April 24, 2016

Abstract

In this proposal I present a main research ideas for my econometrics assignment. Possibly I would like to extend this idea for my MSc. Dissertation. At the core of the idea is how do Bank capital needs and valuation impact the sovereign debt of a country - as falling banks can imply the need of public assistance, and therefore increase the likelihood of a sovereign default. This is particularly relevant as banks simultaneously receive public funding and invest in Sovereign debt.

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1 Introduction

The macroeconomic developments of the last 15 years in Europe and US have highlighted the strong linkage between the financial sector and the overall direction of the economy. In the US a fast growing financial sector created more aggressive practices of secularization, risk sharing and financial innovation that eventually lead to the subprime crisis and a global economic slowdown now know as the great recession. In Europe the creation of the eurozone also lead to the expansion of the financial sector in some peripheral economies, aided by the availability of cheap credit. This problem, associated with the perception of increasingly frequency of financial crisis created a trend on assessing if there is something as an optimal size of the financial sector. Jean-Louis Arcand et al. (2015) shows that there is indeed such thing as "too much finance".

My research topic deals with the home-country bias. Banking activity, even in the context of a monetary union, is characterized by the existence of several systemically important banks at the regional (national in the case of the eurozone) level. This banks operate in a regional economy(national), and are highly dependant of the outcome of that same economy. If this is the case, and that dependence can have some feedback effects (as a crisis in the banking system can lead to an economic crisis that in turn accentuates the banking crisis), maybe the capital requirements of investments in bonds of the national economy should have different capital requirements. Given that this idea is inspired in the recent developments of the European economy it might sound a very regional-specific problem, but it generalizes in several different ways.

2 Proposal Topic - What's the role of home country bias in a sovereign debt crisis?

The disproportionate size of the financial system in some European countries lead to an additional level of instability. Several European banks though are not *too big to fail* for the eurozone are definitely to their local economy. Bank nationalizations, or massive programs of public assistance have been pretty common during the last decade and have included giants like RBS, Lloyds, Anglo-Irish Bank and arguably Citigroup. Given the sheer significance of the involved amounts this has created threats to the solvability of some sovereign nations. Consider for instance Ireland where the nationalisation of Anglo Irish Bank and Irish Nationwide Bank cost amounted to 34.7 billion euros more than 20% of the country GDP. To some extent this proves that the activity of the financial sector has a high degree of political setting that is not fully explained by a profit maximization behaviour. Fernández-Villaverde et al. (2013) provides an extensive and interesting narrative for the case of political credit cycles in Europe.

There is early evidence on the role of home country bias. Just recently a study by the IMF, Asonuma et al. (2015),conducted an analysis of advanced and emerging markets and showed that home country bias is used as a cost saving mechanism, but that indeed creates some fragility as in the presence of worsening market situations decreases the effectiveness of fiscal policy.

This research line seems to be gaining some attention Cornand et al. (2014) is a recent working paper that models the impact of home country bias and, in my opinion, finds a particularly striking finding that home country bias is not destabilizing. I believe that the source of this result is some deficient modelling of the financial sector in their theoretical approach. Their view is that the government chooses to pay/default based on their observation of the level of debt owned by home

households - it fails to introduce the mechanism that the cost of that debt might be externally affected by the amount of bias.

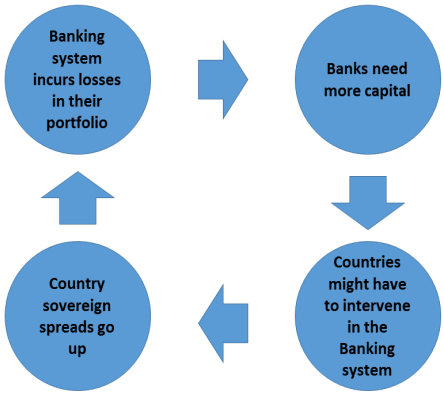

Figure 1: Sovereign feedback effects in a Banking Crisis

The role of the financial system in the realization of a sovereign debt crisis has been mostly ignored in academic research where often subjects are studied separately (banking crisis on one side, sovereign debt crisis in a different one). The IMF in IMF (2014) however shed some light on this dynamics and specifically highlights that most governments do not discuss the fiscal risks associated with supporting the banking sector as a major problem[1].

Arellano and Bai (2012) showed that sovereign default events are interlinked, as a default of one nation increases the probability of other nation's default. In their multi-country model nations are linked to one another by borrowing from and renegotiating with common lenders. However this propagation mechanism is not completely realistic I would argue, as it relies on a strong assumption about common lenders that does not particularly hold. And when it holds, those lenders tend to be international Institutions like the IMF or ESM that have a core concern on avoiding the contagion of default events. In my theoretical approach the contagion mechanism is made through the fragility of the national financial system. As presented in the diagram above banks limited profitability and failure risk increase the chance of a bailout, that in turn puts pressure on the yields of sovereign debt and has banks are heavily exposed to sovereign debt the circle starts all over again.

2.1 Theoretical framework

The recent research on sovereign debt and the linkages with the current political debate is discussed at length in Aguiar and Amador (2015). They show the specific dynamics of the sovereign debt markets, defined by the limited commitment; political economy frictions; the possibility of unobserved or unverifiable shocks in limiting risk sharing; the vulnerability to self-fulfilling debt crises; the difficulties in renegotiating debt in a timely and efficient manner. My research idea clearly fits

[1] Also interesting to note that the IMF has a long standing tradition in understanding the role of a correct sovereign debt design in preventing economic crisis - see for instance Borensztein et al. (2005). Even latest model generations of sovereign default and debt restructuring fail to incorporate the feedback effects of a strong bank exposure (see for instance Yue (2010)

into this agenda. First of all I would like to consider the option that the degree of home country bias can have an effect on the final outcome/equilibria. ***Conceptually, I argue that a country where the banking system has a higher exposure to the nation sovereign debt is more likely to have sovereign default mostly justified by the feedback loop discussed in the previous point.***

De Marco (2013) using data for European banks during the sovereign debt crisis in southern Europe shows that for a 1% increase in the sovereign losses over total assets, on average, the growth rate in loans declines by 5.3%. This is particularly worrying as in the limit the financial system can be seen as an inefficient leveraged bet on sovereign debt. European banks benefited from cheap liquidity assistance, and in some cases public capital and used that to passively invest in sovereign debt. It adds to the inefficiency that countries like Ireland, Portugal, Spain and Greece injected capital in their banking system at a cost lower cost than their cost in the international market. This situation represents to some extent a capture of the political system, that is trapped in a situation where effectively is subsidizing the financial system to buy sovereign debt. Using data from European Banks Battistini et al. (2013) finds supporting evidence to this view, they concluded that in the periphery, banks respond to increases in country risk by increasing their domestic exposure, while in core countries they do not. By their risk taking actions, banks in the periphery increased the likelihood of a sovereign default as they added to the fragility of the banking system.

2.2 Empirical strategy

From this we see that a naive econometric model of making a regression of sovereign debt based on some metric of the banking system (profitability, share prices, CDS spreads) would naturally be a biased exercise given the feedback effects. At this stage I suggest, for a set of relevant economies, using the daily prices of a bond benchmark index (*ie* the 10 year bond) and see how sensitive those prices are to the movements in the price of the national banks. To avoid the bias previously discussed the release of earnings by banks can be used as an instrumental variable (IV) as they contain relevant information for the valuation of the banks, but that however are not expected to be significant to the overall credit risk of a country. The datasets required are publicly available in Bloomberg (for the 10 year bond index), and several sources of financial data for the indiviudal shares(ie. Google Finance, Yahoo Finance, Bloomberg, etc..)

2.3 Policy implications

The most straightforward implication is that an optimal level of capital requirements should be influenced by the degree of home country bias. If a bank is basically using its using public guarantees to buy sovereign debt it is effectively receiving a subsidy from the government. Research like Clerc et al. (2014) and Mendicino (2014) already shows that optimum levels of capital might be significantly higher than the ones proposed in Basel, it is likely that this optimal level might be higher in the presence of bias, or lower in the case of a country where the Banking system is well diversified.

3 Data

The data used covers the equity prices of the public listed Portuguese Banks and the sovereign yield spread of a portuguese 10 year bond. The data for the portuguese banks refers to the daily share price of Banco Espirito Santo (BES.lS), Banco Comercial Portugues (BCP.LS), Banco Portugues de Investimento (BPI.LS) and BANIF. This data was obtained from Yahoo Finance. The data for the portuguese 10 year bond is obtained from the respective Bloomberg Index (GSPT10YR:IND).

The data refers to the period from the beginning of 2001 to the end of 2015. During those 14 years, the

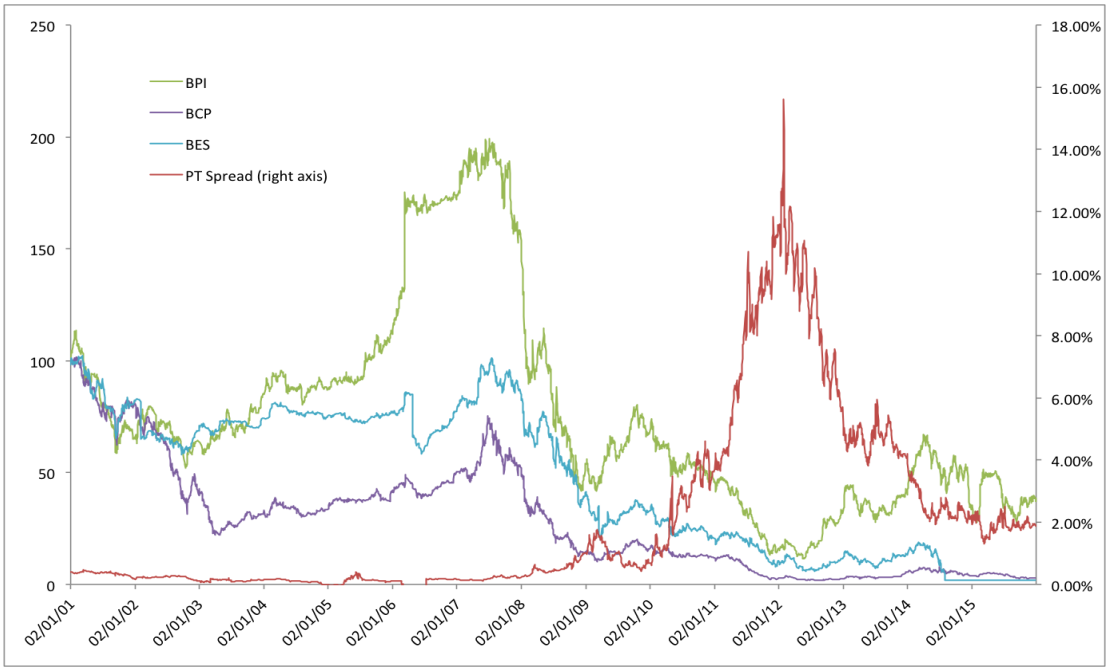

Figure 2: Evolution of Equity prices (Jan2001 = 100) and Portuguese sovereign bond yield spread (%)

4 Modelling

In this section I will build several econometric models that will incrementally add some more depth to the analysis and will work in turn as sensitive tests. The data set, covering approximately 15 years should provide space to different approaches while covering different economic moments (expansions, recessions, international events and local events).

4.1 A Naive Baseline Model

The first model is a naive formulation that will work as a preliminary exploration and as a baseline result. If my theoretical approach is correct, I should be able to find in a regression context the negative correlation mentioned between the Banks equity prices and the Portuguese Sovereign

bond yield. As I'm not interested in the levels of any of the variables, I will use the daily appreciation/depreciation of the individual prices of the three main banks and it's effects on the sovereign yields - the changes in the total yield.

Table 1:

	Dependent variable:	
	PT_var	
	default	robust
	(1)	(2)
Var_BCP	-0.513***	-0.513***
	(0.102)	(0.159)
Var_BES	-0.749***	-0.749***
	(0.097)	(0.149)
Var_BPI	-0.749***	-0.749***
	(0.118)	(0.162)
Constant	-0.0002	-0.0002
	(0.002)	(0.002)
Observations	3,535	3,535
R^2	0.094	0.094
Adjusted R^2	0.093	0.093
Residual Std. Error (df = 3531)	0.121	0.121
F Statistic (df = 3; 3531)	121.705***	121.705***
Note:	*p<0.1; **p<0.05; ***p<0.01	

The results from the first model are in line with what would be expected given my theoretical approach. For all the three banks Positive (negative) impacts in equity prices cause decreases (increases) in the sovereign yield. The results suggest that a 1% decrease in the equity prices of banks causes an increase of 4.7 to 8.6 basis points in the Portuguese bond yield. All this results are significant to the 1% level. Finally, but also relevant, the constant is statistically insignificant which is to be expected as the changes of yields are not expected to have a drift element.

4.2 A model of bad and good news

The first model is a naive formulation that will work as a preliminary exploration and as a bas

Table 2:

	Dependent variable:	
	PT_var	
	default	robust
	(1)	(2)
BCP_Negative	-0.316**	-0.316
	(0.156)	(0.276)
BCP_Positive	-0.615***	-0.615**
	(0.176)	(0.240)
BPI_Negative	-0.222	-0.222
	(0.179)	(0.220)
BPI_Positive	-1.264***	-1.264***
	(0.208)	(0.302)
BES_Negative	-1.381***	-1.381***
	(0.177)	(0.282)
BES_Positive	-0.397***	-0.397***
	(0.126)	(0.131)
Constant	-0.003	-0.003
	(0.003)	(0.004)
Observations	3,535	3,535
R^2	0.100	0.100
Adjusted R^2	0.098	0.098
Residual Std. Error (df = 3528)	0.121	0.121
F Statistic (df = 6; 3528)	65.310***	65.310***
Note:	*p<0.1; **p<0.05; ***p<0.01	

Table 3:

	Dependent variable:	
	PT_var	
	default	robust
	(1)	(2)
Lag1_BCP	-0.144	-0.144
	(0.107)	(0.127)
Lag2_BCP	0.125	0.125
	(0.107)	(0.120)
Lag1_BES	-0.340***	-0.340**
	(0.106)	(0.132)
Lag2_BES	0.079	0.079
	(0.113)	(0.135)
Lag1_BPI	-0.260**	-0.260*
	(0.124)	(0.147)
Lag2_BPI	-0.299**	-0.299**
	(0.125)	(0.150)
Constant	0.0004	0.0004
	(0.002)	(0.002)
Observations	3,532	3,532
R^2	0.014	0.014
Adjusted R^2	0.013	0.013
Residual Std. Error (df = 3525)	0.127	0.127
F Statistic (df = 6; 3525)	8.602***	8.602***
Note:	*p<0.1; **p<0.05; ***p<0.01	

4.3 A time series model

4.4 Forecast and a Profitable trading model

The following trading alghortim was implemented

1. With the information available at period t, estimate the model of the previous section by simple OLS.
2. Compute the t+1 forecast
3. If the forecast is of an increase in Yield short the Bond, if it is of a decrease go long the Bond
4. Check the actual realization of the yield at t+1

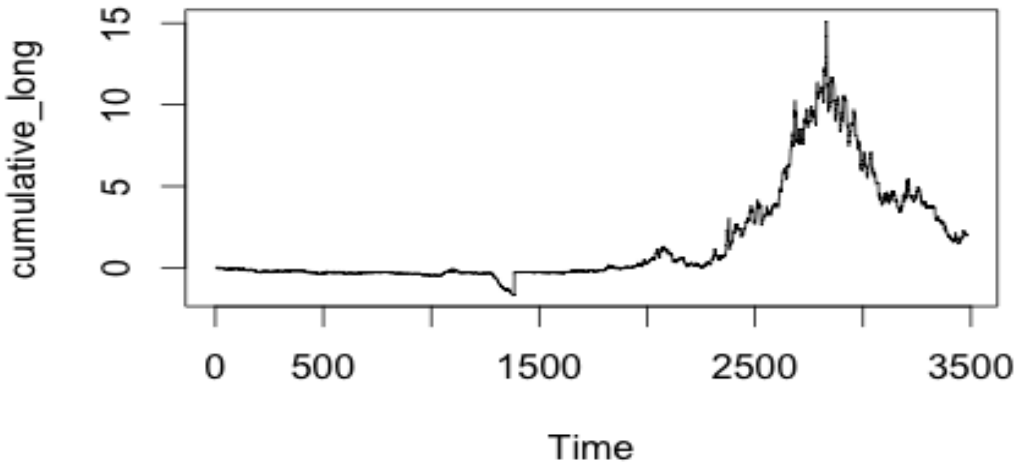

Figure 3: Evolution of Equity prices (Jan2001 = 100) and Portuguese sovereign bond yield spread (%)

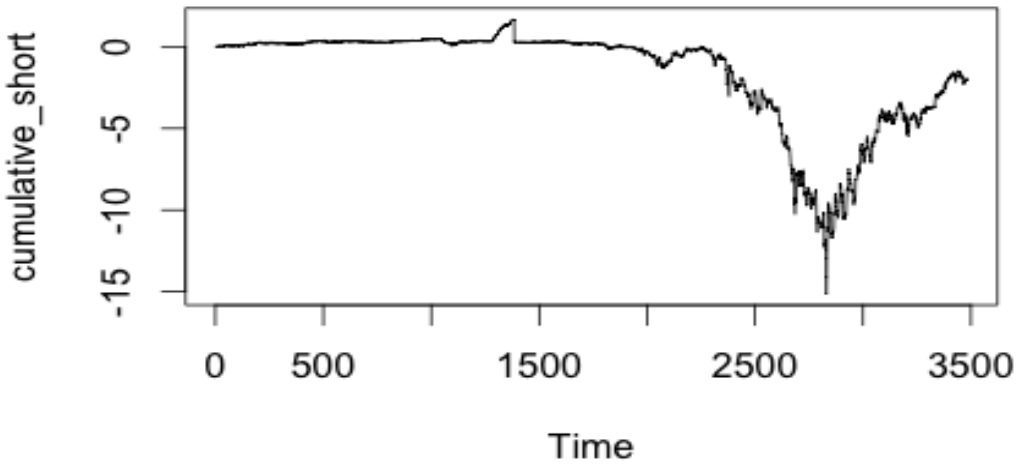

Figure 4: Evolution of Equity prices (Jan2001 = 100) and Portuguese sovereign bond yield spread (%)

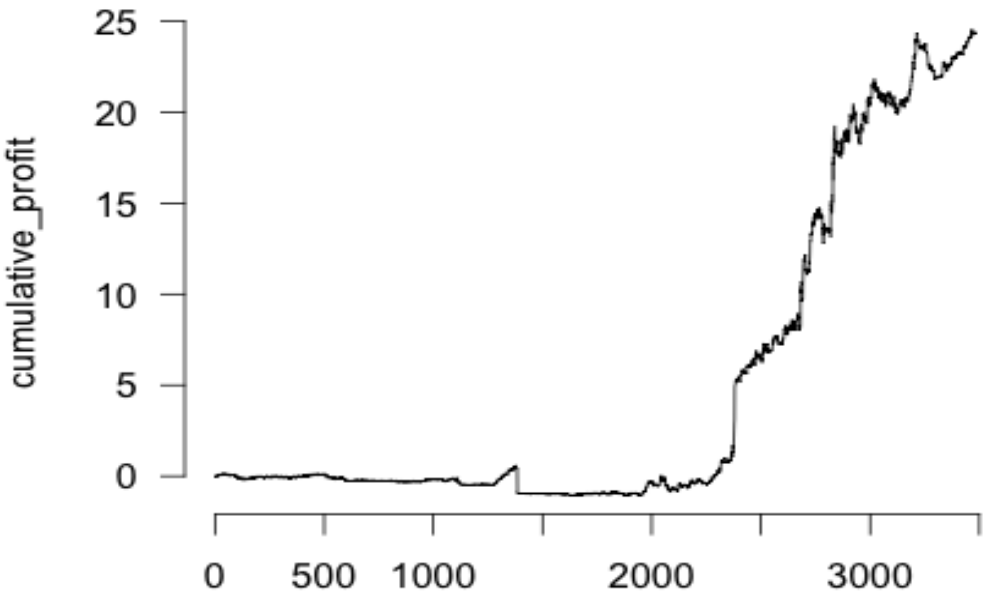

Figure 5: Evolution of Equity prices (Jan2001 = 100) and Portuguese sovereign bond yield spread (%)

5 Conclusion

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