



The behavior of Turkish exchange rates: A panel data perspective



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ABSTRACT

This paper investigates the behavior of Turkish exchange rates within the context of purchasing power parity (PPP) hypothesis by means of recent developments in the panel unit root testing procedures for ten Turkish real exchange rates during January 2002–May 2012. The unit root test which accounts for nonlinearity, smooth structural shifts, and cross-section dependency supports that PPP hypothesis holds for Eurozone and European countries (Denmark, Norway, Sweden, Switzerland, and United Kingdom), while it does not hold for non-European trading partners (Canada, Japan, Saudi Arabia, and USA). From the empirical results, we can conclude that PPP hypothesis holds in the countries which have the free trade agreement, while it is violated in the countries in which there are trade barriers and greater distance. The findings therefore provide policy implications for Turkey in determining equilibrium exchange rates with her major trading partners.

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1. Introduction

Turkey as an emerging country and one of the fastest growing economies during the last decade has been implementing the trade-oriented growth model since 1980. The exchange rate policy in that respect is at the center of trade and monetary policies. After the eruption of the 2001 crisis, Turkey shifted from pegged to flexible exchange rate system and hence the behavior of Turkish lira has attracted a great deal of attention in recent years. Thereby determining the behavior of exchange rates would provide important information for better understanding of the dynamics of Turkish lira and is also crucial for designing sound monetary policy for macroeconomic stability.

With respect to the behavior of exchange rates, the prominent theory is purchasing power parity (PPP) hypothesis. The hypothesis implies that exchange rates adjust to their equilibrium values until purchasing power discrepancy across countries disappears. The PPP hypothesis is based on the “law of one price” which means that in the absence of transportation and transaction costs, the price of an identical good in two countries will be same when the prices are expressed in the same currency. PPP hypothesis means that exchange rates between two countries change according to relative prices so they show a mean

reverting (stationary) process. Given the importance of PPP hypothesis in open economy macroeconomics and for constructing fundamental equilibrium exchange rates, long-run PPP relationship is of great importance for academicians and policy makers (Cerrato and Sarantis, 2007). The common approach in examining PPP hypothesis is to carry out unit root analysis on real exchange series to determine whether or not real exchange rates are mean reverting. The stationary real exchange rates provide evidence in favor of PPP hypothesis (see Rogoff, 1996; Sarno and Taylor, 2002; Taylor, 2003).

The literature on the behavior of Turkish real exchange rates shows that there is no consensus whether PPP hypothesis holds.⁴ On the one hand, some studies find evidence on the validity of PPP hypothesis (Erlat, 2003; Guloglu et al., 2011; Kalyoncu, 2009; Sarno, 2000; Yazgan, 2003). On the other hand, some studies find out the lack of PPP hypothesis (Doganlar et al., 2009; Erlat and Ozdemir, 2003; Telatar and Kazdagli, 1998). The controversy in the literature can be attributed to two reasons. First, the results from the empirical studies differ based on time period and data frequency. For instance, Telatar and Kazdagli (1998) reject PPP hypothesis for the period 1980–1993 with monthly data; Kalyoncu (2009) supports the hypothesis employing quarterly data for 1980–2005. Second, the difference in empirical evidence is based on empirical methods which have different assumptions regarding data generating process of the exchange rates. In the panel data studies, Erlat and Ozdemir (2003) rely on the panel unit root test that takes into account dependency across series. In a recent study,

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⁴ The literature on Turkey with respect to data, method, and findings is summarized in appendix.

Guloglu et al. (2011) utilize panel unit root approach controlling for structural shifts. The lack of consensus on the validity of PPP hypothesis provides a room to analyze the behavior of Turkish exchange rates within the context of recent developments in unit root tests which assume different generating process. By employing a different unit root testing approach, this paper tries to extend the recent discussion on whether shocks to Turkish exchange rates are permanent or transitory. This study contributes to the literature by providing new information regarding the nature of the dynamics in Turkish exchange rates.

This paper examines the behavior of Turkish exchange rates within the context of PPP hypothesis for ten Turkish real exchange rates during the period January 2002–March 2012. In the empirical analysis, we follow a systematic modeling approach within the panel data framework. First, we conduct a preliminary analysis which includes testing cross-section dependency, nonlinearity, and structural shifts. Second, we focus on employing an appropriate panel unit root test which is able to take information into account provided by the preliminary analysis. Accordingly, we employ the sequential panel selection method (SPSM) along with Panel KSS unit root tests with a Fourier function. The results support the validity of PPP hypothesis in Eurozone and five European countries (United Kingdom, Switzerland, Norway, Denmark, Sweden), although PPP hypothesis is not valid for four countries (Saudi Arabia, Canada, Japan, and USA).

In our modeling approach, nonlinearity in exchange rates is captured by the nonlinear panel unit root test proposed by Ucar and Omay (2009); structural shifts are modeled as gradual adjustment; and finally cross-section dependency is taken into account by means of bootstrap distribution. Furthermore, the unit root strategy employed here classifies the whole panel into a group of stationary series and a group of non-stationary series.

The rest of the paper is organized as follows: The developments in Turkish exchange rates policy are summarized in Section 2. In Section 3, we concentrate on modeling issues in PPP hypothesis which provides the background of this paper. The empirical framework is outlined in Section 4 and the findings are discussed in Section 5. Finally, brief summary and policy discussion are provided in Section 6.

2. Turkish exchange rate policy: a brief overview

With the implementation of the trade-oriented growth strategy since 1980, Turkey has assigned a crucial role to the exchange rate policy. From 1980 to early 2000s, Turkey adopted fixed exchange rate regime and shifted from pegged exchange rate regime to flexible exchange rate system after the eruption of the 2001 economic crisis. The trade dynamics and exchange rate policy developments in Turkish economy during recent years show a positive relation between floating exchange rates and an increase in exports (Nazlioglu, 2013).

It seems that the changes in Turkey's exchange rate policy are in line with the developments in the macro-economy. A fixed exchange rate regime was adopted before 1980 by adjusting the value of Turkish lira according to changes in economic condition. After implementation of the outward-oriented growth strategy in 1980, adjustable peg policy was followed in order to maintain the trade-oriented growth model. During 1980–1988, Turkish lira was daily adjusted and consequently it devaluated more than 8% in real terms. In 1989, the government decided to put into effect the partial official exchange rate system and allow the free capital movements along with higher interest rates and convertible Turkish lira. These structural shifts led to the appreciation of the Turkish lira.⁵

The 1994 crisis – one of the major economic crises in Turkey – led the government to put into effect the stabilization and economic rescue programs in cooperation with the International Monetary Fund (IMF).

⁵ An interested reader is referred to Asikoglu and Uctum (1992) for a broad overview of Turkish exchange rate policies during the 1980–1990 and to CBRT (2002) for an overview of the liberalization process.

In this respect, Turkish lira was considerably devaluated by 39%. The 1999 stabilization program guided by the IMF to decrease inflation and real interest rates and to provide a stable macroeconomic environment was essentially designed based on exchange rate policy. It depended on announcing value of exchange rate basket for first one and a half year period (Central Bank of the Republic of Turkey (CBRT), 2002).

In February 2001, Turkey experienced the most destructive economic crisis since 1945 and in the aftermath of the crisis, the CBRT decided to implement floating exchange rate regime and the value of Turkish lira was essentially left to market forces. However, it is worthwhile emphasizing that the Turkish central bank intervenes in exchange rate markets when Turkish lira is dramatically depreciated against the dollar and euro. The global financial crisis in 2008 led to a considerable depreciation of the Turkish lira and thereby the CBRT launched the monetary expansion process in November 2008. After the global financial crisis, even though the CBRT continues to implement floating exchange rate regime, changes in the real effective exchange rate indices are closely monitored and policy measures are taken in order to maintain financial stability.⁶

3. Background

The definition of PPP hypothesis by Cassel (1918) postulates that real exchange rates are mean reverting around a constant term. Even though this definition requires only a constant term in an estimated model, a deterministic trend term can also be introduced to take into account high levels of productivity growth shown by the countries. The so-called “trend PPP” concept described by Balassa (1964) and Samuelson (1964) therefore entails a stationary real exchange rate series that has a linear time trend in addition to the constant term. Structural breaks in constant and time trend are usually considered as evidence of why PPP hypothesis does not hold. If structural breaks are ignored in testing for PPP, a stationary real exchange rate could not necessarily imply evidence of PPP hypothesis (Erlat, 2003). The presence of one structural break in level of the real exchange rate is first considered in Dornbusch and Vogelsang (1991). While examining PPP hypothesis around structural breaks in constant term has been called “qualified PPP” by Dornbusch and Vogelsang (1991), it has been defined as “quasi PPP” by Hegwood and Papell (1998), Papell (2002), and Papell and Prodan (2006). The case of which real exchange rate is stationary around a linear time trend with structural shifts can be denoted as “trend qualified PPP” or “trend quasi PPP” (Basher and Carrion-i-Silvestre, 2009).

The literature on PPP hypothesis shows that some important issues are still remaining. First, univariate time series unit root tests have low power and therefore more recent studies have paid attention to panel unit root tests because panel data methods increase power of tests (for example, Papell, 1997; Cerrato and Sarantis, 2002; Choi, 2001; Erlat and Ozdemir, 2003; Wu et al., 2004; Baharumshah et al., 2007). Second, there is a growing consensus on that real exchange rate series exhibit nonlinearity (asymmetry) and therefore unit root tests which are not able to control for this feature may have low power. As extensively discussed in Chinn (1991), nonlinear behavior of exchange rates can be attributed to regime changes, greater trade barriers, tighter currency bands, and shocks causing high volatility in exchange rates. Third, it is important to consider impact of possible structural breaks in real exchange rate series since changes in economic structure and conditions result in structural policy shifts. Omission of structural breaks in data can result in bias towards non-stationarity conclusion (Perron, 1989). As shown in Papell (2002), structural breaks in real exchange series can play an important role in appropriately analyzing whether or not PPP hypothesis holds. Fourth, dependency across exchange rates has triggered great interest in empirical analysis. The dependency can

⁶ See CBRT (2009) for the general framework of the monetary and exchange rate policy.

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