3.95)	(3.73)	(3.44)	(3.34)	(3.63)	(3.5)
Inflation (Time Average)	-5.795**	-6.494**	-3.996*	-4.812**	-5.519**	-6.192**
	(-1.99)	(-2.11)	(-1.72)	(-2.00)	(-2.20)	(-2.36)
Fiscal Balance (Time Average)	-0.07	-0.063	0.082	0.041	-0.027	-0.057
	(-0.42)	(-0.41)	(0.63)	(0.34)	(-0.19)	(-0.42)
Public Debt (Time Average)	0.062***	0.052***	0.079***	0.069***	0.052***	0.049***
	(4.46)	(4)	(6.58)	(5.09)	(5.21)	(5.7)
Unemployment (Time Average)	0.303***	0.285***	0.363***	0.322***	0.297***	0.262***
	(2.79)	(2.77)	(4.38)	(4.39)	(3.86)	(3.56)
Openness (Time Average)	0.002	-0.001	0.003	0.002	0.002	0.001
	(1.09)	(-0.42)	(1.58)	(1.14)	(1.38)	(0.87)
MFI Liabilities to NCB (Time Average)	-0.376**	-0.385**	-0.351***	-0.350***	-0.377***	-0.380***
	(-2.32)	(-2.35)	(-2.84)	(-2.78)	(-2.81)	(-2.82)
Real GDP Growth (Cross-Section Average)		-0.138*		0.181		0.056
		(-1.73)		(1.04)		(0.47)
Inflation (Cross-Section Average)		-0.824**		-0.629*		-0.847**
		(-2.38)		(-1.76)		(-2.48)

Fiscal Balance (Cross-Section Average)		-0.051		-0.195***		-0.114**
		(-1.28)		(-2.64)		(-2.08)
Public Debt (Cross-Section Average)		-0.004		-0.027		-0.005
		(-0.19)		(-1.50)		(-0.32)
Unemployment (Cross-Section Average)		-0.104		-0.064		-0.04
		(-0.55)		(-0.65)		(-0.37)
Openness (Cross-Section Average)		-0.011		0.003		0
		(-1.40)		(0.58)		(0.03)
MFI Liabilities to NCB (Cross Section Average)		-0.008		-0.019		-0.036
		(-0.18)		(-0.39)		(-0.68)
Constant	16.670***	19.985***	15.782** *	17.575***	17.124***	18.157***
	(9.01)	(8.34)	(9.61)	(8.46)	(9.84)	(9.17)
N	595	595	595	595	595	595
rho	0	0	0	0	0	0
r2_overall	0.936	0.942	0.922	0.929	0.936	0.941
r2_between	0.964	0.964	0.971	0.971	0.972	0.972
r2_within	0.9	0.913	0.881	0.895	0.89	0.901

*Notes: The dependent variable is the numerical equivalent of the sovereign rating of the respective CRA; RE stands for Random Effects ;regressions are based on the xtreg routine in STATA; heteroskedasticity robust standard errors are used; all variables are defined in Appendix A; all time varying right hand variables are included with a lag; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.*

Furthermore, the systematically high statistical significance of LiabToNCB indicates that all three CRAs have been disputing the capacity of the EU and the IMF to successfully contain the European crisis.

In conjunction with the results of the previous section, we can observe that the gap and the difference in slopes between actual and generated ratings do not change much for the peripheral countries of Eurozone (see the Bonus Model projections in the main graphs). This means that the results obtained earlier, supporting the hypothesis of panicked and exaggerated reactions on behalf of CRAs, are robust under the Bonus Model. Moreover it is interesting to notice that the inclusion of the two variables entirely removes the statistical significance from trade openness for all three CRAs, while it also removes the

significance of real GDP growth from the models of Moody’s and Fitch. This can be seen as a result of the important correlations between public debt and trade openness on one hand and real GDP growth and LiabToNCB on the other (see the correlation matrix).

4.5.3.2 Controlling for Cross- Sectional Dependence

Table 4.9. Cross-Sectional Dependence Test

	Basic Model		Extended Model	
	chi2(66)	Prob.	chi2(66)	Prob.
S&P	881.45	0	374.90	0
Moody's	842.61	0	412.76	0
Fitch	767.18	0	402.59	0
	Specific Model		Bonus Model	
	chi2(66)	Prob.	chi2(66)	Prob.
S&P	425.88	0	326.32	0
Moody's	365.02	0	341.82	0
Fitch	396.53	0	293.91	0

based on the Breusch-Pagan LM test for cross-sectional correlation (see Baum, 2001); Ho: No Cross-Sectional Dependence

To test for cross-sectional dependence I conduct the Breusch-Pagan LM test. As Table 4.9 indicates, the null hypothesis of no dependence is clearly rejected for all models and all rating agencies. For that reason, Table 4.8 also reports the results of the Bonus Model when controlling for strong cross-sectional dependence. The approach follows the insights of Pesaran (2006) and Bailey *et al.* (2014) and involves the incorporation of the cross-sectional averages in the RE regressions of all three rating agencies. As it can be seen, most of the results remain qualitatively similar for every rating agency. In addition there is only a slight improvement in the R^2 -within measurement of

the relevant regressions. From their side, both RR Public Debt and LiabToNCB manage to retain their signs and significances. Furthermore, we can observe that only the cross-section average of inflation is found to be systematically significant across all three CRAs²⁵.

4.6 Conclusion

Despite their widely acknowledged contribution to the 2007/08 financial crash, CRAs' role in the context of the Eurozone crisis has not received much attention. This gap is filled in the present chapter by studying the movements of sovereign ratings for the Eurozone peripheral countries. The flawed institutional structure of the monetary union, with no institution capable of acting as a LLR for member states, and the continuing European crisis underpin the power of CRAs towards EMU member states and bring into the fore a topic that so far has been mainly explored in relation to developing countries.

Key hypothesis is the idea that CRAs do not only conduct a technical analysis of the macroeconomy but also exhibit feelings of euphoria and panic. Such a hypothesis arises from the concept of fundamental uncertainty. Put simply, if it is true that in the face of uncertainty it is impossible to conduct accurate forecasting due to the a priori non-existence of the required set of knowledge, there is no reason to exempt CRAs from such reasoning. Hence, like all other economic agents, CRAs can get excessively excited and depressed.

²⁵ I also repeated the regressions by including the cross-section averages for the post crisis era only (using an interacting dummy that takes the value of 1 for all periods after 2008q3), so as to see whether they would pick up some further statistical significance. Nonetheless, the results were similar to the original specification.

At the methodological level, the chapter attempts to capture such exaggerated reactions by means of linear panel data econometrics. Using a number of benchmark models that aim at incorporating the key macroeconomic variables that are associated with CRAs' analyses, it seeks for evidence of systematic discrepancies between the econometric and the actual ratings of the crisis-hit EMU peripheral countries. To the extent that actual ratings are found to be systematically lower than the estimated ones throughout the post-crisis period, such evidence is taken as supportive of the hypothesis.

The chapter shows that since 2009 the sovereign rating downgrades of peripheral states have indeed been systematically exaggerated as compared with the macroeconomic 'fundamentals' that are supposed to matter for CRAs. While part of the gap might be dependent on the precise model configuration, the overall evidence is robust in the sense that the actual ratings of EMU periphery are systematically found to be too low under all specifications. Furthermore, results hold for all three CRAs and they pass a number of robustness checks. More specifically, the chapter shows how the discrepancy between actual and econometric ratings is retained even after accounting for two innovative variables into the model. These include an interactive term between public debt to GDP and a dummy that takes the value of one once the debt to GDP ratio exceeds the 90% threshold, and a variable measuring the proportion of domestic MFIs' liabilities to the central bank. An extension of the model with cross-sectional averages is also considered so as to account for cross-sectional dependence.

All in all, the findings of the present can be used in a number of ways. First it is interesting to see to what extent the component of panicked reactions

matters for financial instability. This is taken up in the following chapter that focuses on extreme capital flow movements. Secondly, if it is true that exaggerated reactions of CRAs are a result of fundamental uncertainty, and not an outcome of false incentives as suggested by existing literature (e.g. Ferri *et al.*, 1999), there are different policy implications to consider. This issue is further discussed in the concluding chapter of the thesis.

4.7 Appendix A- Variables Description

	Description	Unit	Source
Sovereign Ratings	Long Term Foreign Currency Ratings	Index numbers	S&P, Moody's and Fitch websites
Per Capita Income	GDP at Mkt Prices/ Population; quarterly figures are seasonally adjusted and multiplied by 4	Thousands of Euros	Eurostat
Real GDP Growth	Real GDP = Nom GDP/GDP Deflator * 100; seasonally adjusted	%	Eurostat
Inflation Rate	Inflation Growth Rate; Harmonized Consumer Price Index used; seasonally adjusted	%	International Financial Statistics IMF
Fiscal Balance	[(Total Public Revenues- Total Public Expenses)/ GDP]*100	%	Eurostat
External Balance	(Current Account Balance/GDP)*100	%	Eurostat
External Debt	(External Debt/ Total Exports)*100; External Debt is approximated by (portfolio account, debt instrument liabilities+other investment, liabilities); Total Exports are the summary of (goods, credit+ services, credit+ income, credit); quarterly ratio divided by 4	%	Eurostat
Public Debt	(General Government Debt/ GDP)*100; Maastricht Debt used; ratio divided by 4	%	Eurostat
Reserves	(Foreign Reserves/ Imports)*100; divided by 4	%	Eurostat
Unemployment	Total Unemployment Rate; seasonally adjusted	%	Eurostat
Government Effectiveness; Voice and Accountability; Political Stability and Absence of Violence; Regulatory Quality; Rule of Law; Evidence of Corruption	Indices reported in the World Governance Indicator Database; interpolated from annual to quarterly frequency; used 1998 as the entrance scores for 1999; copy pasted the 2000 values in 2001 cause the latter were missing	Index Numbers	World Bank
Trade Openness	Measured as [(Exports+Imports)/ GDP]*100	%	Eurostat
Domestic Credit	(Credit/ GDP)*100; Credit approximated by the "MFI claims on Other Sectors" account; national residency criterion used	%	International Financial Statistics IMF
Liabilities of MFIs to NCB	(Liabilities of MFIs to NCB/ Total Assets)*100; MFIs include all Domestic Monetary Financial Institutions (MFIs) other than the National Central Bank (NCB); Total Assets include: MFI claims on NCB; MFI Claims on Depository corporations in other EA countries; MFI claims on non-EA Residents; MFI claims on General Government and MFI Claims on Other Sectors (this classification follows the listing of data in the IMF IFS Database). National Residency applied in all cases.	%	International Financial Statistics IMF
Periphery Dummy	Taking the value of 1 for Greece, Spain, Ireland, Italy and Portugal	0 or 1	Constructed by the author

* Methodology applied for seasonal adjustment: weighted moving averages $(1/9)*x(t-2) + (2/9)*x(t-1) + (1/3)*x(t) + (2/9)*x(t+1) + (1/9)*x(t+2)$

** Divisions/ Multiplications by 4 have been done so as to bring the variables in the same scale with the corresponding annual ones

*** All growth rates have been computed based on the formula $\Delta X_t / X_{t-1}$

4.8 Appendix B- Main Features of the Fixed Effects and Random Effects Estimators

I briefly illustrate the main aspects of the Fixed Effects and Random Effects estimators here. Following Wooldridge (2002) and Baum (2006) let us assume the following panel data equation:

$$y_{it} = x_{it}\beta_k + z_i\delta + u_i + \varepsilon_{it} \quad (4.6)$$

where x_{it} is a $1 * k$ vector of variables that vary over country and time, β is the $k * 1$ vector of coefficients on x , z_i is a $1 * p$ vector of time-invariant variables that vary only over countries, δ is the $p * 1$ vector of coefficients on z , u_i is the country-specific effect, and ε_{it} is the disturbance term. With this as given, the essential difference between FE and RE is how to model the country-specific effect. Thus if u_i depends on the regressors x_{it} and z_i , it is best captured by FE. In contrast if it is thought to be independent, it is said to be random and hence RE is the most suitable method.

To illustrate how the FE estimator is derived, a within transformation can be conducted that removes the time invariant variables as well as the country specific effects:

$$y_{it} - \bar{y}_i = (x_{it} - \bar{x}_i)\beta_k + (z_i - z_i)\delta + (u_i - u_i) + \varepsilon_{it} - \bar{\varepsilon}_i \quad (4.7)$$

where $\bar{y}_i = \left(\frac{1}{T}\right) \sum_{t=1}^T y_{it}$, $\bar{x}_i = \left(\frac{1}{T}\right) \sum_{t=1}^T x_{it}$, and $\bar{\varepsilon}_i = \left(\frac{1}{T}\right) \sum_{t=1}^T \varepsilon_{it}$. This equation can also be labelled as

$$\widetilde{y}_{it} = (\widetilde{x}_{it})\beta + \widetilde{\varepsilon}_{it} \quad (4.8)$$

The FE estimator is nothing but the OLS estimator of the above equation:

$$\beta_{FE} = \left(\sum_{i=1}^N \widetilde{X}_i' \widetilde{X}_i \right)^{-1} \left(\sum_{i=1}^N \widetilde{X}_i' \widetilde{y}_{it} \right) \quad (4.9)$$

Such estimator essentially comes to be equivalent with a Pooled-OLS regression where N country specific dummies are included. Furthermore, as Baum (2006) writes FE will have explanatory power only if each country's fluctuations of y around its mean are significantly correlated with the fluctuation of the country's x variables around their means.

In the case of RE, the assumption of independence of the country specific effect from the regressors is of the utmost importance. Based on this assumption, and assuming mean zero processes and homoscedasticity both for u_i and ε_{it} , as well as zero correlation between them and over time, we get the composite error process

$$\eta_{it} = u_i + \varepsilon_{it} \quad (4.10)$$

with conditional variance

$$E(\eta_{it}^2 | x) = \sigma_u^2 + \sigma_\varepsilon^2 \quad (4.11)$$

and conditional covariance within a unit of

$$E(\eta_{it}\eta_{is}|\mathbf{x}) = \sigma_u^2, \quad t \neq s \quad (4.12)$$

The covariance matrix of these T errors can be written as

$$\Sigma = \sigma_\varepsilon^2 I_T + \sigma_u^2 j_T j_T' \quad (4.13)$$

so that the estimator for RE is the GLS estimator:

$$\beta_{RE} = \left(\sum_{i=1}^N X_i' \Sigma^{-1} X_i \right)^{-1} \left(\sum_{i=1}^N X_i' \Sigma^{-1} y_i \right) \quad (4.14)$$

4.9 Appendix C- a Fixed Effects GMM version of the Specific Model

From a theoretical viewpoint one could suspect that the future values of the explanatory variables, and especially of the variables related with public finances (budget deficit and public debt) could be affected by sovereign rating fluctuations, therefore violating the strict exogeneity assumption required by FE and RE. Here the apparent alternative would be to try out some Instrumental Variable (IV) techniques. However it seems to be quite impossible to find some instruments that can be thought of as independent from sovereign ratings- both in terms of lags and leads as required by strict exogeneity- and that can at the same time explain the associated macroeconomic variables in a satisfying manner (without finding shelter to frivolous instruments such as the number of mobile phones or the number of ice-creams in a country).

Nonetheless, for the sake of completeness I report here the results of the Fixed Effects General Method of Moments (GMM) regression of the Specific Model, where the budget deficit and the public debt are instrumented on the six dimensions of public governance reported by the World Bank, namely i) Voice and Accountability, ii) Political Stability and Absence of Violence, iii) Regulatory Quality, iv) Government Effectiveness, v) Rule of Law, and vi) Evidence of Corruption. From a theoretical viewpoint one could expect such measurements to be capable of explaining public finance variables since the latter can also be thought to be a reflection of the quality of public governance. At the empirical level such hypothesis is clearly supported by the correlation figures reported in

Table 4.10. Correlation Matrix for Public Finance and Public Governance Variables

	Fiscal Balance	Public Debt	Corruption	Government Effectiveness	Political Stability	Regulatory Quality	Rule of Law	Voice and Accountability
Fiscal Balance	1.00							
Public Debt	-0.54	1.00						
Corruption	0.48	-0.71	1.00					
Government Effectiveness	0.51	-0.63	0.92	1.00				
Political Stability	0.49	-0.53	0.70	0.64	1.00			
Regulatory Quality	0.46	-0.75	0.88	0.82	0.69	1.00		
Rule of Law	0.38	-0.70	0.95	0.90	0.68	0.88	1.00	
Voice and Accountability	0.50	-0.70	0.89	0.85	0.73	0.88	0.86	1.00

Source: Eurostat, WGI and author's elaboration

Table 4.11. FE GMM version of the Specific Model for S&P ratings

First- Stage Regressions				
Variable	Shea Partial R2	Partial R2	F(6, 594)	P-value
Public Debt	0.1792	0.1785	20.79	0
Fiscal Balance	0.1805	0.1798	16.61	0
Underidentification tests				
Ho: matrix of reduced form coefficients has rank=K1-1 (underidentified)				
Ha: matrix has rank=K1 (identified)				
Kleibergen-Paap rk LM statistic		Chi-sq(5)=81.83	P-val=0.0000	
Kleibergen-Paap rk Wald statistic		Chi-sq(5)=128.34	P-val=0.0000	
Weak identification test				
Ho: equation is weakly identified				
Kleibergen-Paap Wald rk F statistic		21.04		
Weak-instrument-robust inference				
Tests of joint significance of endogenous regressors B1 in main equation				
Ho: B1=0 and overidentifying restrictions are valid				
		S&P	Moody's	Fitch
Anderson-Rubin Wald test		F(6,594)= 31.43	F(6,594)= 14.50	F(6,594)= 16.93
		P-val=0.0000	P-val=0.0000	P-val=0.0000
Anderson-Rubin Wald test		Chi-sq(6)=191.78	Chi-sq(6)=88.46	Chi-sq(6)=103.32
		P-val=0.0000	P-val=0.0000	P-val=0.0000
Stock-Wright LM S statistic		Chi-sq(6)=100.93	Chi-sq(6)=73.22	Chi-sq(6)=77.51
		P-val=0.0000	P-val=0.0000	P-val=0.0000

Notes: when results are not presented separately for each CRA it is because they are identical

2nd step GMM estimation

	S&P FE	Moody's FE	Fitch FE
Fiscal Balance	-0.14***	-0.13***	-0.12***
	(-14.95)	(-12.81)	(-13.05)
Public Debt	-0.28***	-0.28***	-0.31***
	(-7.97)	(-7.29)	(-9.28)
Real GDP Growth	0.31***	0.30***	0.34***
	(3.82)	(3.53)	(4.18)
Inflation	-0.01	-0.48**	-0.01
	(-0.05)	(-2.28)	(-0.06)
Unemployment	-0.21***	-0.29***	-0.28***
	(-4.92)	(-6.08)	(-6.19)
Trade Openness	0.01***	0.01***	0.01***
	(8.12)	(9.48)	(9.56)
N	616	616	616
Centered R2	0.7523	0.7762	0.7355
Hansen J statistic (over-identification test of all instruments)			
Chi-sq(4)	61.6	20.047	23.358
P-val	0.0000	0.0005	0.0001

*Notes: The dependent variable is the numerical equivalent of the sovereign rating of the respective CRA; FE stands for Fixed Effects; regressions are based on the xtivreg2 routine in STATA; heteroskedasticity robust standard errors are used; all variables are defined in Appendix A; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.*

Table 4.10, which range from 0.37 to 0.75 in absolute terms. Other than that, one could also expect the World Bank variables to be relatively more detached from the effects of sovereign ratings, therefore acting as good instruments. Nonetheless, as it can be seen from the results above, although the six instruments perform well in explaining the public finance variables, they are still endogenous to the overall specification.

In particular, the first part of Table 4.11 reports the summary statistics for the first-stage regressions, while the second part reports the results generated for the actual model. As it can be seen by the summary statistics of the first regressions, the selected instruments perform well in explaining the public finance variables. In particular, the Shea partial R^2 and the partial R^2 are quite similar while the F statistics in both cases are above the threshold of 10 (my interpretation is based on the rules of thumb suggested by Baum, 2006). In addition the underidentification tests clearly reject the null of underidentification, while the results for the weak identification test allow me to reject the null of weak identification at the 5% level. Coming to the second regression, it can be seen that with the exception of inflation all other variables manage to retain their signs and significances for all three CRAs. R^2 ranges from 0.73 to 0.77, which although lower than the R^2 - within of the original version of the model is still at a satisfying level. Nonetheless, across all regressions the Hansen J statistic clearly rejects the null hypothesis that all instruments are uncorrelated with the disturbance process, therefore implying

the endogeneity of the public governance indicators²⁶. Results are highly similar across all three rating agencies.

²⁶ I also tried to run the model without the included instruments and the results of the Hansen statistic were quite similar in rejecting H_0 .

Chapter 5- Rating Downgrades and Sudden Stops of Capital: the Eurozone Experience

5.1 Introduction

Throughout the last decade there has been a voluminous literature focusing on the macroeconomic determinants of episodes of extreme capital flow movements. Until recently such literature has mainly focused on developing countries (e.g. Calvo *et al.*, 2004) due to the vulnerability of those states to sudden movements of foreign capital and the corresponding richness of crisis episodes that were recorded. Interestingly, there is now a shift of attention towards the developed world, and more specifically towards the Euro area (see for instance Forbes and Warnock, 2012a).

Along that line, this chapter investigates the importance of sovereign ratings in explaining episodes of extreme capital flow movements in the Eurozone, and especially sudden stop events. Following the research findings of Chapter 4 my main interest is in exploring the implications of that part of sovereign ratings which reflects exaggerated reactions by Credit Rating Agencies (CRAs). For the purposes of the current, I employ a Panel probit model with random effects for the baseline regressions. My focus is on the original twelve countries of the Eurozone, on the time span 1999 to 2012 (in quarterly frequency) and on the long-term sovereign ratings provided by the three main CRAs (these include S&P, Moody's and Fitch).

Illustrated in a nutshell, my findings suggest that exaggerated fluctuations of sovereign ratings are indeed important in determining episodes

of sudden stops of capital flows in Eurozone, irrespectively of the CRA under consideration. While the results appear to be consistent both for total and non-FDI flows, it is in the case of the second where they become more conspicuous. Other than exhibiting consistency across regressions based on different sets of control variables, the results also satisfy a list of robustness checks.

The chapter contributes to existing literature in a twofold way. First, it is to the best of my knowledge the first work within the extreme capital flow literature that explicitly focuses on the economic and statistical significance of sovereign rating movements. Given the influence of CRAs in European financial markets discussed earlier, there is a gap that the current study aims to fill. Moreover the affirmative evidence offered by the chapter adds to the political economy literature outlined in Chapter 2 that critically reflects on the role of CRAs.

The rest of the chapter is organized as follows: the next section reviews in detail the econometric literature on episodes of extreme capital flows. Following, section three outlines the relevant data and discusses in detail my approach in constructing the necessary binary variables. The subsequent part presents the econometric methodology and my approach in capturing the effects of sovereign ratings. This is followed by the results section which other than the baseline regressions also reports a number of robustness checks for my findings. The last section concludes.

All regressions of the chapter are based on the “StataSE 12” software.

5.2 Literature Review

There has been a voluminous econometric literature studying the occurrence of episodes of capital flow reversals and sudden stops. This literature treats those episodes as something qualitatively different from continuous capital flow fluctuations. Hence rather than employing a standard linear model that would amalgamate all kinds of capital flow movements, papers in this literature typically opt for binary response models. Here the most common approach is to employ a panel probit model with random effects. An advantage of this approach is the fact that binary response models allow for non-linear effects, so that a certain variable can have a different impact at different levels of the response variable (also see the discussion on the Econometric Methodology section of the current chapter). An obvious puzzle is how one goes on to define episodes of extreme capital flow movements. In particular, it is easy to notice that any definition cannot but be arbitrary to an extent so that different definitions can give rise to different results.

With the above being said, we can see that although there are several modifications, most of the papers presented below adopt a variant of the definition given by Calvo *et al.* (2004), as being one of the first and most cornerstone papers of that stream. In particular, the basic version of their definition (Calvo *et al.*, 2004: 14) flags a sudden stop as a ‘phase that meets the following conditions:

- It contains at least one observation where the year-on-year fall in capital flows lies at least two standard deviations below its sample mean (this addresses the “unexpected” requirement of a sudden stop).

- The sudden stop phase ends once the annual change in capital flows exceeds one standard deviation below its sample mean. This will generally introduce persistence, a common fact of sudden stops.
- Moreover, for the sake of symmetry, the start of a sudden stop phase is determined by the first time the annual change in capital flows falls one standard deviation below the mean.'

At the empirical level, stressing the fact that sudden stops are mainly an emerging market phenomenon, Calvo and his colleagues point out trade openness and domestic liabilities denominated in US dollars as the two key factors explaining such episodes. Furthermore, they link those variables with domestic fiscal and monetary policies, arguing that the deepest cause of such episodes comes from within rather than outside a country. Following the approach taken in the Calvo *et al.* paper Broner and Rigobon (2005) show that capital flow volatility is associated with underdeveloped domestic financial markets, weak institutions and low income per capita of the recipient countries. Using a definition of sudden stops similar to that in Calvo *et al.*, Frankel and Carvalho (2008) also investigate the importance of trade openness, claiming that a higher degree of international trade helps countries become less vulnerable to sudden stops. Similarly, Edwards (2005) explores whether capital mobility augments the probability of crisis episodes. Although he claims that evidence supports the absence of such a link, he writes that once a crisis has occurred more open countries are more likely to face a higher cost in terms of foregone economic growth. Moreover in a more recent paper (Edwards, 2007) he states that even though there appears to be some significant effect of capital mobility upon crisis episodes, this is nonetheless very small. Furthermore, Eichengreen

et al. (2006) assert that while sudden stops are fewer and less severe in countries under IMF intervention, the Fund's programs do not seem to mitigate the negative output effects if an episode does indeed take place.

Agosin and Huaita (2011), in turn, utilize a Minskyan conceptual framework to cast doubt on the results of Calvo *et al.* They argue that it is not domestic factors but rather capital inflows themselves; when these are large compared with the size of the recipient country's financial system, they constitute the most important explanatory variable behind crisis episodes. In addition the authors show that the share of non-FDI flows and the size of the current account deficit are also important factors in explaining crises in emerging countries.

Coming to more recent literature, a number of authors have broadened their scope by including advanced countries into their analyses (see for instance Forbes and Warnock, 2012a, 2012b; Obstfeld, 2012; Lane, 2013). This shift has underlined the need to focus on gross rather than net capital flows²⁷. As pointed out by Forbes and Warnock (2012a, 2012b), using gross flows makes it possible to differentiate the behaviour of domestic and foreign investors. In that sense, Forbes and Warnock (2012b:4) identify four kinds of capital flow episodes, namely:

- “Surges”: a sharp increase in gross capital inflows;
- “Stops”: a sharp decrease in gross capital inflows;
- “Flight”: a sharp increase in gross capital outflows; and
- “Retrenchment”: a sharp decrease in gross capital outflows”.

²⁷ Gross flows imply a separation between gross inflows and gross outflows of capital.

It becomes apparent that the two first kinds of episodes are driven by foreign investors, whereas the other two are related with domestic ones. Moreover based on this distinction it becomes possible to identify episodes that would otherwise be missed, as for instance in the case wherein a “stop” is counterbalanced by a “retrenchment” occurring at the same time. In this context, Lane (2013) points out the experience of Iceland arguing that domestic financial risks can be intensified even if capital inflows are fully recycled into capital outflows.

On the econometric front, by utilizing an innovative set of variables Forbes and Warnock (2011, 2012) show that global and contagion factors are more important than domestic variables (for more discussion on contagion effects also see Forbes, 2012). Most importantly they point out that highly significant variables such as global risk (approximated by the authors by employing the Volatility Index (VXO) of the Chicago Board Options Exchange) can appear to be unimportant if regressions are based on net rather than gross flows. Moreover they show that most of the extreme episodes of capital flow movements are associated with debt rather with equity flows.

In contrast with the above scholars, Catao and Milesi-Ferretti (2013) find that it is the net external debt of a country that mostly matters, pointing out that distinguishing between gross assets and liabilities does not add much explanatory power in predicting crisis episodes. At the same time they confirm the fact that most of such episodes are related with debt rather than equity flows. Furthermore, Schmidt and Zwick (2013) provide a more detailed assessment of uncertainty’s impact on gross capital flows, by considering a number of different proxy variables. Contrary to Forbes and Warnock, the

authors' results suggest that domestic factors seem to play a more important role in explaining extreme capital flows.

Lastly, there is a clear gap in this literature regarding sovereign ratings. Apart from Forbes and Warnock (2012a), who consider ratings as an additional control variable in their robustness checks, no one has attempted to explicitly investigate their potential significance in a panel probit context.

5.3 Data Outline

My panel consists of the twelve original countries of the Eurozone, and runs from 1999q1 and up to 2012q4 (quarterly frequency). Throughout this era the composition of international capital flows across Eurozone countries consisted mainly of non-FDI flows. Consider the contrast depicted in Figures 5.1 to 5.3 between the total gross positions²⁸ of FDI and portfolio investment stocks for an indicative set of countries, namely Greece, Germany and Ireland. In all three cases, portfolio investment has been the dominant sort of flow since the establishment of the Euro. This development is particularly important in terms of macroeconomic stability due to the volatile and short-term nature of this kind of capital (for further discussion see Agosin and Huaita, 2011).

Coming to the specification of the capital flow variables, following the most recent developments of the relevant literature (see above), I employ both net and gross flows. In addition I distinguish between total and non-FDI flows, with the first including foreign direct investment (FDI), portfolio investment and other investment, and the second consisting of portfolio and other

²⁸ Here, total gross position equals assets plus liabilities.

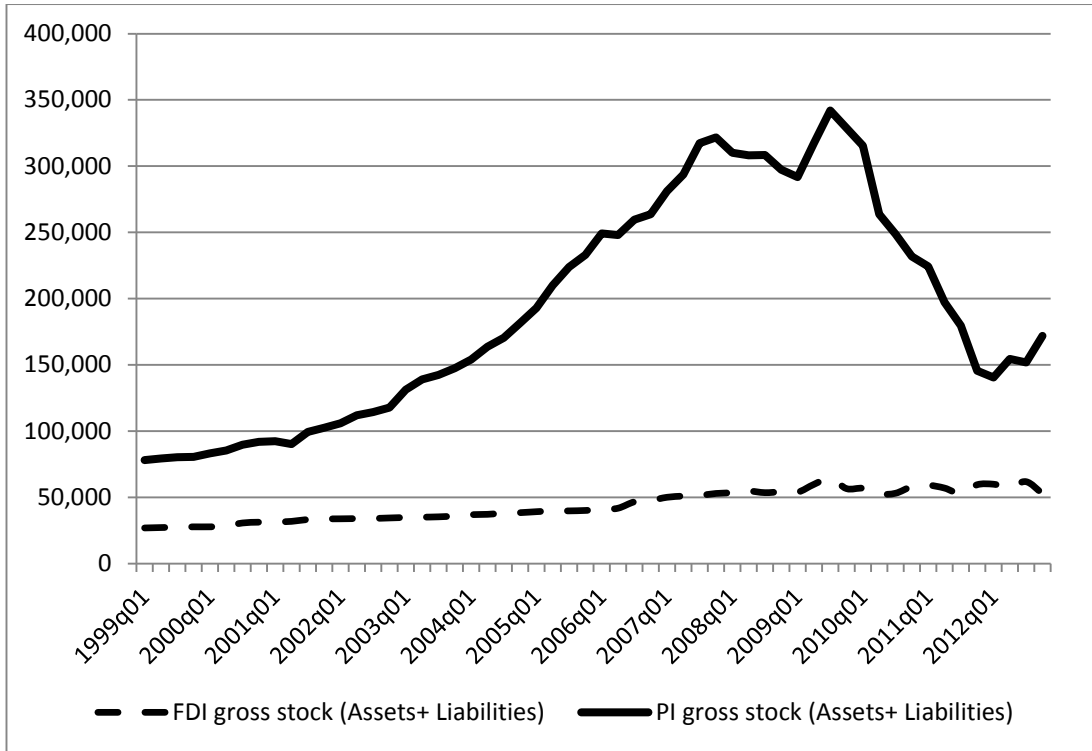


Figure 5.1. Total Gross FDI and Portfolio Investment Positions for Greece (source: Eurostat, IMF IFS, and author's calculations)

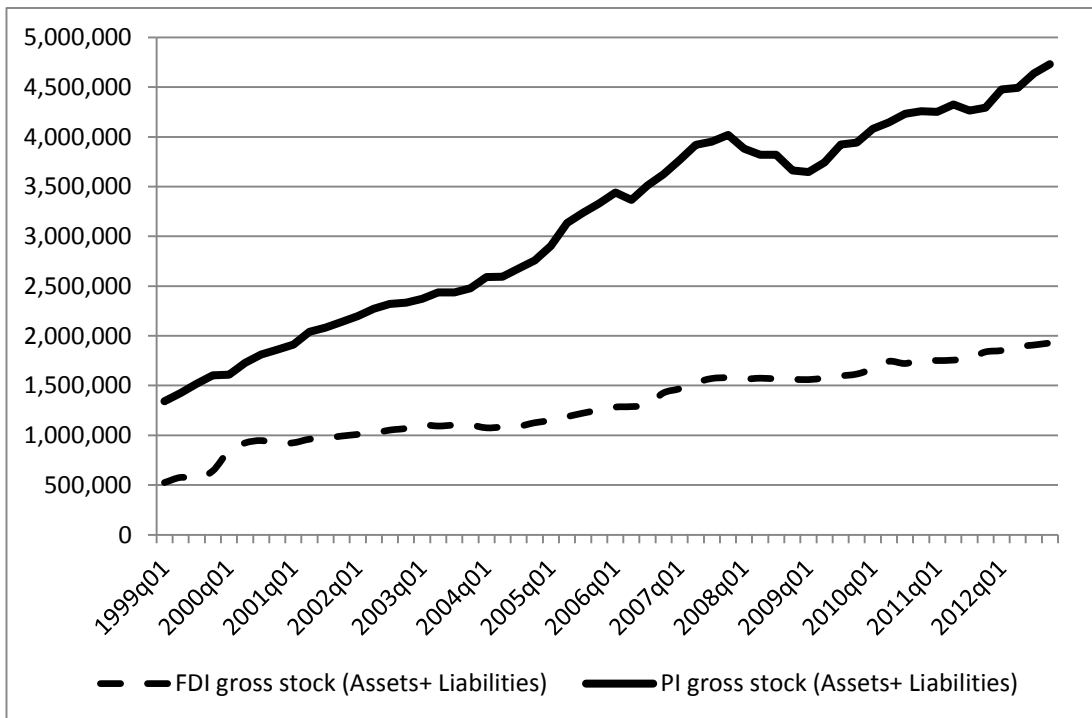


Figure 5.2. Total Gross FDI and Portfolio Investment Positions for Germany (source: Eurostat, IMF IFS, and author's calculations)

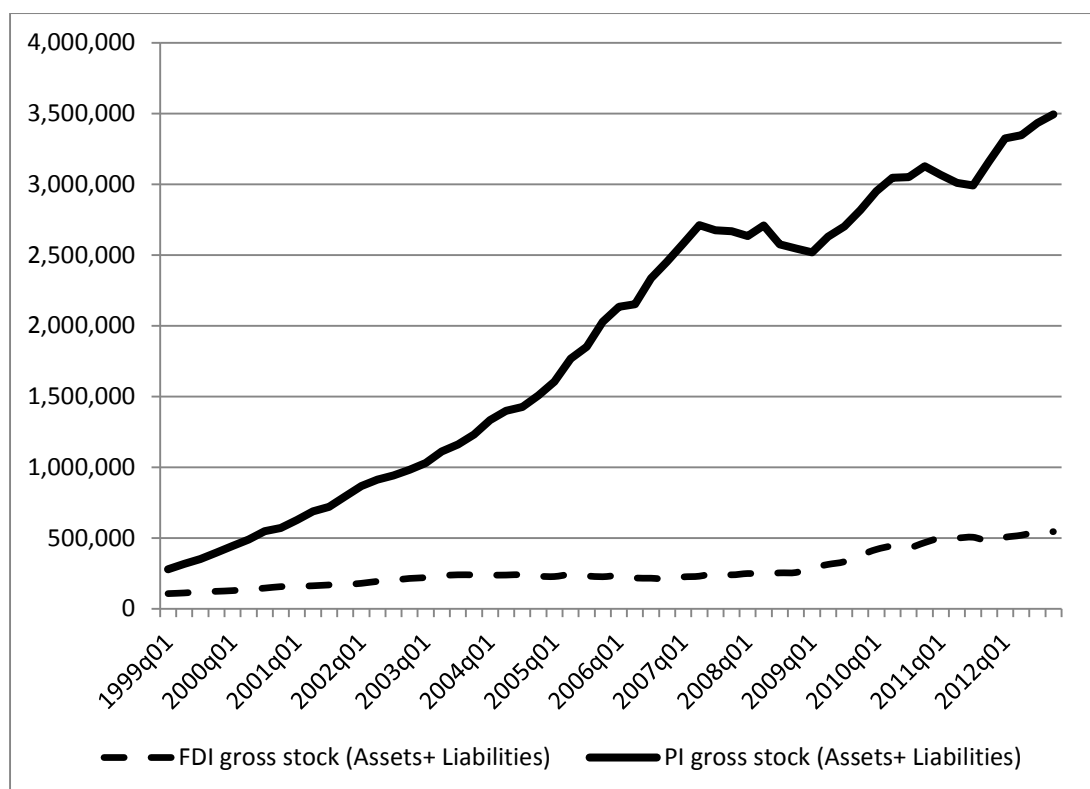


Figure 5.3. Total Gross FDI and Portfolio Investment Positions for Ireland (source: Eurostat, IMF IFS, and author's calculations)

investment only²⁹. Taken in conjunction, my approach gives rise to six different series of flows, namely net total flows, net non-FDI flows, total inflows, total outflows, non-FDI inflows and non-FDI outflows (see the Appendix for more details).

In order to construct the binary variables necessary for the probit model, I follow closely the approach developed by Forbes and Warnock (2012a; 2012b). More specifically, I take the 4-quarter moving sums for each of the above series of capital flows ($F_t = \sum_{i=0}^3 FLOW_{t-i}$ for $t = 1999q1, 1999q2, \dots, 2012q4$), and then compute the year-over-year changes ($\Delta F_t = F_t - F_{t-4}$ for $t = 2000q1, 2000q2, \dots, 2012q4$). Following this, I derive moving averages and standard deviations, using a 5 year window (this is

²⁹ Foreign Reserves are not taken into account since my focus is on the dynamics of the private sector.

Table 5.1. Summary Statistics of year over year changes of (moving sums) of Capital Flows

Variable	Full Sample (1999q1- 2012q4)				
	Obs	Mean	Std. Dev.	Min	Max
Net Total Flows	598	1119.84	27302.72	-136115.00	215642.00
Total Inflows	598	-3645.35	116810.20	-709282.00	444119.00
Total Outflows	592	-4288.77	118176.40	-718749.00	424577.00
Non-FDI Inflows	598	-4945.62	108832.00	-655478.00	413390.00
Non-FDI Outflows	598	-5115.55	107046.60	-606145.00	386519.00
Net non-FDI Flows	598	131.67	36783.35	-141648.00	167207.00
	Pre-Crisis Sub-Sample (1999q1- 2008q3)				
	Obs	Mean	Std. Dev.	Min	Max
Net Total Flows	394	2096.40	23514.87	-91721.00	215642.00
Total Inflows	394	10948.80	75910.38	-264983.00	282216.00
Total Outflows	388	8965.79	73439.33	-301024.00	296264.00
Non-FDI Inflows	394	7881.20	71764.93	-283221.00	244747.00
Non-FDI Outflows	394	4904.62	65747.70	-368820.00	246734.00
Net non-FDI Flows	394	2972.59	32619.05	-141648.00	141734.00
	Post-Crisis Sub-Sample (2008q4- 2012q4)				
	Obs	Mean	Std. Dev.	Min	Max
Net Total Flows	204	-766.25	33411.64	-136115.00	150354.00
Total Inflows	204	-31832.10	166612.60	-709282.00	444119.00
Total Outflows	204	-29498.40	171471.10	-718749.00	424577.00
Non-FDI Inflows	204	-29719.00	154681.50	-655478.00	413390.00
Non-FDI Outflows	204	-24468.20	157351.80	-606145.00	386519.00
Net non-FDI Flows	204	-5355.20	43281.37	-139954.00	167207.00

Source: Eurostat and author's calculations

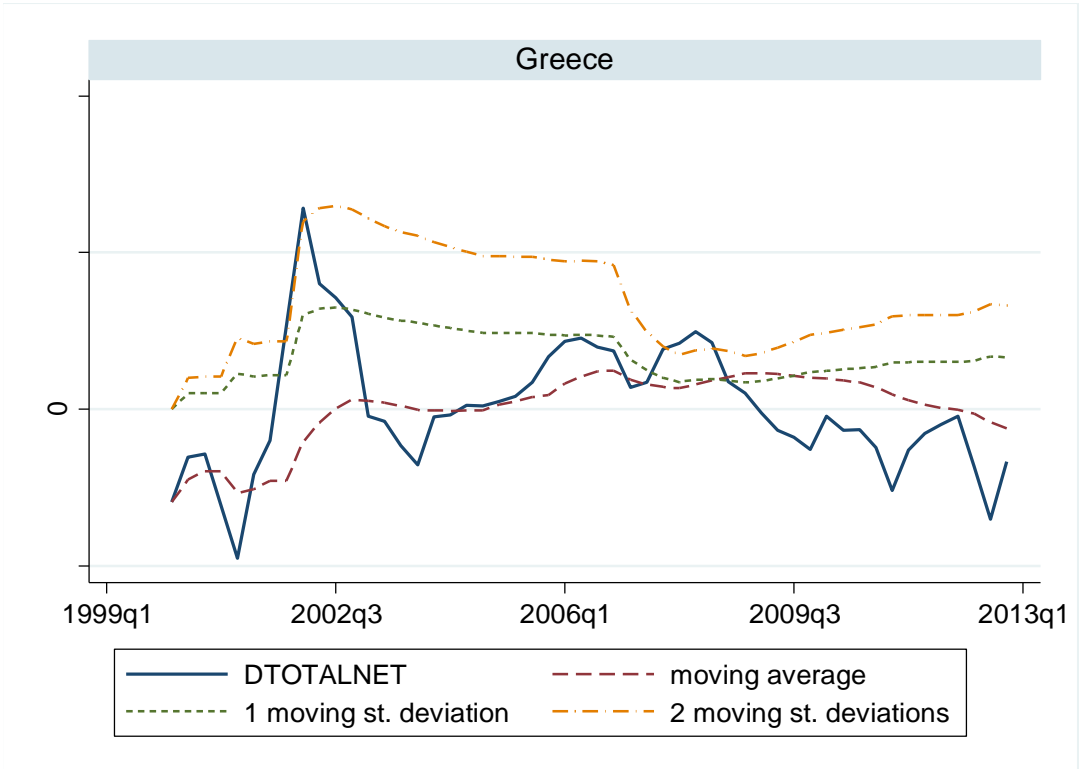


Figure 5.4. Year over Year change in Net Total Capital Flows for Greece (source: Eurostat, IMF IFS, and author's calculations)

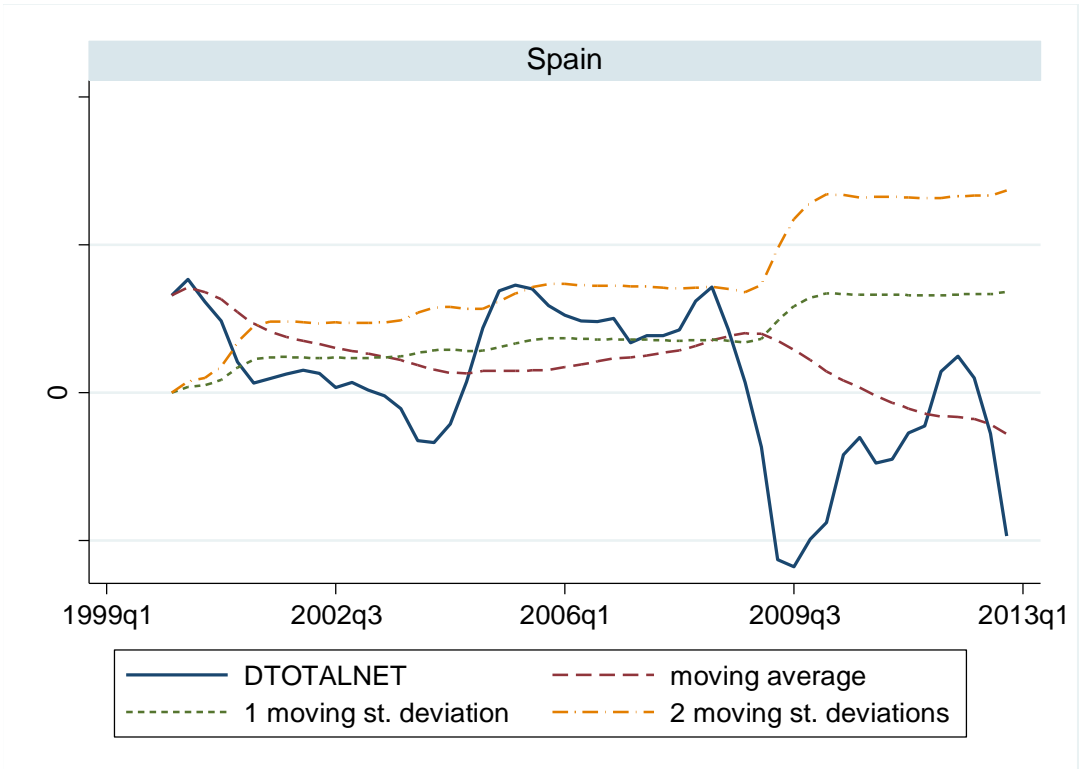


Figure 5.5. Year over Year change in Net Total Capital Flows for Spain (source: Eurostat, IMF IFS, and author's calculations)

equivalent with 20 quarters, so that my computations employ 19 lags and the current value for each statistic).

Table 5.1 reports the summary statistics for each of the six series constructed for the full sample as well as for two sub-samples based on the split between the pre and post crisis era (the cut-off point used here is the third quarter of 2008). In addition, Figures 5.4 and 5.5 give an idea of the fluctuations of the year-over-year changes in net total flows (labelled as ‘DTOTALNET’) for Greece and Spain.

Given the above, I now move to the construction of the binary variables. In principle, other than following the guidelines established in relevant literature (see for instance Calvo *et al.*, 2004; Forbes and Warnock, 2012a; 2012b), the idea is to construct those variables based on simple rules. More specifically, given the separation between gross inflows and gross outflows, and the consequent distinction between four kinds of episodes (surges, sudden stops, flight, and retrenchment; also see above), the binary variables are based on the following rules:

$$\text{Sud. Stop or Retrenchment} = \begin{cases} 1 & \text{if i) } \Delta F_{it} < \overline{\Delta F}_i - \sigma_{\Delta F_i}; \text{ ii) if } \Delta F_{it} < \overline{\Delta F}_i - 2\sigma_{\Delta F_i} \\ & \text{for at least 1 period during the interval} \\ & \text{that satisfies the 1st condition; and} \\ & \text{iii) if the total interval lasts at least 2 periods} \\ 0 & \text{otherwise} \end{cases}$$

$$\text{Surge or Flight} = \begin{cases} 1 & \text{if i) } \Delta F_{it} > \overline{\Delta F}_i + \sigma_{\Delta F_i}; \text{ ii) if } \Delta F_{it} > \overline{\Delta F}_i + 2\sigma_{\Delta F_i} \\ & \text{for at least 1 period during the interval} \\ & \text{that satisfies the 1st condition; and} \\ & \text{iii) if the total interval lasts at least 2 periods} \\ 0 & \text{otherwise} \end{cases}$$

where ΔF_{it} is the year-over-year change of the flow under consideration (based on the moving sums of the quarterly observations) for the country i at time t , and $\overline{\Delta F}_i$ and $\sigma_{\Delta F_i}$ are the 5 years moving average and standard deviation values respectively. Also note that in the case of outflows I have reversed the Balance of Payments accounting signs by multiplying all figures with -1 (so that an outflow of domestic capital appears with a plus rather than a minus). Given the above definitions, I derive twelve different binary variables, whose summary statistics are illustrated in Table 5.2. The Appendix of the chapter reports the precise starting and ending point of each kind of episode per country. As can be seen, there are significantly fewer episodes recorded when net flows are used, while in the case of gross flows the biggest amount of episodes is recorded for sudden stop and retrenchment events. For instance episodes of sudden stops of net total flows cover approximately 10% of the observations of the sample, whereas sudden stops of gross total inflows round up to about 15%.

Regarding the right hand variables, my focus is on testing the economic and statistical significance of the long term sovereign ratings provided by the three main CRAs (Standard and Poor's, Moody's, and Fitch). Due the alphabetical ordering of those scores, a standard approach in empirical studies is to convert them into a certain arithmetical scale. In my case, following the methodology developed in Chapter 4, I convert ratings into a 1 to 17 scale. As with before, 17 corresponds to AAA, 16 translates into AA+ and so on, while all credit scores below B- are given the score 1. In addition I utilize the credit outlook and watch scores provided by the three CRAs by turning them into 0.25 and 0.5 points.

Table 5.2. Summary Statistics of Binary Variables

Variable	Obs	Mean	Std. Dev.
SSTNETm	588	0.10	0.30
SURGENETm	588	0.07	0.26
SSNFNETm	588	0.09	0.29
SURGENFNETm	588	0.10	0.30
SSTINm	588	0.15	0.36
SURGETINm	588	0.09	0.28
FLTOUTm	588	0.09	0.29
RTTOUTm	588	0.14	0.35
SSNFINm	588	0.15	0.36
SURGENFINm	588	0.10	0.30
FLNFOUTm	588	0.08	0.27
RTNFOUTm	588	0.17	0.37

Notes: SSTNETm and SSNFNETm denote Sudden Stop episodes based on Net Total and non-FDI flows respectively, SSTINm and SSNFINm denote Sudden Stop episodes for gross Total and non-FDI inflows, SURGETNETm and SURGENFNETm stand for Surge episodes of Net Total and non-FDI flows, SURGETINm and SURGENFINm denote Surge episodes for gross Total and non-FDI inflows, FLTOUTm and FLNFOUTm stand for Flight episodes of gross Total and non-FDI outflows, and RTTOUTm and RTNFOUTm stand for Retrenchment episodes of gross Total and non-FDI outflows; source: Eurostat and author's calculations
Source: Eurostat and author's elaboration

Table 5.3. Summary Statistics of Control Variables

	Variable	Obs	Mean	Std. Dev.	Min	Max
Domestic Factors	Per Capita Income	672	29.53	13.26	10.55	82.3
	Real GDP Growth	660	0.4	0.71	-2.23	2.49
	Real Effective Exchange Rate	660	0.18	1.21	-6.97	7.35
	Inflation (divergence from Eurozone average)	660	0.16	0.13	0	0.84
	Interest Rate Spread (based on the US long term rate)	672	0.42	2.42	-2.01	23.58
	External Balance	660	0.05	5.94	-15.53	14.85
	External Debt	648	368.34	159.36	143.94	889.83
	Non-FDI share of Total Inflows	635	0.77	0.27	0	1
	Trade Openness	660	172.96	216.98	49.47	1072.91
	Foreign Reserves	660	9.67	7.67	-0.03	61.31
	Fiscal Balance	672	-2.51	4.33	-27.65	6.75
	Public Debt	624	67.35	31.82	5.42	174.41
	Credit Growth	652	1.88	2.07	-3.25	13.01
	Velocity	664	1.06	0.42	0.14	2.15
	Economic Sentiment Indicator	616	100.37	10.04	68.5	118.6
Global Factors	VIX	672	21.86	8.19	11.39	44.14
	US long term interest rate	672	4.14	1.14	1.64	6.48
	G7 GDP growth	672	1.7	1.56	-3.39	3.68

Sources: Eurostat, IMF IFS, CBOE

Table 5.4. Correlation Matrix of Control Variables

	Per Capita Income	Real GDP Growth	REER	Inflation	Interest Rate Spread	Ext. Balance	Ext. Debt	Share of non-FDI flows	Trade Openness	Foreign Reserves	Fiscal Balance	Public Debt	Credit Growth	Velocity	ESI	VIX	US long term interest rate	G7 GDP growth
Per Capita Income	1.00																	
Real GDP Growth	0.08	1.00																
REER	0.08	0.10	1.00															
Inflation	-0.09	-0.02	0.00	1.00														
Interest Rate Spread	-0.17	-0.54	-0.27	0.10	1.00													
External Balance	0.66	0.22	0.04	-0.12	-0.23	1.00												
External Debt	0.30	-0.28	-0.12	0.14	0.36	-0.30	1.00											
Share of non-FDI flows	-0.21	0.07	-0.03	0.10	-0.07	-0.19	0.03	1.00										
Trade Openness	0.93	0.10	0.05	-0.02	-0.11	0.48	0.47	-0.19	1.00									
Foreign Reserves	-0.54	-0.05	-0.07	0.00	0.12	-0.27	-0.27	0.12	-0.52	1.00								
Fiscal Balance	0.39	0.40	0.15	0.00	-0.38	0.57	-0.46	-0.07	0.32	-0.11	1.00							
Public Debt	-0.57	-0.32	-0.15	-0.05	0.49	-0.46	0.01	0.09	-0.56	0.30	-0.59	1.00						
Credit Growth	0.03	0.40	0.14	0.23	-0.36	-0.13	0.04	0.17	0.12	-0.13	0.32	-0.25	1.00					
Velocity	-0.55	0.11	0.07	0.04	-0.08	-0.13	-0.55	0.17	-0.65	0.50	0.17	0.28	0.08	1.00				
ESI	-0.03	0.74	0.07	-0.03	-0.47	0.09	-0.34	0.12	-0.03	0.03	0.40	-0.19	0.44	0.25	1.00			
VIX	-0.01	-0.49	0.04	0.05	0.15	-0.08	0.05	-0.08	-0.01	0.11	-0.10	0.01	-0.22	-0.05	-0.42	1.00		
US long term interest rate	-0.21	0.50	0.10	0.16	-0.45	-0.01	-0.31	0.15	-0.10	0.07	0.38	-0.23	0.48	0.33	0.60	-0.18	1.00	
G7 GDP growth	-0.09	0.61	-0.13	0.03	-0.14	0.09	-0.22	0.09	-0.04	0.11	0.26	-0.03	0.28	0.19	0.62	-0.53	0.35	1.00

Sources: Eurostat, IMF IFS, CBOE and author's calculations

Other than sovereign ratings, I also control for those domestic and global factors that are usually employed in relevant literature (see for instance Agosin and Huaita, 2011; Forbes and Warnock, 2012a; Schmidt and Zwick, 2013). More precisely, the list of domestic variables includes per capita income, real GDP growth, real effective exchange rate (REER), inflation (measured in terms of divergence from the Eurozone average inflation at each point of time), interest rate spread (using the long term US interest rate as the basis so as to include Germany as well), external balance, gross external debt (measured over total exports), the share of non-FDI inflows, trade openness, foreign reserves (measured as a ratio of imports), fiscal balance, public debt, credit growth, velocity of money, and the economic sentiment indicator (ESI) provided by Eurostat. Out of the global variables I have included the VIX volatility index as published by the Chicago Board of Exchange, the average G7 GDP growth rate, and the US long term interest rate. Tables 5.3 and 5.4 report the summary statistics and the correlation matrix of the relevant variables. The precise configuration behind each measurement is outlined in the Appendix of the current chapter, as are all data resources.

5.4 Econometric Methodology

The estimation method deployed here, a panel probit model with random effects, has been widely used in recent relevant literature. Illustrated in a nutshell (based on Wooldridge, 2002), the panel probit is a special form of the binary response model and takes the form

$$\Pr(y_{it} = 1 | x_{it}, c_i) = \Phi(x_{it}\beta + c_i), \quad i = 1, 2, \dots, N; \quad t = 1, 2, \dots, T \quad (5.1)$$

where $\Phi \in [0, 1]$ is the cumulative density function (cdf) of the normal distribution³⁰, y_{it} is the binary variable of interest, x_{it} is the set of right hand variables, and c_i is the unobserved country specific effect. In principle, the main idea in binary response models is to constrain the possible outcomes of the model between zero and one without restricting the range of the right hand variables (which would be the case if I wanted to estimate a probability based on the standard linear model), and to allow for the regressors to exhibit non-linear effects upon the response probability. In terms of interpretation, it is important to note that the partial effect of a certain (continuous) explanatory variable (let's call it x_j) is not simply given by the respective coefficient β_j , but rather by the interactive term $\varphi(x\beta) * \beta_j$, where $\varphi(x\beta)$ is the first derivative of Φ . Hence it can be easily seen that the partial effect of x_j depends on the values of the rest of the right hand variables as well. The model is estimated using the Maximum Likelihood method.

Coming to the estimation strategy, my goal is to measure the importance of sovereign ratings in explaining episodes of capital flow reversals. For a starter, Table 5.5 below shows that ratings are indeed not irrelevant in explaining episodes of sudden stops. Moreover all rating variables appear with a minus, which is in accordance with what we would expect (a higher rating should correspond to a lower probability of a sudden stop).

³⁰ Other transformational forms of the $x_{it}\beta + c_i$ data into the [0,1] interval have also been considered in relevant literature. Most notably, some of the most recent papers (Forbes and Warnock, 2012a; 2012b; Schmidt and Zwick, 2013) use a complementary logarithmic (or cloglog) framework which assumes an extreme value distribution so that it is thought to be more suitable for episodes of capital flow reversals. In this chapter the utilization of this sort of transformation is left as a robustness check of the main results.

An obvious check of robustness here would be to see how well the ratings behave when they are included into a broader macroeconomic model, controlling for the domestic and global factors outlined earlier. Note however that this raises a fundamental estimation issue: how we can put sovereign ratings together with domestic macroeconomic factors at the right hand of the equation. This problem arises because sovereign ratings are by construction measurements that, to a great extent reflect the macroeconomic environment of a country at a certain point of time; thus putting them together with macroeconomic variables would create a serious issue of multicollinearity.

Nonetheless, as argued in Chapter 4, sovereign ratings do not only reflect the macroeconomic conditions of a state; they also include feelings of euphoria and panic. At the econometric level, I showed in the previous chapter that one way to approximate such feelings is by regressing sovereign ratings to the macroeconomic variables they are supposed to reflect and then store the residuals of the model. It is those residuals that capture that portion of the ratings that cannot be explained by a purely technical analysis of the macroeconomy, and which therefore link with the exaggerated feelings of euphoria and panic from the side of CRAs. Even more, it is this part of sovereign ratings whose importance and implications for capital flows I am interested in exploring. Hence I opt for the following methodology:

- I first regress sovereign ratings on the set of the most important macroeconomic variables, using the Fixed Effects ‘Specific Model’ developed in Chapter 4. Table 5.6 summarizes the results, while Figure 5.6 below illustrates the residuals of S&P sovereign ratings for a selection of EMU countries. A positive (negative) residual implies a

rating score that is higher (lower) from what macroeconomic variables would justify, which as such can be attributed to a feeling of euphoria (panic) from the side of the related CRA.

- I keep the residuals of the model for each rating agency, and plug them (separately) in the probit model as an additional explanatory variable along with all other domestic and global variables reported above. As it can be seen from Table 5.7, the levels of correlation between the ratings and the rest of the explanatory variables are significantly reduced when the residuals are considered for each agency instead of their actual ratings.
- I control for excessive multicollinearity by dropping the macroeconomic variables that still exhibit significant correlations between them (see Table 5.4) and repeat my estimations.

With the multicollinearity noise being brought to a minimum, there can now be some confidence about the clarity of inference. In the overall, I run each model separately for each credit rating agency. I also repeat the regressions by replacing the individual ratings with the additive scores of the three CRAs so as to see if there is any extra significance arising when these are taken together (the hypothesis here would be that if a country is downgraded by all agencies at the same time, the overall downgrade's effect could be greater than the sum of the isolated effects). Furthermore, I repeat the above process for all twelve binary variables I constructed earlier. Throughout all the specifications I introduce all the rating and control variables with a lag so as to tackle the issue of endogeneity.

Table 5.5. Basic Regressions based on Actual Ratings and Net Flows

	S&P		Moody's		Fitch	
	SSTNET _t	SSNFNET _t	SSTNET _t	SSNFNET _t	SSTNET _t	SSNFNET _t
Rating	-0.099***	-0.112**	-0.107***	-0.107***	-0.103***	-0.113**
	(-2.68)	(-2.37)	(-3.11)	(-2.62)	(-2.72)	(-2.45)
VIX	0.00	-0.01	0.00	-0.01	0.00	-0.01
	(0.05)	(-1.27)	(0.04)	(-1.31)	(0.00)	(-1.29)
US interest rate	0.04	0.06	0.06	0.07	0.03	0.05
	(0.45)	(0.53)	(0.63)	(0.6)	(0.31)	(0.43)
G7 GDP growth	-0.158***	-0.257***	-0.177***	-0.270***	-0.164***	-0.262***
	(-3.06)	(-4.66)	(-3.32)	(-4.78)	(-3.13)	(-4.71)
constant	0.22	0.62	0.34	0.57	0.36	0.73
	(0.41)	(1.01)	(0.64)	(0.99)	(0.65)	(1.15)
N	588	588	588	588	588	588
sigma_u	0.23	0.55	0.24	0.54	0.23	0.54
rho	0.05	0.23	0.05	0.23	0.05	0.23

Notes: The dependent variable is a binary one, taking the value of 1 if there is an episode, being 0 otherwise; SSTNET_t and SSNFNET_t stand for episodes of Sudden Stops in net Total and non-FDI flows respectively; regressions are based on the xtprobit routine in STATA; all variables are defined in the Appendix; all right hand variables are included with a lag; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.

Table 5.6. Fixed Effects Panel Data Model for Sovereign Ratings

	S&P	Moody's	Fitch
Real GDP Growth	0.546***	0.467**	0.391**
	(3.29)	(2.89)	(2.92)
Inflation	-0.875***	-1.337**	-0.809*
	(-3.61)	(-3.04)	(-2.11)
Fiscal Balance	-0.132***	-0.169***	-0.132**
	(-3.79)	(-3.41)	(-2.54)
Public Debt	-0.090***	-0.100***	-0.082***
	(-7.31)	(-8.52)	(-7.68)
Unemployment	-0.302***	-0.376***	-0.317***
	(-6.44)	(-5.35)	(-5.00)
Trade Openness	0.005***	0.005***	0.005***
	(3.91)	(4.38)	(5.07)
Constant	22.840***	24.449***	22.623***
	(38.47)	(33.31)	(41.52)
N	604	604	604
rho	0.939	0.934	0.931
r2_overall	0.477	0.426	0.46
r2_between	0.404	0.373	0.397
r2_within	0.837	0.811	0.812

*Notes: The above regressions are a replication of what is labelled as 'Specific Model' in Chapter 4; the (numerical equivalent) of the agency's sovereign rating is on the left hand of the regression; fixed effects and robust to heteroskedasticity standard errors are used; xtreg routine in STATA; all variables are defined in the Appendix; all right hand variables are included with a lag; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.*

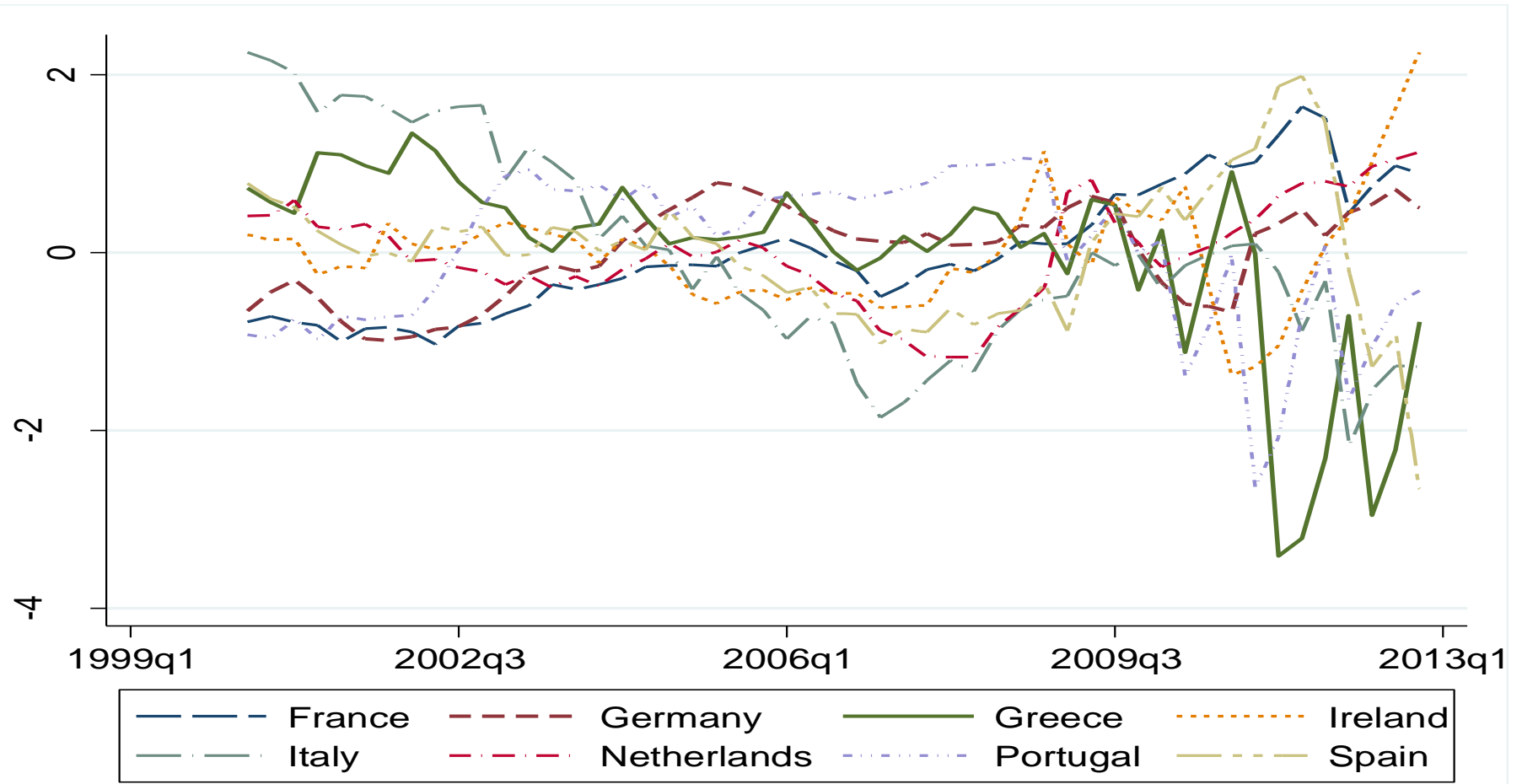


Figure 5.6. Standard and Poor's Residuals for selected EMU countries (source: S&P's website and author's elaboration)

Table 5.7. Ratings and Ratings' Residuals Correlation Pairs

	Actual Ratings				Residual Ratings			
	S&P	Moody's	Fitch	Sum of the 3 Rating Scores	S&P	Moody's	Fitch	Sum of the 3 Rating Scores
Per Capita Income	0.37	0.34	0.37	0.36	-0.01	0.02	0.02	0.01
Real GDP Growth	0.4	0.38	0.36	0.38	0.06	0.02	0.04	0.04
Real Effective Exchange Rate	0.27	0.27	0.26	0.27	0.14	0.03	0.07	0.08
Inflation (divergence from Eurozone average)	-0.13	-0.13	-0.16	-0.14	-0.08	-0.08	-0.14	-0.11
Interest Rate Spread (based on the US long term rate)	-0.8	-0.84	-0.8	-0.82	-0.34	-0.26	-0.31	-0.32
External Balance	0.52	0.45	0.49	0.49	0.03	0	-0.02	0
External Debt	-0.47	-0.42	-0.44	-0.45	-0.04	0.06	0.04	0.02
Non-FDI share of Total Inflows	-0.07	-0.03	-0.06	-0.05	-0.04	-0.01	-0.02	-0.02
Trade Openness	0.21	0.19	0.21	0.21	0.01	0.01	0.01	0.01
Foreign Reserves	-0.19	-0.19	-0.17	-0.19	0	-0.08	-0.06	-0.06
Fiscal Balance	0.57	0.52	0.54	0.55	0.01	-0.08	-0.1	-0.06
Public Debt	-0.71	-0.67	-0.71	-0.7	-0.04	0.01	0	-0.01
Credit Growth	0.16	0.18	0.14	0.16	0.01	-0.02	-0.02	-0.01
Velocity	0.01	0.02	0	0.01	0.07	-0.02	0	0.02
Economic Sentiment Indicator	0.33	0.32	0.3	0.32	0.04	0.02	0.01	0.02
VIX	0.01	0.02	0.02	0.02	0.1	0.05	0.06	0.07
US long term interest rate	0.31	0.3	0.27	0.29	0.07	-0.05	-0.05	-0.01
G7 GDP growth	0.02	-0.02	-0.01	0	-0.07	-0.07	-0.08	-0.08

Source: Eurostat, IMF, CBOE, CRAs' websites and author's elaboration

Table 5.8. Models for Sudden Stops based on net Total Flows

		S&P			Moody's			Fitch			Sum of the 3 CRAs		
	Rating	-0.161*	-0.03	-0.09	-0.204**	-0.288**	-0.165*	-0.187*	-0.220*	-0.15	-0.076**	-0.079*	-0.06
		(-1.67)	(-0.27)	(-0.84)	(-2.47)	(-2.45)	(-1.80)	(-1.96)	(-1.69)	(-1.35)	(-2.27)	(-1.71)	(-1.52)
Global Factors	VIX	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00
		(0.14)	(0.87)	(0.16)	(0.07)	(0.98)	(0.33)	(0.01)	(0.94)	(0.23)	(0.05)	(0.96)	(0.22)
	US interest rate	-0.06	0.761***		-0.07	0.710**		-0.07	0.716**		-0.06	0.691**	
		(-0.75)	(2.66)		(-0.84)	(-2.49)		(-0.92)	(2.55)		(-0.77)	(2.47)	
	G7 GDP growth	-0.132***	0.00	-0.07	-0.145***	0.00	-0.07	-0.138***	0.00	-0.07	-0.141***	-0.01	-0.07
	(-2.61)	(0.01)	(-1.04)	(-2.82)	(0.01)	(-1.08)	(-2.71)	(0.04)	(-1.03)	(-2.76)	(-0.06)	(-1.03)	
Domestic Factors	Per Capita Income		0.105*			0.093*			0.094*			0.09	
			(1.83)			(1.7)			(1.72)			(1.61)	
	GDP Growth		-0.18	-0.419**		-0.20	-0.457***		-0.22	-0.443**		-0.21	-0.448**
			(-0.65)	(-2.40)		(-0.72)	(-2.58)		(-0.79)	(-2.51)		(-0.76)	(-2.54)
	REER		-0.11	-0.179**		-0.11	-0.185***		-0.11	-0.180**		-0.11	-0.181**
			(-1.41)	(-2.51)		(-1.40)	(-2.59)		(-1.38)	(-2.52)		(-1.43)	(-2.54)
	Inflation		-2.491**	-1.885***		-2.538**	-1.861***		-2.715***	-1.991***		-2.591***	-1.923***
			(-2.51)	(-2.79)		(-2.49)	(-2.73)		(-2.70)	(-2.90)		(-2.60)	(-2.82)
	US spread		0.10	0.02		0.04	0.01		0.06	0.01		0.05	0.01
			(1.53)	(0.6)		(0.56)	(0.18)		(0.87)	(0.34)		(0.75)	(0.21)
	Exterbal Balance		0.086**	0.039**		0.106**	0.037**		0.095**	0.037**		0.098**	0.037**
		(1.99)	(2.11)		(2.3)	(1.98)		(2.16)	(1.99)		(2.21)	(2.02)	
External Debt		0.004**			0.005**			0.005**			0.005**		
		(2.16)			(2.49)			(2.33)			(2.35)		
Share of Non-FDI		-0.524*	-0.29		-0.583*	-0.29		-0.552*	-0.28		-0.575*	-0.29	

		(-1.65)	(-1.07)		(-1.83)	(-1.07)		(-1.75)	(-1.04)		(-1.81)	(-1.10)
Openness		-0.009**			-0.009**			-0.008**			-0.008**	
		(-2.28)			(-2.37)			(-2.30)			(-2.21)	
Reserves		0.02	0.01		0.02	0.01		0.02	0.01		0.02	0.01
		(0.66)	(0.82)		(0.6)	(0.8)		(0.72)	(0.73)		(0.68)	(0.79)
Fiscal Balance		-0.07	-0.071**		-0.07	-0.072**		-0.07	-0.073***		-0.07	-0.073***
		(-1.11)	(-2.52)		(-1.12)	(-2.56)		(-1.19)	(-2.59)		(-1.13)	(-2.59)
Public Debt		0.01			0.01			0.01			0.01	
		(0.82)			(1.1)			(0.92)			(0.97)	
Credit Growth		0.122*	0.161***		0.114*	0.161***		0.114*	0.161***		0.114*	0.160***
		(1.92)	(3.29)		(1.76)	(3.27)		(1.79)	(3.28)		(1.78)	(3.26)
Velocity		-0.98			-1.03			-0.93			-0.87	
		(-1.48)			(-1.56)			(-1.47)			(-1.39)	
ESI		-0.01			-0.01			-0.01			-0.01	
		(-0.59)			(-0.39)			(-0.46)			(-0.41)	
Constant	-0.920**	-6.250***	-1.199***	-0.844**	-6.540***	-1.147***	-0.837**	-6.301***	-1.158***	-0.889**	-6.236***	-1.164***
	(2.21)	(2.65)	(2.92)	(2.05)	(2.70)	(2.77)	(2.04)	(2.65)	(2.81)	(2.15)	(2.63)	(2.82)
N	578	515	565	578	515	565	578	515	565	578	515	565
sigma_u	0.16	0.57	0.00	0.17	0.61	0.00	0.16	0.55	0.00	0.16	0.55	0.00
rho	0.03	0.24	0.00	0.03	0.27	0.00	0.03	0.24	0.00	0.03	0.23	0.00

Notes: The dependent variable is a binary one, taking the value of 1 if there is an episode, being 0 otherwise; the rating variables are the residual series from the FE Specific Model reported in Chapter 4; the regressions reported here are based on the xtprobit routine in STATA; all variables are defined in the Appendix; all right hand variables are included with a lag; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively

Table 5.9. Models for Sudden Stops based on net non-FDI Flows

		S&P			Moody's			Fitch			Sum of the 3 CRAs		
	Rating	-0.377***	-0.16	-0.349**	-0.285***	-0.18	-0.186*	-0.329***	-0.11	-0.239*	-0.129***	-0.06	-0.100**
		(-3.33)	(-0.78)	(-2.57)	(-3.19)	(-0.97)	(-1.80)	(-3.11)	(-0.57)	(-1.88)	(-3.48)	(-0.87)	(-2.26)
Global Factors	VIX	-0.02	-0.02	0.00	-0.02	-0.01	0.00	-0.02	-0.02	0.00	-0.02	-0.01	0.00
		(-1.40)	(-0.77)	(0.21)	(-1.51)	(-0.63)	(0.03)	(-1.48)	(-0.73)	(0.12)	(-1.45)	(-0.67)	(0.13)
	US interest rate	-0.05	1.720***		-0.05	1.757***		-0.06	1.731***		-0.05	1.738***	
		(-0.51)	(3.59)		(-0.59)	(3.67)		(-0.71)	(3.59)		(-0.49)	(3.63)	
	G7 GDP growth	-0.255***	-0.496***	-0.451***	-0.257***	-0.464**	-0.447***	-0.258***	-0.483**	-0.451***	-0.263***	-0.477**	-0.453***
	(-4.57)	(-2.65)	(-5.25)	(-4.58)	(-2.47)	(-5.25)	(-4.61)	(-2.57)	(-5.28)	(-4.64)	(-2.55)	(-5.26)	
Domestic Factors	Per Capita Income		-0.10			-0.10			-0.09			-0.10	
			(-0.66)			(-0.60)			(-0.54)			(-0.60)	
	GDP Growth		2.424***	1.045***		2.285***	1.035***		2.417***	1.049***		2.345***	1.041***
			(3.28)	(3.71)		(3.02)	(3.70)		(3.25)	(3.76)		(3.12)	(3.71)
	REER		0.09	0.14		0.10	0.11		0.09	0.11		0.10	0.12
			(0.58)	(1.29)		(0.65)	(1.09)		(0.57)	(1.10)		(0.62)	(1.15)
	Inflation		-3.850*	-1.760*		-3.874*	-1.604*		-3.874*	-1.758*		-3.898*	-1.685*
			(-1.86)	(-1.83)		(-1.86)	(-1.69)		(-1.84)	(-1.85)		(-1.87)	(-1.77)
	US spread		1.214***	0.170***		1.150***	0.182***		1.225***	0.177***		1.182***	0.170***
			(3.72)	(3.15)		(3.48)	(3.46)		(3.76)	(3.33)		(3.58)	(3.19)
Exterbal Balance		0.160*	0.03		0.168*	0.02		0.164*	0.02		0.162*	0.02	
		(1.77)	(0.7)		(1.86)	(0.38)		(1.81)	(0.36)		(1.80)	(0.48)	
External Debt		0.00			0.00			0.00			0.00		
		(0.21)			(0.10)			(0.22)			(0.14)		
Share of Non-FDI		-0.08	-0.16		-0.08	-0.11		-0.05	-0.11		-0.07	-0.12	

		(-0.16)	(-0.46)		(-0.16)	(-0.32)		(-0.10)	(-0.34)		(-0.15)	(-0.34)	
Openness		0.01			0.00			0.00			0.00		
		(0.36)			(0.31)			(0.28)			(0.31)		
Reserves		-0.04	-0.01		-0.04	-0.01		-0.04	-0.01		-0.04	-0.01	
		(-0.68)	(-0.25)		(-0.61)	(-0.22)		(-0.61)	(-0.22)		(-0.59)	(-0.20)	
Fiscal Balance		-0.271**	0.05		-0.253**	0.06		-0.270**	0.05		-0.264**	0.05	
		(-2.32)	(1.2)		(-2.18)	(1.37)		(-2.33)	(1.26)		(-2.28)	(1.31)	
Public Debt		-0.140***			-0.134***			-0.144***			-0.137***		
		(-3.01)			(-2.84)			(-3.10)			(-2.92)		
Credit Growth		-0.396**	-0.223**		-0.402**	-0.201*		-0.391**	-0.204*		-0.397**	-0.210**	
		(-2.20)	(-2.05)		(-2.23)	(-1.89)		(-2.19)	(-1.92)		(-2.22)	(-1.97)	
Velocity		-5.420***			-5.719***			-5.590***			-5.504***		
		(-3.20)			(-3.45)			(-3.35)			(-3.30)		
ESI		-0.067**			-0.064**			-0.067**			-0.065**		
		(-2.23)			(-2.12)			(-2.20)			(-2.15)		
Constant	-0.64	13.727**	-0.74	-0.58	12.936*	-0.74	-0.55	13.708*	-0.74	-0.63	12.974*	-0.75	
		(-1.33)	(1.96)	(-1.23)	(-1.23)	(1.8)	(-1.25)	(-1.16)	(1.91)	(-1.26)	(-1.31)	(1.81)	(-1.26)
N	578	515	565	578	515	565	578	515	565	578	515	565	
sigma_u	0.45	6.72	0.78	0.46	6.61	0.72	0.47	6.79	0.72	0.47	6.64	0.74	
rho	0.17	0.98	0.38	0.18	0.98	0.34	0.18	0.98	0.34	0.18	0.98	0.35	

Notes: The dependent variable is a binary one, taking the value of 1 if there is an episode, being 0 otherwise; the rating variables are the residual series from the FE Specific Model reported in Chapter 4; the regressions reported here are based on the xtprobit routine in STATA; all variables are defined in the Appendix; all right hand variables are included with a lag; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.

Table 5.10. Models for Sudden Stops based on gross Total Inflows

		S&P			Moody's			Fitch			Sum of the 3 CRAs		
	Rating	-0.06	-0.08	0.06	-0.07	-0.08	0.00	-0.06	-0.29	0.03	-0.03	-0.07	0.01
		(-0.65)	(-0.40)	(0.52)	(-0.82)	(-0.44)	(0.01)	(-0.67)	(-1.32)	(0.25)	(-0.79)	(-0.85)	(0.27)
Global Factors	VIX	0.039***	0.00	0.01	0.039***	0.00	0.01	0.039***	0.00	0.01	0.039***	0.00	0.01
		(4.44)	(0.04)	(1.17)	(4.39)	(0.01)	(1.21)	(4.41)	(0.08)	(1.19)	(4.42)	(0.01)	(1.19)
	US interest rate	0.250***	0.710**		0.244***	0.713**		0.244***	0.625**		0.246***	0.647**	
		(3.01)	(2.29)		(2.96)	(2.34)		(2.95)	(2.04)		(2.98)	(2.06)	
	G7 GDP growth	-0.186***	-0.10	-0.03	-0.186***	-0.10	-0.02	-0.186***	-0.13	-0.03	-0.187***	-0.12	-0.03
	(-3.89)	(-0.94)	(-0.37)	(-3.90)	(-0.93)	(-0.34)	(-3.89)	(-1.17)	(-0.35)	(-3.90)	(-1.06)	(-0.35)	
Domestic Factors	Per Capita Income		0.14			0.13			0.08			0.10	
			(1.00)			(0.90)			(0.54)			(0.68)	
	GDP Growth		-2.703***	-1.313***		-2.692***	-1.313***		-2.767***	-1.317***		-2.734***	-1.317***
			(-4.86)	(-6.07)		(-4.88)	(-6.05)		(-4.97)	(-6.07)		(-4.91)	(-6.07)
	REER		0.13	0.01		0.13	0.01		0.14	0.01		0.13	0.01
			(1.27)	(0.14)		(1.26)	(0.16)		(1.31)	(0.16)		(1.27)	(0.16)
	Inflation		-2.633**	-0.39		-2.572**	-0.40		-2.749**	-0.39		-2.583**	-0.40
			(-2.28)	(-0.58)		(-2.20)	(-0.59)		(-2.38)	(-0.57)		(-2.24)	(-0.59)
	US spread		0.13	-0.07		0.13	-0.09		0.07	-0.08		0.09	-0.08
			(1.16)	(-1.27)		(1.09)	(-1.55)		(0.52)	(-1.44)		(0.68)	(-1.40)
	Exterbal Balance		-0.230***	-0.074***		-0.227***	-0.071***		-0.223***	-0.072***		-0.222***	-0.072***
			(-3.34)	(-2.64)		(-3.28)	(-2.61)		(-3.27)	(-2.64)		(-3.22)	(-2.62)
External Debt		0.029***			0.029***			0.031***			0.030***		
		(4.64)			(4.65)			(4.74)			(4.68)		
Share of Non-FDI		-1.053**	-0.46		-1.048**	-0.47		-1.133**	-0.47		-1.099**	-0.47	

		(-2.42)	(-1.53)		(-2.42)	(-1.58)		(-2.55)	(-1.57)		(-2.49)	(-1.57)
Openness		0.01			0.01			0.01			0.01	
		(0.75)			(0.78)			(1.07)			(0.93)	
Reserves		0.181***	0.035*		0.179***	0.034*		0.172***	0.035*		0.174***	0.035*
		(3.91)	(1.71)		(3.82)	(1.65)		(3.69)	(1.69)		(3.73)	(1.69)
Fiscal Balance		0.234***	0.121***		0.233***	0.119***		0.242***	0.121***		0.241***	0.121***
		(2.96)	(3.34)		(2.98)	(3.28)		(3.04)	(3.29)		(3.02)	(3.30)
Public Debt		0.02			0.02			0.03			0.02	
		(0.89)			(0.97)			(1.13)			(1.03)	
Credit Growth		0.20	0.123**		0.20	0.117*		0.18	0.120*		0.19	0.120*
		(1.55)	(1.98)		(1.59)	(1.91)		(1.44)	(1.94)		(1.49)	(1.94)
Velocity		10.082***			9.987***			10.504***			10.247***	
		(3.87)			(3.88)			(4.06)			(3.96)	
ESI		0.02			0.02			0.03			0.03	
		(0.94)			(0.96)			(1.24)			(1.10)	
Constant	-2.745***	-35.058***	-0.996**	-2.709***	-35.175***	-0.969**	-2.714***	-35.929***	-0.977**	-2.721***	-35.185***	-0.980**
		(-6.39)	(-3.69)	(-2.11)	(-6.33)	(-3.71)	(-6.33)	(-3.80)	(-2.08)	(-6.36)	(-3.74)	(-2.09)
N	578	515	565	578	515	565	578	515	565	578	515	565
sigma_u	0.22	6.13	0.52	0.22	6.20	0.50	0.22	6.53	0.51	0.22	6.31	0.51
rho	0.05	0.97	0.21	0.05	0.98	0.20	0.05	0.98	0.21	0.05	0.98	0.21

Notes: The dependent variable is a binary one, taking the value of 1 if there is an episode, being 0 otherwise; the rating variables are the residual series from the FE Specific Model reported in Chapter 4; the regressions reported here are based on the xtprobit routine in STATA; all variables are defined in the Appendix; all right hand variables are included with a lag; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.

Table 5.11. Models for Sudden Stops based on gross non-FDI Inflows

		S&P			Moody's			Fitch			Sum of the 3 CRAs		
	Rating	-0.216**	-0.20	-0.207*	-0.172**	-0.474***	-0.212**	-0.189**	-0.468***	-0.229*	-0.077**	-0.171***	-0.090**
		(-2.17)	(-1.36)	(-1.71)	(-2.19)	(-3.01)	(-2.11)	(-2.04)	(-2.74)	(-1.94)	(-2.35)	(-2.70)	(-2.14)
Global Factors	VIX	0.036***	0.02	0.023**	0.035***	0.02	0.023**	0.035***	0.02	0.023**	0.036***	0.02	0.023**
		(4.03)	(1.35)	(2.04)	(3.90)	(1.31)	(2.00)	(3.93)	(1.38)	(2.07)	(3.95)	(1.36)	(2.04)
	US interest rate	0.06	0.529***		0.05	0.417**		0.05	0.457**		0.05	0.429**	
		(0.73)	(2.84)		(0.59)	(2.14)		(0.55)	(2.36)		(0.63)	(2.19)	
	G7 GDP growth	-0.249***	-0.05	-0.157**	-0.248***	-0.05	-0.163**	-0.247***	-0.05	-0.159**	-0.251***	-0.06	-0.160**
	(-5.22)	(-0.63)	(-2.38)	(-5.20)	(-0.59)	(-2.46)	(-5.19)	(-0.55)	(-2.40)	(-5.23)	(-0.65)	(-2.41)	
Domestic Factors	Per Capita Income		0.083*			0.087*			0.085*			0.08	
			(1.80)			(1.75)			(1.69)			(1.59)	
	GDP Growth		-1.265***	-0.908***		-1.423***	-0.881***		-1.373***	-0.883***		-1.397***	-0.900***
			(-4.49)	(-4.53)		(-4.55)	(-4.49)		(-4.58)	(-4.48)		(-4.60)	(-4.53)
	REER		-0.03	-0.04		-0.08	-0.05		-0.06	-0.05		-0.07	-0.05
			(-0.33)	(-0.54)		(-0.79)	(-0.71)		(-0.65)	(-0.66)		(-0.68)	(-0.66)
	Inflation		-3.417***	-0.60		-3.505***	-0.46		-3.826***	-0.66		-3.631***	-0.57
			(-3.53)	(-0.93)		(-3.39)	(-0.70)		(-3.71)	(-1.02)		(-3.55)	(-0.87)
	US spread		-0.10	-0.04		-0.220**	-0.04		-0.184*	-0.04		-0.211**	-0.05
			(-1.16)	(-0.85)		(-2.15)	(-0.88)		(-1.94)	(-0.88)		(-2.05)	(-1.03)
	Exterbal Balance		0.00	-0.03		0.01	-0.03		0.00	-0.03		0.01	-0.03
			(0.08)	(-1.22)		(0.16)	(-1.38)		(0.08)	(-1.38)		(0.24)	(-1.30)
External Debt		0.006***			0.007***			0.007***			0.007***		
		(3.04)			(3.26)			(3.02)			(3.08)		
Share of Non-FDI		-0.659*	-0.44		-0.722**	-0.43		-0.709**	-0.43		-0.748**	-0.44	

		(-1.92)	(-1.47)		(-2.08)	(-1.44)		(-2.05)	(-1.44)		(-2.14)	(-1.48)
Openness		-0.008***			-0.008***			-0.008***			-0.008***	
		(-2.98)			(-2.92)			(-2.87)			(-2.78)	
Reserves		0.03	-0.03		0.03	-0.03		0.03	-0.03		0.03	-0.03
		(1.51)	(-1.37)		(1.09)	(-1.60)		(1.19)	(-1.58)		(1.22)	(-1.53)
Fiscal Balance		0.186***	0.098***		0.189***	0.097***		0.181***	0.094***		0.192***	0.095***
		(3.15)	(2.93)		(3.06)	(2.96)		(2.96)	(2.85)		(3.09)	(2.88)
Public Debt		-0.01			0.00			0.00			0.00	
		(-0.68)			(0.08)			(0.35)			(0.19)	
Credit Growth		0.07	0.08		0.07	0.08		0.07	0.08		0.06	0.08
		(1.17)	(1.55)		(1.07)	(1.59)		(1.05)	(1.58)		(0.98)	(1.51)
Velocity		-1.238*			-1.17			-1.13			-1.03	
		(-1.89)			(-1.56)			(-1.44)			(-1.27)	
ESI		-0.02			-0.01			-0.02			-0.01	
		(-1.04)			(-0.62)			(-0.84)			(-0.81)	
Constant	-1.871***	-2.58	-0.50	-1.799***	-3.58	-0.49	-1.794***	-3.08	-0.49	-1.823***	-3.12	-0.48
		(-4.41)	(-1.12)	(-4.29)	(-1.37)	(-1.07)	(-4.26)	(-1.16)	(-1.08)	(-4.33)	(-1.17)	(-1.05)
N	578	515	565	578	515	565	578	515	565	578	515	565
sigma_u	0.29	0.31	0.45	0.30	0.42	0.45	0.30	0.40	0.45	0.30	0.41	0.46
rho	0.08	0.09	0.17	0.08	0.15	0.17	0.08	0.14	0.17	0.08	0.15	0.17

Notes: The dependent variable is a binary one, taking the value of 1 if there is an episode, being 0 otherwise; the rating variables are the residual series from the FE Specific Model reported in Chapter 4; the regressions reported here are based on the xtprobit routine in STATA; all variables are defined in the Appendix; all right hand variables are included with a lag; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.

5.5 Results

Starting with sudden stop episodes, we can see in the above tables that the results confirm the significant role that sovereign ratings play in these events. In particular, we observe that out of the four ways to capture sudden stop events (can be done in terms of i) net total flows, ii) net non-FDI flows, iii) gross total inflows and iv) gross non-FDI inflows), sovereign ratings appear to be statistically significant in three configurations (see Tables 5.8, 5.9 and 5.11). More specifically, when measured in terms of net total flows (Table 5.9), the sovereign ratings of Moody's and Fitch appear to be significant at the 5% and 10% levels respectively, when all other variables are included into this model. Although there is a drop of the significance when the model is adjusted for multicollinearity, Moody's ratings manage to retain the biggest part of their significance (the relevant t- statistic is -1.80).

Furthermore, we can see that the statistical significance of the ratings is further consolidated when sudden stop episodes are measured in terms of non-FDI flows (see Tables 5.9 and 5.11). First, in the case of net non-FDI flows the evidence suggests that the ratings of all three rating agencies, along with their aggregate score are significant in either the 5% or the 10% levels when included in the multicollinearity-clear model. Most notably, the significance of all possible specifications is raised when sudden stop episodes are considered within the frame of gross non-FDI Inflows. As reported in Table 5.11 the rating scores of all CRAs appear significant with t-statistics between -1.71 and -2.14 under the multicollinearity- clear model. In addition the statistical significance of Moody's and Fitch ratings reaches the 1% level under the all-inclusive model

(in the case of Moody's the t-statistic is higher than 3 in absolute terms). Throughout all the above specifications ratings are also economically meaningful in the sense that they consistently appear with a minus.

With regards to the remaining variables in these models, we can observe that out of the global factors the global uncertainty index VIX appears to be insignificant; this is in accordance with Schmidt and Zwick, 2013. In contrast, the G7 GDP growth rate appears to be the only noteworthy global determinant of sudden stop episodes. However its significance varies according to specification, so that overall we can conclude that global factors are not very important in shaping sudden stops. Out of the domestic factors, real GDP growth seems to be one of the most important factors, while credit growth also appears to be playing a role in fuelling the dynamics that lead to a sudden stop. Additionally, the analysis undertaken here shows that when included in the specification, external debt is highly significant and with a positive sign for three out of the four ways of measuring sudden stops. Similarly trade openness exhibits some noteworthy significance in two out of the four specifications, while appearing with a minus.

Out of the regressions conducted for surge, retrenchment and flight episodes, there is some evidence suggesting that sovereign ratings might matter for capital surge and retrenchment events. In particular as shown in Table 5.12, when the model is based upon gross total inflows, ratings appear to play a role in encouraging capital surges. More precisely, both the ratings of S&P and Fitch, as well as the aggregate rating seem to be significant at either the 5% or the 1% level across all different specifications of the model. In addition all rating

Table 5.12. Model for Capital Surges based on gross Total Inflows

		S&P			Moody's			Fitch			Sum of the 3 CRAs		
	Rating	0.304**	0.576**	0.472**	0.13	0.341*	0.26	0.338**	0.730***	0.582***	0.096**	0.210***	0.163**
		(2.20)	(2.47)	(2.44)	(1.16)	(1.77)	(1.63)	(2.25)	(2.97)	(2.76)	(1.99)	(2.59)	(2.41)
Global Factors	VIX	-0.024*	0.02	0.01	-0.02	0.02	0.02	-0.022*	0.02	0.02	-0.022*	0.02	0.02
		(-1.82)	(1.08)	(0.79)	(-1.56)	(1.33)	(0.91)	(-1.68)	(1.38)	(0.96)	(-1.70)	(1.25)	(0.86)
	US interest rate	0.12	0.11		0.13	0.07		0.14	0.08		0.13	0.09	
		(1.25)	(0.47)		(1.37)	(0.30)		(1.50)	(0.33)		(1.35)	(0.38)	
	G7 GDP growth	0.15	0.23	0.16	0.15	0.17	0.16	0.14	0.17	0.15	0.14	0.17	0.15
		(1.56)	(1.37)	(1.26)	(1.58)	(1.10)	(1.28)	(1.52)	(1.01)	(1.25)	(1.56)	(1.06)	(1.22)
Domestic Factors	Per Capita Income		0.03			0.01			0.03			0.03	
			(0.51)			(0.12)			(0.61)			(0.49)	
	GDP Growth		0.16	0.18		0.28	0.18		0.32	0.15		0.30	0.19
			(0.36)	(0.58)		(0.62)	(0.61)		(0.67)	(0.50)		(0.64)	(0.63)
	REER		0.308***	0.313***		0.325***	0.340***		0.327***	0.339***		0.324***	0.333***
			(2.89)	(3.12)		(3.18)	(3.43)		(3.21)	(3.41)		(3.12)	(3.36)
	Inflation		-1.53	-1.46		-1.34	-1.45		-1.19	-1.49		-1.28	-1.49
			(-1.24)	(-1.56)		(-1.13)	(-1.61)		(-0.98)	(-1.58)		(-1.06)	(-1.61)
	US spread		-0.32	-0.529**		-0.36	-0.528**		-0.46	-0.600**		-0.37	-0.551**
			(-1.07)	(-2.01)		(-1.24)	(-2.08)		(-1.51)	(-2.30)		(-1.26)	(-2.13)
	Exterbal Balance		0.089*	0.03		0.099**	0.04		0.07	0.03		0.08	0.04
			(1.72)	(1.29)		(2.00)	(1.48)		(1.42)	(1.27)		(1.63)	(1.36)
External Debt		0.00			0.00			0.00			0.00		
		(0.09)			(0.24)			(0.58)			(0.41)		
Share of Non-FDI		0.784*	0.783*		0.796*	0.780*		0.844*	0.783*		0.824*	0.783*	

		(1.70)	(1.80)		(1.70)	(1.78)		(1.80)	(1.80)		(1.76)	(1.79)	
Openness		-0.01			0.00			-0.01			-0.01		
		(-1.45)			(1.08)			(-1.25)			(-1.27)		
Reserves		-0.06	-0.04		-0.04	-0.02		-0.05	-0.03		-0.05	-0.03	
		(-1.47)	(-1.41)		(-1.31)	(-0.83)		(-1.42)	(-1.21)		(-1.41)	(-1.15)	
Fiscal Balance		-0.11	-0.077*		-0.128*	-0.089**		-0.12	-0.080*		-0.128*	-0.084*	
		(-1.44)	(-1.66)		(-1.67)	(-2.00)		(-1.56)	(-1.69)		(-1.67)	(-1.82)	
Public Debt		0.00			0.00			0.00			0.00		
		(0.15)			(0.13)			(0.08)			(0.07)		
Credit Growth		0.292***	0.130*		0.278***	0.133**		0.278***	0.131*		0.288***	0.133*	
		(2.91)	(1.91)		(2.87)	(1.99)		(2.76)	(1.88)		(2.86)	(1.95)	
Velocity		-0.93			-0.55			-0.67			-0.68		
		(-1.04)			(-0.78)			(-0.87)			(-0.86)		
ESI		0.00			0.00			0.00			0.00		
		(0.05)			(0.04)			(0.13)			(0.02)		
Constant	-1.782***	-2.68	-3.036***	-1.882***	-2.79	-3.230***	-1.918***	-2.82	-3.156***	-1.850***	-2.91	-3.146***	
		(-3.37)	(-1.04)	(-4.37)	(-3.61)	(-1.14)	(-4.70)	(-3.66)	(-1.13)	(-4.57)	(-3.54)	(-1.16)	(-4.56)
N	578	515	565	578	515	565	578	515	565	578	515	565	
sigma_u	0.47	0.48	0.48	0.45	0.38	0.46	0.47	0.36	0.47	0.46	0.40	0.46	
rho	0.18	0.18	0.19	0.17	0.12	0.17	0.18	0.12	0.18	0.18	0.14	0.18	

Notes: The dependent variable is a binary one, taking the value of 1 if there is an episode, being 0 otherwise; the rating variables are the residual series from the FE Specific Model reported in Chapter 4; the regressions reported here are based on the xtprobit routine in STATA; all variables are defined in the Appendix; all right hand variables are included with a lag; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.

Table 5.13. Models for Retrenchment Episodes based on gross Total Outflows

		S&P			Moody's			Fitch			Sum of the 3 CRAs		
	Rating	-0.207**	-0.269*	-0.143	-0.096	-0.359***	-0.077	-0.137	-0.425***	-0.118	-0.056*	-0.154***	-0.045
		(-2.17)	(-1.80)	(-1.17)	(-1.26)	(-2.65)	(-0.76)	(-1.52)	(-2.74)	(-0.98)	(-1.78)	(-2.74)	(-1.07)
Global Factors	VIX	0.024***	0.006	0.007	0.023**	0.006	0.007	0.023**	0.007	0.008	0.023**	0.007	0.008
		(2.62)	(0.45)	(0.61)	(2.52)	(0.43)	(0.59)	(2.54)	(0.51)	(0.63)	(2.55)	(0.51)	(0.62)
	US interest rate	0.116	0.16		0.1	0.071		0.1	0.07		0.105	0.052	
		(1.42)	(0.86)		(1.25)	(0.37)		(1.24)	(0.36)		(1.3)	(0.27)	
	G7 GDP growth	-0.204***	-0.076	-0.124*	-0.199***	-0.073	-0.126*	-0.200***	-0.075	-0.124*	-0.203***	-0.081	-0.125*
	(-4.16)	(-0.89)	(-1.73)	(-4.08)	(-0.84)	(-1.77)	(-4.10)	(-0.86)	(-1.74)	(-4.13)	(-0.93)	(-1.75)	
Domestic Factors	Per Capita Income		0			-0.001			-0.005			-0.013	
			(0.00)			(-0.03)			(-0.11)			(-0.31)	
	GDP Growth		-1.139***	-0.921***		-1.195***	-0.898***		-1.167***	-0.896***		-1.185***	-0.900***
			(-4.34)	(-4.59)		(-4.43)	(-4.50)		(-4.39)	(-4.49)		(-4.46)	(-4.51)
	REER		0.073	-0.012		0.06	-0.019		0.068	-0.018		0.067	-0.017
			(0.88)	(-0.14)		(0.74)	(-0.23)		(0.83)	(-0.21)		(0.81)	(-0.21)
	Inflation		-1.766*	-0.672		-1.576*	-0.608		-1.933**	-0.674		-1.741*	-0.635
			(-1.96)	(-1.02)		(-1.76)	(-0.92)		(-2.12)	(-1.03)		(-1.93)	(-0.96)
	US spread		-0.210**	-0.067		-0.257***	-0.051		-0.249***	-0.056		-0.276***	-0.061
			(-2.24)	(-1.18)		(-2.75)	(-0.98)		(-2.75)	(-1.06)		(-2.88)	(-1.12)
	Exterbal Balance		-0.025	-0.087***		-0.025	-0.089***		-0.026	-0.089***		-0.018	-0.088***
		(-0.58)	(-3.48)		(-0.59)	(-3.57)		(-0.61)	(-3.55)		(-0.43)	(-3.53)	
External Debt		0.005***			0.005***			0.005***			0.005***		
		(2.9)			(3.03)			(2.96)			(3.1)		
Share of Non-FDI		-0.652*	-0.478		-0.625*	-0.448		-0.654*	-0.457		-0.681*	-0.463	

		(-1.87)	(-1.49)		(-1.82)	(-1.41)		(-1.89)	(-1.43)		(-1.95)	(-1.45)
Openness		-0.003			-0.003			-0.003			-0.003	
		(-1.40)			(-1.42)			(-1.30)			(-1.12)	
Reserves		0.002	-0.016		-0.006	-0.018		-0.006	-0.018		-0.007	-0.018
		(0.08)	(-0.86)		(-0.30)	(-0.94)		(-0.29)	(-0.97)		(-0.31)	(-0.97)
Fiscal Balance		0.185***	0.113***		0.178***	0.112***		0.171***	0.109***		0.182***	0.110***
		(3.2)	(2.96)		(3.09)	(2.95)		(2.95)	(2.86)		(3.12)	(2.89)
Public Debt		0.004			0.008			0.006			0.007	
		(0.66)			(1.2)			(0.9)			(1.09)	
Credit Growth		0.118*	0.138**		0.112*	0.143**		0.114*	0.141**		0.108	0.139**
		(1.77)	(2.4)		(1.67)	(2.49)		(1.7)	(2.45)		(1.61)	(2.41)
Velocity		-0.794			-0.968*			-0.853			-0.815	
		(-1.33)			(-1.70)			(-1.41)			(-1.39)	
ESI		-0.004			0.003			0.001			0.002	
		(-0.24)			(0.21)			(0.09)			(0.11)	
Constant	-1.891***	-1.043	-0.449	-1.809***	-1.451	-0.475	-1.813***	-1.152	-0.469	-1.833***	-1.048	-0.458
	(-4.44)	(-0.55)	(-0.93)	(-4.30)	(-0.78)	(-0.98)	(-4.29)	(-0.61)	(-0.97)	(-4.34)	(-0.56)	(-0.95)
N	578	515	565	578	515	565	578	515	565	578	515	565
sigma_u	0.349	0.294	0.483	0.36	0.29	0.484	0.36	0.309	0.484	0.358	0.289	0.483
rho	0.109	0.08	0.189	0.115	0.078	0.19	0.115	0.087	0.19	0.114	0.077	0.189

Notes: The dependent variable is a binary one, taking the value of 1 if there is an episode, being 0 otherwise; the rating variables are the residual series from the FE Specific Model reported in Chapter 4; the regressions reported here are based on the xtprobit routine in STATA; all variables are defined in the Appendix; all right hand variables are included with a lag; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.

variables take on positive signs, which accords with what we would expect (the higher the rating, the more attractive the country should appear to foreign capital). Similarly, Table 5.13 reports some partial evidence in favour of the hypothesis that ratings affect retrenchments of capital, provided that such episodes are captured via gross total outflows. Accompanied by a negative sign, the evidence suggests that the higher the rating, the lower the probability that a Eurozone country will experience an episode of capital repatriation.

Note however that all other specifications show the ratings to be insignificant, irrespectively of the rating agency and the variables selection³¹. Hence, the results of the previous paragraph should be interpreted with caution. Furthermore, it is worth noting that in the case of those episodes that primarily relate with the pre-crisis era, as for instance in the case of capital surges, the econometric testing can be somehow difficult at the first place. This is due to the fact that during the ‘good times’, ratings were relatively flat for most EMU countries.

5.5.1 Robustness Checks

I now conduct a number of robustness checks on the results reported for sudden stops. First I repeat all the regressions for sudden stop episodes using a complementary logarithmic transformation (cloglog) instead of assuming a normal distribution as in the case of the usual probit model. The cloglog

³¹ Other specifications include the models for surge episodes based on i) gross non-FDI inflows, ii) net total flows, and iii) net non-FDI flows. In the case of retrenchment episodes they include the models based on net total and non-FDI flows, as well as the models based on gross non-FDI outflows of capital. Moreover all different models of flight episodes are insignificant. Results are not reported in the current but are available upon request.

approach allows for asymmetry as well as for fatter tails in the two ends of the cumulative distribution. As a result, recent literature (Forbes and Warnock, 2012a; 2012b; Schmidt and Zwick, 2013) has recommended it as a more suitable approach for capturing events of capital flow reversals, given that the latter are relatively scarce by nature.

Secondly, I break the sample in the first quarter of 2008 and repeat all the regressions for the post crisis era (2008q1- 2012q4). This gives a panel with a time span of twenty observations, which although small can still allow us to draw some basic inferences.

Third, I repeat the multicollinearity-clear baseline regressions (the ones reported on the third column for each CRA on the main tables above) by adding an aggregate measurement of political instability for every country in the model. This measurement is based on the summation of the six key indices of public governance provided by the World Bank (these include Government Effectiveness, Voice and Accountability, Political Stability and Absence of Violence, Regulatory Quality, Rule of Law, and Evidence of Corruption). The reason why I choose to aggregate them, rather than considering them separately, is the high degree of correlation amongst them.

Fourth, I repeat the baseline regressions under alternative specifications for the sudden stop variables. So far all my binary variables have been based on the most widespread definition of the relevant literature (established by Calvo *et al.*, 2004). The virtue of such approach is that it provides a common denominator between present and past findings, which in turn is of great value in facilitating comparison. Nonetheless, as pointed out earlier any definition is to an extent arbitrary. In that regard an important test of robustness is to see

whether the reported results are fragile to the specification of the binary variables. To conduct such test, I alter the second condition of the baseline sudden stop definition, by shifting the two standard deviation threshold up and down by ten percent. This gives rise to two alternative scenarios. Under the first (second) one a sudden stop episode needs to contain at least one observation where the year-on-year fall in capital flows lies at least 1.8 (2.2) standard deviations below the sample mean. In both cases the first and third criteria remain as before. Namely, a sudden stop episode lasts as long as the year-on-year fall lies lower than one standard deviation below the mean, while any recorded episode needs to contain at least two time periods.

Starting with the cloglog regressions, we can see in Table 5.14 that the results remain essentially unchanged. All specifications that were found significant above manage to retain their significances, with the model based on gross non-FDI inflows exhibiting the highest significance for the sovereign rating variables. Moreover across all specifications ratings keep appearing with the proper sign (minus).

With regards to the post-crisis subsample we can observe that some significance is lost in the models based on net capital flows. However, as illustrated in Table 5.15, the significance of all ratings variables is considerably boosted for all the models that are based on gross flows. Especially in the case of gross non-FDI inflows, I obtain robust significances at the 1% level across all CRAs and for almost all model specifications.

Furthermore, we can see in Table 5.16 that the inclusion of the aggregate public governance indicator does not affect the significance and sign of the

Table 5.14. Sudden Stop Regressions based on the Complementary Logarithmic Transformation (cloglog)

	S&P			Moody's			Fitch			Sum of the 3 CRAs		
	1st reg	2nd reg.	3rd reg.	1st reg	2nd reg.	3rd reg.	1st reg	2nd reg.	3rd reg.	1st reg	2nd reg.	3rd reg.
Net Total Flows	-0.320*	-0.101	-0.109	-0.324***	-0.394**	-0.211*	-0.305**	-0.337*	-0.155	-0.124***	-0.117	-0.068
	(-1.69)	(-0.43)	(-0.50)	(-2.80)	(-2.16)	(-1.82)	(-2.17)	(-1.66)	(-1.08)	(-2.67)	(-1.64)	(-1.34)
Net non-FDI Flows	-0.654***	-0.547*	-0.592**	-0.527***	-0.347	-0.364**	-0.542***	-0.468	-0.455*	-0.230***	-0.191*	-0.189**
	(-4.00)	(-1.93)	(-2.25)	(-3.50)	(-1.55)	(-2.03)	(-3.49)	(-1.63)	(-1.85)	(-3.91)	(-1.82)	(-2.22)
Gross Total Inflows	-0.149	0.043	-0.046	-0.16	0.026	-0.127	-0.166	-0.04	-0.089	-0.063	0.004	-0.037
	(-0.90)	(0.2)	(-0.25)	(-1.30)	(0.13)	(-0.85)	(-1.07)	(-0.20)	(-0.51)	(-1.28)	(0.07)	(-0.63)
Gross non-FDI Inflows	-0.297**	-0.233	-0.199	-0.319***	-0.551**	-0.311**	-0.335**	-0.538***	-0.287	-0.126***	-0.183**	-0.108*
	(-1.97)	(-0.86)	(-1.03)	(-2.73)	(-2.47)	(-2.09)	(-2.39)	(-2.60)	(-1.53)	(-2.72)	(-2.33)	(-1.81)

Notes: The dependent variable is a binary one, taking the value of 1 if there is an episode, being 0 otherwise; only the sovereign rating variables are reported here; the rating variables are the residual series from the FE Specific Model reported in Chapter 4; cloglog routine used in STATA, with robust to heteroskedasticity standard errors; similarly with the sequence of the main results, other than the rating, the 1st regression includes the global factors only, the 2nd one includes all global and domestic factors, while the 3rd includes only those factors that are immune to multicollinearity; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively; only the coefficients and t-statistics of the ratings variables are reported.

Table 5.15. Sudden Stop Regressions for the post-Crisis era (2008q1- 2012q4)

	S&P			Moody's			Fitch			Sum of the 3 CRAs		
	1st reg.	2nd reg.	3rd reg.	1st reg.	2nd reg.	3rd reg.	1st reg.	2nd reg.	3rd reg.	1st reg.	2nd reg.	3rd reg.
Net Total Flows	-0.244*	-0.189	-0.131	-0.189*	-0.325**	-0.192	-0.157	-0.219	-0.139	-0.076*	-0.109*	-0.068
	(-1.82)	(-1.00)	(-0.82)	(-1.91)	(-2.22)	(-1.61)	(-1.44)	(-1.39)	(-1.03)	(-1.87)	(-1.78)	(-1.33)
Net non-FDI Flows	-0.490***	-0.425	-0.169	-0.418***	-0.294	-0.172	-0.357***	-0.14	-0.057	-0.167***	-0.115	-0.053
	(-2.65)	(-1.39)	(-0.60)	(-3.14)	(-1.31)	(-0.92)	(-2.58)	(-0.63)	(-0.28)	(-3.00)	(-1.22)	(-0.66)
Gross Total Inflows	-0.370***	-1.703***	-0.871***	-0.178*	-0.790**	-0.348*	-0.191*	-1.704***	-0.639***	-0.090**	-0.700***	-0.255***
	(-2.67)	(-3.29)	(-3.25)	(-1.80)	(-2.55)	(-1.85)	(-1.71)	(-3.20)	(-2.75)	(-2.19)	(-3.50)	(-2.87)
Gross non-FDI Inflows	-0.336**	-0.803***	-0.548***	-0.249***	-0.677***	-0.445**	-0.244**	-0.897***	-0.582***	-0.107***	-0.443***	-0.236***
	(-2.40)	(-2.87)	(-2.68)	(-2.58)	(-2.68)	(-2.49)	(-2.21)	(-2.99)	(-2.87)	(-2.61)	(-3.21)	(-3.03)

Notes: The dependent variable is a binary one, taking the value of 1 if there is an episode, being 0 otherwise; only the sovereign rating variables are reported here; the rating variables are the residual series from the FE Specific Model reported in Chapter 4; time span used: 2008q1- 2012q4; xtprobit routine used; similarly with the sequence of the main results, other than the rating, the 1st regression includes the global factors only, the 2nd one includes all global and domestic factors, while the 3rd includes only those factors that are immune to multicollinearity; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively; the total number of observations is 240 for the 1st regression, 211 for the 2nd one, and 231 for the 3rd one; only the coefficients and t-statistics of the ratings variables are reported.

Table 5.16. Sudden Stop Regressions including the Aggregate Public Governance Indicator

	S&P		Moody's		Fitch		Sum of the 3 CRAs	
	rating	WGI	rating	WGI	rating	WGI	rating	WGI
Net Total Flows	-0.09	-0.015	-0.170*	-0.023	-0.149	-0.019	-0.059	-0.02
	(-0.85)	(-0.29)	(-1.84)	(-0.46)	(-1.38)	(-0.37)	(-1.55)	(-0.39)
Net non-FDI Flows	-0.282**	-0.461***	-0.223**	-0.549***	-0.231*	-0.514***	-0.097**	-0.502***
	(-2.02)	(-2.68)	(-2.05)	(-2.86)	(-1.77)	(-2.76)	(-2.13)	(-2.79)
Gross Total Inflows	0.053	0.236***	0.016	0.235***	0.037	0.236***	0.014	0.237***
	(0.44)	(2.73)	(0.17)	(2.72)	(0.31)	(2.73)	(0.33)	(2.73)
Gross non-FDI Inflows	-0.209*	0.084	-0.203**	0.067	-0.224*	0.077	-0.088**	0.074
	(-1.72)	(1.02)	(-2.03)	(0.8)	(-1.91)	(0.92)	(-2.10)	(0.89)

Notes: The dependent variable is a binary one, taking the value of 1 if there is an episode, being 0 otherwise; only the sovereign rating variables are reported here; the rating variables are the residual series from the FE Specific Model reported in Chapter 4; xtprobit routine used; the public governance 'WGI' variable is added to the 3rd. column type of regressions (i.e. to those regressions that are immune to multicollinearity); t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively; for each rating agency the table reports the coefficients and significances of the relevant rating variable as well as of the WGI measurement.

Table 5.17. Sudden Stop Regressions with Alternative Definitions of the Binary Variables

	S&P						Moody's					
	1st reg.		2nd reg.		3rd reg.		1st reg.		2nd reg.		3rd reg.	
	1.8 st. dev.	2.2 st. dev.	1.8 st. dev.	2.2 st. dev.	1.8 st. dev.	2.2 st. dev.	1.8 st. dev.	2.2 st. dev.	1.8 st. dev.	2.2 st. dev.	1.8 st. dev.	2.2 st. dev.
Net Total Flows	-0.137	-0.492***	0.023	-0.616***	-0.007	-0.512***	-0.134*	-0.239***	-0.12	-0.055	-0.056	-0.184*
	(-1.60)	(-3.95)	(+0.21)	(-2.75)	(-0.07)	(-3.51)	(-1.88)	(-2.66)	(-1.32)	(-0.24)	(-0.73)	(-1.81)
Net non-FDI Flows	-0.119	-0.465***	-0.105	-0.357	-0.013	-0.454***	-0.155*	-0.289***	-0.045	-0.301	-0.035	-0.191*
	(-1.25)	(-3.84)	(-0.79)	(-1.35)	(-0.12)	(-2.99)	(-1.95)	(-3.20)	(-0.40)	(-1.62)	(-0.41)	(-1.83)
Gross Total Inflows	-0.098	-0.074	-0.099	-0.116	-0.078	0.046	-0.088	-0.107	-0.132	-0.640**	-0.127	-0.116
	(-1.10)	(-0.71)	(-0.73)	(-0.51)	(-0.79)	(+0.32)	(-1.15)	(-1.25)	(-0.92)	(-2.31)	(-1.47)	(-0.89)
Gross non-FDI Inflows	-0.014	-0.342***	0.091	-0.323**	0.079	-0.419***	-0.09	-0.271***	-0.201*	-0.510***	-0.079	-0.460***
	(-0.15)	(-3.25)	(+0.78)	(-2.11)	(+0.79)	(-3.03)	(-1.18)	(-3.18)	(-1.65)	(-3.31)	(-0.91)	(-3.48)
	Fitch						Sum of the 3 CRAs					
	1st reg.		2nd reg.		3rd reg.		1st reg.		2nd reg.		3rd reg.	
	1.8 st. dev.	2.2 st. dev.	1.8 st. dev.	2.2 st. dev.	1.8 st. dev.	2.2 st. dev.	1.8 st. dev.	2.2 st. dev.	1.8 st. dev.	2.2 st. dev.	1.8 st. dev.	2.2 st. dev.
Net Total Flows	-0.134	-0.300***	-0.095	-0.07	-0.032	-0.269**	-0.054*	-0.129***	-0.03	-0.135*	-0.015	-0.123***
	(-1.60)	(-2.84)	(-0.89)	(-0.33)	(-0.35)	(-2.19)	(-1.87)	(-3.41)	(-0.79)	(-1.80)	(-0.46)	(-2.74)
Net non-FDI Flows	-0.173*	-0.380***	-0.035	-0.295	-0.037	-0.302**	-0.061*	-0.145***	-0.025	-0.124	-0.012	-0.118**
	(-1.83)	(-3.49)	(-0.27)	(-1.41)	(-0.34)	(-2.26)	(-1.87)	(-3.77)	(-0.55)	(-1.52)	(-0.33)	(-2.53)
Gross Total Inflows	-0.128	-0.098	-0.266	-0.717***	-0.154	-0.119	-0.042	-0.039	-0.07	-0.236**	-0.049	-0.029
	(-1.41)	(-0.97)	(-1.58)	(-2.70)	(-1.49)	(-0.79)	(-1.34)	(-1.10)	(-1.20)	(-2.16)	(-1.39)	(-0.53)
Gross non-FDI Inflows	-0.071	-0.286***	-0.141	-0.519***	-0.029	-0.511***	-0.025	-0.119***	-0.036	-0.201***	-0.007	-0.202***
	(-0.79)	(-2.92)	(-1.10)	(-3.05)	(-0.28)	(-3.54)	(-0.81)	(-3.42)	(-0.81)	(-3.19)	(-0.19)	(-3.70)

Notes: The dependent variable is a binary one, taking the value of 1 if there is an episode, being 0 otherwise; only the sovereign rating variables are listed here; the rating variables are the residual series from the FE Specific Model reported in Chapter 4; the results for two alternative definitions of sudden stops are reported. In the first (second) scenario an episode occurs if there is at least one period where the year-on-year fall in capital flows is greater than 1.8 (2.2) standard deviations below the mean. In both cases an episode lasts as long as the year-on-year fall is greater than a standard deviation below the mean, while any episode needs to consist of at least two time periods; similarly with the sequence of the main results, other than the rating, the 1st regression includes the global factors only, the 2nd one includes all global and domestic factors, while the 3rd includes only those factors that are immune to multicollinearity; xtprobit routine used; t-statistics in parentheses; *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.

rating variables. Similarly with the main findings, the sovereign ratings of all three CRAs exhibit the highest significance across those specifications that are based on non-FDI flows. Interestingly, although the results concerning the public governance indicator are mixed and inconclusive, the variable appears to be significant at the 1% level for two out of the four sudden stop specifications.

Lastly, Table 5.17 reports the results for the alternative specifications of sudden stop episodes. While the first definition returns insignificant results for almost all regressions, the reverse holds true for the second specification. In particular when setting the threshold of the second condition to a 2.2 standard deviation distance below the mean, the statistical significance of all rating variables is not only retained, but also strengthened for the vast majority of cases, when compared with the baseline results. Most notably, all regressions for gross non-FDI inflows give significant results for the rating variables of all CRAs at the 1% level. In addition, all the immune to multicollinearity regressions (third column for each CRA) give significant results for all net flows. In all cases the economic significance is also retained in that the rating variables consistently appear with a minus sign. All in all, while such evidence shows that the baseline results reported earlier are not irrelevant to the definition of sudden stop episodes, it also shows that they are not dependent upon a specific binary construction either.

5.6 Conclusion

This chapter contributes to the stream of literature that seeks to point out the determinants of extreme capital flow movements. While initially focused on developing countries, such literature has more recently shifted towards developed countries too. In such a context the current chapter focuses on the dynamics of the twelve initial member states of Eurozone and investigates the statistical and economic importance of the sovereign ratings of the three CRAs (S&P, Moody's and Fitch) upon episodes of sudden stops of capital. The timespan of interest is 1999- 2012, a period that includes the 2010 European crisis, as well as the first post-crisis years. Moreover, the methodology employed involves a panel probit model with random effects.

In consistency with the findings of Chapter 4, the emphasis of the present chapter is on that part of sovereign ratings that reflects feelings of euphoria and panic. This choice is navigated by two distinct motives. First, in terms of economic intuition, it is interesting to explore the influence of exaggerated movements of sovereign ratings upon extreme movements of capital flows. Secondly, by decomposing the ratings, and isolating the component of panicked reactions from the portion of ratings that reflects the broader macroeconomic environment of a country, the approach enables the incorporation of sovereign ratings along with macroeconomic control variables into the model, without facing the issue of multicollinearity that would otherwise occur.

Results are on the affirmative for the vast majority of econometric specifications and for all three CRAs. Most notably, sovereign ratings appear to be significant for three out of the four ways of capturing sudden stop episodes (namely for the cases of net total flows, net non-FDI flows and gross non-FDI flows). Results are also strengthened when considering non-FDI rather than

total flows. In addition sovereign ratings appear with economically meaningful signs (minus) under all specifications.

A number of robustness checks are conducted so as to safeguard the results. These include: i) the repetition of the key regressions under a complementary logarithmic transformation (instead of assuming a normal distribution as in the baseline panel probit); ii) the re-estimation of the model for the period 2008q1- 2012q4, so as to account for the possibility of a structural break in the time series; iii) the inclusion of an aggregate measurement of political instability in order to account for an additional control variable; and iv) the repetition of the baseline regressions under alternative specifications for the left- hand binary (sudden stop) variable: given the unavoidable arbitrariness that to an extent governs the construction of such a binary, the intuition here is to see whether the results are dependent upon a particular specification or not. Under all robustness checks, the key results remain qualitatively unaltered.

All things considered, it is interesting to investigate the broader macroeconomic implications of the channel of influence highlighted here. To the extent that sovereign ratings are important in affecting episodes of sudden stops of capital, one can also move a step further and reflect on the instability and constraints that arise. This is done in Chapter 7 by means of a stock flow consistent model. Furthermore there are concrete policy implications that are relevant with the topic. These are considered in detail in Chapter 8.

5.7 Appendix

5.7.1 List of Episodes of Capital Flow Reversals per Country

	Sudden Stops of Net Total Flows		Sudden Stops of Net non-FDI Flows		Sudden Stops of Total Inflows		Sudden Stops of non-FDI Inflows	
	Start	End	Start	End	Start	End	Start	End
Austria	2008q1	2008q3	2009q3	2010q1	2001q2	2001q4	2001q2	2001q4
							2007q4	2009q4
Belgium	2006q4	2007q3	2004q2	2005q1	2008q4	2009q3	2008q4	2009q3
			2006q3	2007q2				
			2009q3	2010q2				
Finland	2001q1	2001q4	2009q4	2010q4	2001q1	2001q4	2009q2	2009q3
					2012q3	2012q4	2012q3	2012q4
France	2007q1	2008q3	2001q2	2002q1	2008q1	2009q3	2008q1	2009q3
Germany					2000q4	2002q1	2008q3	2009q3
					2008q3	2009q3		
Greece	2010q2	2011q2	2012q2	2012q3	2010q2	2011q2	2010q2	2011q2
Ireland	2008q4	2009q3	2002q4	2003q3	2001q1	2001q3	2000q4	2003q2
					2004q4	2005q1	2007q4	2009q3
					2008q2	2009q3		
Italy	2000q4	2001q4	2004q1	2004q3	2001q3	2002q2	2002q1	2002q2
	2009q4	2010q1	2009q2	2010q1				
	2011q4	2012q1	2011q4	2012q1				
Luxembourg	2006q4	2007q3	2006q4	2007q2	2008q2	2009q2	2006q4	2007q2
							2008q2	2009q2
Netherlands	2003q2	2004q3			2001q2	2002q4	2007q4	2009q3
	2009q2	2009q4			2008q1	2009q3		
Portugal	2011q2	2012q4	2012q1	2012q4	2002q2	2003q2	2002q4	2003q3
					2004q3	2005q2	2005q1	2005q2
					2010q4	2011q3	2010q4	2011q4
Spain	2009q1	2010q1	2008q3	2010q1	2008q1	2009q3	2007q4	2009q3

	Surges of net Total Flows		Surges of net non-FDI Flows		Surges of Total Inflows		Surges of non-FDI Inflows	
	Start	End	Start	End	Start	End	Start	End
Austria	2010q3	2011q1	2010q3	2011q2	2003q3	2005q4	2003q3	2005q2
Belgium	2008q1	2009q2	2008q1	2008q4	2007q2	2008q1	2007q2	2008q1
					2010q2	2010q3	2004q3	2004q4
					2011q3	2011q4	2010q2	2010q3
Finland	2002q2	2002q4	2011q4	2012q3			2011q3	2011q4
	2011q4	2012q3						
France	2008q4	2009q3	2009q1	2009q3	2005q1	2005q4	2001q1	2001q3
Germany	2007q2	2008q1	2007q2	2008q2	2007q2	2008q1	2005q2	2005q3
							2007q2	2008q1
Greece	2000q2	2000q4	2000q2	2000q4	2001q4	2002q4	2001q4	2002q4
	2001q3	2002q3	2001q4	2002q3	2007q2	2007q4	2007q2	2007q4
Ireland	2007q3	2008q3	2004q1	2004q4				
					2003q4	2004q1	2003q4	2004q3
					2006q3	2007q2	2006q3	2007q2
Italy	2010q3	2011q1	2010q3	2011q1				
					2003q1	2003q3	2003q1	2003q3
Luxembourg	2008q4	2009q3	2003q4	2004q3				
			2005q4	2006q2				
			2007q3	2008q2	2005q2	2006q1		
Netherlands			2005q3	2006q2	2005q3	2006q2	2005q2	2005q3
			2008q4	2009q3			2010q2	2010q4
Portugal							2006q1	2006q2
Spain			2004q3	2005q3			2005q3	2006q2

	Flights of Total Outflows		Flights of non-FDI Outflows		Retrenchments of Total Outflows		Retrenchments of non-FDI Outflows	
	Start	End	Start	End	Start	End	Start	End
Austria	2003q2	2005q4	2003q2	2005q2			2007q4	2009q4
Belgium	2007q1	2008q1	2007q1	2007q4	2008q4	2009q3	2008q2	2009q3
Finland	2010q2	2010q3			2012q3	2012q4	2001q1	2001q2
							2009q2	2009q3
							2012q3	2012q4
France					2008q1	2009q3	2008q1	2009q3
Germany	2003q1	2003q2	2005q1	2005q3	2008q2	2009q3	2008q2	2009q3
	2004q3	2005q4						
Greece	2012q1	2012q4	2012q1	2012q4	2006q1	2006q4	2000q3	2000q4
					2010q2	2011q2	2006q1	2006q4
							2010q2	2011q2
Ireland	2003q4	2004q1	2003q3	2004q1	2000q2	2001q3	2000q2	2001q3
	2006q3	2007q2	2006q3	2007q2	2004q4	2005q1	2002q4	2003q1
							2004q4	2005q1
					2007q4	2009q2	2008q2	2009q2
Italy	2003q1	2003q4	2003q1	2003q4	2002q1	2002q2	2002q1	2002q2
	2005q1	2005q4	2005q2	2005q4	2008q1	2008q4		
Luxembourg	2005q2	2006q1	2005q2	2006q1	2008q2	2009q2	2006q4	2009q2
Netherlands	2005q3	2006q2	2006q4	2007q3	2001q2	2001q3	2000q2	2001q2
					2007q4	2009q3	2008q1	2009q3
Portugal	2003q4	2004q1			2002q2	2005q2	2004q3	2005q2
					2010q4	2011q3	2011q1	2011q4
Spain			2005q4	2006q2	2007q3	2009q3	2006q4	2007q1
							2007q4	2008q3

5.7.2 Description of Variables

	Description	Unit	Source
Net Total Capital Flows	net FDI+ net Portfolio Investment + net Other Investment	millions of Euro	Eurostat
Net non-FDI Capital Flows	net Portfolio Investment + net Other Investment	millions of Euro	Eurostat
Total Capital Inflows	FDI in Rep Economy + Portfolio Investment Liabilities + Other Investment Liabilities	millions of Euro	Eurostat
Total Capital Outflows	minus (FDI Abroad+ Portfolio Investment Assets+ Other Investment Assets)	millions of Euro	Eurostat
Non-FDI Capital Inflows	Portfolio Investment Liabilities + Other Investment Liabilities	millions of Euro	Eurostat
Non-FDI Capital Outflows	minus (Portfolio Investment Assets+ Other Investment Assets)	millions of Euro	Eurostat
Sovereign Ratings	Long Term Foreign Currency Ratings	Index numbers	S&P, Moody's and Fitch websites
Per Capita Income	GDP at Mkt Prices/ Population; quarterly figures are seasonally adjusted and multiplied by 4	Thousands of Euros	Eurostat
Real GDP Growth	Real GDP = Nom GDP/GDP Deflator * 100; seasonally adjusted	%	Eurostat
Real Effective Exchange Rate (REER)	deflator: unit labour costs in 37 trading partners	%	Eurostat

Inflation Rate	Inflation Growth Rate; Harmonized Consumer Price Index used; seasonally adjusted	%	International Financial Statistics IMF
Divergence of Inflation Rate from Eurozone Average Inflation.	Inflation Growth Rate; Harmonized Consumer Price Index used; differences from EMU average taken in square terms; EMU inflation average computed by the author; seasonally adjusted	%	International Financial Statistics IMF
Fiscal Balance	$[(\text{Total Public Revenues} - \text{Total Public Expenses}) / \text{GDP}] * 100$	%	Eurostat
External Balance	$(\text{Current Account Balance} / \text{GDP}) * 100$	%	Eurostat
External Debt	$(\text{External Debt} / \text{Total Exports}) * 100$; External Debt is approximated by (portfolio account, debt instrument liabilities+other investment, liabilities); Total Exports are the summary of (goods, credit+ services, credit+ income, credit); quarterly ratio divided by 4	%	Eurostat
Public Debt	$(\text{General Government Debt} / \text{GDP}) * 100$; Maastricht Debt used; ratio divided by 4	%	Eurostat
Reserves	$(\text{Foreign Reserves} / \text{Imports}) * 100$; divided by 4	%	Eurostat
Unemployment	Total Unemployment Rate; seasonally adjusted	%	Eurostat
Government Effectiveness; Voice and Accountability; Political Stability and Absence of Violence; Regulatory Quality; Rule of Law; Evidence of Corruption	Indices reported in the World Governance Indicator Database; interpolated from annual to quarterly frequency; used 1998 as the entrance scores for 1999; copy pasted the 2000 values in 2001 cause the latter were missing	Index Numbers	World Bank
Trade Openness	Measured as $[(\text{Exports} + \text{Imports}) / \text{GDP}] * 100$	%	Eurostat
Income Velocity of Money. Measured as GDP/ M2	M2 approximated by the sum of currency under circulation+ demand deposits+ other deposits; GDP multiplied by 4 in the quarterly series	simple ratio units used	International Financial Statistics IMF

Domestic Credit Growth	domestic credit approximated by the "MFI claims to Other Sectors" account; national residency criterion used	%	International Financial Statistics IMF
Economic Sentiment Indicator	qualitative measurement designed by Eurostat; based on monthly interviews; seasonally adjusted by Eurostat itself; converted by the author to quarterly frequency (from monthly) by taking the last month of each quarter (eg March for Q1, June for Q2 and so on)	Index numbers	Eurostat
VIX Volatility Index	designed by the Chicago Board of Exchange (CBOE), based on a range of options' prices; for more information, see the FAQ http://www.cboe.com/micro/vix/faq.aspx ; converted by the author to quarterly frequency (from monthly) by taking the last month of each quarter (eg March for Q1, June for Q2 and so on)	Index numbers	Chicago Board of Exchange (CBOE)
Interest Rate Spread based on the US rate	US long term government yield used as a base	%	International Financial Statistics IMF
US Interest Rate	US long term government yield	%	International Financial Statistics IMF
G7 GDP Growth Rate	the IMF constructs area and world indices by applying a weighted average of country indices; see the IMF IFS manual for more info; G7 countries include Canada, France, Germany, Italy, Japan, UK, and USA; provided in annual frequency; extrapolated to quarterly by the author	%	International Financial Statistics IMF
Share of non-FDI inflows out of total inflows	Constructed by the author; formula used: $(\text{Portfolio Investment} + \text{Other Investment}) / (\text{Portfolio Investment} + \text{Other Investment} + \text{FDI})$; ratio focuses exclusively on positive inflows for the recipient countries so as to avoid extreme values that wouldn't make sense. Hence whenever the inflow would be negative ("stop") the value was set equal to zero; in the cases where all inflows were negative, the ratio is not provided; smoothing has been applied	%	Eurostat

Chapter 6- A Few Notes on Macroeconomic Modelling³²

We “should wish to see a world in which education aimed at mental freedom rather than at imprisoning the minds of the young in a rigid armour of dogma calculated to protect them through life against the shafts of impartial evidence. The world needs open hearts and open minds, and it is not through rigid systems, whether old or new, that these can be derived.”

UADPhilEcon’s motto, courtesy of Bertrand Russell³³

Chapter 7 moves away from econometrics and goes into macroeconomic modelling. Its purpose is to provide a mathematical model that encompasses an endogenous sovereign rating mechanism which in turn feeds back to the aggregate macroeconomic dynamics. Although in the case of econometrics it can often be said that econometric tools are not attached to a specific viewpoint of the world (but not always, see Stockhammer and Onaran, 2004 for critical reflections on the Vector Autoregression (VAR) methodology), the same does not always hold for macroeconomic modelling. Here the modelling framework that a researcher employs often determines to a certain extent his or her assumptions and understanding about the way the economy functions. For this reason it is important to dedicate some space and discuss the merits and limitations of some of the alternative macroeconomic modelling methods that exist before moving on to the actual project. This is done in the current chapter. By contrasting the Dynamic Stochastic General Equilibrium (DSGE) with the

³² The discussion in the current chapter has benefited from the useful remarks provided by Dr. Devrim Yilmaz.

³³ I obtained my MPhil degree in Economics from UADPhilEcon, the doctoral program of the University of Athens.

Stock Flow Consistent (SFC) approach, I provide a justification as to why the second is a more suitable approach for macroeconomic modelling.

Outlined in brief I argue that DSGE has consistently been the analytical expression of neoclassical macroeconomic theory, and reflects its assumptions, and limitations. The latter involve, most notably, the compulsory use of microfoundations, as well as their understanding of stability as the normal state of the market economy. As discussed below, microfoundating a macro world gives rise to a false social ontology, where society is simply assumed to consist of the aggregation of separate individuals, while it also creates the space for fallacies of composition. Furthermore, the intrinsic assumption of stability across DSGE models creates a pre-fixed understanding as to what causes certain economic phenomena, such as unemployment. Although open to non-neoclassical features, such as the New Keynesian price and wage rigidities, and while recently updated so as to include important institutions such as banks and credit, those extensions do not remove the erroneous core of those models.

On the other hand, SFC has recently emerged as an appealing alternative for macroeconomic modelling. In contrast with the DSGE methodology, the SFC is a broader framework, which as such can be utilized by researchers coming from different theoretical backgrounds. As its name suggest, the SFC approach clearly separates between stocks and flows. This separation gives the model an element of dynamic interaction, whereby the realization of flows and the change of stocks link different short-term periods with each other. Furthermore, it provides a solid basis for coherent social accounting, while it also creates the appropriate space for a comprehensive consideration of financial dynamics.

The rest of this chapter is organized as follows: I first outline the most important developments within the DSGE tradition throughout the recent years. I then move on to the critique of the approach. Following, I discuss the alternative of SFC modelling, illustrating both its merits and its limitations. The last section concludes.

6.1 DSGE Models

6.1.1 The State of the Art in DSGE Modelling

Until some years ago it was quite straightforward to spot the shortcomings of DSGE models. Up to the crisis, these models were not incorporating any kind of real world institutions such as banks, while concerns such as income inequality were consistently left outside their scope. An extensive review of this generation of models is provided by Christiano *et al.* (2010) who argue that a key reason behind the ‘success’ of those models had been their capacity to fit the data (mainly referring here to the data up to the 2007 crisis). Indicatively, the Smets and Wouters (2002) model, a model that is still part of the toolbox of the European Central Bank (ECB)³⁴, considers neither banks nor credit. Rather, it contains only households and firms; its main highlight being the incorporation of some real world frictions, such as sticky prices and wages, habit formation in consumption, and variable capital utilization (notice here that in the DGSE jargon, the word ‘frictions’ usually

³⁴ See here <https://www.ecb.europa.eu/home/html/researcher.en.html>

corresponds to factors that slow down the price mechanism from equilibrating the market).

Either as response to the above critiques, or as an effort to grasp the dynamics of the post-crisis era, DSGE modellers have recently made some important progress in building in a number of real world features. To start with, Goodfriend and McCallum (2007) incorporate a banking sector and attempt to explain the existence of multiple interest rates. Gerali *et al.* (2010) introduce a banking sector with monopolistic power and study the importance of credit-supply factors in explaining investment and GDP fluctuations. Their banks provide loans to both households and firms, and draw funds not only from savings but also from retained earnings, therefore creating an important link between the real and financial sides of the economy. Furthermore, interest rates are sticky while households demand either deposits or loans depending on their level of 'patience' (patience relates here with the discount factors that households apply to their future utility). Kumhof and Ranciere (2010) stress the role of inequality in increasing the financial leverage of households and in increasing the probability of a financial crisis. In a similar vein, Charpe and Kuhn (2012) highlight the importance of inequality in dampening consumption and aggregate demand. Their model includes a wage bargaining mechanism and an endogenous labour share of income. Additionally they set a low elasticity of substitution between capital and labour which limits the increase of labour demand that follows a fall in wages. In contrast to most of the existing DSGE literature, their results show how wage rigidities such as minimum wage help to stabilize the economy by containing the falls of output and employment. Christiano *et al.* (2013) also endogenise wage inertia, and examine the response

of labour market variables to monetary, technology and investment shocks. Benes, Kumhof and Laxton (2014a; 2014b) construct a DSGE model with banks and household credit, following a balance sheet approach for their banks. Adopting the key insights of the endogenous money theory³⁵, the authors suggest that it is not savings but rather demand for financing, banks' expectations of future profitability and the risk absorption capacity of their capital that govern banks' decisions to provide credit. In that regard they use their model to show that banks have the capacity to create purchasing power *ex nihilo*, while at the same time they show how large and risky loans create the seeds of a financial crisis. Christiano *et al.* (2014) also include financial frictions into their model, without however considering an explicit banking sector. What is interesting in their paper is that they adopt a two stage decision mechanism for households, with a monetary shock in-between. With households deciding the size of their portfolio in the first stage, and the allocation of their wealth in the second one, this model permits the authors to depict a "fly to safety" situation.

6.1.2 Points of Critique

6.1.2.1 Microfoundations

The key point of the Lucas Critique (Lucas, 1976) was that expectations play an important role in explaining observed regularities at the aggregate level.

³⁵ For an outline of endogenous money theory see Fontana (2009; chapters 7 and 8). It is interesting to note that although Benes and his colleagues clearly take the insights of endogenous money on board (see especially Benes *et al.*, 2014a: 9- 11), they do so without providing a single reference to acknowledge the original source of the ideas they develop.

In that regard, once there is a policy change, expectations might change and as a result change the observed aggregate relationships. To tackle this problem, macroeconomic models should start from the level of the individual, since structural parameters such as consumption preferences and production functions are immune to policy changes.

The above critique shaped DGSE models from their genesis, so that the microfoundations approach provided DSGE models a strong *raison d'être*. To evaluate the validity of the Lucas argument, one should first consider the purpose of mathematical modelling. If our aim is to conduct accurate forecasting, as advocated by neoclassical economists (e.g. Friedman, 1953), the Lucas Critique is right in pointing out the possible instability in observed aggregate relationships. But then the disappointing performance of DSGE models in forecasting the crisis and post-crisis economic dynamics (for evidence see Edge and Gurkaynak, 2010) could also be taken as a sign that not even the individual-based parameters are permanently fixed, as assumed by the microfoundations approach. In that case we either need to think of abolishing mathematical modelling all together, or to acknowledge the artificiality of the closures we construct when building such models.

A mathematical model is, in essence, an analytical tool for exposing and communicating an argument. As such, it often requires a vast number of simplifications. Although such communication might include projections of future scenarios, there is no obvious reason why we need to attach certain probabilities to possible scenarios, especially when our knowledge of such likelihoods appears to be so shaky. Neither there is any reason to pretend that the parameters we utilize are going to stay constant, when we know that they

won't. Instead, we can reflect on the sustainability of the processes that arise out of the model and the experiments we conduct, as for instance in Godley (1999) and Godley and Lavoie (2007b). Any projections will of course be liable to the stability of the parameters we have employed, but this not an error itself. In either a micro or a macro founded model, what is an error is to forget the artificiality that surrounds our constructs.

Even if the microfoundations approach was to provide a solution to a problem, it only does so by creating a few new ones. In particular, it introduces a false social ontology, which as such creates the hazard of false policy conclusions, while it also opens the space for fallacies of composition.

To start with the first, microfounded models such as the DSGEs are based on the dubious idea that society is an aggregation of individual households and firms, so that we can conduct a valid macro analysis by focusing at the level of the representative agent without losing scope. However, as argued by Kirman (1989, 1992) it is far from obvious that the aggregate of individuals acts in the same way with the representative agent, even if everyone is assumed to behave rationally. Put simply, there is no direct relation between individual and collective rationality. Furthermore, Kirman points out that even if we could somehow construct an accurate representative agent at a given point of time, such representation would be itself liable to policy changes. In Kirman's words 'the representative constructed *before* the change may no longer represent the economy *after* the change' (1992: 123; emphasis in the original). This means that the Lucas Critique applies to DSGE models equally well (also see Skott, 2014).

Despite the recent developments in DSGE modelling in incorporating insights from Game Theory, the basic microfounded ontology of the model leaves aside any element of social conflict, class divisions or exploitation. For instance under the basic routine of those models, households provide capital to firms, while in their role as workers they freely choose how much to work and how much to go on holidays based on the disutility they derive from their labour. To the extent that those elements are important in capturing real social dynamics, DSGE models act in a way that constrains rather than liberates the mind of the researcher.

Coming to the second point, when microfounding a macro world, it is easy to neglect the fact that some variables might have different and often opposing effects at the two levels. Such cases are described as fallacies of composition. For example, a key point raised by Keynes (Keynes, 1936) in his critique against the classical economics of his time is the ‘paradox of thrift’, a phenomenon that relates with the implications of increased savings. As argued by Keynes, although increased savings can secure some increased future consumption if applied solely by the individual, the reverse occurs when such behaviour is adopted in a collective scale by the population. In that case, rather than securing an augmented volume of future consumption, increased savings will reduce consumption demand, and therefore investment. As a result, not only the economy will experience a slump but the actual savings will also end up being lower than before due to the fall in peoples’ incomes.

6.1.2.2 Equilibrium

By virtue of their neoclassical underpinnings, DSGE models assume that equilibrium is something that exists in the real world. In that regard, DSGEs work with the deeply-rooted assumption that the market mechanism is capable of providing stability and full employment if left to operate freely. Of course actual DSGEs employ all different sorts of frictions so as to explain the data of the real world. However, the usage of those frictions does not remove the main idea behind DSGEs, and this is of the utmost importance for policy conclusions.

For example, one of the most common kinds of rigidities that can be found in DSGE is wage rigidities. The conventional (but not universal) wisdom across the DSGE community is that wage stickiness explains unemployment since it keeps the market away from the equilibrium wage that would deliver full (or non-inflation accelerating) employment. Put simply if there are legal barriers, such as the minimum wage, firms might not hire as many workers as they would do otherwise, and therefore the labour market does not clear. Even more, when in a recession workers refuse to accept a cut in their wages firms will have to fire part of their staff in order to reduce their costs. Other than the fact that as with before there is a fundamental fallacy of composition when taking wages solely as a cost factor, and omitting their role as a source of aggregate demand, there is also an important issue in that DSGE modellers would usually assume that there really exists at all times an equilibrium wage consistent with full or non-inflation accelerating employment. They ignore the fact that firms' decisions to hire does not relate solely with the wages they have to pay, but also with their expectations about the future, so that especially in a recession we might very well have falling wages and increasing unemployment going hand in hand.

Or, to state another example, even in the most advanced DSGE formulations where banks are explicitly incorporated into the model, there is the implicit assumption that if we were to remove the specific element that creates financial crises we could think of a stable financial system. For instance in Kumhof and Ranciere (2010) the trouble of high leverage is caused by income inequality, while in Benes *et al.* (2014a) it has to do with risky loans given out to households. In none of the papers outlined above there is any thought towards the direction that financial instability might be inherent to the functioning of the capitalist economy, rather than a symptom of specific regularities. This of course is not a coincidence, but a reflection of the fact that in DSGE models finance is at best considered as an afterthought, rather than an intrinsic feature of the process of capital accumulation. All those models outlined earlier can equally well explain investment with or without finance. Needless to say, my point of critique does not imply that observed regularities such as income inequality or risky loans are not important, but that there can be deeper causes behind financial crises not picked up by DSGEs. For instance Minsky (1986) and his celebrated Financial Instability Hypothesis shows how financial fragility and speculation can be seen as intrinsic outcomes of the capitalist economy, given the way overoptimistic expectations are formed and re-enforced in the expansionary phase of the business cycle.

The precise schema that intrinsically creates financial instability goes beyond the current discussion. For my purpose it suffices to point out that as long as there exist coherent explanations as to how unemployment, financial instability and crises can arise as endogenous outcomes of the market economy, DSGE models act in a way that impoverish the researcher by binding him or her

to a very specific understanding of the economic system that assumes stability as its ultimately normality. Furthermore, as Yilmaz (2015) argues this is a very important distinction at the terrain of policy: rather than focusing on policy recommendations that would allow us to prevent unsustainable and destabilizing processes from building up, DSGE models tend to provide recommendations on how to improve the shock absorbing mechanisms of the economy. Even more, as it can be seen in the abovementioned literature, those recommendations are usually delivered in the aftermath of the occurrence of actual shocks, so that the usefulness of this kind of modelling can be directly questioned.

6.2 The SFC Alternative

SFC modelling has recently emerged as a way out of the flaws of DGSEs, while also opening up the space for a richer comprehension of economic phenomena. Despite the fact that the SFC approach has mainly been adopted by scholars broadly belonging to the Post Keynesian tradition, it sets a framework that can also be adopted by economists who do not necessarily share the assumptions and insights of the Post Keynesian theory. While the SFC approach has its roots at the works of James Tobin and Wynne Godley (indicatively see Brainard and Tobin, 1968; Tobin, 1982; Godley, 1999), it was the seminal book of Godley and Lavoie (2007b) that provided the main unified framework for the development of those models. It is this book, along with the recent review of SFC models provided by Caverzasi and Godin (Caverzasi and Godin, 2015) that mainly influence the outline provided here.

First, as the name suggests, SFC models pay attention in clearly separating between stocks and flows. As pointed out by Godley and Lavoie (2007b), such distinction gives an element of dynamic interaction in the model whereby different short-run periods are interrelated through the realization of flows and the corresponding change of stocks in the economy. Furthermore, by focusing on the interaction of the balance sheets of all the agents that are included in the model, the SFC approach gives a strong emphasis to watertight social accounting. Namely, every flow needs to come from somewhere and go somewhere else, while every asset in the economy is always somebody else's liability. Although conceptually simple, this rule is powerful in making sure that we do not conduct any fallacies of composition. In addition, it forces the researcher to comprehend the multifaceted role of assets/ liabilities in economic dynamics. For instance under proper SFC accounting, public debt always has a mirror reflection as wealth either at the hands of the private sector, or at the hands of the central bank.

The above rule also holds in the case of open economy stock flow modelling. In contrast with non-SFC models, the stock flow approach requires the explicit modelling of the external sector. Open economy SFC models usually include from two to four countries (see below) with an emphasis being ascribed to the proper modelling of all the sectors in all countries. As with before, the logic of SFC models forces us to take into account the fact that every trade imbalance has two distinct points of view: the deficit of one country is always the surplus of another. Similarly the wealth that flies out of a country does not go into a black hole, but ends up in the hands of an agent or fund in a foreign sector. Furthermore, unless special assumptions are employed, there is nothing

in the system that guarantees balanced trade across countries in either the short or the long run.

In neither the closed nor the open economy set-up there is any default assumption of gravitating tendencies towards a market clearing equilibrium point. Of course the model still solves for a steady state in most (but not all) of the SFC applications (for a discussion of explosive trajectories in SFC models, see Macedo e Silva and Dos Santos, 2011). However, this does not imply that equilibrium is understood here as a feature of the real world. Rather the steady state is merely employed as a reference point so as for the researcher to be able to draw inference and conclusions out of the model and the experiment he or she conducts. Similarly, it can be seen as a useful device for comparing alternative policies.

Although there is a growing stream of agent based stock flow applications (see for instance Carvalho and Di Guilmi, 2013), microfounding a SFC model is not a compulsory requirement. In fact, most of the SFC models, including the ones outlined in Godley and Lavoie (2007b), have been so far based on macrofoundations. Notice here that the macrofounding a macro model does not imply a return to the old school IS/LM framework. In most, if not in all SFC models there is a far richer interaction between the developments going on in the financial market and the real economy than what the IS/LM approach could allow for.

With regard to the behaviour of the model's agents, there is no specific requirement for assuming rational expectations. Instead a variety of expectation mechanisms can be employed. Most importantly, given that some key decisions of the agents are made in the beginning of the period, before the

economy engages into any sort of interactions, mistakes can also be realized. For instance, households can err when calculating their expected wealth, firms may face a discrepancy between the expected and actual sales of their products, and banks may face a gap between the asset and liability sides of their balance sheet. In all cases a buffer element is assumed for every sector so as to ensure the ex-post coherency of the accounting.

One of the most interesting aspects of an SFC model is the way the financial market is depicted. As modelled, it is essentially based on the financial decisions of households, who after deciding at the beginning of the period how much to consume, go on to estimate their end of the period wealth and decide how to allocate it across the available financial assets (e.g. government bills and bonds, corporate equities etc.). The (proportional to expected wealth) demand of every asset is not only a function of its own rate of return, but also relates with the rates of return of all the other financial assets, including cash. In its usual set up, the demand for cash can be either for liquidity or transactions purposes. In that way we end up with a system of equations that needs to satisfy the following Tobin's principles: i) the column of the coefficients that relate with liquidity preference (the constants of the equations) needs to sum up to one; ii) the coefficients of all other columns need to sum up to zero; iii) the sum of all the coefficients on rates of return, reading horizontally need to sum up to zero as well. The logic behind those rules is that what matters for the decision making of households is not the rate of return of every asset per se, but its yield relative to all other assets. For the same reason, whether the rates of return are included in a nominal or in a real form, does not make any difference (Godley and Lavoie, 2007b: 326- 7). Furthermore cash usually plays the role of

the buffer so as to correct the realized mistakes in expectations. In that regard the ex-ante demand for cash usually differs from the actual ex-post cash holdings.

In the overall, there is a three-stage process that needs to be followed when setting up and solving an SFC. First, in accordance with the requirement of the watertight accounting, a balance sheet matrix must be designed for the model. This is meant to include all the stocks of assets and liabilities that every sector has at the beginning of the period, as well as their net worth. Second, a transaction matrix is required so as to map every transaction that takes place throughout the period across the different sides of the economy. Any capital gains are also included here. As a reflection of proper accounting, in both the balance and the transaction matrices all columns and rows should sum up to zero. Third, the accounting identities and behavioural equations of each sector need to be established in order to illustrate the causalities that are assumed to run across the model. Following, the parameters and initial values of stocks and flows need to be obtained so as to simulate the model (alternatively one can solve the system analytically and stop there, or just stop at the specification of the identities and equations). As discussed in Caverzasi and Godin (2015) numerical values can either be theoretical or empirical, while in the second case the researcher can either calibrate them or estimate them econometrically. Notice here that up to stage two the model does not have a 'character' yet. Rather, it is only by means of the equations of stage three that the model incorporates insights from theory (also see Toporowski and Michell, 2011). For instance the model could be either a demand or a supply led one and up to stage two those assumptions would make no difference.

All in all, there are no specific constraints to the issues to be studied. Rather, SFC models can allow for a plethora of phenomena to be investigated such as income inequality, innovation and financialization (see literature outline below). Moreover, there are no boundaries to the theoretical narratives that one might want to reflect in a model, so that the SFC approach does not advocate any kind of economic orthodoxy, either new or old.

6.2.1 Literature Review

Caverzasi and Godin (2015) provide the most up to date and complete literature outline of SFC applications. In what follows I outline some of the most recent papers, with a relative focus on open economy case studies.

To start with, van Treeck (2009) introduces some aspects of financialization into the SFC framework, running a number of experiments related to share buybacks and higher dividend pay-outs. Moreover, Arestis and Sawyer (2012) study the effectiveness of fiscal policy, and Ryoo and Skott (2013) investigate the fiscal requirements for continuous full employment. Dafermos (2012) designs a model that incorporates liquidity preference in all three sectors (households, firms and banks) at the same time. His analysis is facilitated by the construction of an uncertainty index that links with the economic agents' precautionary motive and asset selection, as well as their willingness to take up more debt. Passarella (2012) introduces the Minskyian dynamics of financial instability, while modifying Minsky's theory by allowing households' autonomous consumption (in relation to capital gains and credit) and equity price inflation to enter the model. Furthermore, Dafermos (2014)

attempts to put together some of the key insights of Godley and Minsky, by taking on board Godley's 'financial balances approach' and merging it with an endogenous target of the private sector's net debt-to-income ratio a la Minsky. Nikolaidi (2014) studies the joint role of wage stagnation and securitization in amplifying macroeconomic instability. Her model consists of nine distinct sectors, including two types of households, commercial banks, Special Purpose Vehicle (SPV)-underwriters and institutional investors. Bhaduri *et al.* (2015) investigate the links between asset price fluctuations and the real economy. Interestingly, Bhaduri and his colleagues show how the inflation of asset prices can drive funds from real to financial investment, and thus contribute to systematic financial fragility. From their side Caiani *et al.* (2014) study Schumpeterian innovation and its interplay with financial dynamics.

Out of the open economy SFC applications, Lavoie and Daigle (2011) study the implications of different behavioural finance strategies upon the exchange rate and trade account movements. Following Duwicquet and Mazier (2010/11) construct a two country asymmetric model. Controlling for different types of possible shocks, the writers show that within a monetary union like the Eurozone, an efficient stabilization policy needs to rely on federal transfers, rather than the holding of foreign assets by households and the supply of intrazone credit. In a similar fashion, Duwicquet *et al.* (2012) show the need for a federal budget in the Eurozone, and the stabilizing potential of the idea of euro-bonds. Furthermore, Kinsella and Khalil (2011) investigate the effects of debt-deflation in a monetary union, showing that for a small participant country facing deflation, only transfers from the larger country and increased public expenditure can put an end to the recession. More recently, Ehnts (2013)

explores the potential benefit of an exchange rate rule, taken in conjunction with expansionary fiscal policy, while Greenwood-Nimmo (2014) compares the distinct and combined effectiveness of fiscal and monetary policy in a two country SFC model that faces inflationary and recessionary pressures. Bortz (2014) allows for the possibility of having sovereign and private debt denominated in foreign currency and corporate debt issued by foreign banks, and studies the relevant implications upon trade and financial flows, distribution, as well as on fiscal and monetary policy. Moreover Khalil and Kinsella (2014) consider a two country model with two commercial banks in each state, and examine the contagion effects of non-performing loans between banks and towards the macro economy.

At a more 'brave' level, Godley and Lavoie (2007a) and Lavoie and Zhao (2010) construct some three country models, with the first paper studying the intra-Eurozone imbalances and the possible ways to confront them, and the second investigating the impacts of a diversification of China's foreign reserve assets upon the Eurozone and the US. Similarly, Mazier and Tiou-Tagba Aliti (2012) set-up a three country model, including the US, China and Eurozone, and contrast the effectiveness of fixed and flexible dollar-yuan parities in reducing global imbalances. Valdecantos and Zezza (2015) expand such framework in order to formally elaborate Keynes's bancor proposal and its usefulness in containing global imbalances. Furthermore Belabed *et al.* (2013) set up a three country model and study the effects of changes in income distribution upon current account imbalances. Lastly, Mazier and Valdecantos (2015) construct a four country model and explore the possibility of a Eurozone with two Euros.

6.2.2 Limitations

Although the SFC framework is a promising alternative to conventional macroeconomic modelling, it too has its limitations. First most SFC models (but not all) still narrow down to a system of linear equations, as in the case of DSGEs. Similarly, despite its usefulness as a methodological tool, the steady state assumption also creates some distance between the model and reality. Moreover, as discussed by Godley and Lavoie (2001/2) and Caverzasi and Godin (2015), the numerical solution of the model focuses around local stability, so that the researcher cannot know whether there are any other equilibria in the model, and whether these are stable or not.

Aggregate SFC models usually employ a vast amount of equations (probably around a hundred equations on average). In addition, as pointed out by Toporowski and Michell (2011) the analysis of some phenomena such as stock market inflation can require the splitting of one or more of the aggregate sectors and hence further augment the mathematical complexity of the model. In either case, such complexity can obscure economic interpretation, while the results can prove to be quite sensitive to parameter values. As discussed by Caverzasi and Godin, the parameterization of the model always involves some arbitrariness, irrespectively of the strength of the underlying empirical analysis, while some times non-realistic values need to be assumed for the sake of obtaining a realistic steady state solution.

Furthermore, the SFC approach to open economy modelling essentially gives rise to a two-country (or more) closed economy model (under fixed exchange rates it could also be thought as a regional model). As outlined above,

the SFC strategy to model the external sector is by making it part of the model. Nonetheless, this brings along the weak assumption that the entire international trade of country A is conducted solely with country B. Other than the fact that this might obscure our understanding of international macro-dynamics if taken too seriously, it also creates an issue when one wants to calibrate the model to real data. In particular, if we work on the assumption that the exports of country A are identical to the imports of country B, and if at the same time we want to set the figures of country A equal to their actual values for a given year, then by necessity we have to allow the exports of country B also to obtain that number. With this said, the extent to which an open economy SFC model is useful depends on what we want to study. For instance if one were to focus on Eurozone the SFC methodology could be justified by the fact that although open at a member state level, the Euro area is to a large extent a big closed economy when taken as a whole. If that is the case then despite its limitations an open economy SFC model could still be a powerful tool in analysing, let's say, the way intra-Eurozone imbalances were created and maintained throughout the decade that led to the European crisis.

Taking all these considerations into account, it is important to remember that the SFC approach is a method of mathematical modelling. As pointed out earlier, while modelling techniques can allow us to understand and illustrate analytically some otherwise complex phenomena and interactions, there are always simplifications and sacrifices that need to be made. But even the most advanced and extended model one could ever imagine would not be in a position to capture the richness of theory. For example, although there are lots of clever mechanics that can be employed in order to illustrate aspects that

arise out of Keynesian uncertainty, uncertainty itself remains a non-quantifiable concept. The way out of the conundrum is not to downgrade the importance of such non-quantifiable phenomena and constraints and treat them as disturbances to an otherwise smooth process, but to fully acknowledge them and in that sense also acknowledge the limitations of the modelling we are doing.

6.3 Conclusion

Paving the ground for the model developed in the following chapter, Chapter 6 discusses some of the main alternatives in macroeconomic modelling. In contrasting the DSGE with the SFC approach, the chapter points out the advantages of the second. As shown, the DSGE methodology offers the researcher a narrow modelling framework which operates on the basis of microfoundations, and which intrinsically assumes stability as the normal state of the economy. As discussed, microfounding a macroeconomic model gives rise to a false social ontology, whereby society is taken to be equal to the mere aggregation of individual households and firms, and where a clear correspondence between individual and collective rationality is assumed. Furthermore the microfoundations approach allows for a number of fallacies of composition, such as the 'paradox of thrift'. In turn, assuming stability as the normal state of the capitalist economy gives rise to a pre-fixed understanding of certain economic phenomena, such as the rise and maintenance of unemployment.

On the other hand, the SFC approach provides a broader framework that can be employed by researchers coming from a variety of theoretical traditions. Some of the main merits of the approach include the clear distinction between stocks and flows, the emphasis on watertight social accounting, as well as the creation of the space required for the thorough examination of the various financial relationships between the agents of the economy. The separation between stocks and flows gives an element of dynamic interaction to the model, whereby different periods are linked with each other by the realization of flows and the change in stocks. Additionally, the coherent approach to social accounting forces the researcher to consider the fact that everything comes from somewhere and goes somewhere else. It also acknowledges the multifaceted role of financial assets/ liabilities in the economy.

Chapter 7- Sovereign Ratings, Macroeconomic Dynamics, and Fiscal Policy: Interactions within a Stock Flow Consistent Framework

7.1 Introduction

Credit Rating Agencies (CRAs) have long been recognized as an important driver of financial and macroeconomic dynamics. Since the outbreak of the East Asian crisis, authors such as Ferri *et al.* (1999) have pointed out their role in exaggeratedly downgrading crisis-hit countries, and re-enforcing recessionary spirals. More recently, researchers such as Arezki *et al.* (2011) and De Santis (2012) have demonstrated evidence as to how sovereign ratings have a significant impact upon interest rates, while in Chapter 5 of the current I showed how ratings relate with extreme capital flow movements.

Nonetheless, the effects of sovereign ratings on economic outcomes have not been investigated to date in a macroeconomic model. This is done here by means of a two-country stock flow consistent (SFC) model. Purpose of the model is to elucidate the links between sovereign rating movements, the financial market and the constraints for fiscal policy. Approximating the Eurozone set-up, my framework separates between a relatively weak and a relatively strong economy (labelled as South and North respectively), and includes one currency and one central bank. It also allows for the fiscal expenditure of the South to be endogenously determined. In addition I establish an endogenous mechanism that sets the sovereign rating of the South

to be a function of the accumulated GDP growth and the debt to GDP ratio of the country.

Based on this specification, this model connects the movements of the South's sovereign rating with the domestic and international financial markets and thereby with the South's public sector. The key idea is that once a crisis episode occurs in the South, the country's 'fundamentals' deteriorate so that CRAs decide to downgrade it. The drop of the South's rating score has a negative impact on the demand for the financial assets issued by the southern government. By switching to more liquid assets, investors amplify the financial constraints that the government faces, so that the latter is forced to implement fiscal austerity. In turn fiscal austerity diminishes the already falling aggregate demand and the recessionary spiral gets deepened.

A number of alternative closures are established. Under the baseline scenario, the withdrawal of funds from the downgraded country is matched by an increase in liquidity preference and thus a rise in cash holdings. An alternative scenario where those funds are instead driven towards the bills issued by the North is also assembled. This set-up could be seen as a resemblance of the 'flight to quality' phenomenon that has commonly been observed in financial markets (see for instance De Santis, 2012). In addition, building on the insights of Chapter 4, a scenario whereby CRAs exhibit an element of panic once downgrading the South is also explored.

The rest of the chapter is organized as follows: section two outlines the background theory and evidence. Section three prepares the ground for the model, by discussing two alternative specifications relating with the assumptions about the behaviour of the central bank. It then introduces the

sovereign model and outlines the corresponding mechanism and causalities. Section four presents the results of the model, both for the baseline specification and the two alternative closures discussed above. It also includes two robustness checks, namely a set of sensitivity tests and an extension of the baseline model with prices. Lastly section five concludes. All simulations of the current are done in R Studio. The 'PKSFC' package has been used, a package that provides a set of commands for stock flow models based on the methodology developed by Kinsella and O'Shea (2010).

7.2 Theoretical Background, Empirical Evidence and Contribution

As discussed in Chapter 2, CRAs have been an important part of the nexus of power throughout the neoliberal era. With globalized and deregulated financial markets, and with the incorporation of ratings into financial regulation, ratings have been seen as a sort of a 'blessing' for rated entities, with the agencies' decisions relating directly to the cost of financing. Furthermore, sovereign ratings have been the key expression of CRAs' power upon the state. As pointed out in Chapter 3, such power is a function of a government's need to access the financial market. In the case of the Eurozone, the lack of an institution that can act as an LLR exposes EMU member states to the sentiment of the market and therefore augments the power of CRAs.

For the purposes of the current, one more dimension must be illustrated. In particular it is interesting to observe that the power of CRAs' over the state contains an asymmetry in the way that agencies' decisions affect governments.

More specifically, while it is easy to see that a government will need to apply measures of fiscal austerity in the aftermath of a severe downgrade so as to regain its access to the market, the reverse does not necessarily hold true. For example, it can hardly be the case that a triple-A rated country will take its excellent rating as a blank check and start increasing its public expenditure by investing in public services, welfare provisions and infrastructure. Rather, a sovereign rating upgrade, or the maintenance of a high rating score by CRAs, can be seen as an encouragement for continuing to apply a frugal approach to the public budget. In a way a good rating score can be taken as a reward for exactly this kind of behaviour. If the asymmetry pointed out here is right, it should also be reflected on a model that aims to capture the macroeconomic effects of sovereign ratings.

Coming to the empirical evidence, Figures 7.1 and 7.2 provide an idea of the co-movement of sovereign ratings and public expenditure from 1999 to 2012 across Germany and the Eurozone periphery (for the sake of diversity, given that the development of S&P sovereign ratings is already depicted in Figure 4.1 of the Chapter 4, I chose to illustrate those of Moody's here). As pictured in those graphs, there have been some severe rating downgrades in all five peripheral countries since 2008, with Greece providing the most conspicuous example. Parallel to these downgrade movements, the fiscal expenditures of these countries have either remained stagnant or followed a downward trend too.

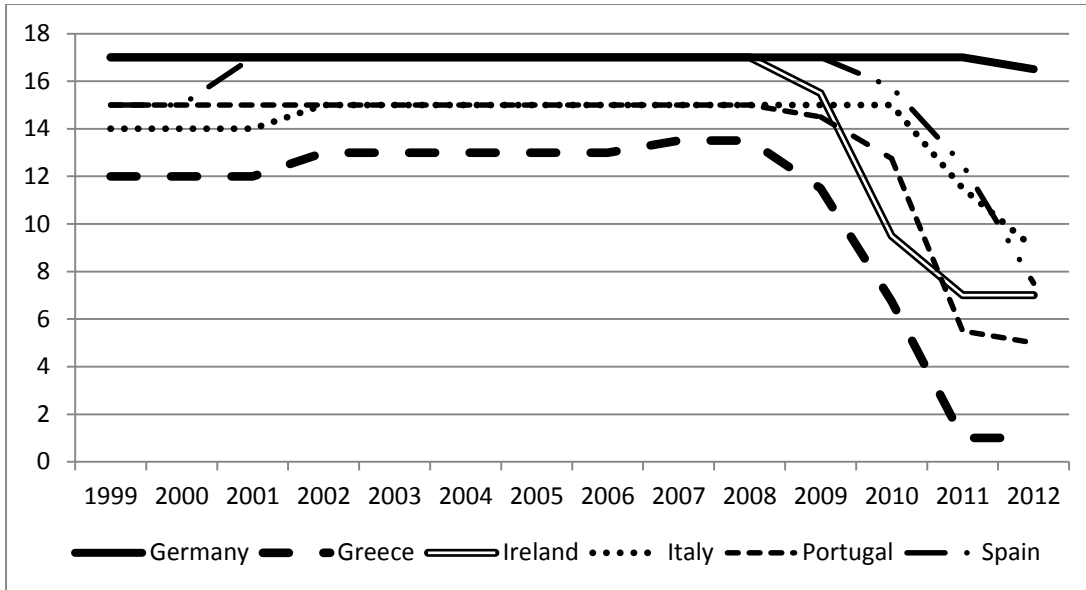


Figure 7.1. Moody's ratings for a selection of EMU countries; ratings measured in a 1 to 17 scale with 17 corresponding to AAA and 1 corresponding to any rating from CCC+ and below; source: Moody's website and author's elaboration.

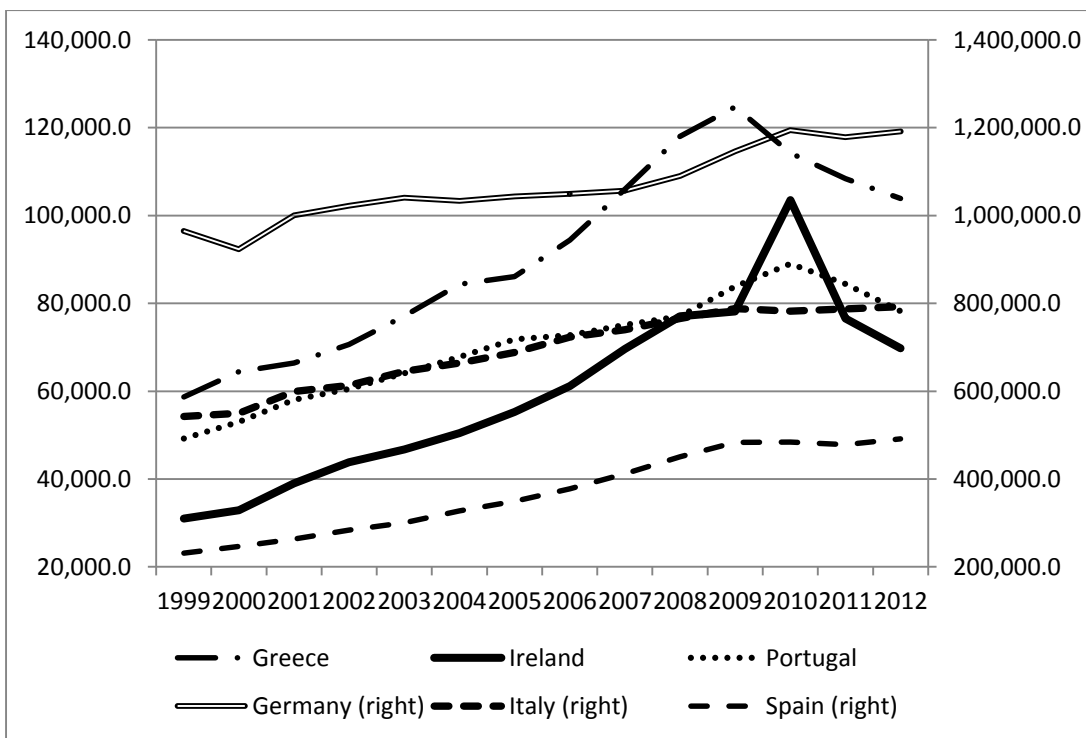


Figure 7.2. Total Public Expenditures for a selection of EMU countries; unit: millions of Euro; source: Eurostat.

In accordance with the above remarks we can see that although Germany stands in contrast to the rest of the countries in that it has managed to retain its triple-A status, its public spending has exhibited a similar stagnating tendency. All in all, despite the fact that the evidence outlined here is not adequate to establish a particular line of causality and despite the peculiarities of each country, it is interesting to observe how the recent period of economic turbulence has driven all peripheral countries towards fiscal austerity, and how CRAs have reacted by severely downgrading all five of them.

Having said this, the present chapter contributes to existing literature in two distinct ways. On one hand, it provides the first attempt to capture the effects of sovereign ratings in a formal macroeconomic model. In that regard, it expands the political economy literature that critically reflects on the destabilizing and authoritarian role of CRAs by providing some new analytical insights (the relevant literature is discussed in Chapter 2 of the current). Secondly, it contributes to the SFC literature outlined in the previous chapter, and in particular to the open economy (two country) SFC branch. While various authors have concentrated on issues that relate to the activity and channels of influence of CRAs, such as sovereign debt creditworthiness (Bortz, 2014) and endogenous shifts in liquidity preference (Dafermos, 2012), and several others have focused on the dynamics of the Eurozone (see for instance Duwicquet *et al.*, 2012 and Greenwood-Nimmo, 2014), no one has so far attempted to explicitly incorporate European sovereign ratings into an SFC model. Given the capacity of CRAs to affect the macroeconomy, as well as the institutional constraints of the Eurozone outlined above, there is a gap that the current chapter aims to fill.

7.3 The Model

To formalize the potential effects of sovereign ratings in a macroeconomic model I employ a stock flow consistent (SFC) model, based on the approach developed by Godley (e.g. Godley, 1999) and more recently by Godley and Lavoie (2007b) (for a detailed discussion of the SFC methodology see Chapter 6 of the current). The basis of my model is model REG from chapter 6 of Godley and Lavoie (Godley and Lavoie, 2007b: 170- 187). This is an open economy, demand driven regional model. It includes two economies, labelled as South and North, with two separate governments that issue bills, but there is only one currency and one central bank. Although initially designed as a regional model, the single currency and central bank assumptions make it quite suitable as a tool for analysing Eurozone. Moreover, while the two countries of the model are labelled as 'North' and 'South', one could use some imagination and think of them as Germany and Greece respectively. In addition there is nothing to prevent us from labelling the central bank as ECB.

All the equations of the model can be found in Appendix A of the current chapter. In each economy GDP is composed of consumer expenditure, public expenditures, imports and exports. Compared with the version of Godley and Lavoie, the only modification I have done is to add expectations (see eq. 7.4 and 7.9 in Appendix A), and to allow households to purchase both domestic and foreign assets. It is important to highlight that households' portfolio asset decisions are essentially the locus of the financial market in this model (eq. 7.11 to 7.16). In the beginning of each period, after deciding how much to consume,

households estimate their end-of-period wealth and decide how to allocate it across the different financial assets. Following the SFC tradition the asset demand functions are based upon the Tobinisque logic in that the demand for each financial asset is not only a function of its own rate of return, but also links with the returns of all other available assets (see the λ_{ij} parameters below, with $i \in [1,6]$; $j \in [1,3]$). It also relates with the demand for cash for liquidity and transaction purposes (captured by the λ_{i0} and λ_{i4} parameters respectively, with $i \in [1,6]$). Households' expectations for disposable income and wealth are assumed to follow a simple adaptive rule, where the most recent observation is the expectation of the present period.

With regards to notation, the 'S' and 'N' upper-scripts denote the South and the North respectively. For example C^S is the consumption of the South, while Y^N is the GDP of the North. In addition the 'h' subscript denotes actual (ex-post) holdings of households, 'e' stands for expectations, 'd' for demand and 's' for supply. In all financial assets, the upper script denotes the issuer and the lower script denotes the holder of the asset. Greek letters are used for all behavioural parameters, while all magnitudes are expressed in a nominal form, using capital letters. Furthermore there is a quite conventional notation used for the variables of the model: YD stands for households' disposable income; Y denotes Gross Domestic Product (GDP); T is used for taxes; r is the interest rate on bills; B is used for government bills; V denotes wealth; H stands for cash; r_h denotes the interest rate on cash holdings (set equal to zero); NW

implies net worth; G is used for fiscal expenditure; X means exports; IM is imports; and F is profits.

Tables 7.1 and 7.2 illustrate the balance sheet and transaction matrices of the model. In both tables, all rows and columns must sum up to zero so as to satisfy the stock flow consistency requirements. Table 7.1 describes the stocks of assets and liabilities that are inherited from the past (described with a plus and minus respectively). In addition, Table 7.2 shows the transactions that take place within a period. Here the plus and minus signs correspond to revenues and expenditures. For instance households spend money in consumption and therefore C appears with a minus in their column, while they are the sole recipients of income from production (wages and profits are amalgamated in the current) so that Y appears with a plus in their account. Similarly, the households of both countries pay taxes to their governments, while they also receive interest payments from their bill holdings. Furthermore, by the end of the period they update their stock holdings of all their assets. As it can be seen from Table 7.1, there are three available financial assets for households, namely cash H , southern bills B^S and northern bills B^N . The ECB is the sole issuer of cash, with cash playing here the role of money, while it also purchases government bills from both countries. Notice here that money is endogenous in that the ECB always provides any amount of cash that is demanded by households. Moreover, the double entry bookkeeping helps us illustrate the fact that all stock of debt of the two governments is nothing but wealth at the hands of the private sector. Under this system of accounting, the columns of the

Table 7.1. Balance Sheet Matrix

	South			ECB	North			
	Households	Firms	Government		Households	Firms	Government	Σ
Cash	$+H_h^S$			$-H$	$+H_h^N$			0
Southern Bills	$+B_{Sh}^S$		$-B^S$	$+B_{ECB}^S$	$+B_{Nh}^S$			0
Northern Bills	$+B_{Sh}^N$			$+B_{ECB}^N$	$+B_{Nh}^N$		$-B^N$	0
Balance	$-V_h^S$		$-NW_g^S$		$-V_h^N$		$-NW_g^N$	0
Σ	0		0	0	0		0	0

Notes: plus and minus denote assets and liabilities respectively

Table 7.2. Transactions Flow Matrix

		South			ECB		North			
		Households	Firms	Government	C	K	Households	Firms	Government	Σ
	Consumption	$-C^S$	$+C^S$				$-C^N$	$+C^N$		0
	Govt. Exp.		$+G^S$	$-G^S$				$+G^N$	$-G^N$	0
	Trade		$-IM^S$					$+X^N$		0
			$+X^S$					$-IM^N$		0
	GDP [Memo Item]	$+Y^S$	$-Y^S$				$+Y^N$	$-Y^N$		0
	ECB' Profits			$+r_{-1}^S B_{ECB-1}^S$	$-F_{ECB}$				$+r_{-1}^N B_{ECB-1}^N$	0
	Taxes	$-T^S$		$+T^S$			$-T^N$		$+T^N$	0
Interest On	Southern Bills	$+r_{-1}^S B_{Sh-1}^S$		$-r_{-1}^S B_{-1}^S$	$+r_{-1}^S B_{ECB-1}^S$		$+r_{-1}^S B_{Nh-1}^S$			0
	Northern Bills	$+r_{-1}^N B_{Sh-1}^N$			$+r_{-1}^N B_{ECB-1}^N$		$+r_{-1}^N B_{Nh-1}^N$		$-r_{-1}^N B_{-1}^N$	0
Change in the Stock of	Southern Bills	$-\Delta B_{Sh}^S$		$+\Delta B^S$		$-\Delta B_{ECB}^S$	$-\Delta B_{GERh}^S$			0
	Northern Bills	$-\Delta B_{Sh}^N$				$-\Delta B_{ECB}^N$	$-\Delta B_{GERh}^N$		$+\Delta B^N$	0
	Cash	$-\Delta H_h^S$				$+\Delta H$	$-\Delta H_h^N$			0
	Σ	0	0	0	0	0	0	0	0	0

Notes: plus and minus denote revenues and expenditures respectively

firms in the transaction matrix give the national income identities of the two countries.

There are a number of simplifying assumptions in the model. First, firms act in an accommodating way viz-a-viz the rest of the economy. They simply produce whatever is demanded. They do not undertake any productive investment, while all their profits are immediately transferred back to households. In that sense there is no endogenous economic growth in the model. Secondly my set-up does not include private banks.

For each simplification done in the current, the underlying hypothesis is that its inclusion would only serve to strengthen the simulation results presented here. Indicatively, although the incorporation of commercial banks could open the space for the consideration of additional channels of influence of sovereign ratings, and thus give rise to more complex results, the recessionary effects caused by ratings would still occur unless we were to assume commercial banks capable of operating in a counter-cyclical manner. In a similar fashion, the inclusion of an endogenous interest rate for the southern economy would only increase the persistence of the impact of a sovereign rating downgrade and thereby contribute to the deepening of the recession.

With this said, the above simplifications were seen as necessary sacrifices in order to be able to focus on the dynamics of the household sector and the state, which are important for the purposes of the current. By narrowing down the model, and making it as simple as possible, it becomes much more feasible not only to solve it on the computer and find a steady state solution, but also to trace the channels through which a change spreads out

across the two economies. Tractability simply means that under all scenarios you know what is going on in the model you have constructed.

The parameterization of the model is based upon the numbers provided by Godley and Lavoie (2007b). These are reasonable steady state values that allow us to draw some useful inference from the model and contrast different scenarios and shocks. The arithmetical values of all parameters and stocks are provided in the end of Appendix A. As modelled the two countries are taken as identical in terms of size, with only small differences in their behavioural parameters (for instance the propensity to consume of the South is set to be 0.7, while the one of the North is set at 0.6). They are then differentiated by the different shocks that are conducted in the model.

7.3.1 Basic Set- Up (model FEX)

In its basic version (let me call it model FEX) the model assumes that the ECB acts as a purchaser of last resort for both governments' bills (see eq. 7.27 and 7.28 below) and is happy to support any levels of deficits that arise. This means that none of the two governments can ever default and that the influence of the financial market is limited for both countries (the only impact is through the component of consumption that comes out of wealth).

To illustrate the properties of FEX I run three separate experiments, namely: i) I raise the propensity to import μ of the South from 0.180781 to 0.20781; ii) I increase the exogenous fiscal expenditure of the South from 20 to 25, and iii) I decrease the liquidity preference of southern households by raising

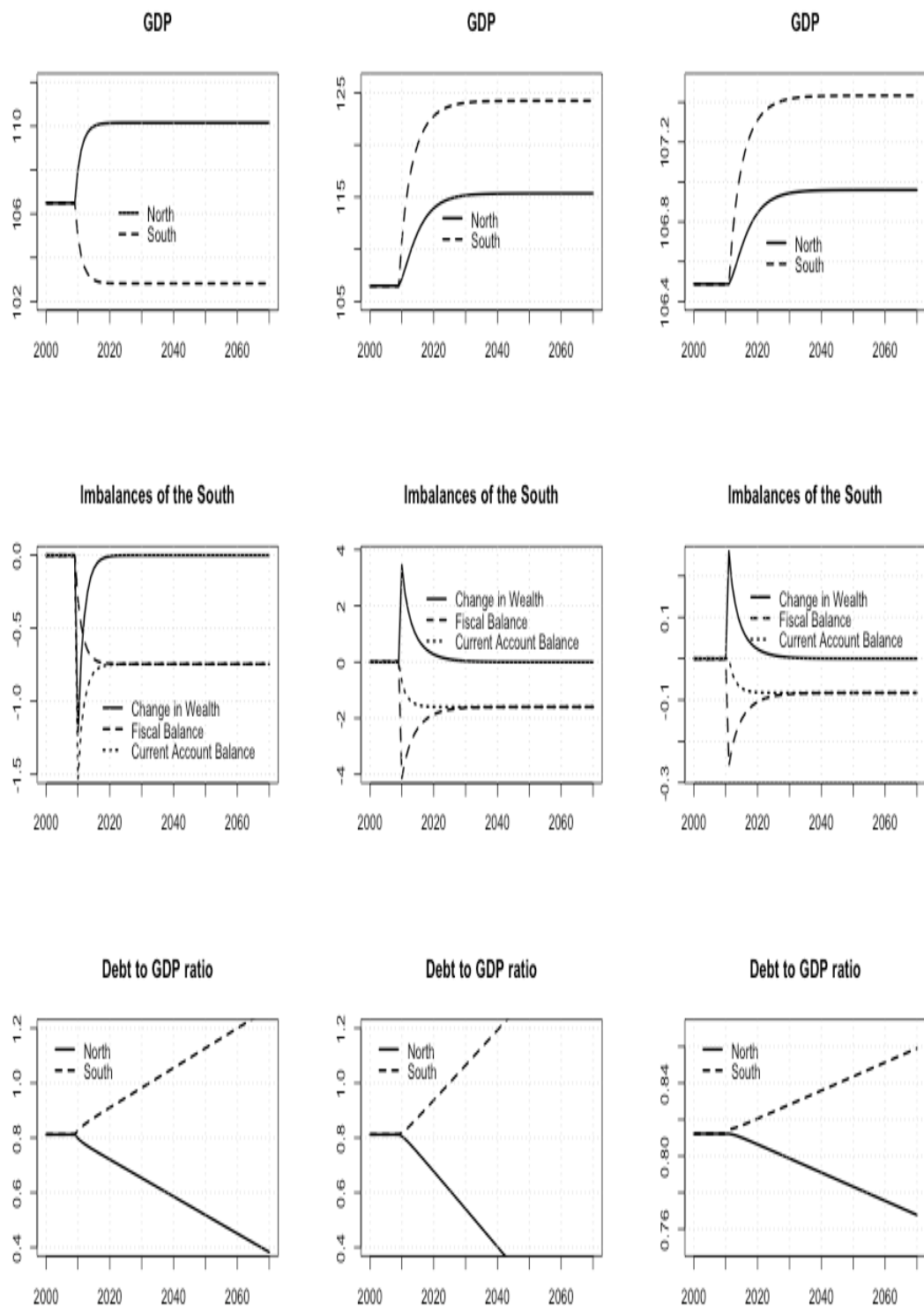


Figure 7.3. Three experiments with FEX; experiment 1 (1st column): increase the propensity to consume of the South from 0.18781 to 0.20781; experiment 2 (2nd column): increase the (exogenous) fiscal expenditures of the South from 20 to 25; experiment 3 (3rd column): reduce the liquidity preference of southern households by setting λ_{20} from 0.35 to 0.5. First row describes the development of GDP across all three experiments, the second row shows the developments of the change in private wealth, as well as the fiscal and current account imbalances, while row three shows the development of the debt to GDP ratio for the two countries.

λ_{20} from 0.35 to 0.5. Relevant results are reported in Figure 7.3. Regarding the first experiment (first column in Figure 7.3), while the GDP in the Southern country falls, there is a symmetric rise of the Northern economy. Moreover, given that the South's public expenditures are exogenous, and that the fall of GDP causes a fall of tax revenues, the southern government needs to run a permanent budget deficit so as to keep supporting its expenditures (first column/ second row). For the process to be sustainable the ECB needs to enter into ever increasing purchases of southern bills, so that the South's debt to GDP ratio permanently increases once the shock has occurred (with the reverse happening for the North; see column1/ third row). Under the second experiment, the rise of public expenditure in the South boosts growth in both countries. This is because the higher income that is produced in the South also pushes upwards the income of the North, through the channel of international trade. As with before, for the increased public expenditure to be supported, the southern government needs to run a permanent budget deficit, which in turn gives rise to an ever-increasing debt to GDP ratio on that country. Lastly, experiment three highlights the limited importance of the financial market in this model. While the fall of the liquidity preference of southern household increases the demand for southern bills, this change only manages to increase the country's GDP by less than 1% (see the GDP scale at the first row/ third column graph).

As argued by Godley and Lavoie (2007b) there is nothing in the model to drive the two economies towards balanced trade. Current account and budget imbalances are fully compatible with a steady state environment. Furthermore, by virtue of proper accounting, there is, under all scenarios, a twin deficit

situation in that the current account and budget imbalances are identical at the end of every experiment (see row 2 of Figure 7.3; also see the discussion at Godley and Lavoie, 2007b: 176- 180). However, as noted by Godley and Lavoie, the satisfaction of the twin deficit identity does not imply a specific line of causality in the model; it simply says that the two are always equal. Still, the identity is powerful enough to remind us that in a closed-two country set up such as the one employed here, it is not only impossible for the two countries to run trade surpluses at the same time, but it is equally futile to simultaneously push them to achieve fiscal surpluses (Godley and Lavoie, 2007b: 182- 3).

7.3.2 Endogenous Public Expenditure for the South (model FEXEND)

While the above model is a useful tool for reflecting on alternative policies for Eurozone, it lies on the assumption that there is an accommodative central bank that supports any imbalances that are created. This is not however a realistic assumption for describing the behaviour of the ECB, which by its own constitution is forbidden to directly purchase government debt of EMU member states. Hence there is a need for modifying the model so as to get closer to the actual dynamics of Eurozone. To do this I create an alternative closure with endogenous fiscal expenditures for the South. This closure is based on chapter 12 of Godley and Lavoie (see Godley and Lavoie, 2007b: 465-466 and 472-476). The key change here is to flip the G^S and ΔB_S^S terms in eq. 7.18, so that rather than having the southern public expenditure determining the required amount of bills to be issued, we now have the supply of bills

constraining the expenses that can be undertaken. In addition the ECB's purchasing of southern bills is set to be constant (eq. 7.27B below) so as to reflect the fact that it now ceases to act as a lender of last resort³⁶. There is also a new equation (7.27A) that determines the total supply of southern bills, so that in the overall we have:

$$G^S = \Delta B^S + T^S - r_{-1}^S B_{Sh-1}^S - r_{-1}^S B_{Nh-1}^S \quad (7.18A)$$

$$B^S = B_{Sh}^S + B_{Nh}^S + B_{ECB}^S \quad (7.27A)$$

$$B_{ECB}^S = \text{constant} \quad (7.27B)$$

Doing so entirely changes the dynamics of the model. As Godley and Lavoie point out, in this version there exists a recessionary bias not only for the South, but also for the system as a whole. This is because any shock that would diminish the GDP of the South would also reduce the tax revenues of the country, which constitute the sole source of income for the state besides the issuance of new bills. In that regard, unless there is some source of additional financing, the fall in tax revenues will lead to a reduction in southern public expenditures. Nonetheless, under the new closure of the model, there is no source that could meet the southern state's need for new borrowing. With the

³⁶ The precise amount of B_{ECB}^S is set equal to the figure obtained from the steady state solution of the model. Notice here that although any other level of B_{ECB}^S such as 0 would also enable us to solve the model, it would however violate the stock flow consistency requirement, since the redundant equation would not be satisfied any more.

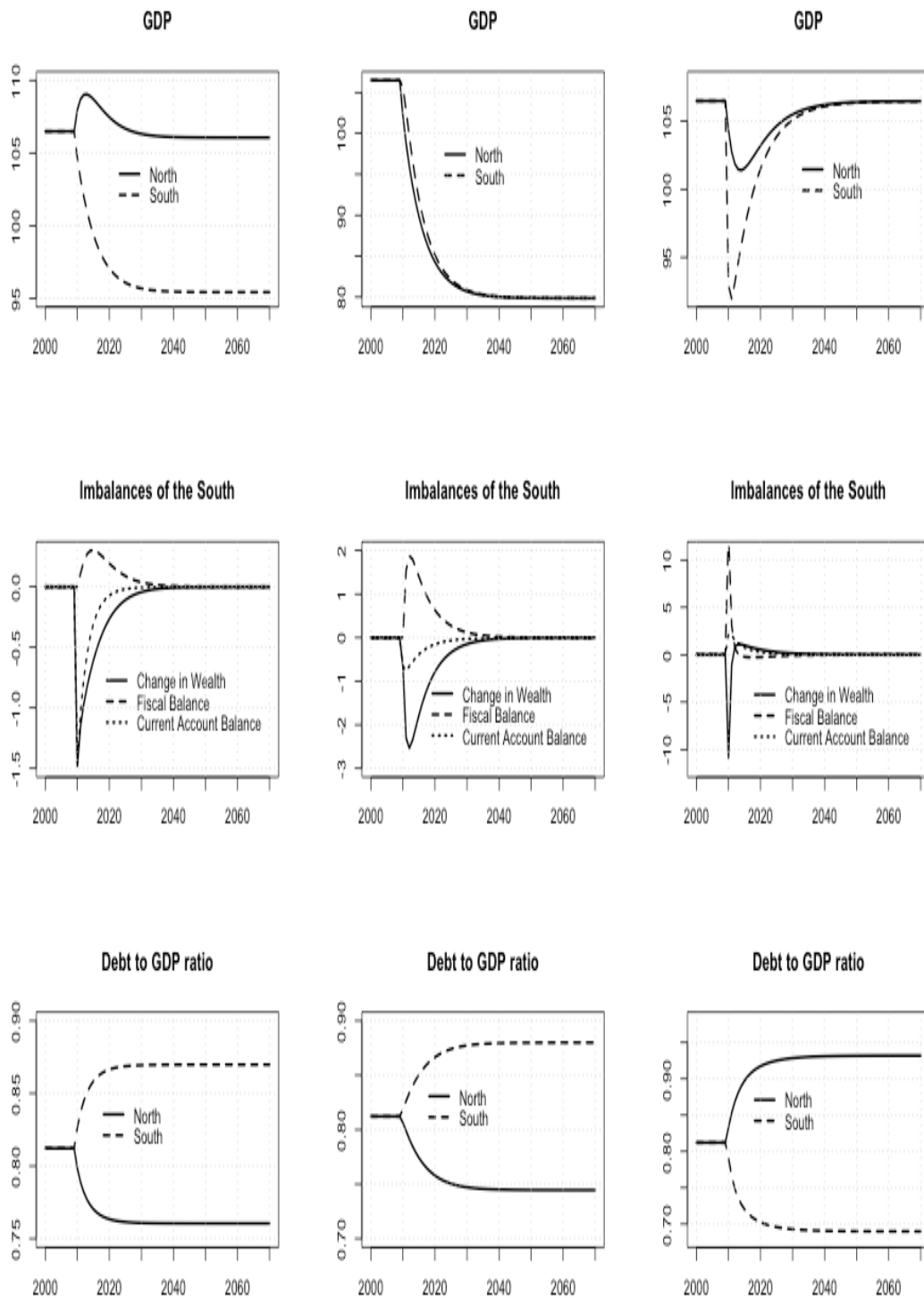


Figure 7.4. Three experiments with model FEXEND; experiment 1 (1st column): increase the propensity to consume of the South from 0.18781 to 0.20781; experiment 2 (2nd column): decrease the (exogenous) fiscal expenditures of the North from 20 to 15; experiment 3 (3rd column): increase the liquidity preference of southern households by reducing λ_{20} from 0.35 to 0.2. First row describes the development of GDP across all three experiments, the second row shows the developments of the change in private wealth, as well as the fiscal and current account imbalances, while row three shows the development of the debt to GDP ratio for the two countries.

liquidity provided by the private market being initially flat and later falling due to the fall of GDP and wealth, and with no Central Bank acting as a purchaser of last resort, there is no way to sustain any level of budget deficit once a recession hits the South. As a result the fiscal expenditure of the South is pushed downwards so as to maintain the balance of the budget. In that way however the southern state is pushed to adopt an austerity policy that reinforces instead of containing the recessionary spiral. With the fiscal expenditures of the South being endogenous and falling, and with the ones of the North staying exogenous, there is no source of demand to run counter-cyclically. As a result the global economy is driven as a whole into recession once a negative shock occurs in the South.

The above can be seen more clearly when repeating the first experiment of the above, where the propensity to import of the south raises from 0.180781 to 0.20781. As seen in the first column of Figure 7.4, not only the recession is deeper than before with regards to the South, but it also affects the North. More specifically, in contrast with the model FEX, where there was a complete symmetry between the developments of the two countries, the North now sees the initial boost of its growth evaporating shortly after the shock. At the new steady state, both countries find themselves with a lower GDP than before.

On top of the above, I also conduct two more experiments, one by cutting the exogenous fiscal expenditures of the North, setting them from 20 to 15, and one by pushing the λ_{20} parameter downwards from 0.35 to 0.2 (which implies a rise in the liquidity preference of Southern households). In the first case (column 2 of Figure 7.4) the experiment shows how an exogenously given austerity in the North is fully transmitted to the South. Moreover, as it can be

seen from the last experiment (column 3 of Figure 7.4), the financial market is now far more important than in model FEX in determining economic dynamics. Namely, the demand for bills not only affects aggregate demand indirectly through the consumption out of wealth channel, but there is also a direct link with the fiscal expenditures of the South. In contrast with the previous case where the change in the liquidity preference only had an impact of about 1% upon the GDP of the South, it now affects it by more than 10%.

At the same time, as it can be seen from the second and third rows of Figure 7.4, the levels of public debt never get out of hand, and the fiscal and current accounts are always balanced in a steady state environment. These results hold irrespectively of the experiment considered. We can therefore think of model FEXEND as one that replicates more closely the dynamics of an economy such as Eurozone where balanced accounts and stable public debts are the utmost policy priorities and where there are institutions such as the central bank and the financial market to discipline the countries that get out of track (also see the discussion in Godley and Lavoie, 2007b: 474). With this said, the key point of model FEXEND is to show that such priorities are not necessarily compatible with the stable growth of the economy.

7.3.3 Incorporating Sovereign Ratings: The SR Model

Having constructed two alternative closures of the model, it is now time to introduce sovereign ratings. As discussed earlier sovereign ratings are one of the key means by which rating agencies exercise power over national governments, by disciplining them and enforcing the idea of 'sound finance'.

Notice however that it is one thing to acknowledge and take seriously such power, and is quite another to end up with a narrative that attributes cataclysmic forces to CRAs. As pointed out in Chapter 2, CRAs act within a specific socio-economic surrounding, that of neoliberalism, which as such already includes forces attempting to enforce the dominant frame of thought to governments and the public. In that regard it would be an exaggeration to construct a model that would put CRAs in a position where they can create a crisis *ex nihilo*. Rather, a more accurate approach is to show how CRAs can affect and reinforce already ongoing recessionary spirals. Hence out of the two models outlined above, it is the second one (model FEXEND) that is more suitable for using as a basis here. With the ECB already playing the role of enforcing fiscal discipline, it is interesting to see how the picture can be amplified once sovereign ratings are also taken on board.

In particular, we can think of a model where CRAs act as an institution that can potentially impose more severe constraints than the already established ones. This can either be conceived as a result of CRAs being stricter in their requirements for approving the continuation of financing, or because CRAs might be looking more carefully at some variables that are not incorporated into the model yet. While we can think of both scenarios holding true, it is primarily the second case that can be interesting here. More specifically, as shown in that stream of literature that studies the key determinants of sovereign ratings (see Chapter 4 of the current), and as mentioned by CRAs themselves in their reports (see for instance S&P, 2013), CRAs do not only look at the levels of public debt and the levels of fiscal and current account deficits (which can be seen as the elements already

Table 7.3. Accumulated GDP Growth and Public Debt to GDP for EMU Peripheral Countries

		2008	2009	2010	2011	2012
Greece	Accumulated Real GDP growth	-0.22	-3.40	-8.35	-15.45	-21.82
	Public Debt to GDP	112.90	129.69	148.33	170.31	156.87
Ireland	Accumulated Real GDP growth	-2.17	-8.56	-9.63	-7.41	-7.31
	Public Debt to GDP	44.16	64.42	91.19	104.08	117.40
Italy	Accumulated Real GDP growth	-1.21	-6.68	-4.94	-4.48	-6.99
	Public Debt to GDP	106.09	116.42	119.29	120.70	126.96
Portugal	Accumulated Real GDP growth	-0.03	-2.95	-0.94	-2.22	-5.47
	Public Debt to GDP	71.69	83.70	93.99	108.25	124.07
Spain	Accumulated Real GDP growth	0.85	-3.00	-3.21	-3.14	-4.80
	Public Debt to GDP	40.17	53.98	61.66	70.47	85.97

Notes: real GDP growth and Public Debt to GDP are both measured in % units; source: Eurostat and author's elaboration

constraining the FEXEND model), but also take into account the record of GDP growth of the economy under consideration. Simply put this means that with everything else being the same, the falling rate of growth of a country will be identified by CRAs as a factor that increases the probability of default of the corresponding government on its debt (remember here that sovereign ratings are nothing but an expression of this probability). The usual response of CRAs in such a case would be to downgrade the country under consideration. But then, it is exactly this activity of CRAs that creates the potential for a self-fulfilling prophecy, since the downgrading might make it even more difficult for the given country to reverse the falling trend of its GDP growth (for a similar point also see Ferri *et al.*, 1999). Despite what they claim for themselves, CRAs might be actually pushing a recession-hit country off the cliff.

To capture the hypothesis into the model, I create a new variable that aims to approximate severe movements of the southern sovereign rating. Let me call it SR^{37} . Conceptually speaking we can think of the word ‘severe’ either as one big downgrade or as a cluster of smaller ones, which in either case result in augmented financial difficulties for the rated country. Recalling here that institutional investors such as pension funds are usually obliged by law to shift their portfolios when an asset drops below the BBB- notch, we could think for instance of SR as the event of a downgrade that pushes the country below that threshold and towards the speculative range.

Naturally, the SR variable needs to be a function of the magnitudes that matter for sovereign ratings. In the context of the current model, such variables

³⁷ Hereafter, SR will be used to denote the SR model whereas SR in italics will denote the sovereign rating variable.

are the South's ratio of Debt to GDP as well as the country's accumulated GDP growth.

Table 7.3 provides a quick overview of those variables for the peripheral countries of Eurozone. In order to define whether an *SR* downgrading episode occurs we need to set some thresholds for its determinants, which if crossed would increase *SR*'s value. To do so I construct a dummy composition mechanism, which works as follows:

$$SR1 = 1 \text{ if accumulated GDP growth} < -15\% \quad (7.34)$$

$$SR2 = 1 \text{ if Debt to GDP} > 85\% \quad (7.35)$$

$$z = 1 \text{ if both } SR1 > 0 \text{ and } SR2 > 0 \quad (7.36)$$

$$SR = SR1 + SR2 - 0.8 * z \quad (7.37)$$

Needless to say, the -15% and 85% thresholds are partly arbitrary. In that sense, the model developed here captures the effects of sovereign ratings in a world where those thresholds exist. With this said, it is easy to see how within a certain range, changing the thresholds would only alter the timing of the *SR* change. Furthermore, in the *SR* expression I have added another dummy, the *z* one, so as to distinguish between the impacts of the different determinants in terms of timing. The hypothesis here is that *SR* will switch

from 0 to 1 once the first variable crosses its threshold, but will only rise for another 0.2 once the second one follows. The idea is based on the simple fact that once a country has suffered from a severe downgrade, any further drop of the rating only does little more in deteriorating further the economy's financial environment³⁸. Moreover the SR variable does not change more than twice. That is, once SR has switched to 1 and/or to 1.2 it does not go back to zero at any point. This is simply for the purpose of being able to extract some meaningful inference from the model, since if I were to let SR to fluctuate freely I would create a repetitive loop that would strip the model from any meaningful economic results. We can think of this set-up as a two-step experiment: at first we need to change a parameter so as to generate a recession in the South. We then need to wait and see how and when the SR variable will respond. In a way the process described here is not that different from the usual modeling simulation routines, with the main difference being that instead of studying a one-off experiment this project focuses on a two-stage process.

Given the above mechanism, I set the sovereign rating (SR) of the South as a determinant of the liquidity preference parameters of both southern and northern households that relate with the demand for southern bills³⁹. Expressed in a formal way this implies endogenizing the λ_{20} and λ_{60} parameters of equations 7.11 and 7.15 respectively as follows:

$$\lambda_{20} = \zeta_{20} + \zeta_{21}SR; \zeta_{21} \leq 0 \quad (7.38)$$

³⁸ We could just remove the z dummy and any results we get would just be intensified.

³⁹ The way liquidity preference parameters are endogenized is influenced by Dafermos (2012).

$$\lambda_{60} = \zeta_{60} + \zeta_{61}SR; \zeta_{61} \leq 0 \quad (7.39)$$

Here, we can think of ζ_{20} and ζ_{60} as the default values of λ_{20} and λ_{60} respectively. Furthermore the ζ_{21} and ζ_{61} parameters capture the power of CRAs. Measured in absolute terms, the greater the value of those parameters, the greater the influence of sovereign ratings upon households' decision making (also see the sensitivity tests below). Both ζ_{21} and ζ_{61} are set to be negative (or zero), implying here that a rise in SR would increase the liquidity preference of households by causing a fall in λ_{20} and λ_{60} . Such development would shift demand away from southern bills and towards interest-free cash. In accordance with Chapter 5 of the current, the ζ_{61} can be seen as a reflection of the degree of influence of CRAs upon foreign capital flows. Furthermore, as constructed, the model provided here is a more general case of the corresponding model of Godley and Lavoie (2007b), with the latter being equivalent with the special case where $\zeta_{21} = \zeta_{61} = 0$.

As the SR model is set, there is a chain of causality running from sovereign rating events to the fiscal expenditure of the South. To facilitate the illustration of the channel I put together the most relevant equations, setting in bold the variables that link directly with the sovereign rating influence:

$$\mathbf{G^S} = \mathbf{\Delta B^S} + T^S - r_{-1}^S B_{S h-1}^S - r_{-1}^S B_{N h-1}^S \quad (7.18A)$$

$$B^S = B_{Sh}^S + B_{Nh}^S + B_{ECB}^S \quad (7.27A)$$

$$B_{Sh}^S = V_e^S (\lambda_{20} - \lambda_{21}r_h + \lambda_{22}r^S - \lambda_{23}r^N - \lambda_{24} \frac{YD_e^S}{V_e^S}) \quad (7.11)$$

$$\lambda_{20} = \zeta_{20} + \zeta_{21}SR; \zeta_{21} \leq 0 \quad (7.38)$$

Equation 7.18A shows the endogenous determination of the southern fiscal expenditure, 7.27A determines the total supply of southern bills, equation 7.11 sets the demand of southern bills by households that reside in the South, and equation 7.38 shows the abovementioned mechanism that links the sovereign rating of the south with the liquidity preference of southern households.

Reading those expressions from bottom to top, it can be seen that when SR changes, causing λ_{20} to change, we have $\Delta B_{Sh}^S = V_e^S * \Delta \lambda_{20}$. This implies that other than the power of CRAs, which as mentioned before is reflected by the ζ_{21} parameter, what matters in determining the overall effect of SR upon the southern fiscal expenditure is the total amount of wealth of the southern households: *ceteris paribus*, the greater the volume of wealth, the greater will be the exposure of the southern state to the sentiment of the financial market, and thus the greater the reduction in public expenditures it will need to confront when an SR shock occurs. This link is of course a manifestation of the simple truth that the greater the stock of bills held by southern households, the greater the amount of bills they can get rid of at any point of time. From here it would also be quite straightforward to expand and show how a similar mechanism also operates in the model at the terrain of

foreign flows (i.e. in that part of the model where northern households demand southern bills).

7.4 Simulation Results

7.4.1 Baseline SR Model

Having established the SR model, I now need to generate a recession in the South so as to see how the sovereign rating mechanism responds. For this purpose, I repeat the first experiment of the above, whereby the southern propensity to import rises from 0.18781 to 0.20781. With regards to the ζ parameters, ζ_{20} and ζ_{60} obtain the steady state values of λ_{20} and λ_{60} (0.35 and 0.32 respectively), while ζ_{21} and ζ_{61} are both set equal with -0.10. Figure 7.5 shows the most essential simulation results of the model. For the clarity of the comparison Figure 7.5 combines the results of the SR model with those generated by the same experiment in model FEXEND.

As it can be seen, shortly after the generation of the recession, the sovereign rating mechanism is activated. Due to the deterioration of the sovereign rating score of the South, the households of both countries attempt to reduce their holdings of southern bills. With the ECB maintaining a passive role in purchasing a fixed amount of southern bills, the government of the South is pushed to implement fiscal austerity by cutting sharply its expenditures. The key results are twofold. First, the trends of the debt to GDP ratios are reversed in both countries. On the one hand the South is forced to issue fewer bills as a

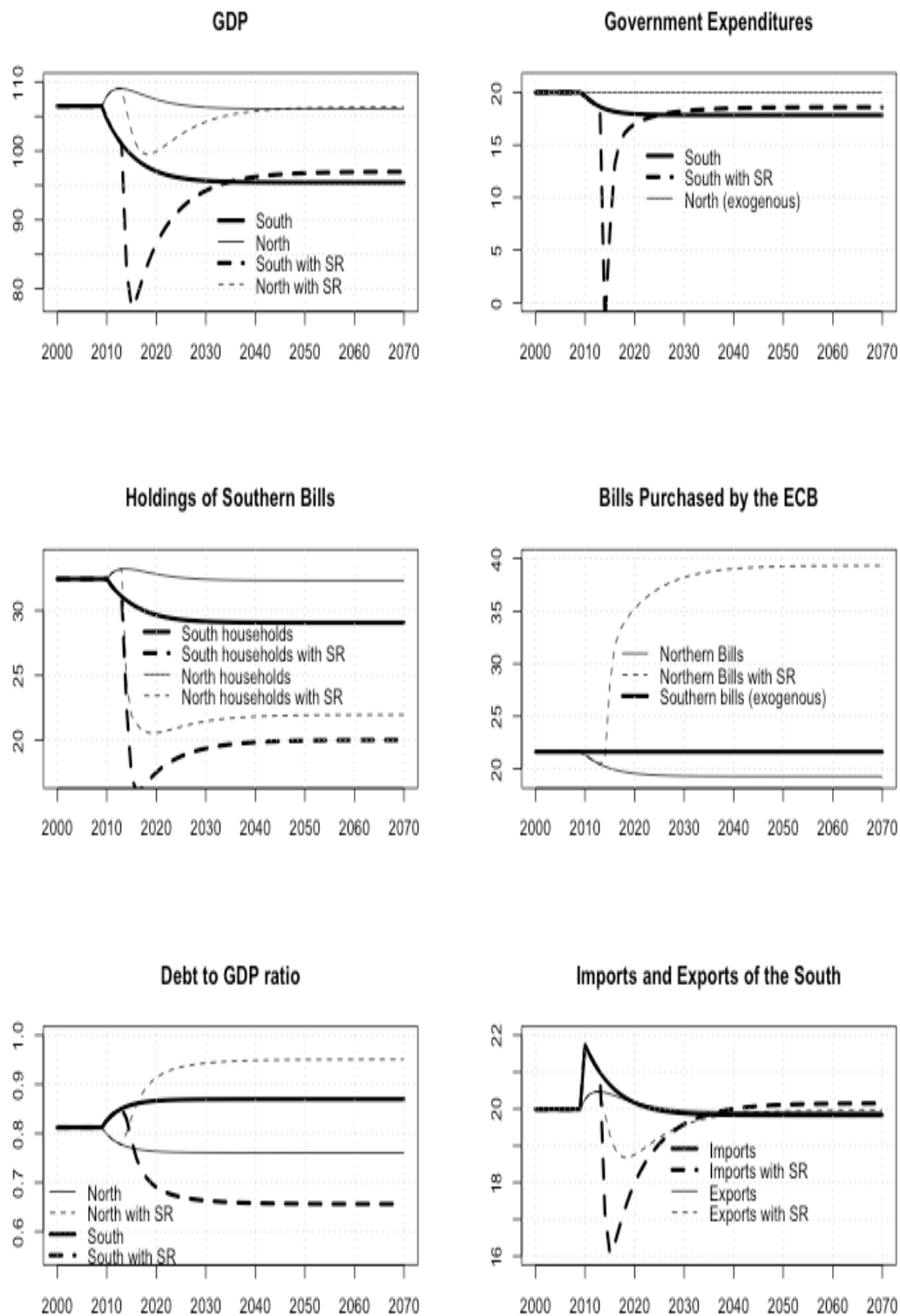


Figure 7.5. Key results of the baseline SR model when a recession is caused by the increase of the South's propensity to import. Model FEXEND (continuous lines) used as a benchmark of comparison for the evaluation of the effects of the sovereign rating downgrade of the South.

result of the downgrade, while the North needs to sell an increased amount of its bills to the ECB so as to maintain its own (exogenous) fiscal expenditure. Secondly the GDP of both countries falls.

While the loss of national income is naturally more profound for the South, it is interesting that the North is also affected. This is mainly due to its foregone exports as well as the lower amount of wealth that the northern households end up with at the new steady state (recall that northern households give up southern bills and increase their holdings of cash).

Notice that the fall of GDP caused by sovereign ratings is gradually recovered. This is a result of the assumption of fixed interest rates. Once the government of the south issues fewer bills, it automatically faces lower interest payments to conduct in the following periods, and hence the implemented austerity is reversed. Nonetheless, with a dose of imagination one could still think of such development as a real world outcome. It could for instance describe the case where the sovereign rating event causes an at least partial default of the downgraded government on its debt. In a similar fashion one could think of the reversal of the trend of the South's debt to GDP ratio as a result of debt restructuring.

While it is important in the context of the model to generate a recession so as to activate the sovereign rating mechanism, there are more than one ways of doing that in the SR model. An alternative could have been to generate a recession by repeating the second experiment of the FEXEND model whereby the public expenditure of the North falls from 20 to 15. Preserving again the relevant FEXEND results as the benchmark, Figure 7.6 shows how the dynamics of the two economies are affected once there is an episode of a severe rating

downgrade of the South. Most importantly, one can observe that all results reported above remain qualitatively unchanged. As with before there is a fall of the GDP for both countries due to the drop of the South's rating score, while in both countries the trends of their debt to GDP ratios are reversed.

7.4.2 Alternative Specifications

7.4.2.1 Shift of Demand towards the Bills of the North

The above specification is based on the assumption that once households get the news about the downgrade of the South, they will move funds away from southern bills and keep them in the form of cash. The logic here is that the downgrade will be seen as the reflection of augmented uncertainty in the global economy. According to Keynes (1936), in such cases people start moving towards more liquid assets so as to protect themselves against violent economic fluctuations (hence the term 'liquidity preference'). In its most extreme form such movement is driven towards money (cash in this model), as being the most liquid asset of the economy, or else the 'ruler of the roost'.

Nonetheless, it would be fair to argue that a run towards cash does not always have to be the response to a downgrade. In that sense we could also think of a scenario where once the southern downgrade takes place, the households of both countries move towards northern bills instead. Although not the most liquid asset of the model, it would suffice for the hypothesis if we

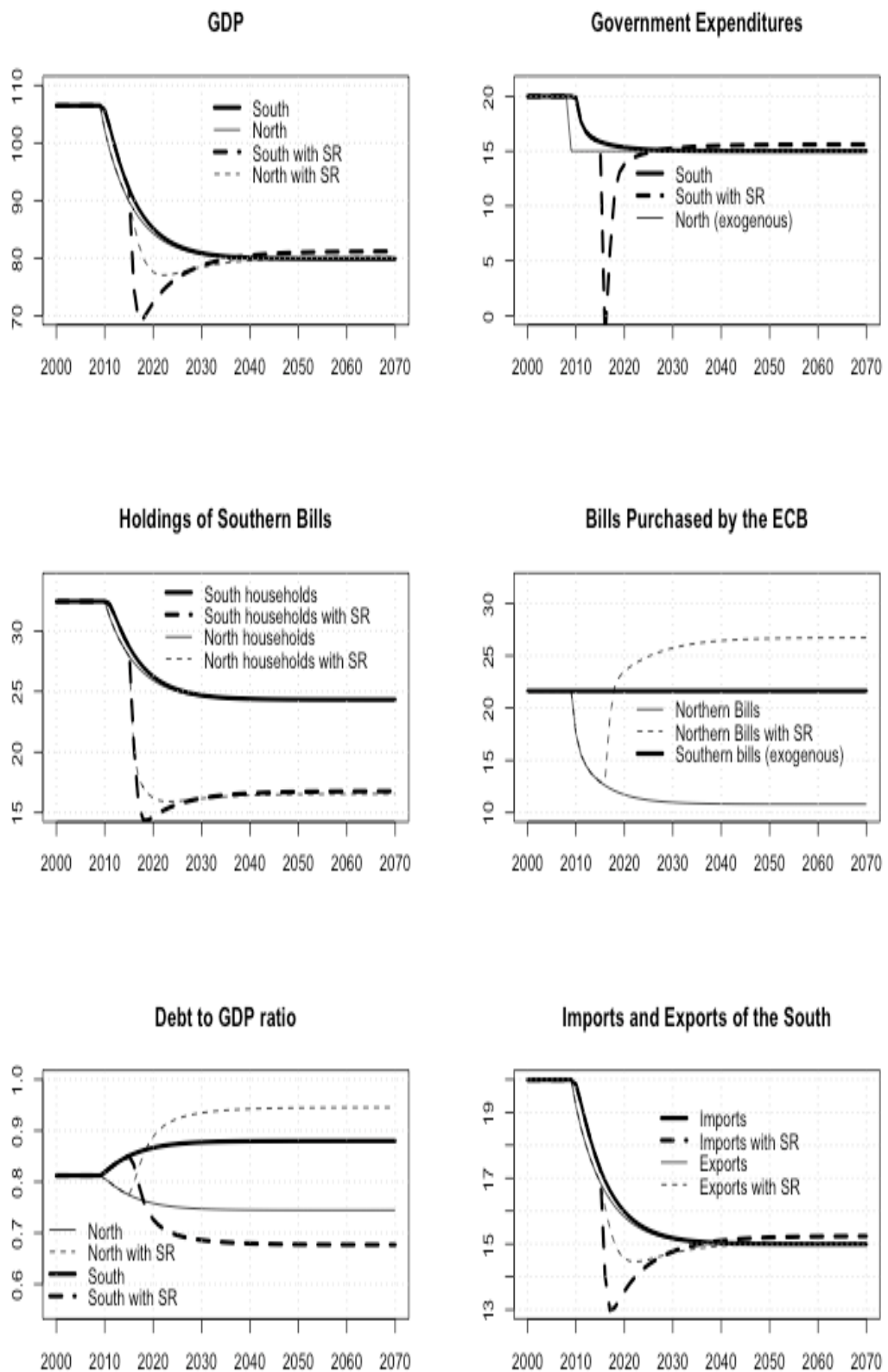


Figure 7.6. Key results of the baseline SR model when a recession is caused by the fall of the public expenditure of the North. Model FEXEND (continuous lines) used as a benchmark of comparison for the evaluation of the effects of the sovereign rating downgrade of the South.

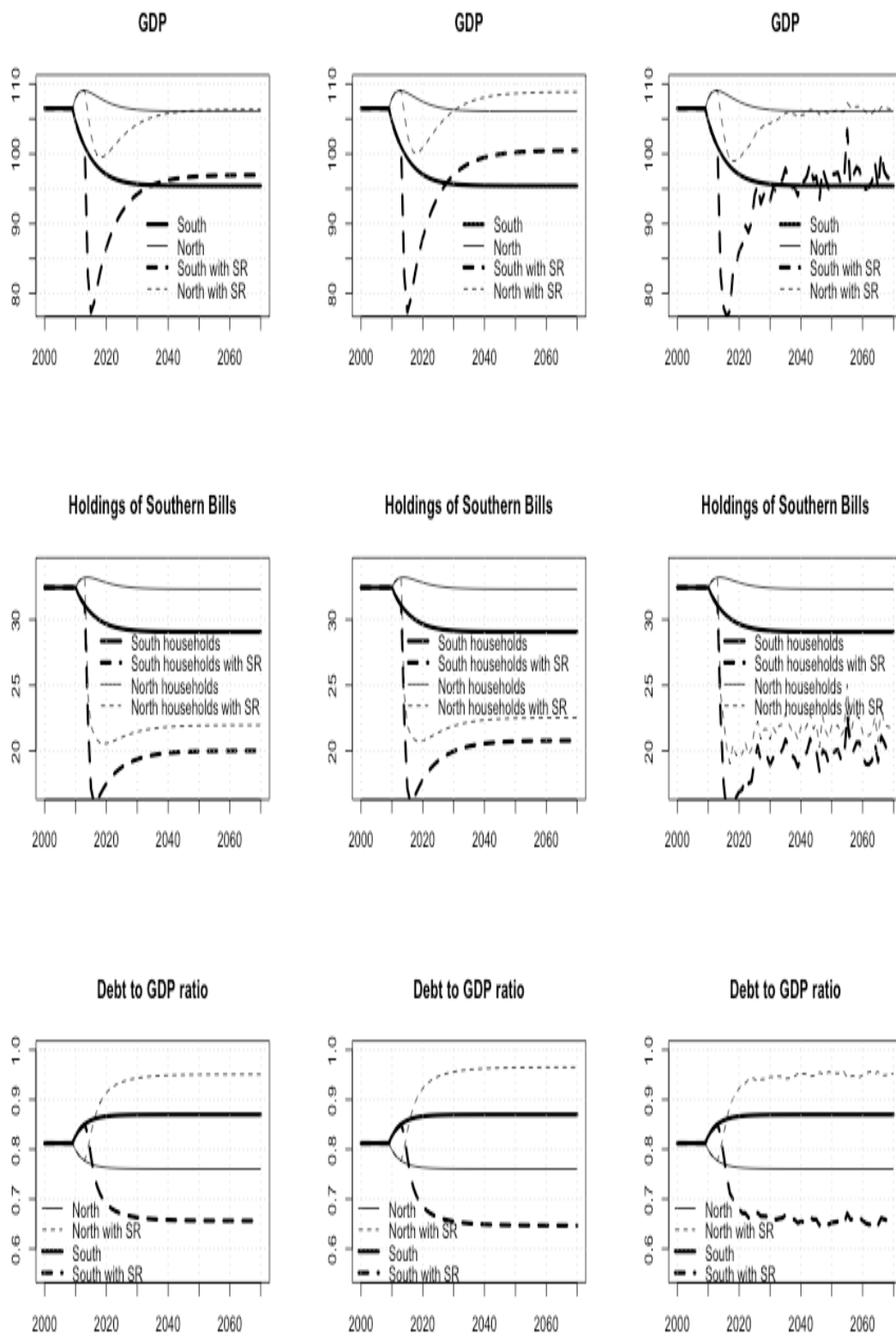


Figure 7.7. Alternative specifications of the SR model: Column 1 preserves the relevant results of the baseline specification; column 2 illustrates the model with endogenous liquidity parameters in the northern bills' demand functions; column 3 illustrates a version of the baseline model with a random shock in the SR specification.

were to think of the northern bills as a relatively more liquid asset than the southern ones.

Given the above, I set an alternative specification of the model where not only the liquidity preference parameters of the southern bills' demand functions are endogenous (λ_{20} and λ_{60}), but also the ones related with the demand for northern bills. The endogenous mechanism is dictated by a similar logic with before, so that on top of equations 7.38 and 7.39, the model now includes:

$$\lambda_{30} = \zeta_{30} + \zeta_{31}SR; \zeta_{31} \geq 0 \quad (7.40)$$

$$\lambda_{50} = \zeta_{50} + \zeta_{51}SR; \zeta_{51} \geq 0 \quad (7.41)$$

where λ_{30} and λ_{50} are the liquidity preference parameters of the demand for bills of the North by southern and northern households respectively (see equations 7.12 and 7.14). Same as before, ζ_{30} and ζ_{50} take the steady state values of λ_{30} and λ_{50} . In addition the ζ_{31} and ζ_{51} parameters are set to be equal or greater than zero and are meant to capture the positive influence of the South's sovereign rating on the demand for northern bills. It is easy to see how the greater the value of those parameters, the greater the positive impact of a southern downgrade upon the demand for bills of the North. Assuming for the sake of simplicity a similar influence of CRAs as before (in absolute terms), I set $\zeta_{31} = \zeta_{51} = 0.1$.

To evaluate the model, I repeat the first experiment of the above where a recession is caused by increasing the propensity to import of the South. The

second column of Figure 7.7 illustrates the results of the model. Keeping the relevant results of the baseline specification in the first column of the figure, one can see that the key results remain qualitatively similar. The *SR* shock is still activated at the same point of time, while the recession is equally deep in both countries. The main noteworthy change is that instead of bouncing back to the steady state that would have occurred had the *SR* shock not been there, the new steady state values of the GDP in both countries move to a slightly higher level (contrast the first two graphs of the first row, from left to right). This is a result of the augmented consumption out of wealth that arises in both countries due to the increased popularity of the northern bills.

7.4.2.2 'Nervous' CRAs

Another alternative to the baseline specification of the SR model is to consider the hypothesis that similar with all other economic agents, CRAs can also be liable to feelings of euphoria and panic. As discussed in Chapter 4, such feelings can be the result of amplified uncertainty, and as such may become more conspicuous in times of economic turbulence. Formally speaking they can be seen as a product of the 'qualitative' side of the analysis of sovereign ratings. While Ferri *et al.* (1999) investigate econometrically a similar hypothesis at the terrain of the East Asian crisis, Chapter 4 provides some more recent evidence on the affirmative for the sovereign ratings of the periphery states of Eurozone. In both cases there is a robust post-crisis gap between the actual ratings of the main CRAs and the ones generated by a dry econometric model that

encompasses the key variables that are supposed to matter for sovereign ratings.

In the context of the current model, a way of approximating the above hypothesis can be by letting a random shock to influence the *SR* variable once both its determinants have crossed their thresholds. In a sense the specification provided here can be seen as one where CRAs ‘get nervous’ once they fully downgrade the southern state. Formally expressed this implies expanding equation 7.37 as follows:

$$SR = SR1 + SR2 - 0.8 * z + \tag{7.37A}$$
$$SR1 * SR2 * rnorm(mean = 0, st. dev. = 0.1)$$

Recalling that the *SR1* and *SR2* dummies relate with the accumulated GDP growth and the debt to GDP ratio of the South respectively, the mechanism established here will add an element of random volatility once both of those dummies get activated. While the zero mean of the random shock implies that the recession created by the sovereign downgrade is not made deeper, it can be easily seen how this could be the case under a positive mean⁴⁰. The third column of Figure 7.7 portrays the results obtained when the updated *SR* function is incorporated into the baseline model. As it can be seen, the augmented volatility arising from the temperament of CRAs is communicated to

⁴⁰ The mean would have to be positive so as to turn negative in its relation with the lambda parameters of the southern bills demand functions that the *SR* variable affects.

all the important variables of the model. Additionally, it is transmitted to both countries.

7.5 Further Robustness Checks

7.5.1 Sensitivity Tests

In order to examine the sensitivity of the underlying model, I repeat the baseline simulations by trying different sets of numbers for the behavioural parameters. In particular, I focus on the numerical values of the propensities to import of the two countries (μ^S and μ^N), the propensities of households to consume out of disposable income (α_1^S and α_1^N), the liquidity preference that relate with the demand of domestic assets (λ_{20} and λ_{50}), as well as the zeta parameters that capture the influence of CRAs in the demand for southern bills (ζ_{21} and ζ_{61}). In the first three cases, I set every pair of parameters equal to the 90% and the 110% of the baseline values, and repeat the simulations in the FEXEND model. In the fourth case, I set the zeta parameters equal with the 80% and the 120% of their default figures (measured in absolute terms), and re-run the baseline SR model (the only reason why I chose a wider gap here was to facilitate the diagrammatical illustration). Every scenario is examined separately. That is, when I change for instance the propensities to import, all other behavioural parameters retain their baseline values. Moreover, for every pair of parameters the values of both countries are jointly set to either the 90% or the 110% levels. Table 7.4 reports the relevant numerical values for all

Table 7.4. Sensitivity Tests (as percentages of baseline values)

Parameter	Baseline	90%	110%	90%	110%	90%	110%	80% (in abs. values)	120% (in abs. values)
μ^S	0.187	0.1683	0.2057	-	-	-	-	-	-
μ^N	0.187	0.1683	0.2057	-	-	-	-	-	-
λ_{20}	0.35	-	-	0.315	0.385	-	-	-	-
λ_{50}	0.35	-	-	0.315	0.385	-	-	-	-
α_1^S	0.7	-	-	-	-	0.63	0.77	-	-
α_1^N	0.6	-	-	-	-	0.54	0.66	-	-
ζ_{21}	-0.1	-	-	-	-	-	-	-0.08	-0.12
ζ_{61}	-0.1	-	-	-	-	-	-	-0.08	-0.12

sensitivity tests. In addition, Figures 7.8 and 7.9 illustrate the response of the different specifications to the first experiment of the above whereby a recession is caused by increasing the propensity to import of the southern economy.

As it can be seen, in three out of the four experiments, there is no qualitative difference between the default parameterization and the alternative scenarios. To start with, all the trials based on different sets of propensities to import (see the first row of Figure 7.8) show that once the propensity to import of the South rises, there is a recession caused in the southern economy, while a fragile growth is experienced in the North. In all occasions the GDP is higher in the North under the new steady state. Moreover it is quite straightforward to see how the volume of the recession depends on the overall difference between the initial propensity to import of the southern economy (which varies under the relevant sensitivity tests) and the number introduced by the shock (same with the above experiment this is 0.20781). Similarly, it can be seen that under all trials the new steady state gives a higher debt to GDP ratio for the South compared with the North.

Sensible results are also produced under the different specifications of the lambda and zeta parameters. In the case of the first, the lower the values of λ_{20} and λ_{50} , i.e. the lower the autonomous demand for domestic bills, the deeper the recession for both countries. Additionally, while the debt to GDP of the South always ends up being higher than the North's under the new steady state, the gap between the two widens as we increase the values of the lambdas. Regarding the trials of the SR model with different zeta parameters (second row in Figure 7.9), it is easy to see how the greater the absolute values of ζ_{21} and

ζ_{61} , or else the greater the power of CRAs, the deeper the recession. Furthermore, the greater such influence, the lower the new steady state debt to GDP ratio for the South at the end of the recession. The opposite holds for the North.

The only case of ‘puzzling’ results is when I try out different propensities to consume out of disposable income. In particular, as it can be seen from the second row of Figure 7.8, when setting α_1^S and α_1^N equal with the 90% of their baseline values, the recession caused by the rise of the propensity of imports of the South is initially deepened but the GDP of both countries in the new steady state is higher than before. The reverse holds when the alphas are set at the 110% level. At the same time the recession is still effective in that the GDP of the South ends up significantly lower than its initial level under all specifications. Moreover, despite the fact that under all specifications the debt to GDP of the South ends up being higher than that of the North, we can observe some qualitatively different dynamics being developed. On one hand the 90% setting gives a higher debt to GDP ratio for both countries compared with their baseline specification, while the opposite holds true under the 110% regime.

There is a simple explanation for such results. They reflect the limitations of the model. Recall that my model has no active firms, and no private banks. At the same time, by construction model FEXEND positively associates fiscal expenditures with household savings and wealth. In that regard, given the lack of investment and banking credit, there is a sort of neoclassical slip in that increased aggregate savings expand aggregate expenditure, rather than the other way around. More precisely, when the alpha

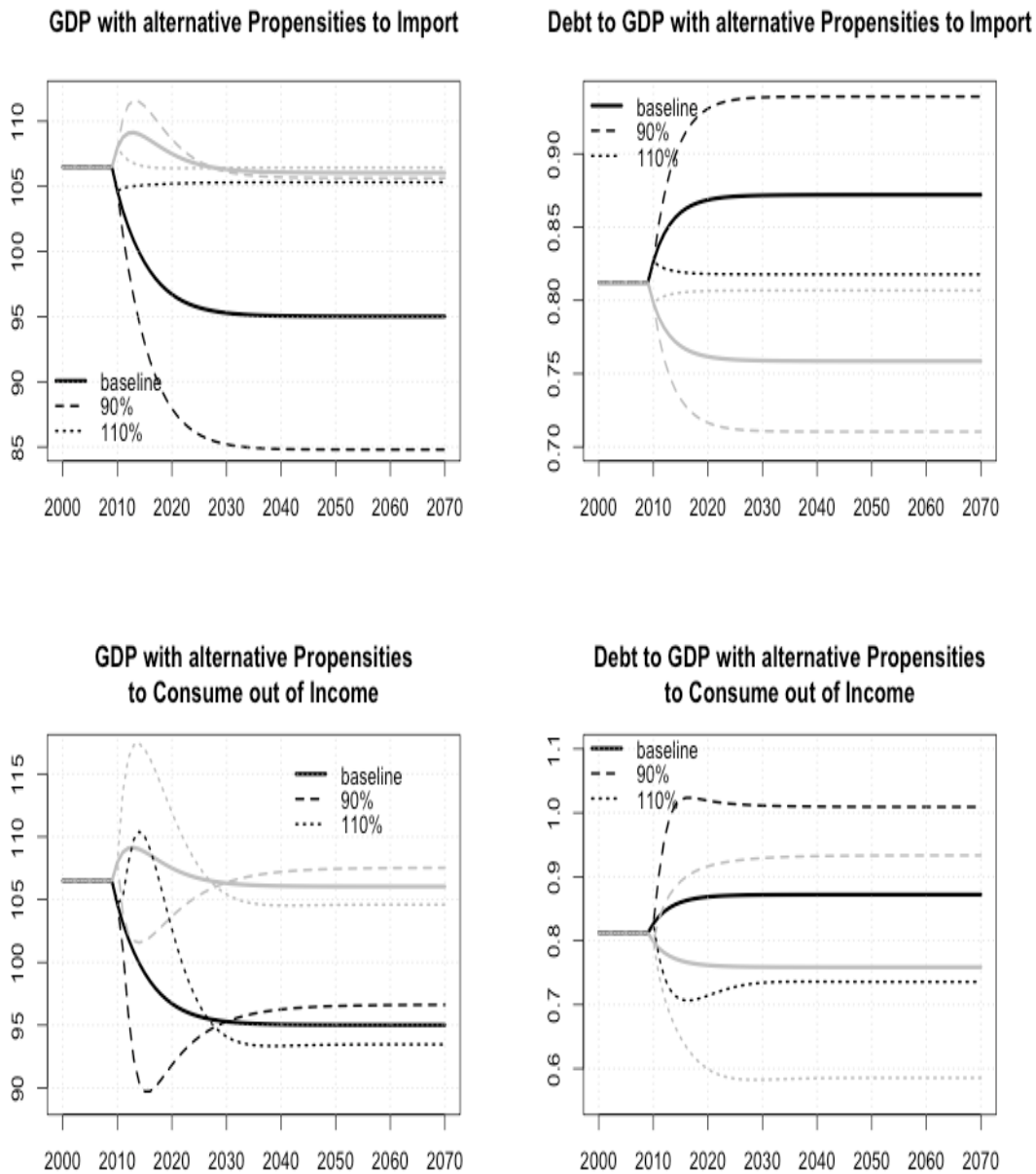


Figure 7.8. Sensitivity tests with different values for the propensities to import and the propensities to consume out of income; illustration is based on experiment 1, where the propensity to import of the South increases; in all graphs the South is in black and the North in grey; each set of propensities is changed simultaneously for both countries, either in the 90% or in the 110% level of their default values. All tests are done in model FEXEND.

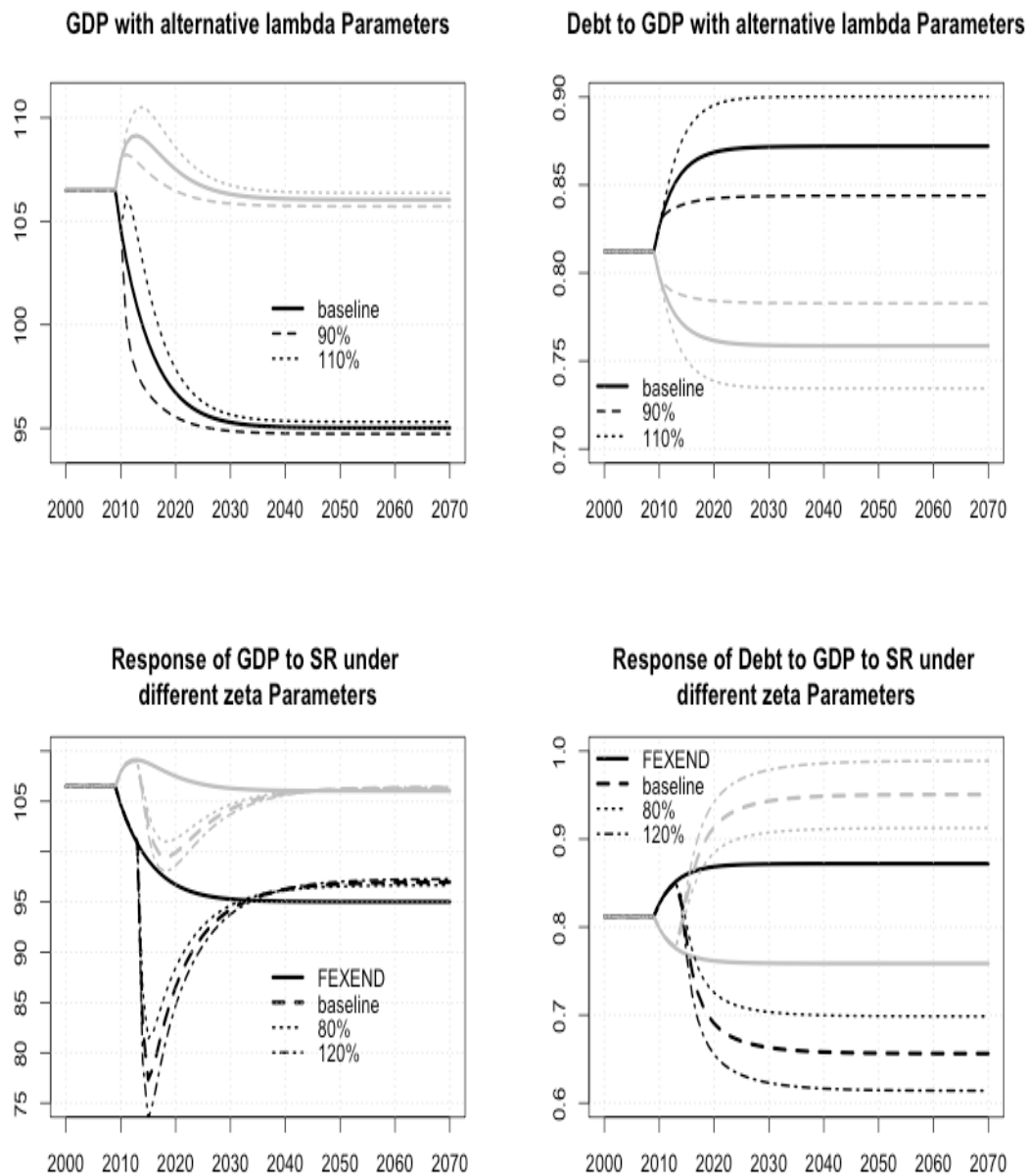


Figure 7.9. Sensitivity tests with different values for the lambda and zeta parameters; illustration is based on experiment 1, where the propensity to import of the South increases; in all graphs the South is in black and the North in grey; each set of parameters is changed simultaneously for both countries; in the case of the lambda parameters the 90% and the 110% are tested and the underlying model is the FEXEND one; in the case of the zeta parameters, FEXEND is included for the facilitation of the comparison (continuous lines), and the tests are conducted in the baseline SR model; the zeta values are reset to the 80% and 120% levels, measured in absolute terms.

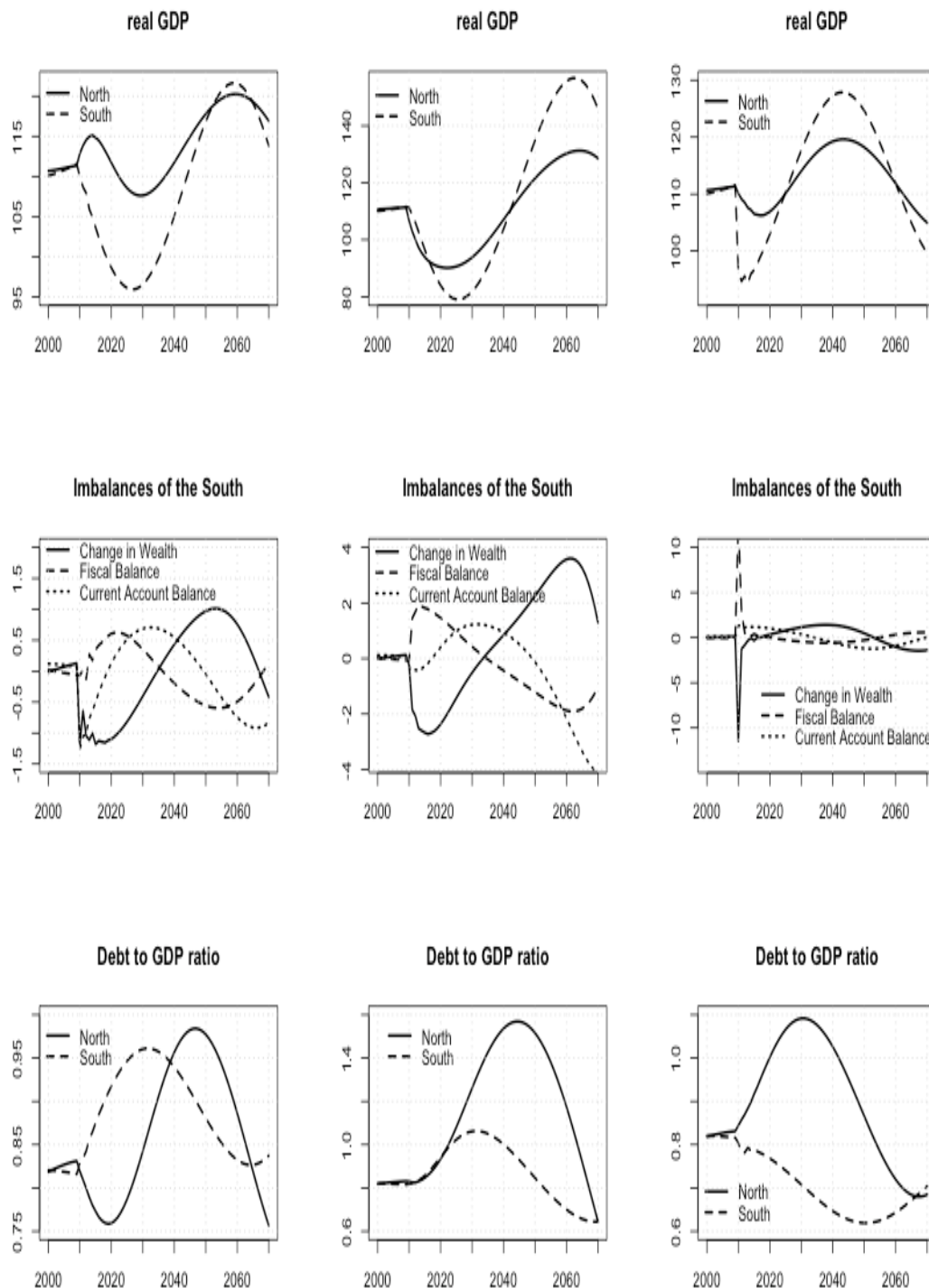


Figure 7.10. Three experiments with the version of FEXEND model with prices; experiment 1 (1st column): increase the propensity to consume of the South from 0.18781 to 0.20781; experiment 2 (2nd column): decrease the (exogenous) fiscal expenditures of the North from 20 to 15; experiment 3 (3rd column): increase the liquidity preference of southern households by reducing λ_{20} from 0.35 to 0.2. First row describes the development of GDP across all three experiments, the second row shows the developments of the change in private wealth, as well as the fiscal and current account imbalances, while row three shows the development of the debt to GDP ratio for the two countries.

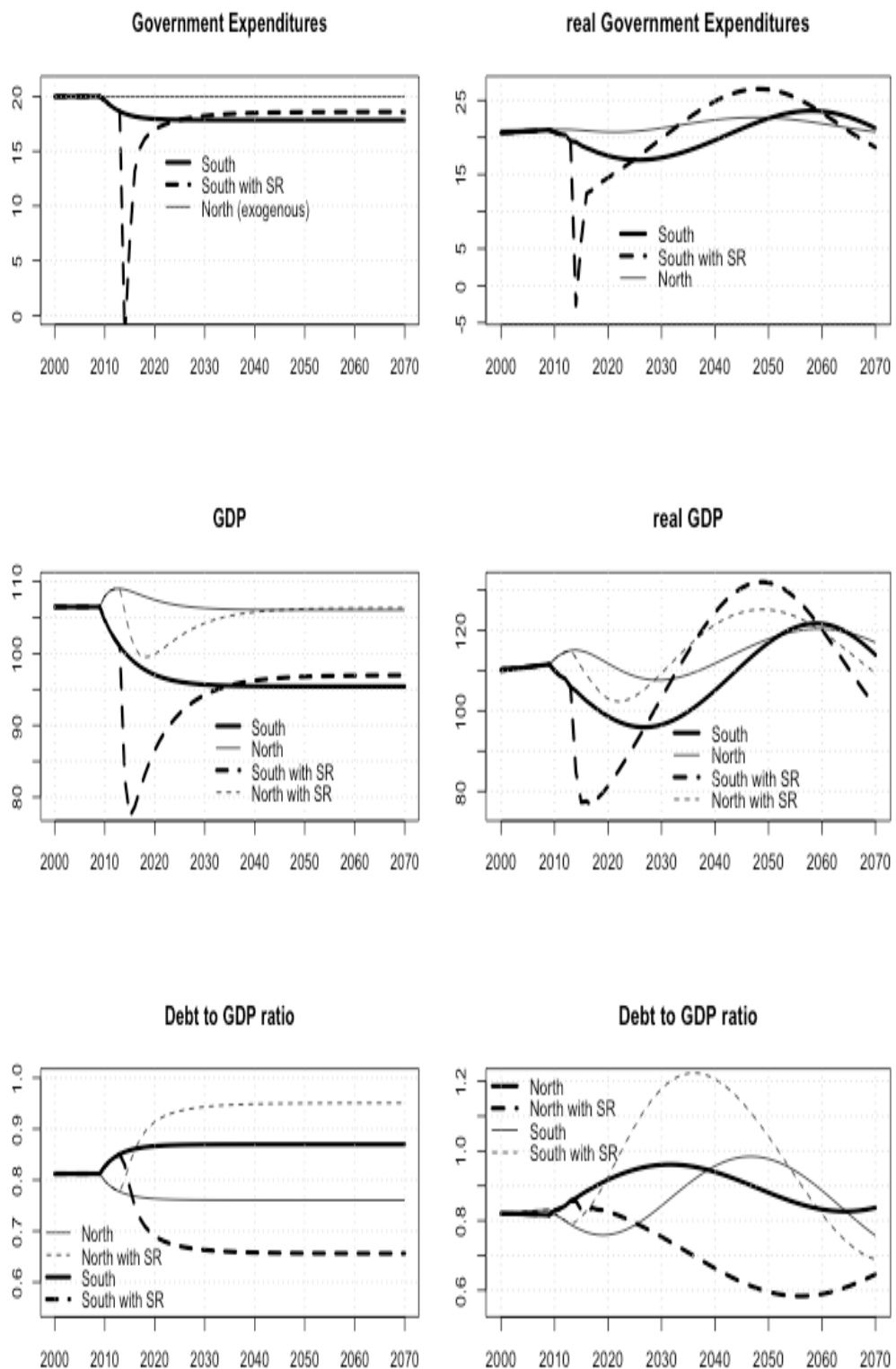


Figure 7.11. Comparison of the baseline SR model in the nominal version (left hand) and the version with price fluctuations (right hand column); recession generated by the rise of the autonomous propensity to import of the South; in all cases the corresponding FEXEND model (captured by the continuous lines) is used as a benchmark of comparison for the evaluation of the effects that arise out of the sovereign rating downgrade of the South.

one propensities to consume equal with the 90% of the baseline, more savings are generated which in turn raise the demand for government bills, therefore giving rise to an initial overshooting of the southern fiscal expenditure (not reported here). Following, the fiscal expenditure of the south converges to the new baseline steady state, but as shown above the overshooting is sufficient to ameliorate the new steady state for the GDP of both countries.

With this said, let me note that it is precisely because of the limitation pointed out here that I have abstained from conducting experiments with the propensities to consume in the current. To avoid misleading insights, such experiments would require a more rigorous modelling of the corporate and banking sectors, as for instance done in chapter 7 of Godley and Lavoie (2007b).

7.5.2 A Version of the Model with Prices

Another evident limitation of the model as developed so far has been the assumption of fixed prices. In particular, there has been no consideration of inflationary dynamics, which in an open economy environment might be thought to matter for international trade, most notably by affecting the competitiveness of trading countries. For instance it could be said that the enlargement of the current account deficit in a country would push the latter to conduct some internal devaluation (given the assumption of fixed exchange rates) by cutting its production costs, mainly wages, so as to regain its competitiveness. As a result, such policy could prevent a crisis from building

up, and in that way prevent episodes of severe downgrades such as the ones described above⁴¹.

Although the assumption of fixed prices has been a deliberate choice so as to keep the model simple and allow myself to illustrate clearly the mechanism developed above, it is interesting to see how results are affected once prices are incorporated into the model. In particular, building on the insights of chapter 12 of Godley and Lavoie (2007b), I introduce five price indices per country into the FEXEND model. These include the GDP deflator p_y , the sales and domestic sales indices (p_s and p_{ds} respectively), as well as the prices of imports and exports (p_m and p_x). All new and modified equations can be found in Appendix B. Following the conventional notation, small Latin letters denote real variables, while capital Latin letters stand for nominal ones. Furthermore, to avoid confusion notice that when found in front of a price index, the lower-script S stands for ‘sales’ (and not ‘supply’ as before). Most notably, the model now includes a standard Kaleckian mark-up mechanism for the sales of each country (eq. 7.62 and 7.77) while following the insights of chapter 9 of Godley and Lavoie there is also a mechanism of endogenous wage determination in each country (eq. 7.65, 7.66, 7.80 and 7.81). Illustrated here for the case of the South:

$$p_s^S = (1 + \varphi^S) \frac{W_{-1}^S N_{-1}^S + IM_{-1}^S}{s_{-1}^S} \quad (7.62)$$

⁴¹ This line of thought, often associated with austerity policies, lies in some quite shaky assumptions such as for instance the idea that falling wages will translate into falling prices. Nonetheless, its in-depth critique of it goes beyond the purpose of the current.

$$\omega_T^S = \left(\frac{W^S}{p_S^S}\right)_T = \Omega_{10} + \Omega_{11}pr^S + \Omega_{12}\left(\frac{N^S}{N_{fe}^S}\right) \quad (7.65)$$

$$W^S = W_{-1}^S \left[1 + \Omega_{13} \left(\omega_{T-1}^S - \frac{W_{-1}^S}{p_{S-1}^S}\right)\right] \quad (7.66)$$

where φ denotes the exogenously given mark-up, W is the nominal wage rate and S stands for real sales. In addition ω_T is the real wage target of workers, which is set to be a function of the exogenously given productivity (pr) and the degree of employment ($\frac{N}{N_{fe}}$). As set there is an adaptive mechanism in which the wage rate is updated in every period based on the discrepancy between last period's targeted and actual real wage. Also note that in the new version of the model households' consumption decisions and expectations are based on real variables. Furthermore the imports of the two countries are not only a function of domestic income anymore but also associate with relative prices.

An issue that arises in this version of the model is the non-linearity of the system once the mark-up equation has been established. To circumvent the problem I allow all price mechanisms to operate with a lag so as to break the non-linear system into smaller linear ones. At the terrain of economic logic such approach can be thought as a sort of price stickiness dynamic.

Having defined the model I now repeat the same experiments as in Figure 7.4. Figure 7.10 reports the relevant results. In the first experiment I raise the autonomous southern propensity to import (column 1). In the second one (column 2) I decrease the exogenous fiscal expenditure of the North, while in the third one (column 3) I drop the λ_{20} parameter from 0.35 to 0.2. In order to facilitate the comparison with the simple FEXEND model, Figure 7.10 preserves a one to one correspondence with Figure 7.4 in the mapping of all graphs.

As it can be seen the incorporation of prices creates some cyclicity, which obscures the inference beyond the short and medium run. This is a result of having endogenous fiscal expenditures and lagged prices (although not reported here, the version of the model with exogenous southern fiscal expenditures was much more stable). With this said notice that all the essential short-term dynamics are similar with the ones developed in the simple FEXEND model. For example, once the autonomous propensity to import of the South increases, a recession is created in the South, while a fragile growth arises in the North. Similarly there is a rise of the southern debt to GDP ratio and a decline of the northern one. Moreover a recession is caused in both countries when either the northern fiscal expenditure drops or the liquidity preference of the south increases. The only substantial short-run difference with before is the fact that under experiment two, not only the debt to GDP ratio of the South but also that of the north increases (in contrast with the simple FEXEND model where the debt to GDP ratio of the North was experiencing a decline).

Coming to the inclusion of the sovereign rating mechanism, Figure 7.11 contrasts the results of the simple SR model (left-hand column) with the ones

obtained from the SR model with prices (right-hand). Same as before recession is caused by an increase in the propensity to import μ^S in the case of the simple model. At the same time, a similar recession is caused in the price model by increasing μ_{10} , the autonomous propensity to import of the South. As documented in the relevant graphs, all key dynamics remain unchanged. The *SR* mechanism is still activated once the accumulated growth of the South and/or the debt to GDP ratio of the country crosses a certain threshold (-14% for accumulated growth and 85% for the debt to GDP ratio). The downgrade of the southern economy drives households' demand away from southern bills and towards cash. Such development reduces the fiscal expenditure of the southern state, and as a result both counties are driven deeper into recession. In addition, same as before, the debt to GDP ratios reverse their trends.

7.6 Conclusion

As pointed out in earlier chapters, CRAs are an institution of authority within the context of neoliberal capitalism, capable of dictating the terms of finance for borrowers, and influencing the decision making of lenders. In turn sovereign ratings are the key expression of CRAs' power upon the state. By linking directly with the macroeconomic level, sovereign ratings are capable of affecting capital flow movements and imposing tight financial constraints upon national governments. The latter's exposure to the sentiment of CRAs relates with the behaviour of the associated central bank.

Interestingly, although there is a vast theoretical and empirical literature discussing the above, no one has attempted to capture the macroeconomic effects of sovereign ratings by means of a formal model. This is done in the current chapter. Utilizing an open economy SFC model, the chapter shows how sovereign ratings can contribute to an on-going recession by impeding a government's access to financial resources and by pushing it to implement fiscal austerity.

The model developed has two countries, one currency and one central bank. Of the two countries, one- labelled as South- is assumed to be weak in the sense of not being unconditionally supported by the central bank. This implies that its fiscal expenditure is endogenous to the volume of debt it can issue on the private market. In such a framework, the liquidity preference of domestic and international investors is set as a function of the South's sovereign rating. The latter is in turn affected by two key 'fundamentals' of the South, namely the country's accumulated GDP growth as well as its debt to GDP ratio.

The model shows how a recession shock deteriorates the two determinants of the southern sovereign rating and thereby generates a severe rating downgrade. This in turn pushes investors to reduce their holdings of southern bills and move their wealth towards cash. Such a shift forces the southern government to cut its public spending, therefore deepening the recession further. Interestingly, the 'strong' economy (i.e. the North) is also affected due to its foregone exports and the drop in the total volume of wealth held by the households of the country.

Two alternative closures are also considered. Under the first one, the investors of the two countries switch to Northern bills instead of cash, once the

southern rating downgrade occurs. Under the second one, there is an element of panic and volatility that is generated by CRAs and that is transmitted to the economic system once both determinants of the southern sovereign rating cross their threshold values.

Furthermore, the chapter is accompanied by a sensitivity analysis and an expansion of the model with prices. Regarding the sensitivity tests, all pairs of behavioural parameters are successively set as equal to the 90% and 110% of their baseline values. In all cases the properties and stability of the model are retained. On the other hand, the incorporation of prices raises the degree of complexity of the model and obscures the inference of long-term dynamics. Nonetheless the short and medium term results of the model are qualitatively similar as before.

To facilitate the tractability and illustration of the model, a number of simplifications have been allowed. Most notably, no active firms and private banks are considered. It is quite straightforward to see how such simplifications limit the scope of the construct. In that sense, a promising extension of the current could be to develop a model with a more rigorous treatment of those sectors, so that further links between sovereign ratings and the macro-economy can be explored. For instance sovereign ratings could be thought to affect not only public expenditure, but also to influence the decisions of banks regarding their provision of credit.

7.7 Appendix A- Equations of the Simple Model

Remarks

- The 'S' and 'N' upper-scripts denote the South and the North respectively
- Only the equations that are actually used in simulations are numbered.
- In all financial assets, the upper script denotes the issuer and the lower script denotes the holder of the asset.
- Lower scripts 'd', 's', 'h', and 'e' denote demand, supply, actual holdings and expectations respectively

Exogenous parameters

- α propensities to consume
- λ_{ij} tobinisque parameters ($i = 1,2,..6; j = 1,2,..5$)
- θ^S, θ^N taxation rates
- r^S, r^N government bills interest rates
- μ propensities to import
- G public expenditure of both countries

Household Sector

South

Income and Wealth (ex post)

$$YD^S = Y^S - T^S + r_{-1}^S B_{Sh-1}^S + r_{-1}^N B_{Sh-1}^N \quad (7.1)$$

$$V^S = V_{-1}^S + (YD^S - C^S) \quad (7.2)$$

Equations related with the consumption and investment decisions of households

$$C^S = \alpha_1^S YD_e^S + \alpha_2^S V_{-1}^S \quad (7.3)$$

$$YD_e^S = YD_{-1}^S \quad (7.4)$$

$$V_e^S = V_{-1}^S + (YD_e^S - C^S) \quad (7.5)$$

North

Income and Wealth (ex post)

$$YD^N = Y^N - T^N + r_{-1}^N B_{Nh-1}^N + r_{-1}^S B_{Nh-1}^S \quad (7.6)$$

$$V^N = V_{-1}^N + (YD^N - C^N) \quad (7.7)$$

Equations related with the decisions of households

$$C^N = \alpha_1^N YD_e^N + \alpha_2^N V_{-1}^N \quad (7.8)$$

$$YD_e^N = YD_{-1}^N \quad (7.9)$$

$$V_e^N = V_{-1}^N + (YD_e^N - C^N) \quad (7.10)$$

Asset Demand Functions

South

$$\frac{H_d^S}{V_e^S} = \lambda_{10} + \lambda_{11}r_h - \lambda_{12}r^S - \lambda_{13}r^N + \lambda_{14}\frac{YD_e^S}{V_e^S}$$

$$\frac{B_{Sh}^S}{V_e^S} = \lambda_{20} - \lambda_{21}r_h + \lambda_{22}r^S - \lambda_{23}r^N - \lambda_{24}\frac{YD_e^S}{V_e^S} \quad (7.11)$$

$$\frac{B_{Sh}^N}{V_e^S} = \lambda_{30} - \lambda_{31}r_h - \lambda_{32}r^S + \lambda_{33}r^N - \lambda_{34}\frac{YD_e^S}{V_e^S} \quad (7.12)$$

$$H_d^S = V_e^S - B_{Sh}^S - B_{Sh}^N$$

$$H_h^S = V^S - B_{Sh}^S - B_{Sh}^N \quad (7.13)$$

North

$$\frac{H_d^N}{V_e^N} = \lambda_{40} + \lambda_{41}r_h - \lambda_{42}r^N - \lambda_{43}r^S + \lambda_{44}\frac{YD_e^N}{V_e^N}$$

$$\frac{B_{Nh}^N}{V_e^N} = \lambda_{50} - \lambda_{51}r_h + \lambda_{52}r^N - \lambda_{53}r^S - \lambda_{54}\frac{YD_e^N}{V_e^N} \quad (7.14)$$

$$\frac{B_{Nh}^S}{V_e^N} = \lambda_{60} - \lambda_{61}r_h - \lambda_{62}r^N + \lambda_{63}r^S - \lambda_{64}\frac{YD_e^N}{V_e^N} \quad (7.15)$$

$$H_d^N = V_e^N - B_{Nh}^N - B_{Nh}^S$$

$$H_h^N = V^N - B_{Nh}^N - B_{Nh}^S \quad (7.16)$$

Following the Tobinisque principles for each country, the vertical conditions are

$$\lambda_{10} + \lambda_{20} + \lambda_{30} = 1$$

$$\lambda_{11} + \lambda_{21} + \lambda_{31} = 0$$

$$\lambda_{12} + \lambda_{22} + \lambda_{32} = 0$$

$$\lambda_{13} + \lambda_{23} + \lambda_{33} = 0$$

$$\lambda_{14} + \lambda_{24} + \lambda_{34} = 0$$

for the South and

$$\lambda_{40} + \lambda_{50} + \lambda_{60} = 1$$

$$\lambda_{41} + \lambda_{51} + \lambda_{61} = 0$$

$$\lambda_{42} + \lambda_{52} + \lambda_{62} = 0$$

$$\lambda_{43} + \lambda_{53} + \lambda_{63} = 0$$

$$\lambda_{44} + \lambda_{54} + \lambda_{64} = 0$$

for the North. In turn the symmetry conditions are

$$\lambda_{12} = \lambda_{21}$$

$$\lambda_{13} = \lambda_{31}$$

$$\lambda_{23} = \lambda_{32}$$

and

$$\lambda_{51} = \lambda_{42}$$

$$\lambda_{61} = \lambda_{43}$$

$$\lambda_{62} = \lambda_{53}$$

for the South and the North respectively. Also note that the fulfillment of the vertical and symmetry conditions automatically satisfies the horizontal conditions too (Godley and Lavoie, 2007b: 145).

The Government Sector

South

$$T^S = \theta^S(Y^S + r_{-1}^S B_{Sh-1}^S + r_{-1}^N B_{Sh-1}^N) \quad (7.17)$$

$$\Delta B^S = G^S - T^S + r_{-1}^S B_{Sh-1}^S + r_{-1}^S B_{Nh-1}^S \quad (7.18)$$

$$-NW_g^S = B^S$$

North

$$T^N = \theta^N(Y^N + r_{-1}^N B_{Nh-1}^N + r_{-1}^S B_{Nh-1}^S) \quad (7.19)$$

$$\Delta B^N = G^N - T^N + r_{-1}^N B_{Nh-1}^N + r_{-1}^N B_{Sh-1}^N \quad (7.20)$$

$$-NW_g^N = B^N$$

GDP, Imports and Exports

South

$$Y^S = C^S + G^S + X^S - IM^S \quad (7.21)$$

$$IM^S = \mu^S Y^S \quad (7.22)$$

$$X^S = IM^N \quad (7.23)$$

North

$$Y^N = C^N + G^N + X^N - IM^N \quad (7.24)$$

$$IM^N = \mu^N Y^N \quad (7.25)$$

$$X^N = IM^S \quad (7.26)$$

The ECB

$$B_{ECB}^S = B^S - B_{Sh}^S - B_{Nh}^S \quad (7.27)$$

$$B_{ECB}^N = B^N - B_{Nh}^N - B_{Sh}^N \quad (7.28)$$

$$B_{ECB} = B_{ECB}^N + B_{ECB}^S \quad (7.29)$$

$$H_h = H_h^N + H_h^S \quad (7.30)$$

$$\Delta H_s = \Delta B_{ECB} \quad (7.31)$$

$$r^S = \overline{r^S} \quad (7.32)$$

$$r^N = \overline{r^N} \quad (7.33)$$

$$F_{ECB} = r_{-1}^N B_{ECB-1}^N + r_{-1}^S B_{ECB-1}^S$$

$$H_s = H_h$$

(redundant equation)

Current and Financial Account Identities

TB = Trade Balance; CA = Current Account; FA = Financial Account

South

$$TB^S = (X^S - IM^S)$$

$$CA^S = (X^S - IM^S) + (r_{-1}^N B_{S h-1}^N - r_{-1}^S B_{N h-1}^S)$$

$$FA^S = (\Delta B_{Nh}^S - \Delta B_{Sh}^N) + \Delta B_{ECB}^S$$

North

$$TB^N = (X^N - IM^N)$$

$$CA^N = (X^N - IM^N) + (r_{-1}^S B_{N h-1}^S - r_{-1}^N B_{S h-1}^N)$$

$$FA^N = (\Delta B_{Sh}^N - \Delta B_{Nh}^S) + \Delta B_{ECB}^N$$

Parameter and Steady State Values

α_1^S	0.7	South's prop. to consume out of disposable income	Y^S	106.4869	GDP of the South	
α_2^S	0.3	South's prop. to consume out of wealth	Y^N	106.4869	GDP of the North	
α_1^N	0.6	North's prop. to consume out of disposable income	YD^S	86.4869	Disposable income of the South	
α_2^N	0.4	North's prop. to consume out of wealth	YD^N	86.4869	Disposable income of the North	
μ^S	0.187	South's prop. to import	T^S	21.62172	Tax revenues of the South	
μ^N	0.187	North's prop. to import	T^N	21.62172	Tax revenues of the North	
θ^S	0.2	South's taxation rate	B_S^S	32.4325	Southern bills held by southern households	
θ^S	0.2	North's taxation rate	B_N^S	32.4365	Northern bills held by southern households	
λ_{20} (= ζ_{20})	0.35	Tobinisque parameters for the asset demand functions of Southern households	B_N^N	32.4325	Northern bills held by northern households	
λ_{22}	4.8		B_N^S	32.4365	Southern bills held by northern households	
λ_{23}	1		V^S	86.49062	Total wealth of the South	
λ_{24}	0.07		V^N	86.49062	Total wealth of the North	
λ_{30} (= ζ_{30})	0.32		C^S	86.4869	Consumption of the South	
λ_{32}	1		C^N	86.4869	Consumption of the North	
λ_{33}	4.4		H_h^S	21.62162	Actual cash holdings of the South	
λ_{34}	0.03		H_h^N	21.62162	Actual cash holdings of the North	
λ_{50} (= ζ_{50})	0.35		Tobinisque parameters for the asset demand functions of Northern households	G^S	20	Public expenditure of the South
λ_{52}	4.79			X^S	19.99	Exports of the South
λ_{53}	1	IM^S		19.99	Imports of the South	
λ_{54}	0.07	G^N		20	Public expenditure of the North	
λ_{60} (= ζ_{60})	0.32	X^N		19.99	Exports of the North	
λ_{62}	1	IM^N		19.99	Imports of the North	
λ_{63}	4.4	B_{ECB}^S		21.62162	Southern bills held by the central bank	
λ_{64}	0.03	B_{ECB}^N		21.62162	Northern bills held by the central bank	
ζ_{21}	-0.1	Parameters related with the influence of credit rating agencies	B^S	86.49062	Total stock of southern bills (public debt of the South)	
ζ_{31}	0.1		B^N	86.49062	Total stock of northern bills (public debt of the North)	
ζ_{51}	0.1		H_s	43.24324	Total supply and holdings of cash (satisfied by the redundant equation)	
ζ_{61}	-0.1		H_h	43.24324	Total supply and holdings of cash (satisfied by the redundant equation)	
r^S	0.025	Interest rate of the South	r^N	0.025	Interest rate of the North	

7.8 Appendix B- Equations of the Model with Prices

Remarks:

- Only the equations that are actually used in simulations are numbered.
- The equations that are identical with the simple model retain the same numbers
- In all financial assets, the upper script denotes the issuer and the lower script denotes the holder of the asset.
- Capital letters correspond to nominal and small case ones correspond to real variables.
- Variables in bold denote natural logarithms

Exogenous parameters and variables

- α propensities to consume
- λ_{ij} tobinisque parameters ($i = 1,2, \dots, 6; j = 1,2, \dots, 5$)
- $\theta^{GR}, \theta^{GER}$ taxation rates
- r^{GR}, r^{GER} government bills interest rates
- μ propensities to import
- G public expenditure of both countries
- pr level of productivity in the two countries
- Ω parameters for wage setting

Price Indices

- p_y GDP deflator
- p_s sales index
- p_{ds} domestic sales index
- p_m imports prices
- p_x exports prices

Household Sector

South

Income and Wealth (ex post)

$$YD^S = Y^S - T^S + r_{-1}^S B_{Sh-1}^S + r_{-1}^N B_{Sh-1}^N \quad (7.1)$$

$$yd^S = \frac{YD^S}{p_{ds}^S} - \frac{\pi_{ds}^S V_{-1}^S}{p_{ds}^S} \quad (7.42)$$

$$V^S = V_{-1}^S + (YD^S - C^S) \quad (7.2)$$

$$v^S = \frac{V^S}{p_{ds}^S} \quad (7.43)$$

Equations related with the consumption and investment decisions of households

.

$$c^S = \alpha_{11} y d_e^S + \alpha_{12} v_{-1}^S \quad (7.44)$$

$$C^S = c^S p_{ds}^S \quad (7.3A)$$

$$y d_e^S = y d_{-1}^S \quad (7.45)$$

$$YD_e^S = p_{ds}^S y d_e^S + \frac{\pi_{ds}^S V_{-1}^S}{p_{ds}^S} \quad (7.4A)$$

$$V_e^S = V_{-1}^S + (YD_e^S - C^S) \quad (7.5)$$

North

Income and Wealth (ex post)

$$YD^N = Y^N - T^N + r_{-1}^N B_{Nh-1}^N + r_{-1}^S B_{Nh-1}^S \quad (7.6)$$

$$y d^N = \frac{YD^N}{p_{ds}^N} - \frac{\pi_{ds}^N V_{-1}^N}{p_{ds}^N} \quad (7.46)$$

$$V^N = V_{-1}^N + (YD^N - C^N) \quad (7.7)$$

$$v^N = \frac{V^N}{p_{ds}^N} \quad (7.47)$$

Equations related with the decisions of households

$$c^N = \alpha_{21}yd_e^N + \alpha_{22}v_{-1}^N \quad (7.48)$$

$$C^N = c^N p_{ds}^N \quad (7.8A)$$

$$yd_e^N = yd_{-1}^N \quad (7.49)$$

$$YD_e^N = p_{ds}^N yd_e^N + \frac{\pi_{ds}^N V_{-1}^N}{p_{ds}^N} \quad (7.9A)$$

$$V_e^N = V_{-1}^N + (YD_e^N - C^N) \quad (7.10)$$

Asset Demand Functions

South

$$\frac{H_d^S}{V_e^S} = \lambda_{10} + \lambda_{11}r_h - \lambda_{12}r^S - \lambda_{13}r^N + \lambda_{14} \frac{YD_e^S}{V_e^S}$$

$$\frac{B_{Sh}^S}{V_e^S} = \lambda_{20} - \lambda_{21}r_h + \lambda_{22}r^S - \lambda_{23}r^N - \lambda_{24} \frac{YD_e^S}{V_e^S} \quad (7.11)$$

$$\frac{B_{Sh}^N}{V_e^S} = \lambda_{30} - \lambda_{31}r_h - \lambda_{32}r^S + \lambda_{33}r^N - \lambda_{34} \frac{YD_e^S}{V_e^S} \quad (7.12)$$

$$H_d^S = V_e^S - B_{Sh}^S - B_{Sh}^N$$

$$H_h^S = V^S - B_{Sh}^S - B_{Sh}^N \quad (7.13)$$

North

$$\frac{H_d^N}{V_e^N} = \lambda_{40} + \lambda_{41}r_h - \lambda_{42}r^N - \lambda_{43}r^S + \lambda_{44} \frac{YD_e^N}{V_e^N}$$

$$\frac{B_{Nh}^N}{V_e^N} = \lambda_{50} - \lambda_{51}r_h + \lambda_{52}r^N - \lambda_{53}r^S - \lambda_{54} \frac{YD_e^N}{V_e^N} \quad (7.14)$$

$$\frac{B_{Nh}^S}{V_e^N} = \lambda_{60} - \lambda_{61}r_h - \lambda_{62}r^N + \lambda_{63}r^S - \lambda_{64} \frac{YD_e^N}{V_e^N} \quad (7.15)$$

$$H_d^N = V_e^N - B_{Nh}^N - B_{Nh}^S$$

$$H_h^N = V^N - B_{Nh}^N - B_{Nh}^S \quad (7.16)$$

Following the Tobinisque principles for each country, the vertical conditions are

$$\lambda_{10} + \lambda_{20} + \lambda_{30} = 1$$

$$\lambda_{11} + \lambda_{21} + \lambda_{31} = 0$$

$$\lambda_{12} + \lambda_{22} + \lambda_{32} = 0$$

$$\lambda_{13} + \lambda_{23} + \lambda_{33} = 0$$

$$\lambda_{14} + \lambda_{24} + \lambda_{34} = 0$$

for the South and

$$\lambda_{40} + \lambda_{50} + \lambda_{60} = 1$$

$$\lambda_{41} + \lambda_{51} + \lambda_{61} = 0$$

$$\lambda_{42} + \lambda_{52} + \lambda_{62} = 0$$

$$\lambda_{43} + \lambda_{53} + \lambda_{63} = 0$$

$$\lambda_{44} + \lambda_{54} + \lambda_{64} = 0$$

for the North. In turn the symmetry conditions are

$$\lambda_{12} = \lambda_{21}$$

$$\lambda_{13} = \lambda_{31}$$

$$\lambda_{23} = \lambda_{32}$$

and

$$\lambda_{51} = \lambda_{42}$$

$$\lambda_{61} = \lambda_{43}$$

$$\lambda_{62} = \lambda_{53}$$

for the South and the North respectively. Also note that the fulfillment of the vertical and symmetry conditions automatically satisfies the horizontal conditions too (Godley and Lavoie, 2007b: 145).

The Government Sector

South

$$T^S = \theta^S (Y^S + r_{-1}^S B_{Sh-1}^S + r_{-1}^N B_{Sh-1}^N) \quad (7.17)$$

$$\Delta B^S = G^S - T^S + r_{-1}^S B_{Sh-1}^S + r_{-1}^S B_{Nh-1}^S \quad (7.18)$$

$$-NW_g^S = B^S$$

$$g^S = \frac{G^S}{p_{ds}^S} \quad (7.50)$$

North

$$T^N = \theta^N (Y^N + r_{-1}^N B_{Nh-1}^N + r_{-1}^S B_{Nh-1}^S) \quad (7.19)$$

$$\Delta B^N = G^N - T^N + r_{-1}^N B_{Nh-1}^N + r_{-1}^N B_{Sh-1}^N \quad (7.20)$$

$$-NW_g^N = B^N$$

$$g^N = \frac{G^N}{p_{ds}^N} \quad (7.51)$$

GDP, Imports and Exports

South

$$s^S = c^S + g^S + x^S \quad (7.52)$$

$$S^S = s^S p_s^S \quad (7.53)$$

$$y^S = s^S - im^S \quad (7.54)$$

$$Y^S = S^S - IM^S \quad (7.21A)$$

$$p_y^S = \frac{Y_{-1}^S}{y_{-1}^S} \quad (7.55)$$

$$im^S = \mu_{10} \left(\frac{p_y^S}{p_m^S} \right)^{\mu_{11}} (y^S)^{\mu_{12}}$$

or else

$$im^S = \mu_{10} + \mu_{11}(p_y^S - p_m^S) + \mu_{12}(y^S) \quad (7.56)$$

$$IM^S = im^S p_m^S \quad (7.22A)$$

$$x^S = im^N \quad (7.57)$$

$$X^S = x^S p_x^S \quad (7.23A)$$

$$p_m^S = p_x^N \quad (7.58)$$

$$p_x^S = p_m^N \quad (7.59)$$

$$N^S = \frac{y^S}{pr^S} \quad (7.60)$$

$$pr^S = \overline{pr^S} \quad (7.61)$$

$$p_s^S = (1 + \varphi^S) \frac{W_{-1}^S N_{-1}^S + IM_{-1}^S}{s_{-1}^S} \quad (7.62)$$

$$p_{ds}^S = \frac{s_{-1}^S - X_{-1}^S}{s_{-1}^S - x_{-1}^S} \quad (7.63)$$

$$\pi_{ds}^S = \frac{p_{ds}^S - p_{ds-1}^S}{p_{ds-1}^S} \quad (7.64)$$

$$\omega_T^S = \left(\frac{W^S}{p_s^S}\right)_T = \Omega_{10} + \Omega_{11} pr^S + \Omega_{12} \left(\frac{N^S}{N_{fe}^S}\right) \quad (7.65)$$

$$W^S = W_{-1}^S \left[1 + \Omega_{13} \left(\omega_{T-1}^S - \frac{W_{-1}^S}{p_{s-1}^S}\right)\right] \quad (7.66)$$

North

$$s^N = c^N + g^N + x^N \quad (7.67)$$

$$S^N = s^N p_s^N \quad (7.68)$$

$$y^N = s^N - im^N \quad (7.69)$$

$$Y^N = S^N - IM^N \quad (7.24A)$$

$$p_y^N = \frac{Y_{-1}^N}{y_{-1}^N} \quad (7.70)$$

$$im^N = \mu_{20} \left(\frac{p_y^N}{p_m^N} \right)^{\mu_{21}} (y^N)^{\mu_{22}}$$

or else

$$im^N = \mu_{20} + \mu_{21}(p_y^N - p_m^N) + \mu_{22}(y^N) \quad (7.71)$$

$$IM^N = im^N p_m^N \quad (7.25A)$$

$$x^N = im^S \quad (7.72)$$

$$X^N = x^N p_x^N \quad (7.26A)$$

$$p_m^N = v_0 + (1 - v_1)p_y^N + v_1 p_y^S \quad (7.73)$$

where $0 < v_1 < 1$

$$p_x^N = v_0 + (1 - v_1)p_y^N + v_1 p_y^S \quad (7.74)$$

where $0 < v_1 < 1$

$$N^N = \frac{y^N}{pr^N} \quad (7.75)$$

$$pr^N = \overline{pr^N} \quad (7.76)$$

$$p_s^N = (1 + \varphi^N) \frac{W_{-1}^N N_{-1}^N + IM_{-1}^N}{s_{-1}^N} \quad (7.77)$$

$$p_{ds}^N = \frac{s_{-1}^N - X_{-1}^N}{s_{-1}^N - x_{-1}^N} \quad (7.78)$$

$$\pi_{ds}^N = \frac{p_{ds}^N - p_{ds-1}^N}{p_{ds-1}^N} \quad (7.79)$$

$$\omega_T^N = \left(\frac{W^N}{p_s^N}\right)_T = \Omega_{20} + \Omega_{21} pr^N + \Omega_{22} \left(\frac{N^N}{N_{fe}^N}\right) \quad (7.80)$$

$$W^N = W_{-1}^N \left[1 + \Omega_{23} \left(\omega_{T-1}^N - \frac{W_{-1}^N}{p_{s-1}^N}\right)\right] \quad (7.81)$$

The ECB

$$B_{ECB}^S = B^S - B_{Sh}^S - B_{Nh}^S \quad (7.27)$$

$$B_{ECB}^N = B^N - B_{Nh}^N - B_{Sh}^N \quad (7.28)$$

$$B_{ECB} = B_{ECB}^N + B_{ECB}^S \quad (7.29)$$

$$H_h = H_h^N + H_h^S \quad (7.30)$$

$$\Delta H_s = \Delta B_{ECB} \quad (7.31)$$

$$r^S = \overline{r^S} \quad (7.32)$$

$$r^N = \overline{r^N} \quad (7.33)$$

$$F_{ECB} = r_{-1}^N B_{ECB-1}^N + r_{-1}^S B_{ECB-1}^S$$

$$H_s = H_h$$

(redundant equation)

Current and Financial Account Identities

TB = Trade Balance; CA = Current Account; FA = Financial Account

South

$$TB^S = (X^S - IM^S)$$

$$CA^S = (X^S - IM^S) + (r_{-1}^N B_{Sh-1}^N - r_{-1}^S B_{Nh-1}^S)$$

$$FA^S = (\Delta B_{Nh}^S - \Delta B_{Sh}^N) + \Delta B_{ECB}^S$$

North

$$TB^N = (X^N - IM^N)$$

$$CA^N = (X^N - IM^N) + (r_{-1}^S B_{N h-1}^S - r_{-1}^N B_{S h-1}^N)$$

$$FA^N = (\Delta B_{Sh}^N - \Delta B_{Nh}^S) + \Delta B_{ECB}^N$$

Parameter and Steady State Values of the Model with Prices

μ_{10}	0.6389787	Autonomous propensity to import of the South	v_0	0	Autonomous component of exports prices of the North
μ_{20}	0.6389787	Autonomous propensity to import of the North	v_0	0	Autonomous component of imports prices of the North
μ_{11}	0.7	Imports price coefficient of the South	v_1	0.5	Relative weight of foreign prices upon export prices of the North
μ_{21}	0.7	Imports price coefficient of the North	v_1	0.7	Relative weight of foreign prices upon import prices of the North
μ_{12}	0.5	Imports income coefficient of the South	N_{fe}^S	111.3309	South's full employment
μ_{22}	0.5	Imports income coefficient of the North	N_{fe}^N	111.3309	North's full employment
pr^S	1	Productivity of the South	N^S	111.3342	South's employment
pr^N	1	Productivity of the North	N^N	111.3343	North's employment
Ω_{10}	0.2731589	Wage targeting autonomous parameter of the South	S^S	125.6098	South's nominal sales
Ω_{20}	0.2731589	Wage targeting autonomous parameter of the North	S^N	125.6098	North's nominal sales
Ω_{11}	0.1	Wage targeting productivity coefficient of the South	ω_T^S	0.7731709	South's wage target
Ω_{21}	0.1	Wage targeting productivity coefficient of the North	ω_T^N	0.7731709	North's wage target
Ω_{12}	0.4	Wage targeting employment coefficient of the South	W^S	0.7395176	South's nominal wage rate
Ω_{22}	0.4	Wage targeting employment coefficient of the North	W^N	0.7395176	North's nominal wage rate
Ω_{13}	0.3	Nominal wage adjustment parameter of the South	p_{ds}^S	0.9564807	South's domestic sales index
Ω_{23}	0.3	Nominal wage adjustment parameter of the North	p_{ds}^N	0.9564806	North's domestic sales index
p_y^S	0.9564807	South's GDP deflator	p_m^S	0.9564807	South's imports prices
p_y^N	0.9564806	North's GDP deflator	p_x^S	0.9564807	South's exports prices
p_s^S	0.9564835	South's sales index	p_m^N	0.9564807	North's imports prices
p_s^N	0.9564835	North's sales index	p_x^N	0.9564807	North's exports prices
φ^N	0.2381	Mark-up of the North	φ^S	0.2381	Mark-up of the South

Note: only the new parameters and stocks of the model are reported here; everything else is essentially identical with the simple model

Chapter 8- Conclusion and Policy Reflections

This thesis focuses on the political economy of CRAs and investigates the macroeconomic implications of sovereign ratings. Summarizing here some of the key points, Chapter 2 sets the scenery by pointing out the particular importance of CRAs within the context of neoliberal capitalism and financialization. Key features that underpinned the rise of CRAs' power were the process of disintermediation, whereby traditional forms of bank credit were replaced by new financial instruments, the collapse of the Bretton-Woods system and the globalization of capital flow movements, as well as the attachment of CRAs to financial legislation. By emerging as a significant voice of authority, these agencies came to play the role of the gatekeeper to those seeking to access the financial market. In that way, rated entities came to adopt the conceptual framework of CRAs and limit their choices to what would be considered to be compatible with a good rating. At the same time, CRAs provided an artificial sense of stability to investors regarding the uncertainties behind heterogeneous debt instruments. By making such uncertainties look like calculable risk, CRAs allowed investors to feel comfortable with the trade of such instruments, and neglect the underlying complexity and correlations.

Chapter 2 also points out the particular importance of sovereign ratings. Most notably, sovereign ratings link directly with the macroeconomic level by providing a ceiling for all other categories of domestic credit ratings. This implies a strong correlation and causality running from sovereign ratings towards the rest. Furthermore, sovereign ratings are the most direct expression of CRAs' power towards the state. Across a number of cases, such

power has been effective in narrowing down the range of public choices and in imposing severe financial constraints for elected governments.

Chapter 3 outlines some key stylized facts for a selection of core and peripheral Eurozone countries. Following a period of growth based on huge and unsustainable trade imbalances, the Eurozone entered into the crisis during the period 2009/10. Key features of the crisis have been the stagnant and falling GDP growth, and the ballooning unemployment for the countries of the European periphery, especially for Greece and Spain. As pointed out by heterodox scholars key factors that led to the crisis were the flawed institutional set-up of the Eurozone- with its lack of full employment policy targets, and with arbitrary thresholds for the public debt and deficits of EMU countries- as well as the process of financialization.

The chapter also discusses the rise of influence of CRAs in Eurozone. Most importantly, given the establishment of the Euro as an external currency for Eurozone member states and the prohibition of the ECB from acting as a lender of last resort for their governments, EMU countries came to be downgraded to the status of developing countries and the probability of sovereign default was brought to the fore. Such development exposed those countries to the sentiments of the financial markets, and thus to the judgements rendered by CRAs.

Coming to the contribution of this thesis, Chapter 4 investigates empirically the hypothesis that CRAs do not only conduct a technical analysis of macroeconomic data, but they are also liable to feelings of euphoria and panic. Such hypothesis is underpinned by the concept of fundamental uncertainty and

the corresponding impossibility of accurate forecasting for economic phenomena.

In terms of methodology, Chapter 4 employs linear panel data econometrics and sets up a number of alternative models for explaining the recent sovereign rating movements of the crisis-hit EMU peripheral countries. The key idea is to econometrically generate sovereign rating scores that capture those macroeconomic variables that are supposed to matter for CRAs' own analyses. My analysis then seeks evidence of systematic discrepancies between econometric and actual ratings. In case where the latter are lower than the former for a continuous period of time, the evidence is taken as supportive of the abovementioned hypothesis.

Overall, the chapter provides some robust affirmative evidence, by showing how the actual post-crisis downgrades of the European peripheral countries have been significantly exaggerated as compared to what those countries' fundamentals would justify. While the precise difference between the actual and the econometrically generated ratings might partly depend upon the actual specification of the model, the post-crisis gap between the two is retained for the vast majority of peripheral countries. Results are consistent across the three rating agencies, while they also satisfy a number of robustness checks. More specifically, results remain qualitatively unchanged after incorporating two new variables into the model, while they also prove to be robust to cross-sectional dependence.

Chapter 5 contributes to the stream of literature that seeks to identify the determinants of extreme capital flow movements, focusing on episodes of sudden stops. Utilizing a panel probit model with random effects, and

concentrating on the twelve initial members of the EMU in the period 1999q1-2012q4, the chapter considers the economic and statistical significance of sovereign ratings in explaining such episodes. In consistency with the findings of the previous chapter, the emphasis is on that part of sovereign ratings that captures exaggerated and panicked reactions of CRAs. Besides the economic intuition in testing for the importance of such reactions, the applied rating decomposition is also motivated by the solution it provides to the issue of multicollinearity that would otherwise occur between the sovereign rating and the rest of the macroeconomic variables that are included in the model.

Results show that exaggerated reactions of CRAs are indeed important in affecting episodes of sudden stops. This holds for three out of the four ways of specifying such episodes (can be done by means of net and gross total inflows as well as net and gross non-FDI inflows), while the strongest findings appear in the case of non-FDI flows. Results are also consistent across the three rating agencies. Under all specifications the sovereign rating variable has an economically meaningful sign (minus). In addition, four robustness checks are conducted, with the findings remaining qualitatively similar in all cases.

Chapter 7 offers the first attempt to incorporate the effects of sovereign ratings into a macroeconomic model. This is done by means of an open economy stock flow consistent framework. The model developed includes two countries, one currency and one central bank, and it aims to approximate the north and south dichotomy of the Eurozone. In that sense, the southern country of the model is designed to be weak by setting its fiscal expenditure as endogenous to the volume of debt it can issue at the private market. Such dependence implies that the central bank of the model is not willing to act as a

lender of last resort for the South. Moreover, the liquidity preference parameters that relate to the demand for southern bills are set to be a function of the South's sovereign rating, which in turn is affected by the rate of accumulated GDP growth and the debt to GDP ratio of the country.

Outlined in brief, the model shows how an exogenous recessionary shock in the South can deteriorate the macroeconomic fundamentals of the country, and thereby generate a severe sovereign rating downgrade of the South. This event affects domestic and foreign investors' liquidity preference. As a result investors decide to move their wealth away from southern bills and towards cash. Such a development significantly restrains the fiscal expenditure of the South, and hence the recession gets deepened. An interesting aspect of the model is that the northern economy is also affected due to its foregone exports and the fall in the stock of wealth held by the households of the country.

Two alternative closures are considered for the model. Under the first one, households of both countries move their funds towards northern bills instead of cash. Although this behaviour partly ameliorates the new steady state reached, it does not alter qualitatively the dynamics of the model. Under the second alternative an element of panic is introduced into the behaviour of the rating agency. This extension results in an amplified volatility that transmits to all the key variables of the model once a severe sovereign downgrade occurs.

Lastly the chapter includes a set of sensitivity tests for all the essential parameters of the model, as well as an extension of the model with prices. In the vast majority of cases, the change in parameter values does not affect the behaviour of the model. In addition, although the incorporation of prices raises

the degree of complexity of the model and creates some cyclicity, the short and medium run dynamics described earlier remain qualitatively similar.

8.1 Policy Reflections

While my thesis makes a contribution in illuminating new dimensions with regard to CRAs, it is certainly not the first one to discuss policy proposals aiming at containing CRAs' influence in Europe. More specifically, starting in 2013 the European Commission (EC) has launched a process of reducing the mechanistic reliance on ratings and promoting transparency in the ratings market⁴². To this end the Commission has announced the following:

- i) Reduced overreliance on credit ratings. Banks and other financial institutions are requested to enforce their own credit risk assessments, rather than relying mechanistically on CRAs. Furthermore, the EC has set a target of removing all reference to external ratings from EU legislation by 2020;
- ii) For sovereign ratings, CRAs will have to set up a calendar every year, indicating when they are going to publish new ratings throughout the year to follow. CRAs will not be able to conduct rating announcements for more than three times per year. Moreover ratings will only be announced after the closing of the markets on Fridays, and at least one hour before they re-open;
- iii) Increased accountability of CRAs. An investor or an issuer can now sue a CRA if the latter causes him or her some damage by violating

⁴² For all relevant reports and press releases see here http://ec.europa.eu/internal_market/rating-agencies/index_en.htm.

the existing legislation, either intentionally or unintentionally (e.g. by announcing a downgrade in a date outside the announced calendar described above);

- iv) Reduced conflicts of interest. Amongst other measures, the CRAs will have to disclose if a shareholder of 5% or more of the agency under consideration also owns 5% or more of a rated entity. A CRA will also be prohibited from rating when a shareholder of 10% or more of the agency's capital or voting rights also holds 10% or more of a rated entity;
- v) As of June 2015, all ratings of financial instruments are to be published on a European Rating Platform in order to improve their comparability and visibility. The EC expects such a step to help investors make their own credit risk assessments, as well as to promote diversity in the ratings market.
- vi) Support of smaller CRAs, so as to boost competitiveness in the ratings market. The EC aims at creating a network of smaller CRAs in order to make the latter more visible across the investors' community.

Besides the above policy action steps, there are also certain ideas that were considered by the EC but were eventually rejected⁴³. These include the overall prohibition of sovereign ratings, as well as the proposal of establishing a European rating agency. Regarding the first, the EC assessed that if such a prohibition were to be established, it would give the impression that EU member states have something to hide. As a result, such a move would

⁴³ See the discussion here [http://europa.eu/rapid/press-release MEMO-13-571_en.htm?locale=en](http://europa.eu/rapid/press-release_MEMO-13-571_en.htm?locale=en)

augment financial instability and rise borrowing costs for member states. As for the plan of setting up a European rating agency, the EC claims that the idea was rejected due to the anticipated cost of such an institution (the EC estimates a cost of 300 to 500 million euros over a period of five years), due to the issues of credibility that would be raised (in the sense that a public European rating agency would have to rate the member states which in turn would fund the agency), and due to the concern that private CRAs would be put in a comparative disadvantage.

Overall, although the new European legislation moves in the right direction, it does not go far enough. To begin with, it can be seen that points iii) to vi) of the list above aim at boosting ratings' transparency and competitiveness as well as eliminating possible conflicts of interest. As discussed in Chapter 2, although those ideas do have some merit, they do not provide a comprehensive solution. Especially with regard to sovereign ratings, if my thesis is right in pointing out their relative immunity to moral hazard considerations, and if those ratings are important in affecting macroeconomic dynamics, more needs to be done.

Potentially, proposals i) and ii) could be seen as effective in containing the influence of sovereign ratings. Nonetheless, the Commission's approach is rather hesitant and piecemeal. First, the setting of a maximum limit of three rating announcements per year is still quite high for sovereign ratings. As a matter of comparison it suffices here to illustrate the fact that even in a period of a crisis such as the current one, where one should find the most severe clusters of rating announcements, there are rarely more than three announcements per year. This is shown in Table 8.1 by focusing on S&P, an

agency with a relatively high frequency of announcements as compared with the other two. Thus, it can be seen that with the exception of Greece no other peripheral country of Eurozone has experienced more than three rating announcements per year since the outburst of the crisis.

Table 8.1. Number of S&P announcements per year for EMU peripheral countries (2009- 2015⁴⁴)

	2009	2010	2011	2012	2013	2014	2015
Greece	4	3	4	5	0	1	5
Italy	0	0	3	1	1	1	0
Spain	3	1	2	3	1	1	0
Portugal	3	2	3	1	3	2	1
Ireland	3	2	3	1	2	2	1

Source: author's elaboration, based on S&P's website. As recorded here announcements include either rating changes or changes in the credit outlook/watch that S&P provides

Furthermore, the target of 2020 for the removal of all legislative reference to external ratings is a quite arbitrary and remote one. In view of the on-going public debt crisis, the EU could have established a shorter horizon for implementing such change. The EC's defence here was to claim that the sudden removal of all references would lead to legal uncertainty. Hence the Commission assessed that alternative credit risk measures need to be in place first. Such a position may nevertheless be criticized on the grounds that instead of waiting for several years for banks and investors to develop their own credit

⁴⁴ The 2015 rating changes are recorded up to the end of July 2015.

risk assessment mechanisms, the EU could facilitate them by establishing an institution such as a European rating agency.

Although as discussed above the EC has come up with numerous reasons in order to justify the rejection of the idea, these are not very sound. First, the argument about the prohibitive cost of setting up a European agency is flimsy when it comes from a sovereign entity such as the EU. The ECB could simply provide some financial support. Secondly, the issues of credibility and moral hazard are the exact same ones that are raised with regards to private CRAs, under the 'issuer-pays' model. If these issues can be thought of being capable of be faced for private CRAs, they can equally well be faced for a European rating agency too. Thirdly, worrying about not putting private CRAs in a comparative disadvantage contradicts at the very first place the idea of controlling them.

There may indeed be some merit in setting up a European rating agency. Such a development could push rating making to be much more accountable to public institutions as well as detach it completely from the field of profit-making market activities. In particular, it may be argued that CRAs do not reveal the precise model and methodology they follow in order to protect the profitability of their products. In contrast, a non-profit public rating agency could work on the basis of a publicly available methodology. Moreover, since it would not be only technocratic but also political in nature (see discussion in Chapter 2), this methodology could also be subject to debate amongst democratically elected European authorities such as the European Parliament.

All in all, while ideas such as the above are well intentioned, their unfolding also reveals the limitations that surround them. More specifically, it is unlikely that such projections are capable of producing concrete results in

transforming economic constraints and providing economic stability on their own. Rather, they might be more effective if seen as part of a wider change in Europe.

To start with, the proposal of a European rating agency - if the insights of Chapter 4 are right in pointing out that every agent and institution is liable to feelings of euphoria and panic- implies that those insights should also apply here. In that sense, the aim of setting up a European rating agency cannot be in constructing an institution that will deliver accurate forecasts. Even if one assumed that a European rating agency would be able to perform better than the private ones, we would still be looking in the wrong direction.

Rather it is a question of power. In that regard, the reason why the European rating agency plan has some merit is because it could transfer some amount of authority away from a private institution and back to a public one. But then, thinking within the current status quo of Eurozone, it would be naïve to believe that a European rating agency would be any less harsh against member states than its private counterparts. Under the prevailing set of ideas of today, such institution would only accompany European authorities such as the ECB in promoting recessionary values, such as the ideas of 'sound finance' and balanced budgets across the European economies.

Similarly, in conjunction with the discussion of Chapters 3 and 6, unless there is an accommodating ECB for member states, with the power to make fiscal transfers across borders, and with the authority to act as a lender of last resort, those economies would still be exposed to the sentiment and expectations of private lenders. Unavoidably then, by the time a Eurozone state would find itself in financial distress, the European rating agency would still end

up downgrading it, irrespectively of the precise technicalities behind its methodology.

On what has to do with democracy, although establishing a European rating agency and making it accountable to the European parliament might sound good, one should also bear in mind the limited importance of the latter. Despite being the most democratic institution of the EU structure, the European parliament has no actual authority in changing economic policy rules, voting laws and exercising control over other European institutions such the ECB or the so called Eurogroup. As Varoufakis notes in a recent interview, a parliament that does not legislate is not a parliament⁴⁵.

In a similar vein, following the insights of Chapters 5 and 7 we could also give some credit to the idea of prohibiting sovereign ratings. If as the results of those chapters indicate sovereign ratings are important in affecting episodes of extreme capital flow movements, and in imposing additional constraints upon fiscal policy, their complete prohibition could indeed enhance financial and economic stability across Eurozone. Moreover in order to face the abovementioned response of the EC against the proposal, one could argue that financial instability and high borrowing costs for member states have already become a reality across Europe.

Nonetheless, although promising, the above idea can hardly be expected to be effective in isolation. As argued in Chapter 2, CRAs' influence is to an extent explained by financial deregulation, as well as by the complexity surrounding several categories of debt instruments. Hence, if we were to keep

⁴⁵ Varoufakis' point was made in Greek; see here <http://www.skai.gr/news/greece/article/285665/o-varoufakis-os-vouleutis-pia-sto-kafeneio-tis-voulis/>

deregulated financial markets as they are, any attempt to prohibit sovereign ratings would only manage to replace one voice of influence with another. Sooner or later, some other source of private authority, such as a group of megabanks would emerge, producing the exact same destabilizing results as CRAs. Although a detailed discussion of how to reform the European financial system goes beyond the purposes of the current thesis (for some up to date proposals see for instance Dymski and Kalterbrunner, 2014), some key ideas could be to ban naked trading (i.e. the sort of trading that involves financial derivatives with no attachment to their underlying assets), as well as to place some barriers in the mobility of short-term capital, such as portfolio investment flows, across borders. The evidence outlined in Chapter 5 can be used in support of the latter. As pointed out, it was non-FDI flows that dominated European capital flow movements since the establishment of the Euro, while it is such flows that are mostly affected by the movements of sovereign ratings.

The above thoughts do not aim at postponing actions that seek to contain the influence of CRAs. They only aim at highlighting their dependency on the surrounding environment. In that sense they aim to strengthen the reach of such reforms. To think otherwise would be to an extent counterproductive. It is equally false on the one hand to limit our scope on CRA reforms without any consideration of what needs to change in the broader picture, and on the other to think that only a full-scale reform or vision is worth applying. The latter is highly important in providing us with a direction. But then, equally well, it is our actions that make a vision useful, and in that way protect it from being converted to a metaphysical concept.

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