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The Tax and Petroleum Revenue Effect on Iran's Public Expenditures (1994–2015), Employing Fiscal Illusion Approach

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Abstract

Increased expenditures and the government size are an important issue in public sector economics. In this regard, various theories have been developed in order to justify the reasons for the public expenditure growth, and the theories have been empirically tested. One of the outlooks explaining the government expenditures growth and the economy size is fiscal illusion approach. According to fiscal illusion theory and experiences, citizens generally do not have a correct perception of fiscal parameters systematically, so that they wrongly demand for more government expenditures. In this study, seasonal data for the period of 1994–2015 were used to test and analyze the fiscal illusion in Iran's economy by applying autoregressive distributed lags model. Findings, obtained from the model estimation, indicate that the fiscal illusion in Iran's economy can be explained from the variables of oil revenue and government debt in short-term and long-term, and indirect tax elasticity in short-term. Since the government uses oil revenue to finance its debt and budget deficit, the results may lead to fiscal illusion. In order to prevent fiscal illusion, using these sources should be gradually reduced as much as possible. As tax revenue itself generally does not result in fiscal illusion (based on the findings), the government should specify transparent fiscal rules by using tax revenues rather than oil revenues in order to prevent both the increasing government expenditures and fiscal fluctuations. According to the results, government should use more direct tax revenue. As government's direct tax revenue, unlike other sources of revenue, does not create fiscal illusions, it does not result in excessive demand by citizens for public expenditures.

Keywords: Fiscal Illusion, Government Expenditures, Iran's Economy, Tax.
JEL Classification: H41, H11.

1. Introduction

One of the most important issues in macroeconomics is the government sector and its expenditures. Undeniable roles of governments in resources re-allocation, economic stabilization,

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economic fluctuations, public goods production, income redistribution, and wealth in the society, are quite familiar facts in economics. Increased interference of governments in fiscal affairs, would lead to increasing the amounts of government revenues and expenditures. In addition to many economic impacts, increasing government activities in Iran's economy makes it difficult for government to supply resources to perform its public duties. Therefore, government budget deficits and its financing methods have become a challenging task for the country's economy. Identifying the causes for public expenditures growth is one of the main topics in the public sector economics. On these issues, serious studies have been conducted, and various theories have been proposed. One of them is fiscal illusion theory. In fact, one reason for increased government expenditures is the citizens' fiscal illusion, for lack of systematic perception of the expenditures and benefits of public programs by citizens, would lead to increased government expenditures. The citizens' fiscal illusion creates motivations in politicians and decision-makers to increase public expenditures and government size. For this reason, it seems to be an essential to identify the fiscal illusion sources and their impact. This study aims to analyze the impact of government revenue resources on public sector expenditures in Iran's economy based on fiscal illusion theory. In this regard, we review the empirical studies, and explain the research theoretical framework. Then, the research model will be specified. Finally, the model is studied empirically using the seasonal data for the period 1994 to 2015, based on the specified model.

The remainder of this paper is organized as follows. Section 2 presents the theoretical framework including the theories and other studies' findings. In Section 3 the literature review is presented. Section 4 explains the model specification and introduces the research variables. Section 5 estimates the model and findings, and Section 6 concludes the paper.

2. Theoretical Framework

Public sector is the part of country's economy, which is controlled or supported financially by the government. Government and central banks use fiscal policy, which involves changing the levels of government expenditure and taxation, in order to limit the extent of the business cycle (Sloan and Zurcher, 1970). In general, fiscal policy refers to the use of taxation and government expenditures, in order to regulate the aggregate level of the economic activity.

Public finance deals with the government revenue and expenditure activities. In general, there are at least three functions for the government: the allocation, the distribution, and the stabilization function (Mukherjee, 2010). Public finance simply deals with the principles and problems of the public sector. The subject matter has been greatly expanded along with population increase to tackle; for example education, health, environmental, etc. Macroeconomics or aggregate economics deals with the broad aggregates or the overall dimensions of the economic life of a country: an important part of which is the public sector (Deane and Kuper, 1988).

Public sector or public economics or governmental economics is frequently called public finance. Public finance shares many common grounds and interactions with politics and political economy. Its main concerns are revenues expenditures, and borrowings of the public authorities. During the decades after the World War II, theories dealing with public finance and public choice have been developed and tested extensively. On the other hand, the demand for public goods and services has been econometrically estimated for a variety of goods for different periods and countries. Therefore, considering these points, governments face challenges to use the best possible instruments in order to provide people with goods and services.

Governments usually engage difficult decisions. A Well-developed public finance policy often helps the government spend it revenue.

The government expenditures growth origins are very important in public finance. In this regard, various theories have been proposed to explain the public sector expenditures changes. The fiscal illusion theory also explains the relative growth of the public sector from another view.

The fiscal illusion literature assumes that the mechanism at play is incomplete information. Because of lack of transparency in the fiscal system, so as the argument goes, the true price for public programs is obscured for citizens (Baekgaard, 2016: 27).

Fiscal illusion is typically raised if certain revenue structure features lead taxpayers to underestimate how much cost they are incurred, creating excess demand for government-provided goods, i.e., more public expenditures are demanded than would be in the absence of fiscal illusion (Gemmell et al., 1999: 689). On the other hand, fiscal illusion is created when the citizens are not aware of the fiscal reality, i.e. they do not know how much they receive from the state or how much they pay to it (Mourao, 2010: 267).

The theory of fiscal illusion is based on an assumption of limited rationality among citizens. It contains two related notions of inconsistent voter preferences, and misperception of the costs and benefits of public services. Underestimation of costs is often referred to as a possible explanation for inconsistent preferences. According to this perspective, due to inconsistency and underestimation of costs, citizens demand greater amounts of public sector goods than if they had been fully informed, or than they actually want to pay for in taxes (Winter and Mouritzen, 2001: 110).

There are three authors who are referred as the originators of fiscal illusion: John Ramsay McCulloch (1845), John Stuart Mill (1848), and, Amilcare Puviani (1903), the economist who coined the term. Puviani is treated as the 'father of fiscal illusion'. He posited that the ruling class designed public tax and expenditure policies to minimize resistance from the dominated class (Afonso, 2014: 221).

Mill (1848; 1994: 237) discusses the perception of different taxes: "If all taxes were direct, taxation would be much more perceived than at present, and there would be a security, which now there is not, for economy in the public expenditure." Mill shows that one important nature of fiscal illusion is political illusion. It occurs when politicians use fiscal instruments to deceive taxpayers making them feel paying less than they are actually contributing to the government programs. In this sense, taxpayers potentially attribute more value to public expenditures than they are worth, which in the end leads to a public sector of excessive size (Buehn, 2015).

Amilcare Puviani (1903) founded the economics of illusion–the study of public choices made by some agents with imperfect knowledge. After more than a half of a century, James Buchanan (1960) renewed this obscure concept and the fiscal illusion theory.

James Buchanan, influenced by Downs (1957) extended Puviani's approach to analyze the substantial lag between the true intentions of governments, and the electorate beliefs. This lag is usually manipulated to increase the government size through less visible (and less reactive) taxation (Maura, 2008: 82).

Fiscal illusion may be achieved by failing to disclose the future consequences of current expenditure policies, and thus taking advantage of information asymmetry (Guillamón, 2011: 393). The idea is based on the information asymmetry between the suppliers (e.g. bureaucrats), and consumers (e.g. voter-taxpayers) of public goods. It is argued in recent public choice theories, government agents hold more information than voter-taxpayers, and hence, this asymmetry allows the magnitude of public spending to go beyond the voters' preferences (Pinar, 1998: 38; Maura, 2008: 82).

Buchanan and Wagner (1977) have argued that complex and indirect tax payment structures create a fiscal illusion that will systematically produce higher levels of public outlay than those that would be observed under simple payments structures. The basic idea is that complex payments structures, induce underestimation of the tax-price of public expenditure, and therefore result in voting behavior favoring relatively large public sectors (West and Winer, 1980: 607).

Next points describe some factors that are considered to be the cause of fiscal illusion.

Case 1. The Revenue System Complexity

The first source of fiscal illusion is the revenue system complexity. Buchanan, attributes the revenue complexity hypothesis to Puviani (1903). As Buchanan puts it, 'to the extent that the total tax load on an individual can be fragmented so that he confronts numerous small levies rather than a few significant ones, illusory effects may be created' (1967, p. 135). According to this hypothesis, the more complicated the revenue system, the more difficult it is for the taxpayer to determine the "tax-price" of public outputs, and the more likely it is that he will underestimate the tax burden associated with public programs. In short, the hypothesis implies that, other things equal, the more complex the revenue system, the larger will be the public budget.

Richard Wagner (1976) performed the first test of the revenue complexity hypothesis. Wagner's approach was, as discussed above, regressing total current expenditures for a sample of 50 large US cities on a set of socio-economic variables, and the revenue system complexity measure. Wagner, interestingly, chose an index, the Herfindahl index, that is widely used in the industrial organization literature to measure the concentration degree within an industry. His revenue complexity measure is formulated as follows:

$$\mathrm{HHC} = \sum_{i=1}^{N} t_i^2 \qquad (1)$$

In Equation 1, t_i is the relative share of tax i in total tax revenues, and N is the number of different tax bases. The HHC index takes the value of 1 when the total tax revenue is received from one type of tax base, and it approaches to 0 when the tax system includes many tax bases types. In fact, values approximate to 0, which is the government's revenue system complexity. In contrast, as this index approximates to 1, it indicates government's revenue system simplicity.

Since the rational individual does not expect to have more than a negligible effect on the size and composition of the public goods bundle he receives, investment in public sector benefit-cost information is not expected to yield much of a return. Alternatively, the revenue system complexity increases the cost of obtaining budgetary information which will, according to the traditional view, lead people to consistently underestimate their true fiscal burden. This underestimation would increase the quantity of demanded public output (Dilorenzo, 1982: 243).

Case 2. Income Elasticity of the Revenue System

Another form of fiscal illusion is associated with income elastic taxation forms. The establishment of a system with a high degree of income elasticity, or with a small proportion of revenue from inelastic sources, with everything else constant, will cause an increase in the fiscal illusion level. Such systems support the increase in the agents' incomes which will be reflected in increased public expenditures. Thus, there is a direct relationship between increased revenue from an income elastic revenue structure, and increased expenditures, ceteris paribus (Laranjeira and Borges, 2013: 18).

Elasticity measures the extent to which a tax structure generates revenue in response to increases in taxpayer income, without a change in tax rates (Craig and Heins, 1980: 267).

According to Oates (1975: 141), 'people will not object to increases in public expenditures if they can be funded with no increase in tax rates (that is, from increments to revenues resulting solely from growth in income), but they will not support an expanded public budget if it requires a rise in tax rates'. So, the agents do not care about their tax burden but rather with the tax rate they face.

In sum, the more elastic the tax system, the more responsive is the revenue to national income growth. Therefore, it is easier to sustain a higher volume of public expenditure if income is growing (Buchanan, 1967).

Case 3. Debt Illusion

Fiscal illusion also arises when public expenditures are financed by government borrowing or from the government bonds sale. A government can borrow by selling bonds to the public, and using the proceeds for public expenditures. A government that borrows by selling bonds is making a commitment to pay interest over time to bondholders, and to repay the bond value at the end of the bond life. To finance and repay the bond, the government will require future taxes, or there will be a need to borrow again, but eventually repayment will require future taxes. Therefore, bond financing of public expenditures is deferred taxation, including a deferred taxation excess burden (Hillman, 2009: 288–289).

Except for a world consistent with the Ricardo–Barro equivalence theorem of public debt, citizens tend to underestimate the future burdens of public debt (Haug, 2008: 7). As governments replace the public expenditures financing through the collecting taxes by resorting to loans, fiscal illusion increases and consequently the expenditures on public goods increases as well (Laranjeira and Borges, 2013: 19). Illusion can come out when people are incorrectly informed about the time path of future benefits or the time path of future taxes. The excess of the present value of perceived net future represents an illusory addition to wealth, which can affect real consumption and asset decisions (Floyd and Hynes, 1978: 380).

The issue here is that people are more likely to perceive the public programs costs if they pay for them through current taxation, than if tax liabilities are deferred through public sector borrowing. Vickrey (1961), for example, has referred to "a public debt illusion" under which people pay no attention to their liability share by the public debt. From this viewpoint, reliance on debt rather than tax finance, results in a larger public budget (Oates, 1988: 76).

Case 4. Renter Illusion

Renter illusion associates fiscal illusion with the property ownership level in a fiscal jurisdiction. It is expected that the raise in the renters' jurisdiction proportion will raise the demand for public goods with everything else constant, and therefore the level of public expenditures (Laranjeira and Borges, 2013: 19). The strand of empirical literature on fiscal illusion shows that renters are more likely to support higher levels of local public expenditures than homeowners (Dell'Anno and De Rosa, 2013: 72).

Occupants of rental dwellings do not pay the tax directly, and the legal tax liability rests with landlords. There are some reasons to believe that property taxes on rental units are shifted forward in the higher rents form, it is nevertheless the case that renters never see a tax bill. Moreover, there is some indirect, but pervasive evidence suggesting that renters don't think that they pay local property taxes. If renters believe that they don't have to pay for local public services, they will tend to support excessively large public budgets. As a result, we might expect overspending in the local public sector (Oates, 2005, 420). The fiscal illusion degree depends on the homeowners' proportion in a given jurisdiction (Haug, 2009: 7).

Case 5. The Flypaper Effect

Recent public choice approaches to local government finance, have emphasized that the combination of local taxes and central grants is likely to give rise to voter misperceptions of the tax–price of local public goods (Pinar, 1998: 39).

This is labeled the flypaper effect by Gramlich and Galper (1973), namely the money "stick where it hits" (Tovmo and Falch, 2002: 154-

155).

According to Courant et al. (1979), and Oates (1979), the observed tendency for lump-sum grants to stimulate higher public expenditures than equivalent increases in other revenue sources, is mainly due to the behavior of budget maximizing bureaucrats and politicians. Such budget–maximizing agents, project the illusion that lump sum allocations reduce both actual average tax rates paid by citizens, and the marginal tax–price of public goods provided to citizens (Amusa et al., 2008: 447).

There is empirical evidence in mixed form for each of the fiscal illusion hypotheses stated above. It should be noted that the renter illusion and the flypaper effect, are usually examined at the level of the local governments (provincial or municipality). Although petroleum forms a significant part of the total budget of Iran, no tax is imposed on the petroleum (as an income or wealth). Therefore, the public goods tax–price becomes less than it true cost, and people’s demand for public services would rise. Thus, in the present study, oil revenue is included in the model as another proxy causing fiscal illusion.

3. Literature Review

Oates (1991) identified five forms of fiscal illusions: the tax structure complexity, renter illusion with respect to property taxation, income elasticity of the tax structure, debt illusion, and the flypaper effect. Heyndels and Smolders (1994) found four of these potential sources of fiscal illusion at the municipal level: elasticity of tax receipts, the revenue system complexity, renter illusion, and the flypaper effect. Royed and Borrelli (1999), using data from 16 OECD countries during the 1959–1990 period, tested the hypotheses regarding the linkage between a country's revenue structure, and its experience with deficits. They found evidence that countries heavily dependent on direct taxes, had more difficulty keeping expenditures and revenues in line, particularly during times of high unemployment. Yet they found no evidence of a fiscal illusion effect on the budget deficits.

Mitias and Turnbull (2001) showed that grant illusion (the flypaper effect) and tax illusion, were inexorably interrelated. Furthermore, they came to the conclusion that fiscal illusion, arises from voters’ disability to perceive the full amount of intergovernmental aid, being given to the county government. Gemmell et al. (2002) provided a model that shed light on fiscal illusion, accountability, and income inequality effects at the municipal level. They found strong evidence of grant illusion. They also showed evidence of renter illusion, and less accountability under the property tax.

Sausgruber and Tyran (2005) investigated whether fiscal illusion was the result of the overexpansion of public expenditure, thus promoting an excessive presence of the State in the market. The two authors, in fact, limited their work to assess the reliability of the so-called "mill hypothesis", according to which the fiscal pressure obtained by indirect taxation was underestimated than the direct taxation; because it is less visible to taxpayers.

Mourão (2008), through a various intensity indicators of illusion-owners' strategies, estimated a global (national) proxy for the degree of financial illusion in a sample of 68 countries for the period of 1960–2006. This estimation, based on the Multiway approach to the analysis of principal components, clearly showed that the phenomenon of fiscal illusion, varied greatly from one country to another. In terms of global trends, Mourão (2008) estimated that there was a significant reduction between 1980 and 1995, whilst procedures with illusory aims remained more or less constant until 2006.

Dell'Anno and Dollery (2012) provided an empirical analysis of fiscal illusion estimating an index of fiscal illusion for 28 European countries over the period 1995–2008, by employing a structural equation approach. Using Multiple Indicators Multiple Causes models (MIMCM), they investigated the main indicators of fiscal illusion, and developed a fiscal illusion index. They came to the conclusion that the chief determinants for the fiscal illusion strategies deployment were the self-employment share on the total employment, the educational level of citizens, and the size of tax burden. At the same time, policymakers attempted to 'conceal' the real tax burden by means of debt illusion, fiscal drag, wage withholding taxes, as well as taxes on labor. Dell'Anno and Mourão (2012) estimated a fiscal illusion index for 50 countries for the period 2000-2008. Their employing the structural equation modelling (SEM), allowed both an estimation of the fiscal illusion scale, and an empirical test of the main causes and phenomenon indicators.

Buehn et al. (2012) provided an empirical analysis of the relationship between fiscal illusion and the shadow economy, for 104 countries over the period 1989–2009. They argued that both the unobservable phenomena were closely linked to each other, such that a fiscal illusion creation might be helpful if governments wanted to control shadow economic activities. Using a MIMIC model with two latent variables, they found that fiscal illusion, negatively affected the shadow economy: Concealing the real tax burden through fiscal illusion, potentially contributed to the government's efforts to repress shadow economic activities.

Mourao and Cabral (2015) studied the duration of public finance cycles in 12 European countries since 1960. They applied periodogram techniques on the levels of fiscal illusion found for these established democracies, and tested the statistical significance of the Fourier frequency peaks. According to their findings, in addition to the electoral or real business cycles, the democracy expands public finance cycles which extend over various legislative tenures ruled by different political parties.

Irwin (2016) studied how much had been done in 28 advanced countries since 2003 in order to recognize assets and liabilities, and thus, dispel the fiscal illusions that such transactions created. Good progress has been made in recognizing some assets and liabilities, e.g. owned shares and payable accounts, but much less in others, e.g. pensions for civil.

The studies on fiscal illusion have been summarized in Table 1. More particular, it includes studies in which fiscal illusion hypotheses have been tested.

Table 1: A Summary of Major Studies of the Fiscal Illusion

Author(s)	Data	Estimation techniques (*)	Dependent Variable	Measure of Fiscal Illusion Employed	Other Independent Variables	Major Findings
Abbott and Jones (2016)	36 USA states (1980–2000)	3SLS and SYS-GMM dynamic panel data estimator	Per capita current government spending	Borrowing as a proportion of GDP, income elasticity of state sales tax, income	Per capita personal income, percentage of population>65, urban rate, state	High income elasticities of sales tax revenue, and receipt of intergovernment

Author(s)	Data	Estimation techniques (*)	Dependent Variable	Measure of Fiscal Illusion Employed	Other Independent Variables	Major Findings
				elasticity of state personal income tax, Herfindahl index, per capita federal aid	revenues proportion, total state debt outstanding as a proportion of GDP, Gini index, proportion of the non-white population, owner occupation rate	al transfers, are important determinants of fiscal illusion.
Carroll (2009)	US municipal governments with population greater than 25,000 (1970–2002)	Panel data	Per capita expenditures, revenue volatility (in 2 models)	Tax diversification, nontax diversification, debt burden, debt service burden, tax leverage, tax visibility	Tax revenue, Nontax revenue, Population, State-local tax burden, Intergovernmental aid, dummy, State unemployment, US unemployment	Fiscal illusion does not occur among municipal governments, but revenue diversification does influence the volatility levels.
Amusa et al. (2008)	237 local government in South Africa (2005–2006)	2SLS and IV	Per capita expenditures	Intergovernmental transfers	per capita revenues generated by municipalities, fiscal or revenue raising capacity (in per capita terms), per capita Expenditure needs	There is no statistical evidence in support of the flypaper hypothesis.
Deller and Maher (2006)	Local government in Wisconsin (1990–2000)	OLS	per capita expenditures	Per capita revenues	Per capita income, Percentage of population with college degree, Percentage of population <20, Percentage of employment in manufacturing and professional services, Median house value, per capita property taxes	Empirical support for the existence of asymmetric behavior in the fiscal illusion of flypaper effect.
Carroll (2005)	50 US states, Pooled time–series, cross–sectional (1992–2000),	Panel corrected OLS	Revenue diversification	Per capita expenditure, tax visibility	Average monthly salaries, per capita personal, tax burden, sales tax rate, gas tax rate, citizen ideology, government ideology, population,	Significant and positive impact of tax burden on revenue diversification

Author(s)	Data	Estimation techniques (*)	Dependent Variable	Measure of Fiscal Illusion Employed	Other Independent Variables	Major Findings
					republican governor, poverty rate, homeownership, tax limitation	
Landers and Byrnes (2000)	Columbus, Ohio, metropolitan (1992–1996)	IV	School district performance and unit house price (Measured as binary variable)	School district debt liability	Average teacher salary, teacher training level, pupil-teacher ratio, expenditure per pupil, low income enrollment, college prep enrollment, school district tax rate	The results support the debt illusion hypothesis.
Gemmell et al. (1999)	UK (1955–1994)	Johansen procedure	Government expenditure	Ratio of revenue to expenditure, ratio of expenditure taxes to total government revenues	Gross domestic product, ratio of the public sector deflator to the GDP deflator, population	Empirical support for fiscal illusion via 'less visible' _indirect taxes and deficit financing.
Royed and Borrelli (1999)	Sixteen OECD countries (1959–1990)	OLS	Deficits	Elasticity of revenue, visibility of tax (direct taxes)	Unemployment, GDP, interest payments, lagged deficit change, dummy.	No empirical support for fiscal illusion
Pinar (1999)	Local governments for England and Wales (1991–1994).	OLS	Per capita expenditures	Per capita central grants, ratio of renters to the local population, tax share	Per capita income, ratio of local non-taxpaying adults to local taxpayers, population	Empirical support for the flypaper effect. No evidence of rent illusion.
Dollery and Worthington (1995a,b)	7 Australian states. Pooled time–series, cross sectional (1982–1992)	OLS and GLS (linear and log-linear)	Total expenditure and total expenditure net of grants and transfers	Revenue complexity (Herfindahl), income elasticity, ratio of direct to indirect taxes, dummy variables for reliance on grant income	Population, median voter income, proportion of government under 19 years, proportion of population over 65 years, population density, dummies for large and small states	Complexity of revenue system positive and significant impact on expenditures. No empirical support for revenue-elasticity hypothesis. Strong empirical support for the flypaper effect.
Dollery and Worthington (1995c)	Australia National time–series (1981–1992)	OLS (linear and log-linear)	Per capita federal non grant expenditure	Not applicable	Perceived price of grantor expenditures, per capita national income, perceived price of recipient	Empirical support for the flypaper effect.

Author(s)	Data	Estimation techniques (*)	Dependent Variable	Measure of Fiscal Illusion Employed	Other Independent Variables	Major Findings
					expenditures, per capita state and local expenditures, unemployment rate.	
Worthington (1994)	46 Australian LGAs Cross sectional 1991	OLS and TSLS (linear and log-linear)	Total and per capita expenditure	Proportion owner occupied, (Herfindahl) Revenue complexity, dummies for grant and utility reliance, and indirectness of revenue system	Rateable area, and roads, median voter tax price, median voter income, population, proportion of population>65 years, measure of revenue-complexity, dummies for grant and utility reliance	Complexity of revenue system positive and significant impact on expenditures. Revenue system determined exogenously to level of expenditure. Proportion owner occupied and expenditure negatively related.
Heyndels and Smolders (1994)	302 Flemish municipalities Cross sectional 1990	OLS (log-linear)	Total expenditure	Revenue complexity (Herfindahl), (Oates) income elasticity, percentage non-owner occupied, grant income divided by total income	Population, median voter tax share, median voter total disposable income	Complexity of revenue system has a positive and significant impact on expenditures. No empirical support for revenue elasticity hypothesis. Positive and significant impact of grants on expenditure.
Greene and Hawley (1991)	US states (1977–1983)	Logit models	A discrete variable assuming the value of zero if there was no change in the tax code in the state during the year, and one if there was a tax decrease	Income elasticity	change of the GNP deflator, rate of change of nominal income, Hunter and Scott's measure of progressivity, rate of change of the state's revenue, rate of change of population	Empirical support for tax revenue elasticity hypothesis.
Marshall (1991)	50 US states Cross sectional 1986	TSLS	Per capita expenditure, Change in per capita expenditure	Estimated per capita tax windfall	Per capita income, per capita intergovernmental revenue, price of public goods (employee salaries), population, state	Windfall revenue exerts a positive though insignificant effect on expenditure.

Author(s)	Data	Estimation techniques (*)	Dependent Variable	Measure of Fiscal Illusion Employed	Other Independent Variables	Major Findings
					share of final expenditure on public goods, urban rate, population density, per capita tax windfall	
Henrekson (1988)	Sweden Time series 1950–1984	OLS	Government consumption, investment and transfer expenditures	Revenue complexity (Herfindahl), ratio of direct to indirect taxes	Urban population, GDP, non-labor force population as a proportion of total, ratio of median to mean income, ratio of net exports to GDP, proportion of unionized to non-unionized labor, inflation	Simplicity of revenue structure insignificantly positive.
Fujii and Hawley (1988)	46 Australian cities (1991)	OLS	Perceived marginal tax rate, Computed marginal tax rate	Dummy variable for home ownership	Age and sex of respondent, education of respondent, the number of household members	No empirical support for fiscal illusion.
Misiolek and Elder (1988)	50 US states Cross sectional Changes between 1967 and 1984.	OLS (log-linear)	Per capita real tax revenues, per capita. real state-local expenditure	Income elasticity (Oates), revenue complexity (Herfindahl), visible tax concentration ratio	Per capita personal income, population, average monthly salary of state-local employees, dummy for state expenditure limit, tax export measure, variability of taxes over period, variance of income over period, State share of state-local expenditures	Tax elasticity and revenue complexity positive and significant in tax revenues only.
Islam (1988)	39 Ontario, Canada, municipalities Pooled time–series, cross sectional (1977–1991)	Generalized 2SLS, ARCH	Local expenditures	Revenues grants received	Property and business taxes combined, population of the recipient municipality, number of households in the municipality, assessed valuation of	Empirical support for the flypaper effect.

Author(s)	Data	Estimation techniques (*)	Dependent Variable	Measure of Fiscal Illusion Employed	Other Independent Variables	Major Findings
					municipal properties (per capita)	
Breeden and Hunter (1985)	37 US cities Cross sectional 1975	OLS	Per capita total city revenue	Measure of breadth of revenue system (number of different instruments)	Per capita income, per capita federal revenue, per capita state revenue, dummies, sales taxes, license fees, charges, property taxes, city area	Simplicity measure negative and significant, breadth of revenue system positive and significant.
DiLorenzo (1982)	66 US counties Cross sectional Changes between 1967 and 1977	OLS	Change in per capita expenditures	Income elasticity (Oates)	Change in population, change in population density, change in per capita real income, change in intergovernmenta l revenue	Tax elasticity significant though negative.
Craig and Heins (1980)	50 US states Pooled time series, cross sectional (1970 and 1975)	OLS and TSLS	Per capita state expenditure, expenditure as a percentage of income	Income elasticity of state taxes	Per capita personal income, per capita federal aid, population density, percentage of population urban, percentage of population > 18, percentage of state and local expenditures sourced locally	Positive and significant relationship between tax elasticity and expenditure.
Wagner (1976)	50 US cities Cross sectional 1970	OLS	Total current expenditure	Revenue complexity (Herfindahl)	Total personal income, intergovernmenta l revenue, percentage of population below poverty line, av. Salary of city employees, local expenditure as a percentage of total, population density	Simplicity of revenue structure significantly negative.
Clotfelter (1976)	50 US states Cross sectional 1970	TSLS	Per capita expenditure and per capita revenue	Ratio of direct to indirect taxes	Wage rate, income, population, public tertiary education enrolment ratio, various measures	Simplicity of revenue structure negative though insignificant.

Author(s)	Data	Estimation techniques (*)	Dependent Variable	Measure of Fiscal Illusion Employed	Other Independent Variables	Major Findings
					of education, revenue simplicity	
Oates (1975)	33 US cities Cross sectional (1960–1970)	OLS and TSLS	Government revenues as a percentage of national income	Tax receipts as a percentage of total tax receipts	GDP, measure of income elasticity of tax structure	Tax elasticity measure positive and significant.
Bergstrom and Goodman (1973)	826 US municipal areas Cross sectional 1962	OLS (log-linear)	Total government on police, parks and total excluding education and welfare	Percentage of municipal housing owner occupied	Number of households, tax share of median voter, median income, measure of the crowding of the public good, percentage population change, percentage nonwhite, of population > 65, population density	Negative and significant coefficient between percentage owner occupied and the level of general expenditures

(*) Three-Stage Least Squares, System Generalized Method of Moments (SGMM), Instrumental Variables Approach (IV), Ordinary Least Squares (OLS), Generalized Least Squares (GLS), Two-Stage Least Squares (2SLS), Multiple Indicators and Multiple Causes models (MIMIC) (respectively).

Iran is a developing country whose variables are different from the developed countries, economically, politically, socially, and culturally. These countries are mostly studied and examined in relation to fiscal illusion. The present study, which is probably the first study of this kind, specifically addresses the complexity effects of the revenue, income, elasticities of direct and indirect taxes, and oil revenue as indicators of fiscal illusion in Iran’s public sector. So, the results of this research will affect the government revenue, expenditure policies, and tax policies of the authorities. By identifying the factors that create fiscal illusion in Iran's economy, the government will be able to reduce its negative externalities (imposed by fiscal illusion).

4. Model Specification and Introducing Variables

The theoretical model proposed in this paper, is based on the following sources: Borcherding and Deacon (1973), Bergstrom and

Goodman (1973), Pinar (1999), and Abbott and Jones (2015).

The demand for government-provided goods can be formulated as follows (Borcherding and Deacon, 1973; Bergstrom and Goodman, 1973):

$$G_i = \alpha Y_i^{\alpha} P_{gi}^{\beta} \qquad i = 1,2,\dots,N \tag{2}$$

Where G_i, is voter–taxpayer i's consumption of government provided goods. Y_i is i's income, and P_{gi} is i's tax-price paid for G_i. Also, the coefficients α and β capture income and price elasticities of demand for government–provided goods, respectively.

The tax-price is specified as $P_{gi} = T_i C N^{\eta}$, in which T_i is i's tax share, C is the unit cost of G, and N is the population with the degree of publicness η.

Borcherding and Deacon (1972) deal with nondiscrimination in taxation, and specify the tax-price as $P_{gi} = CN^{\eta-1}$ as all pay the same amount of tax. If the same amount of tax is paid by every voter–taxpayer, then the tax share is computed by the following formula: $T_i = (T/N)T = N^{-1}$ where T is the total tax revenue, and (T/N) is i's tax bill.

Eliminating P_{gi} from the model, the following specification is obtained:

$$G_i = \alpha Y_i^{\alpha} C^{\beta} N^{\beta(\eta-1)} \tag{3}$$

In a time series context, if there is a productivity lag in the public sector, the implied difference between private and public sector prices should be taken into account: Government expenditures must be appropriately deflated, as the model variables are defined in real terms, and a measure of public and private price differences should be included in the equation 3. Putting relative prices and aggregating to express demand in terms of total expenditures, we have:

$$G = \alpha Y^{\alpha} P_r^{\beta} N^{\phi} \qquad \text{where } \phi = (\beta+1)(\eta+1) + \eta - \alpha \tag{4}$$

Where G and Y are total government expenditures and gross domestic product (GDP), respectively, both in real terms, and $P_r(= C/P_x)$ is the relative price, where P_x is the private sector goods price. Obviously, the relative price measures the demand responses to a combination of the public and private sector prices. Specification 4 is the demand standard model for government-provided goods used in previous empirical studies.

Such a specification adopts the democratic process theory, in which it is assumed that citizens are fully aware of the costs and benefits of the government-provided goods. However, as noted above, recent studies within the public choice field have challenged this assumption, suggesting that voter-taxpayers may not be aware of their "true" tax-prices, because of some tax structure features. The arguments in the case of central government expenditures include debt illusion (BR), the invisibility of indirect taxes (ELASIDT), the complexity of the tax system (HER), and the income elasticity (ELASDT). BR can be calculated by the budget deficit ratio to GDP.

In the case of countries where the government's main revenue comes from oil revenue, the oil revenue is another indicator that affects the public goods price, which is called the oil revenue illusion (another example of fiscal illusion). When we investigate the fiscal illusion, we may come across a case in which the citizens underestimate the public goods price, and do not take into account the costs of oil revenue injected into society as a whole. Oil revenue (OIL) is an indicator of oil revenue illusion.

Let the perceived tax-price be a function of the perception parameter Π, the "true" tax-price as $\widehat{P_{gi}} = \Pi P_{gi}$, where Π is a function of OIL, BR, HER, ELASDT, and ELASIDT as follows:

$$\Pi = OIL^{\pi_1} e^{\pi_2 BR} HER^{\pi_3} e^{\pi_4 ELASDT} e^{\pi_5 ELASIDT} \tag{5}$$

Replacing P_{gi} by $\widehat{P_{gi}}$ in (2), and substituting (5), the model (4) can be rewritten in the following logarithmic form:

$$LnG = lna + \alpha lnY + \beta lnP_r + \phi lnN + \delta_1 LNOIL + \delta_2 BR + \delta_3 LNHER + \delta_4 ELASDT + \delta_5 ELASIDT + u \tag{6}$$

where δ_1, δ_2, δ_3, δ_4 and $\delta_5$represent $\pi_1\beta$, $\pi_2\beta$, $\pi_3\beta$, $\pi_4\beta$ and $\pi_5\beta$, respectively. The coefficients δ_1, δ_2, δ_4 and δ_5, are predicted to be positive while δ_3 are predicted to be negative.

Since the data of the P_r (the public goods price to the private goods price) variable do not exist in the Iran's economy, and we did not find an appropriate proxy (indicator) for it, we delete the variable from the model. Moreover, the debt illusion proxy (indicator), is considered as the budget deficit ratio to GDP as a lagged variable. Those variables which are treated as a single entity (as a whole), are considered per capita.

So, the following model is used to investigate the fiscal illusion effect on the government expenditures level:

$$\mathrm{LG_t} = \alpha_0 + \alpha_1 LY_t + \alpha_2 \mathrm{LOIL_t} + \alpha_3 \mathrm{BR_t} + \alpha_4 \mathrm{LHER_t} + \alpha_5 ELAS\mathrm{DT_t} + \alpha_6 \mathrm{ELASIDT_t} + \varepsilon_t \quad (7)$$

Where the dependent variable is LG (logarithm of total per capita government expenditure), and independent variables are LY (logarithm of GDP per capita with oil), LOIL (logarithm of oil per capita revenue), BR (government debt as a percentage of GDP), budget deficit is considered as an indicator creating debt for government). Some of the variables are calculated as follows:

Herfindahl concentration index is the squares sum of each tax base divided by the total tax. Hence, based on tax bases in Iran's economy, it includes the legal entities tax, income tax, imports tax, wealth tax, consumption and sale tax, and other revenues.

Income elasticity of indirect tax revenue is the percentage of indirect tax changes (including import tax and tax of consumption and sale) divided by the percentage of changes in GDP.

Income elasticity of direct tax revenue is the percentage of changes in direct tax (including tax of legal entities, income tax, and wealth tax) divided by the percentage of changes in GDP.

ε is the error term of the model. The variables are in the form of real values.

Fiscal illusion is assessed by the indicators of oil revenue (LOIL), government debt (BR), Herfindahl index of tax revenues (LHER), the income elasticity of direct tax (ELASDT), and income elasticity of indirect tax (ELASIDT). The variables of ELASDT, ELASIDT, and LHER need to be calculated. It is expected that all coefficients, except for LHER, will be positive. The measurement variables amount is a billiard Rials. The research data have been collected from the Central

Bank Database, including data from 1994 to 2015, which all data are seasonal, except the population data (for calculating per capita of some variables). In order to calculate seasonal population data, Cubic method was used.

5. Estimation Model and Findings

5.1 Investigating the Stationary of Research Variables

Using traditional econometric methods in empirical studies is based on the assumption of variables' stationary position. Studies conducted in this way, do not confirm this assumption on many macroeconomic time series, for most of these variables are nonstationary. Since the model variables are in the form of time series, in order to prevent false regression in the model estimation, it is required to first test the variables in terms of stationary. So, in order to test the variables' stationary position, augmented Dickey–Fuller test (ADF) was used. The testing results of the variables' stationary are presented in Table2.

Table 2: Results of ADF Unit Root Test of Model Variables

Variable	Model with intercept and without time trend on the variables level			Model with intercept and without time trend on the first difference of variables		
	Statistic	Critical value	Interruption	Statistic	Critical value	Interruption
LG	–1.20	–2.90	7	–13.07	–2.90	7
LY	–1.05	–2.90	7	–8.21	–2.90	7
LOIL	–8.77	–2.90	7			
BR	–10.79	–2.90	7			
LHER	–2.04	–2.90	7	–11.87	–2.90	7
ELASDT	–9.15	–2.90	7	-	-	-
ELASIDT	–9.19	–2.90	7	-	-	-

Source: Research findings.

Based on the Table 2, LG, LY, and LHER are not stationary at level 1, since the absolute value of the calculated statistic for augmented Dickey–Fuller test (ADF), is smaller than the critical values, and other variables are stationary at the level. By repeating the Dickey–Fuller test for the first nonstationary variables difference, all of them became stationary after one differentiating zero hypothesis on unit root of the data difference, nonstationary was rejected, and the opposite hypothesis was confirmed at the 95 percent confidence level.

Thus, the variables are cointegrated in order 1. Since all variables are not I(1), the Autoregressive Distributed Lags (ARDL) method, which has been taken of a dynamic approach, was used. For this purpose, the model was studied using Eviews9 software. According to the Table 3, the optimal lag was determined by using the Schwarz-Bayesian criterion. The optimal lag for LG is determined 2, while it is determined 1 for the other variables. Results are shown in Table 3. As can be seen, all variables coefficients are statistically significant at the level of 90 percent.

Table 3: ARDL Model Estimation
(Government Expenditures Dependent Variable)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LG(-1)	0.109551	0.085262	1.284886	0.2028
LG(-2)	0.257170	0.082599	3.113489	0.0026*
LY	0.507857	0.113680	4.467411	0.0000*
LOIL	0.195795	0.035751	5.476670	0.0000*
LOIL(–1)	–0.118122	0.038231	–3.089671	0.0028*
BR	3.794954	0.574987	6.600074	0.0000*
BR(-1)	1.546076	0.545975	2.831768	0.0059*
LHER	0.518805	0.143711	3.610052	0.0006*
ELASDT	–0.003767	0.002012	–1.871968	0.0651***
ELASIDT	0.003897	0.002273	1.714726	0.0905***
C	–0.312627	0.304152	–1.027864	0.3073
R-squared	0.851819			
F-statistic	43.11384	Durbin-Watson stat	1.98921	
Prob (F-statistic)	0.000000			

Source: Research findings; * and *** are significant at 1 percent, and 10 percent level, respectively.

By assuming that other things equal, the estimated coefficients can be interpreted. As Table 3 shows, government expenditures per capita

(LG) with two lags have a positive significant effect on per capita government expenditures in the current period. Given the coefficients, an increase of 1 percent in per capita government expenditure in the two previous periods, led to a raise of 0.25 percent in per capita expenditure in the current period. The GDP per capita coefficient (LY) is 0.50, which shows a positive significant effect on per capita government expenditure. Every 1 percent rise in GDP grows per capita government expenditure as 0.50 percent. LOIL has a positive significant impact on per capita government expenditure. Based on the coefficient obtained for the mentioned variable, a 1 percent rise in oil per capita, would lead to a 0.19 percent increase in current expenditure, which indicates fiscal illusion resulting from oil revenue. Considering the BR variable, the relevant coefficient is 3.79, which has a positive significant effect on the government expenditure, as well as a fiscal illusion. This result is in line with Gemmel et al. (1999), and Landers and Byrnes (2000). The LHER variable coefficient is 0.51, which has a positive effect on government expenditure, and is constant with Misiolek and Elder (1988), Dollery and Worthington (1995a), Worthington (1994), Heyndels and Smolders (1994), Henrekson (1988), and Gemmel et al. (1999).

Considering the ELASDT, the relevant coefficient is 0.003, indicating a negative significant effect on per capita government expenditures. It means that taxpayers do not have fiscal illusion about this type of tax. The result is confirmed by DiLorenzo (1982), and Dollery and Worthington (1995b). The income elasticity coefficient of indirect tax (ELASIDT) is 0.003, which shows a positive impact on per capita government expenditure, meaning that taxpayers have a fiscal illusion on it. The result is confirmed by Abbott and Jones (2015) and Gemmel et al. (1999).

As can be seen in Table 4, the estimated results' coefficients from ARDL model have been confirmed. In addition, except for the ELASIDT variable, the variables that were significant in the previous section would be significant in this section too.

Table 4: Results of Equation Long-Term Coefficients (Dependent Variable of Government Expenditure)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LY	0.801948	0.091406	8.773467	0.0000*
LOIL	0.122653	0.073401	1.670996	0.0989***
BR	8.433932	2.475527	3.406923	0.0011*
LHER	0.819237	0.223034	3.673143	0.0004*
ELASDT	–0.005948	0.003405	–1.746689	0.0848***
ELASIDT	0.006154	0.003783	1.627027	0.1799

Source: Research findings, * and *** are significant at 1 percent and 10 percent level, respectively.

5.2 Diagnostic Tests of the Equation

One main issue in estimating the long-term relationships between the variables, is testing the classical assumptions (equations diagnostic tests are performed). Table 5 shows the tests' results. In this table, A represents the Lagrange coefficient test, and confirms the serial non-correlation among the residuals. B indicates Ramsey test, examining the specified form of the model correctly. In addition, LM statistic shows the model specification accuracy. C represents normal diagnostic test of the residual terms, based on the LM statistic. In addition, the distribution normality in the model is confirmed. Section D in the table shows the heteroscedasticity test, and according to the Table 5, this test confirms the residuals homoscedasticity. Thus, due to the diagnostic tests results, the statistical validity of the results obtained from the model estimation, is confirmed.

Table 5: Model Diagnostic Tests Results

Test statistics	LM version	F-Version
A: Serial correlation	2.214658[.3304]	0.964787[.3859]
B: Functional form	0.742245[.4603]	0.550927[.4603]
C: Normality	2.192289[.334157]	
D: Heteroscedasticity (ARCH)	10.19251[.4238]	1.008394[.4445]

Source: Research findings.

The error correction model was used to determine if the adjustment of short-term disequilibrium's in public expenditure, leads to long-term equilibrium. The ECM coefficient shows that how much percent of the short-term disequilibrium in public expenditure, is adjusted to achieve long-term equilibrium in each period. In other words, how many periods does it take for per capita public expenditure to return to its long-term trend.

Table 6: Error Correction Equation Estimation Results (ECM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLG(-1)	–0.257170	0.082599	–3.113489	0.0026*
D(LY)	0.507857	0.113680	4.467411	0.0000*
D(LOIL)	0.195795	0.035751	5.476670	0.0000*
D(BR)	3.794954	0.574987	6.600074	0.0000*
D(LHER)	0.518805	0.143711	3.610052	0.0006*
D(ELASDT)	–0.003767	0.002012	–1.871968	0.0651***
D(ELASIDT)	0.003897	0.002273	1.714726	0.0905***
CointEq(-1)	–0.633279	0.119332	–5.306849	0.0000*

Source: Research findings, * and *** are significant at 1 percent and 10 percent level, respectively.

The results of error correction model estimation are indicated in Table 6. The error term coefficient (–0.63) is statistically significant. Also the error correction term showed that in each period, 63 percent of the disequilibrium in the per capita expenditure had been adjusted, and approached its long-term trend. Accordingly, in order to achieve a long-term equilibrium in each period, 63 percent of the disequilibrium will be corrected in the next period. As the ECM estimation results show in Table 6, all variables' coefficients are statistically significant at least at the level of 90 percent. The LY coefficient is equal to 0.50, as positive and significant. The LOIL coefficient with the value of 0.19 is positive and significant, showing a fiscal illusion in the short-term equilibrium. Government debt or BR with a coefficient of 3.79 affects the government expenditures in the short-term equilibrium, indicating the short-term fiscal illusion. The LHER coefficient with the value of 0.005 is positive and significant. The ELASDT coefficient is negative based on the theory, as tax system capacity is weak in Iran's economy. Besides, the tax acquisitions have been limited, and thus, fiscal illusion does not have the complexity of the tax structure. In fact, by enlarging the tax revenue by the limited tax bases, government expenditures would increase, and vice versa.

The variable coefficient of direct tax income elasticity (ELADT) is 0.003, which is significant at 10 percent level. It shows that, as the direct tax is more elastic than the national income, the fiscal burden of this type of tax on the taxpayers will be more specified. Hence, the demand for government expenditures lessens. As a result, taxpayers have no fiscal illusion on this type of tax. The coefficient of indirect tax income elasticity (ELASIDT) is 0.003, which is significant at the level of 10 percent. It shows that as the indirect tax is more elastic than the national income, the fiscal burden of this type of tax on the taxpayers would be less specified. Therefore, demand for government expenditures increases, and taxpayers would have fiscal illusion on this type of tax.

6. Conclusion

According to the fiscal illusion theory, the government revenue structure affects the voters' perception of the fiscal burden imposed on them, so that they underestimate the cost they spend on public goods. In this paper, the effect of government revenue sources on public expenditures in Iran's economy was examined by using seasonal data for the period of 1994–2015, based on the fiscal illusion theory. Accordingly, the specified model was tested and analyzed empirically based on the autoregressive distributed lags, and error correction models. According to the results, by using petroleum revenue, the presence of fiscal illusion in Iran's economy, the government debt in the short-term and long-term, and indirect tax income elasticity in the short-term, were confirmed. The coefficients of tax structure complexity and the elasticity of direct tax income were statistically significant and positive. According to this theory, negative coefficient of tax revenue complexity indictor is expected to be negative, but this coefficient appeared as positive in the model. It could be stated that, based on our empirical evidence, the government in Iran's economy, increases its expenditures by increasing its revenues, which makes the government face budget deficits that can continue. Furthermore, since tax bases in Iran's economy are somewhat limited, it is expected the Herfindhal index to be close to 1 in various years. By increasing tax revenue, and the oil revenue in Iran's economy, the government expenditures would raise. The variable coefficient of the direct tax income elasticity is statistically significant and negative. According to the theory, taxes with high income elasticity, would impose increasing changes for high revenue groups. For this reason, less tax burden would be imposed on people in moderate revenue groups, and this reduction in the public goods cost, creates fiscal illusion, and these groups would demand a larger government. Our findings also show that in Iran's economy, the elasticity hypothesis of direct tax income, is not empirically confirmed, that is in this community the economy does not face fiscal illusion. So, we understand that taxpayers in Iran are quite aware of the direct tax fiscal burden, imposed by the government. Moreover, in regard to indirect tax income elasticity, it is hypothesized that a percentage change in income, increases the demand for domestic and foreign goods and services, and raises the level of indirect government tax revenue. As a result, as indirect tax is less visible and less tangible. It finally causes the taxpayers to have fiscal illusion, and leads to an increase in their demand for public expenditures. According to the results, it seems that the government should use more direct tax to secure its revenue since it does not cause fiscal illusion, and unlike other government revenue sources, it does not lead to an uncontrollable increase in public expenditures. On the other hand, according to the results, the fiscal illusion created by oil revenue and government debt, indicates that the government budget dependence on oil revenue, instability of this type of revenue, the deficits caused by this instability, and increased government debts, result in an excessive increase in public expenditures. As this type of financing the government expenditures is not directly paid by people, this type of fiscal illusion would increase the demand for public expenditures, and the government accountability to the people demand, will decrease. Oil is a nonrenewable resource which the government cannot depend on in the long future. As a strategic policy, our study suggests that since the direct taxes in short-term and long-term in Iran's economy do not create fiscal illusion, Iran government and tax authorities should use the policy of increasing their revenue through direct taxes. On the other hand, since the government uses oil revenue to finance its debt and budget deficit, these leads to fiscal illusion. In order to avoid fiscal illusion, these revenue sources should be gradually reduced as far as possible. The government should develop transparent fiscal rules by replacing tax revenues with oil revenues, to prevent increasing the government size and fiscal fluctuations. These rules may include quantitative criteria to restrict the political interventions or procedural rules, the aim of which is to improve the budget institutions function and public sector management. Some of these institutions have reserved funds or currency stabilization. If public expenditures are financed through tax resources, government accountability against people will be increased, and public sector activities will be improved.

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