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Testing the Fiscal Theory of Price Level for Türkiye with Fourier-Based Empirical Approaches

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Fiyat Düzeyinin Mali Teorisinin Türkiye İçin Fourier Temelli Ampirik Yaklaşımlarla Test Edilmesi	**Testing the Fiscal Theory of Price Level for Türkiye with Fourier-Based Empirical Approaches**
Öz Enflasyon, ortodoks yaklaşımlarda parasal bir olgu olarak tanıtılmaktadır. Ancak fiyat düzeyinin mali teorisi kapsamında dönemler arası bütçe kısıtının bugünkü değerini yükümlülüklerinden bağımsız bir biçimde belirleyen mali otoritenin uyguladığı politikaların fiyat düzeyi üzerinde belirleyici olabileceği savunulmaktadır. Bu çalışmada Fourier-ADL eş-bütünleşme ve Fourier Toda-Yamamoto nedensellik yaklaşımları kullanılarak Türkiye için fiyat düzeyinin mali teorisinin geçerliliği test edilmektedir. Elde edilen bulgular 1975-2021 dönemi kapsamında fiyat düzeyinin belirlenmesinde maliye politikasının etkili olduğuna işaret etmektedir.	**Abstract** Inflation is introduced as a monetary phenomenon in orthodox approaches. However, in the fiscal theory of the price level, the policies implemented by the fiscal authority, which determines the present value of intertemporal budget constraint independently of its liabilities, may be determinative of the price level. In this study, the validity of the fiscal theory of the price level for Türkiye was tested via the Fourier-ADL co-integration and Fourier Toda-Yamamoto causality approach. The findings indicate that fiscal policy was effective in determining the price level in the 1975-2021 period.
Anahtar Kelimeler: Maliye Politikası, Kamu Borcu, FTPL, Fourier-ADL	**Keywords:** Fiscal Policy, Public Debt, FTPL, Fourier-ADL
JEL Kodları: E62, E63, C22	**JEL Codes:** E62, E63, C22

Araştırma ve Yayın Etiği Beyanı	Bu çalışma bilimsel araştırma ve yayın etiği kurallarına uygun olarak hazırlanmıştır.
Yazarların Makaleye Olan Katkıları	Yazar 1'in makaleye katkısı %55, Yazar 2'nin makaleye katkısı %45'tir.
Çıkar Beyanı	Yazarlar açısından ya da üçüncü taraflar açısından çalışmadan kaynaklı çıkar çatışması bulunmamaktadır.

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1. Introduction

Understanding the relationship between monetary and fiscal policies and their effect on the price level is a challenging yet worthwhile pursuit in macroeconomics literature. Price stability is among the major objectives, not only monetary but also fiscal policies. It is crucial to recognize that orthodox theories oversimplify economic circumstances by disregarding the impact of fiscal policies. Hansen (1949: 157) asserts that monetary policies alone are insufficient for determining the price level. Orthodox theories argue that the fiscal authority will design the intertemporal budget constraint to respond systematically to shocks in the public debt, whereby the price level will be determined independently of the fiscal policy. Such a format is defined as the Ricardian regime (hereafter R.) (Aiyagari and Gertler, 1985), monetary policy dominant regime (Sargent and Wallace, 1981), or passive fiscal policy (Leeper, 1991) with the same meanings. Based on the assumption that changes in public debt do not systematically finance by the intertemporal budget constraint, fiscal policy will become a critical element in determining the price level. Such a format is introduced in the literature with the terms non-Ricardian regimes (hereafter N.R.), fiscal policy dominant regimes, and active fiscal policy as a substitute. Clarification of both formats is achieved by examining the assumptions of the Ricardian equivalence hypothesis (Barro, 1974: 1116). According to the assumptions of the hypothesis, households comprehend that the rises in the public debt stock will be financed by future tax increases. Therefore, they do not regard a rise in the public debt stock as an improvement in net wealth. However, in the N.R. regime, where fiscal policy does not systematically respond to public debt shocks (when debts are not financed by budget surpluses or future taxes), public debt may create a net wealth effect and play a role in determining the price level via aggregate demand. The debate on the interaction of monetary-fiscal policy in determining the price level revolves around the concepts of R. and N.R. fiscal regimes, which are the core pillars of the discussion.

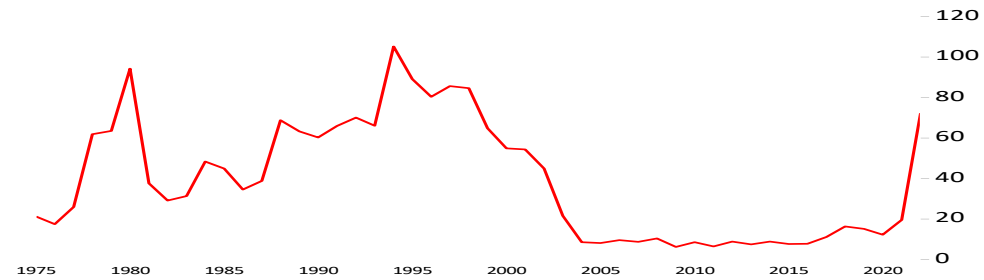
Another worthy discussion about determining the price level by fiscal policy actions belongs to Sargent and Wallace (1981), with their seminal study titled some unpleasant monetarist arithmetic. In certain economic conditions, financing budget deficits through domestic debt may not be sustainable if real interest rates exceed real economic growth rates. This is an important consideration to keep in mind when determining fiscal policy actions. Because the government can use the way of printing money as well as debt instruments, the unpleasant monetarist arithmetic advocates that if the government initially borrows domestically to fund budget deficits and then increases the money supply to pay off those debts, it could lead to a higher rate of inflation than if the money supply was increased first.

The N.R. regime and unpleasant monetarist arithmetic formed the foundation of a new theory of price-level determination called the "fiscal theory of price level" (hereafter, FTPL). Pioneering studies in the theoretical evolution of FTPL were established by Leeper (1991), Woodford (1994; 1995), Sims (1994), and Cochrane (1999; 2001). FTPL re-examines the problem of inflation from the perspective of fiscal theory. It draws attention to the fact that having an independent monetary authority may not be enough to ensure price stability. Instead, a coordinated effort between the monetary and fiscal authorities is necessary to construct policies that work together harmoniously.

It is argued repeatedly that fiscal indiscipline, budget deficits and its techniques o are among the causes of inflation in Türkiye. Therefore, our study focuses on the price level

determination and stability, which has increased again and rapidly after 25 years. In this context, this study attempts to examine the theoretical validity of FTPL for Türkiye and to make sense of fiscal policy's effects in determining the price level in this way. Figure 1 illustrates annual inflation data for 1975-2022 in Türkiye. In Figure 1, the inflation level experienced a significant increase shortly after 1975. The first upward trend in the period under investigation is because Türkiye began printing money to finance its military expenditures, which increased soon after the Cyprus Peace Operation (Bildirici and Ersin, 2005: 99). It is important to closely monitor the monetization of budget deficits through the central bank as it has been a trigger of the inflationary process. The economic situation in Türkiye was highly unstable during the late 1970s due to a series of crises, including political instability, budget deficits, and the global oil crisis, and these factors caused the price level to out of control (Pamuk, 2023: 7). The inflationary process that was exposed necessitated January 24 decisions in 1980, which contained radical measurements in several fields of the economy. Many structural reforms were carried out within the scope of the liberalization strategy initiated in the 1980s, especially in foreign trade and balance of payments. In addition, in the relevant period, some monetary instruments previously controlled by the Central Bank were extended to the use of commercial banks in order to liberalize the financial sector. Floating exchange rate regimes and foreign currency deposit accounts, among the new instruments extended to commercial banks, accelerated dollarization in Türkiye and lessened the effectiveness of the monetary authority (Aricanli and Rodrik, 1990: 1344). This process inherently made it challenging for the monetary authority to maintain price stability.

Figure 1: Annual Inflation Rates (1975-2022)



Source: World Bank Data, (2023).

From 1985 to 2002, it is possible to mention exceptional social, political, and economic challenges in Türkiye. Regarding its economic dimension, cheap loans offered by public banks to the agricultural sector and small industries in the relevant period, the persistent loss of state economic enterprises due to their commercial activities, and the rapidly increasing military expenditures within the scope of the fight against terrorism led to enormous budget deficits (Pamuk, 2023: 12). In particular, after 1990, domestic debt instruments were used to pay off the budget deficits (Akcay et al., 1996: 9; Telatar, 2002: 62). As conveyed in the unpleasant monetarist arithmetic, financing the budget deficits first with domestic debts and second monetizing them with the central bank's resources results in an upsurge in the inflationary trend. On the other hand, the liberalization of foreign currency deposit accounts in 1984 reduced the demand for the Turkish lira. Inflation rates averaging 40% on average until 1988, exceeded 70% in 1988. Then, until 1994, the average inflation level remained nearly 60%.

In 1994-1999, the money supply was attempted to be controlled with a series of regulations that restricted the treasury's use of central bank resources. Thus, the monetary policy, integrated into the fiscal policy in a by-force manner before the 1999 economic crisis, tried to become an independent authority. The public debt stock that reached 80% of GDP in 2001 and the annual inflation level of 105% in 1994 followed by an in-depth public finance crisis. These circumstances necessitated a solid fiscal discipline plan put into force in Türkiye within the framework of the IMF called the Transition to the Strong Economy Program. Furthermore, in 2001, the Türkiye Central Bank law underwent some amendments. As a result, the central bank's primary objective became ensuring price stability. In addition, privatizing state-owned enterprises and IMF support and programs have stabilized the price level. In Türkiye, single-digit inflation levels were achieved in 2004. To maintain predictableness and fiscal discipline in public finances, medium-term fiscal plans began to be published in 2006.

Unfortunately, the economic downturn caused by the 2008 global financial crisis had some severe consequences. Combine that with lax fiscal discipline, ongoing social and political turmoil, and economic crises. We observe a resurgence in public debt and elevated price levels starting around 2015 (Masatci and Oktayer Buzluca, 2022b: 78). The price level has been on an upward trend due to various factors such as the foreign exchange rate shock, increased credit default swaps in 2018, and the implementation of expansionary fiscal policies in return to the COVID-19 pandemic. Over the past few years, there have been some noteworthy negative alterations to the monetary policies implemented in 2021, which were later abandoned in 2023. These changes, along with the upward shocks in the exchange rates, have profoundly impacted the price level. Accordingly, we have seen a structural break in the price level, with an annual increase of 72% in 2022, the highest peak value in the last 24 years.

The price level in Türkiye has been subjected to cycles of severe instability with its dynamics for practically every period. To date, numerous empirical studies have been conducted to observe the relationship between fiscal policy and the price level in Türkiye. According to some studies conducted under the FTPL framework, fiscal expansion can lead to an upward push on the price level in Türkiye (Telatar, 2002; Bildirici and Ersin, 2005; Oktayer, 2013; Yalcın and Tulumce, 2020). Furthermore, several examinations reveal that the fiscal policy was N.R. before 2001 (Metin, 1995; Metin, 1998; Oge Guney, 2007; Oktayer, 2010; Songur and Sarac, 2018). Moreover, some of the studies in the literature point to the switch to the R. regime with the positive effect of the fiscal discipline programs implemented after the 2001 crisis (Yurdakul and Sackan, 2007; Bolukbas and Peker, 2017). In addition, there are studies in the literature that exhibit that the R. regime might not be valid in the post-2016 period (Masatci and Oktayer Buzluca, 2022a; Masatci and Oktayer Buzluca, 2022b).

The leading starting point of our research is whether the fiscal policy is decisive in determining the general level of prices in which many structural breaks are observed for Türkiye within the scope of the historical process. This study is aims to conduct extensive research on the influence of fiscal authority on price levels in Türkiye. In addition, an answer is pursued to which regime is dominant in determining the price level under the four different models examined. With the use of long-term data and innovative methods, our study will cover the period between 1975 and 2021. The study will investigate public debt with domestic and external components separately.

Our findings can potentially to make essential contributions to the ongoing discussions presumably two aspects. The first of these contributions is related to the fact that our study examines the public debt dynamics within the scope of four different empirical models and examines the effects of public debt according to its source with a long-term data set. The second important contribution is that the preferred empirical model is based on a novel methodology that allows the model soft structural breaks internally, not externally, with dummy variables, unlike previous studies. Also, in this context, we empirically examine the causality assumptions (Bajo-Rubio et al., 2009: 527) from the intertemporal budget balance to public liabilities implicitly introduced by the FTPL.

The study is structured as follows: The second part presents the theoretical foundations of FTPL, followed by a discussion of empirical studies and their findings in the next section. The data, model, and methodology applied in the study are presented in the third part. In the last part, the relationship between the results obtained within the scope of the investigation and the empirical literature findings is discussed, and the study is concluded by presenting some policy recommendations.

2. FTPL: Theoretical Foundations

While orthodox theories concentrate on the monetary policy impact on the price level, they oversimplify fiscal policy outcomes. Fiscal policy, which is influential on the disposable income of consumers as well as monetary policy, has a function in determining the price level (Hansen, 1949: 157). In this respect, FTPL is a theoretical criticism that draws attention to this gap in mainstream approaches. FTPL points out that intertemporal budget balance, which does not systematically respond to shocks in public liabilities in determining the price level, may create fiscal policy-driven inflationary processes via the channels of change in wealth effect and aggregate demand. Under such a condition, Sargent and Wallace (1981: 7) exhibited that the monetary authority, in the case of fiscal policy-driven inflation, could only adjust the timing of inflation (Fialho and Portugal, 2005: 661).

It is possible to mention conceptual complexity in FTPL-based studies. Accordingly, the situation expressed by the R. regime is a format in which monetary policy can determine the price level externally. Namely, fiscal policy is ineffective in determining the price level. Alternatively, the format the N.R. regime expresses is one in which the monetary authority cannot externally set interest rates. Interest rates are determined endogenously as they are sensitive to the level of public liabilities. Since the monetary authority cannot determine the interest rates exogenously, it does not have the capability to dominate the price level on its own. Consequently, a consistent monetary and fiscal authority action is critical for price-level stability. In summary, the nominal anchor of the fiscal authority in determining the price level can be simply decomposed as an N.R. regime and the nominal anchor of the monetary authority as an R. regime (Canzoneri et al., 2001: 1221; Telatar, 2002: 62).

It is possible to discuss the eclectic normative propositions mentioned above and fiscal policies in the implementation processes to ensure price stability. The traditional approach builds the formation of the price level mainly on the classical quantity theory and the advanced forms of the quantity theory. The classical quantity theory argues that monetary policy instruments could determine the price level without the need for coordination with fiscal policy. Notations of M, V, P and y in equation 1 created within the quantity theory framework represent nominal money supply, money circulation velocity, price level and real output level, respectively, while the t index indicates time.

$$M_t\bar{V} = P_t y \quad (1)$$

The classical quantity theory is grounded on a series of assumptions, such as the interest responsiveness of money demand being zero, prices being flexible, the velocity of money being constant, and there is a simultaneous balance between income and expenditures (Keyder, 2002: 303). Since the velocity of money ($\bar{V}$) is considered constant in the classical quantity theory, the determination of the price level (P) depends on the adjustment of the exogenously determined (M) money supply according to (y) real output. By way of explanation, it is a mathematical necessity that the level of prices increases when M>y in equation 1 and decreases in the case of y>M. Even so, the quantity theory is a model that does not consider the possibility of embedding, saving, and spending the savings and assumes that all of the earned income is spent under full employment conditions (Keyder, 2002: 304). Considering these restrictions, the FTPL criticizes price level determination approaches based on quantity theory and discusses the effects of fiscal policy (Woodford, 1994; Cochrane, 1999).

FTPL's critical perspective on the Ricardian equivalence theorem is the first matter where it differs from traditional views. In an R. regime, public debt cannot influence the price level (Woodford, 1995: 4) because public debt is financed by adjusting the intertemporal budget constraint. Knowing that the increase in public debt will be financed by future taxes under an R. regime, the "rational household" will save as much as the present value of future taxes. Accordingly, increasing public debt will not impact aggregate demand, investment, and savings. Specifically, there is no differentiation between financing public deficits by borrowing or taxes in terms of price level. For this reason, it is accepted that fiscal authority plays a passive role, and monetary authority plays an active role in the formation of the price level (Sala, 2004: 2; Dewachter and Toffaono, 2012: 14). Conversely, the N.R. regime is a format in which fiscal policy constructs the intertemporal budget constraint independent of the present value of future liabilities. However, other conditions being equal, to finance the budget deficits without increasing the public debt stock, the fiscal authority must establish primary budget surpluses. To have a primary surplus, public expenditures must be reduced or public revenues must be driven up. If the fiscal authority does not create a tax increase to correspond to the increased public liabilities, the net wealth of the households holding the debt securities will improve. As a result, the budget deficit resulting from the difference between liabilities and taxes can influence the price level through wealth and aggregate demand (Leeper, 1991).

The elemental identity explaining the intertemporal structure of FTPL is presented in equation 2. In Equation 2, $\mathrm{D_{t-1}}/\mathrm{P_t}$ on the left side of the equation denotes the real value of public debt in period t, where $\mathrm{D_{t-1}}$ is the nominal public debt stock, and $\mathrm{P_t}$ is the price level (Cochrane, 2023: 12-14; Congregado et al., 2023: 9).

$$\frac{\mathrm{D_{t-1}}}{\mathrm{P_t}} = \mathrm{E_t}\sum_{\mathrm{j=0}}^{\infty}\beta^{\mathrm{j}}\mathrm{s_{t+j}} \quad (2)$$

Equation 2 more simply: $\frac{Nominal\ Public\ Debt_{\mathrm{t-1}}}{Price\ Level_{\mathrm{t}}} = Primary\ Surplus_{\mathrm{t}}$

In Equation 2, $\mathrm{D_t}$ the nominal public debt, $\mathrm{P_t}$ the price level, β, the real interest rate, $\mathrm{s_{t+j}}$ the primary budget balance, and $\mathrm{E_t}$ denotes the conditional expectations about the future budget balance. Equation 2, the intertemporal model of FTPL, is also based on some

assumptions. The first is the preference for the primary budget surplus, as it does not contain interest payments for public debt as an intertemporal budget constraint. Second, the government soaks the money in the market at the end of period t imposing a flat income tax or issuing new bonds. It is also assumed that interest earnings from public nominal debt cannot be negative. For the reason that in the case of negative interest earnings, there will be no reasonable aspect of lending. For the R. regime to be valid within the framework of Equation 2, the real value of public debt must be equivalent to the primary budget surplus in the next period. It should be noted at this point that the right-hand side of equation 2 does not depend on the price level. Consequently, the price level is adjusted so that the nominal public debt equals the primary budget balance.

Suppose the conditional expectations $(\mathrm{E_t})$ regarding the primary budget surplus in Equation 2 are that the primary budget balance will decrease in the coming period. Expansionary effect of fiscal policy give rise to the demand for the purchase of goods and services rises, and it will increase the price level. In that case, the public debt level should also reduce in theory. An increase in the price level will trigger a drop in real interest earnings (Cochrane, 2023: 22). The upsurge in demand created by the wealth effect will persist until the price level is equal to the future period value of the budget balance foreseen in the expectations. Alternatively, a negative assessment of expectations regarding the present value of the budget balance for the next period can be defined as "*unexpected inflation*" arising from fiscal policy (Cochrane, 2023: 24).

The FTPL does not enter into a discussion about whether an R. or an N.R. regime must be followed. Nor does it focus on which of the two regime types is "good" for an economy. FTPL asserts that fiscal policy has a pivotal impact on the price level in the N.R. regime (Masatci and Oktayer Buzluca, 2022b: 92). Moreover, the advocates of FTPL also state that it is unclear for the fiscal authority to determine the price level alone.

Nevertheless, it should not be unnoticed that the functionality of the intertemporal model presented in equation 2 is based on the assumptions that prices are completely flexible, that the monetary authority does not target inflation, does not set nominal interest rates, and that the money supply is fixed (Afonso, 2008: 4). Similarly, according to Buiter (1999), the FTPL approach presents an unsolvable general equilibrium problem in terms of determining the price level, since it is a model independent of the money stock. In addition, Buiter and Sibert (2018) state that the elements of FTPL's price level are incompletely specified; therefore, it has essential shortcomings. Likewise, Cushing (1999: 147) notes that governments' assumptions that the future inflation level will be fixed is oversimplifying. Lastly, McCallum (2001) stated that using public debt as the primary determinant of fiscal policy is a monetarist solution. Despite these criticisms, FTPL is important because it considers fiscal policy, which the traditional view considers ineffective in determining the price level. On the other hand, FTPL presents a model worth examining for developing countries with chronic price-level instability and budget deficits.

3. Empirical Literature Review

Investigating the link between fiscal and monetary policy through empirical applications can provide insight into the strengths and weaknesses of the theoretical approaches developed in this context. One of the early empirical studies within the framework of intertemporal budget constraints was carried out by Hamilton and Flavin (1986). The authors investigated how long the budget deficits could be sustained without being controlled by the fiscal authority using the OLS method for the USA in the 1962-1984 period. The authors report that if their assumptions about the debt limit are valid, budget deficits cannot be sustained infinitely. However, studies carried out within the framework of this problematic focus on the fiscal solvency of the state rather than FTPL (Telatar, 2002: 66). According to Cochrane (1999: 325), FTPL empirically examines the public debt and budget balance together not other indicators such as monetary aggregates. Hence, studies examining FTPL should concentrate on the formal expression of R. and N.R. regimes with the frame of basic equilibrium conditions presented in Equation 2.

Table 1: Empirical Literature Review

Authors	Sample	Period	Method	Findings
Bohn (1998)	USA	1916-1995	OLS	R.
Cochrane (1999)	USA	1960-1996	OLS	R.
Canzoneri et al. (2001)	USA	1951-1995	VAR	R.
Erdogdu (2002)	USA	1959:1-1998:4	SVAR/SVEC	R.
Janssen et al. (2002)	U.K.	1702-1996	VAR	R.
Tanner and Ramos (2003)	Brazil	1991:1-2000:12	VAR	R.>N.R.
Sala (2004)	USA	1960-1979	VAR	N.R.
		1990-2003		R.
Semmler and Zhang (2004)	Germany	1970:1-1998:4	VAR	N.R.
	French	1971:1-1998:4	S.S with M.S.	N.R.
	Italy	1979:1-1998:4		R.
Creel et al. (2005)	French	1978:1-2003:4	SVAR	N.R.
Fialho and Portugal (2005)	Brazil	1995:M1-2003:M10	MS-VAR	R.
Favero and Monacelli (2005)	USA	1961:1-2002:4	M.S.	N.R. >R.
Moreira et al. (2007)	Brazil	1995:1-2006:2	2-SLS GMM	N.R.
Baldini and Riberio (2008)	S. Africa 22	1980-2005	Panel VAR	N.R.
Afonso (2008)	Eu-15	1970-2003	2-SLS	R.
Javid et al. (2008)	Pakistan	1970-2007	VAR	N.R.
Bajo-Rubio et al. (2009)	EMU 11	1970-2005	DOLS	R.
Alexiou (2010)	Greece	1970-2006	VAR	R.
Chuku (2010)	Nigeria	1970-2008	S.S with M. S.	N.R.
Akram et al. (2011)	Pakistan	1973-2010	VAR	N.R.
Afonso and Toffano (2013)	U.K.	1970:4-2010:4	M.S.	R.> N.R.
	Germany	1979:4-2010:3		R.
	Italy	1983:3-2010:4		R.> N.R.
Javid and Arif (2014)	Pakistan	1960-2009	VAR	R.
Elmas and Songur (2016)	EMU 11	1995-2012	Panel ARDL	R.
Doi (2018)	Japan	1980:1-2017:1	VAR	N.R.
Panjer et al. (2020)	EU 18	1980:2-2013:4	VAR	R.
		2008:3-2013:4		N.R.
Urquhart (2022)	Paraguay	1993:1-2019:4	SVAR	N.R.
Congregado et al. (2023)	Italy	1861-2020	DOLS	R.
		1910-1973		N.R.

Note: R. and N.R. represent Ricardian and non-Ricardian regimes, respectively, and ">" represents the regime change. Markov Regime Switching and State Space methods are represented by M.S. and S.S., respectively.

Parallel to the empirical investigation development of FTPL, it was observed that in the first period of empirical studies, there was generally an R. regime in developed countries (Bohn, 1998; Canzoneri et al., 2001; Janssen et al., 2002; Afonso, 2008; Bajo-Rubio et al., 2009), and therefore, fiscal authorities systematically adjusted intertemporal budget constraints to its liabilities. Namely, the systematic surplus or deficit of the primary budget surplus according to public debt liabilities means that the traditional way of money supply and demand will determine prices. Moreover, in studies that include the period 2008 global financial crisis, transitions from an R. regime to N.R. regimes or N.R regimes were determined (Afonso and Toffano, 2013; Doi, 2018; Panjer et al., 2020; Urquhart, 2022). In equation 2, the primary budget surplus on the right side of the equation is determined arbitrarily, and it is argued that the price level on the left side of the equation will "*jump*" corresponding to the fiscal payment requirements. At this stage, the main distinction is whether fiscal or monetary policy acts as a nominal anchor regarding the price level. If an R. regime is mentioned, monetary policy; If a N.R. regime is mentioned, fiscal policy fulfills the nominal anchor function (Canzoneri et al., 2001: 1221). Variously, in studies applying econometric methods developed to observe regime change, findings point to a transition from an R. regime to an N.R. regime (Tanner and Ramos, 2003) or vice versa (Favero and Monacelli, 2005). Additionally, studies scrutinizing developing countries with both panel data techniques (Baldini and Riberio, 2008) and time series techniques (Moreira et al., 2007; Chuku, 2010; Akram et al., 2011) have reached important conclusions regarding the existence of N.R. regimes. Table 1 summarizes the empirical analyzes, the period they examined, the econometric methods they applied, and the results obtained.

According to table 1, FTPL assumptions were found to be reasonable, mainly in developing countries but in developed countries during periods of external economic shocks. This is not surprising in theory because developed economies with fiscal space have more resilient profiles in terms of net public debt liabilities than developing countries. In addition, thanks to low risk and high fiscal solvency, they can borrow more advantageously in terms of borrowing costs. Lastly, developed economies have a stable position in terms of price level compared with developing countries. Hence, developed economies will be able to design the primary budget surplus against their liabilities in a countercyclical manner. On the other hand, for developing countries with relatively high financial and fiscal vulnerabilities, the systematic response time to shocks in public debt will be longer.

Türkiye included in the classification of developing countries, has persistent fragility regarding price-level stability (See Figure 1). Many surveys examine the FTPL for Türkiye with different econometric methods and periods. Table 2 summarizes the empirical studies for Türkiye.

Table 2: Empirical Investigations on Türkiye

Authors	Period	Method	Findings
Metin (1995)	1949:4-1987:4	Johansen	N.R.
Akcay et al. (1996)	1948-1994	VAR/VEC	N.R.
	1987:1-1995:4		
Metin (1998)	1950-1987	ADL	N.R.
Telatar (2002)	1985:1-1997:4	VAR	N.R.
Creel and Kamber (2004)	1975-2000	VAR	R.
	1975-2002		N.R.
Bildirici and Ersin (2005)	1933-2004	Johansen/VEC	N.R.
Yurdakul and Sackan (2007)	1998:4-2005:3	VAR	N.R.
	1988:12-2001:03		N.R.
	2001:06-2005:09		R.
Oktayer (2010)	1987:1-2009:4	Johansen	N.R.
Oktayer (2013)	1988:4-2013:1	Johansen	N.R.
	1988:4-2001:1	VAR	N.R.
	2001:2-2013:1		R.
Bolukbas and Peker (2017)	2006:1-2015:4	Johansen	N.R.
Songur and Sarac (2018)	1975-2014	ARDL	N.R.
	2001-2014		R.
Yalcın and Tulumce (2020)	2006:1-2019:4	ARDL	N.R.
Masatci and Oktayer Buzluca (2022a)	1996:1-2019:2	ARDL	N.R.
	post 2008:3		R.
Masatci and Oktayer Buzluca (2022b)	1996:1-2005:4	VAR	N.R.
	2006:1-2019:4		R.

Note: R and N.R. represent Ricardian and non-Ricardian regimes, respectively.

The general statement for Türkiye indicates that fiscal policy is in an active position in determining the price level, and it is mostly the dominant policy type. In this context, findings on the N.R. regime are frequently encountered in empirical studies (Metin, 1995; Akcay et al., 1996; Metin, 1998; Telatar, 2002). Conversely, a limited number of studies state that FTPL and traditional quantity theory are invalid in determining the general price level in Türkiye (Tekin-Koru and Ozmen, 2003). The authors reported that fiscal policy instruments in Türkiye do not have a direct impact on the price level through the wealth effect. Instead, they have an external impact on the money supply, as per unpleasant monetarist arithmetic assumption. In addition, it is possible to mention about studies that argue that the fiscal discipline program mentioned to practice post-2001 crisis and the transformation of the central bank into an institution that works independently for price stability provided a transition to the R. regime (Yurdakul and Sackan, 2007; Oktayer, 2013; Songur and Sarac, 2018; Masatci and Oktayer Buzluca, 2022a; Masatci and Oktayer Buzluca, 2022b).

Findings in studies examining FTPL are highly sensitive to the period studied, preferred method, data frequency, and structural breaks modeled with dummy variables. Methods used in empirical research on Türkiye require the date and number of structural breaks to be known and added to the models externally. However, dummy variables added to the models reduce the power of the predicted model. Plus, long-term examinations are believed to provide more comprehensive results on FTPL rather than dividing the series into subperiods (Janssen et al., 2002; Congregado et al., 2023). In the empirical literature, nearly all studies examining FTPL have estimated two- and three-variable models. Univariate and bivariate VAR estimations are prevalent in the literature. The validity of the R. regime is decided if a systematic change in the primary budget balance finances shock to the debt stock under VAR

estimates. However, there are three possibilities for the N.R. regime: the primary budget balance against the shock to the debt stock may have an unrelated, positive, or negative relationship. The point to be noted here is a positive relationship between the primary budget surplus and public debt for the R. regime as well. Therefore, it is crucial to examine the autocorrelation functions of the primary budget balance to determine an R. regime and an N.R. regime because of VAR estimations (Canzoneri et al., 2001: 1129; Telatar, 2002: 67). Furthermore, OLS is one of the other common methods for multiple regression models. However, studies that preferred the OLS estimator (Bohn, 1998; Cochrane, 1999) did not directly investigate whether the series were co-integrated. In these studies, if the unit root test results applied to the residuals estimated in the regression analysis based on the Engle and Granger procedure are stationary, the existence of a co-integration relationship is decided.

When analyzing Türkiye through empirical examinations, researchers often use ARDL and Johansen co-integration methods. These methods necessitate the identification of a break date and number, which are then modeled using dummy variables. Also, in cases where variables different from the public debt stock and primary budget balance variables used in the empirical literature are preferred, the sustainability relationship of fiscal policy is specifically examined, not the FTPL (Telatar, 2002). In the studies on Türkiye, public debt, one of the main determinants of the FTPL, has not been examined as domestic and external public debt, which are its sub-components of total public debt stock. Nevertheless, it has been observed that such a distinction is made in studies examining other countries but not Türkiye (Sala, 2004; Fialho and Portugal, 2005: Javid et al., 2008; Akram et al., 2011). It is vital for the results because of the pioneering work of FTPL, and Sargent and Wallace (1981) built their theory on the variable of public domestic debt. Analyzing the source of public debt is crucial in understanding its impact on the economy, especially when domestic debt is the main component. Lastly, the use of Fourier-based methods, which do not require external determination of the date and number of structural breaks in the examined series, for countries with significant structural changes, such as Türkiye, can potentially make a significant contribution to the empirical literature.

4. Data, Model and Methodology

4.1. Data and Model

The primary budget balance, public sector domestic and external debt data used in the analysis were compiled from official databases T.R. Ministry of Treasury and Finance: Public Finance Statistics (2023), Presidency of the Republic of Türkiye Presidency of Strategy and Budget: Economic and Social Indicators (2023), and Central Bank of the Republic of Türkiye: Public Finance: Central Government Budget Expenses (2023).

A primary budget balance can also be expressed as a non-interest budget balance. Variables expressed with domestic debt are the public sector borrowings from domestic markets. The public sector domestic debt stock is the cash and non-cash debt amount arising from the bonds and bills issued in the domestic markets, which the Ministry of Treasury and Finance is obliged to pay. External debt has four sources: borrowing, issuing bonds, borrowing from governments, and borrowing from international institutions. Public sector external debt stock is the amount of debt arising from foreign loan debts and bonds issued in international markets, which the Ministry of Treasury and Finance is obliged to pay. In order to create a homogeneous data set in terms of all the variables in question, the Central Government level

was taken into account as the scope. Therefore for the public external debt stock, public non-financial and financial enterprises are not considered as they are not directly related to the primary budget balance.

With the aim of empirically examine the validity of FTPL for Türkiye for the period 1975-2021, the four models presented in equation 3 was formed based on the studies in the theoretical and empirical literature:

$$\begin{gathered} Model\ 1\colon PB_t = \alpha_0 + \beta_1 Pdodebt_t + \varepsilon_t \\ Model\ 2\colon PB_t = \alpha_0 + \beta_1 Pexdebt_t + \varepsilon_t \\ Model\ 3\colon PB_t = \alpha_0 + \beta_1 Pdodebt_t + \beta_2 Pexdebt_t + \varepsilon_t \\ Model\ 4\ PB_t = \alpha_0 + \beta_1 Ptotdebt_t + \varepsilon_t \end{gathered} \tag{3}$$

The variables and units of account included in equation 3 are presented in table 3. All variables were included in the model with their GDP ratios.

Table 3: Explanation of Data

Variable Description	Symbol	Unit	Source
Primary budget balance	Pb	%GDP	T.R. Ministry of Treasury and Finance/ T.R.CB EDDS
Public domestic debt	Pdodebt	%GDP	T.R. Ministry of Treasury and Finance /T.R. P. S.B.
Public external debt	Pexdebt	%GDP	T.R. Ministry of Treasury and Finance /T.R. P. S.B.
Public total debt	Ptotdebt	%GDP	T.R. Ministry of Treasury and Finance

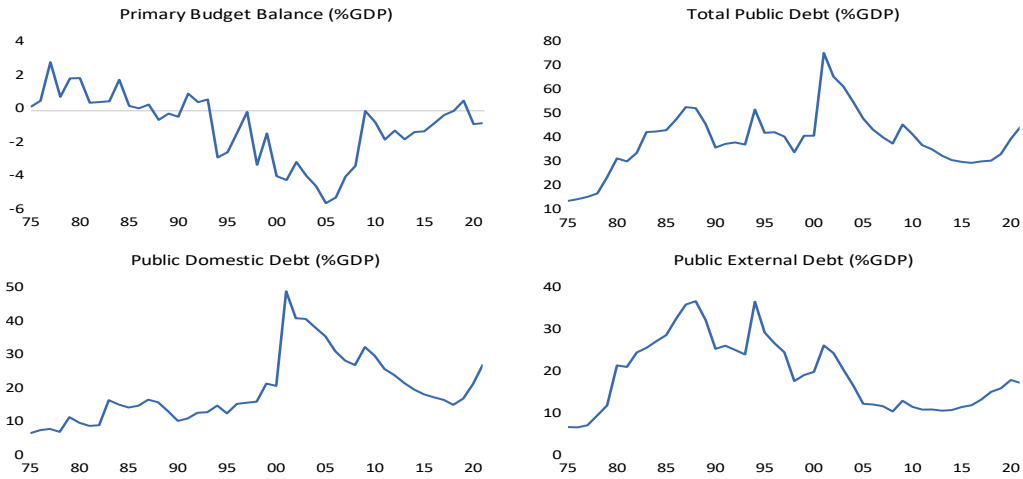
According to the descriptive data presented in Table 4, the primary budget balance (%GDP) showed a deficit of -0.9% on average over the 1975-2021 period, spanning 47 years. Meanwhile, the public domestic debt stock (%GDP) was recorded at an average of 19.9%, whereas the public external debt stock (%GDP) averaged 19.7%. The average total public debt is around 39.6% within the scope of the review period and reached its maximum value of 76% as a result of the ongoing economic crises and political instability in the early 2000s.

Table 4: Descriptive Statistics

Variables	Average	Max	Min	Std. Dev.	Skewness	Kurtosis	JB (p-value)
Pb	-0.970	2.869	-5.529	1.988	-0.542	2.580	2.63(0.256)
Pdodebt	19.951	49.400	7.140	9.948	1.067	3.562	9.54(0.084)
Pexdebt	19.743	37.140	7.119	8.435	0.391	2.125	2.700(0.25)
Ptotdebt	39.684	76.020	14.340	12.258	0.322	4.034	2.913(0.23)

The time path graphs of the series are presented in Figure 2. It shows that the primary budget balance had a surplus between 1975 and 1987 and generally had a deficit after 1987, reaching the minimum value of the primary budget balance of -5.5% in 2005. Between 1975 and 2001, the debt steadily increased, reaching a peak of 49% in 2001. In the post-2001 period, it is observed that the public sector domestic debt has decreased continuously, except for the effect of the 2008 global financial crisis, until 2016. Public sector domestic debt started to increase again after 2016. In parallel with the liberalization trend in the 1980s, public sector external debt also increased rapidly in 1975-1988, reaching its maximum value of 37% and exhibiting a decreasing trend in the following periods. However, after 1994, 2001, and 2008 economic crises, it is seen that public external debts reached their periodic peaks.

Figure 2: Time Path Graphs of the Series



Finally, examining the correlation relationships between the introduced indicators will provide some insights. For example, in table 5 the negative correlation between Pb, Pdodebt, and Pexdebt indicates that the variables are inversely proportional. However, the fact that the correlation relationship has a positive coefficient regarding total debt suggests that the relationship is commensurate.

Table 5: Correlation Matrix

	Pb	Pdodebt	Pexdebt	Ptotdebt
Pb	1.000			
Pdodebt	-0.548 (-7.407)	1.000		
Pexdebt	-0.741 (0.518)	-0.117 (-0.792)	1.000	
Ptotdebt	0.077 (-4.405)	0.731 (7.196)	0.591 (4.918)	1.000

Note: values in parentheses are t-statistics.

Nevertheless, "*correlation is not causation*". Therefore, it is necessary to examine these relations in depth using advanced empirical techniques.

4.2. Methodology

Our study involved an empirical analysis that was carried out in four stages. The first stage of the empirical analysis is the Fourier-ADF (Enders and Lee, 2012) and ADF unit root test application to examine the stationary structure of the series. Then, the co-integration relationship between the series in the model was estimated with the Fourier-ADL (Banerjee et al., 2017) method. This method allows modeling of soft structural breaks. Fourier-based methods estimate the appropriate number of frequencies included in the model without requiring predetermination of the number, dates, and types of structural breaks in the series (Jones and Enders, 2014). Therefore, the dataset was not divided into subperiods, and exogenous dummy variables were not included in the model. In this way, the factors that reduced the model's power predicted in previous studies were eliminated. In the third step, the FMOLS (Phillips and Hansen, 1990) and DOLS (Stock and Watson, 1993) estimators used, including Fourier terms, to calculate the long-term coefficients of the co-integration relationship that was established using the Fourier-ADL method. At the last stage, the Fourier Toda-Yamamoto causality test was used to find the direction of causality between the series and to examine whether there is a reverse causality.

4.2.1. ADF and Fourier-ADF tests

The ADF procedure shown in Equation 4 allows for three regression specifications: the intercept, trend & intercept, and no trend & intercept models.

$$\Delta y_t = \alpha(t) + \delta t + \vartheta y_{t-1} + \sum_{i=1}^{p} \beta_i y_{t-i} + u_t \quad (4)$$

In Equation 4, the deterministic term, $\alpha(t)$ as a function of time, the optimal lag length denotes by p. In ADF, Schwarz (SC) or Akaike (AIC) information criteria can determine the optimal lag length. Furthermore, u_t is a stationary error term with a variance: σ_u^2. Finally, ϑ and β show the coefficients. Lagged values of Δy_t are added to the model to prevent the autocorrelation problem. The Fourier-ADF unit root test was formed by adding Fourier terms to equation (4) by Enders and Lee (2012).

$$\Delta y_t = \alpha_1 + \delta t + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) + \sum_{i=1}^{p} \beta_i y_{t-i} + \vartheta y_{t-1} + u_t \quad (5)$$

When conducting a Fourier-ADF test, the null hypothesis assumes that the series being analyzed has a unit root. The critical values in the table used for comparison of the t statistic vary depending on the Fourier frequency (k) and the number of observations (T). In Fourier-ADF testing, t statistics are calculated by bootstrap or Monte Carlo simulations. If the $t_{statistic} > t_{table\ value}$, the variable is judged to have a stationary process. Moreover, the F test estimates the significance of the Fourier terms. As a first step, the significance of the Fourier terms was tested with the F constraint test. Then, the Fourier-ADF test statistics are estimated. If the $F_{statistic}$ calculated in the first step is less than the $F_{table\ value}$, the Fourier-ADF equation turns into the ADF equation.

4.2.2. Fourier-ADL Co-integration

When performing traditional co-integration tests such as Johansen and Juselius or Engle and Granger, it is important to know that structural breaks are not considered. Ignoring structural breaks can result in an incorrect rejection of hypotheses related to the cointegration relationship. Although there are Gregory and Hansen and Hatemi-J cointegration tests that allow the modeling of structural breaks, it is essential to determine the break date externally. Banerjee et al. (2017) introduced a modification to the ADL estimator by including Fourier terms named Fourier-ADL, which captures soft structural breaks whose structure and number do not have to be determined internally. This is a departure from the original ADL method developed by Boswijk (1994) and Banerjee et al. (1998), which does not account for structural breaks. Banerjee et al. (2017) developed the ADL test that The Fourier-ADL co-integration test equation is presented in equation 6 below.

$$\Delta Pb_t = \beta_0 + \beta_1 \sin\left(\frac{2\pi kt}{T}\right) + \beta_2 \cos\left(\frac{2\pi kt}{T}\right) + \beta_3 Pb_{t-1} + \beta_4 Pdodebt_{t-1} + \beta_5 Pexdebt_{t-1} + \beta_6 \Delta Pb_{t-1} + \beta_7 \Delta Pdodebt_{t-1} + \beta_8 \Delta Pexdebt_{t-1} + u_t \quad (6)$$

In equation 6, β_0 represents the constant term and $\beta_{1\ to\ 8}$ denotes the coefficients in the model; sin and cos are trigonometric terms that capture soft structural breaks. T represents the total number of observations, and k represents the frequency. AIC was chosen as the information criterion in the model, and the number of appropriate frequencies was determined to be a maximum of 5. The method for calculating the Fourier-ADL test statistic is presented in equation 7.

$$t_{ADL}^{F}(\hat{k}) = \frac{\hat{\beta}_3}{pb(\hat{\beta}_3)} \quad (7)$$

Based on the calculated frequency number using Equation 7, it is necessary to test the null hypothesis ($H_0: \beta_3 = 0$) against the alternative hypothesis ($H_1: \beta_3 < 0$) to determine the presence of a co-integration relationship between the variables. If the calculated $t_{statistic}$ is greater than the absolute $t_{table\ value}$ for the given data, it appears that the null hypothesis can be rejected, indicating that there is indeed a co-integration relationship between the series.

4.2.3. Fourier-Toda-Yamamoto Causality

In the Toda-Yamamoto causality test, the optimal lag length (p) of the series and the maximum degree of cointegration (d_{max}) are considered, and it is estimated with a VAR model of order $p+d_{max}$. At this point, the success of the results produced by Toda-Yamamoto depends on the correct determination of p and d_{max}. On the other hand, Toda-Yamamoto is criticized for not considering structural breaks and therefore producing biased results (Enders and Jones, 2016). In order to strengthen the weaknesses of TY, Nazlioglu et al. (2016) developed the Fourier Toda-Yamamoto causality test, which can also consider soft structural breaks by including Fourier terms in the Toda-Yamamoto causality test.

$$y_t = \alpha_0 + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) + \beta_1 y_{t-1} + \ldots + \beta_{p+dmax} y_{t-(p+dmax)} + \varepsilon_t \quad (8)$$

Soft structural breaks caused by economic, social, or political shocks to be followed in the series within the scope of Fourier Toda-Yamamoto can also be modeled without an external diagnosis, and more reliable results can be obtained. However, according to Nazlioglu et al. (2019), as the sample size increases, the Fourier Toda-Yamamoto approach produces more effective and reliable results than Toda-Yamamoto (Akca, 2021; Bozatli et al., 2023).

5. Empirical Results

Determining the stationary level of the data in time series analysis is crucial. Because all the series to be examined in the Fourier-ADL co-integration test should be stationary at the I(1) level. Thus, Fourier-ADF test outcomes were performed first. According to Table 6, the Fourier-ADF unit root test indicates that all variables are stationary at the I(1) level. In addition, the f test results showed that the Fourier terms for *Pb*, *Pexdebt and Ptotdebt* were significant, but not for *Pdodebt*. Therefore, ADF results for the *Pdodebt* series are also reported, and the validity of the findings that the series is stationary at I(1) is supported.

Table 6: Unit Root Test Results

	Fourier ADF (model A)				ADF		
Variables	**I (0)**	**I (1)**	**k(p)**	**F**	**I (0)**	**I (1)**	**p**
Pb	-3.259	-4.370**	1(3)	8.360**			
Pdodebt	-1.809	-8.425***	2(3)	3.642	-1.922	-7.675***	0
Pexdebt	-3.554	-5.641***	1(4)	6.858**			
Ptotdebt	-2.654	-5.641***	1(4)	7.858*-			

Note: ***, **,* denotes significant at 1%, 5% and %10 level, respectively. Critical values for %1 and %5 is -4.420 and -3.810, respectively. (k) denotes the chosen frequency. Optimal lag lengths (p) were selected automatically using the SBC. F-test table statistics for %1, %5, and %10 is 10.35, 7.58, and 6.35, respectively.

When conducting the Fourier-ADL co-integration test, it is not necessary to determine any structural breaks within the data. For this reason, it will not be meaningful to apply sudden structural break unit root tests because the structural break is not modeled by dummy variables. Instead, it would be a more rational choice to use the Fourier-based test, which can

detect soft structural breaks. Based on the similar principle, trigonometric Fourier terms added to the co-integration equation can also capture soft structural breaks.

Table 7: Fourier-ADL Co-integration Results

	$t_{ADL}^{f}(\hat{k})$	$\hat{k}$	AIC
Model 1: Pb=f(Pdodebt)	-4.597**	1	3.027
Model 2: Pb=f(Pexdebt)	-3.617	1	3.193
Model 3: PB=f(Pdodebt, Pexdebt)	-4.464**	1	3.043
Model 4: PB=f(Ptotdebt)	-4.535**	1	3.138
Table critical value	%1	%5	%10
	-4.96	4.32	-3.98

Note: **: According to the Single Frequency Fourier-ADL method, the null hypothesis that there is no co-integration between the variables at the 5% significance level is rejected.

In addition, the necessity of knowing the structure and number of structural breaks in advance weakens the power of the tests to be used (Aydın and Bozatli, 2023: 41289). In Table 7, the Fourier-ADL test was used to analyze co-integration and the results are reported. Table 7 shows that the absolute value of the Fourier-ADL test statistic exceeds the critical value stated in the table for a single frequency. Based on the results provided, it appears that there is a co-integration relationship between the variables for model 1, 3 and 4. The cointegration relationship for model 2 was not found statistically significant, so model 2 was excluded in the process of realizing the long-term coefficient estimates. After determining the co-integration relationship in model 1,3 and 4, FMOLS and DOLS estimators, which are resistant to autocorrelation and heteroscedasticity problems, were used to estimate the long-term coefficients. Long-term coefficients obtained from these variables are presented in table 8. In Table 8, the Jarque-Bera statistics implies that the error terms are normally distributed for both estimators. The LM test is a diagnostic test used to detect the presence of serial correlation, BPG heteroscedasticity problem, Ramsey-Reset modeling errors and VIF multicollinearity test. Regarding the three models estimated within the FMOLS and DOLS estimator, we do not find any evidence of the problems examined by the diagnostic tests.

In all models, the coefficient related to public domestic debt was negative and statistically significant. However, the public sector external debt coefficient was indistinguishable from zero but statistically insignificant. As Canzoneri et al. (2001) stated, the R. regime is applied if the debt variable coefficient is $\beta > 0$. This condition means that the fiscal authority adjusts the present value of the primary budget balance to be equal to its liabilities. However, if the coefficient for the debt variable is $\beta \leq 0$, the fiscal authority creates the intertemporal budget constraint independently of its obligations (Tanner and Ramos, 2003: 866; Bajo-Rubio, 2009: 528). For this reason, the findings regarding the N.R. regime were found to be valid within the scope of the examined period.

Table 8: FMOLS and DOLS Estimator Results

Estimations		FMOLS			DOLS	
	Model 1	**Model 3**	**Model 4**	**Model 1**	**Model 3**	**Model 4**
Pdodebt	-0.086***	-0.085***		-0.124***	-0.118***	
	(-3.204)	(-2.847)		(3.818)	(-3.312)	
Pexdebt		0.000			0.005	
		(0.015)			(0.099)	
Ptotdebt			-0.052***			-0.081***
			(-2.722)			(-3.048)
Sin	0.791***	1.121***	1.535***	0.398	0.470	1.468***
	(4.257)	(3.821)	(6.269)	(1.082)	(0.701)	(5.963)
Cos	1.121***	0.735	1.149***	1.178***	1.380***	0.960***
	(2.373)	(1.344)	(3.545)	(4.047)	(3.291)	(2.485)
Constant	0.757	0.735	1.144	1.563**	1.343	2.232**
	(1.341)	(0.892)	(1.435)	(2.347)	(1.247)	(2.162)
R^2	0.72	0.73	0.70	0.79	0.81	0.76
JB	1.190	1.160	0.618	0.828	3.435	0.172
	[0.551]	[0.558]	[0.733]	[0.660]	[0.179]	[0.914]
		Model 1	**Model 3**	**Model 4**		
LM		0.855	0.835	0.971		
		[0.432]	[0.441]	[0.387]		
BPG		2.178	2.307	2.929		
		[0.104]	[0.074]	[0.062]		
Ramsey-Reset		0.728	1.332	1.185		
		[0.398]	[0.190]	[0.242]		
VIF		1.00	1.01	1.00		

Note: ***, ** Indicates statistical significance at the 1% and %5 level. sin and cos represent sine and cosine as trigonometric terms.

Specifically, in the 1975-2021 period in Türkiye, the public domestic debt was not balanced by the primary budget surpluses. Thus, fiscal policy played an active role in determining the price level within the framework of the FTPL. Considering the periods when public sector domestic debts were monetized in Türkiye, consistent results were obtained regarding FTPL, unpleasant monetarist arithmetic, and most of the previous empirical studies. Although it is statistically insignificant, it points out that the primary budget balance does not respond systematically to public external debt also because it does not fulfill the $\beta>0$ condition. Therefore, making a similar interpretation regarding public sector external debts is impractical.

On the other hand findings pointing to the N.R. regime were also obtained within the scope of total public debt. This situation is likely due to Türkiye's dominant structure of public domestic debts. When we examine the domestic and external public debts mutually, our findings show that the public domestic debts are $\beta\leq0$ however public external debts are indifferent from zero.

The results obtained from the Fourier Toda-Yamamoto causality test reveal the existence of a unidirectional causal relationship from Pb to Pdodebt as presented in table 9. On the other hand, no statistically significant causality relationship could be detected with Pexdebt and Ptotdebt. Therefore, in terms of Türkiye FTPL assumptions N.R. we present evidence that the causality underlying our findings pointing to the regime is due to domestic public debt, in line with theoretical expectations. By drawing attention to the existence of periods in which fiscal discipline was lost in terms of budget deficits and financing methods in Türkiye under

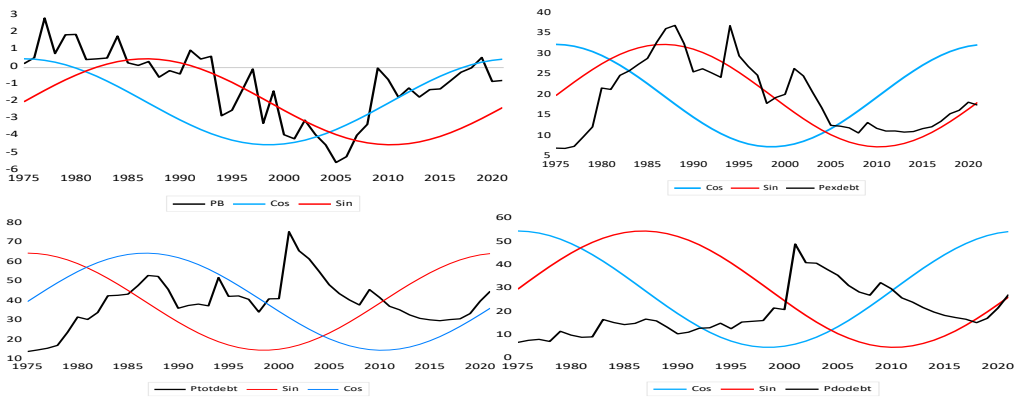
the review period, it is possible to state that the financial authority creates its obligations, primarily arising from public domestic debts, independently of the intertemporal budget balance.

Table 9: Fourier Toda-Yamamoto Causality Test Results

	Test statistics	p-value	K	p
PB $\not\rightarrow$ Pdodebt	3.297	0.060*	1	1
Pdodebt $\not\rightarrow$ PB	0.287	0.592	1	2
PB $\not\rightarrow$ Pexdebt	0.086	0.770	1	1
Pexdebt $\not\rightarrow$ PB	2.605	0.112	1	1
PB $\not\rightarrow$ Ptotdebt	2.042	0.164	1	1
Ptotdebt $\not\rightarrow$ PB	1.233	0.267	1	1

Note: *, indicate significance at 10% levels, respectively. The bootstrap replication count for causality test is 1000. p and k represent the optimal delay length and frequency, respectively. SBC is used for optimum p and k.

Figure 3: Time Path Graphs of Series and Fourier Functions



Finally, in Figure 3 above, it has been determined that the Fourier terms reflect the distribution of the series over time well.

5. Conclusion

The public debt stock, the persistence of budget deficits, and the effect of these variables on the price level emerge as important areas of study for developing countries that have difficulties in the fight against inflation (Javid et al., 2008). In this regard, traditional approaches focus on monetary policy, with the effect of fiscal policy generally remaining in the background. Because traditional approaches think that individuals and institutions are completely rational and that the determination of the price level is entirely under the control of the monetary authority, it is expected that fiscal policy will not have any power to affect the price level under the assumptions of the Ricardian equivalence approach.

Not only unpleasant monetarist arithmetic but also within the framework of the FTPL, attention is drawn to fiscal policy's effects on the price level from a theoretical point of view. In their simplest form, these theoretical approaches point out that inflationary pressures at the price level are a monetary phenomenon driven by fiscal policy (Oktayer, 2010: 432). Based on the assumptions of unpleasant monetarist arithmetic, if the fiscal authority, which does not have unlimited borrowing opportunities, ultimately monetizes its budget deficits

through the central bank, this will cause higher inflation than if money printing was done directly. On the other hand, FTPL states that fiscal policy changes economic agents' preferences by affecting aggregate demand or creating a wealth effect, thus triggering fiscal policy driven inflation. To effectively determine the price level, it is important to recognize that merely having an independent monetary authority is not sufficient within the scope of FTPL. Instead, both fiscal and monetary authorities must work together in a coordinated and harmonious manner. When determining the appropriate price level, one authority follows an "active" regime while the other follows a "passive" regime.

FTPL has some theoretically controversial assumptions and different results from the empirical literature. A significant part of the literature reports that the R. regime is valid in developed countries (Bohn, 1998; Cochrane, 1999; Canzoneri et al., 2001; Janssen et al., 2002; Bajo-Rubio et al., 2009; Alexiou, 2010; Elmas and Songur, 2016). On the other hand, the situation is different for developing countries. It is possible to say that empirical tests of FTPL assumptions are mostly found valid for developing countries (Tanner and Ramos, 2003; Favero and Monacelli, 2005; Javid et al., 2008; Chuku, 2010; Akram et al., 2011; Urquhart, 2022). Empirical findings point to a similar situation for Türkiye. Many empirical investigations report that fiscal policy in Türkiye has an effect on the price level (Telatar, 2002; Bildirici and Ersin, 2005; Oktayer, 2013; Yalcın and Tulumce, 2020). Additionally, some studies examining the specific periods and point to the findings of the N.R. regime before 2001 in accordance with the theoretical expectations (Metin, 1995; Akcay et al., 1996; Metin, 1998; Oge Guney, 2007; Oktayer, 2010; Songur and Sarac, 2018). In addition to these, it is also possible to talk about studies that argue that FTPL is not valid for Türkiye, based on strong empirical methods (Tekin-Koru and Ozmen, 2003). However, it is stated that together with the fiscal discipline programs implemented after the 2001 crisis, the regime transition was experienced after 2006, and the (R.) practices dominated by monetary policy were included (Yurdakul and Sackan, 2007; Bolukbas and Peker, 2017; Masatci and Oktayer Buzluca, 2022a). It should be noted that many external shocks that Türkiye has been exposed to since 2015 have created significant restrictions in terms of fiscal space. Following the first currency shock in 2018, the COVID-19 pandemic in 2020, and the global energy crisis triggered by the Russian-Ukrainian war led to the dominance of fiscal policy. In the study carried out by Masatci and Oktayer Buzluca (2022a; 2022b), the fact that no robust findings were obtained regarding the validity of the R. regime from 2017 to 2019 is also compatible with the current conditions.

The empirical methods applied within the scope of the in this study, considering the soft structural breaks, provided the opportunity to determine the series' stationarity structures and co-integration states. The results obtained in the 1975-2021 period points to the validity of the N.R. regime under the basic FTPL model. On the other hand, the fact that the coefficient of the public domestic debt and public total debts are statistically significant also coincides with the requirements of the theoretical models. The results show that Türkiye’s primary budget surplus did not systematically respond to the public domestic debt obligations in the period examined. On the other hand, the coefficient regarding the public external debt stock was found to be indifferent from zero but statistically insignificant.

In addition, within the framework of Fourier-Todo-Yamamoto causality limitations, a unidirectional causality relationship from primary budget balance to public domestic debt has been determined. Together with the other empirical findings we have obtained, it is possible to evaluate the unidirectional causality within the framework of a kind of N.R. inflation spiral

(Bildirici and Ersin, 2005: 86). Simply, the transmission mechanism works from budget deficits to domestic borrowing and from domestic borrowing to budget deficits. Therefore, while increases in budget deficits lead to an increase in domestic borrowing, increases in domestic borrowing can also lead to increases in budget deficits. Our study differs from previous studies by modeling internal structural breaks in the available long-term data, decomposing public debt according to resource structure, and investigating causal relationships beyond the estimation of co-integration and long-term coefficients.

Our findings are parallel to both previous empirical findings and the economic practices of past periods. Therefore, fiscal policy must be well-thought for Türkiye to ensure price level stability and to return to single-digit inflation levels, which has continued its upward trend since 2018 and reached its peak in 2022. Implementing fiscal consolidation programs to systematically adjust the budget balance against shocks in the public domestic debt stock is essential. On the other hand, expanding the fiscal space and carefully designing discipline-centered fiscal rules that will protect this space against forthcoming risks are necessary. In addition, structural reforms will eliminate the separation of monetary and fiscal policy should be tried to strengthen the harmony between fiscal and monetary policy. In addition, a credible fiscal authority whose boundaries are predetermined within the scope of a reliable program, will positively establish price level stability by creating positive effects in terms of conditional expectations within the framework of FTPL assumptions.

It should be noted that the findings we have obtained are only valid under certain limitations. At the beginning of these restrictions is the a priori acceptance of a linear relationship between the variables. In addition, a suitable control variable to represent the expectations among the dominant determinants in the FTPL has yet to be considered within the scope of the models. Finally, our results are based on a model developed specifically for Turkey, so they are unsuitable for generalization. Consequently, in future studies, it may be interesting to explore the potential results that could be obtained through the implementation of asymmetric empirical methods that separate positive and negative shocks in a series. Again, in terms of future studies, it will provide interesting results in terms of making sense of the implicit causality relations behind the FTPL hypotheses of the research with frequency-domain causality approaches between public liabilities and budget balance. Future studies with these approaches can provide valuable information and contribute to the advancement of research in this area.

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