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IN SOVEREIGN RATINGS

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On the Self-Fulfilling Prophecy of Changes in Sovereign Ratings*

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Abstract

We empirically investigate the dynamic interactions between sovereign ratings and the macroeconomic environment. We use a Panel VAR on annual data for European countries from 1996 to 2010. Our results provide evidence for a significant two-way interaction between the macroeconomic environment and changes in sovereigns' ratings. Thus, rating changes are able to exacerbate a country's boom-bust cycle.

Keywords: sovereign ratings; Panel VAR; self-fulfilling prophecy.

JEL classification: C33; H6.

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1 Introduction

The recent changes in sovereign ratings have received considerable attention from policy makers and researchers alike. Often, changes in ratings are believed to induce a self-fulfilling prophecy. For example, fears mounted that governments which are going through a period of crisis would be additionally adversely affected by rating downgrades. As a consequence, downgrades would induce a self-fulfilling prophecy of instability. Evidence is mounting that suggests significant effects from changes in ratings to macroeconomic conditions, especially bonds and stock prices as well as defaults (e.g. Cantor and Packer 1996, Kaminsky and Schmukler 2002, Reinhart 2002, Brooks, Faff, Hillier and Hillier 2004, Ferreira and Gama 2007), but also from macroeconomic conditions to changes in ratings (e.g. Afonso, Gomes and Rother 2011, Hilscher and Nosbusch 2010, Mellios and Paget-Blanc 2006). However, the studies just cited focus on either the effect of ratings on macroeconomic variables or the other way around.¹ In contrast, a study of the self-fulfilling prophecy would require an integrated framework, allowing for two-way feedbacks between changes in ratings and changes in macroeconomic conditions. Our contribution in this article is, thus, to study these feedbacks within a Panel VAR framework.

There have recently been some contributions that question whether changes in ratings are able to exacerbate a country's boom-bust cycle, since they find that changes to ratings were mainly reactions to news (Mora 2006). Our panel VAR analysis allows us to investigate this question more fully. In particular, the main result of our study is that we find a significant two-way interaction between our macroeconomic variables and changes in sovereigns' ratings, suggesting that ratings are, indeed, able to exacerbate a country's boom-bust cycle.

2 Data and Methodology

Our data consists of consumer sentiment (CCI), Gross Domestic Product per capita (GDPpc) and Blanchard's primary gap indicator (FG), all of which come from Eurostat, while the data on the ratings (R) is taken from Fitch's Complete Sovereign Rating History and Bloomberg. We focus on European countries since this data is fully harmonized and thereby comparison is facilitated and meaningful.

The ratings data comes from Fitch, S&P as well as Moody's and it is the sovereign long-term rating. We recode the rating in a numerical form, ranging from 0 for DD to 22 for AAA for Fitch,

¹Cantor and Packer (1996) study both but not in a dynamic, interactive way.

from 0 for D to 22 for AAA in the case of S&P, and from 0 for C to 22 for Aaa in the case of Moody's. We take the average of the three ratings for each country at each point in time in order to obtain a balanced picture. Our argument here is that a change in each of the three ratings conveys information and thereby needs to be taken into account. In case there are several changes in a sovereign's rating within one year we weigh each rating by the number of days that the rating was active during that year. We then calculate the growth rate of the rating (in percentage), denoted by $\mathbf{g}(\mathbf{R})$, in order to obtain a variable that better fits within the econometric approach of the Panel VAR (i.e. is essentially unbounded). A sovereign's rating has been related to its probability of default and economic soundness (Reinhart 2002). Thus, changes in ratings should drive investors' expectations on their potential returns and household expectations on their future income. Additionally, changes in ratings affect a sovereign's cost of financing its budget deficit (Brooks et al. 2004). In consequence, we also expect rating changes to impact a sovereign's deficit.

The variable $\mathbf{d}(\mathbf{CCI})$ gives the change in the harmonized consumer sentiment index. As described in the background document of the European Commission, (European Commission 2007), the CCI "is the arithmetic average of the balances (in percentage points) of the answers to the questions on the financial situation of households, the general economic situation, unemployment expectations (with inverted sign) and savings, all over the next 12 months." Thus, it is a forward-looking index of the household's perception on the developments of their financial situation. With this variable we capture the expectations of the households in our sample. We anticipate that changes in their sovereign's rating should impact their expectations positively.

As the main indicator for the current economic situation we use the growth rate of GDP per capita. GDP is measured in market prices in Millions of Euro. We calculate the growth rate of GDP per capita in percentage terms and denote it by $\mathbf{g}(\mathbf{GDPpc})$. We expect a positive impact from $\mathbf{g}(\mathbf{GDPpc})$ on a sovereign's rating, but a negative impact from changes in a sovereign's rating on its GDP growth.

The primary gap indicator comes from Blanchard (1990). It is calculated as the debt to GDP ratio multiplied by the difference between the GDP growth rate and the real interest rate minus the government deficit to GDP ratio. This measure integrates the cost of the debt, whether the economic expansion is sufficiently fast to allow the debt to GDP ratio to shrink over time, and the current additions to the debt into one indicator. A positive value indicates that a country's debt is on a sustainable path, while a negative primary gap suggests that the country's debt may be unsustainable. We use the primary gap indicator as this combines information on both the

government deficit and its debt into one simple measure. Only focusing on either government debt or the deficit would provide only a partial picture of a government’s debt sustainability. As suggested in Cantor and Packer (1996) or Reinhard (2002), sovereign ratings may be affected by government debt, its deficit or its sustainability. We use the change in the primary gap indicator in our analysis ($d(\mathbf{FG})$).²

Based on this data, our sample consists of 26 European countries, namely Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

This gives us an unbalanced dataset consisting of at maximum 306 country-year observations ranging from 1996 to 2010. The use of the annual data should minimize potential anticipation effects of fiscal policy changes (Ramey, 2006) and help us in avoiding spurious results due to cyclical effects. The summary statistics are provided in Table 1, and the correlations in Table 2.

Table 1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.
d(FG)	-1.425	403.066	-1709.027	2413.367
g(GDPpc)	4.5726	6.457	20.75	28.01
d(CCI)	-.5412	8.448	-26.41	29.416
g(R)	.42929	2.96	-22.14	12.5588

Looking at the correlations in Table 2 reveals all are significant at the 1% significance level and all variables are moderately positively correlated. The highest percent of variation shared is between changes in the fiscal gap indicator and per capita GDP growth (26.7%), while the lowest is between changes in a sovereign’s rating and the fiscal gap (5.2%). The correlation is only an indication of the strength of a potential contemporaneous relationship between two variables. We now investigate the relationship more fully with a dynamic model

As our estimation strategy we resort to a Panel Autoregressive Regression (PVAR) with one lag. Since we expect all variables to be at least weakly endogenous we resort to the reduced-form VAR approach as this avoids imposing a detailed structural model. Furthermore, the VAR approach allows us to identify the dynamic effects of our variables, which we argued in the previous section to be important for understanding the full interaction between rating changes and macroeconomic variables. It furthermore allows us to isolate the individual effects of each variable via

²Another reason for focusing on the primary gap indicator is that the government deficit is a component of GDP and, thus, part of an identity. This could bias the regression results. This possibility is minimized with the primary gap indicator.

Table 2: Cross-correlation table

Variables	d(FG)	g(GDPpc)	d(CCI)
g(GDPpc)	0.517 (0.000)		
d(CCI)	0.49 (0.000)	0.336 (0.000)	
g(R)	0.229 (0.000)	0.415 (0.000)	0.274 (0.000)

orthogonalized impulse responses, which we decompose based on the Cholesky decomposition (see e.g. Hamilton 1994). We estimate the model itself via system GMM based on the STATA routine provided by Inessa Love (see Love and Zicchino 2006). Firstly, we time de-mean the series,³ which controls for time-specific effects. Secondly, we helmert transform the variables, which is a forward mean-differencing of the variables in order to take away fixed effects without introducing serial correlation.

We choose the ordering $\{g(\text{GDPpc}), d(\text{FG}), d(\text{CCI}), g(\text{R})\}$. Due to the Cholesky decomposition, a variable is allowed to react in the same period to all variables ordered before it, but does not contemporaneously react to any of the variables ordered after it. Our ordering is based on the view that the ratings are responding to all other shocks only contemporaneously (e.g. Mora 2006). Thus, we align ourselves with the results in Mora (2006), namely that ratings react to news, and thereby set the stage against a contemporaneous feedback from ratings to macroeconomic variables. If we, even in this case, find evidence in favor of a two-way relationship, then this would provide the strongest support for the self-fulfilling prophecy.

3 Results

The results for the variance decomposition are shown in Table 3, while the impulse response results are presented in Figure 1. The variance decomposition has a forecasting horizon of ten periods. The impulse responses use 5% confidence bands generated by Monte Carlo simulations with 1000 replications. Overall, we find significant dynamic interactions between changes in countries' ratings and their macroeconomic environment, providing support for the self-fulfilling prophecy.

In particular, our results show that 81.22% of the variance in sovereign ratings changes can be attributed to an own shock, while the rest of the variance is explained by changes in the fiscal

³This is done via calculating the average of each variable at each point in time, and then subtracting these from the actual variables.

Table 3: Variance decomposition

Equation	g(GDPpc)	d(FG)	d(CCI)	g(R)
g(GDPpc)	94.90	0.23	0.07	4.79
d(FG)	52.97	44.43	0.11	2.49
d(CCI)	9.77	1.85	84.65	3.73
g(R)	8.54	3.00	7.24	81.22

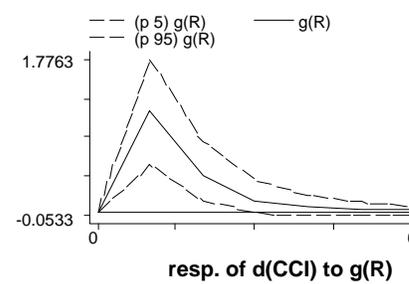
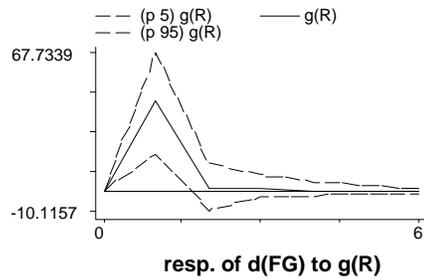
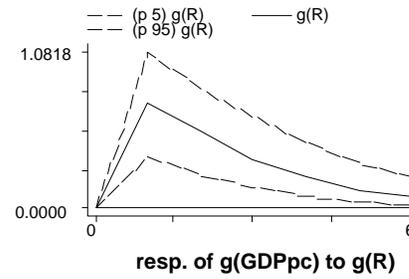
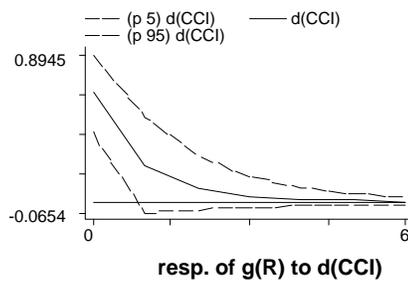
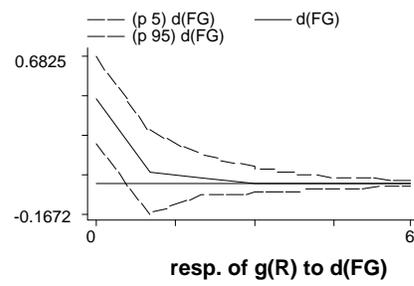
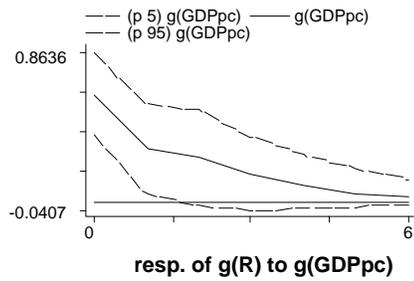
gap indicator (3%), by per capita GDP growth (8.54%) and by changes to consumer sentiment (7.24%). Thus, though in line with the previous literature on the sustainability of government finances (e.g. Afonso et al. 2011), we also find a relevant role for per capita GDP growth and for expectations.

The impulse responses in Figure 1 show significant feedbacks from the macroeconomic variables to changes in the ratings. The effect of changes in a country’s GDP growth rate is short-run and impacts a country’s sovereign rating for two periods (panel (a)). A one percentage point increase in a country’s GDP growth rate increases the growth rate of that country’s rating by 0.67 percentage points. Thus, GDP growth seems to generally be an important contributor to a country’s rating. This is evident by the fact that positive GDP growth tends to indicate a healthy economy with rising income levels. A sovereign’s rating growth rate will be increased by roughly 0.51 percentage points following a one standard deviation increase in that country’s fiscal gap indicator (panel (b)). Thus, a country that is on a sustainable fiscal path as measured by the fiscal gap indicator will have a higher sovereign rating. This thus confirms previous results on the effect of government debt or deficit on ratings (e.g. Cantor and Packer 1996). Changes to consumer sentiment lead to a statistically significant and short-term increase in a sovereign’s rating (panel (c)). Here we find that a one standard deviation increase in consumer sentiment raises a country’s growth rate of its rating by roughly 0.675 percentage points. Consumer sentiment captures consumer’s expectations and proxies certainly for many things like unemployment expectations, a country’s stability as seen from the consumers’ point of view, as well as the evolution of the stock markets. In this respect, the positive impact from consumer sentiment to sovereign ratings should not be surprising.

We now look at the impact from ratings on the macroeconomic variables. These effects are also non-negligible. The results indicate that changes in ratings can explain 2.49% of the variance in the fiscal gap indicator, 3.73% of the changes in consumer sentiment, and up to 4.79% of the variance in a country’s per capita GDP growth rate.

Our impulse response results show that all three macroeconomic variables in our model are

Figure 1: Impulse response results



significantly positively related to changes in ratings. A one percentage point increase in a country's growth rate of its rating increases per capita GDP growth by roughly 0.85 percentage points after one year, while its consumer sentiment increases by approximately 1.34 points. Thus, positive rating changes tend to improve a country's growth perspective and also its inhabitants expectations. We find that a one percentage point increase in a country's growth rate of its rating increases a country's fiscal gap indicator by roughly 50 points. This effect arises is short-term. Indeed, one would have expected that a country's downgrade induces this country towards more fiscal austerity. However, we find a positive relationship between ratings and a country's fiscal gap. Thus, a decrease in a sovereign's rating will worsen the fiscal sustainability of that country. With this analysis we are obviously not able to identify whether downgrades lead to more or less fiscal austerity or whether a country's interest rate payments will be negatively affected by the downgrade. But what we can clearly say is that the net effect, namely the effect on fiscal sustainability as measured by the fiscal gap indicator, is negative. As a consequence, a downgrade that occurred because of a weak fiscal position tends to have an additional, second-round adverse effect on fiscal sustainability.

Robustness

We undertook the following robustness exercises which are all available from the author. We studied stationarity, all variables were stationary at any lag length with or without trends. We excluded all those countries that did not have a rating change during our period of study (Austria, France, Germany, Luxembourg, Netherlands, United Kingdom), without a change to the results. We excluded the crisis period to see whether there was potentially a structural change in the results and thus dropped all observations after 2007. The only relationship that loses some significance level is the response of the fiscal gap indicator to rating changes. While its response is still positive it now turns out to be only marginally significant. However, one would expect this as stronger and more rating changes have been observed during the period of the financial crisis. In addition to the analysis above it is informative to change the order of the Panel VAR and place the rating variable first. This, thus, implies that ratings are not contemporaneously affected by the other variables, while they may drive changes in the other variables. In this case we still find that the macroeconomic variables react significantly to changes in ratings, while we do not find that the feedbacks from the macroeconomic variables onto ratings are statistically significantly different from zero. We, however, observe that if we order a variable before the rating variable, then

the impulse response from that variable onto ratings turns significant. The reason is simple. Our impulse response functions show that a shock in a macroeconomic has the strongest impact on itself and other macroeconomic variables during the same period. Since the effects of the own shocks die out rather quickly (mostly within one year), then not allowing for a contemporaneous impact from macroeconomic variables to ratings implies weaker shocks in the next round. Thus, we conclude that rating agencies are likely to only react to sufficiently large shocks in the macroeconomic variables. We also varied the lag length to two years with a qualitative change to the results above.

4 Conclusion

In this article we find evidence for the self-fulfilling prophecy caused by changes in sovereigns' ratings, suggesting that ratings are, indeed, able to exacerbate a country's boom-bust cycle. Thus, ratings seem to have a similar impact as marking-to-market of balance sheets. While marking-to-market of balance sheets may lead to fire sales and additional rounds of feedbacks between asset sales and asset prices (Plantin, Sapra and Shin 2008), thereby potentially rendering an otherwise sound institution illiquid, rating changes may exacerbate a sovereign's boom-bust cycle by two-way feedbacks between its rating and its macroeconomic condition.

The obvious advantage of sovereign ratings is that they provide debt holders and investors with an idea about the probability of a sovereign's default. Another advantage is that rating downgrades will place pressure on governments to address structural problems that otherwise might get postponed and potentially result in larger costs than those incurred by immediately tackling the problems. The disadvantage, as we have shown, arises from the fact that changes in ratings can induce a downward spiral and essentially aggravate existing problems. To find the welfare trade-offs between the advantages and the disadvantages as well as potential policy solutions should prove to be a fruitful future research agenda.

References

- Afonso, A., P. Gomes, and P. Rother**, “Short-and long-run determinants of sovereign debt credit ratings,” *International Journal of Finance & Economics*, 2011, 16 (1), 1–15.
- Blanchard, O.**, “Suggestions for a New Set of Fiscal Indicators,” OECD Economics Department Working Papers 79, OECD Publishing 1990.
- Brooks, R., R.W. Faff, D. Hillier, and J. Hillier**, “The national market impact of sovereign rating changes,” *Journal of Banking & Finance*, 2004, 28 (1), 233–250.
- Cantor, R. and F. Packer**, *Determinants and impacts of sovereign credit ratings*, Federal Reserve Bank of New York New York, 1996.
- European Commission**, *The joint harmonised EU programme of business and consumer surveys: User Guide*, European Commission Directorate - General for Economics and Financial Affairs, 2007.
- Ferreira, M.A. and P.M. Gama**, “Does sovereign debt ratings news spill over to international stock markets?,” *Journal of Banking & Finance*, 2007, 31 (10), 3162–3182.
- Hamilton, J.D.**, *Time series analysis*, Vol. 2, Cambridge Univ Press, 1994.
- Hilscher, J. and Y. Nosbusch**, “Determinants of Sovereign Risk: Macroeconomic Fundamentals and the Pricing of Sovereign Debt*,” *Review of Finance*, 2010, 14 (2), 235–262.
- Kaminsky, G. and S.L. Schmukler**, “Emerging market instability: do sovereign ratings affect country risk and stock returns?,” *The World Bank Economic Review*, 2002, 16 (2), 171–195.
- Love, I. and L. Zicchino**, “Financial development and dynamic investment behavior: Evidence from panel VAR,” *The Quarterly Review of Economics and Finance*, 2006, 46 (2), 190–210.
- Mellios, C. and E. Paget-Blanc**, “Which factors determine sovereign credit ratings?,” *The European Journal of Finance*, 2006, 12 (4), 361–377.
- Mora, N.**, “Sovereign credit ratings: guilty beyond reasonable doubt?,” *Journal of Banking & Finance*, 2006, 30 (7), 2041–2062.
- Plantin, G., H. Sapra, and H.S. Shin**, “Marking-to-Market: Panacea or Pandora’s Box?,” *Journal of Accounting Research*, 2008, 46 (2), 435–460.

Reinhart, C.M., “Default, Currency Crises, and Sovereign Credit Ratings,” *World Bank Economic Review*, 2002, 16 (2), 151–169.