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SUSTAINABILITY OF FISCAL POLICY: ESTIMATING A FISCAL REACTION FUNCTION FOR TURKEY

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ABSTRACT

In this study a Fiscal policy analysis is used for Turkey between the periods 2006:1-2016:2 to assess the sustainability of fiscal policy. A fiscal reaction function is estimated to analyze the effects of public debt and fluctuations in GDP on the primary balance. The fiscal reaction function is obtained from the intertemporal government budget constraint in order to depict the behaviour of government towards the public debt. The results suggest that the primary budget balance reacts significantly to the previous increase in GDP gap.

Keywords: *Fiscal Policy, Debt Sustainability, Fiscal Reaction Function.*

MALİYE POLİTİKASININ SÜRDÜRÜLEBİLİRLİĞİ: TÜRKİYE İÇİN MALİ TEPKİ FONKSİYONUNUN TAHMİNİ

ÖZET

Bu çalışmada Türkiye'nin maliye politikasının sürdürebilirliğini 2006:1- 2016:2 dönemi için test etmek amacıyla bir maliye politikası analizi kullanılmıştır. Kamu borcunun ve GSYH'deki dalgalanmaların faiz dışı bütçe dengesi üzerindeki etkilerini analiz edebilmek için bir mali reaksiyon fonksiyonu tahmin edilmiştir. Mali reaksiyon fonksiyonu, hükümetin kamu borçlarına olan davranışını analiz edebilmek için hükümetin zamanlar arası bütçe kısıtından elde edilmiştir. Elde edilen sonuçlara göre faiz dışı bütçe dengesi GSYH'deki dalgalanmalara önemli ölçüde tepki göstermektedir.

Anahtar Kelimeler: *Maliye Politikası, Sürdürülebilir Borç, Mali Reaksiyon Fonksiyonu.*

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1. Introduction

Sustainable public debt is an important topic for fiscal policy analysis. Public debt has an increasing trend especially after 1980 for the Turkish economy. Investigating the reaction of Turkish government how has reacted to the past public debt is an essential tool for the sustainability of fiscal policy. A fiscal reaction function is estimated in order to analyze the effects of public debt and fluctuations in GDP on the primary balance.

There is a bulk of literature studying fiscal sustainability. The method checking whether the government satisfies the present value borrowing constraint (Intertemporal Fiscal Constraint) is a popular method. (Stoika & Leonte 2011: 392). According to this approach the value of the government debt is less than or equal the sum of discounted future government surpluses, therefore the Ponzi scheme is eliminated from the government financing (Stoika & Leonte 2011: 392). Hamilton & Flavin (1986), Hakkio & Rush (1991), Quintos (1995) use the present value borrowing constraint method. According to Bohn 2007 testing for debt sustainability is useless since inter temporal budget constraint holds under very weak conditions. And therefore several solvency tests based on specific stationarity and cointegration conditions e.g. Hamilton & Flavin 1986, Trehan & Walsh (1988), Hakkio & Rush (1991), Quintos (1995) become invalid. Bohn (2007) states that, using fiscal reaction functions is "more promising for un derstanding deficit problems." (D'Erasmo et al, 2015: 7).

When the present value of future primary surpluses are equal or more than the current level of debt then fiscal policy satisfies the inter-temporal budget constraint and it is sustainable (Bohn, 1998: 2). Whereas fiscal sustainability brings good administration of public sources, unsustainable fiscal policy has adverse effects on the economy and welfare (Mutuku, 2015: 174). It may result in financial crises, increase in the inflation rate and its volatility, high interest rates, excessive public debt stock and raising the sovereign default (Anca, 2011: 21).

For the Turkish economy there is a bulk of literature in which the sustainability issue is investigated using Hamilton & Flavin (1986), Trehan & Walsh (1988), Hakkio & Rush (1991), Quintos (1995) etc frameworks. Dalgic et al (2014) use Hakkio & Rush framework for the 2006:1-2013:3 period and find evidence of weak sustainability. Weak sustainability is obtained when the cointegration relation is revealed under the condition that long run coefficient is smaller than one. Kustepeli & Onel (2005) employ Hamilton & Flavin framework for the 1970-2003 period and their analysis shows that Turkish fiscal deficits are weakly sustainable. They conduct the empirical analysis with and without structural breaks and reach the same conclusion under both cases. Hepsag (2011) also employs Hamilton & Flawin framework for the period 1990:1-2008:4, and the empirical analysis suggests that fiscal policies are unsustainable under the structural breaks and periodic behaviours. Azgun & Tasdemir (2006) have examined sustainability of budget deficits in Turkish economy with the cointegration tests and found that budget deficits are weakly sustainable for the 1980-2004 period. My approach is different from the most of the literature mentioned above and I follow Bohn (2007) and adopt estimating a fiscal response function method.

Especially after the 2001 financial crises the sustainability of public debt issue gained a lot more attention for Turkish economy. Budina & Wijnbergen (2008) investigates the

fiscal sustainability issue for Turkey after 2001 crisis by extending various approaches and combining them into one model. Their Value at Risk analysis for the period 1990-2004 suggests that considerable risks remain unless necessary fiscal policy tools are implemented. The rest of the paper is organized as follows. Section 2 introduces the model. Section 3 presents the estimation results. Section 4 concludes.

2. Model

Budget constraint of the government (Bohn (1998, 2007), Gali & Perotti (2003), De Mello (2005:10), Burger et al. (2011:6-7):

$$D_t = D_{t-1} + iD_{t-1} - B_t \tag{1}$$

Where *D* denotes public debt, *i* denotes nominal interest rate, **B** denotes primary balance (+ surplus, - deficit).

$$\Delta(D/Y)_t = ((r-g)/(1+g))(D/Y)_{t-1} - (B/Y)_t \tag{2}$$

Equation (2) is obtained from Equation (1). Time subscripts for *r* and *g* are omitted. Where *r* denotes real interest rate, *g* denotes real economic growth rate, *Y* denotes nominal GDP. From Equation (2) we can obtain the expression.

$$(B/Y)_t = ((r-g)/(1+g))(D/Y)_{t-1} \tag{3}$$

As noted in Burger et al. (2011:7), Equation (3) can be interpreted as a fiscal rule, the rule defines the primary balance/GDP ratio required to keep a debt/GDP target. We can estimate a fiscal reaction function:

$$(B/Y)_t = \beta(D/Y)_{t-1} + \in_t \tag{4}$$

As (De Mello 2005:10) suggests we can add a lag of the primary balance, $(B/Y)_{t-1}$ to the right-hand side of Equation (4). Following Bohn (1998:951); De Mello (2005:10); and Taylor (2000) we can also add the lag of output gap $\hat{y}_{t-1}$ to the right-hand side of Equation (4) as a control variable. Then a fiscal reaction function can be given as:

$$(B/Y)_t = \beta_1 + \beta_2(B/Y)_{t-1} + \beta_3(D/Y)_{t-1} + \beta_4\hat{y}_t + \in_t \tag{5}$$

Table 1: ADF Test Results for the Variables in Equation (5)

	Test Statistic	Conclusion
B / Y (Primary Balance / GDP)	-6.023*	Series is Stationary
D / Y (Debt / GDP)	-2.781***	Series is Stationary
$\hat{y}$ (Output Gap)	-4.986*	Series is Stationary

Note:* stands for 99% significance level, *** stands for 90% significance level.

Table 2: Estimation of Equation (5)

	Estimated coefficient	t statistics
β_1 (constant)	0.0265	1.04
$\beta_2 (B/Y)_{t-1}$	-0.0217	-0.14
$\beta_3 (D/Y)_{t-1}$	-0.0203	-1.26
$\beta_4 (\hat{y}_{t-1})$	-0.0218	-2.26
R-squared	0.15	

3. Estimation Results

Before the estimation, the stationarity of the variables in the regression is tested by using the Augmented Dickey Fuller (ADF) test. Table (1) presents the Augmented Dickey Fuller (ADF) test results. The test confirms the stationarity of the variables in the Equation (5). Equation (5) is estimated by OLS for the Turkish economy for the periods 2006:1-2016:2. The data is obtained from Turkish Central Bank Electronic Data Distribution System. Figure (1) shows debt/GDP ratio. Output gap is estimated as the percentage deviation of the actual real GDP from the potential GDP where potential GDP is obtained as the trend using the Hodrick-Prescott Filter by taking the smoothing parameter as 19. Alp et al. predict Hodrick-Prescott smoothing parameter for the Turkish economy using 1987-2007 quarterly real GDP data and they got the two parameters 98 and 19 using two different methods. Figure (2) depicts the estimated output gap.

4. Conclusion

As discussed in the introduction part of this paper Bohn (2007) suggests to use fiscal policy approach. In this paper a fiscal reaction function is estimated for the Turkish economy covering the periods 2006:1-2016:2 using OLS. Public debt affect fiscal policy in a statistically insignificant way. Therefore a firm conclusion cannot be reached about the sustainability of the fiscal policy. However business cycle affects fiscal policy in a statistically significant way.

Figure 2: Output Gap

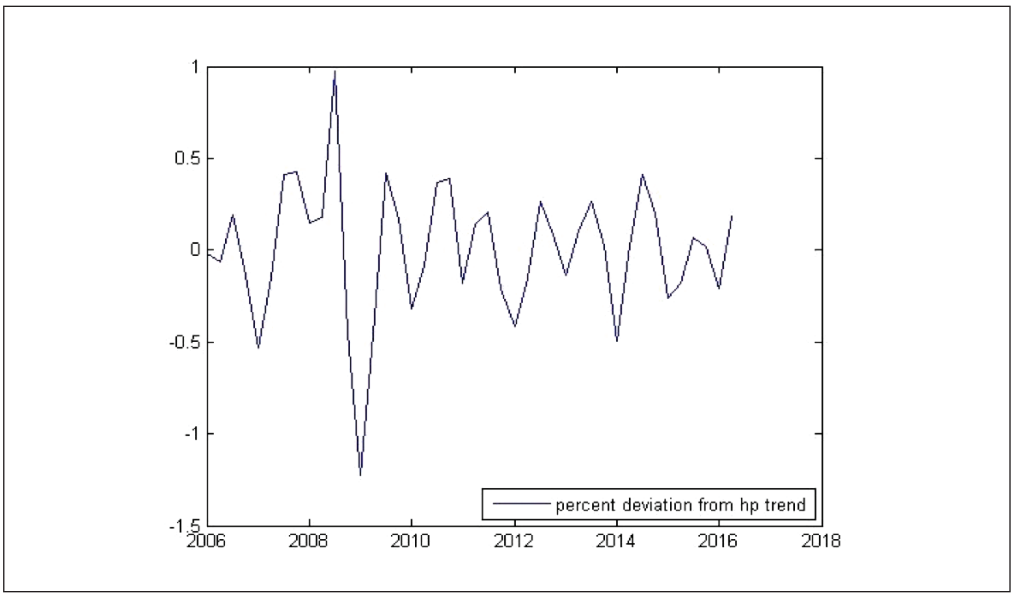
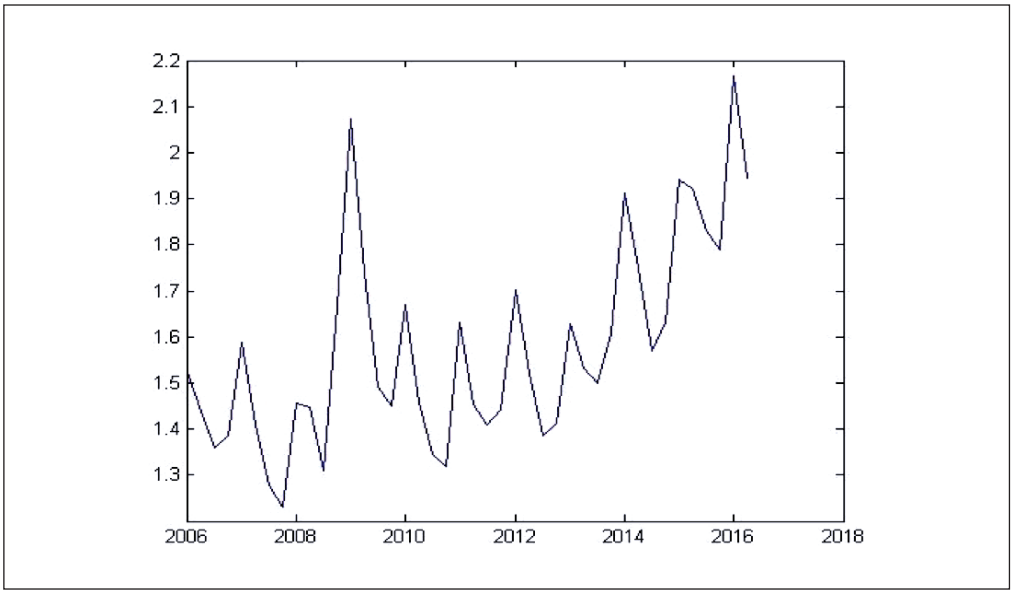


Figure 1: Debt/GDP Ratio



References

Alp, H., Başkaya, Y. S., Kılınç, M., & Yüksel, C. (2011). Estimating optimal Hodrick-Prescott Filter smoothing parameter for Turkey. *İktisat, İşletme ve Finans*, 26, 9-23.

Anca, R. (2011). How to assess public debt sustainability: Empirical evidence for the advanced European countries. *Romania Journal of Fiscal Policy*, 2(2), 20-43.

Azgün, S., & Taşdemir, M. (2006). Bütçe açıklarının sürdürülebilirliği: Zamanlararası borçlanma kısıtının testi (1980-2004). *Atatürk Üniversitesi İİBF Dergisi*, 20 (2), 35-47.

Bohn, H. (1998). The Behaviour of U. S. Public Debt and Deficits. *The Quarterly Journal of Economics*, 113(3):949-963.

Bohn, H. (2007). Are stationarity and cointegration restrictions really necessary for the intertemporal budget constraint?. *Journal of Monetary Economics*, 54: 1837-1847.

Budina N., & Wijnbergen S.V. (2009). Quantitative approaches to fiscal sustainability analysis: A case study of Turkey since the crisis of 2001. *The World Bank Economic Review,* 23(1), 119-140.

Burger, P., Stuart, I., Jooste, C., & Cuevas, A. (2011). Fiscal sustainability and the fiscal reaction function for South Africa. *IMF Working paper*.

Dalgiç, B., İyidoğan, P.V., & Balıkçıoğlu, E. (2014). Sustainability of Fiscal policy: An empirical examination for Turkish economy. *Journal of Business Economics and Finance,* 3, 13-137.

D'Erasmo, P., Mendoza, E.G., & Zhang, J. (2015).What is a sustainable public debt? *NBER Working Paper,* No: 21574.

De Mello, L. (2005). Estimating a fiscal reaction function: The case of debt sustainability in Brazil. *OECD Economics Department Working Paper* No. 423. OECD, Paris.

Gali, J., & Perotti, R. (2003). Fiscal policy and monetary integration in Europe. *CEPR Discussion Paper,* No. 3933, Centre for Economic Policy Research, London.

Hakkio, C., & Rush, M. (1991). Is the budget deficit too large?. *Economic Inquiry*, 29(3): 429-446.

Hamilton, J.D., & Flavin, M. A. (1986). On the limitations of government borrowing: A framework for empirical testing. *American Economic Review*, 808-816.

Hepsağ, A. (2011). Mali politikaların sürdürülebilirliğinin yapısal kırılmalı periyodik birim kök testi ile analizi: Türkiye örneği. *Doğuş Üniversitesi Dergisi*, 12(1), 32-45.

Kuştepeli, Y., & Önel, G. (2005). Fiscal deficit sustaianbility with a structural break: An application to Turkey. *Review of Social, Economic and Business Studies*, 5(6), 189-208.

Mutuku, C. (2015). Assessing fiscal policy cyclicality and sustainability: A fiscal reaction function for Kenya. *Journal of Economics Library*, 2(3), 173-191.

Quintos, C. (1995). Sustainability of the deficit process with structural shifts. *Journal of Business & Economic Statistics*, 13(4): 409-417.

Stoica, T., & Leonte, A. (2011). *Estimating a fiscal reaction function for Greece,* International Conference on Financial Management and Economics IPEDR vol.11.

Taylor, J. B. (2000). Reassessing discretionary fiscal policy. *Journal of Economic Perspectives,* 14(3), 21-36.

Trehan, B., & Walsh, C. E. (1988). Common trends, intertemporal budget balance, and revenue smoothing. *Journal of Economic Dynamics and Control,* 12 (JuneSeptember), 425-444.