

## Response to Reviewers

### **Compliance to Reviewer #1**

#### Reviewer's comment:

1. *“Nevertheless, EMDs have not to date been used to study the behaviour of stock prices.” Apparently, there are some recent studies on stock indices (not prices) using EMD as the first stage for forecasting (hybrid models). Could they eventually be related to this study, at least on the EMD stage? Some examples are (but not limited to) below:*

*Response: Dear reviewer we thank and appreciate this point. We have incorporated these citations.*

2. *“Our analysis is based on a historical data set of US stock prices. The monthly data on the S&P 500, covering the period 1791:08 to 2015:05 was obtained from the Global Financial Database (GFD).”*

*Response: The data is indeed from the Global Financial Database. The link that the referee is referring to is the weblink where the journal hosts the data, i.e., Dataverse. It is not the source of the data.*

*Please see here:*

*Data Set*

*Data sets for articles published in "Economics" are available at Dataverse. Please have a look at our repository.*

*The data set for this article can be found at:*  
<http://dx.doi.org/10.7910/DVN/FZUODM>

*Also, the data does start from 1791, as should be evident from the attached excel file when the data was downloaded from Global Financial Database, and then updated using the closing prices of SP500 from the FRED database of the St. Louis Fed, since our subscription for Global Financial Database ended in 2014.*

3. *“The subsamples were identified by applying the Bai and Perron (2003) test of structural breaks in both mean and trend to the natural logarithms of the S&P 500 stock index”. Is there any output available from Bai-Perron Test including F-Statistics and break dates (eventually also global break points)?*

*Response: Two breaks detected based on the powerful WDMAX test as indicated below.*

*Multiple breakpoint tests*

*Bai-Perron tests of 1 to M globally determined breaks*

*Sample: 1791M08 2015M05*

Included observations: 2686

Breakpoint variables: C @TREND

Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

Sequential F-statistic determined breaks: 5  
Significant F-statistic largest breaks: 5  
UDmax determined breaks: 1  
WDmax determined breaks: 2

Breaks	Scaled F-statistic	Weighted F-statistic	Critical F-statistic	Value
1 *	8943.155	17886.31	17886.31	11.47
2 *	8697.869	17395.74	20464.52	9.75
3 *	6925.407	13850.81	19003.45	8.36
4 *	5460.844	10921.69	17423.06	7.19
5 *	4422.842	8845.684	17343.59	5.85

UDMax statistic\* 17886.31 UDMax critical value\*\* 11.70

WDMax statistic\* 20464.52 WDMax critical value\*\* 12.81

\* Significant at the 0.05 level.

\*\* Bai-Perron (Econometric Journal, 2003) critical values.

Estimated break dates:

1: 1944M06

2: 1863M01, 1940M05

3: 1863M01, 1940M05, 1973M11

4: 1863M01, 1900M11, 1940M05, 1973M11

5: 1829M07, 1863M01, 1900M11, 1940M05, 1973M11

4. "Since the continuing increasing trend of the US stock market is consistent with the development of the US economy over the decades, it can be said that the long-term price behaviour of US stocks has been determined by the long-term growth of the US"  
Is this the first finding explaining the relationship or the causality between economic growth and long term price behavior?
- If not, then citation is needed.
  - If yes, then this hypothesis should be investigated and tested under different multivariate time series approaches (ie. Vector AutoRegressive Regression or similar techniques). Moreover, the selection of the growth indicator for the RHS of the time series equation is also an important issue (eg. GDP is generally lagged by 3 months).

*Response: We introduced a small write up in the introduction section mentioning how based on “supply side” models long term real growth and stock prices could be related. We also have incorporated a citation **MSCI (2010)** to support it.*

5. *“Therefore, it is concluded that, in general, US stock prices are not driven by the short-term irrational behaviour of investors, but seem to be driven mostly by fundamentals; though, it is true that there have been episodes of bubbles, as indicated by Phillips et al. (2015)”*

*Does this conclusion support any existing related work? Once again, the hypothesis should either be supported by citations or additional analysis in order to reach this general outcome.*

*Response: We have incorporated citation **Heaton and Lucas (2000)** to support it.*

In addition to these comments we have incorporated a section on the usefulness of EMDs relative to wavelets in the introduction part. Further, objective was clearly defined. We are thankful to the anonymous referee for highlighting the critical issues without which this paper would have been flawed.

Thanks.....