Structural analysis of the eurozone banking system in the period of the sovereign debt crisis [1]

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Abstract:

The sovereign debt crisis, which hit Europe as a consequence of the 2008 crisis, had a very clear geographical delimitation, having affected mainly the southern economies. This fact rekindles the debate on the relationship between heterogeneous economic spaces, particularly regarding to the perspectives for reaching the balanced growth and reducing regional disparities in the context of an increasing process of financialization of the world economy. The aim of this study is to analyze the role of the banking system in defining the regional particularities of the European debt crisis. The analysis is based on the hypothesis that assets located or issued in peripheral regions/countries are subjected to a relatively higher liquidity preference, with negative effects on the pace of investment and, consequently, on the level of the regional economic growth. The methodology consists in a structural analysis balance sheet based. Banks are sorted out into classes of specialization, size and location, following a cluster analysis, for the periods before and after the 2008 crisis, in order to identify patterns of balance sheet. The results indicate evidence of distinct patterns of balance sheet linked to specifics geographical spaces, suggesting the need for a monetary policy with regional concerns.

Key words: Regional Development; Liquidity Preference; Banking System.

Área 6. Dinheiro, finanças internacionais e crescimento.

[1] This text presents some results of the postdoctoral research conducted at Leeds University – UK in 2016, sponsored by CAPES/Brazil.

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1 Introduction

Since the introduction of the single currency the economy in the Eurozone has faced at least two distinct phases. The first one, up to 2007, is characterized by a high liquidity, which boosted growth in the area, particularly regarding to the less developed economies. Nevertheless, the sub-prime crisis in 2008 had a negative impact on the European economies, resulting in the sovereign debt crisis, which affected mainly the economies of the so-called peripheral block. This fact rekindles the debate on the relationship between heterogeneous economic spaces, particularly regarding the perspectives for reaching the balanced growth and reducing regional disparities in the context of an increasing financialization of the word economy.

The uneven development has been object of many branches of the economic thought and many forces have been identified as taking part in this process, most of which linked to the real sector of the economy. Nevertheless, the process of financialization makes necessary to verify the extent to which strictly monetary dynamics take place in this process. Therefore, the proposal of this study is to assess the way by which both the structure and behavior of the banking system have determined the specific aspects of the crisis in the Eurozone, with special attention to its regional effects. The analysis is based on the hypothesis that assets located or issued in peripheral regions/countries are subjected to a relatively higher liquidity preference with negative effects on the pace of investment and economic growth.

The methodology consists in a structural analysis balance sheet based. Banks are sorted out into classes of specialization, size and location, following a cluster analysis, for the periods before and after the 2008 crisis, in order to identify patterns of balance sheet.
Doing so, it is expected to find evidence of distinct behavior or strategy of banks which could be assigned to geographical spaces with distinct level of centrality.

This study is divided in 4 sections, including this introduction. Section 2 points out some theoretical background. Section 3 presents the method, data and variables used. The main results are shown in section 4, with some concluding remarks in the final section.

2 Theoretical background

The international economy has been featured from the last decades by a dynamic growth largely determined by the financial sphere which, since then, has expanded its relevance quite consistently, in a process of increasing financialization (Epstein, 2005). In 2007 started in North American financial sector one of the most severe crises of the capitalism. Due the specific characteristics of financialization and financial liberalization process in that country the crisis, which arises in a very well defined geographical space, spreads rapidly not only across markets, but also between different territories.

From the perspective of the general equilibrium framework cyclical fluctuations, caused by external shocks, have instantaneous and proportional effect on the territory. In some of its extensions, some models assign the eventually differentiated impacts to the particularities of the regional productive structures or to the existence of market failures (More & Hill, 1982; De Fina and Carlino, 1997). Such models have the following characteristics: i) no active role is due to money in the determination of the employment and income (the money neutrality hypothesis); and ii) the fluctuations are caused by exogenous factors and their effects possibly differentiated in the territory are attributed to the existence of obstacles that, once removed, the system tends to the equilibrium.

Nevertheless, the credit boom evidenced by the 2008 crisis is not necessarily the result of a market failure but, as Chick *at al* (2013) points out, a consequence of the market interplay between supply (financial intermediaries trying to increase their market share) and demand (economic agents asking for finance in order to increase activities in speculative markets). The authors are actually referring to the Financial Instability Hypothesis of Minsky (1982) according to which the agents' financial position deteriorates naturally over the expansion phases. The deepening of this process leads at some moment to the reversal of expectations, particularly in the financial system, triggering the financial crisis.

Minsk's proposal is, however, a-spatial. It assumes implicitly that the cycle develops in a closed and homogeneous economy. According to Dymski (1998, p. 75), trade

imbalances and cross-border flows of factors must be taken into account, i.e., the financial fragility can be intensified by imbalances in the flows of savings and factors between regions. The possibility of raising a financial crisis, as well as the ability to react to that, depends not only on the economic cycle, but the success of that economy in mediating the tensions between the real and financial sectors inherent in economies with borders. Such mediation in turn depends on the way the banking system is structured in that region in order to contribute to channeling savings inflows and reserves to investment. The author argues that the differences between countries/regions concerning to the "boundary conditions" as well as to the structure of the banking sector imply a need for spatializing the FIH. Furthermore, the Minskyan cycle can be characterized as an increasing process of nominal appreciation over a given amount of existing real assets. Avoiding or mitigating this process depends on how well positioned is the economy for creating real assets, i.e., for transforming the resources inflow into new assets, rather than mere property rights. To do so, a structurally strong banking system is necessary: robust banks, well-established lender-borrower relationships, large reserves or retained earnings to serve as funds to expansion and to new initiatives. Conversely, one structurally weak banking system would be characterized by undercapitalized banks, deficient lender-borrower relationships and inadequate sources of funds.

A boom economy is featured by high inflows of resources (non-resident factors). When the domestic banking system fails in transforming this inflow into real assets a boom economy can be converted into a "bubble economy". The threat of capital flight becomes latent and it limits the scope for managing the difficulties. This view is consistent with the one presented in Chick *et. al.* (2013) where the authors use the term "functional bank" to describe the ability of the banking system in contributing to economic growth through an efficient transformation of existing savings into productive investment. More specifically, the authors highlight the role of local banks, or more broadly, a decentralized banking system, in financing small and medium local businesses.

Although, in its most advanced functions, the financial system tends to be increasingly a-spacial, the debt, specially that one that matters for the economic development, remains local (e.g., house-purchase, construction, real estate, industry, durables). The

"functional distance" matters. While an asset bubble is characterized by an overvaluation in asset prices in periods of economic expansion, the opposite occurs in recessions. Both movements tend to be wider with respect to assets located or issued in peripheral economies. That is considered by some authors as an implication of the liquidity preference which is, on average, greater for peripherals. For instance, Rodriguez-Fuentes & Dow (2003) analyze the regional impacts of the European monetary unification by focusing the credit market stability in different regions of Spain. Using panel data techniques and considering annual information for the period 1986-2001, they concluded that during periods of expansion the rate of credit growth in the poorest regions was 69% higher than in rich regions, while in the period of low growth it was 72% lower. The authors argue that these results support the post-Keynesian theory, which claims a greater instability of credit expansion in less developed regions along the business cycle. That pattern is explained by changes in liquidity preference over the cycle. The competition induces banks to increase its market share in the peripherals in periods of expansion, increasing preference for less liquid portfolios. As expectations, about the levels of risk and return, are formed over weaker bases in periphery, when a shift in the national income path is verified there is a drastic contraction of credit in the periphery. Therefore, the instability of the credit is not explained by structural differences in the real sector, but by changes in the behavior of actors in the financial system, which are influenced by the current monetary policy (Rodriguez-Fuentes & Dow, 2003, p. 977).

De Grawe (2012) presents some evidence that the financial agents' strategies contain a significant behavioral component that goes beyond of what could be expected from an analysis strictly based on fundamentals. In a study about the impact of the ECB decision in the middle 2012 of acting as a lender of last resort the author concluded that the risk assessment process of financial agents depressed the peripheral asset prices more than could be expected from the fundamentals theory.

Crocco *et al* (2005) links the regional liquidity preference to the concept of centrality. Centrality is a fundamental concept in the Central Place Theory (Christaller, 1966) which emphasizes that once a central function is provided by a central place it implies immediately that it cannot be provided by the complementary region (the periphery). As a greater centrality implies a greater supply of central goods, it is possible to assume

that this centrality will stimulate the diversification of both the industrial and the tertiary sector. Such a diversification would open new investment possibilities for banks as they could diversify their portfolio not only in terms of liquid and non-liquid assets, but also regarding to different types of real assets. According to the authors, the greater the centrality the lower the liquidity preference of financial and non financial agents. Consequently, both demand and supply of credit will be greater in central regions, implying cumulative process.

3 Methodology

The analysis carried out in this study consists basically in obtaining patterns of bank balance sheet trying to identify which kind of bank are correlated with each pettern. To do so, it makes use of a non hierarchical cluster technique based on some ratios calculated from the individual banks balance sheet. Banks are sorted out into classes of size, specialization and location. With respect to the specialization three types are considered: Commercial Banks, Cooperative Banks and Saving Banks. The classification by size is given by the volume of assets and follows the classification proposed by Mid-size Bank Coalition of America (2013), as follows:

- Super Large banks: assets > $250Bn;
- Large banks: $50Bn <=assets< $250Bn;
- Mid-size banks: $10Bn <=assets< 50Bn;
- Small banks: assets < $10Bn.

The analysis is conducted for two periods, 2007 and 2011, i.e., before and after the 2008 financial crisis. The year of 2011 is chosen because in the middle of 2012 the ECB acted as a Lender of Last Resort, implying changes on the set of incentives for the financial agents (De Grawe, 2012). Thus, up to the end of 2011, it can be considered as a period of institutional stability, particularly with respect to the monetary policy. The main source of data is Bankscope (Bureau van Dijk, 2016), which provides institutional and balance sheet data, and Eurostat (2016) for macroeconomic information (GDP and Balance of Payment data). Bankscope is said to have a good coverage, although some bias are identified, particularly with respect to small and local institutions which tends

to be underestimated (Bhattacharya, 2003). Moreover, due the existence of missing data, the samples for 2007 and 2011 comprise 482 and 604 observations, respectively, in a population of 3245 institutions (commercial, cooperative and savings banks).

For the cluster analysis a simplified bank balance sheet is proposed in Table 1. On the asset side a short term asset (Derivatives) is faced to a long term one (Loans); on the liability side a short term commitment (Deposits & Short Term Funding) is faced to a long term one (Long Term Funding). Each item is taken as a percentage of the balance sheet size, measured by the total assets (or total liabilities), resulting in the set of variables listed in Table 2.

It is considered that the analysis of the current financial market should goes beyond a theory of portifolio composition and take into account the investment as a tool of capital reproduction. It is important to notice that the set of variables proposed is based on that hypothesis and, doing so it could be taken as a proposal on how to capture moviments of the liquidity preference.

Table 1: Stylized bank balance-sheet

	Asset	**Liability**
Long term item	Loans	Long Term Funding
Short term item	Derivatives	Deposits & Short Term Funding
	Total Assets	**Total Liabilities**

Variables 1 (CPA) and 2 (DPA) indicate the share of assets of low and high liquidity, respectively, over the total asset. A high value of these indicators can be assigned to a low and a high Liquidity Preference, respectively. Variables 3 (LTL) and 4 (STL), as a percentage of Liability, refer to the quality of the liability, i.e., the greater the Long Term Funding and the lower the Short Term Funding more freely the bank can make use of its reserves (Crocco, 2012). Table 3 presents some directions for the clustering results interpretation.

Table 2: Variables definition

Variables
1) Loans as a percentage of Total Assets (CPA): Loans/Total assets;
2) Derivatives as a percentage of Total Assets (DPA): Derivatives/Total Assets;
3) Need for reserves maintenance (LTL): Long Term Funding/Total Liabilities;
4) Need for reserves (STL): Deposits & Short Term Funding /Total Liabilities;

Before performing the cluster analysis, it is necessary to consider scaling or transforming the variables, since variables with large variances tend to have a larger effect on the resulting clusters than variables with small variances. Therefore, the data used in this exercise are standardized with average equals zero and standard deviation equals one.

Table 3: Balance sheet classification

Balance sheet side	Relative value	Classification
Asset	CPA low; DPA high	Liquid
	The inverse	Iliquid
Liability	LTL low; STL high	Liquid
	The inverse	Iliquid

Considering those possibilities a non hierarchical cluster analysis technique (K means) is applied, allowing for four clusters. Finally, it is worth to emphasize that, as the variables are standardized, the level of liquidity must be taken in relative terms when comparing distinct clusters.

4 Results

4.1 Patters of balance sheet before (2007) and after (2011) the 2008 crisis

The aim of this exercise is to identify different patterns of balance sheet in a sample of

Commercial, Cooperative and Saving banks. As described in section 3, the cluster analysis makes use of variables that are expected to capture the Liquidity Preference of banks and non banking agents. The final cluster centers for both periods are shown in Table 4, which also informs the number of cases in each cluster. The most important variable to determine the clustering, given by F statistic, is Zscore(DPA) in 2007 and Zscore(LTL) in 2011. It is worth to notice that those variables are featured, respectively, by high and low liquidity level, which is consistent with the pre-2008 scenario of high liquidity and the liquidity shortage observed in the aftermath of the crisis.

Table 4: Final Cluster Centers – 2007 and 2011

Cluster	Period	Asset			Liability			nº of cases
		Zscore (DPA)	Zscore (CPA)	*DPA-CPA*	Zscore (STL)	Zscore (LTL)	*STL-LTL*	
1	**2007**	5.23	-1.85	***7.08***	-1.56	-0.2	***-1.36***	14
	2011	4.69	-1.67	***6.36***	-2.14	0.13	***-2.27***	21
2	**2007**	-0.16	0.64	***-0.8***	-0.1	-0.1	***0***	143
	2011	-0.09	0.43	***-0.52***	-1.02	1	***-2.02***	205
3	**2007**	-0.21	0.81	***-1.02***	-1.82	1.97	***-3.79***	261
	2011	-0.21	0.4	***-0.61***	0.07	-0.21	***0.28***	237
4	**2007**	0.22	-1.42	***1.64***	-0.82	0.29	***-1.11***	64
	2011	-0.14	0.78	***-0.92***	-2.18	2.57	***-4.75***	141

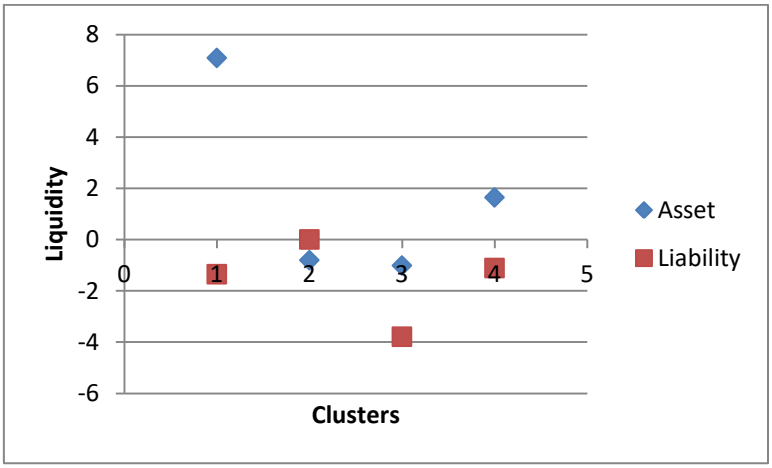
i) Source: Own calculation, using SPSS Statistics and Bankscope Database.
ii) All the variables are statistically significant and both clustering converge at the fourteenth iteration (see Appendix I).

Considering cluster 1 in 2007, the values of Zscore(DPA) and Zscore(CPA) are, respectively, high (5.23) and low (-1,85). The combination of these findings suggests that, in average, the balance sheet of the set of banks in that cluster presents a very liquid asset side. Actually, by providing the Euclidean Distance between the most and the less liquid items in each side of the balance sheet, i.e., by obtaining the difference between (Zscore(CPA)-Zscore(DPA)) and (Zscore(STL) - Zscore(LTL)) respectively, it is possible to assess the clusters balance sheet in terms of their relative liquidity.

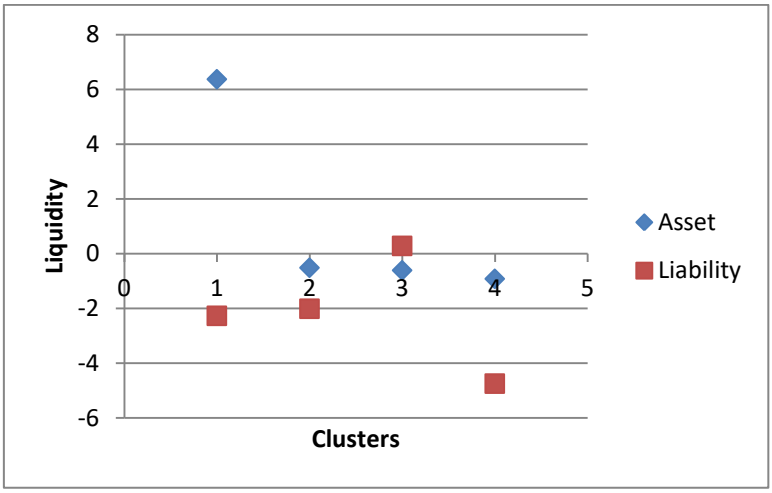
Graph 2 and 3 show those differences.

As it can be noticed in the graphs 1 and 2 clusters 1 and 4 are characterized by liquid asset and illiquid liability. On the other hand, clusters 3 in 2007 and cluster 4 in 2011 present the relatively most illiquid feature in both sides. Finally, cluster 2 seems to have the most balanced feature. Although the table and the graphs presented in this section allow a comparison between clusters and between the two sides of the same cluster, it is important to emphasize that, as the clusters membership might vary between the periods (see last column of Table 4), any comparison must be taken with reservation. Next section breaks down the clusters in order to specify the kind of institutions present into each of them.

Graph 2: Relative Liquidity – 2007



Graph 3: Relative Liquidity – 2011



4.2 Classes of banks: size, specialization and patterns of balance sheet

Different types of banks have a distinct role in the economic system. In terms of size, big banks tend to have a more decentralized strategy, as the opposite is verified with respect to the small banks. In other words, the former are more linked to the global financial market while the later have a more local acting. Table 5 starts to address this question by showing in percentage terms the share of distinct type of banks in some balance sheet items.

Table 5: Balance Sheet items – Share of each bank class and change (%) 2007/2011

Size Class		Assets	Deposits & Short Term funding	Loans
Super Large	**2007**	71.40	63.51	61.82
	2011	70.23	62.39	62.58
	Δ (%)	***-1.63***	***-1.77***	***1.24***
Large	**2007**	11.59	13.23	15.13
	2011	13.50	15.98	16.81
	Δ (%)	***16.42***	***20.84***	***11.05***
Mid-size	**2007**	9.04	11.80	12.36
	2011	8.86	11.35	11.51
	Δ (%)	***-2.08***	***-3.83***	***-6.88***
Small	**2007**	7.96	11.46	10.69
	2011	7.41	10.28	9.10
	Δ (%)	***-6.92***	***-10.30***	***-14.85***

Source: Own calculation from Bankscope database.

The first thing to notice in Table 5 is that, excepting Super Larger banks, all other classes have a more than proportional Loans to Assets ratio. A comparison between the periods shows that Small banks present the worse performance in all balance sheet items, followed by mid-size banks. The greatest performance is duo to Large banks, which increase their share in all items. Super Super Large banks present a slight

decreasing in Assets and Deposits & Short Term Funding, as well as a slight increasing in Loans.

Tables 6 and 7 show the composition of each cluster. Regarding to size, cluster 1 is composed basically by Super Large banks in both periods, while Small banks have the greatest share in cluster 3 in 2007 and in cluster 4 in 2011. As Graphs 3 and 4 show, cluster 1 is well characterized by a liquid asset and an illiquid liability, which is consistent with the finding that Super Large banks have a relatively lower share in total loans (Table 5). On the other hand, Cluster 3 in 2007 and Cluster 4 in 2011 present the same feature that is a low liquidity level, particularly regarding to the liabilities. Moreover, Cluster 1 is composed basically by Commercial banks, while Clusters 3 in 2007 and Cluster 4 in 2011 have a greater presence of Cooperatives banks.

Table 6: Cluster composition (%) – Size Class – 2007/2011

Cluster	Super Large		Large		Mid-size		Small	
	2007	2011	2007	2011	2007	2011	2007	2011
1	71.43	61.90	7.14	9.52	7.14	14.29	14.29	14.29
2	2.80	7.32	8.39	12.68	40.56	20.98	48.25	59.02
3	1.92	0.42	5.75	7.17	9.58	31.22	82.76	61.18
4	18.75	4.26	15.63	8.51	21.88	9.22	43.75	78.01

Source: Own calculation from Bankscope database.

Table 7: Cluster composition (%) – Specialization Class – 2007/2011

Cluster	Commercial		Cooperative		Saving	
	2007	2011	2007	2011	2007	2011
1	85.71	80.95	7.14	9.52	7.14	9.52
2	47.55	31.22	39.16	57.56	13.29	11.22
3	17.24	41.35	73.56	45.15	9.20	13.50
4	67.19	24.11	29.69	62.41	3.13	13.48

Source: Own calculation from Bankscope database.

Table 8: Classes of bank - Percentage change in the respective shares

	Size				Specialization		
	Super Large	**Large**	**Mid-size**	**Small**	**Com.**	**Coop.**	**Sav.**
2007	6.43	7.88	20.33	65.35	34.85	55.60	9.54
2011	5.79	9.44	22.02	62.75	35.26	52.15	12.58
Δ%	**-9.90**	**19.70**	**8.30**	**-3.99**	**1.18**	**-6.20**	**31.85**

Source: Own calculation from Bankscope database.

Finally, Table 8 presents the percentage change between the periods in respect to the banks' shares, by size and by specialization classes. It can be noticed that Large banks presents the greatest increasing, followed by mid-size ones. In the opposite way, Super large banks presents the greater decreasing, followed by Small banks, which means that the worse performance happens in the borders. Regarding to the specialization class, Cooperatives are the most affected, with a reduction of 6,2% in its share. Savings banks present a significant increasing and Commercial banks a slight increasing.

4.3 A regional analysis

This section introduces space into the analysis under the concepts of centre and periphery. The periphery is composed by the countries more deeply impacted by the recent financial crisis, which are: Spain, Portugal, Greece, Ireland and Italy. The set of countries that compose the centre are defined according to the Graph 1, which are: Germany, France, Luxembourg, Belgium, Nederland, Finland and Austria.

According to Table 9, in 2007 one can notice one cluster basically composed by central institutions (cluster 1), two clusters with predominance of peripheral institutions (clusters 3 and 4) and one cluster well distributed between the two regions (cluster 2). It can be seen that in 2011 that level of predominance is reduced, with banks from both regions increasing their share in clusters where they were less representative in 2007. This fact suggests a change of strategy, given by the changes in the respective balance sheet, as a reaction to the crisis.

Table 9: Spatial distribution of clusters (%)

Clusters	2007			2011		
	Centre	Periphery		Centre	Periphery	
1	85.7	14.3	100%	80.0	20.0	100%
2	47.9	52.1	100%	21.2	78.8	100%
3	5.9	94.1	100%	47.2	52.8	100%
4	8.0	92.0	100%	12.9	87.1	100%

Source: Own calculation from Bankscope database.

Considering its role for credit providing, mainly to small and local business, it is necessary to consider the case of small and mid-size banks. One could expect a homogeneous behavior in this set of banks in face of the crisis. However, what is shown in Table 10 is that central and peripheral institutions behave in a distinct way. In 2007 small and mid-size banks from central countries are basically in cluster 2 and those from peripheral countries are mainly in cluster 3. According to Graphs 3 and 4, the balance sheet of cluster 2, particularly in respect to its liability side, is sensibly more liquid than the one for cluster 3. The comparison between periods revels that central institutions keep the same feature but the peripheral ones increase their share in clusters with more liquid balance sheet, which can be understood as an increasing of the liquidity preference both of banks and non financial agents located in peripheral regions.

Table 10: Distribution of small & mid-size banks (%)

Clusters	2007		2011	
	Centre	Periphery	Centre	Periphery
1	1.3	0.7	0.8	1.2
2	66.2	17.8	19.5	38.7
3	13.0	74.3	69.5	28.3
4	19.5	7.2	10.2	31.8
Total	**100%**	**100%**	**100%**	**100%**

Source: Own calculation from Bankscope database.

5 Concluding remarks

The results of this study are still rather preliminary and must be deeper explored. Nevertheless, the analysis suggests that a structural difference exists in regarding to the European Monetary Union banking system. These differences can imply a leak of income towards central countries as long as their banks are responsible for providing the most liquid assets. This feature might imply loose of capital in periods of crisis given by a higher degree of volatility in peripheral assets.

These finds reinforce the need for an alternative economic policy guideline. For instance, one of these proposals includes the separation of the retail banks from the rest of financial system so that it could focus on its main business which is lending to non financial sector. Another measure consists in making more democratic the decision making process referring to the activities of the ECB. Particularly, should be considered the directly lending to governments on the primary bond market by the ECB in order to compensate the intrinsic trend towards uneven development given by the way the EU banking system is structured.

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