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The Effects of Indirect Taxes on Consumer Prices: Empirical Evidence for Greece

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Abstract

The importance of the tax incidence is obvious both for academics and for policymakers. Using data of HICP and CT_HICP, it is proposed in this article that the influence of CT_HICP of the imposition of indirect taxes determines the extent of tax incidence and the contribution of indirect taxes to inflation. The empirical investigation, based on simple log linear regression technique with dummy variables showed that although after the imposition of the indirect taxes at the beginning of 2010, the Harmonized Index of Consumer Price with constant taxes (CT_HICP) exhibited a downwards kink, this is rather the outcome of the recession occurred during this period than of any absorption of the imposed indirect taxes on the part of the producers. Based on these findings it is shown that the least contribution of indirect taxes to the general inflation index through the main categories are estimated as the product of the difference of % change of HICP – CT_HICP and the share of this category into the "basket" of HICP.

The empirical investigation showed that the contribution of indirect taxes to the inflation represented by HICP is at least 82.0% in 2010 and 60.7% in 2011. The 2-digit categories through which indirect taxes exhibited the highest contribution to the general index inflation rates was: For 2010 to the total tax contribution 4.18% (out of 5.11% inflation) the Transport contributed 1.55%, Alcoholic-beverages-tobacco 0.52%, Restaurants and hotels 0.36%, Food and non-alcoholic beverages 0.31%, Clothing and footwear (0.31%) and Miscellaneous goods and

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services 0.31%. In 2011, to the total tax contribution 1.39% (out of 2.29% inflation) the categories taking the higher part in this total tax contribution are: Restaurants and hotels (0.95%), Food and non-alcoholic beverages (0.35%), Housing - water- electricity- gas and other fuels (0.13%).

1 Introduction

The question of who bears the burden of taxes i.e. the "incidence of taxation" has received a great deal of attention, especially at the theoretical level but it is as important to policymakers as to academics. This question is related to discussions on tax harmonization in Europe and its effects upon prices (Besley and Harvey,1999). It is becoming of increasing importance for fiscal policies all over the world, since the fact that labor and capital tend to become more mobile, governments tend to shift from direct to indirect taxation (Carare & Danninger, 2008). It is also becoming of increasing importance for monetary policies, as Central banks base their monetary tightness or loosening on the relationship between expected inflation and the inflation target. The knowledge of whether inflation is due to VAT or to market process, is important for Banks' decisions as VAT changes lead to a transitory increase in the inflation rate, and their impact dies out later (Gabriel & Reiff, 2006).

In its effort to restrict fiscal deficit, and following the existing stabilization program, the Greek government has taken a number of measures to cope with the recent fiscal crisis. Among these measures are increases in Value Added Tax (VAT) and in Special Consumption Tax (SCT)). More specifically, the recent imposition of indirect taxes took place in March 2010 and further in June 2010, both announced one month earlier. Evaluating the effectiveness of the whole package on improving competitiveness through the deflationary and structural policy measures included in the stabilization program, it is of vital importance to know the extent to which indirect taxes contributed to the observed inflation and the extent to which it is the outcome of other factors such as failing to curb production cost (rental, wage), reduce market imperfections (mark up) and increase of the energy costs.

In this article we examine the effect of the recent (2010) changes in indirect taxes in Greece on Consumer Prices on the basis of simple statistical and econometric techniques and using the Harmonized Index of Consumer Prices (HICP) and the Harmonized Index of Consumer Prices (HICP) with Constant Indirect Tax Rates (HICP-CT). The questions to be answered in this article are: (a) to what extent the incidence of indirect taxes imposed recently in Greece burdened consumers and to what extent it was absorbed by producers, (b) what is the contribution of indirect taxes to total inflation and (c) what is the contribution to inflation of various two-digit categories through indirect taxation. The answers to questions (b) and (c) presuppose an answer to question (a), since any absorption of

indirect taxes by producers should not be counted as indirect taxes adding to inflation.

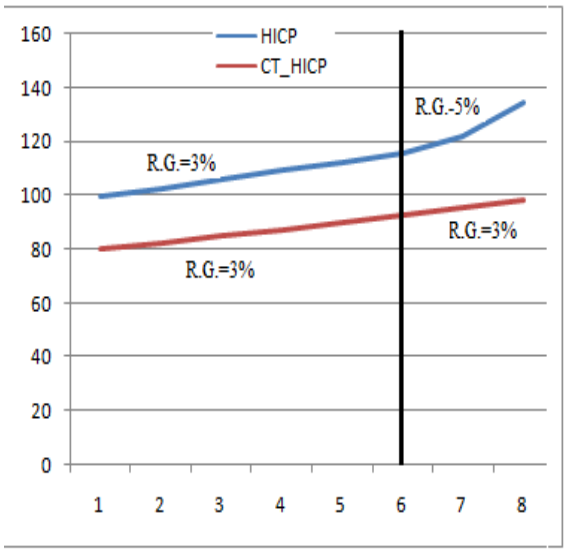
2 Incidence of indirect taxes

There are numerous attempts to identify empirically the incidence of indirect taxes using various models and answering various questions. The more recent work for Greece was done by Karagiannis and Panagopoulos (2010) who uses a model proposed by Carare & Danninger (2008) and focuses on whether the indirect taxes on announcement date, on the implementation date and on the post implementation period had an effect on inflation. They examined the indirect taxes imposition in 2005 and in 2010. According to their finding, " the VAT effect on the headline inflation in Greece, was statistically significant for (i) the VAT post implementation effect of the April 2010 period, and (ii) the VAT announcement effect of the May-June 2010 period. No variable regarding the VAT change of the 2005 period is found to be statistically significant. In their words "…..Our results are possibly related to the different growth rates ……. in 2010 Greece is experiencing a serious recession, with a negative GDP growth rate. In this economic environment, enterprises face profitability difficulties and therefore are under pressure to pass VAT increases to their final consumers". These findings for 2010 are important for considering the contribution of indirect taxes to the inflation. For this reason, a simple method will be employed to evaluate the incidence of indirect taxes on HICP.

2.1 Theoretical reasoning

The imposition of an indirect tax may exert an effect on the price index counted at a constant base year tax rate (CT–HICP). In the case where CT_HICP is unaffected by this change in indirect tax then, the difference between inflation with indirect taxes and inflation with constant indirect taxes can be considered as a total shift of indirect taxes to prices and therefore to the consumers. Such a situation is depicted in Figure 1a below where the trend of CT_HICP (red line) is supposed to remain at 3% after the imposition of the tax at the point of time 6 while at the same time the trend of HICP increases to 5% from 3% immediately after the imposition of the tax. The whole difference CT-CT_HICP =5%-2% = 2% constitutes the contribution of indirect taxes to inflation. The % contribution of the new indirect taxes to inflation is 2%/5% = 40%.

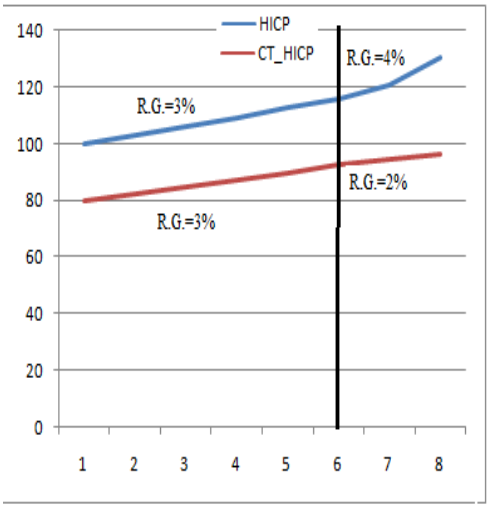
In the case where CT_HICP is negatively affected by the change in indirect tax then, the difference between inflation with indirect taxes and inflation with constant indirect taxes (HICP – CT_HICP) can only partly be considered as a shift of indirect taxes to prices and therefore to the consumers. To obtain the exact



Contribution of Indirect Tax:

5%-3% = 2% ⇨ 2%/5% = 40%

Figure 1a: The contribution of Indirect taxes to inflation in the case where CT_HICP is unaffected by their imposition (average increase of all indirect taxes by 2%).



Contribution of Indirect Tax:

4%-2% = 2% ⇨ 2%-1%=1% ⇨ 1%/4% = 25%

Absorption due to the reduction of the %rate of CT-HICP from 3% to 2% as a result of the imposition of indirect taxes

Figure 1b: The contribution of Indirect taxes to inflation in the case where CT_HICP is negatively affected by their imposition (average increase of all indirect taxes by 2%).

effect on the consumer (on inflation) the extent of the reduction of the trend in CT_HICP should be subtracted from the difference HICP – CT_HICP. There has

been a partial absorption of indirect taxes by the producers. Such a situation is depicted in Figure 1b below where the trend of CT_HICP (red line) is supposed to be reduced from 3% to 2% after the imposition of the tax at the point of time 6 while at the same time the trend of HICP increases to 4% (instead of 5%) from 3% immediately after the imposition of the tax. The difference HICP-CT_HICP =4%-2% = 2% minus the absorption 1% = 1%, constitutes the contribution of indirect taxes to inflation. The % contribution of the new indirect taxes to inflation is (2%-1%)/4% = 25%.

In the case where CT_HICP is positively affected by the change in indirect tax then, the contribution of indirect taxes to total inflation is higher than the difference between inflation with indirect taxes and inflation with constant indirect taxes (HICP – CT_HICP). To obtain the exact effect on the consumer (on inflation) the extent of the increase of the trend in CT_HICP should be added to the difference HICP – CT_HICP. There has been an overshooting of inflation to the change of the indirect taxes. Such a situation is depicted in Figure 1c below where the trend of CT_HICP (red line) is supposed to increase from 3% to 4% after the imposition of the tax at the point of time 6 where at the same time the trend of HICP increases to 6% (instead of 5%) from 3% immediately after the imposition of the tax. The difference HICP-CT_HICP =6%-4% = 2% plus the positive change of CT_HICP trend 1% = 3%, constitutes the contribution of indirect taxes to inflation. The contribution of the new indirect taxes to inflation is now (2%+1%)/6% = 50%.

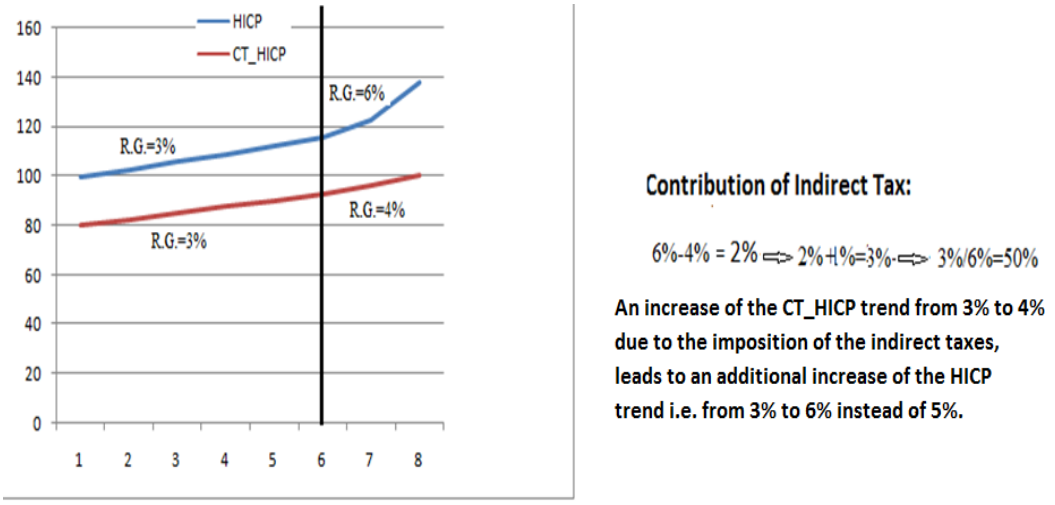


Figure 1c: The contribution of Indirect taxes to inflation in the case where CT_HICP is positively affected by their imposition (average increase of all indirect taxes by 2%).

2.2 Empirical investigation of the tax incidence

The monthly data of the Harmonized Index of Consumer Prices (HICP) and the Harmonized Index of Consumer Prices (HICP) with Constant Indirect Tax Rates (HICP-CT) was taken from January 2003 to October 2010 from Eurostat and El.Stat.

Using simple econometric techniques, we investigated firstly whether the trend of the price index without changing the tax rates has changed relative to the past. Looking at the CT_HICP index the whole period after 2006:3, it can be observed that there is an obvious kink at the beginning of 2008 which is close to the start of the recession[4]. The change of the trend in the index can be verified with the use of dummy variables comparing the trend of the index before the start of depression and after, i.e. comparing the periods 2006:1 -2008:2 and 2008:3 – 2011:12. This is done using, the log-linear regression model specified as follows:

$$Log(CT\_HICT) = \alpha + \beta * TIME + \gamma * D + \delta * D * TIME$$

where D represents a dummy variable taking 0 for the period 2006:1 -2008:2 and 1 for the period 2008:3 – 2011:12.

The results are presented in table 1 (columns 2 and 3) and Figure 2 below. It can be inferred that there is indeed a change, in statistical terms, of the trend since the coefficient of the dummy variable D*time is statistically significant[5] (Gujarati, 1998).

Table 1: Regression results for testing the change in the trend of CT_HICP general index

Explanatory Variables	**Compared periods**			
	2006:1-2008:2, 2008:3-2011:12		2008:3-2010:2, 2010:3-2011:12	
	Coefficients	t-statistics	Coefficients	t-statistics
Constant	4.5258	353.0216	4.658172	215.0702
Time	0.0026	9.964880	0.000737	2.547073
Dummy	0.1163	7.313826	-0.007125	-0.183472
Dummy*Time	-0.0016	-5.718432	0.000139	0.316012
	R2=0.94		**R2=0.65**	
	D.W.=1.4		**D.W.=1.4**	

[3] The year 2005 is not included to avoid the effect of a change in taxes in this year.
[4] It seems from the quarterly GDP at constant prices that the recession started end of 2007 - beginning of 2008. The price index seems to respond to this recession in March 2008.
[5] Similar results are found using the Chow test. Also, similar results are found using exponential functions representing the trend.

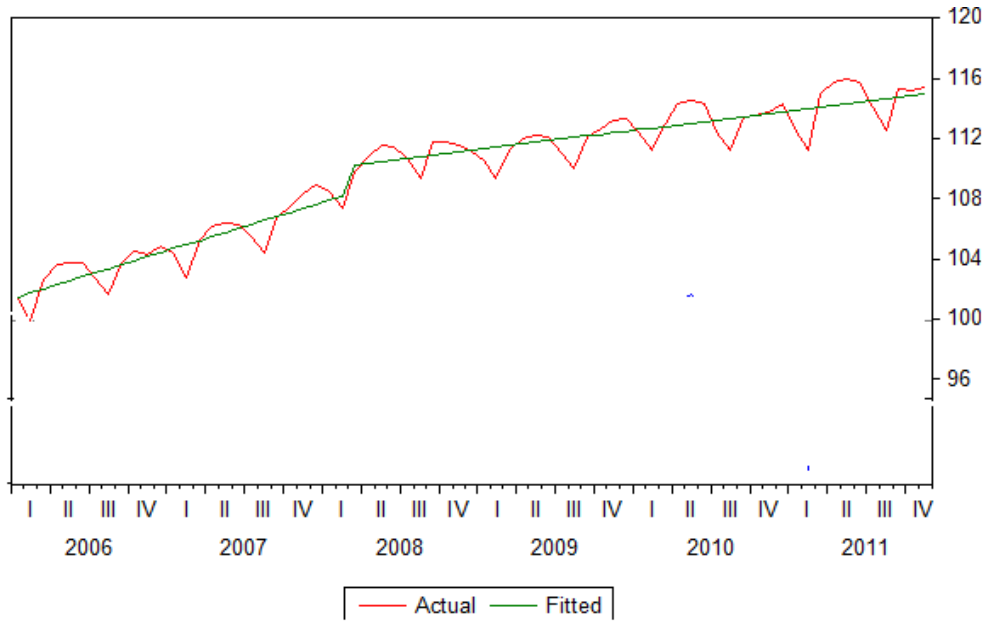


Figure 2: The changing trend of CT_HICP between the periods 2006:1-2008:2 and 2008:3-2011:11

The question is to what extent this change in inflation trend with constant indirect taxes can be attributed to the depression which dominated during this period and to what extent it can be attributed to the indirect taxation imposed during the same period. In other words, to what extent this was the outcome of loosening past demand pressures and/or of reducing cost components due to depression and to what extent this was the outcome of producers absorbing part of the indirect taxation by lowering their profits and/or their other cost components due to indirect taxes.

To disentangle these two effects, we considered the period only after the recession. A comparison was made of the sub period before the announcement and implementation of the indirect tax, i.e. before February-March 2010 and the period after these months. The results are presented in Table 1 (columns 4 and 5), and Figures 3 below. It can be inferred that, in statistical terms, there is no change of the coefficient, neither of the constant, nor of the trend, since the coefficients of the dummy variables D and D*t are not statistically significant[6].

[6] Considering the effect of indirect taxes, it would be more relevant to look at the significance of the constant, since the tax effect on the level of the price index is one step up and remaining at this new level.

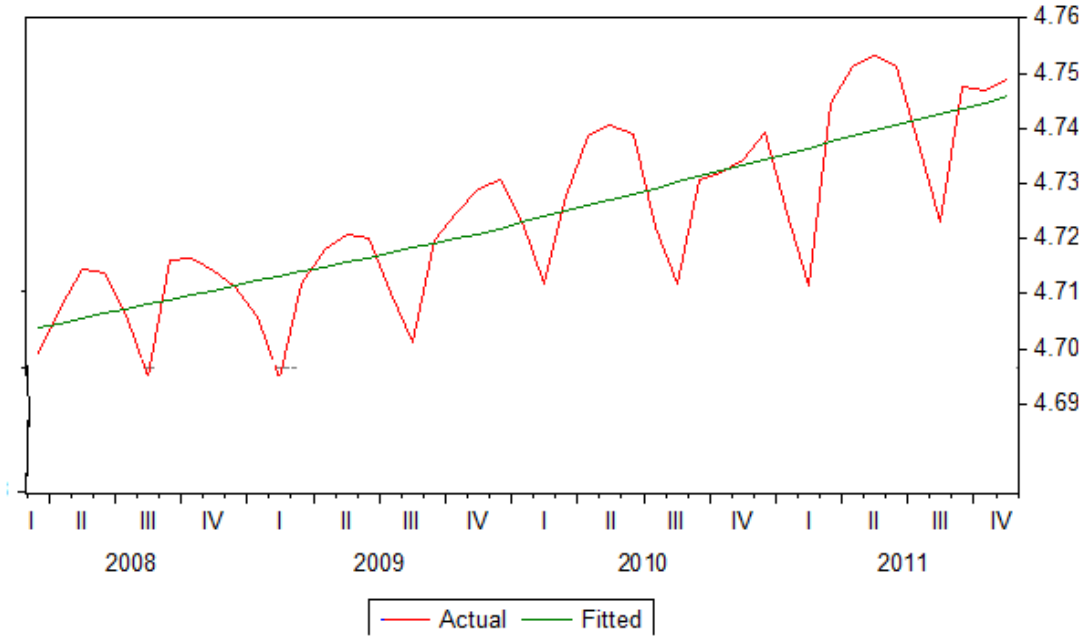


Figure 3: The comparison of the trend of CT_HICP between the periods 2008:3- 2009:122 and 2010:1-2011:11

An additional verification of the tax incidence can be made, relating the CT_HICP series with both unemployment rate representing the depression and the differences between HICP and CT_HICP representing the indirect taxation. The linear regression model is specified as follows:

$$CT\_HICT = \alpha + \beta * UR + \gamma * (HICP - CT\_HICP)$$

where UR represents the unemployment rate and HICP -CT_HICP the indirect taxation.

A statistically significant coefficient of indirect taxation would imply an impact of taxation on the other components of inflation mainly on profits. To the extent that this happens, it can be considered as absorption of indirect taxes and the incidence of these taxes are on both the consumers and the producers. The results of a linear function in first differences (due to high degree of autocorrelation in levels) are shown in Table 3. Contrary to the coefficient of unemployment rate, the coefficient of Indirect taxes does not show any significant effect of indirect taxation to the CT_HICP [7].

[7] A positive sign of the coefficient indicates that the imposition of indirect taxes provided the opportunity to the producers to increase prices in addition to the whole extent of tax increases, leading to increased profits.

In line with the findings of the article of Karagiannis and Panagopoulos, it can be inferred that during the period after the beginning of 2010, there has been at least a total shift of indirect taxes at the expense of the consumer.

Table 3: Regression results for testing the effect of recession and Indirect taxes on CT_HICP

Explanatory Variables	Sample 2006:1- 2011:09	
	Coefficients	t-statistics
Constant	0.218773	1.319226
UR	-0.394547	-1.737539
HICP-CT_HICP	0.214151	0.438016
	D.W.=2.07	

2.3 The contribution of indirect taxes to total inflation

The aforementioned empirical results imply that *the difference between the rates of change of HICP and HICP-CP, shows the least impact of tax changes on the rate of change of prices*, since it is found that there is at least an instant shift of the changes of tax rate to the final price that is actually paid by the consumer.

The % changes of the price index with current indirect taxes and with constant indirect taxes is shown on Table 4 as well as the contribution of indirect taxes to these changes for the years 2010 and 201, both on an annual basis and the average monthly figures.

Table 4: The contribution of indirect taxes to total inflation

Year	**% Change of HICP (1)**	**% Change of CT_HICP (2)**	**Contr/tion of Ind. Tax to Inflation (3) = (1)-(2)**	**% Contr/tion of Ind. Tax to Inflation (5) = (3)/(1)*100**
Yearly 2010	5.11	0.92	4.19	82.0%
Average Monthly 2010	0.43	0.08	0.35	
Yearly 2011	2.29	0.90	1.39	60.7%
Average Monthly 2011	0.19	0.07	0.12	

It can be inferred from the table that for the year 2010 the contribution of indirect taxes to the yearly inflation is around 4.19% out of 5.11%. This amounts to a percentage contribution to the yearly inflation rate of 82%. The same contribution on a monthly average inflation is 0.35% out of 0.43%.

For the year 2011 the contribution of indirect taxes to the yearly inflation is around 1.39% out of 2.29%. This amounts to a percentage contribution to the yearly inflation rate of 61%. The same contribution on a monthly average inflation is 0.12% out of 0.19%.

2.4 The contribution of indirect taxes to price changes within main categories and to the general index through main categories

Some consumption categories exhibit a relatively high rate of change in their prices. If the share of these categories into the consumer basket is relatively high, the contribution of this category to the general price change will be relatively high. In addition, some categories exhibit a relatively high indirect tax contribution to their price change. If all three conditions (high rate of change, high share and high tax contribution within the category) take place in a category, the contribution of indirect taxes to the general price change through this category will be relatively high.

It can be proved that the contribution of each category to the general HICP change is obtained by multiplying the rate of change of the price of the category by its share into the "basket" of HICP.

$$\frac{\Delta P}{P} = \frac{P_2 - P_1}{P_1}$$

$$P_1 = \sum_{j=01}^{12} P_{1j} * \frac{Q_j}{\Sigma Q_j} = \frac{1}{Q} \sum_{j=01}^{12} P_{1j} * Q_j$$

$$P_2 = \sum_{j=01}^{12} P_{2j} * \frac{Q_j}{\Sigma Q_j} = \frac{1}{Q} \sum_{j=01}^{12} P_{2j} * Q_j$$

$$P_2 - P_1 = \Delta P = \frac{1}{Q} \sum_{j=01}^{12} P_{2j} * Q_j - \frac{1}{Q} \sum_{j=01}^{12} P_{1j} * Q_j = \frac{1}{Q} \sum_{j=01}^{12} Q_j \left[P_{2j} - P_{1j} \right] = \frac{1}{Q} \sum_{j=01}^{12} Q_j * \Delta P_j$$

$$\frac{\Delta P}{P_1} = \frac{\sum_{j=01}^{12} Q_j * \Delta P_j}{\sum_{j=01}^{12} P_{1j} * Q_j} = \frac{\sum_{j=01}^{12} P_j Q_j * \frac{\Delta P_j}{P_j}}{\sum_{j=01}^{12} P_{1j} * Q_j} = \sum_{j=01}^{12} \frac{P_j Q_j}{\sum_{j=01}^{12} P_{1j} * Q_j} * \frac{\Delta P_j}{P_j}$$

In Tables 5a and 5b, this contribution is shown in column 4. As it can be seen in 2010 (table 5a) the categories with the higher contribution to the change of the general consumer price index (5.11%) are: Transport (1.78%), Housing–water-electricity-gas and other fuels (0.86%), Alcoholic- beverages-tobacco (0.82%), Clothing and footwear (0.70%), In 2011(table 5b) the categories with the higher contribution to the change of the general consumer price index (2.46%) are: Clothing and footwear (1.39%), Housing–water- electricity-gas and other fuels (0.71%),Food and non-alcoholic beverages (0.69%).

Based on the assumption of total incidence of indirect taxes on the price paid by consumer *for each category, the difference between the rates of change of HICP and HICP-CP in any category shows the least impact of tax changes on the rate of change in their prices*. In Tables 5a and 5b, this contribution is shown in column 5. As it can be seen in 2010 (table 5a) the categories in which indirect taxes had the most impact on their inflation are: Transport (11.71% out of 13.20%), Alcoholic- beverages-tobacco (11.40% out of 17.77%), Miscellaneous goods and services (4.5%% out of 3.58%) eat. In 2011 (table 5b) the categories in which indirect taxes had the most impact on their inflation are: Restaurants and hotels (6.8% out of 2.4%), Food and non-alcoholic beverages(2.05% out of 4.01%), Housing - water- electricity- gas and other fuels (1.44% out of 7.72%) etc.

Based on the assumption of total incidence of indirect taxes on the price paid by consumer *for each category, it can be proved that the product of the difference between the two rates HICP and HICP-CT of any category with the share of this category in the "basket" of HICP shows the contribution of indirect tax rates changes to the total inflation that originates from this category.*

$$\frac{\Delta P_{HICP}}{P_{HICP}} - \frac{\Delta P_{CT\_HICP}}{P_{CT\_HICP}} = \sum_{j=01}^{12} \frac{P_{jHICP} Q_{jHICP}}{\sum_{j=01}^{12} P_{jHICP} * Q_{jHICP}} * \frac{\Delta P_{jHICP}}{P_{jHICP}} - \sum_{j=01}^{12} \frac{P_{jCT\_HICP} Q_{jCT\_HICP}}{\sum_{j=01}^{12} P_{jCT\_HICP} * Q_{jCT\_HICP}} * \frac{\Delta P_{jCT\_HICP}}{P_{jCT\_HICP}}$$

Under the plausible assumption that

$$\frac{P_{jHICP} Q_{jHICP}}{\sum_{j=01}^{12} P_{jHICP} * Q_{jHICP}} = \frac{P_{jCT\_HICP} Q_{jCT\_HICP}}{\sum_{j=01}^{12} P_{jCT\_HICP} * Q_{jCT\_HICP}}$$

We obtain:

$$\sum_{j=01}^{12} \frac{P_{jHICP} Q_{jHICP}}{\sum_{j=01}^{12} P_{jHICP} * Q_{jHICP}} * \left[\frac{\Delta P_{jHICP}}{P_{jHICP}} - \frac{\Delta P_{jCT\_HICP}}{P_{jCT\_HICP}} \right]$$

Table 5a: The contribution of indirect taxes to the main category and to the general index through main categories, 2010

COICOP	Categories	Weights %	2010				
			% change HICP	% change CT_HICP	Contribution of category to the general	Contribution of taxes to the category	Contribution of taxes to the general
		(1)	(2)	(3)	(4) = (1)*(2)	(5) = (2)- (3)	(6) = (1)*(5)
01	Food and non-alcoholic beverages	17.3	1.96	0.15	0.34	1.81	0.31
02	Alcoholic, beverages, tobacco	4.6	17.77	6.38	0.82	11.40	0.52
03	Clothing and footwear	8.7	8.07	4.54	0.70	3.53	0.31
04	Housing, water, electricity, gas and other fuels	9.2	9.38	6.88	0.86	2.50	0.23
05	Furnishings, household equipment and routine house maintenance	6.5	2.35	-0.73	0.15	3.08	0.20
06	Health	7.4	1.31	0.17	0.10	1.14	0.08
07	Transport	13.2	13.47	1.76	1.78	11.71	1.55
08	Communication	4.0	1.47	-1.84	0.06	3.31	0.13
09	Recreation and culture	5.3	0.92	-1.11	0.05	2.03	0.11
10	Education	2.9	-0.10	-0.10	0.00	0.00	0.00
11	Restaurants and hotels	14.0	2.84	0.27	0.40	2.56	0.36
12	Miscellaneous goods and services	6.9	3.58	-0.92	0.25	4.50	0.31
00	**General index (HICP)**	100.0	5.11	0.92	5.11	4.18	4.18

Table 5b: The contribution of indirect taxes to the main category and to the general index through main categories, 2011

COICOP	Categories	Weights %	2011				
			% change HICP	% change CT_HICP	Contribution of category to the general	Contribution of taxes to the category	Contribution of taxes to the general
		(1)	(2)	(3)	(4) = (1)*(2)	(5) = (2)-(3)	(6) = (1)*(5)
01	Food and non-alcoholic beverages	17.3	4.01	1.96	0.69	2.05	0.35
02	Alcoholic, beverages, tobacco	4.6	4.93	7.06	0.23	-2.13	-0.10
03	Clothing and footwear	8.7	15.98	15.98	1.39	0.00	0.00
04	Housing, water, electricity, gas and other fuels	9.2	7.72	6.28	0.71	1.44	0.13
05	Furnishings, household equipment and routine house maintenance	6.5	0.79	0.77	0.05	0.02	0.00
06	Health	7.4	0.33	0.37	0.02	-0.04	0.00
07	Transport	13.2	0.62	0.37	0.08	0.25	0.03
08	Communication	4.0	-0.98	-0.98	-0.04	0.00	0.00
09	Recreation and culture	5.3	-0.49	-1.14	-0.03	0.65	0.03
10	Education	2.9	-1.03	-1.03	-0.03	0.00	0.00
11	Restaurants and hotels	14.0	2.84	-3.96	0.40	6.80	0.95
12	Miscellaneous goods and services	6.9	1.83	1.72	0.13	0.11	0.01
00	**General index (HICP)**	100.0	2.29	0.90	2.29	1.39	1.39

In Tables 5a and 5b, this contribution is shown in column 6. As it can be seen in 2010(table 5a), with a total tax contribution 4.18% (out of 5.11 change of the index) the categories taking the higher part in this total tax contribution are: Transport (1.55%), Alcoholic- beverages-tobacco (0.52%), Restaurants and hotels (0.36%) Food and non-alcoholic beverages (0.31%), Clothing and footwear (0.31%), Miscellaneous goods and services (0.31%) etc. In 2011 (table 5b), with a total tax contribution 1.39% (out of 2.29% change of the index) the categories taking the higher part in this total tax contribution are: Restaurants and hotels (0.95%). Food and non-alcoholic beverages (0.35%), Housing - water- electricity- gas and other fuels (0.13%).

3 Conclusion

In this paper a relatively simple methodology is proposed for analyzing inflation rate when indirect taxes are imposed. The time series of CT_HICP and the dummy variables techniques in regression analysis are used to infer about the change of the trend in inflation with constant taxes during the period after the imposition of the indirect taxes. The evidence of at least a full tax incidence on the consumer is checked once more by regressing CT_HICP during the period of recession on UR, representing the recession variability, and on the difference between HICP and CT_HICP representing indirect taxes variability.

Having concluded that there is not any absorption of the indirect taxes, its contribution to the rate of change of the general HICP is estimated taking the differences of the *rates of change* between the HICP and CT_HICP. The contribution of the indirect taxes through each 2-digit category to the general HICP rate of change is shown to be the outcome of the product of the differences between the rates of $HICP_I$ and CT_HICP_I and the share of the category (i) into the basket of the consumer. The results showed that the contribution of indirect taxes to the general inflation represented by HICP is at least 82% in 2010 and 61% in 2011. In the 2-digit categories the most significant contribution of indirect taxes to their inflation rates was ranged from 44% to 87%. The contribution of indirect tax changes to the total inflation that originates from each category, in 2010 reached 1.55% for Transport 0.52% for Alcoholic-beverages-tobacco and 0.36% for Restaurants and hotels while for 2011 the highest contribution was identified in Restaurants and hotels (0.95%), Food and non-alcoholic beverages (0.35%), Housing - water- electricity- gas and other fuels (0.13%).

In a future work any absorption or overshooting of inflation as a reaction to the imposition of indirect tax could be estimated and be taken into consideration when measuring the contribution of indirect taxes to inflation by category.

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Appendix

Table A1: Monthly data on Harmonized Index of Consumer Price (HICP) and HICP with constant 2005 indirect taxes rate (CT_HICP)

Month -Year	HICP	CT_HICP	UR	Month -Year	HICP	CT_HICP	UR	Month- Year	HICP	CT_HICP	UR	Month -Year	HICP	CT_HICP	UR
1 - 05	98.7	99.2	10.4	1 - 07	104.8	104.4	8.6	1 - 09	111.0	110.6	9.4	1 - 11	119.2	112.7	15.1
2 - 05	97.0	97.6	10.4	2 - 07	103.1	102.8	9.0	2 - 09	109.8	109.3	9.1	2 - 11	117.6	111.2	15.9
3 - 05	99.5	100.1	10.6	3 - 07	105.7	105.3	9.5	3 - 09	112.0	111.3	9.2	3 - 11	121.4	115.0	16.2
4 - 05	100.3	100.1	9.9	4 - 07	106.5	106.2	8.4	4 - 09	112.5	112.0	9.4	4 - 11	122.2	115.7	15.8
5 - 05	100.6	100.5	9.6	5 - 07	106.7	106.4	7.7	5 - 09	112.8	112.2	8.5	5 - 11	122.4	116.0	16.6
6 - 05	100.4	100.3	9.5	6 - 07	106.6	106.3	8.2	6 - 09	112.7	112.2	8.6	6 - 11	122.2	115.7	16.0
7 - 05	99.1	98.9	9.6	7 - 07	105.8	105.5	7.8	7 - 09	111.8	111.1	9.6	7 - 11	120.5	114.1	16.5
8 - 05	98.6	98.4	9.9	8 - 07	104.8	104.4	7.6	8 - 09	110.9	110.1	9.0	8 - 11	118.8	112.5	18.4
9 - 05	100.9	100.7	9.7	9 - 07	107.1	106.8	8.3	9 - 09	113.0	112.1	9.1	9 - 11	122.8	115.3	17.5
10 - 05	101.6	101.4	9.5	10 - 07	107.9	107.5	7.9	10 - 09	113.6	112.7	9.8	10- 11	123.0	115.2	18.2
11 - 05	101.3	101.1	10.0	11 - 07	108.7	108.3	7.6	11 - 09	114.3	113.2	10.6	11-11	123.2	115.4	
12 - 05	101.9	101.7	9.7	12 - 07	109.2	108.9	8.9	12 - 09	114.5	113.4	10.2	12-11	123.0	115.2	
1 - 06	101.7	101.5	9.6	1 - 08	108.9	108.4	8.0	1 - 10	113.6	112.5	11.3				
2 - 06	100.1	99.9	10.4	2 - 08	107.8	107.4	8.0	2 - 10	112.9	111.2	12.1				
3 - 06	102.8	102.6	9.2	3 - 08	110.3	109.9	9.0	3 - 10	116.4	113.0	11.6				
4 - 06	103.8	103.7	9.0	4 - 08	111.2	110.8	7.7	4 - 10	117.8	114.3	11.9				
5 - 06	104.0	103.8	9.2	5 - 08	112.0	111.5	6.6	5 - 10	118.7	114.5	12.0				
6 - 06	103.9	103.7	8.3	6 - 08	111.9	111.5	7.3	6 - 10	118.5	114.3	11.6				
7 - 06	103.0	102.8	8.1	7 - 08	111.1	110.6	7.0	7 - 10	118.0	112.4	12.0				
8 - 06	102.0	101.7	8.6	8 - 08	109.8	109.4	7.1	8 - 10	117.2	111.2	12.2				
9 - 06	104.1	103.8	8.2	9 - 08	112.2	111.7	7.4	9 - 10	119.4	113.4	12.6				
10 - 06	104.7	104.5	7.7	10 - 08	112.2	111.8	7.4	10 - 10	119.5	113.5	13.5				
11 - 06	104.6	104.3	9.1	11 - 08	112.0	111.5	7.8	11 - 10	119.8	113.8	13.9				
12 - 06	105.2	104.9	9.3	12 - 08	111.6	111.2	8.9	12 - 10	120.4	114.3	14.8				

Source: El STAT and EUROSTAT