



Estimating inflation compensation for Turkey using yield curves[☆]

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ABSTRACT

Inflation compensation derived from nominal and real bond yields contains market based, real time information regarding the inflation expectations and the pricing of inflation risks. In this study, we calculate inflation compensation for Turkey by using nominal and real yield curves. The findings of event study analysis on inflation compensation indicate that changes in the term structure of inflation compensation contain information regarding the credibility of monetary authority. Moreover, we find that, at daily frequency, liquidity conditions have no significant effect on inflation compensation and hence the effects of events such as monetary policy decisions and inflation surprises on inflation compensation can be attributed mainly to changes in inflation expectations and pricing of inflation uncertainty.

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1. Introduction

Acquiring accurate information regarding inflation expectations is important for economic agents in order to make healthy consumption and investment decisions. Surveys are the main sources of information regarding inflation expectations. However, using survey data has some disadvantages since the number of participants of a survey is limited and there is no penalty for incorrect responses. On the other hand, deriving inflation compensation directly from financial market data overcomes such problems and can be considered as an alternative indicator of inflation expectations because it is calculated by using the yields of conventional¹ and inflation-indexed bonds traded in markets and contains market-based information regarding future inflation.

In this study, we aim to derive an indicator of inflation expectations of market participants by using yield curves fitted to conventional and inflation-indexed bonds issued by the Turkish Treasury and traded on the Istanbul Stock Exchange (ISE).² In this context,

firstly, inflation-indexed bond markets in Turkey and in the world are introduced and real yield curves are estimated using Turkish data. Then, the concept of inflation compensation is defined and it is calculated for different maturities by using yield curves. Next, data on inflation expectations obtained from the Central Bank of Turkey's (CBT) Survey of Expectations are compared with inflation compensation calculated using yield curves. Finally, liquidity effects on inflation compensation are examined and event studies to investigate the effects of inflation surprises and monetary policy on inflation compensation are carried out.

2. Inflation-indexed bond market in Turkey

The Turkish Treasury has started issuing exchange-traded inflation-indexed bonds in February 2007. Inflation-indexed bonds are issued for 5 or 10 year maturities with semiannual coupon payments. Principal and coupon payments of these bonds are protected against inflation. The calculation of inflation premium in principal and coupon payments is based on Consumer Price Index (CPI) data announced by the TurkStat.³

Real yields on nominal (conventional) bonds decline in case of unanticipated increases in inflation whereas inflation-indexed bonds guarantee the real yields and protect the investors from inflation. In other words, real yield on an inflation-indexed bond does not decline with inflation. Therefore, investors prefer these securities since they provide predictable returns which are unresponsive to changes in inflation.

Issuance of inflation-indexed bonds enables the CBT to extract information regarding the term structure of real yields and hence the

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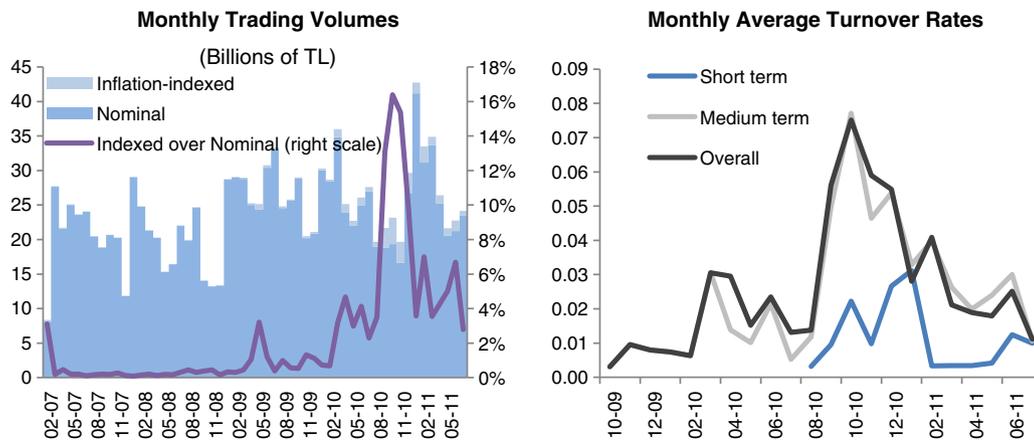
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¹ We use the words "conventional bond" and "nominal bond" interchangeably throughout the text.

² Nominal bond markets are more developed than real bond markets in Turkey and knowledge regarding inflation-indexed bonds is limited due to the fact that these bonds were introduced recently in Turkey. Detailed information on the estimation of the nominal yield curves can be found in Akinci et al. (2007). Hence, in this study, we emphasize more on inflation-indexed bonds and estimation of real yield curves than nominal ones.

³ For detailed information regarding inflation-indexed bonds market in Turkey, please see Treasury of Turkey (2009).



* Bonds with maturity less than 1.5 years are classified as short term and those with maturity 1.5 to 5 years are classified as medium term.
Source: ISE.

Chart 1. Liquidity of inflation-indexed bonds (monthly average turnover rate of a bond is calculated as the ratio of total monthly trading volume of the bond to its outstanding amount).

term structure of inflation expectations. In addition to this, issuance of inflation-indexed bonds contributes to the diversification of treasury debt securities, broadening the investor base and extending the maturity of treasury debt (Treasury of Turkey, 2009). In fact, nominal amount of inflation-indexed bonds issued by the Turkish Treasury has reached to almost 63 billion TL as of August 2011.

Trading volume of inflation-indexed bonds on the ISE was limited in the first three years but started to rise afterwards. Recently it is around 5% of the trading volume of the overall bond market on the ISE (Chart 1, left panel).

We think that one of the reasons behind the rise in the trading volume of inflation-indexed bonds in 2010 may be the increase in the supply of inflation-indexed bonds in that period. Newly issued 5 and 10 year inflation-indexed bonds along with existing ones filled the term space of inflation-indexed bonds to some extent. This resulted in more options on investment horizons and has contributed to the increase in trading volume of inflation-indexed bonds.

The rising trend in the trading volume of inflation-indexed bonds implies that the liquidity of these bonds is also improving. Monthly trading volumes of inflation-indexed bonds were less than 0.1% of the nominal value of their outstanding amount before 2010. With the help of new issuances and longer maturities, monthly turnover rate of inflation-indexed bonds has increased and reached to 7.5% in 2010 (Chart 1, right panel).

Although the trading volume of inflation indexed bonds is increasing, their liquidity is still far from being level with that of the nominal bonds. Therefore, there may be an additional liquidity premium in the yields of inflation-indexed bonds.

3. Inflation-indexed bond markets in the world

Inflation-indexed bonds are more preferable for emerging countries than for advanced economies since their main features (extending the maturity of treasury debt, diversification of debt instruments, eliminating inflation risk for investors) are more valuable for treasury departments of emerging countries. Therefore, these markets are more widespread in emerging countries (Chart 2). In particular, inflation-indexed bonds constitute very large portions of the overall bond markets in Israel and in some Latin American countries. On the contrary, these instruments are less widespread in advanced economies and Eastern European countries. When it comes to Turkey, amount of inflation-indexed bonds is increasing relative to other emerging countries.

4. Inflation-indexed bonds and real yield curve

Issuance of inflation-indexed bonds enables the measurement of market expectations regarding the real interest rates. In this study, we estimate the real yield curve using inflation-indexed bond data. Estimation is based on the prices of inflation-indexed bonds with different maturities, that are traded in the secondary market.

The most conventional methods of yield curve fitting suggested in the related literature are Nelson–Siegel (NS), Svensson (Extended Nelson–Siegel) and non-parametric spline function methods.⁴ Spline methods fit the observations very well but are very vulnerable to outliers. Parametric methods such as NS and Svensson enable estimation of yield curves which fit a prespecified functional form instead of concentrating on fitting every single point. This makes the yield curves smoother and rules out specific factors affecting the individual securities (Gürkaynak et al., 2010b). In this study, we prefer parametric methods which are more suitable to macroeconomic policy analysis and estimate the real yield curve by the NS method.

Our yield curve estimations are based on minimizing the difference between observed prices and yield curve implied prices similar to the approach adopted by Akıncı et al. (2007) for the nominal yield curve. Estimated real yield curve plots real yields on zero-coupon bonds for different maturities. Prices of inflation-indexed bonds whose value dates are the same day are obtained from the ISE daily bond market bulletins. Real yield curve estimations are performed by using these data.⁵

The NS method involves the estimation of 4 parameters and this requires observing the prices of at least 4 different bonds. In Turkey, the fourth inflation-indexed bond was issued in October 2009, therefore real yield curves can be estimated after that date.⁶ Time plots of 1, 2, 3 and 4-year real yields estimated by the NS method are illustrated in Chart 3.

⁴ For more detailed information regarding the yield curve fitting methods used by various central banks, please see BIS (2005).

⁵ For more detailed information regarding the data that are suitable for yield curve estimation in Turkey, please see Akıncı et al. (2007).

⁶ Having four different inflation-indexed bonds does not guarantee the estimation of real yield curve. In any day at least four different inflation-indexed bonds must be traded in the bond market so that there exist four different prices for four different maturities. Only then the NS method can be used. In some dates after October 2009, there were adequate numbers of different inflation-indexed bonds outstanding but inadequate number of prices because some of the inflation-indexed bonds were not traded in the markets that day. So real yield curves could not be estimated for those dates.

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