AN ALTERNATIVE PROPOSAL FOR VAT ON CONSUMPTION IN GREECE

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Abstract

It is well established that a reduction in consumption VAT rates during an economic crisis, followed by the introduction of a single VAT rate rather than multiple rates, may significantly increase tax revenues through improved collectability of VAT due to increased consumption as well as reduction of tax evasion and avoidance. This paper presents the economic impact on the Greek economy of the establishment of a basic VAT rate of 20 per cent for most consumer goods and services, with a reduced VAT rate of 10 per cent for certain socio-economically important goods and services.

Keywords: VAT rates; consumption; elasticity of demand; tax revenue; Greece

INTRODUCTION

VAT has been a major issue in Greek fiscal reforms in recent years. Successive increases in VAT rates following the country's entry into financial surveillance programmes, combined with a decline in household incomes owing to recession, have resulted in a considerable reduction in government revenues from VAT (Skintzi, 2015). Consumption has dropped dramatically, while tax evasion and avoidance have increased (Artavanis, 2015). Several studies (Hakim, 2009; Bye et al., 2003; OECD, 2010a; Hall, 2005; Boeters et al., 2006; Artavanis, 2015; Hellenic Parliament, 2015) show that a reduction in VAT rates during an economic crisis, followed by the introduction of a single VAT rate (with a few exceptions for essential goods) may significantly increase tax revenues without increasing the tax burden. This can be achieved through improved VAT collectability resulting from a subsequent increase in consumption, as well as by broadening the VAT base, lowering administrative costs and reducing tax evasion and avoidance.

In this study, we present the economic impact on Greece of the establishment of a uniform basic VAT rate of 20 per cent (rather than the existing 23 per cent) for most consumer goods and services, with a reduced VAT rate of 10 per cent for certain socio-economically important goods and services. Various compensation measures might be adopted for those likely to suffer most from the suggested VAT reform, for example as a result of higher VAT rates or abolition of exemptions, but these are beyond the scope of this study.

We apply two alternative scenarios ("economic" and "social"), using a combination of socio-economic criteria such as the elasticity of demand, the level of social preference, the degree of competitiveness and the share of consumer goods in household budgets. We conclude that VAT

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revenues from the suggested reform would result in a quite significant increase on current (2014) VAT revenues, with a lower tax burden for the majority of consumers.

PROBLEMS OF THE CURRENT VAT SYSTEM IN GREECE

The current (2014) VAT system consists of a basic rate of 23 per cent, a reduced rate of 13 per cent, and an over-reduced rate of 6.5 per cent for certain essential goods. In the Aegean Islands, all VAT rates have been further reduced by 30 per cent, although this reduction was partially removed in 2016 and will be totally removed by the end of 2017. The available data suggest that successive VAT rate increases introduced over a short period of time (from 19%, 9% and 4.5% in March 2010 to 23%, 13% and 6.5% in November 2011) were intended to increase public revenues. However, as shown in Table 1, VAT revenues have not only failed to rise, but have actually fallen by 21 per cent over the last five years (Skintzi, 2015). This may have resulted from reduced consumption owing to higher prices and the post-crisis recession, as well as higher tax evasion and avoidance.

TABLE 1: TAX BASE AND REVENUES FROM VAT

Category (amounts in € billion)	2010	2014	Δ 2014/2010
Taxable individual income	**100.6**	**64.0**	**-36%**
Taxable corporation income	**15.1**	**9.9**	**-34%**
Total taxable income (tax base)	**115.7[1]**	**73.9[2]**	**-36%**
GDP[3]	**226.0**	**177.9**	**-21%**
VAT revenue[4]	**16.0**	**12.7**	**-21%**

Source: [1] www.gsis.gr; [2] www.cnn.gr; [3, 4] Eurostat (http://ec.europa.eu/eurostat/web/national-accounts/data/database)

In 2010, the reported total income from both individuals and corporations was €115.7 billion, while in 2014 it was less than €74 billion. Thus, the reduction in the tax base over the last five years of changes (and especially increases) in VAT rates was 36 per cent, much higher than the 21 per cent fall in GDP over the same period (Table 1, Column Δ 2014/2010), resulting in a loss of revenue due primarily to tax evasion and avoidance and partly to recession. This is supported by other studies (Artavanis, 2015; OECD, 2016a). Since VAT revenues account for about seven per cent of annual GDP and are the largest source of tax revenues after insurance contributions, their efficient collection is crucial to improving the country's consolidated budget.

One method of measuring the efficiency of VAT collection, which focuses on the effectiveness of compliance and collection (compliance efficiency), is to calculate the VAT gap. The VAT gap is the difference between actual VAT revenues (VR), calculated by Eurostat, and the potential income from VAT (VAT total tax liability, VTTL), measured by the national accounts and the current structure of VAT rates. The VTTL is calculated by mapping information on standard and reduced rates and exemptions onto available data on final and intermediate consumption. The VAT gap is usually expressed as a percentage of VTTL. The higher the VAT gap, the higher a country's tax evasion, bankruptcies, late payments and avoidance (Skintzi, 2015). According to data from the European Commission (Barbone et al., 2014, 2015), the average VAT gap in Greece between 2000 and 2010 was 28 per cent (or 2.8 per cent of GDP). However, since 2011 when the current VAT rates were applied, it has increased to an average of 32 per cent (or 3.5 per cent of GDP), despite an improvement in 2014 (Poniatowski, 2016) owing to a significant fall in VTTL together with temporarily higher tax compliance (Bank of Greece, 2016). The EU average is less than half that of Greece, at around 14 per cent.

An alternative method of measuring VAT collection efficiency, used by the OECD, is to calculate the VAT revenue ratio (VRR). This is defined as the ratio of realised revenues from VAT to potential incomes from VAT, when applying the basic VAT rate to the potential tax base. The difficulty with VRR lies in determining the potential tax base, although it is usually expressed as the difference between final consumer expenditure and actual VAT revenues. Essentially, the VRR combines policy efficiency (i.e. the amount that could theoretically be collected if the basic VAT rate were applied across the tax base in the absence of reduced VAT rates and exemptions) and compliance efficiency (i.e. the amount that could theoretically be collected by the state if all VAT were collected). If a country has a very low VRR (close to zero), this means either that reduced VAT rates are being applied in many cases, or that there are many exceptions to the basic VAT rate, or that there is a failure in the collection of VAT, or a combination of all three (Skintzi, 2015). For Greece, the VRR in 2014 was 0.37, well below the average of 0.56 for OECD countries (OECD, 2016b). A study by the Bank of Greece (2014) shows that low efficiency for VAT in Greece compared with other OECD countries is due largely to the considerable number of exemptions and exceptions from the basic rate.

From both methods, it is evident that Greece has a significant VAT collectability problem (OECD, 2016a), resulting in an annual average loss of €7.5 billion per year from 2009 onwards (Skintzi, 2015). To improve the situation, a series of interventions is required, including mandatory use of electronic transactions, enhanced tax assessment mechanisms, fiscal stability, and reduction of the tax burden by selecting the most appropriate (lower) tax rate (Hakim, 2009; Bye et al., 2003; Bank of Greece, 2016). The latter seems particularly necessary since, intuitively, during times of recession the ability to pay taxes decreases. As predicted by the Laffer curve, which relates income to the tax rate, increasing tax rates beyond a certain point begins to have the opposite effect on government revenues, mainly due to reduced economic activity and increased evasion. Studies of fiscal policy on tobacco products in Greece (Foundation for Economic and Industrial Research, 2014; Center of Planning and Economic Research; 2014) show that the rise in tax rates was followed by a reduction in government revenues and, above all, a huge rise in smuggling. Similar results occurred following a tax increase on heating oil. Therefore, the appropriate economic policy during times of recession is to reduce rather than increase the tax burden. This argument is also supported by the international literature (Hakim, 2009; Bye et al., 2003; Artavanis, 2015).

Moreover, strengthening consumer confidence is as important as structural reforms, since tax evasion is not a cause but a result of a lack of confidence in the state (Wintrobe & Gërxhani, 2004; Hayoz & Hug, 2007). A so-called "tax consciousness" develops in countries where governments use taxpayers' money on merit, rationally and in the interests of society. A straightforward way to accomplish this in Greece is to adopt a stable taxation system with a uniform tax rate.

CHANGES IN CONSUMPTION DURING RECESSION

To determine the impact of the proposed VAT reform on consumption and, more generally, on the economy, our primary data source is the Household Budget Survey of the Hellenic Statistical Authority, spanning the period 2010–2014 (HSA, 2010–2014). The impact of the financial crisis on the consumption of various products and services by Greek households (see Table 2 and Figures 1A and 1B) depends on changes in preferences relating directly to basic consumer needs and, at the micro level, the price elasticity of demand, e (p).

TABLE 2: CHANGES IN HOUSEHOLD CONSUMPTION (2010–2014)

CATEGORY	2010	2011	2012	2013	2014	Δ 2014/ 2010	VAT (2014)	|ε(p)|+sde.
Food	**18.0**	**19.5**	**20.1**	**20.4**	**20.5**	**13.9**	**13**	**0.5 ± 0.1**
Housing/heating/water/electricity	**11.7**	**12.6**	**13.9**	**13.7**	**13.4**	**14.5**	**23/13**	**0.4 ± 0.1/ 0.2 ± 0**
Transport/fuel	**13.5**	**13.2**	**12.8**	**12.5**	**12.7**	**-5.9**	**13/23**	**0.5 ± 0.1/ 0.2 ± 0**
Hotels/restaurants	**10.7**	**10.4**	**9.8**	**9.6**	**9.8**	**-8.4**	**6.5/13**	**1.1 ± 0.1/ 1.7 ± 0.7**
Various goods & services	**10.4**	**10.0**	**9.5**	**9.3**	**9.2**	**-11.5**	**23**	**0.8 ± 0.3**
Health/medicine	**6.4**	**6.3**	**6.4**	**6.9**	**7.2**	**12.5**	**13/6.5**	**0.3 ± 0/ 0.1 ± 0**
Clothing & footwear	**7.2**	**6.2**	**5.8**	**5.8**	**5.9**	**-18.1**	**23**	**0.9 ± 0.1**
Durable goods	**6.7**	**6.0**	**5.8**	**5.6**	**5.0**	**-25.4**	**23**	**1.3 ± 0**
Leisure/culture/books/theatre	**4.7**	**4.7**	**4.5**	**4.6**	**4.7**	**0**	**23/13/6.5**	**1.1 ± 0/0.6 ± 0/ 0.1 ± 0**
Communications	**4.0**	**4.0**	**4.2**	**4.1**	**4.1**	**2.5**	**23**	**1.6 ± 0**
Alcohol/tobacco	**3.5**	**3.6**	**3.8**	**4.2**	**4.0**	**14.3**	**23**	**1.1 ± 0/0.4 ± 0**
Education	**3.3**	**3.5**	**3.5**	**3.4**	**3.5**	**6.1**	**0**	**0.4 ± 0.1**

Notes: values given are the percentage contribution of each category to total annual consumption; sde = standard deviation error

According to basic economic theory, the price elasticity of demand describes the ratio of the percentage change in the quantity demanded of a good to the percentage change in its price. By introducing into our analysis the inverse elasticity rule,[3] which assumes that demand for each good depends only on its own price, we conclude that the rate at which a commodity is taxed should be inversely proportional to the absolute value of its elasticity of demand. Thus, goods with low elasticities of demand should be taxed relatively highly. Of course, the application of this rule to every different kind of good or service (as suggested by economic theory) is not administratively feasible; therefore, the application of different elasticities to broader categories is more efficient.

The last column of Table 2 shows the elasticity of demand as an absolute (positive) number, with prices drawn from average elasticities established by various studies (see Appendix). The calculated error is the standard deviation error derived from relevant statistical theory. Thus, if $|e(p)| < 1$, the demand is considered inelastic, i.e. the quantity demanded of that good will decrease (increase) less than the corresponding increase (decrease) in its price; while if $|e(p)| > 1$, the demand is considered elastic and changes in the quantity demanded vary more than price changes. Goods that have zero elasticity of demand are completely inelastic, i.e. whatever the change in price, they will still have a steady demand. One such good is medicine (with $|\varepsilon(p)| = 0.1$), as shown in Table 2.

Note that for the major category, "Housing/heating/water/electricity" presented in Table 2, two different elasticities are adopted: one is the average of the elasticities of sub-classes with a 23 per cent VAT rate (housing and heating) and the other is the average of the elasticities of sub-classes with a 13 per cent VAT rate (water and electricity). These elasticities are given in the last column of Table 2. There are also different elasticities for different VAT rates on transport and fuel, the provision of health services and medicines, hotels and restaurants, and the major

[3] The inverse elasticity rule is also called the Ramsey rule for optimal excise taxation and is often followed in designing tax policy (Selim, 2007)

category "Leisure/culture/books/theatre" (the latter is subject to the over-reduced VAT rate of 6.5%). On the other hand, items in the "Alcohol/tobacco" category have very different elasticities, even though the VAT rate is the same (23%); this relates to consumer behaviour trends with respect to these goods.

Based on the data shown in Table 2 Column Δ 2014/2010, which describes the percentage change in the contribution of each category to total consumption for the period 2010–2014 compared with consumption in 2010, the proportion of household budgets spent on basic consumer goods (food, housing and health) increased as consumption shifted to these necessary categories of goods owing to reduced available income. Such behaviour would be expected, given their low elasticity of demand, with the price reduction resulting from the recession leading to an increase in quantity demanded. The relatively large percentage increase in the proportion of the "Alcohol/tobacco" category in the average household budget (14.3% greater in 2014 than at the beginning of the crisis) may be because this category is viewed as a substitute for some luxury goods or for psychological reasons relating to the prolonged crisis (higher unemployment, lower income). Some goods and services with increased significance in the family budget remained almost unchanged (transport, leisure, communications and education), while the share of consumption of other goods decreased following the economic downturn. Of all goods and services, those that increased in value from 2011 onwards were housing (CPI change 13m/m) and "Alcohol/tobacco" (CPI change 8m/m) (HSA, 2015).

Figures 1A and 1B represent changes in the proportion of various categories of consumption by the average household for the period 2010–2014. Consumption trends for several categories of goods changed significantly. Figure 1A shows the five largest categories of goods as a percentage of total household consumption (using values from Table 2). This shows that the curve for "Housing/heating/water/electricity" rose above the "Transport/fuel" curve, since housing services acquired greater importance in the household budget as a more necessary commodity than transport services, while the "Food" curve steepened because food accounted for a greater proportion of the household budget.

Figure 1B presents the remaining consumption categories from Table 2 (with lower contributions to the household budget). The categories "Clothing & footwear" and "Durable goods" fell dramatically during the period under investigation (as secondary and more flexible goods), while health services increased their contribution to the household budget (as more essential goods).

FIGURE 1A: % CHANGE IN MAIN CONSUMPTION CATEGORIES (2010–2014)

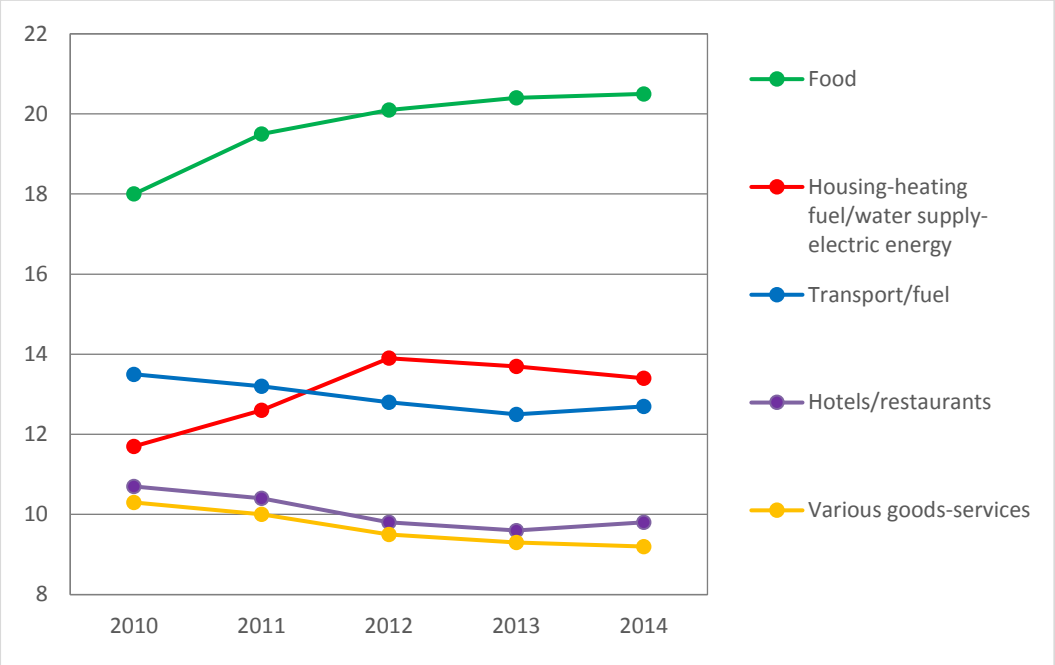
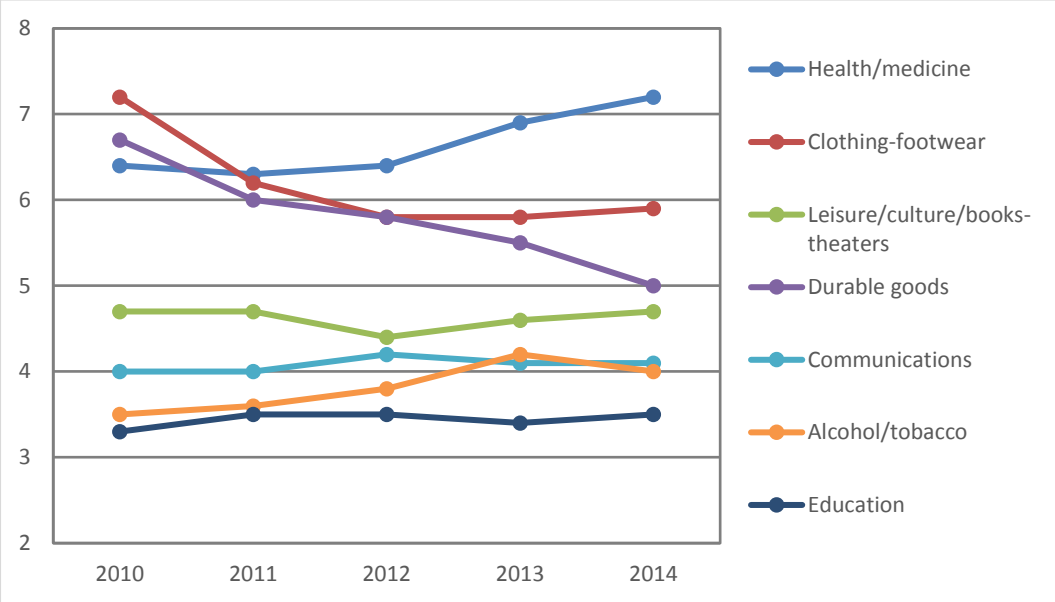


FIGURE 1B: % CHANGE IN REMAINING CONSUMPTION CATEGORIES (2010–2014)



The observed shift in household consumption priorities arose from the beginning of the crisis (2010), leading to a considerable loss in household income, while the increase in VAT rates after 2011 and the subsequent increase in prices led to further deterioration.

Useful conclusions relating to changes in VAT rates and consumption can be drawn by investigating fluctuations in VAT rates applicable to restaurants to identify the relevant elasticity for that particular sector. The high VAT rate of 23 per cent for restaurant services lasted for almost two years, until in August 2013 the rate returned to 13 per cent. The sharp change in this sector, combined with consumer preferences, had an impact on these services. The relevant financial results are described in detail by Artavanis (2015), who shows that the increase in VAT on restaurants during the recession also affected tax revenues, owing to higher tax evasion and avoidance and a shift in consumption to substitute goods and services. In

contrast, the reduction of the VAT rate from 23 to 13 per cent led to far lower revenue losses, indicating an increase in consumption due to falling prices and improved VAT compliance by entrepreneurs.

Focusing now on the most important category of household budgets, the "Food" category, Table 3 presents the various food sub-categories as a percentage of the major category, for the period 2010–2014. This shows that for the most important sub-categories for the average household, the trend either increased (flour/bread/cereals) or remained almost unchanged (meat, dairy, vegetables, oils), while the proportion of some other sub-categories that might be considered to be "luxury" goods (fish, soft drinks, sugar and sweets) tended to decline. Overall, this supports the intuition that during a recession, consumption by the average household shifts toward more appropriate or "accessible" food. Similar conclusions can be drawn from the elasticities of demand, $|\varepsilon(p)|$ shown in Table 3 for the various food sub-categories, showing that the proportion of more elastic foods (e.g. fish, fruits) in the household basket reduced significantly between 2010 and 2014.

TABLE 3: CHANGES IN HOUSEHOLD FOOD CONSUMPTION (2010–2014)

FOOD	2010	2011	2012	2013	2014	Δ (2014)/ (2010)	VAT (2014)	$\|\varepsilon(p)\|$+sde
Meat	**23.2**	**23.0**	**22.9**	**22.9**	**22.7**	**-2.2**	**13**	**1 ± 0.1**
Dairy	**17.0**	**17.2**	**17.9**	**18.1**	**18.1**	**6.5**	**13**	**0.5 ± 0.1**
Flour/bread/cereals	**14.0**	**14.4**	**14.9**	**15.7**	**15.7**	**12.1**	**13**	**0.5 ± 0.1**
Vegetables/potatoes	**11.8**	**11.7**	**11.7**	**11.7**	**11.8**	**0**	**13**	**0.6 ± 0.1**
Fish	**7.9**	**7.9**	**7.5**	**7.1**	**7.2**	**-8.9**	**13**	**0.7 ± 0.1**
Fruit	**7.6**	**7.6**	**7.6**	**7.1**	**7.1**	**-6.6**	**13**	**0.7 ± 0.1**
Fats and oils	**5.6**	**5.6**	**6.0**	**6.0**	**5.9**	**5.4**	**13**	**0.5 ± 0.1**
Sugar and sweets	**5.4**	**5.3**	**4.7**	**4.5**	**4.6**	**-14.8**	**13**	**0.4 ± 0.1**
Mineral water/soft drinks	**3.9**	**3.7**	**3.2**	**3.1**	**3.1**	**-20.5**	**13/23**	**0.5 ± 0/0.5 ± 0.1**
Coffee/tea/cocoa	**2.0**	**2.1**	**2.0**	**2.2**	**2.2**	**10.0**	**23**	**0.2 ± 0.1**
Various food	**1.6**	**1.5**	**1.6**	**1.6**	**1.6**	**0**	**13**	**0.9 ± 0.2**

Notes: values are given for the % participation of each sub-category in total food consumption; sde = standard deviation error

Two important observations can be made with respect to Table 3. The first involves the "Flour/bread/cereals" sub-category, which in the literature is associated with very different elasticities of demand for each good (see Appendix), ranging from 0.1 (flour/bread) to 0.9 (cereals) and 1.5 (various foods). The reason for this is that participants in relevant studies have exhibited considerable differences in eating habits, resulting in large variations in demand for the products concerned. The pattern of Greek consumers' behaviour over time indicates that these foodstuffs (especially flour and bread) are inelastic. However, given a lack of reliable studies to support this, the weighted average elasticity of 0.5 for the "Flour/bread/cereals" sub-category is used in this study, in view of the much greater proportion in the more inelastic food sub-category (flour and bread). The second point concerns the "Mineral water/soft drinks" sub-category. From 1 September 2011, soft drinks were taxed at the 23 per cent VAT rate, so two weighted average elasticities are calculated, depending on the VAT rate. These are used later when considering the economic impact.

FIGURE 2A: % CHANGE IN THE MOST BASIC FOOD SUB-CATEGORIES (2010–2014)

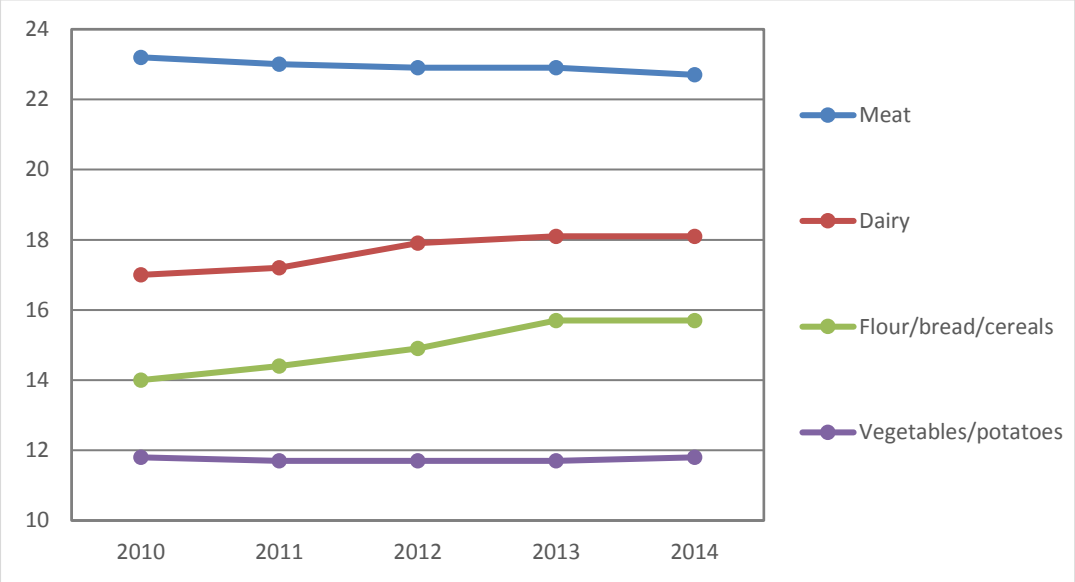
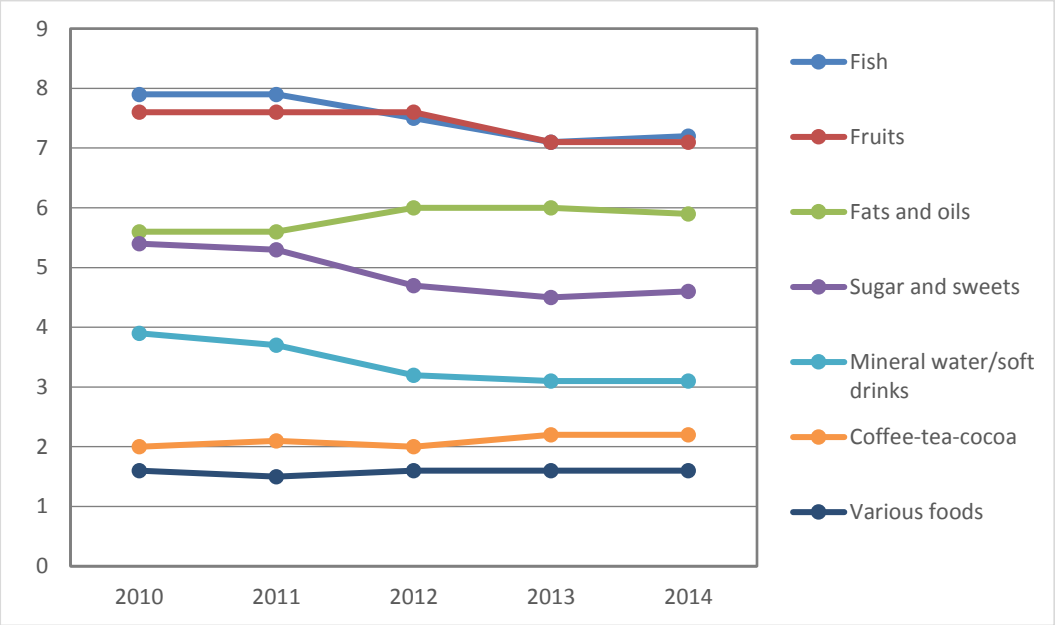


FIGURE 2B: % CHANGE IN THE REMAINING FOOD SUB-CATEGORIES (2010–2014)



Figures 2A and 2B present the changing curves for the various sub-categories of food for the period 2010–2014 with respect to the total food consumption of the average household. From 2011 onwards, higher VAT rates on food were applied (13% rather than 11%), and taxes on certain food sub-categories (soft drinks, coffee/tea/cocoa) and restaurant services ranged from 13 to 23 per cent. Thus, there were sharp drops in consumption of "Mineral water/soft drinks" and "Sugar and sweets" (non-essential goods) and a less significant decrease in "Fish" consumption (expensive food), with a shift to a greater proportion of household expenditure on the sub-categories of "Flour/bread/cereals" (necessary and cheap consumer goods) and to a lesser degree "Dairy" and "Fats and oils" (more staple foods). One exception is the

"Coffee/tea/cocoa" sub-category, which exhibited resistant behaviour, despite the rise in the VAT rate. However, this can be explained by their almost inelastic demand (elasticity of demand = 0.2, see Table 3 and Appendix).

PROPOSED DISTRIBUTION OF PRODUCTS AND SERVICES BETWEEN VAT RATES

In Greece, in 2014 (year of reference) the basic VAT rate of 23 per cent applied to car services and transportation, telecommunications, house construction and alcoholic beverages. The reduced VAT rate of 13 per cent was applied to food, restaurants, electricity, water, public transportation and medical equipment, while medicine, hotels, books, newspapers, magazines and theatre tickets were subject to the over-reduced VAT rate of 6.5 per cent. There were also exceptions/exemptions from VAT for several goods and services, of which the most important were the "Education" category (excepted from the basic VAT rate) and diplomatic missions, international organisations, charity events, casinos, gambling, national TV/radio and postal services (exempted from taxation). The latter are described in detail in the Tax Expenditure of State Budget 2016.[4]

Reforming the existing VAT regime to increase economic and social benefits, combined with wider structural reforms of the economy, would result in increased state revenues and fewer distortions in consumers' preferences (Mirrlees et al., 2011; Borselli et al., 2012) and enhanced tax awareness by citizens. This study proposes the transfer of most consumer goods and services (including specific exceptions/exemptions) to a basic VAT rate of 20 per cent, and of certain socially-sensitive items to a reduced VAT rate of 10 per cent (described in detail below). The suggested VAT rates of 20 and 10 per cent are selected on the basis of being close to (but not exceeding) the current average VAT rate[5] on the one hand (since a larger reduction would probably generate unwanted distortions in both consumer and business preferences), and not reducing the respective revenues on the other hand (since a basic VAT rate below 19% or a reduced VAT rate below 9% would lead to lower revenues). It should be mentioned that our analysis integrates the VAT changes, the elasticity impact on modified consumption and the resulting revenues from each category of consumer good. Thus, the results of this study are not significantly affected by the fact that goods markets in Greece do not work under conditions of perfect competition.

The main advantages of adopting a uniform basic VAT rate, lower than the currently prevailing rate (23%), are the following (Hakim, 2009; OECD, 2010a; Boeters et al., 2006; Artavanis, 2015; Hellenic Parliament, 2015; Mirrlees et al., 2011; OECD, 2010b):

- Increased consumption through lower prices and broader consumer base
- Reduced evasion through better compliance
- Less distortion of household consumption decisions resulting in increased prosperity
- Reduction of administrative burden through simplification of the tax system
- Lower tax burden on the weakest social groups though lower prices on basic consumer goods and services
- Improved business and general economic climate (in the long term).

[4] http://www.hellenicparliament.gr/UserFiles/c8827c35-4399-4fbb-8ea6-aebdc768f4f7/9391377.pdf

[5] The current (2014) average VAT rate is estimated to be 18 per cent.

Conversely, there are some drawbacks to the adoption of a basic VAT rate, for example (Hakim, 2009; Hall, 2005; Boeters et al., 2006; OECD, 2010b):

- Possible reduction in public revenues from special cases (mainly inelastic items on which the rate is reduced)
- Loss of competitiveness of certain products and services that are currently in a special status of exemption or lower VAT and would lose this advantage with the single tax
- Possible distortions due to uneven distribution of the tax burden across various social groups.

However, following Artavanis' (2015) study on restaurants, and in combination with other parallel measures to improve citizens' tax compliance, revenue losses from migrating (primarily inelastic) goods to a lower VAT rate would arguably be much less than estimated.

At this point, it should be mentioned that we are not suggesting a tax revenue-neutral reform. We intend to increase public revenues by improving VAT collectability and compliance, and to reduce the tax burden by introducing lower VAT rates for most households, since the suggested VAT reform would result in reduced rates for 70 per cent of total consumption of goods/services. We do not ignore the fact that a few categories of goods and services would lose the lower (or exempted) VAT advantage[6] given for competitive or social reasons, nor that the (suggested) higher VAT rates might cause distortions in consumers' preferences. For these cases, additional measures such as income subsidies or partial tax refunds (Hakim, 2009; Hall, 2005; Boeters et al., 2006; Hellenic Parliament, 2015; Remeta et al., 2015), for example for medicine/health or educational services, might be adopted to compensate the social groups most affected. These are not considered in this study.

Several studies, both in Greece (Hellenic Parliament, 2015; HSA, 2010–2014; Foundation for Economic and Industrial Research, 2015; INEMY, 2013) and internationally (OECD, 2010a; Hall, 2005; Boeters et al., 2006; Lechene, 2000), have shown that if the main goal is to increase revenues, the prevailing economic opinion is that VAT rates should be increased on luxury consumer goods, which are more inelastic in demand, and reduced on the most necessary and/or elastic goods. Indeed, relevant economic theory predicts that the more elastic the demand curve for a product, the lower the proportion of tax borne by consumers. However, several aspects relating to the significance of some goods in household budgets, especially for the weakest social groups (food, medicine, etc.), and the competitiveness and growth potential of specific services and goods (e.g. tourism, agricultural products) should also be considered. According to related research (Remeta et al., 2015; Rizov et al., 2015), more efficient targeting, in terms of lower taxation, should address socially-sensitive goods/services other than those relating to limited household types (e.g. books). This is because low-income households derive greater benefit than the highest income groups from reductions in the prices of necessary goods and services, since the former consume the highest proportion of their income on such goods. Therefore, in order to select the goods to be included in the reduced VAT rate of 10 per cent that will result in more effective VAT collection and increased social impact, the following criteria should be taken into consideration.

1. **Social sensitivity (goods preferred mainly by poor households)**

Goods and services preferred by poor households should have reduced VAT rates to make them affordable while not significantly affecting households' economic opportunities, thereby indirectly redistributing the tax burden to benefit socially weak households.

[6] See Tables 6 and 7.

2. **Elasticity of demand to price**

As previously mentioned, demand for consumer goods with high elasticity of demand is subject to greater change at a given change in price relative to others, so including these in the reduced rate will result in much greater household demand, and hence increased revenues.

3. **Participation in the household budget (basket) for 2014**

For goods preferred by most households, integration of the reduced VAT regime will result in increased consumption with a simultaneous widening of the tax base, thus leading to increased revenues.

4. **Competitiveness and growth perspective**

Goods and services that are highly competitive and are in sectors with high growth rates should be included in the reduced VAT scheme in order to preserve their competitive advantage and increase exports, consumption, and hence public revenues. An example is the current situation of over-reduced VAT rates for the Aegean Islands.

Our socio-economic model uses these eligibility criteria to transform consumers' behavioural preferences into a more efficient VAT collection system, thus presenting the impact of the suggested VAT reform on the economy. Based on the categories of goods reported in Table 2 and the above comments, consumer goods are divided into three descriptive categories, A, B and C. Category A comprises the more preferred goods to be included in the reduced VAT rate of 10 per cent, which fulfil all the above-mentioned criteria; Category B involves "neutral" goods; and Category C includes less preferred goods. Thus, the classification is as follows:

Category A
High social sensitivity
Large contribution to household basket in 2014 (≥ 10%)
Elasticity of demand ≥ 1 (high elasticity – elastic goods)
High competitiveness and growth perspective.

Category B
Moderate social sensitivity
Medium contribution to household basket in 2014 (≥ 5% and < 10%)
Elasticity of demand ≥ 0.5 and < 1
Moderate competitiveness and growth perspective.

Category C
Low social sensitivity
Small contribution to household basket in 2014 (< 5%)
Elasticity of demand < 0.5 (low elasticity – inelastic goods)
Low competitiveness and growth perspective

Finally, preferences for various consumer goods are ranked by adding the effects of each eligibility criterion to a total eligibility index (EI) and selecting appropriate weighting factors for two different scenarios. These scenarios are selected to describe (qualitatively and quantitatively, as explained later) the general purpose of this reform of VAT rates from two diametrically opposite perspectives: economic benefits in terms of increasing government revenues (Scenario 1 – economic), and social justice and prosperity through a fair redistribution of weightings (Scenario 2 – social).

Scenario 1 (economic): Weighting factors for EI are 50 per cent for elasticity of demand, 25 per cent for share of goods in the household basket in 2014, 15 per cent for degree of competitiveness and 10 per cent for degree of social sensitivity.

Scenario 2 (social): Weighting factors for EI are 50 per cent for degree of social sensitivity, 25 per cent for degree of competitiveness, 15 per cent for share of goods in the household basket in 2014 and 10 per cent for elasticity of demand.
The total EI is calculated by multiplying the weighting factor for each scenario (economic or social) by the respective category (A, B or C) by applying to the latter the correlation A ↔ 3, B ↔ 2 and C ↔ 1 and then adding the four sub-products, resulting in a final ranking for the two scenarios. The classification of consumer goods with respect to the degree of social sensitivity is based on the poorest households' options (HSA, 2010–2014) in conjunction with the time value of certain public goods for Greek families (health/education). Thus, for example, using the data from Table 2 for the "Food" category results in the following:
Scenario 1 (economic)
Elasticity of demand = 0.5 → moderate → Category B → Impact on the overall index = 50% * 2 → 1
Participation in the household basket = 13.9% → high → Category A → Impact on the overall index = 25% * 3 → 0.75
Degree of competitiveness → high → Category A → Impact on the overall index = 15% * 3 → 0.45
Social sensitivity → high → Category A → Impact on the overall index = 10% * 3 → 0.3
→ **Total eligibility index** = 1 + 0.75 + 0.45 + 0.3 = **2.5**
2nd scenario (social)
Social sensitivity → high → Category A → Impact on the overall index = 50% * 3 → 1.5
Degree of competitiveness → high → Category A → Impact on the overall index = 25% * 3 → 0.75
Participation in the household basket = 13.9% → high → Category A → Impact on the overall index = 15% * 3 → 0.45
Elasticity of demand = 0.5 → moderate → Category B → Impact on the overall index = 10% * 2 → 0.2
→ **Total eligibility index** = 1.5 + 0.75 + 0.45 + 0.2 = **2.9**

The classification of consumer goods for each criterion and the overall EI for scenarios 1 and 2 are presented in Table 4. To select appropriate categories for the reduced VAT rate of 10 per cent, from the last column of Table 4 referring to the EI, we select categories of goods/services with an EI of 2.5 and above, since these are closest to the category A classification corresponding with more preferred goods. Thus, we conclude that the "Food" and "Hotels/restaurants" categories from scenario 1 (economic) and "Food" from scenario 2 (social) should be assigned the reduced VAT rate of 10 per cent.

To further limit the categories of goods to be included in the reduced VAT rate, we focus on the "Food" category, which has the largest EI in both scenarios and the largest share of the household budget, and also includes a variety of products considered to be "luxury" which might be transferred to the basic VAT rate of 20 per cent. In this way, income-dependent distortions in household preferences associated with food consumption can be further reduced, since a rich household is presumably able to allocate more money to buying fish or sweets, as well as maximising the potential economic benefits.

TABLE 4: CLASSIFICATION OF CONSUMER GOODS BY ELIGIBILITY CRITERIA

CONSUMER GOODS	ε(p)	Proportion of household basket (2014)	Competitiveness	Social Sensitivity	ELIGIBILITY INDEX	
					1	2
Food	**B**	**A**	**A**	**A**	**2.5**	**2.9**
Housing/heating/water/ electricity	**C**	**A**	**C**	**A**	**1.7**	**2.3**
Transport/fuel	**B/C**	**A**	**B**	**B**	**2.3/1.8**	**2.2/2.1**
Hotels/restaurants	**A**	**B**	**A**	**C**	**2.6**	**1.9**
Various goods/services	**B**	**B**	**C**	**B**	**1.9**	**1.8**
Health/medicine	**C**	**B**	**B**	**A**	**1.6**	**2.4**
Clothing & footwear	**B**	**B**	**C**	**B**	**1.9**	**1.8**
Durable goods	**A**	**B**	**B**	**C**	**2.4**	**1.6**
Leisure/culture/books/theatre	**A/B/C**	**C**	**B/A/B**	**C**	**2.2/1.8/1.2**	**1.5/1.6/1.3**
Communications	**A**	**C**	**C**	**B**	**2.1**	**1.7**
Alcohol/tobacco	**A/C**	**C**	**B**	**C**	**2.2/1.2**	**1.5/1.3**
Education	**C**	**C**	**C**	**A**	**1.2**	**2**

To calculate the respective EI for the food sub-categories, we apply the previous eligibility criteria, after allocating them to categories A, B and C previously used as general categories of consumer goods. The basic difference is that almost all food sub-categories have elasticities of demand smaller than or equal to 1 (apart from some special cases, see Appendix for more detail); therefore, food sub-categories with elasticities of demand exceeding 0.7 are classified in category A, those with elasticities of demand between 0.4 and 0.7 in category B, and the most "inflexible" foods (elasticities of demand smaller than 0.4) in category C. The proposed classifications for each sub-category, depending on elasticity, social sensitivity, share of the household basket and competitiveness, are shown in Table 5.

TABLE 5: CLASSIFICATION OF FOOD SUB-CATEGORIES BY ELIGIBILITY CRITERIA

FOOD SUB-CATEGORY	ε(p)	Participation in household basket (2014)	Competitiveness	Social Sensitivity	ELIGIBILITY INDEX	
					1	2
Meat	**A**	**A**	**B**	**B**	**2.8**	**2.3**
Dairy	**B**	**A**	**A**	**A**	**2.5**	**2.9**
Flour/bread/cereals	**B**	**A**	**A**	**A**	**2.5**	**2.9**
Vegetables/potatoes	**B**	**A**	**B**	**A**	**2.4**	**2.7**
Fish	**B**	**B**	**C**	**C**	**1.8**	**1.3**
Fruit	**B**	**B**	**A**	**B**	**2.2**	**2.3**
Fats and oils	**B**	**B**	**A**	**A**	**2.3**	**2.8**
Sugar and sweets	**B**	**C**	**C**	**B**	**1.6**	**1.6**
Mineral water/soft drinks	**B/B**	**C**	**B**	**C**	**1.5**	**1.4**
Coffee/tea/cocoa	**C**	**C**	**C**	**B**	**1.1**	**1.5**
Various foods	**A**	**C**	**C**	**C**	**2**	**1.2**

Applying the same methodology as for the food sub-categories used above (for the main categories of consumer goods), looking at the last column of Table 5 corresponding to the calculated EI for the two scenarios, the "Meat", "Dairy" and "Flour/bread/cereals" sub-categories for scenario 1 (economic) and "Dairy", "Flour/bread/cereals",

"Vegetables/potatoes" and "Fats and oils" for scenario 2 (social) should be allocated to the reduced VAT rate of 10 per cent.

Table 6 presents the proposed classification of consumer goods/services at the 20 per cent (basic) and 10 per cent (reduced) VAT rates based on the two alternative scenarios discussed above, together with expected revenues (in millions of €). The total VAT revenue for 2014 is taken from Eurostat (http://ec.europa.eu/eurostat/web/national-accounts/data/database) and is recalculated and confirmed by multiplying the VAT rate by the corresponding turnout for each good or service in the total tax base of 2014, which is estimated at €73.9 billion (Table 1). This expenditure is distributed per category/sub-category depending on corresponding data from Tables 2 and 3 and the turnouts for each case. Instead of a single "Food" category, proportions for all food sub-categories are presented in Table 6.

TABLE 6: PROPOSED CLASSIFICATION OF CONSUMER GOODS AT BASIC (20%) AND REDUCED (10%) VAT RATES, COLLECTED VAT REVENUE (2014) AND EXPECTED REVENUES FROM SCENARIOS 1 AND 2 FOR GREECE

Category of consumer goods/services	Proportion of total expenditure (%)	2014		Scenario 1		Scenario 2	
		VAT (%)	Revenue (€m)	VAT (%)	Revenue (€m)	VAT (%)	Revenue (€m)
Meat	**4.65**	**13**	**447**	**10**	**447**	**20**	**447**
Dairy	**3.71**	**13**	**357**	**10**	**351**	**10**	**351**
Flour/bread/cereals	**3.22**	**13**	**309**	**10**	**305**	**10**	**305**
Vegetables/potatoes	**2.42**	**13**	**232**	**20**	**239**	**10**	**230**
Fish	**1.48**	**13**	**142**	**20**	**145**	**20**	**145**
Fruit	**1.46**	**13**	**140**	**20**	**143**	**20**	**143**
Fats and oils	**1.21**	**13**	**116**	**20**	**120**	**10**	**115**
Sugar and sweets	**0.94**	**13**	**91**	**20**	**94**	**20**	**94**
Mineral water	**0.40**	**13**	**38**	**20**	**40**	**20**	**40**
Soft drinks	**0.23**	**23**	**39**	**20**	**39**	**20**	**39**
Coffee/tea/cocoa	**0.45**	**13**	**43**	**20**	**46**	**20**	**46**
Various foods	**0.33**	**13**	**32**	**20**	**32**	**20**	**32**
Housing/fuels	**11.00**	**23**	**1,870**	**20**	**1,831**	**20**	**1,831**
Water/electricity	**2.40**	**13**	**231**	**20**	**244**	**20**	**244**
Transport **@ 23%**	**5.00**	**23**	**481**	**20**	**504**	**20**	**504**
Transport **@ 13%**	**7.70**	**13**	**1,309**	**20**	**1,301**	**20**	**1,301**
Hotels	**1.70**	**6.5**	**82**	**10**	**81**	**20**	**81**
Restaurants	**8.10**	**13**	**778**	**10**	**795**	**20**	**740**
Various goods & services	**9.20**	**23**	**1,564**	**20**	**1,555**	**20**	**1,555**
Health	**6.20**	**13**	**596**	**20**	**625**	**20**	**625**
Medicine	**1.00**	**6.5**	**48**	**20**	**54**	**20**	**54**
Clothing & footwear	**5.90**	**23**	**1,003**	**20**	**1,000**	**20**	**1,000**
Durable goods **@ 23%**	**4.20**	**23**	**714**	**20**	**721**	**20**	**721**
Durable goods **@ 13%**	**0.80**	**13**	**77**	**20**	**75**	**20**	**75**
Leisure	**1.90**	**23**	**323**	**20**	**324**	**20**	**324**
Culture	**2.10**	**13**	**202**	**20**	**207**	**20**	**207**
Books/theatre	**0.70**	**6.5**	**34**	**20**	**38**	**20**	**38**
Communication	**4.10**	**23**	**697**	**20**	**710**	**20**	**710**
Alcohol	**0.84**	**23**	**143**	**20**	**143**	**20**	**143**
Tobacco	**3.16**	**23**	**537**	**20**	**528**	**20**	**528**
Education	**3.50**	**23**	**0**	**20**	**0 (584)**	**20**	**0 (584)**

Exemptions		**(23)**	**0**	**20**	**0 (348)**	**20**	**0 (348)**
TOTAL	100.0		12,676		12,737		12,666

Thus, for example, the "Mineral water/soft drinks" sub-category had a 3.1 per cent share of total household food consumption in 2014 (see Table 3). The "Food" category accounts for 20.5 per cent of total consumption expenditure; hence, the "Mineral water/soft drinks" sub-category contributes 3.1 * 20.5 = 0.63 per cent to total household consumer expenditure. Moreover, the proportion of mineral water in the configuration of sub-index prices for the specific sub-category is 63 per cent (Ministry of Development and Competitiveness, 2013), thus resulting in a proportion for mineral water of 0.40 per cent of total consumer expenditure. Finally, by multiplying the latter by the corresponding VAT rate (13%) and reducing the result to the total tax base (€73.9 billion), we obtain the revenue from the "mineral water" sub-category, which is estimated to have been €38 million for 2014 (Table 6).

Following the same procedure, we determine the respective revenues for the remaining sub-categories of household consumption. Note that at this point, for simplicity (relating to the calculation procedure as well as for more coherent presentation), in Table 6 we add the "Heating" and "Fuel" sub-categories (the latter from the "Transport/fuel" category) into a broader category named "Housing/fuels"; we divide both "Transport" and "Durable goods" categories into two parts, corresponding with differences in VAT rates (23% and 13%) on several goods/services in these categories; and divide the "Hotels/restaurants" category into its two constituent sub-categories, each attracting different VAT rates (see Table 2).

The "Education" category, which accounts for 3.5 per cent of household consumption, has so far been excluded from VAT taxation; thus, in Table 6 the respective revenue in 2014 is shown as zero. The VAT exemptions considered in this study, excluding diplomatic missions, international organisations and charity events, are estimated to have cost the state around €400 million (Table 7).

TABLE 7: SERVICES EXEMPTED FROM VAT (2014)

Exempted service	Revenue loss (in € million)
Postal services	**41.0**
Radio and TV (national)	**25.6**
Casinos	**56.3**
Gambling	**276.0**
Various exemptions	**1.6**
TOTAL	400.5

The expected revenues for each category of consumer goods/services in Table 6, based on scenarios 1 (economic) and 2 (social), are calculated by the basic economic relationship for revenue, E:

$E = \text{quantity} * \text{price} = Q * P \rightarrow dE = P * dQ + Q * dP \rightarrow dE/E = dQ/Q + dP/P$ (1)

and the equation for the elasticity of demand:

$$\varepsilon = -\frac{\left(\frac{dQ}{Q}\right)}{\left(\frac{dP}{P}\right)} = -\frac{P}{Q}\frac{dQ}{dP} \quad (2)$$

Combining equations (1) and (2) and using the relationship dP = P2 – P1 = (P1 + df * P1) – P1 = df * P1, where P1 is the current (2014) value of the good/service, P2 is the new value after the change in VAT rate and df represents the change in VAT rate (e.g. reduction from 13% to 10% gives a df of –0.03), we have:

$dE/E = dP/P * (1 - \varepsilon) \rightarrow dE/E = df * (1 - \varepsilon) \rightarrow E_{1,2} = E_{2014} * df * (1 - \varepsilon)$ (3)

In equation (3), $E_{1,2}$ is the expected revenue based on the respective scenarios, and E_{2014} is the revenue received in 2014. From the last equation, we observe that an increase in the tax rate ($df > 0$) results in an increase in revenues from inelastic goods ($e < 1$), but to a gradually smaller degree as elasticity of demand tends to 1, while revenues from goods with a high elasticity of demand ($e \geq 1$) decline. The opposite picture is observed in the case of a reduction in the VAT rate (increase in revenues from more elastic goods).

Comparing the resulting revenues for each category shown in Table 6, we observe a higher revenue increase for the "Health" category (additional revenue of €29 million – green squares) and a higher revenue decrease in the integrated "Housing/fuels" category (revenue loss of €39 million – red squares) in comparison with the respective 2014 revenues for both scenarios. The most significant variation between the two scenarios occurs in "Restaurants", where there is a revenue gain of €17 million for the economic scenario and a revenue loss of €38 million for the social scenario compared with 2014 revenues. In conclusion, the economic (1st) scenario leads to total VAT revenues of €12,737 million, while the social (2nd) scenario leads to total VAT revenues of €12,666 million, so the economic scenario for VAT rate reform is preferred. Compared with the VAT revenues collected in 2014 (€12,676 million), the economic scenario (1st) provides an additional benefit of €61 million (or 0.5% of total VAT revenues), while the social scenario (2nd) leads to a small loss (€10 million).

Including services that have so far been exempt from VAT (see Table 7) in the basic VAT rate (20%) results in an extra benefit of €348 million for both scenarios, while if "Education" (represented in red in Table 6) is also included, this results in an additional revenue of €584 million when the estimated revenue is adjusted to the changed VAT rate. Therefore, implementing the (preferred) economic reform scenario for VAT would result in additional revenues of €993 million (or 7.8%) compared with total VAT revenues in 2014, which are estimated to have been €13,669 million. If education is excluded, total VAT revenues reach €13,085 million, which still represents a 3.2 per cent increase in the VAT revenue collected.

Table 8 presents the collected and estimated revenues (for economic and social scenarios), together with statistical errors (standard error, $se = \sqrt{N}$). Note that, although most food sub-categories fall into the lower VAT rate – the three categories transferred to the 10 per cent VAT rate account for approximately 60 per cent of total food consumption – and one would expect large revenue losses due to the rigidity of the corresponding expenditure and the greatly reduced household tax base, the expected revenues, excluding education, are significantly higher than those collected in 2014. No change is proposed to the special status of the Aegean Islands, since a relevant study (Hellenic Parliament, 2015) suggests that the expected benefits would be almost zero if the over-reduced rate were abolished.

TABLE 8: COLLECTED AND ESTIMATED VAT REVENUES (IN € MILLION) FROM THE TWO PROPOSED SCENARIOS FOR 2014

2014	VAT revenues (collected)	1st scenario (economic) + se	2nd scenario (social) + se
Goods & services (from Tables 2 & 3 except "Education") (i)	**12,676**	**12,737 ± 113**	**12,666 ± 113**
Exemptions (from Table 7) (ii)	**0**	**348 ± 19**	**348 ± 19**
Education (iii)	**0**	**584 ± 24**	**584 ± 24**
TOTAL (i + ii + iii)	**12,676**	**13,669 ± 156**	**13,599 ± 156**
Alignment of VAT rates (iv)		**159 ± 13**	**159 ± 13**
TOTAL (i + ii + iii + iv)		**13,828 ± 169**	**13,758 ± 169**

Note: se = standard error

With regard to the economic impact of simplification of the tax administration, studies conducted in other European countries (Barbone et al., 2012) estimate the administrative costs of taxation to be 0.29 per cent of GDP, of which VAT-associated administrative costs account for about one fifth, or 0.06 per cent of GDP. Since Greece's GDP for 2014 was €177.9 billion (Table 1), the expected additional revenues from applying a basic rate without exemptions is €106 million, while applying two VAT rates instead of three results in expected additional revenues about half as great, i.e. €53 million. Therefore, adopting a basic VAT rate of 20 per cent for most consumer goods and services, and a reduced VAT rate of 10 per cent for basic food products (meat, dairy and flour/bread/cereal) and hotels/restaurants results in a €159 million growth in revenues. Thus, the aggregate gain in VAT revenues from adopting the overall VAT reform suggested by this study, i.e. the economic scenario for VAT rates together with the resulting reduction in administrative costs, is estimated to be €1,152 million (or 9.1%) more than 2014 VAT revenues, with a total VAT revenue of €13,828 million representing about 7.8 per cent of Greek GDP (see Table 8).

Another important factor is the effect on tax compliance of adopting a basic VAT rate. To this end, we calculate the VAT revenue ratio (VRR), as explained earlier, which combines policy efficiency, as determined by the policy deficit or policy gap (PG), with compliance efficiency, corresponding to the VAT gap. Thus, drawing on Barbone et al. (2015):

$$VRR = (1 - \text{VAT gap}) * (1 - PG) \quad (4)$$

Moreover, the policy deficit is the sum of two parameters: the rates deficit or rate gap (RG), which corresponds to the revenue loss rate arising from the application of reduced rates compared with the potential revenue if the basic rate were applied, and the exemptions deficit or exemption gap (EG), corresponding to the revenue loss rate attributable to various exemptions from VAT for goods/services. For 2014, the VAT gap for Greece is estimated to have been 0.28, the policy gap 0.541, the rate gap 0.139 and the exemptions gap 0.402 (Poniatowski et al., 2016), while according to the OECD, the VRR was 0.37 (OECD, 2016b).

To assess the impact of the proposed VAT reform on tax compliance, we adopt the EU's approach (Barbone et al., 2013), which concludes that a one per cent reduction in the basic VAT rate results in a 0.7 per cent improvement in compliance. Thus, reducing the basic VAT rate from 23 to 20 per cent leads to a 2.1 per cent improvement in compliance or a 2.1 point lower VAT gap, resulting in a VAT gap of 0.259**.** If a basic VAT rate of 20 per cent is adopted, the policy deficit will also be smaller than previously, since both conditions (rates deficit and deficit exemptions) will fall. If the additional revenue resulting from adopting two rather than three rates (Kulis, 2003) is €53 million, then the improvement in the rates deficit (RG) will be 53/12676 = 0.4 per cent, while the additional revenue derived from taxation of goods exempted or excluded will be €932 million and the improvement in the exemptions deficit (EG) will be 932/12676 = 7.4 per cent. Adopting the proposed VAT reform results in an RG of 0.135 and an EG of 0.328; therefore, the (reformed) policy deficit is PG = RG + EG = 0.463. From equation (4) it is deduced that the VRR is 0.398.

TABLE 9: CALCULATED (FROM EC AND OECD) AND ESTIMATED VAT EFFICIENCY RATES UNDER THE 'ECONOMIC' REFORM SCENARIO FOR GREECE (2014)

Greece (2014)	EC/OECD (calculated)	Economic scenario (estimated + se)
VAT gap	**0.28**	**0.259**
Rate gap (RG)	**0.139**	**0.135 ± 0.001**
Exemptions gap (EG)	**0.402**	**0.328 ± 0.005**
Policy gap (PG = RG + EG)	**0.541**	**0.463 ± 0.006**
VRR	**0.37**	**0.398 ± 0.006**

These results, together with the respective values calculated by the EC and the OECD, are presented in Table 9. The statistical error is the standard error corresponding to the original calculations of the respective gaps under the suggested reform, after introducing the estimated values.

Finally, to calculate the resulting change in final consumer expenditure (private, public and non-governmental organisations), we use the following formula (Skintzi, 2015):

$$\mathrm{VRR} = \frac{\mathrm{VR}}{(\mathrm{C}-\mathrm{VR})\cdot\mathrm{VAT}} \quad (5)$$

where VR is the actual VAT revenue, C is final consumer expenditure and VAT is the basic VAT rate. Implementing the suggested VAT reform (economic scenario + taxation of exemptions and exclusions + lower administrative costs) gives C = €187.5 ± 5.3 billion, while under the current VAT regime (2014), C = €161.2 billion (data from Eurostat).

Therefore, adopting the suggested VAT reform results in a significant (16.3%) increase in final consumer expenditure, with obvious collateral benefits for the country's GDP and economy.

CONCLUSION

This study focuses on the fiscal impact of a VAT reform in Greece. Large revenue shortfalls due to high VAT rates, leading to increased tax evasion and reduced consumption, and hence prolonged recession, can be treated effectively by adopting a basic VAT rate of 20 per cent for most goods/services and a reduced VAT rate of 10 per cent for specific products, while simultaneously eliminating some existing exemptions. Applying a combination of socio-economic criteria, including the elasticity of demand, the level of social preference, the degree of competitiveness and the proportion of consumer goods in the household budget, we conclude that, through two alternative scenarios ("economic" and "social"), a reduced VAT rate of 10 per cent should be introduced on the average household's most necessary foodstuffs (meat, dairy and flour/bread/cereals) and on hotels and restaurants, namely on products or services with a socially sensitive orientation or providing comparative competitive advantage to the Greek economy.

As this study clearly shows, the suggested reform will achieve €13,669 million in VAT revenues, a quite significant increase of €993 million or 7.8 per cent compared with current (2014) VAT revenues. When the impact of the reformed VAT rates on consumption and simplification of the tax administration are taken into account, a further increase of €159 million is expected in VAT revenues, despite taxing most food products at a lower VAT rate than before and a significant expected revenue loss arising from rigidity in the respective expenditure. The overall VAT revenue improvement thus reaches €1,152 million, leading to VAT revenues of more than €13.8 billion, or 7.8 per cent of the 2014 GDP.

Finally, adopting the proposed VAT model (a basic rate for most goods/services and a reduced rate for a few) has another significant benefit: improved tax compliance. The impact of improved tax compliance is captured by a 16.3 per cent increase in final consumer expenditure, with obvious knock-on effects for government revenues from GDP growth and better national economic prospects. Therefore, the suggested VAT reform, starting from consumer preferences and weaknesses in the current VAT system and integrating them into a socio-economic model, significantly improves VAT collectability and contributes to economic growth.

Although this study suggests VAT reform for Greece, a country which is experiencing special conditions due to the prolonged financial crisis, the significant conclusions that are drawn may also be applicable to other countries.

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APPENDIX

Elasticities of demand for major consumption categories

Food:	0.4 (Adam & Moutos, 2014); 0.6 (Nilsson & Wadeskog, 1998)
Housing:	0.5 (Sinai, 2007); 0.4 (Albouy et al., 2014)
Heating:	0 (Nilsson & Wadeskog, 1998); 0.1 (Litman, 2016; Adam & Moutos, 2014; Albouy et al., 2014); 0.3 (Maniatis & Danchev, 2013)
Water:	0.2 (Gratziou & Andreadaki, 2005; Gratziou et al., 2006)
Electricity:	0.2 (Nilsson & Wadeskog, 1998); 0.1 (McConnell et al., 2012)
Transport:	0.6 (Fouquet, 2012; Litman, 2013); 0.3 (Nilsson & Wadeskog, 1998); 0.3 bus, 0.8 rail (Litman, 2016; Department of Infrastructure and Regional Development, n.d.)
Hotels:	1 (Stergiou, 2005); 1.1 (Candela & Figini, 2012)
Restaurants:	1 (Stergiou, 2005); 2.3 (McConnell et al., 2012)
Various goods & services:	0.5 (Nilsson & Wadeskog, 1998); 1 (Stergiou, 2005)
Health:	0.3 (McConnell et al., 2012; Adam & Moutos, 2014)
Medicine:	0.1 (Meyerhoefer & Zuvekas, 2006)
Clothing & footwear:	1.1 (Nilsson & Wadeskog, 1998); 0.7 (McConnell et al., 2012); 1 (Martinez, 2012)
Durable goods:	1.3 (McConnell et al., 2012)
Leisure:	1.1 (Nilsson & Wadeskog, 1998)
Culture:	0.6 (D'Angelo et al., 2010)
Books/theatre:	0.1 (McConnell et al., 2012)
Communication:	1.6 (AUEB, 2015)
Alcohol:	1.1 (Pavlou et al., 2011)
Tobacco:	0.3 (Nilsson & Wadeskog, 1998; McConnell et al., 2012); 0.5 (Adam & Moutos, 2014; Anderson et al., 1997); 0.4 (Tarantilis et al., 2015)
Education:	0.1 (Vedder, 2010); 0.4 (Campbell & Siegel, 1967); 0.6 (Parker, 2010)

Elasticities of demand for food sub-categories

Meat:	0.7 (Andreyeva et al., 2010; Okrent & Alston, 2012); 1.1 (Tiffin et al., 2011; Lechene, 2000); 1.3 (McConnell et al., 2012)
Dairy:	0.3 (Andreyeva et al., 2010; McConnell et al., 2012; Lechene, 2000); 0.2 (Okrent & Alston, 2012); 0.6 (Andreyeva et al., 2010; Tiffin et al., 2011; McConnell et al., 2012); 0.4 (Lechene, 2000; Okrent & Alston, 2012); 0.9 (Rizov et al., 2014)
Flour:	0.1 (Okrent & Alston, 2012)
Bread:	0.1 (McConnell et al., 2012); 0.4 (Lechene, 2000)
Cereals:	0.6 (Andreyeva et al., 2010); 0.9 (Lechene, 2000); 1.1 (Okrent & Alston, 2012); 0.7 (Rizov et al., 2014)
Vegetables:	0.5 (Lechene, 2000); 0.6 (Andreyeva et al., 2010); 0.9 (Tiffin et al., 2011; Okrent & Alston, 2012); 1.1 (Rizov et al., 2014)
Potatoes:	0.1 (Lechene, 2000); 0.3 (Tiffin et al., 2011); 0.4 (Okrent & Alston, 2012)
Fish:	0.5 (Andreyeva et al., 2010); 0.8 (Lechene, 2000; Okrent & Alston, 2012)
Fruit:	0.7 (Andreyeva et al., 2010; Tiffin et al., 2011); 0.3 (Lechene, 2000); 0.9 (Okrent & Alston, 2012); 1.1 (Rizov et al., 2014)
Fats & oils:	0.7 (Lechene, 2000); 0.2 (Okrent & Alston, 2012); 0.4 (Andreyeva et al., 2010); 0.6 (Tiffin et al., 2011)
Sugar and sweets:	0 (Stergiou, 2005); 0.3 (Andreyeva et al., 2010; McConnell et al., 2012); 0.8 (Lechene, 2000); 0.6 (Tiffin et al., 2011; Okrent & Alston, 2012); 0.1 (FAO, 2003)
Mineral water:	0.5 (Okrent & Alston, 2012)
Soft drinks:	0.8 (Andreyeva et al., 2010); 0.4 (Lechene, 2000); 0.3 (Okrent & Alston, 2012)
Coffee/tea/cocoa:	0.1 (Okrent & Alston, 2012); 0.3 (Anderson et al., 1997)
Various foods:	0.8 (Andreyeva et al., 2010); 0.6 (Lechene, 2000); 1.5 (Okrent & Alston, 2012); 0.8 (Rizov et al., 2014)