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Long-term fixed income market structure

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Abstract

Long-term fixed income market securities present a strong positive correlation in daily returns. By using a metrical approach and considering "modified" time series, I show how it is possible to show a more complex structure which depends strictly on the maturity date.
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PACS: 05.45.Tp

Keywords: Fixed income; Clustering

1. Introduction

Fixed-income market securities seem to move in a very homogeneous way as shown, for instance, in [2]. This is not surprising because the prices must follow common market laws dictated by macroeconomic variables. As a consequence data present a strong positive correlation among bonds. In [2] we have seen the presence of a cluster structure which depends strongly on the maturity of bonds.

We have found that there are essentially three distinct clusters, one of them is composed exclusively of 29 "long-term" bonds, which is very compact (the maximum diameter D is equal to 0.2077) meaning that the correlation among the corresponding fixed income securities is very strong.

The paper shows how, by using a different approach, also for elements of the long-term bonds cluster, it is possible to show a more complex structure. I analyzed a data set of 100 US Treasury notes and bonds in the period between 30/01/97 and 28/09/99 (694 daily prices).

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2. The "modified" time series

Since price fluctuations are very small and correlation among bonds is quite positively high, if one focuses on returns, the behavior of two different time series is almost indistinguishable (see Figs. 1 and 2).

In order to introduce a more complex structure I consider a new time series that is a sort of "detrend" time series. Since time series of daily returns are very similar, the
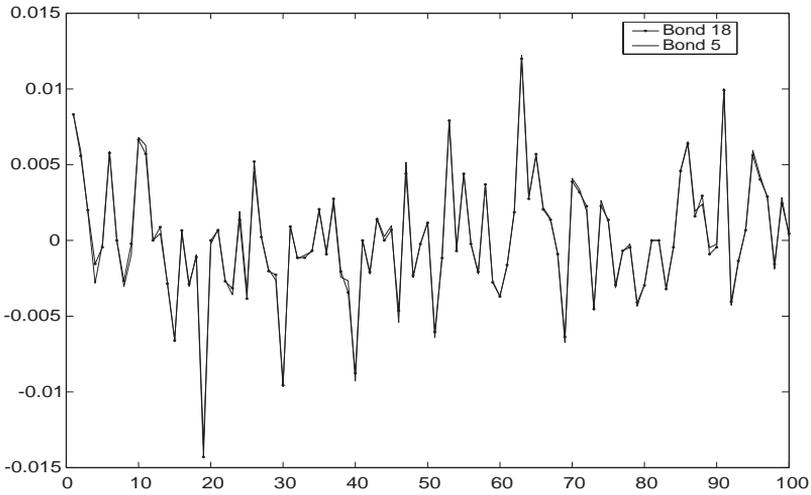

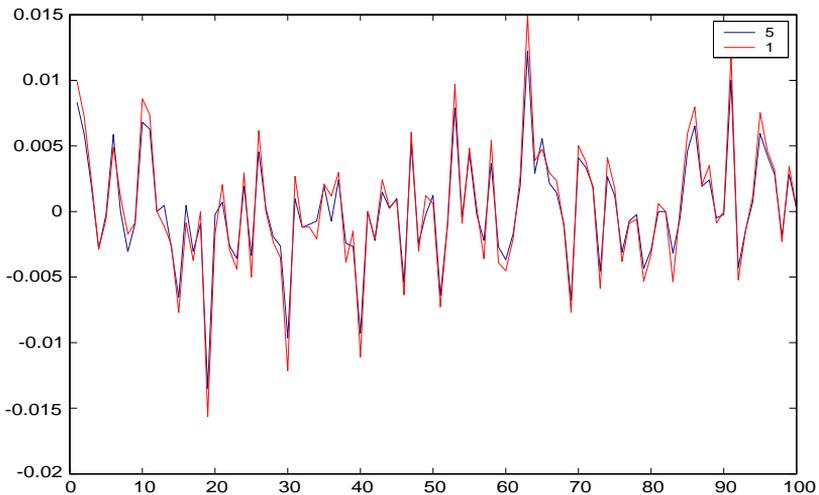Fig. 1. Daily returns time series (100 observations). The two time series are almost indistinguishable.

Fig. 2. Daily returns time series (100 observations). The two time series are almost indistinguishable.