

Prioritizing Solutions of Sovereign Debt Default in PIIGS

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Abstract

The global economic recession in 2008 triggered an eruption of Europe sovereign debt defaults in Portugal, Italy, Ireland, Greece, and Spain (PIIGS), and these defaults originated from a social welfare expense burden and sovereign debt rollover. In this paper, we detect methods for eliminating the European sovereign debt crisis via the Delphi technique and the Analytic Hierarchy Process. Suggestions from experts include, respectively, “actively lessening government fiscal deficit,” “lowering the sovereign debt of PIIGS,” and “strengthening the fiscal structure of Eurozone countries.” The empirical results correspond with the actual actions of the EMU, especially the reimbursement constraints on PIIGS by the European Central Bank. It is concluded that improving the nation’s fiscal structure is important, and the feasible ways to do so include reducing social welfare expense, levying more taxes on the middle class, and improving the quality of labor. Especially, enhancing a nation’s debt-credit ratio could increase solvency.

Keywords: sovereign debt default, PIIGS, debt burden

JEL Codes: E50, E60, F33, F34

1. Introduction

Since the US subprime mortgage crisis in 2008, global economic depression speeded up the eruption of European sovereign default. Several European countries faced the collapse of their financial institutions, notably Iceland's banking system, and this issue spread to Greece, Ireland, and Portugal. Many Eurozone countries could not afford large sovereign debts and current account deficits. In addition, rising unemployment depressed the economy and reduced competitiveness, threatening the expulsion of Portugal, Ireland, Greece, and Spain (hereafter, PIIGS) from the Eurozone. In PIIGS, raising inflation, vast fiscal deficits, and debt burdens, sharply deteriorated their economy. The failure of the PIIGS governments to pay back debt in full resulted in sovereign debt defaults. These debt defaults caused panic among other member countries, hurting the rest of Europe even more.

Our motivations come from the stylized facts in the aftermath of European sovereign default. Based on the literature on this topic and judgements from experts, we conclude several possible main methods to eliminate sovereign debt default in PIIGS. Applying the Analytic Hierarchy Process (hereafter, the AHP) to extract weights and the relative importance of causes, we look forward to proposing useful suggestions. We aim at finding out the prominent factors to prevent the eruption of sovereign debt default once again. The outstanding results of this paper are our empirical results correspond with the actual actions of the EMU, especially the reimbursement constraints on PIIGS by the European Central Bank. It is concluded that improving the nation’s fiscal structure is important, and the feasible ways to do so include reducing social welfare expense, levying more taxes on the middle class, and improving the quality of labor. Especially, enhancing a nation’s debt-credit ratio could increase solvency.

First, we introduce the evolution of the Eurodollar and provide the background of the eruption of European sovereign debt default.

1.1 *The European Economic Community (EEC)*

After World War II, the varied international environment drove economic integration among countries. In 1957, the Treaty of Rome was signed by the founding members: Belgium, France, Italy, Luxembourg, the Netherlands, and West Germany. The resulting organizations were called the European Economic Community (EEC) and the

European Atomic Energy Community (EAEC). They were aimed toward overcoming trade barriers, and allowing free movement of goods, services, and people within the EEC.

1.2 The Economic and Monetary Union (EMU)

The Economic and Monetary Union (EMU) represented a major step in EU economic integration. Launched in 1992, the EMU involved the coordination of economic and fiscal policies, union monetary policy, and union currency (i.e. the euro). While all 28 EU member states took part in the economic union, some countries took integration further and adopted the euro. Together, these countries made up the euro area.

1.3 Treaty on European Union

The Treaty on EU (TEU) is one of the primary European Union treaties along with the treaty on the functioning of the European Union. The TEU set out general principles of the purpose of the EU, the governance of its central institutions, and the rules related to external, foreign, and security policies.

1.4 European Monetary System (EMS)

The European Monetary System (EMS) was established in 1979. After the Bretton Woods system was established in 1971, most of the EEC countries agreed to maintain a stable exchange rate. Preventing exchange rate fluctuations of more than 2.25%, the European "currency snake," most nations of the EEC linked their currencies to prevent large fluctuations relative to one another. The system was replaced by the EMS in 1979, and the European Currency Unit (ECU) was defined. Because of the relative strength of the Deutsche Mark, and the low-inflation policies of the German Bundesbank, all other currencies were forced to follow its lead. Eventually, it was one of the primary forces behind the drive to monetary union (ultimately the euro).

1.5 European Sovereign Debt Crisis

A sovereign debt default is the failure of a government to pay back its debt. Since late 2009, several Eurozone members have been unable to repay government debt in full or have bailed out over-indebted banks under their national supervision without the assistance of third parties such as other Eurozone countries, the European Central Bank (ECB), or the International Monetary Fund (IMF).

Causes of the sovereign debt crisis vary. The debt crisis had an adverse impact on the labor market and threatened the Eurozone economy as well as the entire European Union. In Greece and Spain, the unemployment rates rose up to as high as 27%.

Here, we apply the AHP to measure priority scales through pairwise comparisons, relying on the judgements of experts, and conclude the main possible causes of the sovereign debt default crisis in PIIGS.

2. Literature Review

Literature on the sovereign debt default can be divided into several categories, listed as follows:

2.1 Debating Origins of the European Sovereign Debt Default

If countries in the same region adopt a monetary union policy, but the monetary policy and fiscal policies are not concurrent, then the official union money will not operate well (Rogoff, 2002). In addition, loss of a nation's own monetary policy might result in a significant disadvantage in being a member of a monetary union (Overtveldt, 2011). Member countries in a union have various economic backgrounds, so a union money policy might be not appropriate for every country. In the case of some member countries, the union policy might be too harsh, but it may be too easy for others. This may result in inflation and increased deficits. Therefore, the main cause of European sovereign debt default might be adopting a monetary union policy with no corresponding union fiscal policy.

2.2 Arguing the Eurozone Imbalance

Overtveldt (2011) emphasized five interrelated imbalances in the wake of the Great Recession around late 2009. These imbalances included separately high current account deficits, asset price bubbles with credit over-expansion, fiscal deficits, debt burden, and loss of competitiveness against corresponding trade partners in some countries.

The origins of these imbalances are separately, (1) Credit over-expansion raising inflation and most loans sourced from mortgages, inducing housing bubbles. (2) Member countries in the EU, because of the lowering of tariffs and the union of the official money in this region, made efficient reciprocal transactions and became closer to each other. However, credit expansion and the huge debt burden in EU had hurt EU countries and the rest of Europe.

Hence, as a currency union (i.e., one currency) without a fiscal union (e.g., different tax and public pension rules), the Eurozone design easily reached a crisis state. However, the flexibility of the responses from authorities was limited (De Grauwe, 2011; 2013; De Grauwe and Ji, 2013; Kopf, C., 2011; Calvo, 1988; Eichengreen et al., 2005).

We use “union fiscal policy in Eurozone countries” as a sub-criteria for eliminating European sovereign debt default. Other sub-criteria include “strengthening the fiscal structure of Eurozone countries” and “increasing the competitiveness of Eurozone countries” based on the fact that if some countries are less competitive, this slows their overall economic growth.

2.3 Discussing the Influence of the Great Recession in 2008 on European Sovereign Debt

Some causes of the sovereign debt crisis include the Great Recession of 2008-2012, the real estate market crisis, and asset price bubbles in several countries.

The Debt-to-GDP ratio in PIIGS rose above 60 percent, resulting in higher default risk. Banks lost confidence in PIIGS's willingness to pay and refused to roll over existing debts, causing PIIGS to face an insolvency crisis. Large-scale financial support from the IMF was an attempt to avert default in Greece, Ireland, and Portugal and to impose austerity measures on them. Austerity measures were designed to slow down the growth of public sector debt, implying a government spending reduction and tax revenue increases or both. To obtain loan agreements, these countries should comply with the austerity measures. However, austerity programs were implemented inefficiently.

The interior economic problems of PIIGS included the following:

1. Economic downgrades, the aged-population problem, lower production, and sticky systems in Portugal and Italy. Significant labor emigration reinforced the aged-population problem, further weakening the labor force and lessening economic growth.
2. In Greece, the main cause of the crisis was debt burden. The Debt-to-GDP ratio in Greece was 175 percent by 2012, the highest in the world. The Debt-to-GDP ratio reduction and budget cutting could avert the sovereign debt default. Government budget deficits could be reduced through spending cuts and tax increases.
3. In Spain, the contributing causes of the sovereign debt crisis included problems

Resulting from interdependence among real estate, the banking system, and local debt. In a large part of Spain, bank loans were real estate mortgages, and one of Spain's main sources of the crisis was the housing bubble. The housing bubbles in Spain induced a banking crisis, worsening local debt, which turned into sovereign debt.

In conclusion, Ireland and Spain should focus on eliminating the real estate bubbles, and Portugal and Italy should both emphasize economic improvement and increasing employment. PIIGS needs to enforce social welfare to raise the economic level of these populations.

Many developed countries have economies immersed in debt. Debt payback ability depends on economic growth, industrial competitiveness, trade surpluses, and government taxation. Obviously, PIIGS were not qualified in regard to these indicators (Davies and Green, 2010).

We conclude that debt default can be avoided via specific criteria: “raising the nation's debt-credit ratio,” “actively lessening government fiscal deficit,” and “lowering the sovereign debt of PIIGS.”

2.4 Eliminating the Sovereign Debt Crisis with Social Welfare Improvement

European countries were overloaded with huge social welfare expenses, and because of employee's dependence on social welfare subsidies, it was difficult to reduce unemployment. The optimal allocation of welfare and resources could sustain a stable economy. In northern Europe, the social welfare system operated well, but this was not the case in southern Europe.

According to the literature, we summarize key factors related to eliminating sovereign debt default in PIIGS and classify them into four main criteria and twelve sub-criteria. The four main criteria are, separately, “reducing imbalance in Eurozone countries,” “reducing the negative influence of common global factors,” “enforcement of the nation's own policies,” and “lowering sovereign debt default risks.” Each main criteria has three sub-criteria.

3. Empirical Methods

Our procedure follows two stages. In the first stage, the Delphi technique is applied to choose the initial criteria, combined with the judgements of experts to detect the main causes of sovereign debt default in PIIGS. In the second stage, we use analyses of the first stage as the foundation of the AHP to extract the weights of the criteria.

3.1 First Stage- the Delphi Technique

The Delphi technique is a communication method, an interactive forecasting method relying on experts’ answers to questionnaires. The facilitator designs a questionnaire that is sent to a group of experts and summarizes the results after the questionnaire is returned. Then, the facilitator develops a new questionnaire for the respondent group based on the results, and experts answer questionnaires in two or more additional rounds. A communication process is structures, and the process is effective in allowing experts to revise their earlier answers based on the replies of others in this group. The facilitator provides an anonymized summary of the experts’ forecasts from the previous round at each round. During this process, the number of answers will decrease, and the experts will converge towards the “correct” answer. After a predefined stop criterion, the process is stopped, and the mean scores of the final rounds determine the results (Linstone and Turoff, 1975).

3.2 Second Stage- the Analytic Hierarchy Process (AHP)

The AHP measures priority scales through pairwise comparisons and relies on the judgements of experts. Because the characteristics of the AHP are evaluating the weights of each criteria, the results of questionnaires must depend on priority scales to extract whether one important criteria dominates another with respect to a given attribute. In the case of decision-making, decision alternatives comprise many criteria and sub-criteria. Because the criteria may be intangible, it might be not easy to weigh the priorities of the alternatives to obtain their rankings. The questionnaires are designed as pairwise comparisons for the convenience of calculating weights, and we also test the consistency. Hence, the foundation of second stage is the AHP.

Decision making involves many intangibles. Therefore, we apply measurement through pairwise comparisons and judgements from experts to derive priority scales. The scales measure intangibles in relative terms through a scale of absolute judgements by comparing one criteria with another to determine which one is dominant with respect to a given attribute.

Because judgements may be inconsistent, it’s important to measure inconsistency and improve their degree of consistency. The relative importance between two criteria is numerically scaled from 1 to 9, where a range from 5 to 9 indicates the proper results (Miller, 1965). The relative scores are shown on Table 1.

Table 1. Relative Scores

Value	Interpretation	Value of a_{jk}
1	Equal Importance	(1,1,2)
2	Between	(1,2,3)
3	Weak Importance	(2,3,4)
4	Between	(3,4,5)
5	Essential Importance	(4,5,6)
6	Between	(5,6,7)
7	Very Strong Importance	(6,7,8)
8	Between	(7,8,9)
9	Absolute Importance	(8,9,9)

Source: Miller (1965)

The procedure for evaluating the methods intended to eliminate the negative impact of the US QE policies on Taiwan is as follows:

Step 1: Checking the consistency

When we perform pairwise comparisons, inconsistencies may typically easily appear. It’s necessary to check the consistency via the Consistency Index (C.I.). Satty (1980, 1990, 2008) proposed checking consistency using both the Consistency Index (C.I.) and the Consistency Ratio (C.R.). The consistency index is defined as follows:

$$CI = \frac{\lambda^k_{max} - N}{N - 1} \tag{1}$$

CI : Consistency Index

λ^k_{max} : the maximum eigenvalue of Matrix \tilde{A}

N: the number of evaluation criteria considered

The random index (RI) is defined as the consistency index of a randomly generated reciprocal matrix, which is in a scale ranging from 1 to 9 with the reciprocals forced for each matrix size. Table 2 provides the values for the random index. The consistency ratio, $C.R. = C.I./R.I.$, where $C.R.<0.1$ represents that the inconsistencies are tolerable, and a reliable result may be expected from the AHP. Otherwise, this must be revised and adjusted

accordingly.

Table 2. Random Index

Matrix order	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI.	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.48	1.56	1.57	1.59

Source: Satty (1990)

Step 2: Structuring of the hierarchy

The hierarchy from top to bottom with the decision goal, followed respectively with the intermediate levels to the lowest level, with objectives from a broad perspective. To get a perfectly consistent comparison judgment and perform pairwise comparison more easily, the number of elements in each level should be less than 7.

Step 3: Design an answer questionnaire for experts

We designed the questionnaires as a pairwise comparison, synthesizing the responses received from the experts. Form a pairwise comparison matrix as follows:

Step 4: Form a square matrix of pair-wise comparison matrix, $\tilde{A} = [\tilde{a}_{ij}]$

Synthesizing pair-wise comparison responses to form a square matrix of pair-wise comparisons, where $\tilde{A} \cdot \tilde{A}$ is positive, and it is reciprocal if the paired comparison judgment is perfectly consistent. That is,

$$\tilde{a}_{ij} = \frac{1}{\tilde{a}_{ji}}, \forall i, j = 1, 2 \dots n$$

In matrix \tilde{A} , each entry a_{ij} represents the importance of the *i*th criterion relative to the *j*th criterion. If $a_{ij} < 1$ then the *i*th criterion is less important than the *j*th criterion; otherwise, the *i*th criterion is more important than the *j*th criterion if $a_{ij} > 1$. $a_{ij} = 1$ if two criteria have the same importance.

$$\tilde{A} = [\tilde{a}_{ij}], \tilde{A} : \text{a square matrix of pair-wise comparison, } \tilde{a}_{ij} = (l_{ij}, m_{ij}, u_{ij}).$$

Step 5 : Synthesize judgements

Using the geometrical mean average method to synthesize judgements by experts, the equation is as follows:

$$\tilde{a}_{ij} = (\tilde{a}_{ij}^1 \otimes \tilde{a}_{ij}^2 \otimes \dots \otimes \tilde{a}_{ij}^n)^{\frac{1}{n}} \tag{2}$$

\tilde{a}_{ij}^n : “judgement of \tilde{a}_{ij} ” from the *N*th expert

Step 6 : Computing the vector of criteria weights

We use the geometrical mean average method to weight the criteria. In this way, we can also obtain normalization.

$$r_i = (\tilde{a}_{i1} \otimes \tilde{a}_{i2} \otimes \dots \otimes \tilde{a}_{in})^{\frac{1}{n}} \tag{3}$$

$$\tilde{w}_i = r_i \otimes (r_1 \oplus r_2 \oplus \dots \oplus r_n)^{-1} \tag{4}$$

r_i : geometrical mean in matrix \tilde{A}

\tilde{w}_i : weights of each row in the reciprocal matrix

Step 7: Eliminate intangibles

To optimize each criterion, we have to eliminate intangibles. The advantages of adopting DF_{ij} are objectivity and the fact that the experts’ preferences can be ignored.

$$DF_{ij} = \frac{a + b + c}{3} \tag{5}$$

A, b, and c are the upper value u_{ij} , middle value m_{ij} , and lower value l_{ij} , separately.

Step 8: Normalization

To compare the importance of various criteria, we normalize the weights.

$$NW_i = \frac{DF_{ij}}{\sum DF_{ij}} \quad (6)$$

Step 9: The final priorities

Use the priorities obtained from the comparisons to weigh the criteria in the level immediately below. Do this for each element in the level below, and add its weight to obtain this overall priority. By continuing to weigh and add, we can obtain the final priorities of the alternatives in the bottom level.

From steps 1 to 8, we get NW_i and NW_{ij} , and the final priorities of the alternatives in the bottom level, as follows:

$$NW_j = NW_i \times NW_{ij} . \quad (7)$$

4. Empirical Results

First, we constructed the questionnaires using the Delphi technique and analyzed the judgements from the experts, where the evaluation standards are averages that should be larger than 3 and where the coefficients of variation should be less than 0.5. In the first round, we issued 90 questionnaires, returning 70 effective questionnaires, and the response rate was 77.78%. We issued the questionnaires to 21 professors, 49 experts in financial institutions, for which the percentages were, respectively, 30% and 70%. In the second round, the questionnaires were constructed in the AHP. We issued 90 questionnaires, returning 69 effective questionnaires, for which the response rate was 76.67%. We issued questionnaires to 21 professors and 48 experts in financial institutions, for which the percentages were, respectively, 30.43% and 69.57%¹.

4.1 Results of the Questionnaires Using the Delphi Technique

We synthesized the received responses for the pairwise comparison and used the geometrical mean average method to weigh the determination of those factors, corresponding to both the major criteria and the sub-criteria. Through ranking, we chose the top 8 factors as the main possible methods to eliminate sovereign debt default.

Measurement standards: the averages are greater than 3, and the coefficient of variation is smaller than 0.5. The results of the questionnaires are shown in Table 3. If the result is 0, this indicates that the experts had consistent opinions. Otherwise, X indicates that they expressed different opinions.

The 8 items of possible causes selected using the Delphi technique are shown in Table 3. Their coefficient variations are all smaller 0.5, representing consistency in the experts' opinions. For the next step, we designed the questionnaire using the AHP method, structured as four criteria and 8 sub-criteria.

4.2 Results of Questionnaire in AHP Method

Since the judgements of the experts reached consistency, we created a pairwise comparison matrix, evaluating the weights of each criteria. The results are shown in Table 4 and Table 5.

As for the criteria of methods for eliminating sovereign debt default in PIIGS, "lowering the sovereign debt default risks (0.50)" was shown to be the most important, and then, sequentially "enforcing the nation's own policies (0.20)," "reducing the negative influence of common global factors (0.16)," and "diminishing the imbalances in Eurozone countries (0.14)."

As for the sub-criteria, the top 5 are, in order, "actively lowering the government's fiscal deficit (0.31)," "lowering the sovereign debt of PIIGS (0.18)," "strengthening the fiscal structure of Eurozone countries (0.12)," "lessening the negative impact of the QE policy in the US and Europe (0.10)," "lowering unemployment to increase economic growth (Portugal, Italy) (0.10)," and "social welfare revolution (0.08)."

¹Those professors come from college of management in several universities of Taiwan. And experts in financial institutions, almost belonging to Dept. of market analysis in securities companies and banks, cover research fellows, certified investment analysts, and investment advisors.

The results of the AHP are shown in Table 6, where we examine the consistency using CI and CR., showing the (C.R.) and (C.R.H.) of the returned questionnaire were all smaller than 0.1, representing the overall consistency of the judgements from experts.

Table 3. Results for causes chosen using the Delphi technique

Item	Option	Average	Coefficient of Variation	Result
1	Diminishing external shocks (oil price)	3.3	0.20	O
2	Lessening the negative impact from the QE policy in the US and Europe	3.1	0.21	O
3	Union fiscal policy in Eurozone countries	4.3	0.14	O
4	Strengthening the fiscal structure of Eurozone countries	4.7	0.10	O
5	Lowering the sovereign debt of PIIGS	3.7	0.18	O
6	Actively lowering government fiscal deficit	4.5	0.11	O
7	Lowering unemployment to trigger economic growth (Portugal, Italy)	4.8	0.09	O
8	Social welfare revolution	3.6	0.19	O

Table 4. Weight of major criteria and sub- criteria for eliminating sovereign debt default in PIIGS

Goal	weight			Option	weight		
	lower	Medium	upper		lower	medium	upper
Reducing the negative influence on global common factors	0.52	0.82	1.14	Diminishing external shocks (oil price)	1.00	1.30	1.69
				Lessening the negative impact from the QE policy in the US and Europe	1.51	2.04	2.47
Diminishing the imbalance of Eurozone countries	0.57	0.77	1.07	Union fiscal policy in Eurozone countries	0.77	0.92	1.12
				Strengthening the fiscal structure of Eurozone countries	2.02	2.41	2.76
Lowering the sovereign debt default risks	1.46	2.04	2.63	Lowering the sovereign debt of PIIGS	0.94	1.24	1.64
				Actively lessening government fiscal deficit	1.64	2.10	2.44
Enforcing the nation's own policies	0.62	0.79	1.16	Lowering unemployment to trigger economic growth (Portugal, Italy)	1.41	1.94	2.45
				Social welfare revolution	0.97	1.41	1.82

Table 5. Relative weight and ranking

Goal	Weight	Option	Weight	Eliminate Intangibles	Ranking
Reducing the negative influence on global common factors	0.16	Diminishing external shocks (oil price)	0.38	0.06	7
		Lessening the negative impact of the QE policy in the US and Europe	0.63	0.10	4
Diminishing the imbalance of Eurozone countries	0.14	Union fiscal policy in Eurozone countries	0.29	0.05	8
		Strengthening the fiscal structure of Eurozone countries	0.71	0.12	3
Lowering the sovereign debt default risks	0.50	Lowering sovereign debt of PIIGS	0.37	0.18	2
		Actively lessening government fiscal deficit	0.63	0.31	1
Enforcing the nation's own policies	0.20	Lowering unemployment to trigger economic growth (Portugal, Italy)	0.56	0.10	4
		Social welfare revolution	0.44	0.08	6

Table 6. Checking of Consistency Index and Consistency Ratio

	C.I.	Qualified	C.R.	Qualified
Reducing the negative influence of common global factors	0.001	YES	0.001	YES
Diminishing the imbalance of Eurozone countries	0.005	YES	0.01	YES
Lowering sovereign debt default risks	0.001	YES	0.001	YES
Enforcing the nation's own policies	0.02	YES	0.05	YES
Overall consistency	C.R.H.=0.02 <0.1 , satisfying the overall consistency			

From the results of the questionnaire, we find main possible methods by which to reduce the sovereign debt default risk are, respectively, “actively lessening government fiscal deficit,” “lowering the sovereign debt of PIIGS,” and “strengthening the fiscal structure of Eurozone countries.”

The high social welfare expenses in PIIGS and rolling over of debt, the fiscal deficit became worse, and the Debt-to-GDP ratio became higher.

As for “actively lowering government fiscal deficit,” Eurozone countries could try to reduce social welfare expenses, thus lowering residents’ reliance on social subsidies, deferring the retiring age, and improving the aged-population problem and labor supply problems. Also, levying more taxes from the middle class would further raise the nation’s GDP because richer people would consume more with their after-tax income.

“Lowering the sovereign debt of PIIGS” would reduce social welfare expenses and further increase government revenue and solvency.

Furthermore, “actively lowering government fiscal deficit” and “lowering sovereign debt of PIIGS” would raise the nation’s debt-credit ratio, thus improving solvency.

5. Conclusions

Using the Analytic Hierarchy Process (AHP) to measure priority scales through pairwise comparisons and the judgements of experts, we summarized the main possible causes of the sovereign debt default crisis in PIIGS.

Based on the literature, we designed a questionnaire and set up the research process to assess the main possible methods by which to eliminate sovereign debt default in PIIGS. We also synthesized the judgements of experts and weighed the criteria.

Our conclusions can be summarized as follows: 1. in regard to all main criteria, the experts stress on “lowering the sovereign debt default risks.” 2. In all sub-criteria, the experts emphasize “actively lessening government fiscal deficit,” “lowering the sovereign debt of PIIGS” and “strengthening the fiscal structure of Eurozone countries.”

The score for “lowering sovereign debt default risks” is the highest, as shown in Table 5, where two of its sub-criteria rank at the top, thus revealing its importance. Our empirical results correspond with actual actions of EMU, especially the reimbursement constraints on PIIGS by the ECB. The AHP revealed the importance of strengthening the fiscal structure of Eurozone countries. We expect our conclusions to offer useful suggestions to reduce the risk of sovereign debt default.

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