European Research Studies,
Volume XVI, Issue (1), 2013

pp. 41-66

The Clusters of Economic Similarities between EU Countries: A View Under Recent Financial and Debt Crisis

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Abstract:
This article analyzes the clusters of similarities among EU member states before and during the recent financial and debt crisis, using variables from banking, taxation, government debt and deficit, and the Current Account of the Balance of Payment; our study follows the method of Multi-Sample Case of Cluster Analysis between and within groups of EU countries. Our findings show that the current economic crisis the EU is faced with is two-faceted and has arisen from the financial and banking sectors and from government debt. In this sense, problems have resulted from the credit policies of the national banking sectors and from national fiscal and budgetary controls. These two crisis facets are correlated and a new problem emerges concerning the fiscal similarities of European Monetary Union (EMU) countries and the necessity for a fiscal union or for common fiscal policies between them. The aim of this article is to help us understand that the current EU crisis is due to the lack of homogeneity in fiscal and financial polishes across the Union.

Key Words:
EMU, taxation, banking, government debt, crisis

JEL Classification: H1; H2; H6; H8;

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1. Introduction

Herman Van Rompuy argues that "the Eurozone will in the near future most probably retain its unique character of a monetary union in which fiscal policy remains in the hands of the Member States. The overall goal, therefore, has to be to make Member States more mindful of their responsibilities towards themselves and the other members of the club. The action —or lack of action— of one affects all." (*European View*, 2010).

On the other hand, Stuckler *et al.* (2010) advocate that reducing government deficits is, in principle, simple - cut costs or free up money. Governments should always spend money efficiently, but there are also at least five ways to increase their finances. One short-term measure is the sale of government assets (i.e. privatization); alternatively, governments can stimulate the economy by increasing the money supply; a third option is to borrow more money; a fourth option is to increase taxes; the final option, adopted by any government, is to cut public spending.

Before the debt crisis started the spread of each EU country, 10 years government bond against Germans correspondently, are not strongly correlated with index government debt to GDP. According to Simone Manganelli and Guido Wolswijk (2009), in the run-up to the European Economic and Monetary Union (EMU), interest rate spreads of the euro-area 10-year government bonds against the German benchmark have declined dramatically. The decline reflected mainly the introduction of the euro and the subsequent removal of exchange rate risks. However, developments in spreads after that are more puzzling. Developments in the fiscal positions of euro-area governments seem, at first sight, to offer only a limited explanation for this. In the work of Codogno, Favero and Missale (2003), movements in yield differentials on euro-zone government bonds are mostly explained by changes in international risk factors, as measured by US swap and corporate bond spreads relative to the US Treasury yields. These international factors affect spreads because they change the perceived default risk of government bonds in the euro zone. Liquidity factors play a less significant role, though. The impact of international risk on yield differentials in Austria, Italy and Spain, is explained by their debt-to-GDP ratios relative to Germany. Default risk explains a substantial part of changes in yield spreads in Italy and Spain. Yield differentials for all the other countries are also significantly affected by international risk factors, although independently from debt-to-GDP ratios. This suggests that bonds issued by these countries are viewed as imperfect substitutes of German bonds for reasons not related to their debt ratios. International risk may have an impact because of differences in liquidity but also because of unobservable fundamentals, such as the reputation of the issuing government, or because of greater uncertainty of future budget surpluses. Greater trading volumes significantly reduce yield differentials in

France, Greece, the Netherlands and Spain, while other traditional indicators, such as bid-ask spreads, have no effect. Even in such countries, however, international risk-related factors appear the main source of variation in yield differentials. France is the only country where liquidity matters more than international risk. Finland and Ireland, the two countries with the lowest debt-to-GDP ratio, also show no reaction to international risk factors. Yields on euro-zone government bonds have been increasingly correlated across issuers. This is a sign of enhanced integration that is explained by the common denomination in euro. However, additional policy steps to increase financial market integration by means of increased efficiency both in primary and secondary markets, although desirable, would not deliver a 'seamless' bond market in the euro area.

The risk of default, though small, remains an important factor explaining movements in yield differentials. This evidence points to incomplete fiscal consolidation and to the need for further convergence of debt-to-GDP ratios. In this process, yield differentials would be important policy indicators, as they would signal market perception of fiscal vulnerability. Furthermore, since higher bond yields imply higher debt service costs, yield differentials reflecting default risk impose market discipline on fiscal policies of the national governments within the euro zone. Although such a role now appears somewhat reduced compared to the pre-EMU period, also because of the limited changes currently observed in budget deficits, it is likely that the risk component of bond yields would continue to work as a deterrent for irresponsible fiscal policies if such policies were ever implemented.

Wyplosz (2006) notes that, policy-makers went on building the monetary union by paying limited attention to academic views, largely because academic research could not keep up with the speed at which decisions were made. Another reason was that the adoption of a common currency was, first and foremost, a political project with political imperatives. In particular, the whole project rested on Germany's willingness to give up its currency. Having accepted to share a currency with countries whose monetary record was far from stellar, Germany's request for formal and precise guarantees could not be turned down. Europe's economic performance, especially in the three largest euro-area countries, is highly disappointing. Two decades of slow growth and stubbornly high unemployment have generated massive frustrations. Economists are steeped in the fine distinction between monetary and structural matters. The public at large, many politicians and policy-makers are not in agreement and, as the rejection of the draft constitution has shown, many are ready to blame Europe in general, and the monetary union in particular, for the hardship that they face. This is a very serious threat to European institutions. A transparent and accountable monetary union will not bring instant illumination, but it may help diffuse dangerous misunderstandings between citizens and Europe.

Philip R. Lane and Gian Maria Milesi-Ferretti (2007) have stressed that the growth in trade and financial linkages between Europe and the rest of the world means that the spillover impact of a contraction in the US deficit and Asian surpluses on Europe is now larger than 20 years ago. The scale of global integration in trade and finance remains limited, and the exposure of Europe to external shocks should not be overstated. However, with increasing levels of global economic integration, even the determination of domestically orientated policies must take into account international factors. Indeed, a major motivation for structural reforms is to boost the flexibility of European economies so as to improve their capacity to cope with globalization and swings in the external environment. The exposure of Europe to the dollar, while non-negligible, is much smaller than the exposure of emerging Asia and Japan.

A real effective depreciation of the dollar occurs primarily vis-à-vis the largest creditor countries and regions –emerging Asia, Japan, and oil exporters– the consequences for Europe in general, and the euro area in particular, would not be large. Clearly, the risks for Europe are much more significant if creditor country currencies, many of which closely track the US dollar, fail to adjust, so that at least in the short term a weakening of the dollar would imply a substantial real effective appreciation for Europe and the euro area. In turn, this could have strong negative repercussions on economic activity, underscoring the importance of policy measures that help sustain output and demand.

While there is substantial variation in the extent of trade and financial linkages between individual European countries and the United States and Asia, the scale of such linkages is limited even for the most exposed countries (with the possible exception of Ireland). If this shift were to be accompanied by a less benign international financial environment, characterized by higher spreads on debtor countries and less bountiful capital flows, some countries in Central and Eastern Europe may be forced to undergo a sharp adjustment in their external accounts.

In the work of Hodson Dermot (2010), the financial crisis got real for the euro-area, with falling investment and the slump in world trade weighing on the real economy and causing the worst recession of modern times. Thalassinos, Liapis and Thalassinos (2011) have analysed the regulation framework for the banking sector during the crisis pointing out the role of the rating companies in this development. The recession bore all the hallmarks of a symmetric shock with asymmetric effects, with all member states being affected, though some were paying a higher price than others for their exposure to global trade, toxic assets and bursting property bubbles. The response of euro-area authorities to these developments was predictable in some respects and surprising in others. In the monetary sphere, the European Central Bank's (ECB) cautious response to interest rate cuts was true to form for a central bank with an overriding interest in price stability - although it moved fairly rapidly

once the inflationary pressures of 2008 subsided. The Bank proved less reticent than anticipated about embracing unconventional monetary policies, although its covered bond scheme to provide emergency credit to euro-area banks was modest in scale and less ambitious than the actions of other central banks. In the financial sphere, the blueprint of the de Larosière Report's for the future of prudential supervision in the EU, was surprisingly supranational, calling as it did for the creation of new community bodies to prevent a recurrence of the excessive risk taking that precipitated the financial crisis. The member states' response to these plans was predictably intergovernmental, seeking as it did to limit the powers of the Community in general and the ECB in particular. In the fiscal sphere, the Stability and Growth Pact proved to be surprisingly resilient in 2009. The European Commission and Ecofin prosecuted all member states that posted budget deficits in excess of 3 per cent in spite of the exceptional nature of the crisis. Greece has been hit the hardest by these sanctions as EU authorities have sought, with limited success thus far, to reassure markets that a sovereign default is not inevitable. In the sphere of external relations, 2009 was a year in which EU Member states found their voice on the world stage. Although they did not always say the same thing, Member states did pursue their collective interests, driving the agenda that led to the landmark summit of the G20 in London and putting up a fairly united front at the summit itself. If the EU was the winner from this exercise, then the euro-area may have been the loser insofar as the Eurogroup President was effectively sidelined in the G20's important discussions on the future of global governance.

Holger (2010) notes that unsustainable public debt low competitiveness and high current account deficits are major problems for the so-called PIIGS countries (Portugal, Ireland, Italy, Greece, Spain). Thalassinos, Liapis and Thalassinos (2013) argued that PIIGS have been affected strongly by the CRAs through their rating during the credit crisis. These countries experienced consumer price and wage inflation above the euro-area average in the first decade of the euro, basically fuelled by buoyant capital inflows. The resulting real appreciation against low-inflation countries led to a deterioration in their competitiveness, but rigid labour markets now prevent a quick market-based readjustment of real wages to the changed situation. Thus, both public expenditure cuts and structural labour market reforms are urgent to reduce the likelihood of a euro-area break-up.

Following the above, our article is focused on the presentation of similarities between EU countries according to fundamental economic variables, like bank sector health, taxation structure and performance, balance of payments, gross wage earnings and government debt and deficit. The action —or lack of it— from the countries involved, have created the framework of present day crisis.

Our article starts in section 2 with a presentation of the European Union (EU) and the European Monetary Union (EMU). The timeline of EMU integration is showed

and the current situation is presented. In section 3, the method of analysis and the data used are discussed. Section 4 presents the main figures related to European banking and the similarities between individual country banking sectors. This is followed by the structure of tax revenues in EU countries; the similarities between individual countries' tax regime structure and burden on gross wage earnings; the performance of each country's tax regime and the similarities between individual country performance in section 5; in section 6, the EU intra country trade and payments and the similarities between individual countries' current account of balance of payment are produced; section 7 presents the Government debt and budget net year lending (deficit), as well as similarities between individual countries' Government debt and deficit. Using the above analysis, section 8 focuses on the similarities which are produced when following all the above components as criteria. The EU and EMU seem to comprise large clusters of countries sharing common characteristics.

According to the work of Peeters (2009, 2010, 2011), Schwarz (2007), Smith and Webb (2001), Munin (2011), and Navez (2012), the tax system applied in a country has a serious impact on cross-country competiveness, something that, in turn, impinges strongly on the actual economy of common markets such as the European Union (EU) and the differences among tax regimes diversifies homogeneity. From the other hand the mobility of productive factors is directly related with country tax-regime differences, government budget funding from tax revenues and rates are the main fiscal policy tools. Thalassinos, Maditinos and Paschalidis (2012) have argued about the effect of the insider trading in the stock exchange affecting the performance of listed companies in the Athens Stock Exchange.

We argue that there are significant differences among the tax regimes of EU countries and that no policy has been implemented to ensure tax homogeneity across the EU, nor is there any likelihood of such. The anarchy in fiscal policy is an obstacle for the European Integration. Budget deficits have an impact on taxation and countries, invariably, manage the recent debt crisis by selecting different taxes as fiscal policy tools.

Our article shows that the type and the level of economic growth affects the structure of taxes at work and alters the performance of different types of taxes; is also wishes to explain the factors that differentiate tax regimes by using multi dimensional criteria and thus contribute to the debate for a common tax regime between EU countries. It presents, also, the groups of EU countries with similar tax regimes and analyzes the characteristics of structure among applied tax regimes and thus contributes to debate which type of tax regime is more suitable as a common tax regime.

According to Stuckler *et al*. (2010), taxing the rich is a policy based to increase taxes against the recent financial crisis and carries a considerable populist appeal (as many hold those involved with the bank system responsible for the crisis and believe they should pay its price, though this happened only in the case of Ireland and not in other PIIGS countries).

A key problem with the current debt crisis is public spending is increased less than decreased tax revenue. However, Wilkes (2009) argues that taxing bonuses and high incomes may stifle incentives for entrepreneurship and innovation. Enforcing a more progressive tax system is politically challenging in light of the lobbying strength of the wealthy, but may most directly address the current debt crisis. While more progressive taxation is a less viable option in countries with already highly progressive systems, like Sweden, there is scope for raising revenues in the UK, Greece and other EU countries. In fact, the current governments of EU countries have adopted a quite different approach, increasing VAT — a regressive indirect tax whose burden falls disproportionately on the poor.

There are also some simple, albeit politically difficult, changes that would bring the corporate taxation in line with other countries, to yield very large sums for continued government spending. In many countries, like Ireland, the economic development policy is based on a low corporate tax and, thus, it is difficult for this tax to be in line for all EU countries. Increasing taxes on alcohol, tobacco and sugary drinks further could represent viable revenue-generating options, benefiting both health and the economy. In the short run, these options may disproportionately hurt the poor (although there are disputes about the net effect on their overall welfare), and Keynesian economists worry that such taxes will diminish aggregate demand and slow down recovery. Thus, in Roosevelt's New Deal, prohibition on alcohol was lifted not only because drinking was popular, but mainly because it would reinvigorate consumer spending and increase tax revenues. The health costs of this aspect of New Deal policy (and, in turn, subsequent downstream costs) were never assessed. Further limitations include the scope for tax evasion due to imports from other EU countries, as well as smuggling of goods such as cigarettes, an activity in which the tobacco industry has been complicit. Another option is the proposed Tobin Tax, which would take a very small percentage of capital flows. This could generate significant revenue, but would require agreement and implementation by all major countries to be effective. Finally, the excessive use of taxes against crisis causes social dissatisfaction, and, especially in the case of Greece, nobody knows whether this policy is suitable and can bring the desired effects.

In our article the tax regimes of EU countries are analyzed in the following parts in order to present the current situation and to find the structure, the trends and the similarities among applied tax regimes. Our work, also, examines the

implementation fair and unfair taxes and the adequacy of each countries tax system and legislation.

2. The European Union (EU) and the European Monetary Union EMU

Based on the work of John H. Rogers (2007) and John Goddard *et al.* (2007), the present study will describe the environment established by the European Monetary Union (EMU) and the main accounting and other quantitative figures for the EU banking sector as follows:

European Monetary Union integration timeline

The European Monetary Union was established in 1957. The timeline for economic integration has progressed as follows:

1957	The Treaty of Rome establishes customs unions.
1970s	An informal joint float of several European currencies is instituted versus the dollar (called "the snake").
1979	The European Monetary System creates a formal network of mutually pegged exchange rates (France, Germany, Italy, Denmark, Ireland, Luxemburg, and Netherlands).
1986	The Single European Act ("Europe 1992") is established, which eventually facilitates the full development of the internal market, removing internal barriers to trade and to the movement of capital and labour.
1991	Specified convergence criteria for EMU admission are developed, along with calls for the harmonisation of social policy ("stage 2" to begin 1/94).
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1989-92	Spain (1989), Britain (1990), Portugal (1992) join the EMS; Italy and Britain leave after the 9/92 crisis over the harmonisation of the value-added tax (VAT); the internal market is fully developed.
1997	The Stability & Growth Pact specifies medium-term budgetary objectives for the EMU.
1998	EMU members include Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxemburg, Netherlands, Portugal, and Spain.
1999	The Euro is launched along with a single monetary policy for the entire EMU (set by the ECB); all monetary policy actions and most large-denomination private payments are completed in Euros. National currencies are "irrevocably fixed" but continue to circulate for a 3-year transition period.
2001	Expansion of the EMU; Greece joins
2007	Expansion of the EMU; Slovenia joins
2008	Expansion of the EMU; Cyprus and Malta join
2009	Expansion of the EMU; Slovakia joins
2011	Expansion of the EMU; Estonia joins

The current situation

Economic growth had resumed in most countries by the 4th quarter of 2009. The main exceptions were the Baltic States, Greece, Iceland, Ireland, Portugal and Spain. Most developing countries have experienced a return to pre-recession growth rates,

but growth rates in developed countries are generally below trend, and unemployment rates continue to rise. From January 2010 to the present, twelve member states in the Eurozone have experienced public debt ratios higher than 60% of GDP. Particular concern developed in early 2010 regarding the fiscal sustainability of the economies of the PIIGS countries following rating downgrades by the credit rating agencies and a dramatically increase of spreads and Credit Default Swaps (CDS) of their government's bond. In May 2010, the Eurozone governments and the IMF made €110 billion available to Greece. Also, the Eurozone launched its €600bn European Financial Stability Facility during that period, and the European Central Bank launched its Securities Markets Program. In November 2010, an agreement was reached regarding an EU/IMF Ireland rescue package of €90 billion for Ireland. Beginning in December 2010, the European Central Bank bought Portuguese and Irish bonds. In April 2011, Portugal was integrated into the European Financial Stability Facility with a rescue package of approximately €80 billion. Nowadays the above amount for the financial stability of Greece proves to be unrealistic and a new round of discussions has started.

3. The method of our analysis and the data.

The method

The aim of our study is to present similarities among EU countries, thus we gathered a collection of samples, for critical economic variables, in order to group the samples into homogeneous groups of EU countries. The most suitable method for our analysis is the Single sample case and Multi sample case of Cluster analysis (Mardia *et al.*, 1979). In our analysis, we used the Multi sample problem of Cluster analysis:

Let $x_{ij}, i = 1, \ldots, n_j$, be the observation in the jth samples, j=1, 2,…,m. The aim of cluster analysis is to group the m samples into g homogeneous classes where g is unknown, $g \leq m$.

The clustering methods are optimization partitioning techniques since the clusters are formed by optimizing a clustering criterion. According to these hierarchical methods, once an object is allocated to a group, it cannot be reallocated as g decreases, unlike the optimization techniques. The end product of these techniques is a tree diagram (Dendrogram).

In our study, we used the max similarities within groups and min similarities between groups as hierarchal methods.

These techniques operate on a matrix of distances $\boldsymbol{D} = (\boldsymbol{d_{ij}})$ between the points $\mathbf{x_1}, \cdots, \mathbf{x_n}$ rather than the points themselves.
We used two choices for the distant matrix:

Euclidian distance $\boldsymbol{d_{ij}^2} = \sum_{k=1}^{p}(\boldsymbol{x_{ik}} - \boldsymbol{x_{jk}})^2 = \left|\boldsymbol{x_i} - \boldsymbol{x_j}\right|^2$ (1)
Where X be an (n x p) data matrix

Karl Pearson distance $\boldsymbol{d_{ij}^2} = \sum_{k=1}^{p} \frac{(\boldsymbol{x_{ik}} - \boldsymbol{x_{jk}})^2}{\boldsymbol{s_k^2}}$ (2)

Where: $\boldsymbol{s_k^2}$ is the variance of kth's variable.

The data matrix
The sources of our data are: ECB Structural indicators for the EU banking sector January 2010 and Key tables from OECD 2010. The EU countries used are: Austria, Belgium, Denmark, Finland, France, Germany Greece Italy, Ireland, Luxembourg, Netherlands, Portugal, Spain, Sweden and UK. Cases j=15. The variables which are used for the production of similarities between countries are separated in the following components:

For the Banking Sector, the variables Number of Banks, Assets of Banks, Branches of Banks, and Employees, for the years 1985, 1995, 2004, 2008 and the variable of Economic Leverage which is defined as Bank's Assets to GDP for the year 2008. For Tax regime structure and burden, tax revenues from income, profits and capital gains, Revenues to cover the charges for social security, Property tax and Taxes on goods and services; also, for the burden of taxation, the variables – indexes income tax and for social security on the Gross wage earnings, and Gross wage earnings per EU country. Tax regime performance: the variables – indexes, taxes to GDP, for total revenue of taxes, property tax, corporate tax, taxes on personal income, taxes on goods and services, social security and for the years 2002 to 2009. EU countries' intra trade and payments: the variable – index, Current Account of Balance of Payments to GDP and for the years 2002 to 2008. Government debt and deficit: the variable – index, Government debt and budget net year lending (deficit) to GDP and Gross Domestic Product and for the years 2002 to 2009. Variables p=72.

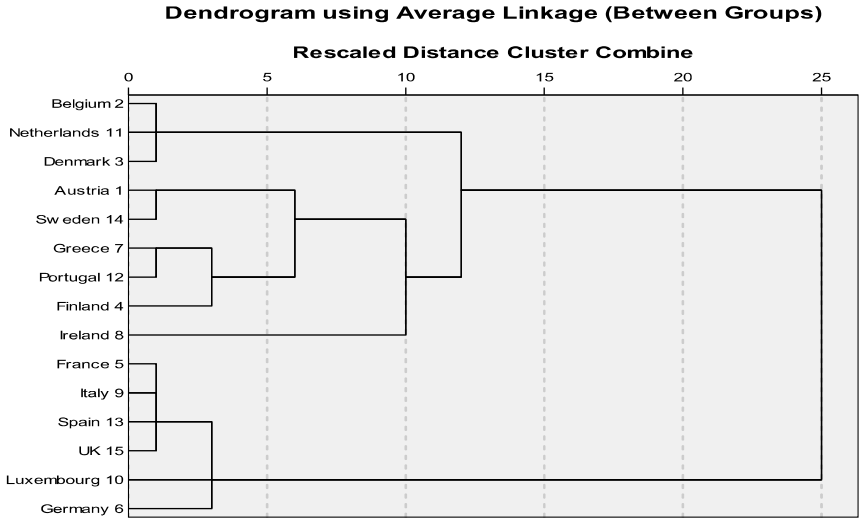
4. The main figures related to European banking: similarities between individual countries' banking sector

The evolution of the key financial figures for the European banking industry from 2005 to 2008 is presented in Table 1. Observations crucial to our analysis are immediately evident from Table 1:

a. The assets in the European banking sector seriously expanded during this time.
b. During the period from 2004 to 2008, bank assets expanded significantly in Spain (123%), Greece (101%) and Ireland (96%).
c. Regarding Greece, it should be noted that the increase in bank assets was mainly due to their expansion into Eastern Europe, Asia and Africa. For that reason, private debt has remained quite low.
d. The number of banks and the number of branches has remained considerably stable.
e. The total number of employees in the European banking sector has remained stable, denoting a remarkable increase in productivity.

The data for Dendrogram 1 indicate the similarities between the banking sectors of several European countries based on hierarchical cluster analysis using all available methods, including Pearson correlation and Euclidian distances.

Dendrogram 1: Similarities among countries using the Banking Figures 1985 -2008



The main conclusions according to the resulting Dendrogram (Karl Pearson Correlation method, average linkage between groups) are as follows:

a. There are two large groups, one comprising large countries like France, Germany, the UK, Italy, and Spain plus Luxembourg, and another group comprising all other countries, including Austria, Belgium, Denmark, Finland, Greece, the Netherlands, Portugal and Sweden.
b. Ireland remains in an uncertain position; based on the within-group analysis, it belongs to the first group, but based on the between-groups analysis, it belongs

to the second.

c. The subgroup within the first group includes France, the UK, Italy and Spain, whereas Luxembourg and Germany stand alone.

d. There are three subgroups within the second group: the Netherlands, Belgium and Denmark; Austria and Sweden; Greece and Portugal. Finland stands alone.

Table 1: Timeline of main figures for the banking industries in the first 15 EU Countries (1985-2008)

	Number of banks				Assets (billion euro)				Number of branches				Employees ('000s)			
Country	1985	1995	2004	2008	1985	1995	2004	2008	1985	1995	2004	2008	1985	1995	2004	2008
EMU countries																
Austria	1406	1041	796	803	–	–	635	1068	–	–	4360	4243	–	–	73	79
Belgium	120	143	104	105	286	589	914	1272	8207	7668	4837	4316	71	77	71	65
Denmark	259	202	202	171	96	126	607	1092	3411	2215	2021	2192	52	47	44	53
Finland	498	381	364	357	–	–	212	384	–	1612	1585	1672	–	31	25	26
France	1952	1469	897	728	1349	2514	4415	7225	25,782	26,606	26,370	39,634	449	408	425	492
Germany	4739	3785	2148	1989	1495	3584	6584	7875	39,925	44,012	45,505	39,531	591	724	712	686
Greece	41	53	62	66	69	94	230	462	1815	2417	3403	4095	27	54	59	66
Ireland	42	56	80	501	21	46	722	1412	–	808	909	895	–	–	36	41
Italy	1101	970	801	818	547	1070	2276	3628	13,033	20,839	30,946	34,139	319	337	337	340
Luxemb.	177	220	169	152	170	445	695	932	120	224	253	229	10	19	23	27
Netherl.	178	102	461	302	227	650	1678	2235	6868	6729	3649	3421	92	111	115	116
Portugal	226	233	200	175	38	116	345	482	1494	3401	5408	6391	59	60	53	62
Spain	364	506	346	362	311	696	1717	3831	32,503	36,405	40,621	46,065	244	249	246	276
Other EU countries																
Sweden	598	249	222	182	–	–	583	900	–	–	2018	2025	–	–	39	50

UK	772	564	413	391	1294	2000	6970	8840	2,224	17,522	13,386	12,514	350	383	511	496

Sources: ECB Structural indicators for the EU banking sector January 2010,

Table 2: Year 2008 bank's assets to GDP

European Country	Economic Leverage
Austria	450
Belgium	451
Denmark	705
Finland	268
France	461
Germany	361
Greece	191
Ireland	1043
Italy	255
Luxembourg	2979
Netherlands	444
Portugal	255
Spain	355
Sweden	346
UK	547

Source: OECD, ECB (2010)

The ratio of a quasi economic leverage for the banking sector could be measured by the formula:

$$Lev_{econ} = 100 * \frac{Total\ Bank's\ Assets}{Gross\ Domestic\ Product}$$

According to the estimations for the above index for each EU country, the lowest value occurs for Greece and the biggest value occurs for Ireland. Luxembourg is a financial centre for EU countries. The above index has to be examined in comparison with government debt index as a total index of debt for an economy. Taking into account the above mentioned for the Greek economy, we argue that the private debt is minimal or the private sector of the economy is very small. Two other countries, Italy and Portugal, have very small index prices. Economies with big prices in the above index, like Ireland, Denmark and Luxemburg, are more vulnerable to financial crises. To the exception of Ireland, the other PIIGS countries don't have any significant problems as a result of credit expansion in their Banks. These matters give the opportunity in these countries to finance their private sector, after a serious increase of their bank's capital, in order to aid economic development, which is necessary under the recent crisis. This ratio is used from our

study as the first component towards finding the total similarity between EU countries and to surveying suitable policies against crisis.

5. The structure of tax revenues in EU countries; similarities among individual countries' tax regime structure and burden.

The tax regime of any EU country is the other part of our research. Using OECD data, we first examined the similarities between countries using the structure of tax revenues. The tax revenues are analysed in four categories; firstly revenues from income, profits and capital gains, secondly revenues to cover the charges for social security, thirdly revenues from property tax and finally the indirect taxes which are charged on goods and services.

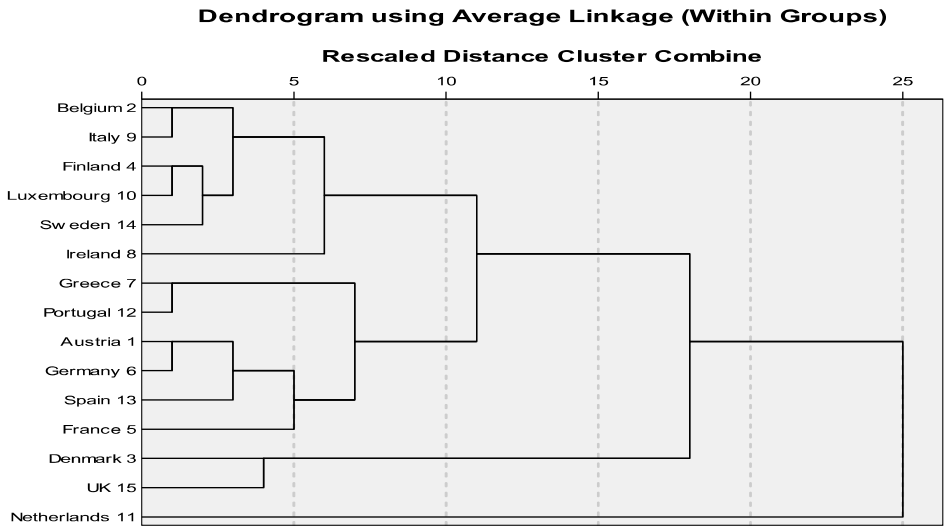
Table 3 presents the structure of tax revenues in EU countries for 2009. The countries with less and greater involvement in any tax revenue are, respectively, France and Denmark, for tax on income, profits and capital gains; Denmark and Spain for revenues to cover charges for social security; Austria and UK for property tax; finally Portugal and Spain for indirect taxes. Using the Karl Pearson Correlation Test and average linkage within groups, Dendrogram 2 presents the clusters of similarities between countries using the structure of tax revenues. Notable groups of countries are: first Belgium and Italy, Greece and Portugal, Germany and Austria, Finland and Sweden. The other countries are left alone.

Table 3: Year 2009: the structure of tax revenues in EU countries

European Country	Income, profits, capital gains	Social security	Property	Goods and services
Austria	27,93	34,89	1,27	28,07
Belgium	35,91	33,39	4,72	25,17
Denmark	61,30	2,05	3,93	31,86
Finland	35,90	29,79	2,58	31,44
France	20,75	39,25	8,15	24,94
Germany	28,82	38,80	2,29	29,65
Greece	25,11	34,07	4,55	35,91
Ireland	35,80	19,79	8,22	34,94
Italy	32,57	31,77	6,22	24,38
Luxembourg	35,29	30,10	6,61	27,76
Netherlands	-	-	-	-
Portugal	26,32	32,74	3,63	36,60
Spain	29,98	39,44	6,36	23,27
Sweden	35,15	24,44	2,35	29,09
UK	38,45	19,74	12,32	28,99

Source: OECD (2010), statistics, and authors calculations

Dendrogram 2: Similarities among countries using the structure of tax revenues



We then examined the burden of taxation on income tax and for social security on the Gross wage earnings per EU countries. Table 4 presents, for 2009, the burden of taxation and the gross wage earnings per EU countries. Using Euclidian Distance and average linkage between groups, Dendrogram 3 shows the clusters of similarities between countries using the burden of taxation and gross wage earnings. Notable groups of countries are: first Belgium and Ireland, Greece and France, Spain and Italy, Finland and Sweden, Austria and Denmark. The remaining countries stand alone. The lower gross wage is in Portugal and the higher in Netherlands.

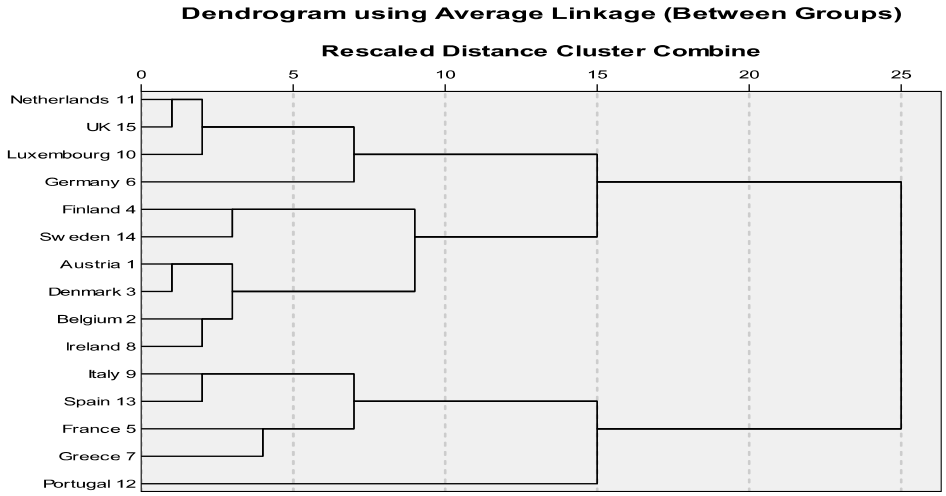
Table 4: Year 2009: The burden of taxation and the gross wage earnings per EU countries

European Country	Total payment % Gross Wage Earnings	Income tax % Gross Wage Earnings	Social security contributions % Gross Wage Earnings	Gross wage earnings
Austria	32,75	14,69	18,06	44.881,10
Belgium	41,51	27,54	13,98	43.556,69
Denmark	39,37	29,09	10,28	44.439,01
Finland	29,17	22,86	6,31	39.582,08
France	27,74	14,04	13,70	36.068,14
Germany	41,32	20,70	20,63	47.882,21
Greece	25,07	9,07	16,00	33.994,29
Ireland	20,90	14,24	6,67	42.461,22
Italy	29,33	19,84	9,49	30.807,82
Luxembourg	26,37	14,16	12,21	52.320,62
Netherlands	31,76	16,59	15,17	51.336,15

Portugal	22,28	11,28	11,00	24.921,03
Spain	19,68	13,33	6,35	31.856,10
Sweden	25,31	18,30	7,01	38.160,92
UK	25,30	16,16	9,14	51.018,21

Source: OECD (2010), Statistics, and authors calculations

Dendrogram 3: Similarities among countries using the burden of taxation and gross wage earnings



A major question emerges regarding the performance of any taxation as a percentage of each country's GDP. Table 5 presents total tax revenue as a percentage of GDP for EU countries. The countries with less and greater involvement in tax revenue are, respectively, Ireland and Denmark. Using Euclidian Distance and average linkage between groups, Dendrogram 4 presents the cluster of similarities between countries using performance of each tax as mentioned in part 3 (for example Income tax, Property tax etc.), and for years 2002 to 2009, as % of GDP- in order to take into account the volatility of performance. Notable groups of countries are: Spain and Ireland, Greece and Portugal, Austria and Italy, Finland and Sweden and Belgium, Germany and Netherlands. The remaining countries stand alone.

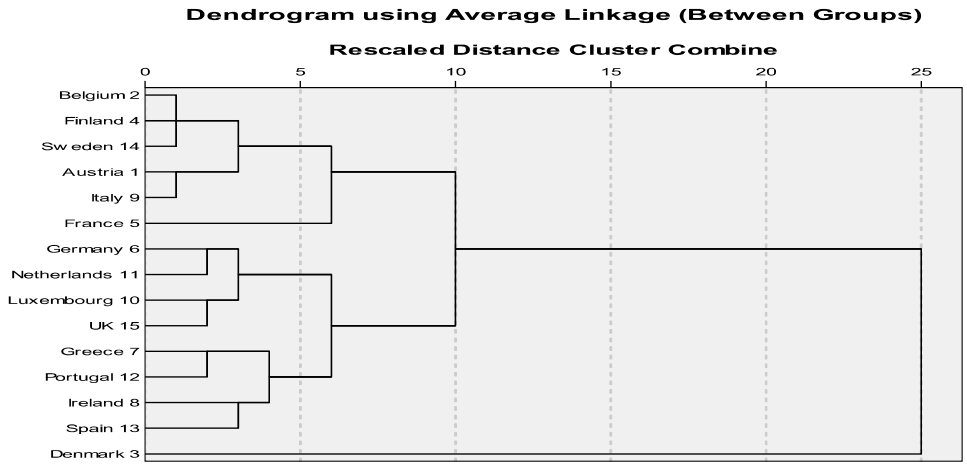
Table 5: The total tax revenue as percentage of GDP

European Country	Total Tax 2008
Austria	42,70
Belgium	44,16
Denmark	48,18
Finland	43,13
France	43,18

Germany	36,97
Greece	32,57
Ireland	28,76
Italy	43,27
Luxembourg	35,55
Netherlands	39,09
Portugal	35,25
Spain	33,26
Sweden	46,30
UK	35,67

Source: OECD (2010),

Dendrogram 4: Similarities among countries using performance of each tax as % of GDP



According to Stuckler *et al.* (2010), taxing the rich is a policy based to increase taxes against the recent financial crisis and carries a considerable populist appeal (as many hold those involved with the bank system responsible for the crisis and believe they should pay its price, though this happened only in the case of Ireland and not in other PIIGS countries).

A key problem with the current debt crisis is public spending is increased less than decreased tax revenue. However, Wilkes G. (2009) argues that taxing bonuses and high incomes may stifle incentives for entrepreneurship and innovation. Enforcing a more progressive tax system is politically challenging in light of the lobbying strength of the wealthy, but may most directly address the current debt crisis. While more progressive taxation is a less viable option in countries with already highly

progressive systems, like Sweden, there is scope for raising revenues in the UK, Greece and other EU countries. In fact, the current governments of EU countries have adopted a quite different approach, increasing VAT □a regressive indirect tax whose burden falls disproportionately on the poor.

There are also some simple, albeit politically difficult, changes that would bring the corporate taxation in line with other countries, to yield very large sums for continued government spending. In many countries, like Ireland, the economic development policy is based on a low corporate tax and, thus, it is difficult for this tax to be in line for all EU countries. Increasing taxes on alcohol, tobacco and sugary drinks further could represent viable revenue-generating options, benefiting both health and the economy. In the short run, these options may disproportionately hurt the poor (although there are disputes about the net effect on their overall welfare), and Keynesian economists worry that such taxes will diminish aggregate demand and slow down recovery. Thus, in Roosevelt's New Deal, prohibition on alcohol was lifted not only because drinking was popular, but mainly because it would reinvigorate consumer spending and increase tax revenues. The health costs of this aspect of New Deal policy (and, in turn, subsequent downstream costs) were never assessed. Further limitations include the scope for tax evasion due to imports from other EU countries, as well as smuggling of goods such as cigarettes, an activity in which the tobacco industry has been complicit. Another option is the proposed Tobin Tax, which would take a very small percentage of capital flows. This could generate significant revenue, but would require agreement and implementation by all major countries to be effective. Finally, the excessive use of taxes against crisis causes social dissatisfaction, and, especially in the case of Greece, nobody knows whether this policy is suitable and can bring the desired effects.

6. EU countries' intra trade and payments; similarities among individual countries' current account of balance of payment.

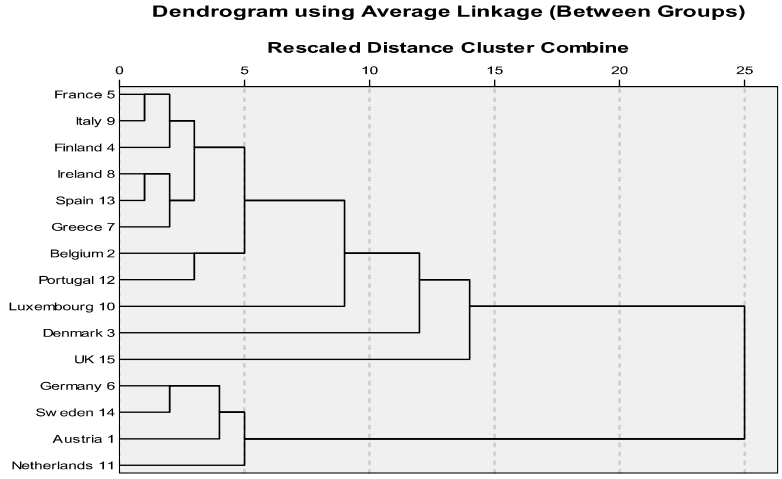
A major question relates to the international and intra trade and payments of each EU country. Table 6 presents the movements in deficit or surplus of EU countries' current account of balance of payment as percentage of GDP of each country and for the years 2001, 2004, 2008. The countries that have significant growth of surplus from 2001 to 2008 are, for EMU, Germany (from 0 to +6.66) and Austria (from -0.80 to +3.18). Sweden (an EU though not an-EMU state) shows a significant increase of surplus from 3.79 to 9.79, while Finland has a significant decrease of surplus from 8,58 to 3,01. All PIIGS countries have significant deficit increase. Using Karl Pearson correlation and average linkage between groups, Dendrogram 5 presents the cluster of similarities between countries using the current account of balance of payments for the period 2001-2008, as % of GDP, in order to take into account the volatility till time. There are two large groups of countries; one for Germany, Austria, Sweden, and Netherlands, and another one for all other countries.

In the second group there are subgroups of countries: one group is consisting of France, Italy, and Finland, one group is consisting of Spain, Ireland and Greece and another group is consisting of Portugal, and Belgium.

Table 6: The movements in EU countries' current account of balance of payment

European Country	2001	2004	2008
Austria	- 0,80	2,23	3,18
Belgium	3,40	3,49	- 2,53
Denmark	2,56	2,35	2,19
Finland	8,58	6,56	3,01
France	1,95	0,61	- 2,25
Germany	0,01	4,67	6,66
Greece	- 7,27	- 5,87	- 14,53
Ireland	- 0,66	- 0,58	- 5,33
Italy	- 0,06	- 0,94	- 3,40
Luxembourg	8,76	11,86	5,45
Netherlands	2,44	7,52	4,78
Portugal	- 9,91	- 7,58	- 12,09
Spain	- 3,94	- 5,25	- 9,57
Sweden	3,79	6,75	9,79
UK	- 2,07	- 2,07	- 1,63

Dendrogram 5: Similarities among countries using current account of balance of payment



The intra-European trade is the lion's share of total international transactions for European countries according to Lane *et al.*, (2007). The level of direct trade with the United States and East Asia is relatively low, approximately 10% respectively in most cases- with the main exception being the high level of trade between Ireland and the United States. In addition, the United States and East Asia are broadly similar in importance as trading partners for most European countries (although, of course, the sectoral composition of trade is likely to be very different across these two regions). Accordingly, the direct impact of a slowdown (or a switch in expenditures away from imports towards domestically produced goods) in the United States on individual European countries through the trade channel is limited in magnitude. Moreover, redistribution in spending from the United States to East Asia (as in benign adjustment scenarios) would have a roughly neutral aggregate impact, with rising trade with East Asia compensating for a decline in trade with the United States. However, the scale of direct trade is an incomplete measure, since European firms may compete with American firms for market share in common third markets. For this reason, it is also informative to take into account such third-country effects in quantifying the importance of the trade channel. The trade channel is only of limited importance for most European countries – however, it poses a particular vulnerability for Ireland and, to a lesser extent, the United Kingdom. Moreover, scenarios in which contraction and/or depreciation in the United States is offset by expansion and/or appreciation in Asia represents a broadly neutral aggregate trade environment for most European countries. Germany was the winner from all other countries of Eurozone in intra-trade. The deficits in current account of balance of payments from all others EU countries are covered from the surplus of Germany in the year 2009. Using a hard currency, the Euro, which is not acceptable yet for international trade, had imported raw materials at low cost, increased the productivity of labor, with cut costing policies and used basically the internal EU market for exports, often opaque trade policies (Siemens) was the most beneficial.

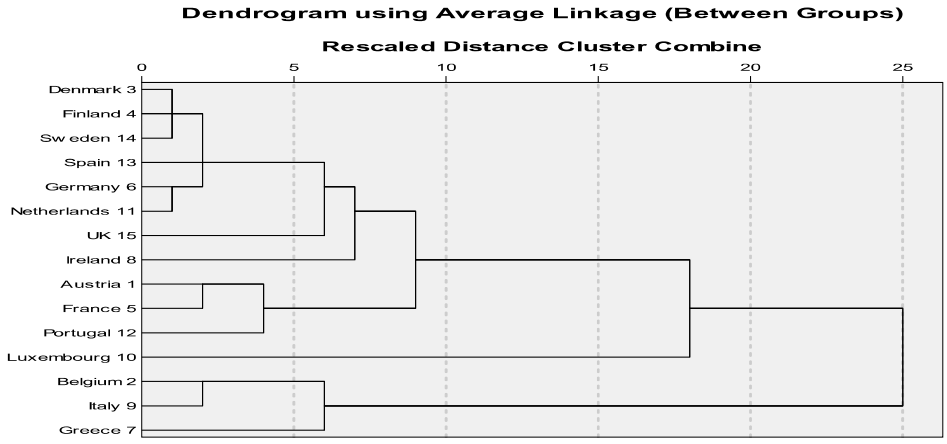
7. Government debt and budget net year lending (deficit); similarities among individual countries' government debt and deficit.

In this part we present government debt and budget net year lending (deficit) in order to produce the similarities among EU countries' Government debt and deficit. Table 7 presents government debt, deficit as percentage of GDP and GDP for 2009. All countries have budget net year lending (deficit) - significant amounts exist for PIIGS countries, France and UK. Using Karl Pearson correlation and average linkage between groups, Dendrogram 6 presents the cluster of similarities between countries using the government debt and deficit for the years 2009 as % of GDP. Two groups of countries stand out: one group is consisting of Italy, Greece and Belgium and the other one is consisting of the other companies.

Table 7: The government debt, deficit and GDP

European Country	Gov. Debt 2009	Deficit 2009	GDP in b$ 2009
Austria	64,31	- 4,15	324,68
Belgium	95,29	- 5,98	391,77
Denmark	37,81	- 2,81	208,11
Finland	37,60	- 2,88	188,13
France	60,79	- 7,50	2.173,32
Germany	43,77	- 3,03	2.975,33
Greece	125,70	- 15,59	330,70
Ireland	45,95	- 14,27	176,81
Italy	106,55	- 5,31	1.951,47
Luxembourg	8,56	- 0,91	42,20
Netherlands	49,87	- 5,46	674,52
Portugal	81,14	- 10,12	266,49
Spain	46,14	- 11,13	1.481,41
Sweden	37,84	- 0,95	345,58
UK	75,06	- 10,84	2.172,53

Dendrogram 6: Similarities among countries using the government debt, deficit



A question that emerges has to do with the way a country can reduce government debt and deficits. A measure to reduce deficits and government's debt is the sale of government assets (i.e. privatization) according to the study of Stuckler *et al*. (2010), though this is not without risk; governments may fail to recoup their assets in a

depressed market. Russia's rapid privatization programmes sold assets at a small fraction of their actual value. In one of the worst examples, an oil company with assets worth $8000 million was auctioned for $101 million. However, Britain has experience with case-by-case sales of assets, and has begun selling assets to raise £16 billion, with more on the way, such as the Channel Tunnel rail link and the National Air Traffic Control Service. It is important to get the timing right; the Swedish government made a substantial profit when it resold ailing banks that had been partially nationalized in the early 1990s in response to a banking crisis and the British government is already sitting on profits of many billions of pounds as a result of its investments in part-nationalized British banks.

Governments can alternatively stimulate the economy by increasing the money supply because, when a country faces the risk of deflation, demand reduces as people wait for prices to fall. Governments have, however, been anxious about doing this since Germany's experience in the inter-war years, when printing money to pay war debts led to spiraling inflation and ultimately World War II. This sequence of events is now recognized as an extreme case, and many economists argue that inflation does not impede growth as long as it does not rise above about 8–10%, leading to "hyper-inflation". The options are, however, limited because when interest rates are already close to zero, it is not possible to stimulate the economy by cutting such rates further. Instead, central banks increase the supply of money to financial institutions to encourage them to lend even greater sums (an approach known as 'quantitative easing', especially relevant when there is risk of deflation which could lead consumers to save in anticipation of further price drops). Thus this measure has been employed by the Bank of England, the US Federal Reserve and the European Central Bank, although there is now considerable pressure for further structural reform of the British banking sector to ensure that the money is lent to businesses. Although primarily intended to increase the money supply, quantitative easing will tend to increase inflation and thus reduce the value of debt held in the national currency (but simultaneously put pressure on interest rates to rise).

Another option is to borrow more money. Most governments have taken this approach, issuing long-term government bonds. The rationale is that the resulting investment helps countries to grow out of debt, as long as the economy grows faster than interest rates (which are currently at record lows).

Another option is to cut public spending. This was done in Japan in the 1990s, but backfired, since removed money from the economy just at a time when a fiscal stimulus was needed, resulting in a further loss of revenue. The implications for public health may be considerable; those calling for public spending cuts focus not only on the bank bailouts that caused the problem but rather also on public services. Such cuts are likely to impact on those without means to buffer themselves from

economic shocks, and who are least likely to live in the marginal constituencies that are crucial for a party to win power under the first-past-the-post political system. They effectively redistribute resources from the poor to the wealthy and there is now clear evidence from historical data that lower spending on social welfare costs lives.

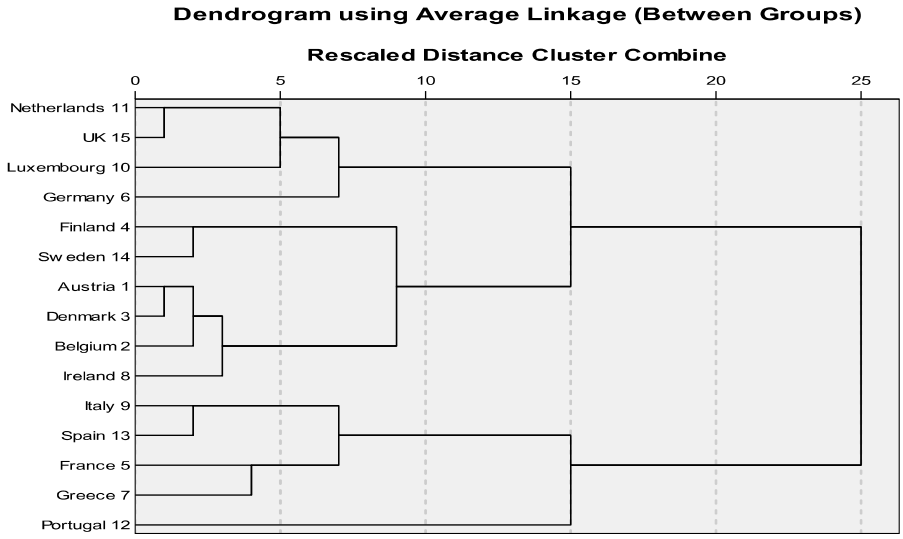
Another option is to increase taxes as mentioned in the corresponding section.

Another option is to increase competitiveness. Competitive economies will be able to reduce high public debt burden in the future. The recent Greek tragedy highlights the need for more labour market flexibility within the euro area according to Holger (2010). After several waves of crises, fiscal consolidation in most European countries is urgent. Rigid labour markets are a pivotal obstacle for a quick adjustment of competitiveness. Thus, reforms towards more flexible labour markets should be implemented as soon as possible in euro-area countries. Announced austerity measures in Ireland, Greece, Spain and Portugal that basically affect the public sector are a step to the right direction but need to be supported by a reduction of employment protection legislation, reduction or elimination of minimum wages (explicit and implicit) and by a decentralized wage-bargaining process. The adjustment process will be painful, but it is a necessary prerequisite for a sustained economic recovery and less long-term unemployment. The alternative would be a long-lasting period of sluggish growth and high unemployment as experienced by Germany after reunification. This scenario neither calls for further steps towards political union nor for a co-ordination or centralization of wage policies at a supranational level – though deregulation should also take place at central EU level. It clarifies that European government should address intra-euro area imbalances by labour market reforms and fiscal consolidation. A political union which turns into a transfer union would be counter-productive as disparities in competitiveness and imbalances in current accounts would tend to grow as much as the volume of transfers allowed. This would cause political discontent in parts of the European Union. Hence, to safeguard the European integration process, we should leave the adjustment of intra-euro area imbalances to markets (again) and put the emphasis of our political efforts on shaping incentives to enact structural reforms.

8. Conclusions; similarities among individual EU countries and the future of EMU

Using Euclidian Distance and average linkage between groups, is produced the cluster of similarities between countries using criteria from above mentioned fields of economy like government debt and deficit, total tax revenues, and Bank's Assets all these variables as % of GDP, and gross wage earnings per country in Euro. These similarities are presented in Dendrogram 7.

Dendrogram 7: Similarities among EU countries



EU countries are separated in 2 groups. The first group is consisting of two subgroups, including the Netherlands, UK, Luxembourg and Germany, characterized by developed financial sector with balanced fiscal policy. The second subgroup is consisting of two subgroups: one subgroup is consisting of Finland and Sweden and the other one is consisting of Austria and Denmark. Finally the countries which are faced several financial or debt problems, Belgium and Ireland are connected with second group. The second large group consists of Southern European countries, such as Italy, Spain, France, Greece and Portugal, and is characterized by high deficit and high government debt, low gross wage revenues and low Bank's Assets to GDP, low or medium total taxations performance, and decreases or deficits of current account of balance of payments.

The differences and the imbalances among EU countries reflect different national economic legislation and fiscal policies like: imbalances in mobility of productive factors, differentiations in the current account of balance of payments, different levels of expand in loans and advances or in use of financial or credit products. This problem seems to have also a spatial character and will pose a serious regional problem for the EU, and especially EMU countries, which already have a common currency and monetary policy.

According to our analysis, Italy and Spain, France and Greece and Portugal, all of them countries in the South Europe, are faced with crisis or will face the crisis in the near future. The problems of Ireland and Belgium are quite different from those of the southern countries. Evidence from our study is that sub unions inside the EU have been created with common characteristics.

Policies which are mentioned above to reduce the government debt of the Eurozone will lead to social discontent, and ultimately the collapse of the European Union. The only policy that seems to be efficient is full integration of the countries with a common fiscal and federal face and legislated solidarity.

The existing debt crisis must be faced with the following ways: The first measure are to be substituted every countries government debt form a common debt of Eurozone with long term perpetual Eurobonds under the management of a federal bank of ECB, in order to cut financing cost. The ECB have to, also, take actions in secondary market of bonds in order to equalizing the imbalances of spreads. The second measure is to minimize the net budget lending with policies to cut public spending. The policy of privatizations is a short measure and will be helpful, not from the direct receipt of funds, but if used to start up investments with capital movements which will aid economic development (by increasing GDP and decreasing the unemployment). A common tax regime for all EU countries eliminates imbalances and allows mobility of capital and labor. Finally, the recent crisis is clearly a regional problem of the Eurozone and only regional policies are suitable solutions to it.

Without the implementation of EU policies to synchronize indicators variables such as those mentioned above, the common currency, and the EU, will be abandoned in the nearest future as countries across Europe will be compelled to return back to their national currencies and monetary and fiscal economic policies.

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