



ELSEVIER

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

SCIENCE @ DIRECT®

Physica A 350 (2005) 418–426

PHYSICA A

[www.elsevier.com/locate/physa](http://www.elsevier.com/locate/physa)

# The long-range dependence behavior of the term structure of interest rates in Japan

Benjamin M. Tabak<sup>a</sup>, Daniel O. Cajueiro<sup>b,\*</sup>

<sup>a</sup>*Banco Central do Brasil, SBS Quadra 3, Bloco B, 9 andar, DF 70074-900, Brazil*

<sup>b</sup>*Universidade Católica de Brasília-Mestrado em Economia de Empresas, SGAN 916, Módulo B-Asa Norte, DF 70790-160, Brazil*

Received 7 October 2004; received in revised form 12 November 2004

Available online 18 December 2004

---

## Abstract

This paper presents an empirical evidence suggesting that Japanese interest rates for different maturities possess long-range dependence in both mean and volatility. For long-term bonds, predictability in the term structure of interest rates increases with maturity, suggesting that there exists a term premium. Furthermore, the dynamics of short-term interest rates (6 months) is very different from longer term bonds, as the former are anti-persistent, which implies that the zero-interest rate policy is perceived to be temporary.

© 2004 Elsevier B.V. All rights reserved.

PACS: 05.45. Df; 05.45. Tp

Keywords: Emerging markets; Hurst exponent; GARCH; Long-range dependence

---

## 1. Introduction

This study investigates the presence of long-range dependence in a variety of Japanese interest rates (6 months to 20-year maturity interest rates) from the beginning of 1992 to July, 2004. In general, the analysis of persistence in interest

---

\*Corresponding author.

E-mail address: [danoc@pos.ucb.br](mailto:danoc@pos.ucb.br) (D.O. Cajueiro).

rates is a fundamental question in macroeconomics and finance. For example, in macroeconomics, since monetary policy is implemented through the setting of short-term interest, interest rates are crucial to the conduction of monetary policy in most countries. On the other hand, in finance, since most portfolio models include interest rate as a fundamental parameter, interest rate movements are essential to make investment decisions.

This research is particularly interesting for the Japanese economy since during the time span of this research, interest rates have been the main instruments to stimulate the economy recovery. To be more precise, it is interesting to review briefly some important facts that happened in this period in the Japanese Economy.<sup>1</sup> In the beginning of 1990, the Japanese economy went to a recession after the bubble burst that occurred in January, 1990.<sup>2</sup> Since then, the Japanese Central Bank has put into operation several efforts to recover the economy. In 1991, the official discount rate was dropped from 6.0 to 5.5% and continued falling until reaching the value of 0.5% on September 8, 1995. Weak recovery of the economy made the Japanese Central Bank to implement a zero interest policy from February 12, 1999. This policy was abandoned on August 11, 2002. Actually, this kind of policy is very restrictive, since the central bank is not able anymore to stimulate the economy via the nominal interest rate setting (this phenomena is called *liquidity trap*).

In this context, this paper studies the long-range dependence behavior of the term structure of interest rates in Japan. Using the local Whittle method due to [6] as our measure of long-range dependence, we have found a very interesting pattern regarding the long-range dependence behavior of the term structure of interest rates in Japan which was not presented in the literature yet.

Actually, while the presence of long-range dependence in equity asset returns seems to be a stylized fact,<sup>3</sup> only few papers have provided empirical evidence of long-range dependence in interest rates. The first to consider the existence of long memory in interest rates seems to be Backus and Zin (1993) [1] who found evidence of long memory in the 3-month zero-coupon rate for the US, and that allowing for long memory in the short interest rate improves the fitted mean and volatility yield curves. Since then, others have supported Backus and Zin's results, see for example Refs. [2,3,8].

This paper proceeds as follows. In Section 2, the local Whittle method which is our measure of long range is reviewed. In Section 3, the data are described. In Section 4, the results of this paper are presented. Finally, in Section 5, this paper is concluded.

## 2. The local Whittle estimator

In this paper, the local Whittle estimator due to Ref. [6] is used to provide Hurst's exponent  $H$ .

---

<sup>1</sup>A more detailed description of the Japanese economy in this period may be found in Ref. [5].

<sup>2</sup>The Nikkei average recorded its highest-ever value (38,916 yen) in December, 1989.

<sup>3</sup>For details, see Ref. [4].

Download English Version:

<https://daneshyari.com/en/article/9727816>

Download Persian Version:

<https://daneshyari.com/article/9727816>

[Daneshyari.com](https://daneshyari.com)