The sticky cost phenomenon at the local government level: empirical evidence from Greece

Abstract

Purpose: The present study explores the asymmetric cost behaviour in Greek local governments. More precisely, it investigates whether municipality costs show stickiness or anti-stickiness behaviour after increases or decreases in the stream of their revenues.

Design/methodology/approach: The Anderson *et al.*'s (2003) approach is adapted to the public sector environment by using types of expenses and revenues typical to the local government setting. The data sample consists of 1,852 observations of Greek municipalities for the period 2002-2008.

Findings: The empirical evidence suggests that local government managers adjust resources related to administrative services faster when revenues decrease than when they rise (anti-stickiness cost behaviour). On the contrary, they adjust costs of service provision which are associated with core activities asymmetrically; more quickly for upward than for downward activity changes (cost-stickiness behaviour).

Research implications: While prior studies examine the sticky cost phenomenon in the private sector, this study explores this phenomenon in the public sector through a data sample of municipalities. Local governments constitute an appealing and unique setting for the examination of asymmetric cost behaviour due to the existence of a strong political influence, which appears to affect rational economic decision-making, and their non-profit character, which prevents them from acting in a business-like manner.

Practical implications: Understanding how cost stickiness works inside local governments, could lead to an understanding of its implications in periods of cutback measures. Decreases in municipalities' subsidies and grants as a result of cutbacks in central government expenditures should not be expected to automatically result in symmetric savings in expenditures as corresponding increases in expenditures when revenues used to grow. At the same time, it might be difficult to achieve balanced budgets in municipalities when there is a considerable decrease in revenues, without

having to make considerable adjustments to the input values, the output and the mix of services offered by them.

Originatity/value: This study contributes to the accounting literature by expanding the understanding of how deliberate decisions influence the asymmetric cost behaviour in local governments, to different cost categories (administrative expenses and cost of service provision) and different revenue categories (grants, tax revenues and revenues from sales of goods and services).

Keywords: Public Sector, Sticky Cost Phenomenon, Cost behaviour, Local governments, Greece

Paper type: Research paper

1. Introduction

Monitoring and understanding how costs "behave" in the public sector could help towards making it more effective through the better allocation and management of expenditures. Moreover, rational management of expenditures could ideally lead to the provision of better services, and eventually to more satisfied constituents. In this realm, the "sticky cost" phenomenon that has recently received much attention in the private sector accounting literature could provide useful insights. This new theory was introduced by Anderson, Banker and Janakiraman in their seminal paper in 2003 and characterizes costs as sticky if they decrease less when activity levels decline than in comparison to how much they rise when activity levels increase.

Sticky cost phenomenon has been studied in several research works following the seminal work of Anderson *et al.* (2003). These studies have enriched the fundamental findings by providing evidence of asymmetric cost behaviour across different cost categories, firms and industries of the private sector (Subramaniam and Weidenmier, 2003; Chen *et al*., 2012; Dierynck *et al.,* 2012; Kama and Weiss, 2013; Banker *et al.*, 2013, Banker and Byzalov, 2014). The starting point in the sticky cost framework is that many, but not all, costs arise as a result of deliberate resource commitment decisions made by managers. According to Anderson *et al.* (2003), sticky cost behaviour may be created because managers do not deliberately reduce resources that are not necessary to support the reduced activity level. However, cost stickiness may not only occur thanks to behavioural reasons but thanks to economic reasons as well.

While management action and its effect on cost behaviour have been studied in the private sector, the public sector has been understudied even though the public sector decision-making could influence cost behaviour as well. The interrelation of politicians with managers creates an interesting setting for decision-making in the public sector, with the existence of strong political influence affecting sound economic rationality (Robinson and Brumby, 2005). At the same time, politicians' self-interest for getting re-elected and bureaucrats' career concerns drive both groups to invest in short-termism (Garrí, 2010). Therefore, there is a certain similarity to the private sector, in that both private sector managers on the one hand, and public sector

executives and politicians on the other, react to short-termism and self-interest. Nevertheless, they have different incentives, which might lead to different actions. In any case, the two sectors present a fundamental difference when it comes to the nature of their output: the output in the private sector is intended to be sold, while the services rendered in the public sector are rarely offered under business-like price conditions. Moreover, in the latter case, there is limited flexibility in processing or adjusting the mix and the cost of service provision towards constituents. Apart from output and costs, the origin of revenues differs as well; local governments rely heavily on governmental grants in order to cover their cost of operations. All the above concur in making the study of cost behaviour in the public sector an interesting issue.

Despite the importance of understanding cost behaviour in the public sector, the literature lacks considerable evidence. Local governments constitute a unique setting for the examination of cost behaviour due to some interesting characteristics witnessed in the relevant literature. The relation between grants and local expenditures at the local government level has been a key issue in the public finance literature (Kalb, 2010). The so-called "flypaper" effect provides evidence regarding an observed public finance anomaly, where grants received by local governments "stick where they hit". Therefore, grants received from local governments appear to give rise to local expenditures to a greater extent compared to the relevant level of local expenditures when they come from other sources (Hamilton, 1983; Worthington and Dollery, 1999). Such financial anomalies could indicate economic irrationality (Hines and Thaller, 1995).

Within this context, we examine cost behaviour in Greek local governments. 1,852 observations from Greek municipalities for the period 2002-2008 are analyzed for this purpose. According to the hypotheses, local governments' managers will be reluctant to maintain idle supplementary resources mainly used for administrative purposes after a revenue level decline since they are not incentivized to take actions that might be needed after a possible reversal in the revenue stream. Therefore, in this case, it is expected that the cost response on a revenue level decrease is greater than on the case of a revenue level increase. Administrative and public relation related costs are rather discretionary costs. Thus, local governments' managers may postpone or alter them without significantly disrupting local government operations in the short run. On the contrary, municipalities are expected to spend more on resources associated with core

activities (i.e. costs of service provision) in response to revenue increases and cut fewer resources in response to revenue decreases due to the critical nature of these services to the constituents. Costs of service provision could rather be characterized as committed costs. Significant reductions in these costs cannot take place without impacting the local government's ability to operate normally.

The findings support the aforementioned predictions, showing that local government managers adjust resources related to support - administrative and public relation-services faster when revenues decrease than when they rise. As a consequence, not only is the degree of cost stickiness diminished but also costs exhibit anti-stickiness behaviour. The findings also show that local government managers adjust costs of service provision which are associated with core activities asymmetrically; more quickly for upward than for downward grant changes. That is, the rate of increase in costs of service provision when grants increase exceeds the rate of their decline when grants decline (cost stickiness).

The paper proceeds as follows. The next section provides a review of the relevant literature. The research hypotheses are developed in Section 3. Section 4 presents the methodology applied, Section 5 the data sample selection and Section 6 the results of the study. Finally, the study concludes with remarks, limitations and future research potentials.

2. Literature review

2.1 The Sticky Cost Phenomenon

Noreen (1991) introduced a traditional concept of cost behaviour, according to which, there is a mechanistic and linear symmetric relation between costs and activity volume, regarding both volume increases and decreases. This assumption treats costs as fixed or variable with respect to sales volume. The traditional theory of cost behaviour implies that neither managers' decisions nor the direction of the change in the activities, play a significant role in the behaviour of costs.

Nevertheless, Noreen and Soderstrom (1997) empirically found that in some cases cost behaviour was asymmetric. They were the first to introduce a different way of thinking about cost behaviour by documenting that costs do not change proportionally

with changes on activity level. Based on the aforementioned findings, Anderson *et al.* (2003) document the existence of cost asymmetry and particularly the selling, general and administrative expenses (SG&A) asymmetric behaviour. The authors named this new phenomenon as "cost stickiness".

According to this new theory, costs are sticky if the magnitude of the increase in costs associated with an increase in the output demand is greater than the magnitude of the decrease in costs associated with an equivalent decrease in activity volume (Anderson *et al.,* 2003). Furthermore, when a firm experiences excess capacity, a reversal phenomenon, known as "anti-sticky" cost behaviour, may occur. In this case, the cost response on an activity level decrease is greater than in the case of an activity increase (Balakrishnan *et al*., 2004; Banker *et al.,* 2013).

The sticky cost phenomenon varies systematically across different cost categories, firms, industries and countries (Anderson *et al.,* 2003; Balakrishnan *et al*., 2004; Calleja *et al.* 2006; Banker *et al.,* 2013; Dalla and Perego 2014; Banker and Byzalov 2014). However, costs are not expected to be sticky in all circumstances. According to literature, no stickiness or anti-stickiness may also occur. For instance, resources that can be adjusted without incurring any adjustment costs (e.g. direct materials) are expected to present neither a sticky nor an anti-sticky cost behaviour. The sticky cost phenomenon is explained by economic factors such as adjustment costs, anticipations for future sales and agency issues. Adjustment costs are monetary or psychological costs that drive managers' deliberate decisions to increase or reduce the committed resources in response to changes on activity levels. Anderson *et al.* (2003) argue that firms with higher employee intensity (log of the ratio of the number of employees to sales revenue) and higher asset intensity (log of total assets to sales revenue) face higher adjustment costs. This happens because they rely more on their own resources to support a given volume of sales than on materials and other external services acquired.

Additionally, literature provides evidence that managerial expectations for the anticipated level of sales, affect deliberate resource adjustment decisions and as a result firm's cost asymmetric behaviour (Subramaniam and Weidenmier, 2003; Chen *et al.,* 2012; Banker *et al.,* 2014b; Banker and Byzalov, 2014).

Regarding agency issues, Chen *et al.* (2012) find a positive association between empire-building incentives and the degree of cost asymmetry. Finally, Balakrishnan *et al.* (2014) suggest that the asymmetric cost behaviour could stem from the firm's cost structure.

In any case, the cost stickiness literature is mainly concentrated in the private sector. As the private and the public sectors have some distinct differences, empirical evidence regarding the cost behaviour in the private sector firms should be further analysed in order to assess whether it could hold true for the public sector as well.

2.2 Characteristics of the Public Sector

The public sector comprises a different setting compared to the private one. It presents a number of particularities, the most important of which being both the absence of a profit-seeking behaviour and the lack of a market. Economic rationality does not always characterize decision-making in the public sector environment due to the strong political influence and the involvement of politicians (Meyer, 1998; Lapsley, 1999). More specifically, decision-making is affected by short-termism and self-interest that seem to drive both politicians and bureaucrats for different reasons; the former appear to be motivated by their goal to get re-elected, while the latter by career concerns (Alesina and Tabellini 2007; Garrì, 2010). Moreover, in most of the cases, the public sector does not adopt efficiency-enhancing compensation contracts, reward systems or performance measures to account for discretionary choices made by executives (Lee and Plummer 2007). Consequently, public sector managers are not rewarded in a different manner if they select projects that maximize the organization's value over projects which pay off quickly. However, during the last decades, the movement of New Public Management has been promoting the adoption of private sector techniques and policies to the public sector. The use of private sector-inspired techniques is considered to play a significant role in the process of rationalizing the public sector (Lapsley, 1999). Local governments, along with health care organizations, have been the pioneers of introducing business-like features in their processes (Schedler, 2003; Torres *et al.*, 2011; Andrews and Van de Walle, 2013). These techniques refer to the adoption of accrual accounting for financial reporting (Caccia and Steccolini, 2006), performance measures (Jackson and Lapsley, 2003;

Melkers and Willoughby, 2005), output-based budgets (Ridder *et al.*, 2005), and activity-based costing models (Lapsley and Wright, 2004). Apart from activity-based techniques, though, costing has been recognized as an under-developed area in local governments with the least actions in implementing new techniques (Jackson and Lapsley, 2003; Lapsley and Wright, 2004). Nevertheless, this area is very important for supporting planning, controlling and decision-making processes. Moreover, it is an area with evident cases of a financial anomaly, as for instance the "flypaper" effect, which is indicative of economic irrationality regarding grants (Hines and Thaller, 1995). On the other hand, the way cost behaves in the local government environment in periods where grant volumes are declining has not been adequately studied[1]. This is a very important topic as governmental entities have only limited discretion to lower the cost of service provision and the mix of their core activities.

2.3 Greek local governments

The number of Greek municipalities has been significantly decreased in number due to reforming policies and amalgamations from 5,751 to 1,034 in 1997, and then to 325 in 2011. Their primary functions focus mainly on local roads, garbage collection, public cleaning, medical services, cultural events, care for the elderly and nurseries, and provision of local public buildings including schools (OECD, 2008). Greek local governments are governed by elected officials supported by political parties, with management being performed by the mayor and the majority party (Cohen *et al.*, 2013). Cohen *et al.* (2013) illustrate the decision-making process inside Greek municipalities as an environment where the political power is scattered between the political parties which elect representatives to the municipal council. This results in a competitive political climate, especially evident in larger municipalities. Therefore, political preferences and interests are likely to affect sound financial decision-making.

Greek municipalities satisfying specific criteria (i.e. revenues above approximately 1.5 million euro or more than 5,000 citizens) had to adopt accrual accounting from 1/1/2000 onwards and produce and publish a set of financial statements on a yearly

[1]One noticeable exception is the working paper of Bradbury and Scott (2015) on the New Zealand local government level.

basis. These financial statements are audited by Certified Auditors and include: a) the Balance Sheet, b) the Profit and Loss Account and c) the Statement of Income Distribution (Cohen, 2015). Municipalities started, practically, to produce accrual accounting financial statements from 2002 onwards. The accrual accounting standards used are similar to the until the end of 2014 Greek private sector accounting standards for non-listed companies. These standards are in conformity with the directions of the 4th EC Directive for company accounts.

In general, Greek local governments appear to have limited financial autonomy, and to be "subject to the restrictive expenditure control mechanisms that govern the public sector financials" (Cohen *et al.*, 2012; p. 272). These are pre-audits and post-audits performed by the Greek Court of Audit (COA). The pre-audits assess the accuracy, regularity and legitimacy of the expenditures. Contractual agreements are also reviewed before becoming definite. These controls, however, do not focus on the substance of the expenses; they solely concentrate on abiding by the formal procedures.

Greek local governments receive revenues from three main sources: taxes, fees from the sales of goods/services and subsidies coming from the central government (deriving from earmarked governmental tax revenues). Around 60% of the needs in financial resources comes from subsidies. Subsidies aim to cover operational expenses, to finance mainly social actions and specialized programs, and to improve the quality of service provision to the citizens (OECD, 2008). Subsidies include earmarked grants and a general purpose grant. The distribution of the funding among local governments is mainly based on population and geographic distribution (OECD, 2008). As for taxes, even though Greek municipalities have a relative flexibility in levying them, they are forbidden to institute their own taxes. As for fees and charges, they can only vary in a certain range and they can only be used for specific purposes. An analysis of the efficiency of Greek local governments performed by Doumpos and Cohen (2014) for the period 2002 to 2009 provides evidence of a slightly improved efficiency during the last years of the study period, at least in purely technical terms. Nevertheless, efficiency could be further increased with more prudent policies on funding through subsidies and proper cost management (Doumpos and Cohen, 2014).

3. Hypotheses development

As the incentives of politicians and managers in local governments are to a great extent driven by re-election or career concerns, it is expected that they are mainly interested in achieving visible short-term results (Alesina and Tabellini, 2007; Garrí, 2010). Consequently, in cases where revenues get lower, they will be motivated to adjust their budgets and manage their costs, in such a way that they would balance their revenues decline.

Nevertheless, as already mentioned, the private and the public sector present a fundamental difference when it comes to the flexibility in adjusting the cost of service provision. Unlike the private sector, the cost of service provision in municipalities is rather inflexible, as it refers to basic services rendered to constituents. Thus, in periods where budget-cutting is a one-way road, local governments will have to proceed to adjusting their discretionary expenses which are mainly related to supplementary services (administrative and public relation expenses). It is much easier and less politically costly to adjust capacity levels to support services compared to core services. Administrative and public relation activities, in general, have minimal impact on municipality's mission. Based on the above discussion, the following hypothesis is tested:

H1: In local governments administrative and public relation costs exhibit anti-stickiness behaviour; Administrative and public relation expenses increase less when revenues rise than they decrease when revenues fall by an equivalent amount.

In the same realm, local government managers face different incentives for scaling capacity in direct municipality services versus public relations activities such as recreation events and festivals. Activities providing direct and basic services to inhabitants (i.e. costs of service provision such as healthcare, cleaning services, police protection, infrastructure projects) represent the core of a local government's mission, making it difficult to adjust resource levels quickly. Moreover, a significant part of the cost of service provision is committed. Consequently, costs of service provision, which are associated with the core activities of the local governments, are likely to exhibit considerable stickiness. Therefore, the second hypothesis is the following:

H2: Costs are sticky in activities considered to be in the core of the local governments' mission; Costs of service provision increase more when revenues rise than they decrease when revenues fall by an equivalent amount.

4. Methodology

Most empirical studies employ Anderson *et al.*'s (2003) approach in order to measure cost stickiness. This approach estimates the magnitude of the variation in selling, general and administrative costs (SGAs) with respect to the contemporary variations in sales revenues. However, as this study refers to the public sector, it adapts the aforementioned methodology to types of expenses and revenues existent in the local government setting. Consequently, the main variables include administrative and public relation expenses as an equivalent to private sector SGAs and revenues from grants, taxes and sales of goods and services as an equivalent to sales revenue:

$$\log\left(\frac{\text{ADMINPR}_{i,t}}{\text{ADMINPR}_{i,t-1}}\right) = b_0 + b_1 \log\left(\frac{\text{REV}_{i,t}}{\text{REV}_{i,t-1}}\right) + b_2 d_{i,t} \log\left(\frac{\text{REV}_{i,t}}{\text{REV}_{i,t-1}}\right) + \varepsilon_{i,t} \qquad \text{Eq. (1)}$$

The annual log-change in administrative and public relation expenses (ADMINPR) and the annual log-change in Revenues (REV) that include tax revenue (TAX), regular grants from the state budget (GRANT) and revenues from sales of goods and services (SALES) are the main variables used in the model above. The dummy variable ($d_{i,t}$) is incorporated to signal the direction of revenues (REV) of municipality i in year t, and equals to 1 if revenues of the municipality i decreased in year t compared to year t-1 and zero otherwise.

The coefficient b_1 measures the percentage increase in administrative and public relation expenses (ADMINPR) following a 1% increase in revenue (REV). The sum of the coefficients b_1+b_2 measures the percentage decrease in administrative and public relation expenses following a 1% decrease in revenue. The empirical hypothesis for stickiness implies that $b_1>0$ and $b_2<0$ ($b_1 > b_1+ b_2$).

Subsequently, we extend the basic model (1) in order to include contributing factors to the sticky cost phenomenon at the local government level. The coefficient of the term b_0 is expanded as follows:

$$
\begin{aligned}
b_0 = b_0 &+ b_3 d_{i,t} \log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right) \log\left(\frac{ASSETS_{i,t}}{REV_{i,t}}\right) \\
&+ b_4 d_{i,t} \log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right) \log\left(\frac{LIAB_{i,t}}{ASSETS_{i,t}}\right) \\
&+ b_5 d_{i,t} \log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right) \log(POPUL_{i,t}) \\
&+ b_6 d_{i,t} \log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right) \log(LAND_{i,t}) \\
&+ b_7 ELECT_{YEAR} \log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)
\end{aligned}
\qquad \text{Eq. (2)}
$$

Consistent with the adjustment cost view, equation (2) includes the log of total assets (ASSETS) to revenue (REV) ratio as a measure of asset intensity. Anderson *et al.* (2003) argue that firms with higher asset intensity face higher adjustment costs because they rely more on their own resources than on materials and services externally acquired.

In order to capture the effects of the debt intensity, the population and the size of the territory of each municipality, we use the log of total liabilities (LIAB) to total assets (ASSETS) ratio, the log of the the population (POPUL) and the log of size (LAND) respectively. We also consider the effect of the election year through a dummy variable ($ELECT_{YEAR}$) which equals to 1 if it is a year before the elections. As in the sample period elections took place only in 2006, the variable $ELECT_{YEAR}$ gets the value of 1 only when the data refer to 2005. The above variables are included in equation (3):

$$\log\left(\frac{\mathrm{ADMINPR_{i,t}}}{\mathrm{ADMINPR_{i,t-1}}}\right) = b_0 + b_1 \log\left(\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t-1}}}\right) + b_2 d_{i,t} \log\left(\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t-1}}}\right) + b_3 d_{i,t} \log\left(\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t-1}}}\right) \log\left(\frac{\mathrm{ASSETS_{i,t}}}{\mathrm{REV_{i,t}}}\right) + b_4 d_{i,t} \log\left(\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t-1}}}\right) \log\left(\frac{\mathrm{LIAB_{i,t}}}{\mathrm{ASSETS_{i,t}}}\right) + b_5 d_{i,t} \log\left(\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t-1}}}\right) \log(\mathrm{POPUL_{i,t}}) + b_6 d_{i,t} \log\left(\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t-1}}}\right) \log(\mathrm{LAND_{i,t}}) + b_7 \mathrm{ELECT_{YEAR}} \log\left(\frac{\mathrm{REV_{i,t}}}{\mathrm{REV_{i,t-1}}}\right) + \varepsilon_{i,t} \quad \text{Eq. (3)}$$

5. Sample selection and descriptive statistics

The sample includes available data for Greek municipalities and covers the period from 2002 to 2008. The period of analysis starts with the adoption of accrual accounting by Greek municipalities that makes the collection of accrual-based financial statements feasible and stops just before the outbreak of the financial crisis in Greece that started becoming evident at the end of 2009. Thus it covers a period characterized by normal financial conditions. Also, the time span of the analysis corresponds to a period of unchanged organizational structure for local governments as a significant amalgamation wave on Greek municipalities took place in 2011. The municipal year observations were initially 2,285 with yearly observations ranging from 170 (in year 2002) to 414 (in year 2005)[2]. The variables used in the analysis are hand-collected. We reduced the effect of outliers by winsorizing each data element to the 1st and 99th percentile of the respective distribution (Balakrishnan *et al.*, 2004, Banker *et al.,* 2013). We present the descriptive statistics of the sample in Table 1a. Regular grants from the state budget (GRANT) represent approximately 50% of total revenues (REV). As for trends in revenue changes, total revenues (REV) and grants from the state budget (GRANT) show a similar frequency of decreases between two successive years (36,3% and 36,1% respectively) while the frequency of declines in

[2]The sample includes 170 municipalities in year 2002, 358 in 2003, 403 in 2004, 414 in 2005, 342 in 2006, 367 in 2007 and 231 in year 2008.In Greece there is not a central data base including the financial statements of municipalities; the financial statements included in this study are hand collected from different sources. The fluctuation on the number of municipalities included in the sample is due to the fact that we were not able to get access to the rest of the financial statements.

revenues from taxes (TAX) between two successive years is 56,2%. Regarding the trends in expense changes, administrative and public relation expenses (ADMINPR) decrease between two successive years in 45.9% of the cases while the cost of service provision (COSP) has decreased in 34.8% of the cases. As for the relative importance of the two types of expenses used in the analysis, the mean value of administrative and public relation expenses (ADMINPR) to total revenue (REV) is 22.6% (median = 30.6%) which is broadly comparable to the mean ratio of selling, general and administrative expenses to sales revenues reported in Anderson *et al.* (2003) (mean = 26.4%), Subramaniam and Weidenmier (2003) (mean =24.4%), Chen *et al.* (2012) (mean = 23.8%), Dierynk *et al.* (2012) (mean =26%), Banker and Byzalov (2014) (mean = 28.3%) and Venieris *et al.* (2015) (mean =25.2%). Furthermore, the average ratio of costs of service provision (COSP) to total revenues (REV) is 85.2% (median = 98%). This is broadly comparable to the values reported by Kama and Weiss (2013) but considerably higher to other studies (Subramaniam and Weidenmeir 2003, mean = 63.7%, Banker *et al.* 2014a, mean = 62.6%) probably because sustainable private sector companies tend to be profitable. The descriptive statistics of the variables included in the model are presented in Table 1b.

- Insert Table 1a and Table 1b approximately here -

6. Results

Following Petersen (2009), the dependent variable in model (3) is the annual log change in administrative expenses and public relation expenses (ADMINPR) and the estimation of the model is made by using firm-clustered standard errors. Firm-clustered standard errors account for the residual dependence created by the firm effect as suggested by Petersen (2009)[3].

Table 2 presents the estimated models (A), (B), (C) and (D) with dependent variable the annual log change in administrative and public relation expenses (ADMINPR) and

[3]The majority of the correlations among independent variables are significant but small in magnitude. The highest pairwise correlation (0.774, p 0.001) is found between variables b_1 (annual log-change in regular grants from the state budget) and b_2 (interaction variable for regular grants decreasing periods) in model B. The variance inflation factor (VIF) for all variables in all four models is less than 2.5 (well below common cutoffs), indicating that multicollinearity is not a problem in the estimations.

main independent variables the annual log change in total revenues (REV - model A), the annual log change in regular grants from the state budget (GRANT - model B), the annual log change in tax revenues (TAX - model C) and revenues from sales of goods and services (SALES - model D). Analysing the estimated coefficients of the aforementioned models, it seems that Greek municipalities face anti-stickiness cost behaviour as far as administrative and public relation expenses are concerned.

In the case of model A, the estimated value of b_1 of 0.600 indicates that administrative and public relation expenses (ADMINPR) increase by 0.60% per 1% increase in total revenues (REV). The estimated value of b_2 of 0.204 provides strong support for administrative and public relation expenses anti-stickiness behaviour. The combined value of $b_1 + b_2 = 0.804$ indicates that administrative and public relation expenses decrease by 0.804% per 1% decrease in total revenues (REV). Similarly, the results of the estimated models B, C and D provide strong support for administrative and public relation expenses anti-stickiness behaviour as well. The combined values of $b_1 + b_2 = 0.829$ (model B), $b_1 + b_2 = 0.333$ (model C) and $b_1 + b_2 = 0.213$ (model D) indicate that administrative and public relation expenses decrease by 0.829%, 0.333% and 0.213% per 1% decrease in regular grants from the state budget (GRANT), revenues from taxes (TAX) and revenues from sales of goods / services (SALES), respectively, while they increase by 0.606%, 0.260% and 0.184% per 1% increase in regular grants from the state budget (GRANT), revenues from taxes (TAX) and revenues from sales of goods/services (SALES), respectively. Additionally, the degree of cost anti-stickiness increases with the asset intensity (ratio of total assets to total revenues) of the municipalities while the size of the municipality seems to mitigate the level of anti-stickiness. That means that in large municipalities administrative and public relation expenses tend to follow the revenue trend and they adjust accordingly to its fluctuations.

Consequently, the reported results in Table 2 provide corroborative evidence that hypothesis 1 holds even if different types of local government revenues are taken into consideration.

- Insert Table 2 approximately here -

Table 3 reports the results from the estimated equation (3) using the annual log change in costs of service provision (COSP) as the dependent variable. In this case, while changes in revenues influence the cost of local governments' core activities, the rate of the decrease in costs for service provision is less than the rate of cost increase for the same proportional change in revenues.

Concerning model A1, the estimated value of b_1 of 0.467 indicates that the costs of service provision increase by 0.467% per 1% increase in total revenues (REV). The estimated value of b_2 of -0.320 provides strong support that the cost of service provision shows a stickiness behaviour. The combined value of $b_1 + b_2 = 0.147$ which indicates that the costs of service provision decrease by 0.147 % per 1% decrease in total revenues (REV). In the same realm, the resources associated with core activities adjust asymmetrically in the case of regular grants from the state budget (GRANT - model B1), revenues from taxes (TAX - model C1) and revenues from sales of goods/services (SALES - model D1). The reported results in Table 3 provide strong support that hypothesis 2 holds even if the effects of various contributing factors on the sticky cost phenomenon are taken into consideration. According to the findings, costs exhibit greater stickiness when they refer to the core municipality's functions. That is, costs of service provision tend to decrease less when revenues decrease than to increase in times of rising revenues. Consequently, Greek municipalities spend more on resources associated with core activities in response to activity increases and cut fewer resources in response to activity decreases.

In the case of cost of services provision, the degree of stickiness increases with the asset intensity (ratio of total assets to total revenue) and the population of the municipalities. The phenomenon is more intense in larger municipalities. This might be due to the fact that adjustment costs are likely to be higher when service provision refers to more citizens and relies more on assets and infrastructure belonging to the municipality. Also, it might be explained by the fact that politicians are mostly driven by "getting re-elected" concerns and therefore it is not desirable to scale down services. Moreover, cost of service provision stickiness decreases with liabilities. That might mean that the more the municipalities are exposed to debt the more they would adjust their costs on the activity level.

Furthermore, we notice that in both Table 2 and Table 3 the election year variable (b_7) is negative and statistically significant. These results suggest that the cost behaviour before elections is smoothed out; the response of costs to revenue changes tends to favor lower increases or decreases in costs compared to other periods. This finding provides corroborative evidence that local government decisions are driven by "getting re-elected" incentives as mayors may try either not to cut the expected costs or to spend less than expected when revenues increase before the elections period. This finding may indicate that mayors do not want to allow their opponents to run a political campaign against them, arguing for example that they increased expenditures to get reelected.

- Insert Table 3 approximately here -

7. Conclusions

The current study investigates the cost behaviour in a data sample of Greek local governments. Local governments constitute an appealing and unique setting for the examination of asymmetric cost behaviour due to the existence of strong political incentives, which appear to affect rational economic decision-making, and their non-profit character, which leads public sector executives and politicians to act under different motives. Moreover, while the existing research on sticky cost phenomenon has primarily focused on the behaviour of selling and administrative expenses with respect to the sales volume, the study documents the anti-sticky behaviour of expenditures relating to administrative and public relation activities and the stickiness behaviour of the cost of service provision to the citizens. Furthermore, the study dismantles and analyses separately local government revenues coming from different sources; that is regular grants from the state budget, tax revenues and revenues from sales of goods/services.

The empirical evidence of this study provides support to the inference that the cost response to administrative and public relation expenses on a revenue level decrease is greater than in the case of a revenue increase (cost anti-stickiness). Findings show that local government managers adjust administrative and public relation expenses faster when revenues decrease than when they rise because it is much easier and less politically costly to adjust capacity levels in the supplementary activities. Thus, it

turns out that local governments' managers will be reluctant to maintain supplementary idle resources after revenues decline.

On the contrary, managers are less likely to trim costs in core activities (i.e. costs of service provision) when there are decreases in revenues because of the critical nature of these services to constituents. "Stickiness" of costs related to core activities is therefore expected to happen since the reduction of the core services is, due to their nature, rather prohibitive. On the other hand, the fact that discretionary expenses (i.e. administrative and public relation expenses) present "anti-stickiness" is very interesting. As cost behaviour is indicative of local government politicians and executives' incentives and managing skills, the above results provide evidence of rational expense management during periods of revenue decreases. Consequently, the current study illustrates the importance of properly selecting the suitable type of resources that should be used in cost models in order to unravel information about managers' decisions.

Furthermore, as politicians are mostly driven by "getting re-elected" concerns, it would be expected that they will be especially interested in showing acceptable results regarding the completion of projects just before election periods (Kido *et al.*, 2012). During these periods, they are motivated to invest more resources on the municipality's development in order to significantly affect electoral choices made by constituents and increase the probability of re-election (Brender, 2003; Brender and Drazen, 2008). In this realm, this study provides evidence that resources decrease less in periods preceding elections compared to non pre-election periods. However, we did not find evidence that municipalities spend more before elections. Maybe mayors in Greek municipalities refrain from these actions not to be accused by their political opponents for this very reason.

The present study contributes to the accounting literature by expanding the understanding of how deliberate commitment decisions influence the asymmetric cost behaviour in the public sector and especially in the local government setting. The topic of the study becomes even more interesting as cost management plays a key role as a means to deal with financial crises. The rise of cutbacks in the public sector brings to the fore cost considerations. The recent financial crisis that stroke European countries (e.g. Greece, Ireland, Portugal, Spain) led to the adoption of austerity and/or

cutback measures as a means of shielding their financial stability (Kickert, 2012; Di Mascio and Natalini, 2015; Cohen *et al.*, 2015). Understanding how cost stickiness works inside local governments, could lead to an understanding of its implications in periods of cutback measures, like the ones currently faced by several European countries. For example, decreases in municipalities' subsidies and grants as a result of cutbacks in central government expenditures should not be expected to automatically result in symmetric savings in expenditures as corresponding increases in expenditures when revenues used to grow. At the same time, it might be difficult to achieve balanced budgets in municipalities when there is a considerable decrease in revenues, without having to make considerable adjustments to the output and mix of services offered to constituents. From another angle, in order to achieve symmetric savings, radical changes in the cost of inputs should be sought. Public sector salary cuts across the board would result in sustaining the same input resources with lower cost. This policy would, however, forcefully interrupt the existing relations of cost stickiness.

As a consequence, the outcome of this study has important implications for Greece. A significant part of the funding Greek local governments receive through grants coming from the central government has dramatically decreased due to the financial crisis impact. Therefore, the measures for cost-saving purposes taken by the Greek central government in 2011 which included the significant lowering of grants (OECD, 2011) are expected to have an impact on Greek municipalities' efficiency (Doumpos and Cohen, 2014). Nevertheless, this study provides corroborative evidence that before the crisis, Greek local governments had been following a rather rational stance towards adjusting expenses, which could, in turn, help them to properly handle the impacts of the crisis with the least effects on the constituents.

The study could be further elaborated by analysing cost stickiness of separate services. Nevertheless, the existing data set does not permit the execution of this type of analyses. Additionally, a fruitful approach for future research would be to test whether these findings hold true in other institutional settings where local governments' management, funding and array of service provision are different.

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TABLES

TABLE 1a: Descriptive Statistics of initial variables

	ADMINPR	COSP	REV	GRANT	TAX	SALES	ASSETS	LIAB	POPUL	LAND
Mean	1,659	6,237	7,319	3,265	733	2,586	39,000	5,070	20.8	145.6
Median	886	2,849	2,887	1,594	153	1,014	20,200	1,841	9.2	115.3
Stand. Deviation	2,184	9,427	20,900	4,389.5	1,866	3,983	52,600	11,200	50.3	132.5
Min	121	180	585	394	5.8	1,5	3,792	11	1.1	1.4
Max	11,800	55,400	53,800	24,800	12,000	21,800	327,000	85,900	745	585.3
1st Quartile	504.5	1,706	1,782	1,038	59	470.1	11,400	813	6.1	47.4
3rd Quartile	1,817	6,470	6,839	3,287	574	2,939	42,300	4,414	17.4	204.7

TABLE 1b: Descriptive Statistics of final variables

	$\log\left(\frac{ADMINPR_{i,t}}{ADMINPR_{i,t-1}}\right)$	$\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)$	$\log\left(\frac{COSP_{i,t}}{COSP_{i,t-1}}\right)$	$\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)$	$\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)$	$\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)$	$\log\left(\frac{ASSETS_{i,t}}{REV_{i,t}}\right)$	$\log\left(\frac{LIAB_{i,t}}{ASSETS_{i,t}}\right)$	$\log(POPUL_{i,t})$	$\log(LAND_{i,t})$
Mean	0.025	0.040	0.041	0.048	0.027	0.028	1.332	-1.104	4.057	4.879
Median	0.030	0.037	0.038	0.044	0.021	0.021	1.294	-1.048	3.966	5.062
Stand. Deviation	0.184	0.074	0.191	0.156	0.349	0.307	0.499	0.464	0.398	0.636
Min	-1.994	-0.728	-2.488	-1.810	-3.310	-4.147	-0.759	-3.574	3.067	2.903

Max	1.734	0.732	2.069	1.588	2.714	3.469	4.412	0.104	5.872	5.941
1st Quartile	-0.012	0.010	0.002	0.011	-0.087	-0.017	1.054	-1.365	3.789	4.676
3rd Quartile	0.077	0.068	0.074	0.086	0.144	0.065	1.525	-0.793	4.240	5.311

Notes:

The time period is from 2002 to 2008.

The variables ADMINPR, COSP, REV, GRANT, TAX, ASSET and LIAB are reported in thousands of Euros.

Population (POPUL) is reported in thousands of inhabitants and the variable LAND is reported in thousands of acres.

Variable definitions:

ADMINPR = Administrative expenses + Public relation expenses ; COSP= Costs of service provision ; REV = Regular grants from the state budget, taxes, sales of goods/services; GRANT = Regular grants from the state budget ; TAX = Revenues from taxes; SALES = Sales of goods/ services; ASSETS = Total Assets; LIAB = Total Liabilities; POPUL = Municipality population; LAND = Size of the municipality territory; $d_{i,t}$ = A dummy variable which equals to 1 if revenues of municipality i decreased in year t compared to year t-1 and zero otherwise.

TABLE 2: Administrative and Public Relation Cost Behaviour

		Coefficient Estimates (t - stat)							
	Model A		**Model B**		**Model C**		**Model D**		
b_0		0.004	b_0		0.055	b_0		0.071	b_0		0.001
		(1.05)			(0.97)			(1.11)			(0.88)
b_1:	$\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)$	0.600***	b_1:	$\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)$	0.606***	b_1:	$\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)$	0.260***	b_1:	$\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)$	0.184***
		(18.18)			(18.73)			(14.29)			(11.65)
b_2:	$d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)$	0.204***	b_2:	$d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)$	0.223***	b_2:	$d_{i,t}\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)$	0.073***	b_2:	$d_{i,t}\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)$	0.029**
		(4.28)			(4.64)			(2.79)			(2.46)
b_3:	$d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log\left(\frac{ASSETS_{i,t}}{REV_{i,t}}\right)$	0.019***	b_3:	$d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)\log\left(\frac{ASSETS_{i,t}}{GRANT_{i,t}}\right)$	0.097**	b_3:	$d_{i,t}\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)\log\left(\frac{ASSETS_{i,t}}{TAX_{i,t}}\right)$	0.045*	b_3:	$d_{i,t}\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)\log\left(\frac{ASSETS_{i,t}}{SALES_{i,t}}\right)$	0.032
		(4.05)			(1.71)			(1.52)			(0.46)
b_4:	$d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log\left(\frac{LIAB_{i,t}}{ASSETS_{i,t}}\right)$	0.003	b_4:	$d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)\log\left(\frac{LIAB_{i,t}}{ASSETS_{i,t}}\right)$	0.044	b_4:	$d_{i,t}\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)\log\left(\frac{LIAB_{i,t}}{ASSETS_{i,t}}\right)$	0.023	b_4:	$d_{i,t}\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)\log\left(\frac{LIAB_{i,t}}{ASSETS_{i,t}}\right)$	0.082**
		(0.76)			(0.88)			(0.64)			(1.93)
b_5:	$d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log(POPUL_{i,t})$	-0.110**	b_5:	$d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)\log(POPUL_{i,t})$	-0.009***	b_5:	$d_{i,t}\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)\log(POPUL_{i,t})$	-0.006	b_5:	$d_{i,t}\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)\log(POPUL_{i,t})$	-0.012
		(-2.12)			(-2.61)			(-1.20)			(-0.84)

b_6:	$d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log(LAND_{i,t})$	0.006	**b_6:**	$d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)\log(LAND_{i,t})$	0.004	**b_6:**	$d_{i,t}\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)\log(LAND_{i,t})$	-0.018***	**b_6:**	$d_{i,t}\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)\log(LAND_{i,t})$	0.044
		(0.68)			(0.82)			(-7.77)			(1.50)
b_7:	$ELECT_{YEAR}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)$	-0.014*	**b_7:**	$ELECT_{YEAR}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)$	-0.029***	**b_7:**	$ELECT_{YEAR}\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)$	-0.114***	**b_7:**	$ELECT_{YEAR}\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)$	-0.008
		(-1.89)			(-3.58)			(-3.05)			(-0.80)
Number of Observations		1,826			1,841			1,828			1,837
Adj. R-Squared		0.340			0.409			0.241			0.288
Prob> F		0.0000			0.0000			0.0001			0.0000

Regression specification:

Model A:

$$\log\left(\frac{ADMINPR_{i,t}}{ADMINPR_{i,t-1}}\right) = b_0 + b_1\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right) + b_2 d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right) + b_3\, d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log\left(\frac{ASSETS_{i,t}}{REV_{i,t}}\right) + b_4 d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log\left(\frac{LIAB_{i,t}}{ASSETS_{i,t}}\right) + b_5 d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log(POPUL_{i,t}) + b_6 d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log(LAND_{i,t}) + b_7 ELECT_{YEAR}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right) + \varepsilon_{i,t}$$

Model B:

$$\log\left(\frac{ADMINPR_{i,t}}{ADMINPR_{i,t-1}}\right) = b_0 + b_1\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right) + b_2 d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right) + b_3 d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)\log\left(\frac{ASSETS_{i,t}}{REV_{i,t}}\right) + b_4 d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)\log\left(\frac{LIAB_{i,t}}{ASSETS_{i,t}}\right) + b_5 d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)\log(POPUL_{i,t}) + b_6 d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)\log(LAND_{i,t}) + b_7 ELECT_{YEAR}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right) + \varepsilon_{i,t}$$

Model C:

$$\log\left(\frac{\mathrm{ADMINPR_{i,t}}}{\mathrm{ADMINPR_{i,t-1}}}\right) = b_0 + b_1 \log\left(\frac{\mathrm{TAX_{i,t}}}{\mathrm{TAX_{i,t-1}}}\right) + b_2 d_{i,t} \log\left(\frac{\mathrm{TAX_{i,t}}}{\mathrm{TAX_{i,t-1}}}\right) + b_3\, d_{i,t} \log\left(\frac{\mathrm{TAX_{i,t}}}{\mathrm{TAX_{i,t-1}}}\right) \log\left(\frac{\mathrm{ASSETS_{i,t}}}{\mathrm{REV_{i,t}}}\right) + b_4 d_{i,t} \log\left(\frac{\mathrm{TAX_{i,t}}}{\mathrm{TAX_{i,t-1}}}\right) \log\left(\frac{\mathrm{LIAB_{i,t}}}{\mathrm{ASSETS_{i,t}}}\right) + b_5 d_{i,t} \log\left(\frac{\mathrm{TAX_{i,t}}}{\mathrm{TAX_{i,t-1}}}\right) \log(\mathrm{POPUL_{i,t}}) + b_6 d_{i,t} \log\left(\frac{\mathrm{TAX_{i,t}}}{\mathrm{TAX_{i,t-1}}}\right) \log(\mathrm{LAND_{i,t}}) + b_7 \mathrm{ELECT_{YEAR}} \log\left(\frac{\mathrm{TAX_{i,t}}}{\mathrm{TAX_{i,t-1}}}\right) + \varepsilon_{i,t}$$

Model D:

$$\log\left(\frac{\mathrm{ADMINPR_{i,t}}}{\mathrm{ADMINPR_{i,t-1}}}\right) = b_0 + b_1 \log\left(\frac{\mathrm{SALES_{i,t}}}{\mathrm{SALES_{i,t-1}}}\right) + b_2 d_{i,t} \log\left(\frac{\mathrm{SALES_{i,t}}}{\mathrm{SALES_{i,t-1}}}\right) + b_3\, d_{i,t} \log\left(\frac{\mathrm{SALES_{i,t}}}{\mathrm{SALES_{i,t-1}}}\right) \log\left(\frac{\mathrm{ASSETS_{i,t}}}{\mathrm{SALES_{i,t}}}\right) + b_4 d_{i,t} \log\left(\frac{\mathrm{SALES_{i,t}}}{\mathrm{SALES_{i,t-1}}}\right) \log\left(\frac{\mathrm{LIAB_{i,t}}}{\mathrm{ASSETS_{i,t}}}\right) + b_5 d_{i,t} \log\left(\frac{\mathrm{SALES_{i,t}}}{\mathrm{SALES_{i,t-1}}}\right) \log(\mathrm{POPUL_{i,t}}) + b_6 d_{i,t} \log\left(\frac{\mathrm{SALES_{i,t}}}{\mathrm{SALES_{i,t-1}}}\right) \log(\mathrm{LAND_{i,t}}) + b_7 \mathrm{ELECT_{YEAR}} \log\left(\frac{\mathrm{SALES_{i,t}}}{\mathrm{SALES_{i,t-1}}}\right) + \varepsilon_{i,t}$$

*, **, *** indicates 10%, 5% and 1% levels of significance respectively.

Variable definitions:

ADMINPR = Administrative expenses + Public relation expenses; REV = Regular grants from the state budget, taxes, sales of goods/services; GRANT = Regular grants from the state budget; TAX = Revenues from taxes; SALES = Sales of goods/ services; di,t = A dummy variable which equals to 1 if revenues (REV in Model A, GRANT in Model B and TAX in model C) of municipality i decreased in year t compare to year t-1 and zero otherwise.; ASSETS = Total Assets; LIAB = Total Liabilities; POPUL = Municipality population; LAND = Size of the municipality territory ; $\mathrm{ELECT_{YEAR}}$ = A dummy variable which is equal to 1 if it is a year prior to elections (2005)

TABLE 3: Cost of Service Provision Behaviour

		Coefficient Estimates (t - stat)							
	Model A1		**Model B1**		**Model C1**		**Model D1**		
b_0		0.015	b_0		0.011	b_0		0.015***	b_0		0.019***
		(1.34)			(1.08)			(7.41)			(3.76)
b_1:	$\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)$	0.467***	b_1:	$\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)$	0.491***	b_1:	$\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)$	0.240***	b_1:	$\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)$	0.144**
		(8.97)			(10.37)			(6.18)			(1.91)
b_2:	$d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)$	-0.320***	b_2:	$d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)$	-0.376***	b_2:	$d_{i,t}\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)$	-0.202***	b_2:	$d_{i,t}\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)$	-0.019**
		(-9.54)			(-3.30)			(-6.29)			(-2.14)
b_3:	$d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log\left(\frac{ASSETS_{i,t}}{REV_{i,t}}\right)$	-0.055***	b_3:	$d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)\log\left(\frac{ASSETS_{i,t}}{GRANT_{i,t}}\right)$	-0.082**	b_3:	$d_{i,t}\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)\log\left(\frac{ASSETS_{i,t}}{TAX_{i,t}}\right)$	-0.075	b_3:	$d_{i,t}\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)\log\left(\frac{ASSETS_{i,t}}{SALES_{i,t}}\right)$	-0.023***
		(-5.43)			(-1.79)			(-1.17)			(-5.58)
b_4:	$d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log\left(\frac{LIAB_{i,t}}{ASSETS_{i,t}}\right)$	0.027*	b_4:	$d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)\log\left(\frac{LIAB_{i,t}}{ASSETS_{i,t}}\right)$	0.010***	b_4:	$d_{i,t}\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)\log\left(\frac{LIAB_{i,t}}{ASSETS_{i,t}}\right)$	0.058**	b_4:	$d_{i,t}\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)\log\left(\frac{LIAB_{i,t}}{ASSETS_{i,t}}\right)$	0.004
		(1.59)			(3.78)			(1.94)			(0.70)
b_5:	$d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log(POPUL_{i,t})$	-0.032***	b_5:	$d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)\log(POPUL_{i,t})$	-0.006	b_5:	$d_{i,t}\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)\log(POPUL_{i,t})$	-0.009***	b_5:	$d_{i,t}\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)\log(POPUL_{i,t})$	-0.003
		(-3.91)			(-0.58)			(-2.95)			(-0.92)

b_6:	$d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log(LAND_{i,t})$	-0.032	**b_6:**	$d_{i,t}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)\log(LAND_{i,t})$	-0.069***	**b_6:**	$d_{i,t}\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)\log(LAND_{i,t})$	-0.004*	**b_6:**	$d_{i,t}\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)\log(LAND_{i,t})$	-0.017***
		(-1.40)			(-6.28)			(-1.63)			(-2.81)
b_7:	$ELECT_{YEAR}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)$	-0.052***	**b_7:**	$ELECT_{YEAR}\log\left(\frac{GRANT_{i,t}}{GRANT_{i,t-1}}\right)$	-0.042***	**b_7:**	$ELECT_{YEAR}\log\left(\frac{TAX_{i,t}}{TAX_{i,t-1}}\right)$	-0.034***	**b_7:**	$ELECT_{YEAR}\log\left(\frac{SALES_{i,t}}{SALES_{i,t-1}}\right)$	-0.003
		(-13.08)			(-4.42)			(-3.63)			(-0.92)
Number of Observations											1806
		1822			1810			1811			
Adj. R-Squared		0.309			0.330			0.298			0.273
Prob> F		0.0000			0.0000			0.0000			0.0000

Regression specification:

Model A1:

$$\log\left(\frac{COSP_{i,t}}{COSP_{i,t-1}}\right) = b_0 + b_1\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right) + b_2 d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right) + b_3\, d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log\left(\frac{ASSETS_{i,t}}{REV_{i,t}}\right) + b_4 d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log\left(\frac{LIAB_{i,t}}{ASSETS_{i,t}}\right) + b_5 d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log(POPUL_{i,t}) + b_6 d_{i,t}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right)\log(LAND_{i,t}) + b_7 ELECT_{YEAR}\log\left(\frac{REV_{i,t}}{REV_{i,t-1}}\right) + \varepsilon_{i,t}$$

Model B1:

$$\log\left(\frac{\mathrm{COSP}_{i,t}}{\mathrm{COSP}_{i,t-1}}\right) = b_0 + b_1 \log\left(\frac{\mathrm{GRANT}_{i,t}}{\mathrm{GRANT}_{i,t-1}}\right) + b_2 d_{i,t} \log\left(\frac{\mathrm{GRANT}_{i,t}}{\mathrm{GRANT}_{i,t-1}}\right) + b_3 d_{i,t} \log\left(\frac{\mathrm{GRANT}_{i,t}}{\mathrm{GRANT}_{i,t-1}}\right) \log\left(\frac{\mathrm{ASSETS}_{i,t}}{\mathrm{REV}_{i,t}}\right) + b_4 d_{i,t} \log\left(\frac{\mathrm{GRANT}_{i,t}}{\mathrm{GRANT}_{i,t-1}}\right) \log\left(\frac{\mathrm{LIAB}_{i,t}}{\mathrm{ASSETS}_{i,t}}\right) + b_5 d_{i,t} \log\left(\frac{\mathrm{GRANT}_{i,t}}{\mathrm{GRANT}_{i,t-1}}\right) \log(\mathrm{POPUL}_{i,t}) + b_6 d_{i,t} \log\left(\frac{\mathrm{GRANT}_{i,t}}{\mathrm{GRANT}_{i,t-1}}\right) \log(\mathrm{LAND}_{i,t}) + b_7 \mathrm{ELECT}_{\mathrm{YEAR}} \log\left(\frac{\mathrm{GRANT}_{i,t}}{\mathrm{GRANT}_{i,t-1}}\right) + \varepsilon_{i,t}$$

Model C1:

$$\log\left(\frac{\mathrm{COSP}_{i,t}}{\mathrm{COSP}_{i,t-1}}\right) = b_0 + b_1 \log\left(\frac{\mathrm{TAX}_{i,t}}{\mathrm{TAX}_{i,t-1}}\right) + b_2 d_{i,t} \log\left(\frac{\mathrm{TAX}_{i,t}}{\mathrm{TAX}_{i,t-1}}\right) + b_3 d_{i,t} \log\left(\frac{\mathrm{TAX}_{i,t}}{\mathrm{TAX}_{i,t-1}}\right) \log\left(\frac{\mathrm{ASSETS}_{i,t}}{\mathrm{REV}_{i,t}}\right) + b_4 d_{i,t} \log\left(\frac{\mathrm{TAX}_{i,t}}{\mathrm{TAX}_{i,t-1}}\right) \log\left(\frac{\mathrm{LIAB}_{i,t}}{\mathrm{ASSETS}_{i,t}}\right) + b_5 d_{i,t} \log\left(\frac{\mathrm{TAX}_{i,t}}{\mathrm{TAX}_{i,t-1}}\right) \log(\mathrm{POPUL}_{i,t}) + b_6 d_{i,t} \log\left(\frac{\mathrm{TAX}_{i,t}}{\mathrm{TAX}_{i,t-1}}\right) \log(\mathrm{LAND}_{i,t}) + b_7 \mathrm{ELECT}_{\mathrm{YEAR}} \log\left(\frac{\mathrm{TAX}_{i,t}}{\mathrm{TAX}_{i,t-1}}\right) + \varepsilon_{i,t}$$

Model D1:

$$\log\left(\frac{\mathrm{COSP}_{i,t}}{\mathrm{COSP}_{i,t-1}}\right) = b_0 + b_1 \log\left(\frac{\mathrm{SALES}_{i,t}}{\mathrm{SALES}_{i,t-1}}\right) + b_2 d_{i,t} \log\left(\frac{\mathrm{SALES}_{i,t}}{\mathrm{SALES}_{i,t-1}}\right) + b_3 d_{i,t} \log\left(\frac{\mathrm{SALES}_{i,t}}{\mathrm{SALES}_{i,t-1}}\right) \log\left(\frac{\mathrm{ASSETS}_{i,t}}{\mathrm{SALES}_{i,t}}\right) + b_4 d_{i,t} \log\left(\frac{\mathrm{SALES}_{i,t}}{\mathrm{SALES}_{i,t-1}}\right) \log\left(\frac{\mathrm{LIAB}_{i,t}}{\mathrm{ASSETS}_{i,t}}\right) + b_5 d_{i,t} \log\left(\frac{\mathrm{SALES}_{i,t}}{\mathrm{SALES}_{i,t-1}}\right) \log(\mathrm{POPUL}_{i,t}) + b_6 d_{i,t} \log\left(\frac{\mathrm{SALES}_{i,t}}{\mathrm{SALES}_{i,t-1}}\right) \log(\mathrm{LAND}_{i,t}) + b_7 \mathrm{ELECT}_{\mathrm{YEAR}} \log\left(\frac{\mathrm{SALES}_{i,t}}{\mathrm{SALES}_{i,t-1}}\right) + \varepsilon_{i,t}$$

*, **, *** indicates 10%, 5% and 1% levels of significance respectively.

Variable definitions:

COSP= Costs of service provision; REV = Regular grants from the state budget, taxes, sales of goods/services ; GRANT = Regular grants from the state budget; TAX = Revenues from taxes; SALES = Sales of goods/services; di,t = A dummy variable which equals to 1 if revenues (REV in Model A, GRANT in Model B and TAX in model C) of municipality i decreased in year t compare to year t-1 and zero otherwise; ASSETS = Total Assets; LIAB = Total Liabilities; POPUL = Municipality population; LAND = Size of the municipality territory ; $\mathrm{ELECT}_{\mathrm{YEAR}}$ = A dummy variable which is equal to 1 if it is a year prior to elections (2005)