PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Estimates of price and income elasticity in Greece: Greek debt crisis transforming cigarettes into a luxury good - an econometric approach
AUTHORS	Tarantilis, Filippos; Athanasakis, Kostas; Zavras, Dimitris; Vozikis, Athanasios; Kyriopoulos, Ioannis

VERSION 1 - REVIEW

REVIEWER	Evan Blecher American Cancer Society, United States
REVIEW RETURNED	03-Mar-2014

GENERAL COMMENTS	The paper does not fully describe the data used. What is the time period and frequency of data in the regressions? Furthermore, while a dynamic model was rejected what was the statistical tests to confirm this? Finally, since the data used is time series why were appropriate time series techniques dealing with stationarity and cointegration not used? You have not justifiable that the regression results are not spurious. In modern economic analysis, these issues are absolutely necessary and have not been addressed at all.

REVIEWER	Jie-Min Lee Department of Shipping and Transportation Management, National Kaohsiung Marine University Taiwan
REVIEW RETURNED	07-Mar-2014

GENERAL COMMENTS	The objective of this study is to assess smokers' sensitivity to cigarette price and consumer income changes as well as to project health benefits of an additional tax increase.I felt the topic of the paper is interested. However, what confused me is that the short run income elasticity(1.04) is bigger than short –run price elasticity(-0.441). The authors also simulation the effects of cigarette tax increase in table 2, they seem to imply that (1) Falling in consumption due to income decrease is -4.99%, and (2) Falling in consumption due to price increase -5.55% in Scenario1.These statements seem contradictory. Finally, I find the smoking restrictions variable be incorporating in conventional demand model, but in the results section didn't see the estimation results.I think the authors could elaborate on what they make of all of this.There are few places where clarifications or more details are needed (see specific comments below).

	1.On page2, the Abstract part, the firs sentence “Addiction models were unable to provide statistically significant information due to a nearly 23.5% drop in consumption during “in Results section need to delete. 2. On page8, More detailed description about the data collection and study design is helpful. For example, All variables data is monthly or quarterly data. These sample data’s period is from 2007 to 2011. . On page9, testing for endogeneity of cigarette prices was not possible as the annual tax rates were only available from 2008 onwards. Why not consider other variables to testing for endogeneity of cigarette prices. Please give more details. 3. On page 11, Please add a sentence to explain the cigarette price per pack is 3.976€ in 2010 (include Sales tax for cigarettes is fixed at 23% of the retail price). 4. On page 11, Please include a sentence to explain how the SR coefficient in conventional demand model is to be interpreted. 5. On page 13, Discussion. Re the comments about what the model predicts will happen to total tax revenue - I suggest that the authors add data on what actually happened? (Which should be available from the tax administration authority) 6. On page 14, the last paragraph I think the manuscript could be strengthened by adding endogeneity of cigarette prices and addiction models were unable to provide statistically significant information that discuss the limitations of the study.

VERSION 1 – AUTHOR RESPONSE

In response to Reviewer #1 comments:

“The paper does not fully describe the data used. What is the time period and frequency of data in the regressions?”

In response to the comment, we have specified the data used in the analysis as annual and referring to the time period from 1994 to 2012 (18 observations). Data and the rationale for the value chosen in the analysis (annual consumption per person over 15) are addressed in the first paragraph of the “Methods” section.

“Furthermore, while a dynamic model was rejected what was the statistical tests to confirm this?”

As in the conventional (static) model of demand case, a regression analysis was performed in order to estimate the relationship between variables. The stepwise method was chosen, as more reliable. The main indicator used was p value of the regression analysis. We have added a paragraph in the “Results” section, in order to explain why addiction (dynamic) models were rejected (“Through the myopic addiction model, the additional variable (lnQt-1) shows no statistical significance. Therefore the model remains unchanged. Through the rational addiction model, only the variable representing following year’s consumption (lnQt+1) is found significant (p value asymptotically equal to 0), with substantially lower levels of fit (R square). Thus, we conclude that addiction models fail to offer additional information on how consumption is influenced.”)

“Finally, since the data used is time series why were appropriate time series techniques dealing with stationarity and cointegration not used? You have not justifiable that the regression results are not spurious. In modern economic analysis, these issues are absolutely necessary and have not been addressed at all.”

Thank you for addressing the matter. We have updated the analysis by performing an Augmented

Dickey-Fuller test, as more reliable than the Philipps-Perron test. Results (at a 5% confidence level) indicate that the set of variables used is cointegrated and that regression is not spurious.

In response to Reviewer #2 comments:

“The objective of this study is to assess smokers’ sensitivity to cigarette price and consumer income changes as well as to project health benefits of an additional tax increase. I felt the topic of the paper is interested. However, what confused me is that the short run income elasticity (1.04) is bigger than short –run price elasticity (-0.441).”

Thank you for your kind remarks. As far as elasticities are concerned, that’s the major result of the analysis; whereas price elasticity is in accordance with previous research, income elasticity is greater than 1, indicating that cigarettes could be viewed as a luxury good.

“The authors also simulation the effects of cigarette tax increase in table 2, they seem to imply that (1) Falling in consumption due to income decrease is -4.99%, and (2) Falling in consumption due to price increase -5.55% in Scenario1.These statements seem contradictory.”

According to economic theory (e.g. Samuelson and Nordhaus, Microeconomics, 2001), elasticity measures the responsiveness of the quantity demanded of a good to a change of a factor, ceteris paribus. An increase in the price of a good results in a decrease of the demanded quantity (unless it is Veblen or Giffen good, which a very rare occurrence) and a decrease in personal disposable income results in a decrease of the demanded quantity (unless income elasticity is negative). In the study’s case, both the price increase (through tax increase) and the projected fall in income (due to recession) work in the same direction regarding their impact on consumption.

“Finally, I find the smoking restrictions variable be incorporating in conventional demand model, but in the results section didn’t see the estimation results.”

In an attempt to clarify why smoking restrictions were omitted from the results, we have added the estimated p value in the “Results” section [“The variable created to capture the effect of smoking restrictions was found non-significant (p value asymptotically equal to 0.303 at 5% confidence level)”]

“On page2, the Abstract part, the first sentence “Addiction models were unable to provide statistically significant information due to a nearly 23.5% drop in consumption during “in Results section need to delete.”

In agreement to your view on the matter, the sentence was deleted from the abstract of the analysis, as it offers no meaningful additional information.

“On page8, More detailed description about the data collection and study design is helpful. For example, All variables data is monthly or quarterly data. These sample data’s period is from 2007 to 2011.”

The reference to the aforementioned set of data is deleted, as it does not add value to the analysis. The base set data is further specificated as annual data, from 1994 to 2012. Data source was the Greek Ministry of Finance.

“On page9, testing for endogeneity of cigarette prices was not possible as the annual tax rates were only available from 2008 onwards. Why not consider other variables to testing for endogeneity of cigarette prices. Please give more details.”
In order to investigate the endogeneity of prices, we performed a Hausman’s test. As per the test’s

results, we couldn't safely assume that prices are endogenous. A sentence was added in the "Discussion" section on how this weakness could be addressed ("Furthermore, the study could be strengthened by employing statistical tests on more observations, regarding the endogeneity of cigarette prices.")

"On page 11, Please add a sentence to explain the cigarette price per pack is 3.976€ in 2010 (include Sales tax for cigarettes is fixed at 23% of the retail price)."

Prices were deflated in order to account for real values. The cigarette price per pack in 2012 is €3.97 and €3.59 in 2010 (in real values, 2005 base). We have added the word "nominal" in the paragraph's beginning in order to avoid confusion on the matter.

"On page 11, Please include a sentence to explain how the SR coefficient in conventional demand model is to be interpreted."

We have updated SR coefficient's definition as "SRt : index of smoking restrictions or bans according to law in year t"

"Discussion. Re the comments about what the model predicts will happen to total tax revenue - I suggest that the authors add data on what actually happened? (Which should be available from the tax administration authority)"

A direct comparison between our estimations and the actual numbers is a great idea and would offer great insight both to policy makers and researchers. Unfortunately, in Greece, data availability from authorities is observed to lag. Data for 2013 are not available yet and there exists no update on when they could become available.

"On page 14, the last paragraph I think the manuscript could be strengthened by adding endogeneity of cigarette prices and addiction models were unable to provide statistically significant information that discuss the limitations of the study."

Thank you for providing a view that could strengthen the analysis. Both subjects were added to the limitations of the study as follows:
1. "As regards to the limitations of this study, it must be noted that addictions models were unable to provide statistically significant information, possibly due to the inclusion of 2012 data in the time series".
2. "Furthermore, the study could be strengthened by employing statistical tests on more observations, regarding the endogeneity of cigarette prices".

Overall, we made an effort to carefully address all comments raised by the reviewers, bearing in mind the word count limitations, in an attempt to revise and (hopefully) improve our previous submission. In any case, we do remain at your disposal, should any further changes be deemed necessary.

VERSION 2 – REVIEW

REVIEWER	Eduardo Fe University of Oxford, United Kingdom
REVIEW RETURNED	07-Jul-2014

GENERAL COMMENTS	This article puts forward estimates of income and price elasticity derived from a demand model of cigarette consumption in Greece.

	My comments relate to the implementation of the statistical methodology only and will not refer to the suitability of the methods chosen to address the question of interest (although, from my point of view, the main limitation of the study is that endogeneity is not addressed. This severely limits the credibility of the results) The author(s) explore a series of competing time series models, each motivated by previous published work. They test for asymmetries in the distribution of outcomes as well as heteroskedasticity –since they are using OLS, only the latter seems relevant, as OLS is "distribution free". Because parametric tests for heteroskedasticity are not consistent, I had used "robust" standard errors regardless. I don't completely understand the use of the D-F test for a unit root in the "conventional demand model" –where is the lagged dependent variable? All this considered, the implementation of statistical methods is adequate and the above are, from a statistical point of view, just minor comments that need not preclude publication of the article.

VERSION 2 – AUTHOR RESPONSE

In response to Reviewer #3 comments:

"From my point of view, the main limitation of the study is that endogeneity is not addressed. This severely limits the credibility of the results"

As far as price endogeneity is concerned, reckoning the fact that time series available was relatively short, we assumed that there exists little interaction between supply and demand in the local tobacco market. Thus, with supply considered definitely elastic, price can be viewed as exogenous and the "identification problem"(1) does not arise. The subject is addressed in the discussion section, as a limitation of the study as follows:

"The study could be strengthened by employing statistical tests on more observations, regarding the endogeneity of cigarette prices"

"They test for asymmetries in the distribution of outcomes as well as heteroskedasticity -since they are using OLS, only the latter seems relevant, as OLS is "distribution free". Because parametric tests for heteroskedasticity are not consistent, I had used "robust" standard errors regardless."

We used test for normalilty on the residuals in order to check the distribution of the time series. Moreover, since heteroskedasticity can seriously affect the regression analysis and invalidate statistical tests, we used the Breusch–Pagan test on the residuals to conclude whether the estimated variance of the residuals from a regression is dependent on the values of the independent variables(2). Since the Breusch–Pagan test leads to the notion that conditional heteroskedasticity does not exist, we omitted further research i.e. robust standard errors or the Hansen method.

"I don't completely understand the use of the D-F test for a unit root in the "conventional demand model" -where is the lagged dependent variable?"

We performed cointegration techniques in order to give our study a sound basis, examining whether

the time series is stationary or not and the regression is spurious or not. Unit root test can imply that lagged variables actually exist and we tried to offset that possibility. We used an extended version of the Dickey-Fuller test(3) (Augmented Dickey-Fuller test, ADF) on the residuals (without constant and trend).

Overall, we made an effort to carefully address all comments raised by the reviewer, in an attempt to ensure that the statistical methodology used is up-to-date and suitable for the analysis. In any case, we do remain at your disposal, should any further changes be deemed necessary.

Yours Sincerely

Filippos Tarantilis,

Lead Author Manuscript ID bmjopen-2013-004748

On behalf of the team of authors

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3. Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. Journal of the American statistical association, 74(366a), 427-431.