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The Buchanan-Wagner Hypothesis: Revisiting the Theory with New Empirics for a Spendthrift Democracy

Summary: This study revisits the Buchanan-Wagner hypothesis in reference to the deficit-spending dynamics of Turkey in the period 1924 to 2008, during which the government was expanding along with the developing national economy and democracy. The empirical analysis of the hypothesis is based on the autoregressive distributed lag approach to cointegration, which is not only quite new in the literature on the Buchanan-Wagner hypothesis but also superior to other single-equation cointegration approaches. The prevailing empirics for the Buchanan-Wagner hypothesis reveal deficiencies in several respects, as they ignore the mixed orders of integration in regressors, the endogeneity of regressors, and the encompassing dynamic structure in the short- and long-runs. Within this context, the findings of this study imply the validity of the hypothesis for Turkey, providing empirical evidence on the premise that budget deficits financed by nontax sources are the main driving force behind the continuously increasing public spending in Turkey. This evidence is argued to be a reflection of the fact that the perceived tax price of public goods and services decreases with debt-financed budget deficits over time.

Keywords: Buchanan-Wagner hypothesis, Budget deficits, Public spending, Turkey, Autoregressive distributed lag (ARDL) approach.

JEL: C50, H41, H60.

Taxation has always been a frictional issue between policy-makers and taxpayer citizens, as it is a source of finance for the former and a burden for the latter. Usually because of electoral concerns, politicians have a bias towards postponing this burden. The game theoretic nature of public budgeting, due to the political competition in democratic societies, involves the risk of ending up with excessive deficits and debt accumulation. If the reason is not an extreme condition, such as a war or a disaster, public debt grows continuously as incumbents usually prefer anaesthetic nontax sources for spending to secure their political survival against the displeasures felt by the taxpayer voters. In this respect, debt-financed deficits serve as a means for shifting the burden of public spending forward without arousing any instantaneous displeasure. Hence, the main concern is whether or not this strategy causes a persistent expansion in the size of public expenditures in the long-run.

The motivation behind this study emerges from two points. First, there is a lack of empirical studies that question the continuously growing size of government

spending in Turkey from the perspective put forth by the Buchanan-Wagner hypothesis. Second, the estimation methodology used in the present work considers the deficiencies observed in the empirical literature on the Buchanan-Wagner hypothesis. In this respect, the ARDL modelling approach to cointegration in the manner of Hashem M. Pesaran and Yongcheol Shin (1999) is used for estimations. This seems to be the most appropriate estimation methodology for testing the Buchanan-Wagner hypothesis due to problems associated with integration orders, endogeneity in regressors, an omitted lag structure, and specification errors in modelling the short- and long-run dynamics.

1. Theoretical and Historical Backgrounds

The controversy on the size of the public sector is rather old. It matured in the 1960s with the works of the public choice school theoreticians as a response to the so-called “Keynesian biases”. The federal budget deficits of the United States (US) constitute the basis of these works. However, the roots of the controversy go back to the works of a German political economist, Adolph Wagner (1838-1917), whose contribution is identified as the “law of expanding state activity”. This “law” refers precisely to regularities in the absolute and relative expansion of the government services produced for communal purposes with the development of emerging industrial societies (Alan Peacock and Alex Scott 2000, pp. 2-3). The size of the public sector is argued to increase with governments that passively accommodate the growing demand for public services during the industrial development.

After Adolph Wagner, the issue evolved into the theorization of the correct budget size in democracies. A relatively old literature survey by Ryan C. Amacher, Robert D. Tollison, and Thomas D. Willett (1975) categorized the theoretical discussions on budget size into four groups: first, the social balance approach and the dependence effects, pronounced by Galbraith, Hayek, and others; second, the collective decision-making model of Downs, Buchanan, Tullock, and others; third, the models of bureaucratic behaviour, developed intellectually by Niskanen, McKean, and others; and fourth, the budgetary responses to risks and uncertainties as a form of insurance, discussed by Greene and others. The subject matter of this study falls into the second group, with regard to the public finance view of James M. Buchanan (1967), in which the growing budget size is explained through the link between the individual choice and fiscal institutions in the democratic process. This view was embodied further by Buchanan and Richard E. Wagner (1977), who elaborated on the effects of budgetary choices of democratic politics on public spending and debt accumulation. The debate became an empirical issue with the estimations of William A. Niskanen (1978). Since then, questioning the presence of a relationship running from budget deficits to public spending has been called the Buchanan-Wagner hypothesis in the literature.

1.1 About the Hypothesis

The debate on the political economy of the exchange between government and taxpayer voters began towards the end of the 1940s and matured in the 1960s with the works of the public choice school adherents. One of the most widely discussed issues

of political decision-making has been the description of the dynamics behind budget deficits and public debt. In his seminal book, *Public Finance in Democratic Process*, Buchanan (1967) explains why tax- and debt-financed deficits have different influences on individual demand for public goods and services. Within this context, it is argued that the institutional choices of taxpayer voters reflect their attitudes towards proposals for expanding the public spending and, hence, determine the size of the government budget. According to Buchanan (1967), public debt is "... a fiscal institution through which a collectivity may finance public goods and services ..." (p. 258) as an alternative to tax institutions. In this sense, Buchanan (1967, pp. 125-142) adopted the public finance theory of Amilcare Puviani and developed it to explain the fiscal illusion created by public debt in democratic societies. Individuals prefer public debt to any of the tax alternatives because it provides relief to individuals in adjusting their income-spending pattern over time. However, Buchanan (1967, p. 103) noted that when governments borrow, instead of taxing, to finance the public goods and services, it becomes difficult for individuals to construct the bridge between the benefits from public services and their tax costs. Thus, individuals decide to support proposed expansions in public spending instead of opposing them due to increased future tax liabilities. Wagner (1976) addressed the issue from a different perspective by describing an illusion caused by the complexity in the tax revenue structure. According to him, such complexity makes it difficult for taxpayers to perceive the correct tax price of the public output. This misperception generates excess demand for public goods and services and thereby increases the size of public budgets.

Buchanan and Wagner (1977) revisited the illusion issue in a later work, in the book titled *Democracy in Deficit*, and questioned the legacy of Keynes, i.e., the political bias towards deficit spending, inflation, and expanding government in democratic process. They focused on the fiscal and monetary aspects of decision-making with the institutions of political democracy. Excessive public spending is regarded as the outcome of tolerance to high budget deficits, attributed to the Keynesian influences on the democratic politics of budgetary choice. Such tolerance is generated through reductions in real taxes and increases in aggregate demand, which are initiated by politicians who continuously compete for office in democratic societies. This competition involves a tendency towards deficit finance through government borrowing rather than taxing, because the former does not reduce the utility of taxpayer voters directly and immediately. However, debt-financed deficits involve misleading signals about the relative price of public and private services. This, the so-called Buchanan-Wagner hypothesis, postulates that debt-financed deficits reduce the perceived tax price of public goods and services, hence increasing the government size through increased demand for public goods and services.

In a relatively recent study, Jerry H. Tempelman (2007) provided an overview of the public-debt finance process from the perspective of Buchanan by distilling seven propositions from his works, i.e., "... the incidence of public debt, its economic consequences, Ricardian equivalence, Keynesian macroeconomics, the permanence of public debt, its moral consequences, and Buchanan's call for a constitutional balanced-budget amendment" (p. 436), to explain how public spending is accommodated by the ability of the government to borrow. However, Bradley W. Bateman (2005), who

criticized Buchanan and Wagner by quoting from the works of Keynes, argued that Keynes was not a proponent of “continuing and increasing budget deficits” (p. 186).

There is a vast theoretical and empirical literature on the sources of growth in government size, of which the detailed discussion goes far beyond the scope of this study. Hence, government size expansion is linked only with debt-financed deficits in line with the perspective of Buchanan. The theoretical underpinnings of the Buchanan-Wagner hypothesis are rooted in the public choice perspective, which pioneered the mainstream approach to the political economy of government expansion. However, several other perspectives exist in the literature. The most recent is the political economics alternative, led by Alberto Alesina, Torsten Persson, Roberto Perotti, and Guido Tabellini, which is critical of the public choice perspective (Charles B. Blankart and Gerrit B. Koester 2006) and therefore is relevant to cite here. Alberto Alesina and Guido Tabellini (1990) argued that the fiscal illusion and the irrational voter assumptions of the public choice school are irrelevant in explaining the deficit bias in democracies. The deficit bias and debt accumulation are argued to result from the disagreement between citizens on the composition of the public spending and from the high polarization of political parties (Torsten Persson and Lars E. O. Svensson 1989; Alesina and Tabellini 1990; Tabellini and Alesina 1990). Under these conditions, governments tend to overissue public debt strategically to influence the choices of its successors. Alesina and Roberto Perotti (1995) criticized the fiscal illusion assumption of the public choice school through pointing out the distinction between the concepts of “mistake” and “illusion”. They argued that voters may be imperfectly informed and may make mistakes while foreseeing the future tax costs of current spending benefits. Alesina and Perotti (1995) also questioned why fiscal illusion emerged as a concern during, but not before, the post-1970 period. Moreover, they wondered whether or not more illuded voters and more opportunistic politicians could explain cross-country differences. Further within the framework of the political economics, Persson and Tabellini (1999, 2003) linked government size with types of electoral systems and political regimes. According to their theoretical and empirical models, welfare states are argued to be larger in older and better democracies that have parliamentary regimes with proportional election systems, whereas presidential regimes with majoritarian elections are found to have smaller governments. As can be seen from the literature, the advocates of the political economics approach do not find the postulates of the public choice school convincing enough.

1.2 About the Sample Country

In this study, Turkey, whose economy and democracy have been experiencing continuous progress for almost a century, is analysed empirically in the context of the Buchanan-Wagner hypothesis. Both the debt and the budgetary dynamics of governments in Turkey seem to represent a political process that is in accord with the arguments of both the public choice and the political economics perspective. In Turkey, the political structure has been democratized in stages after its foundation as a modern republic in 1923. Its economic structure has been liberalized gradually over time, parallel to the worldwide economic liberalization process. However, this pace of economic and political development has been accompanied by excessive government spending, which

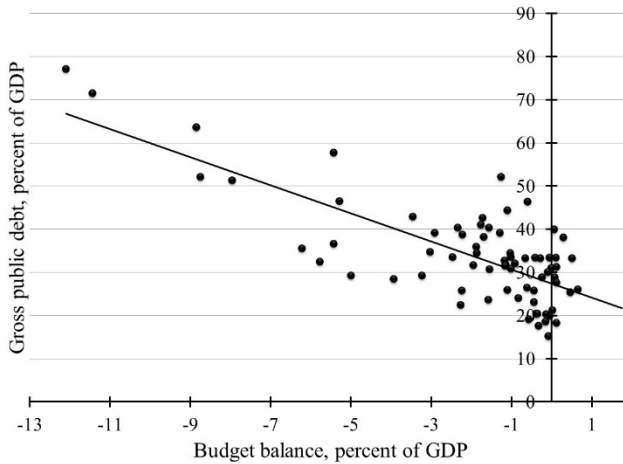
started in the 1950s and accelerated sharply from the 1970s until the 2000s. The late 1940s and the 1950s coincided not only with the adaptation of Turkey to the multiparty political system but also with the economic and social atmosphere shaped by the Cold War between the socialist Soviet Union and the capitalist West led by the US. In this era, governments in Turkey chose to adopt Western-type economic and political liberalization policies mostly by following a welfare state model.

The 1961 constitution of Turkey, which was ratified by a military coup d'état in 1960, actually strengthened this welfare state model through the introduction of the "social state" concept and the improvement of socioeconomic rights. The new constitution introduced a political system that democratized the administrative structure through the separation of legislative, executive, and judicial powers, together with the extensive liberalization of political rights. However, most of these rights were repealed by another coup d'état, in particular by a military memorandum issued in 1971. After that coup, none of the civil governments have been capable of controlling the public budget due to the highly fragmented parliament structure in the 1970s. Government revenues were unable to keep pace with the public spending expansion throughout this period as the electoral cycles were shortened considerably due to the prevalence of minority governments. Besides the unstable governments, the two oil shocks in the 1970s, the embargo imposed on Turkey due to the Turkish military invasion of Cyprus in 1974, and the ongoing unrest between leftist and rightist groups in Turkey unsettled the stability of the Turkish economy in the 1970s. Under these conditions, the excessive public spending financed through government borrowing triggered the debt crisis of 1977. This crisis led to attempts towards an extensive economic reform in Turkey, which aimed to institutionalize the preconditions of enlarging the basis for domestic and external sources of finance. The reform was declared in January 1980 and started a liberalization process in foreign trade and international capital movements. The principles of this reform were strictly followed even by the military government, which began to rule the country towards the end of 1980, with the claim that it would stop the economic turmoil and the violence of the political unrest. This coup d'état issued a new constitution in 1982, which restricted political rights and liberties while supporting the institutionalization of the economic liberalization process. Thus, Turkey became closely acquainted with neoliberal economic policies by the beginning of the 1980s. Except for the three short-lived coup d'état governments mentioned above, budgetary choices have been made by democratically elected governments in Turkey since 1946. However, the chronically unstable economic and political environment has led to so-called "Keynesian biases" in Turkey for years, due to budget-maximizing incumbents who compete for the support of the median voter for the purpose of reelection.

High budget deficits and public debt have long been among the chronic problems of the government in Turkey as the needs of the population grow in line with the rapid changes in the economic, social, and cultural environments of the country and the world. As argued by Buchanan and Wagner (1977), there are institutional biases towards budget deficits in democratic political systems, which can be prevented by effective governments that introduce institutional arrangements to make taxpayers aware of the costs of budgetary choices. Accordingly, this study is an empirical attempt

to investigate indirectly whether taxpayers in Turkey are aware of the fiscal costs laid on them by the governments they elected or are in illusion in regard to the debt-financed deficits.

The scatterplot of the historical data given in Figure 1 shows the close association between the budget surpluses (or deficits) and the accumulation of public debt stock in Turkey. The negative correlation observed in the figure may roughly imply that governments in Turkey have a significant bias towards debt-financed budget deficits.



Source: Author's calculations.

Figure 1 Deficits and Debt in Turkey (1936-2018)

This evidence is analysed from the perspective of the Buchanan-Wagner hypothesis in this study, through questioning if budget deficits in Turkey have systematically encouraged or discouraged public spending over the years. If taxpayers in an economy are aware of the future tax costs of public spending financed by nontax sources, budget deficits are ideally expected to discourage excessive public spending decisions. However, if this awareness is absent either due to the illusion generated by the government borrowing or due to some other reasons complicating the taxpayer perceptions, deficits are expected to be widely welcomed by taxpayers. In the empirical literature on the Buchanan-Wagner hypothesis, this behaviour is verified by the detection of a proportional relationship running from budget deficits to the quantity demanded for public goods and services within the setting of a public good demand model. Statistically significant evidence in favour of such a relationship is deemed to justify the validity of the Buchanan-Wagner hypothesis, implying that continuous growth in government size is maintained through giving deficits financed by nontax sources. Although the theoretical basis of the political economy perspective of government expansion is enriched substantially with a continuously growing literature after Buchanan and Wagner (1977), the empirical framework suggested by Niskanen (1978) still seems to provide the most encompassing economic model for testing the

Buchanan-Wagner hypothesis. Accordingly, basing the nexus between budget deficits and public spending on a well-defined public good demand model can properly reflect the budgetary choices resulting from the interaction of taxpayer benefits and incumbent political interests.

The empirical literature on Turkey consists of studies that consider the Buchanan-Wagner hypothesis only indirectly on the basis of the tax-and-spend hypothesis. The testing procedure of the latter hypothesis mostly relies on the bivariate Granger noncausality specifications that are exploited to investigate the direction of the relationship between government revenues and public spending, which do not provide a theoretically sufficient basis for drawing a precise inference on the Buchanan-Wagner hypothesis. Distinctively, this study directly investigates the effect of budget deficits on public spending on the basis of a theoretically well-defined single-equation specification introduced by Niskanen (1978). Nevertheless, for the sake of providing some empirical evidence on Turkey, the studies that consider the Buchanan-Wagner hypothesis in the context of the tax-and-spend hypothesis are worth reviewing.

To our knowledge, Ali F. Darrat (1998), Abuzer Pinar (1998), and Alpaslan Akçoraoğlu (1999) are the pioneering studies that analysed the relationship between public revenues and spending for Turkey. Among these, only the finding of Darrat (1998) is in favour of the Buchanan-Wagner hypothesis, which is evidenced by a unidirectional Granger causality running from taxes to public spending, with a negative coefficient only in the short-run. This evidence is based on annual data covering the period between the years 1967 and 1994. Following these three pioneering studies, many other empirical works on Turkey can be found within the context of the revenue spending nexus in the literature. However, to limit the scope of the literature review, focus was given only to those studies that have implications for the Buchanan-Wagner hypothesis. Accordingly, in the research by İhsan Günaydın (2004), the Buchanan-Wagner hypothesis is argued to be justified through two types of Granger noncausality tests, which are based on the vector error correction and the Toda-Yamamoto approaches. However, because the signs of the relevant Granger noncausality coefficient estimates are not reported in the study, the validity of the hypothesis cannot be justified precisely. James E. Payne, Hassan Mohammadi, and Murat Çak (2008) tested the same hypothesis for Turkey by using the annual data of the 1968-2004 period. They not only tested the hypothesis in the vector error correction framework but also questioned whether the adjustment in the error correction process is symmetric or not. The tests of symmetry based on the estimates of threshold autoregressive models result in supporting evidence for the symmetric adjustment process. However, the validity of the tax-and-spend hypothesis is justified for the short-run only indirectly through the error correction term, not through the effect of past changes in tax revenues on public spending. In a more recent study, Ahmet Aysu and Doğan Bakırtaş (2018) dealt with the asymmetry aspect of the revenue spending nexus in the Granger noncausality framework, based on the monthly data of the 2006-2017 period. However, their findings on the asymmetric Granger causality running from taxes to spending lend support only for the case in which decreases in tax revenues decrease the public spending. In another study that found asymmetric effects between government revenues and spending through a nonlinear ARDL estimation for the 1998-2016 period, Taner Turan and

Mesut Karakaş (2018) concluded that positive shocks on government revenues cause increases in public spending. Although the findings of these two are consistent in the context of the tax-and-spend hypothesis, they are not consistent with the Buchanan-Wagner hypothesis, because the latter hypothesis theoretically requires an inverse relationship between government revenues and public spending.

The relevant empirical literature shows that the analyses of the Buchanan-Wagner hypothesis on Turkey rely solely on the bivariate Granger causality estimations of the nexus between government revenues and spending, which depart from the modelling approach applied in this study. Moreover, none of the studies on Turkey provide consistent and complete findings about the validity of the Buchanan-Wagner hypothesis.

2. Theoretical Model and Its Empirical Use

The conventional test for the Buchanan-Wagner hypothesis is based on a public good demand specification, originated by Thomas E. Borcharding and Robert T. Deacon (1972), and embodied independently by Theodore C. Bergstrom and Robert P. Goodman (1973). Borcharding and Deacon (1972) constructed a model of public spending with reference to the theory of collective decision-making. By starting with a marginal cost function derived from a constant returns Cobb-Douglas production function and incorporating the demand schedule of the median voter, Borcharding and Deacon (1972) obtained a logarithmic public spending specification, which was consistent with the economic theory of majority rule. With the notation of Niskanen (1978), the exponential form of this spending specification is:

$$QCN = (ae^{1+b})(R/X)^b Y^c A^d W^{f(1+b)} N^{1-b(1-g)+g}, \quad (1)$$

where QCN represents the total public spending. In QCN , Q is the number of units of public goods demanded by the average taxpayer median voter, C is the unit cost of the public good, and N is the total number of taxpayers. The lowercase letters denote fixed elasticity coefficients. However, Q is defined by the demand function:

$$Q = a(TC)^b Y^c A^d, \quad (2)$$

which is analogous to functions constructed by Borcharding and Deacon (1972, p. 893) and Bergstrom and Goodman (1973, p. 282). In this demand function, T is the perceived share of the unit cost of the public good paid by the average taxpayer median voter, Y is the income of the average taxpayer median voter, and A denotes the autonomous demand effects. However, because Q is not an observable variable, Equation (2) is rewritten as the product of Q , C , and N :

$$QCN = aT^b C^{1+b} Y^c A^d N, \quad (3)$$

where QCN becomes a measurable amount, i.e., the total public spending. In this case, the unit cost (C) of the public good is assumed to be the functions of the average wage rate (W) in the private sector and the number of taxpayers (N). Thus, the unit cost of the public good becomes measurable by the cost function:

$$C = eW^f N^g. \quad (4)$$

The perceived share of the unit cost of the public good, which is another unobservable variable in Equation (2), is quantified by the following function in the manner of Bergstrom and Goodman (1973):

$$T = (R/X)(1/N). \quad (5)$$

Here, the perceived tax share (T) of a taxpayer is approximated by the ratio of total tax revenues (R) to total public spending (X), averaged by the number of median voter taxpayers (N). According to Bergstrom and Goodman (1973, p. 284), taxpayers are aware of the costs they will be exposed to due to increased public spending, as they know the amount of the tax they pay and believe that their tax burden will change in proportion to changes in public spending. Then, Equation (5) simply implies that when the budget is balanced ($R/X = 1$), the perceived tax share decreases with the number of taxpayers.

Consequently, the test equation for the Buchanan-Wagner hypothesis is obtained by substituting Equations (4) and (5) in Equation (3) as follows:

$$QCN = \theta(R/X)^{\lambda_1} Y^{\lambda_2} W^{\lambda_3} N^{\lambda_4} A^{\lambda_5}, \quad (6)$$

where, for brevity, $\theta = ae^{1+b}$, $\lambda_1 = b$, $\lambda_2 = c$, $\lambda_3 = f(1+b)$, $\lambda_4 = 1 - b(1-g) + g$, and $\lambda_5 = d$. The test of the Buchanan-Wagner hypothesis relies on estimating the perceived tax price elasticity (λ_1) of the demand for public goods and services in Equation (6). A statistically significant and negative estimate of λ_1 provides evidence in favour of the Buchanan-Wagner hypothesis, implying that debt-financed deficits stimulate the demand for public goods and services, because they reduce the tax price perceived by the taxpayer voters. The parameter λ_2 directly represents the long-run income elasticity of the demand for public goods and services, whereas the composite parameters λ_3 and λ_4 are used to compute indirectly the wage and population elasticities of the unit cost of the public goods and services shown by f and g , respectively, in Equation (4).

The empirical validity of the Buchanan-Wagner hypothesis is tested first by Niskanen (1978) in the literature. His estimations based on the post-war US federal budget deficits result in statistically significant short- and long-run perceived tax price elasticities of public goods and services, which are close to each other at around -0.6, implying the validity of the Buchanan-Wagner hypothesis for the US economy. Moreover, the short- and long-run income elasticities are found to be 1.1 and 0.35, respectively. However, Niskanen (1978, p. 596) warned about an underestimation bias in these estimates, due to the high collinearity of income, wage rate, and population. In later studies, the Buchanan-Wagner hypothesis was tested for Greece by George A. Provopoulos (1982); for South Africa by George Tridimas (1985); for Pakistan by Ashfaque H. Khan (1988); for seven countries, i.e., Canada, France, Germany, Italy, Japan, the United Kingdom (UK), and the US by Jack Diamond (1989); for Barbados by Roland C. Craigwell (1991); for Barbados and Trinidad and Tobago by Craigwell and Llewyn L. Rock (1991); for the UK by Tridimas (1985) and John Ashworth (1995); and for Greece by George Hondroyiannis and Evangelia Papapetrou (2001). The Buchanan-Wagner hypothesis is justified for all these countries, except for France. However, in these studies, the estimates of the perceived tax price elasticity vary in size depending on the country selected for the analysis and the type of the time-series

estimation technique used. More recently, Dimitris K. Christopoulos and Efthymios G. Tsionas (2003) tested the Buchanan-Wagner hypothesis by using a set of 11 European Union countries through a panel data estimation methodology and found strong evidence in support of the Buchanan-Wagner hypothesis.

Most of the empirical studies on the Buchanan-Wagner hypothesis (Niskanen 1978; Provopoulos 1982; Tridimas 1985; Khan 1988; Diamond 1989) inherently contain serious econometric deficiencies in the estimation of the theoretical model depicted by Equation (6), because these studies were produced before the advances in the cointegration approach. One of these deficiencies stems from the practice of estimating long- and short-run dynamics by OLS regressions in levels and first differences, respectively. However, the rapid development of the nonstationary time-series techniques towards the 1980s allowed Craigwell (1991) and Craigwell and Rock (1991) to model the short-run dynamics of the Buchanan-Wagner hypothesis precisely through the error correction approach. This approach rules out any spurious short-run results encountered due to ignorance of the long-run information by definition in first-difference modelling practice. This misspecification problem was also emphasized by Tridimas (1985), who formulated the issue through some sets of restrictions imposed on the alternative specifications of the Buchanan-Wagner hypothesis constructed by various lag structures. Since then, empirical tests and short- and long-run estimations of the Buchanan-Wagner hypothesis (Ashwort 1995; Hondroyiannis and Papapetrou 2001; Christopoulos and Tsionas 2003) have been based on the Engle-Granger and Johansen cointegration approaches, the latter of which considers the dynamic structures and the nonstationary data generation processes in a multivariate setting. However, a much better approach has been introduced by Pesaran and Shin (1999), i.e., the ARDL approach, which alleviates the potential problems of non-stationarity modelling in the Buchanan-Wagner hypothesis to a greater extent. Hence, this study is an attempt to appropriate the ARDL approach in the empirical analysis of the Buchanan-Wagner hypothesis. In this sense, the next section provides a detailed discussion on the relevance of using the ARDL approach in the analysis of the Buchanan-Wagner hypothesis.

3. Methodological Relevance

The conventional empirical test of the Buchanan-Wagner hypothesis is based on the log-linearized form of Equation (6), which originates from the public good demand schedule of a median voter aggregated for society, consistent with the economic theory of majority rule. However, in light of the advances in time-series estimation techniques, the findings in the literature on the Buchanan-Wagner hypothesis have turned out to be inferior in terms of both econometrics and economics theory. In this sense, the ARDL modelling of cointegrated time series is suggested for estimating and testing the Buchanan-Wagner hypothesis in this study.

The superiority of an ARDL model lies on its being a dynamic stochastic process that encompasses almost all other types of single-equation time-series models (David F. Hendry 1995). In its simplest form, the ARDL(p , p_1) model can be shown by:

$$y_t = \delta + \sum_{i=1}^p \alpha_i y_{t-i} + \sum_{i=0}^{p_1} \beta_i x_{t-i} + \varepsilon_t, \quad (7)$$

where p and p_1 denote the lag orders of the variables y_t and x_t , respectively. The static solution to Equation (7) provides a contemporaneous long-run relationship between y_t and x_t :

$$y_t = \theta + \lambda x_t + \varepsilon_t^*, \quad (8)$$

where $\theta = \delta / (1 - \sum_{i=1}^p \alpha_i)$, $\lambda = (\sum_{i=0}^{p_1} \beta_i) / (1 - \sum_{i=1}^p \alpha_i)$, and $\varepsilon_t^* = \varepsilon_t / (1 - \sum_{i=1}^p \alpha_i)$. As can be seen from the definitions of the long-run coefficients θ and λ , the estimation of a long-run relationship within the ARDL context is included in all short-run dynamics reflected by α , β , and ε . Moreover, a one-to-one transformation of Equation (7) provides a conditional error correction representation relevant for expressing short-run dynamics:

$$\Delta y_t = -\pi(y_{t-1} - \theta - \lambda x_{t-1}) + \sum_{s=1}^{p-1} \phi_s \Delta y_{t-s} + \sum_{s=0}^{p_1-1} \varphi_s \Delta x_{t-s} + \varepsilon_t. \quad (9)$$

Each of the parameters π , ϕ_s , and φ_s is a combination of δ , α_i , and β_i . For example, π , which is called the equilibrium correction (EC) coefficient, is defined as $\pi = 1 - \sum_{i=1}^p \alpha_i$. It reflects the speed of adjustment of y_t to short-run disequilibria proxied by the term $y_{t-1} - \theta - \lambda x_{t-1}$. In fact, this proxy term helps integrate the long-run information into the expression of short-run dynamics.

The rich structure of the ARDL modelling gains new dimension with the contribution of Pesaran and Shin (1999), revitalized under the nonstationary data generation process. According to the standard cointegration theory, when y_t and x_t are each generated by a first-differenced nonstationary process, i.e., $y_t \sim I(1)$ and $x_t \sim I(1)$, then they are said to be cointegrated if their linear combination is stationary, i.e., $(y_t - \theta - \lambda x_t) \sim I(0)$. Thus, standard cointegration tests are designed with respect to y_t and x_t being $I(1)$. However, according to the ARDL approach developed by Pesaran and Shin (1999) and Pesaran, Shin, and Richard J. Smith (2001), the existence of a relationship between y_t and x_t in levels can be tested irrespective of whether the underlying regressors are purely $I(0)$, purely $I(1)$, or mutually cointegrated. To be consistent with the representation of Pesaran, Shin, and Smith (2001), Equation (9) should be rewritten in a conditional vector error correction model (ECM) form:

$$\Delta y_t = c_0 + \pi_{yy} y_{t-1} + \pi_{yx} x_{t-1} + \sum_{s=1}^{p-1} \psi'_s \Delta z_{t-s} + \omega' \Delta x_t + \varepsilon_t. \quad (10)$$

Here, the scalar variable y_t is conditioned on the k -vector of the regressors x_t and on the past values of z_t . The latter variable has a partitioned structure $z_t = (y_t, x_t)'$ and represents a $(k+1)$ -vector random process generated by a vector auto-regression model of order p , VAR(p). The presence of a long-run relationship between y_t and x_t is detected by the bounds testing methodology. This test procedure relies on the joint test of the restrictions $\pi_{yy} = 0$ and $\pi_{yx} = 0$ in Equation (10). Pesaran, Shin, and Smith (2001) provided asymptotical critical values for the lower- $I(0)$ and upper- $I(1)$ bounds to determine the existence of a levels relationship between y_t and x_t . If the computed value of the F -statistic falls outside these bounds, conclusive decisions exist without the need to know the cointegration rank. Specifically, whereas a statistic exceeding the upper bound implies the existence of a levels relationship, a statistic below

the lower bound implies its absence. Thus, the ARDL approach to cointegration seems to have superiority in single equation-based cointegration analysis, as the bounds testing procedure allows cointegration tests, first, without the need to know the cointegration rank, and second, without the need to ascertain the integration orders of the regressors before testing for cointegration.

The relevance of using the ARDL approach in testing the Buchanan-Wagner hypothesis can be argued with respect to three main empirical deficiencies observed in the literature on the Buchanan-Wagner hypothesis. The first is the uncertainty about the integration order of regressors, which threatens the consistency of the levels-relationship estimation. Conventionally, the cointegration estimations require pretesting to ascertain whether or not the underlying series are all $I(1)$. However, the inference on integration orders is highly sensitive to the size and power properties of the unit root tests. Thus, any uncertainty due to wrong inferences on $I(0)$ and $I(1)$ processes does not constitute a threat to the cointegration analysis in the ARDL approach, as cointegration testing is done without the need for the regressors to be purely $I(0)$, purely $I(1)$, or mutually non-cointegrated. The second deficiency observed in the literature on the Buchanan-Wagner hypothesis is the ignorance of the possibility of an endogeneity bias in regression coefficients, which may potentially exist due to the characteristics of the regressors applied in the model used for testing the Buchanan-Wagner hypothesis. Any feedback effect from public spending (QCN) to revenue-spending balance (R/X) to *per capita* real income (Y) may result in biases in the estimates of the tax-price and income elasticities of public spending in Equation (6). However, in the ARDL approach, the problems of endogenous regressors and serial correlation in residuals are corrected simultaneously by augmenting additional lags to the model. The third empirical deficiency in the literature on the Buchanan-Wagner hypothesis is the missing lag dynamics resulting from implicitly imposed restrictions on some of the parameters of Equations (7) and (9) by definition. This causes biased short- and long-run estimates, because the regression coefficients in the long-run relationship given by Equation (8) are estimated by the implicit restrictions of $\alpha_i = 0$ and $\beta_i = 0$ for $i \geq 1$, whereas the short-run relationship given by Equation (9) is estimated by the restrictions $\pi = 0$, $\phi_s = 0$, and $\psi_s = 0$ for $s \geq 1$, as observed in most of the studies in the literature on the Buchanan-Wagner hypothesis. However, all these misspecifications are ruled out in the short- and long-run estimations through the well-specified encompassing lag structure of the ARDL approach to cointegration.

4. Empirical Evidence

The Buchanan-Wagner hypothesis is estimated and tested for Turkey within the ARDL modelling context, based on historical long-span (1924-2008) data starting from the first years of the foundation of the Republic of Turkey. The sample period starts from 1924, which is the year the first democratic constitution of the Republic of Turkey was adopted. It ends in 2008 because the consistent wage data series discontinues thereafter. However, the effective estimation period starts from 1930 because the first six observations are reserved for the lag structure of the ARDL model. This period is considered to be long enough to cover both the economic and the political dynamics, which are appropriate for the empirical analysis of the Buchanan-Wagner hypothesis.

The corresponding ARDL estimations are carried out through the methodology reflected by Equations (7) to (10), presented in the previous section. They are analogously expanded to ARDL(p, p_1, p_2, p_3, p_4) specifications by using the variable set of the Buchanan-Wagner hypothesis with regard to the log-linearized version of Equation (6), which is conventionally used for estimating and testing the Buchanan-Wagner hypothesis in the literature. Hence, the dependent variable of the ARDL model is $y_t = (\ln QCN_t)'$, and the vector of four regressors are $x_t = (\ln(R/X)_t, \ln Y_t, \ln W_t, \ln N_t)'$ (see Table A1 in the Appendix for the data definitions). The autonomous demand effects A_t is augmented to estimations through a vector of dummy variables $A_t = (D_t, D61_t, D71_t, D82_t)'$. D_t captures the period of the limited democracy, which ends with the switch to the multiparty election system in 1946, whereas $D61_t$, $D71_t$, and $D82_t$ denote the effects of interruptions to democracy due to coup d'états in May 1960, March 1971, and September 1980, which overthrew governments and resulted in the adoption of a new constitution in 1961 and 1982. Thus, $D_t=1$ between 1924 and 1945. The impulse dummy variables $D61_t$, $D71_t$, and $D82_t$ are equal to 1 in 1961, 1971, and 1982, respectively, and to 0 in the rest of the years. As stated by Pesaran, Shin, and Smith (2001, p. 307), the asymptotic critical values are not affected if the fraction of nonzero values in the dummy variable is low. Accordingly, the fractions in this study are 20.3% for D_t and 1.3% for the impulse dummy variables. Following the application in Pesaran, Shin, and Smith (2001), these fractions do not require a modification in the critical values.

4.1 Long-Run Dynamics

The long-run ARDL estimates in the test equation of the Buchanan-Wagner hypothesis are shown in Table 1 for two alternative measures of government revenue, together with their OLS-based counterparts. However, by definition, the OLS estimates are biased due to ignored lag dynamics; these are presented in Table 1 to enable a comparison with the ARDL estimates. The integration orders of all series are tested, and the computed test statistics are presented in Table A2 in the Appendix for brevity. As expected, there is uncertainty about some of the regressors being I(0) or I(1). However, the ARDL approach to cointegration can suitably solve this problem.

In the case where R is measured by the tax revenue, the best fit to the long-run dynamics of the Buchanan-Wagner hypothesis is obtained by an ARDL(2, 3, 1, 6, 5) levels relationship, in which the lag lengths within the parentheses is set with respect to the Schwarz Bayesian information criterion. The bounds test statistics given in the lower panel of Table 1, i.e., $t_{II} = -4.833$ and $F_{II} = 7.237$, which exceed the 1% finite sample ($T = 80$) critical upper bounds, imply that the dependent variable and the regressors of this levels relationship are found to be cointegrated without the need to know the cointegration rank. The deterministic components are specified with respect to Case II (restricted intercept and no trend), as described by Pesaran, Shin, and Smith (2001). In this levels relationship, the negative and statistically significant estimate of the perceived tax price elasticity of the demand for public goods and services, i.e., $\hat{\lambda}_1 = -0.547$, justifies the validity of the Buchanan-Wagner hypothesis. That is, governments in Turkey are argued to be systematically accommodating the expansions in public

spending through debt-financed or monetized budget deficits. This finding may also imply that due to the low tax share of public spending in the government budget, the demand for public goods and services in Turkey grows continuously. As long as the perceived tax burden of the public spending is reduced by nontax financing, governments tend to increase the public spending. This may be accepted as evidence of a fiscal illusion, in which the taxpayer voters cannot construct the bridge between the benefits from public services and the tax costs.

Table 1 Long-Run Estimates (Dependent Variable: $\ln QCN_t$)

Regressors	R: Tax		R: Total	
	OLS	ARDL (2, 3, 1, 6, 5)	OLS	ARDL (2, 4, 0, 6, 5)
$\ln(R/X)_t$	-0.952*** (0.153)	-0.547*** (0.222)	-0.787*** (0.275)	-0.611* (0.346)
$\ln Y_t$	1.272*** (0.249)	0.944*** (0.271)	1.371*** (0.308)	1.249*** (0.257)
$\ln W_t$	0.338*** (0.094)	0.925*** (0.191)	0.389*** (0.114)	0.859*** (0.173)
$\ln N_t$	0.978*** (0.223)	0.470* (0.250)	0.654*** (0.289)	0.137 (0.262)
Constant	-20.62*** (2.486)	-9.997*** (3.399)	-15.41*** (3.308)	-5.893 (3.631)
Cointegration test				
t_{\parallel}		-4.833***		-6.783***
F_{\parallel}		7.237***		11.745***

Notes: Superscripts ***, ** and * denote 1%, 5% and 10% significance levels, respectively. Figures in parentheses are coefficient standard errors. Individual lag orders in ARDL(p, p_1, p_2, p_3, p_4) models are selected by the Schwarz Bayesian Information Criterion, by setting the maximum common order to 6.

Source: Author's calculations.

The estimated income elasticity of the demand for public goods and services is found to be close to unity with a statistically significant coefficient, i.e., $\hat{\lambda}_2=0.944$. Adolph Wagner's "law of expanding state activity" asserts an income elasticity greater than one. However, the elasticity estimate may still lend support for the law, because the statistical confidence intervals for this estimate provide evidence for the possibility of a coefficient greater than one, which implies a public expenditure growth faster than the income growth. On the other hand, when the estimates of the composite coefficients, i.e., $\hat{\lambda}_3 = 0.925$ and $\hat{\lambda}_4 = 0.470$, are used to compute indirectly the wage and population elasticities of the unit cost of the public goods and services, these elasticities are found to be 2.04 and -2.38, respectively. The former reflects the increasing unit costs due to wage increases, whereas the later implies economies of scale in the provision of public goods and services in Turkey. Overall, these long-run estimates of the Buchanan-Wagner relationship can be represented briefly by rewriting Equations (2) and (4) as follows:

$$Q = a(TC)^{-0.547} Y^{0.925} A^d ; \quad (2a)$$

$$C = eW^{2.04} N^{-2.38}. \quad (3b)$$

As shown in Table 1, the ARDL approach generates substantially different elasticity estimates compared with those estimated by the OLS approach. The difference stems from the rich lag structure of the ARDL modelling methodology, which is deemed to capture economic dynamics better than its counterparts.

To determine if the elasticity estimates obtained above are robust to the inclusion of nontax revenues, the levels relationship is re-estimated by substituting the tax revenue for the total government revenue in the R/X ratio. In the literature on the Buchanan-Wagner hypothesis, R conventionally represents the tax revenue, which is considered as the payoff for the public spending X . Thus, the R/X ratio serves not only as a measure of the budget balance but also as an indicator of the perceived tax price of the public spending. According to the Buchanan-Wagner hypothesis, tax price perceptions are weakened as governments resort to nontax sources of finance, in which misperceptions stimulate the demand for public spending illusively. In this respect, to investigate how nontax government revenues influence the tax price perceptions of the taxpayers, estimations are replicated by broadening the revenue measure to the total government revenue. The corresponding estimates are presented in the third and fourth columns of Table 1. Cointegration is also confirmed for the selected ARDL(2, 4, 0, 6, 5) specification, according to the bounds test statistics, i.e., $t_{II} = -6.783$ and $F_{II} = 11.745$. The estimates of this levels relationship again verify the Buchanan-Wagner hypothesis, with a tax price elasticity estimate slightly larger than the one obtained in the previous case. However, the statistical significance of the estimate is lower in this case, implying a relatively weaker relationship between the budget balance and spending than that found previously. Such a finding may indicate the empirical aptness of using tax revenues in the R/X ratio as a precise measure of the public spending costs to taxpayer voters. In other words, nontax payments do not seem to be as influential as tax payments on the formation of the cost perceptions of taxpayers. On the other hand, with the inclusion of nontax revenues in the R/X ratio, the income elasticity estimate seems to support the postulate of Adolph Wagner, because the coefficient estimate is greater than one. However, the statistical confidence interval constructed for this coefficient also includes the possibility of an elasticity estimate that is smaller than one. Finally, whereas the estimate of the wage elasticity is found to be statistically significant and close to that obtained in the previous case, the estimate of the population elasticity has no statistical significance at all in this case.

In conclusion, when tax revenues, instead of total revenues, are exploited for constructing the revenue spending ratio, which serves as a proxy for the costs of public spending perceived by taxpayers, the long-run estimation lends stronger statistical support for the validity of the Buchanan-Wagner hypothesis in Turkey, as expected.

4.2 Short-Run Dynamics

This section presents inferences based on the lagged structure of the ARDL model, which, in fact, underlie the long-run estimates obtained above. The unconstrained error correction representation of the ARDL model is used both for drawing short-run economic inferences and for providing some statistical diagnoses. Because the main focus is on investigating the presence of a levels relationship through an unrestricted ARDL specification, the simplification of the unconstrained conditional error correction

model is ignored to avoid going beyond the scope of the study. To enable a comparison of the ARDL model with two other models that have been improperly used in the relevant literature, i.e., the difference model and the simple error correction model, computations are reported in Table 2 for the three groups. The models in the first two groups involve misspecifications by definition due to omitted equilibrium correction mechanisms and lagged effects. These specification failures lend themselves not only to coefficient estimates but also to residual diagnostics carried out by using the $Q\text{-}\chi^2_{SC}$, $ARCH\text{-}\chi^2_H$, and $JB\text{-}\chi^2_N$ statistics in this study, as shown in the lower panel of Table 2. Both these diagnostics and the statistical measures, such as the adjusted R-squares, Schwarz Bayesian information criteria, and RESET test statistics, consistently point to the superiority of the ARDL modelling over its two counterparts. These also indicate the statistical validity of not only the short-run estimates of the ARDL approach but its long-run estimates as well. According to the unrestricted conditional error correction estimates, based on the long-run ARDL(2, 3, 1, 6, 5) and ARDL(2, 4, 0, 6, 5) estimates previously obtained, the short-run tax price elasticities are around -0.6 and -0.4, respectively (see the coefficients on the $\Delta \ln(R/X)$ variable in the last two columns of Table 2). Thus, the statistically significant and negative coefficients in both cases also provide evidence of the validity of the Buchanan-Wagner hypothesis in the short-run. Whereas the short-run elasticity estimate is found to be close to its long-run counterpart in the former case, it is found to be lower in the latter case. This shows that the awareness of taxpayers about the unit cost of public goods and services decreases as more of the public spending is financed by nontax payments rather than directly financed by taxes. This finding is consistent with previous results in the long-run estimations.

Table 2 Short-Run Estimates (Dependent Variable: $\Delta \ln QCN_t$)

Regressors	Difference model		Simple error correction model		ARDL error correction model	
	R: Tax	R: Total	R: Tax	R: Total	R: Tax	R: Total
EC_t			-0.177** (0.074)	-0.244*** (0.076)	-0.524*** (0.108)	-0.644*** (0.095)
$\Delta \ln QCN_{t-1}$					-0.198** (0.098)	-0.168* (0.091)
$\Delta \ln(R/X)_t$	-0.856*** (0.113)	-0.647*** (0.196)	-0.838*** (1.109)	-0.587*** (0.185)	-0.582*** (0.119)	-0.376** (0.167)
$\Delta \ln(R/X)_{t-1}$					0.055 (0.139)	0.051 (0.227)
$\Delta \ln(R/X)_{t-2}$					0.069 (0.108)	-0.178 (0.229)
$\Delta \ln(R/X)_{t-3}$						-0.115 (0.198)
$\Delta \ln Y_t$	0.540*** (0.199)	0.467* (0.245)	0.693*** (0.202)	0.707*** (0.242)	0.386* (0.198)	0.804*** (0.204)
$\Delta \ln W_t$	0.309*** (0.096)	0.428*** (0.117)	0.293*** (0.093)	0.365*** (0.111)	0.516*** (0.090)	0.421*** (0.099)
$\Delta \ln W_{t-1}$					-0.129 (0.103)	-0.174* (0.104)
$\Delta \ln W_{t-2}$					-0.150 (0.090)	-0.175* (0.103)
$\Delta \ln W_{t-3}$					-0.001 (0.079)	-0.034 (0.089)

$\Delta \ln W_{t-4}$					-0.262*** (0.078)	-0.307*** (0.089)
$\Delta \ln W_{t-5}$					0.092 (0.083)	-0.003 (0.089)
$\Delta \ln N_t$	1.907*** (0.637)	1.887** (0.786)	1.502** (0.638)	1.134 (0.775)	-4.611 (2.832)	-4.099 (3.142)
$\Delta \ln N_{t-1}$					5.398 (3.269)	6.622' (3.732)
$\Delta \ln N_{t-2}$					-6.951** (3.129)	-9.317*** (3.351)
$\Delta \ln N_{t-3}$					0.191 (2.819)	-1.751 (3.238)
$\Delta \ln N_{t-4}$					-10.36*** (2.678)	-11.82*** (2.916)
D_t	-0.006 (0.028)	-0.006 (0.127)	0.004 (0.027)	0.015 (0.033)	-0.223*** (0.061)	-0.212*** (0.068)
$D61_t$	0.122 (0.105)	0.329** (0.125)	0.105 (0.102)	0.299** (0.118)	0.201** (0.086)	0.378*** (0.089)
$D71_t$	0.069 (0.101)	-0.001 (0.127)	0.066 (0.097)	0.032 (0.119)	0.122 (0.076)	0.137 (0.090)
$D82_t$	-0.206** (0.101)	-0.244' (0.125)	-0.181' (0.098)	-0.227* (0.117)	-0.257*** (0.083)	-0.307*** (0.094)
Diagnostics						
Adj. R ²	0.601	0.393	0.623	0.456	0.802	0.747
SBIC	-1.332	-0.913	-1.347	-0.981	-1.609	-1.361
$Q\text{-}\chi^2_{SC}(1)$	16.00 [0.000]	8.368 [0.004]	7.906 [0.005]	2.127 [0.145]	0.107 [0.744]	3.205 [0.073]
$Q\text{-}\chi^2_{SC}(2)$	17.98 [0.000]	8.421 [0.015]	11.83 [0.003]	2.731 [0.255]	0.226 [0.893]	4.002 [0.135]
$ARCH\text{-}\chi^2_H(1)$	31.57 [0.000]	23.38 [0.000]	31.64 [0.000]	33.84 [0.000]	0.271 [0.602]	0.669 [0.413]
$ARCH\text{-}\chi^2_H(2)$	35.49 [0.000]	26.25 [0.000]	29.45 [0.000]	33.44 [0.000]	0.559 [0.756]	1.350 [0.509]
$JB\text{-}\chi^2_N(1)$	4.818 [0.089]	9.672 [0.008]	4.048 [0.132]	5.901 [0.052]	2.939 [0.229]	0.411 [0.814]
$RESET\text{-}\chi^2_{FF}(1)$	0.359 [0.549]	4.605 [0.032]	0.515 [0.473]	1.329 [0.249]	0.742 [0.389]	1.191 [0.275]
CUSUM stat.	0.291	0.374	0.315	0.325	0.299	0.147

Notes: Superscripts ***, ** and * denote 1%, 5% and 10% significance levels, respectively. Figures in parentheses are coefficient standard errors, while those in square brackets are significance probabilities. Individual lag lengths in ARDL(p_1, p_2, p_3, p_4) models are selected by the Schwarz Bayesian Information Criterion with the maximum common order set to 6. Residuals are tested for serial correlation by the Ljung-Box $Q\text{-}\chi^2_{SC}(1)$ statistics, for heteroscedasticity by ARCH- $\chi^2_H(1)$ statistics and for normality by the Jarque-Bera $JB\text{-}\chi^2_N(1)$ statistics. RESET- $\chi^2_{FF}(1)$ is the functional-form test statistics. CUSUM denotes the recursive cumulative sum test statistic for parameter stability, of which the limiting distribution of the sequence is approximated by a Brownian motion. If the maximum of the CUSUM statistic does not exceed the 1%, 5% and 10% critical values (1.143, 0.948, 0.850 respectively), the null hypothesis of parameter stability cannot be rejected.

Source: Author's calculations.

The short-run income elasticity estimates are also found to be statistically significant, however, with coefficients not only lower than their long-run counterparts but smaller than one as well. Thus, these estimates cannot support the validity of Adolph Wagner's "law of expanding state activity" in the short-run. The outcome is plausible in terms of the economic theory, as Wagner's law is a long-run postulate that is

expected to be substantiated throughout consequent stages of economic and social developments in a nation. The short-run estimates for wage and population elasticities are found to be statistically significant only for the former. The indirectly computed short-run wage elasticities are 1.23 and 0.67 for the tax revenue and total government revenue cases, respectively. These wage elasticities of the unit cost of public goods and services are smaller than those computed for the long-run cases, which are plausible economically.

Finally, the equilibrium correction (EC) coefficients of the two estimated ARDL models indicate that long-run equilibrium is restored fairly fast. The speeds of adjustment to short-run shocks in the ARDL models are substantially higher than those computed for the simple error correction models. Only about 52% and 64%, respectively, of the implied public spending (demand) shocks are corrected within a year. The delays in the fiscal adjustment may be due to frictions inherent in the democratic political decision-making process in Turkey, which is typically characterized by governments that prioritize the competition to stay in office.

Overall, applying the ARDL modelling approach in estimating the public spending specification of Niskanen (1978) provides strong empirical evidence on the validity of the Buchanan-Wagner hypothesis for the budgetary dynamics of Turkey, for both the long- and the short-run.

5. Final Remarks

This study revisits one of the postulates of the public choice school, with the subject matter of analysing how public budgetary dynamics affect government spending in a developing country with historically growing public debt. The empirical analysis carried out in this context aims to determine whether or not the persistence of Turkey's overspending can be explained by the Buchanan-Wagner hypothesis. The novel aspect of the analysis in this study lies not only in the estimation methodology applied but also in the absence of an analysis of the Buchanan-Wagner hypothesis for Turkey. Unlike the empirical studies in the literature on the Buchanan-Wagner hypothesis, this work considers most of the statistical deficiencies observed in estimating and testing the hypothesis by applying the help of the ARDL modelling approach. Moreover, with its economic and political dynamics, Turkey seems to be the most typical country for analysing the validity of the Buchanan-Wagner hypothesis, as her democratization process has witnessed persistent budget deficits often financed by debt over the years.

The findings of this study provide strong statistical evidence in favour of the Buchanan-Wagner hypothesis in Turkey. Public spending demand is found to have persistently increased over time although government budget balances have deteriorated through relatively lower shares of tax revenue in total public spending. In the theoretical context of Buchanan and Wagner's argument, this inverse relation is the outcome of debt-financed deficits, which cause misperceptions about the tax price of the public spending demanded by taxpayer voters. The ARDL estimates of the short- and long-run tax price elasticities of the public spending demand are found to be close to each other around a value of -0.6 in this study. In the empirical literature on Turkey, only the short-run estimates of Darrat (1998) and Payne, Mohammadi, and Çak (2008) provide support for the validity of the Buchanan-Wagner hypothesis in Turkey;

however, these do not provide any directly comparable estimates, as the contexts and methods of these studies are substantially different from those of the present work. With this reservation, after an adjustment is made to enable comparison, the short-run tax price elasticity estimates of this study are found to be slightly smaller than those obtained by Darrat (1998) and Payne, Mohammadi, and Çak (2008). This divergence may be attributed not only to their contextual and methodological differences but also to differences in their long-run elasticity estimates. That is, in the former study, taxes are found to effect public spending positively in the long-run. In the latter study, the estimated long-run relationship shows a negative effect of public spending on government revenues. In fact, both of the long-run findings are inconsistent with the Buchanan-Wagner hypothesis.

A comparison of the findings of this study with those obtained for other countries does not lead to a solid conclusion. Although only those studies that exploit the theoretical model of Niskanen (1978) are considered for comparison, the short-and long-run elasticity estimates seem to vary widely in size regardless of the characteristics of the countries in question. These varying sizes of the elasticity estimates in the literature prevent any systematic classification of these elasticities with respect to the economic and political peculiarities of the countries. However, regardless of its size, the statistically significant negative elasticity estimate found for Turkey in this study may be considered as the justification of the chronic biases towards postponing the tax costs of public spending for political reasons.

One of the limitations in the analysis of the Buchanan-Wagner hypothesis lies in its theoretically pre-structured single-equation specification, which does not allow integrating political factors, such as the degree of the polarization in politics, political instability, and the politico-institutional structure, among others, in the analysis. This is plausibly due to the fact that the Buchanan-Wagner hypothesis is originally modelled within the microeconomic framework of the public good demand. Hence, in further research, it may be worth analysing the Buchanan-Wagner hypothesis within the setting of a macroeconomic model, which can also account for political factors that influence public spending demand.

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Appendix

Table A1 Data Definitions

QCN_t	Consolidated budget expenditures / GDP deflator
R_t	Consolidated budget tax (or total) revenues
X_t	Consolidated budget expenditures
Y_t	GDP (constant 1998 prices) / Population
W_t	Nominal manufacturing wage / GDP deflator
N_t	Population

Source: Consolidated budget and GDP figures are from the statistical database of the Presidency of Strategy and Budget, the Republic of Turkey (2020)¹; population data is from the Turkish Statistical Institute (2020)²; nominal manufacturing wage data is from Tuncer Bulutay (1995).

Table A2 Tests for the Individual Integration Orders

	ADF	ADF	KPSS	KPSS
	t-stat.	t-stat.	LM-stat.	LM-stat.
	Without trend	With trend	Without trend	With trend
Levels				
$\ln QCN_t$	-0.765 (0)	-3.179 (0)	1.156*** (7)	0.137* (6)
$\ln(R/X)_t$ ⁽¹⁾	-1.792 (1)	-4.063** (0)	0.974*** (6)	0.156** (5)
$\ln(R/X)_t$ ⁽²⁾	-4.419*** (0)	-4.347*** (0)	0.125 (5)	0.109 (5)
$\ln Y_t$	-0.733 (0)	-3.783** (0)	1.173*** (7)	0.055 (6)
$\ln W_t$	-1.236 (0)	-2.446 (0)	1.175*** (6)	0.099 (6)
$\ln N_t$	-1.219 (1)	-0.667 (1)	1.167*** (7)	0.164** (6)
1 st differences				
$\Delta \ln QCN_t$	-11.59*** (0)		0.047 (1)	
$\Delta \ln(R/X)_t$ ⁽¹⁾	-13.49*** (0)		0.111 (10)	
$\Delta \ln(R/X)_t$ ⁽²⁾	-10.89*** (0)		0.156 (15)	
$\Delta \ln Y_t$	-11.16*** (0)		0.043 (5)	
$\Delta \ln W_t$	-8.007*** (0)		0.042 (1)	
$\Delta \ln N_t$	-2.969** (0)		0.324 (6)	

Notes: ⁽¹⁾R: tax revenues; ⁽²⁾R: total revenues. Superscripts ***, ** and * denote 1%, 5% and 10% significance levels, respectively. The Augmented Dickey-Fuller (ADF) t-statistics test the "unit root (non-stationarity)" null hypothesis, whereas the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) LM-statistics test the "stationarity" null hypothesis. Figures in parentheses for the former are the augmented lag lengths selected by the Schwarz Bayesian Information Criterion with the maximum lag-length 6, while those for the latter are bandwidths selected by the Newey-West method.

Source: Author's calculations.

¹ **Official Statistics Portal.** 2020. Presidency of the Republic of Turkey Presidency of Strategy and Budget. <https://officialstatistics.gov.tr/en/detail/institution/presidency-of-the-republic-of-turkey-presidency-of-strategy-and-budget/> (accessed January 20, 2020).

² **Turkish Statistical Institute.** 2020. <https://www.tuik.gov.tr/Home/Index> (accessed January 10, 2020).