Unemployment and crisis escalation in the Greek Economy (2008-2014)

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Abstract

The purpose of our research is to investigate the relation between unemployment and economic crisis both in an economy and with regard its trade partners. We investigate how the unemployment of former employees' in Greece during the period 2008-2014 conduced to the deepening of this crisis and the effects of this unemployment to Greece's EU trade partners. In other words, we estimate how the decreased demand for final products, that occurred due to the former employees' unemployment caused firstly the country's direct and indirect production decrease and secondly, to the economy's commercial partners.

The application of Input-Output Analysis allows us to estimate the total multiplier effects in production, due to a shift in the final demand (in our research we locate three distinct shift in final demand: decrease of domestic final demand, decrease of imports for household consumption, decrease of imports for intermediate use). For our analysis we use the input-output table of the Greek economy and the input-output table of its main trade partners, data for unemployment and income by sector of economic activity and the distribution of the households' final demand for domestic and imported goods and services.

The main results of the study per unemployed person indicates that:

- The yearly demand reduction for domestically produced goods and services is estimated at 7,612 € and the production decrease of the Greek economy at 10,837 €, respectively.

- The yearly demand reduction for imports, aiming to cover households' consuming needs, is estimated at 1,240 € and the production decrease to third countries at 2,263 €, respectively.

- The yearly demand reduction for intermediate goods and services is estimated at 750 € and the production decrease to third countries at 896 €, respectively.

The results shows that a significant part of the production loss and, hence, the crisis escalation, starts from the size of unemployment but, also, the structural defects of the Greek economy. This significant production loss not only constitutes a strong disorder to the economic loop (product – income – expenditure) but, also, highlights the need for the public policies' revision.

1. Introduction

The purpose of this research is to analyze the relation between unemployment and economic crisis both in an economy and with regard its trade partners. More specifically, is investigated: i) how the unemployment of the former employees that created during the last economic crisis in Greece (case study), conduced to the deepening of this crisis and, ii) the effects of this unemployment to Greece's EU trade partners. In other words, is estimated how the decreased demand for final products, that occurred due to the former employees' unemployment in Greece, the period 2008-2014, caused firstly the country's direct and indirect production decrease, by sector of economic activity and, secondly, to its commercial partners.

Methodologically, the Input-Output Analysis (I-O Analysis) is applied, which allows the estimation of the total multiplier effects (direct and indirect) in the production level, due to a shift in the final demand (demand-drive model). In this framework, three (3) distinct effects of the recorded total former employees' unemployment are estimated:

a. the domestic production's reduction (direct and indirect), due to the reduced demand for domestic products,

b. the other countries' (trade partners) production reduction (direct and indirect), due to the Greek imports' reduction and,

c. the other countries' (trade partners) production reduction, due to the reduced domestic demand for intermediate products, because of the households' decreased demand for domestic products.

These estimations allow us, based on the current production technology and taking into account the restraints of the applied methodological framework, to measure the total expected (direct; direct and indirect) multiplier effects of the diffusion of the economic crisis within an economy and, via the dynamics of the world trade, to its trade partners.

Particularly, the impact of the indirect product reduction – due to the former employees' unemployment – to the corresponded GDP changes in an economy, illustrates to which extend the crisis diffusion in this economy depends on its sectorial structure. Hence, it would be a useful policy tool to the mitigation of the crisis impacts on the production and unemployment.

The data used for the application of the I-O model, the period of analysis (2008-2014), are:

      a. unemployment and average net wage per sector of economic activity (Labour Force Surveys, Elstat),

      b. imports per country and sector (OECD) and,

      c. Eurostat's I-O Tables for 2010.

The research's empirical results refer to i) the evidence of the Greek economy with regard to the unemployed-former employees, ii) the application of the I-O analysis to Greece and, iii) the application of the I-O analysis to Greece's EU trade partners.

2. Greek Economy and Economic Crisis: Examining Unemployment

Examining primary data from Labour Force Studies (Hellenic Statistical Authority) we came to the conclusion:

i) The former employees are, on average, the 59.7% of the Greek unemployed, the period 2008-2014. In 2008, the former employees were the 49.8% of the total unemployed, while in 2014 the 61.9%. The total number of unemployed increased 3.2 times, during the period 2008-2014, while the respective number of the former employees increased four (4) times, during the same period. The vast majority of the unemployed used to work on the tertiary sector (67%), follows the secondary sector (30%) and, finally, the primary sector (3%).

With regard to the industries that the former employees used to work, ten (10) industries raise the majority (66%) of the unemployed. These industries in decreasing order of significance are: food, beverage and tobacco industry (5), textiles, clothing, leather and footwear industry (6), constructions (27), wholesales (29), retail sales (30), accommodation and food service activities (36), security and investigation facilities, services to buildings and landscape activities, office administrative (53), public administration and defense; compulsory social security (54), education (55), health (56). Namely, the 2/3 of the studied unemployment has industrial "sign". This fact,

which is compatible with the findings of other studies, represents an economy with low and medium technological specialization.

ii) The total wage loss from the former employees is 40.7 billion €, the period 2008-2014. This income, from 0.93% of GDP in 2008, reaches the 4.04% of GDP, in 2014. Moreover, the average wage from 1008 €, that was in 2008, decreases to 848 €, in 2014, namely reduced by 15.83% (in constant prices). However, this reduction appears significant diversification among the industries, since it is ranging from 20.84% to 42.86% (in constant prices).

iii) The wage-income loss does not imply isoquant demand loss. The demand loss is calculated by the mean consumption slope, during the analyzed period (0.81), and it is estimated to be 32.7 billion €, which is the 3.18% of the total private consumption. This demand, partly regards the domestically produces products (28.4 billion € or 86.9%) and, partly, the imported products (4.3 billion € or 13.1%). Hence, it is clear that, over the ¾ of the households' demand concerns the domestically produced final goods and services. More analytically, on average, the 3.11% of this demand is of the primary, the 21.76% of the secondary and the 75.13% of the tertiary sector, during the period of analysis. With regard to the imported goods and services, almost all of the domestic demand is for goods and services of the secondary sector (96.2%), only 3.8% of the primary sector, while there are no data for the tertiary sector.

The industrial allocation of the households' demand has equivalent behavior, since the industries of the tertiary sectors for the domestic products and of the secondary sector for the imported ones, recorded the greater losses.

An interesting finding regarding the shift on the imported goods and services demand composition is the food, beverage and tobacco industry's increased participation, from 22.97% in 2008, to 35.86% in 2014. On the other hand, the participation of the manufacture of motor vehicles etc., decreased during the period 2008-2014 from 13.93% to 4.57%, respectively.

Two methodological issues concerning the imports' analysis are: i) the selection of the sample of the countries-trade partners and, ii) the volume and the mixture of the imports that will be analyzed. In this research, are analyzed: i) the final imported goods and services that are consumed by the households and are about the 25% of the total imports and, ii) the intermediate imported goods and services, used in the production of the domestic goods and services and, they are the 15% of the total imports.

Next, those countries-members of the EU that are the main input suppliers for the households' final consumption are selected. Those countries are: Austria, Belgium, Denmark, France, Germany, Italy, Holland, Spain, United Kingdom and Bulgaria. From those countries the 65% of the Greece's imports is coming from. Consequently, with regard to the imports, a sample of EU members is analyzed, which represents the 2/3 of the country's total imports and, from this sample, the mixture that is analyzed represents the 40% of the total imports.

iv) Finally, from the previous process, we end up to the construction of the annual industrial vectors [of dimension: 62 (industries) x 1(year)] of the (potential) demand loss, for the Greek economy and, which is resulted from the unemployment of the former employees, the period 2008-2014. These vectors quantify three (3) measures: i) the (domestic) demand loss for domestically produced final goods and services, ii) the (domestic) demand loss for imported final goods and services and, iii) the (domestic) demand loss for intermediate products (capital equipment, raw materials, semi-processed products), used for the production of domestic final goods.

3. Input-Output Analysis' results for Greece (2008-2014)

The contribution of Input-Output Analysis is that quantifies the impact of the demand loss to the indirect product shift or, in other words, to that shift that resulted from the sectorial structure of the economy and imprints the dispersion of this result to all the economic sectors. The dispersion of the economic result is a significant index, since it imprints the range of the impact of each sector.

i) The economic results with regard to the dispersion of the product loss to the Greek economy, due to demand loss of the former employees, the period 2008-2014, appear in Table 1.

Table 1: Reduction in the volume of production in Greece, 2008-2014 (in million €).

	2008	2009	2010	2011	2012	2013	2014
Primary Sector	**95.6**	**148.8**	**222.4**	**297.2**	**409.6**	**405.2**	**345.8**
Direct	44.0	68.4	102.2	136.7	188.3	186.3	159.0
Indirect	51.6	80.4	120.2	160.5	221.3	218.9	186.8
Secondary Sector	**453.9**	**706.6**	**1,055.7**	**1,411.1**	**1,944.4**	**1,923.7**	**1,641.7**
Direct	307.2	478.2	714.4	955.0	1,315.9	1,301.9	1,111.0
Indirect	146.7	228.4	341.3	456.1	628.5	621.8	530.7
Tertiary Sector	1,460.2	2,273.4	3,396.4	4,539.8	6,255.5	6,189	5,281.7
Direct	1,060.5	1,651.1	2,466.7	3,297.1	4,543.2	4,494.9	3,835,9

Indirect	399.7	622.3	929.7	1,242.7	1,712.3	1,694,1	1,445.8
Total	**2,009.7**	**3,128.8**	**4,674.5**	**6,248.2**	**8,609.4**	**8,517.9**	**7,269.2**
Direct	1,411.6	2,197.7	3,283.4	4,388.8	6,047.3	5,983.1	5,106.0
Indirect	598.1	931.1	1.391.1	1,859.4	2,562.1	2,534.8	2,163.2

Table 1 illustrates that, due to the sharp unemployment increase, the Greek economy totally lost a significant part of its income-product (40.5 billion €); from this loss, the 69% is the direct and 29% the indirect product loss, respectively. It is estimated that this product decrease constitutes the 65% of the total GDP loss (61.9 billion €), the period 2008-2014.

The product reduction, due to the former employees, as percentage of the GDP is shown in Table 2.

Table 2: Product decrease, due to the former employees, as percentage of the GDP.

	2008	2009	2010	2011	2012	2013	2014
Direct Decrease	0.58%	0.93 %	1.45 %	2.11 %	3.11 %	3.28 %	2.83%
Indirect Decrease	0.25%	0.39 %	0.61 %	0.90 %	1.32 %	1.39 %	1.20%
Total Decrease	0.83%	1.32 %	2.07 %	3.01 %	4.43 %	4.67 %	4.03%

As comes from the previous Table (Table 2), unemployment caused a fivefold decrease in the total country's production, both directly and indirectly. Consequently, the measure of the indirect change imprints the relative significance of the unemployment to the crisis' deepening.

ii) In the sectorial level, the sectors with the higher production decrease (directly, indirectly and totally) are those shown in Table 3.

Table 3: Sectors with the higher production decrease (%).

	Direct Decrease	Indirect Decrease	Total Decrease
1	Real estate services (18.9%)	Wholesale trade services (9.7%)	Real estate services (15.5%)
2	Accommodation and food services (14.6)	Real estate services (7.3%)	Accommodation and food services (10.2%)
3	Food products, beverages and tobacco products (9.4%)	Financial services, except insurance and pension funding (7.3%)	Wholesale trade services (8.5%)
4	Wholesale trade services (7.9%)	Products of agriculture, hunting and related services (7.1%)	Food products, beverages and tobacco products (7.8%)
5	Human health services (4.7%)	Other professional, scientific and technical services; veterinary services (6.2%)	Retail trade services (4.2%)

6	Retail trade services (4.1%)	Legal and accounting services; services of head offices; management consulting services (4.6%)	Products of agriculture, hunting and related services (4%)
7	Coke and refined petroleum products (3.7%)	Retail trade services (4.3%)	Coke and refined petroleum products (1.2%)
8	Telecommunication services (3.3%)	Electricity, gas, steam and air-conditioning (4.2%)	Financial services, except insurance and pension funding (3.4%)
9	Electricity, gas, steam and air-conditioning (3.2%)	Food products, beverages and tobacco products (3.9%)	Electricity, gas, steam and air-conditioning (3.5%)
10	Land transport services and transport services via pipelines (2.9%)	Telecommunications services (3.9%)	Telecommunications services (3.55%)

For the sectors of Table 3, regarding its indirect results' dispersion, it is noted that the sectors with the higher dispersion are: crop and animal production, telecommunications, intermediate financial institutions, real estate activities and legal and accounting activities. The previous analysis gives the completest picture of the tense of the demand shifts, per sector of economic activity.

4. Input-Output Analysis' results with regard to Greece's EU trade partners (2008-2014)

Next, it will be investigated the results of the former employees' unemployment to third countries, with regard to i) the final and ii) the intermediate goods and services, exporting to Greece.

i) The production volume's reduction of the Greece's ten (10) most significant EU trade partners, as comes from the I-O Tables, per country, the period 2008-2014 (Eurostat, 2010), are shown in Table 4.

Table 4: Production decrease for Greece's ten (10) most significant EU trade partners, 2008-2014 (in million €).

	2008	2009	2010	2011	2012	2013	2014
Primary Sector	**32.8**	**43.2**	**59.5**	**96.7**	**111.5**	**122.0**	**99.8**
Direct	12.6	16.2	21.8	36.0	37.3	40.6	33.2
Indirect	20.3	27.0	37.7	60.7	74.2	81.4	66.5
Secondary Sector	**423.9**	**511.5**	**637.0**	**907.1**	**1,040.5**	**1,122.8**	**918.2**
Direct	312.0	376.6	471.8	671.7	772.3	833.0	681.1
Indirect	111.9	134.9	165.2	235.4	268.3	289.8	237.0
Tertiary Sector	**131.7**	**159.4**	**201.9**	**289.7**	**333.5**	**359.1**	**293.7**
Direct	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Indirect	131.7	159.4	201.9	289.7	333.5	359.1	293.7
Total	**588.5**	**714.1**	**898.4**	**1,293.5**	**1,485.5**	**1,603.9**	**1,311.6**
Direct	324.6	392.8	493.6	707.7	809.6	873.6	714.4

Indirect	263.9	321.2	404.8	585.8	676.0	730.3	597.2

As it is recorded in the previous Table, those counties' total loss of production is 11.3 billion €. The greatest losses are recorded in Germany (16.9%) and Italy (16.4%), while France (9.1%), Holland (6.7%), Spain (6.6%), United Kingdom (5.2%), Belgium (4.2%), Denmark (1.9%), Bulgaria (1.8%) and Austria (1.2%) come next. In the rest of the countries is recorded the 29.9% of the production loss.

The sectors that the production loss is mostly directed (on average, for the whole sample of the countries) are: food, beverage and tobacco (21%), manufacture of knitted and crocheted apparel, leather and related products (12.8%), crop and animal production (6.4%), pharmaceuticals (5%), manufacture of chemicals and chemical products (4.7%) and manufacture of motor vehicles and semi-vehicles (4%).

The difference in the empirical findings of this approach (with regard to the trade partners) with the previous one (with regard to Greece) is that, in this approach, the product's significant changes are of the secondary sector and the indirect changes are the 40% of the total.

ii) The intermediate demand's impact to the imports level, as it comes from the Eurostat's I-O Table, for Greece (with the assumption that the production technology of the countries that the imports come from, is the same with the production technology in Greece), is shown in Table 5.

Table 5: Intermediate demand's impact to the imports level (in million €).

|	2008	2009	2010	2011	2012	2013	2014
Primary Sector	19.4	30.3	45.2	60.5	83.4	82.4	70.4
Direct	6.3	9.8	14.7	19.6	27.1	26.8	22.9
Indirect	13.1	20.4	30.5	40.8	56.3	55.7	47.5
Secondary Sector	107.3	167.1	249.6	333.7	459.8	454.9	388.3
Direct	96.0	149.4	223.2	298.4	411.1	406.7	347.1
Indirect	11.3	17.7	26.4	35.4	48.7	48.2	41.2
Tertiary Sector	39.3	61.3	91.5	122.2	168.5	166.7	142.3
Direct	36.9	57.4	85.7	114.6	157.9	156.2	133.3
Indirect	2.5	3.9	5.8	7.6	10.6	10.5	9.0
Total	166.1	258.6	386.3	516.4	711.6	704.0	600.9
Direct	139.1	216.6	323.6	432.6	596.1	589.7	503.3
Indirect	27.0	42.0	62.7	83.8	115.5	114.3	97.6

5. Conclusion

The unemployment of the former employees had as a result the loss of an income which in turn, the analyzed period 2008-2014, resulted:

1. The yearly demand reduction for domestically produced goods and services for 7,612 € and the production decrease of the Greek economy for 10,837 €, respectively. In other words, beyond the direct production decrease, the former employee's unemployment caused an indirect production decrease, due to the tense of the inter-sectorial relations of the Greek economy. This decrease equals with the 29.75% of the total.

2. The yearly demand reduction for imports, aiming to cover households' consuming needs, for 1,240 € and the production decrease to third countries for 2,263 €, respectively. The indirect product decrease to those countries, because of the tense of the inter-sectorial relations, is 1,023 € per year and contributes to the production decrease for 45%.

3. The yearly demand reduction for intermediate goods and services for 750 € and the production decrease to third countries for 896 €, respectively. The indirect reduction has been estimated with the assumption that those countries share the same production technology with Greece, and equals to 146 € every year, contributing for 16.24% to the production decrease.

Totally, the yearly imports demand is reduced – for every former employee – for 1,990 € and, the production to third countries for 3.158€, respectively.

Diagram 1: Demand and production reduction by unemployed former employee in € (average for the period 2008-2014)
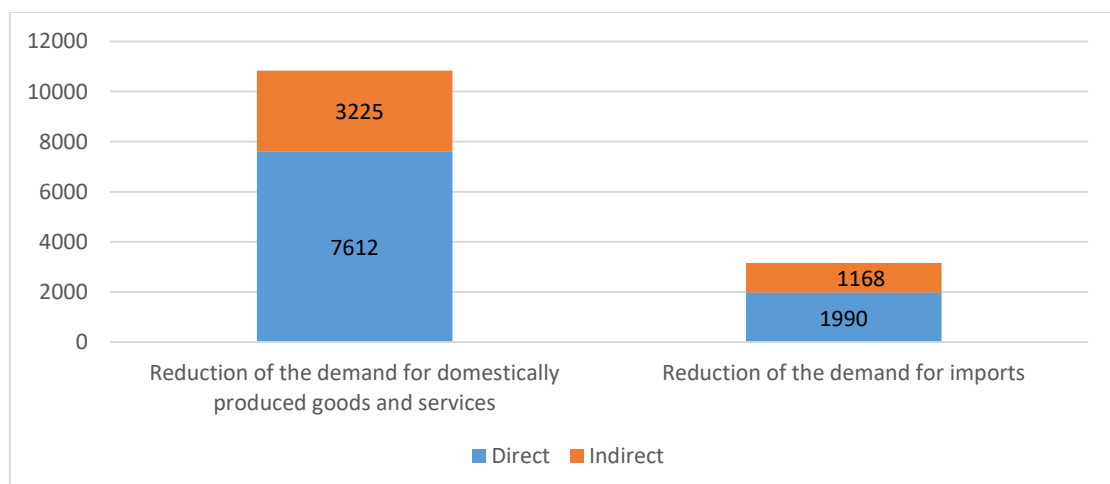
The total GDP reduction of the Greek economy reaches the 25.6%, the period 2008-2014, namely, the Greek economy lost its ¼ of its product. With respect to the research's findings, the losses that the households' consuming power decrease caused to the productive loop, due to the unemployment, is the 65% of this decrease, the period 2008-2014. This finding illustrates the unemployment's significant impact into the crisis deepening.

From the previous analysis occurs that, a significant part of the production loss and, hence, the crisis escalation, starts from the size of unemployment but, also, the structural defects of the Greek economy. This significant production loss not only constitutes a strong disorder to the economic loop (product – income – expenditure) but, also, highlights the need for the public policies' revision. However, taking into account the pro-cyclical policies that are applied in Greece, to cope with the crisis aftermaths, in the short run, the research's findings suggest that the problem is intensified, both from the demand and the production side.

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