PrimeFish

Horizon 2020 Programme

IFET 2016 SCOTLAND

IDENTIFYING “BOOM AND BUST” CYCLES

Cristina Mora, Gianluca Morelli, Giovanni Sogari, Marco Riani, Fabrizio Laurini – University of Parma (Ref. 0531)

Index

- Introduction
- Definition of Trend, cycle, seasonality and B&B
- Data and Data Sources needed
- Metodology for B&B
- Testing the MatLab code
- The case of Trout in Spain
- Conclusion and Next Step

Introduction

- Objectives of Prime Fish Project
- Boom and Bust cycles occurency in prices
- B&B critical factors:
  - The Fundamentals
  - Impact of macro-economic effects on “boom-and-bust” cycles
- Factors protecting against for “boom and bust” cycles (selected case studies)

Definition of Trend, cycle, seasonality and B&B

- As in other economic variables, there is a “law” in the temporal evolution of the prices and it is composed by three components not directly observable:
- **Trend** is the underlying structure of the phenomena considered, often expressed by a polynomial function of degree not too high;
- **Cycle** is the fluctuations around the trend;
- **Seasonality** consists of the changes that occur with similar intensity in the same periods every year.
- The term "business cycle" describes the tendency of the economy to experience periods of rapid economic growth followed by periods of economic stagnation or decline.
- The business cycle is called the boom-bust cycle

To find the features of the cycle without the impact of seasonality

Data and Data Sources needed

- 1. Existence of boom and bust cycle: monthly prices analysed for several market levels (landing/market/retail/import/export) for aquacolture and fishery;
- 2. Causes the cycle: environmental, macro and micro-economic factors that could influence prices (wheather, exchange rate, oil prices, feed price for aquaculture, etc. . .).

- FAO, EuroStat, EUFOMA, National Sources, Kontali ….

Metodology for B&B: testing the MatLab code

For testing MatLab code, we used:

- a bulk of confidential data kindly given by the Joint Research Center of the European Commission. Weekly time series of price (landing/market/retail) of salmon in Spain from 2004 to 2015;
- Kontali's data. Monthly time series of price of Export of fresh Atlantic salmon (head on) from Norway to EU from 2001 to 2015.

The case of trout in Spain

- Data set : Monthly average prices at landing, wholesale and retail levels (aquacolture and fishery)
- Data comes from SECRETARÍA DE ESTADO DE TURISMO Y COMERCIO
- 2004-2015
- The data structure is satisfactory for the wholesale and retail markets .
- While as regards landing price the time serie “seem partially re-constructed “.

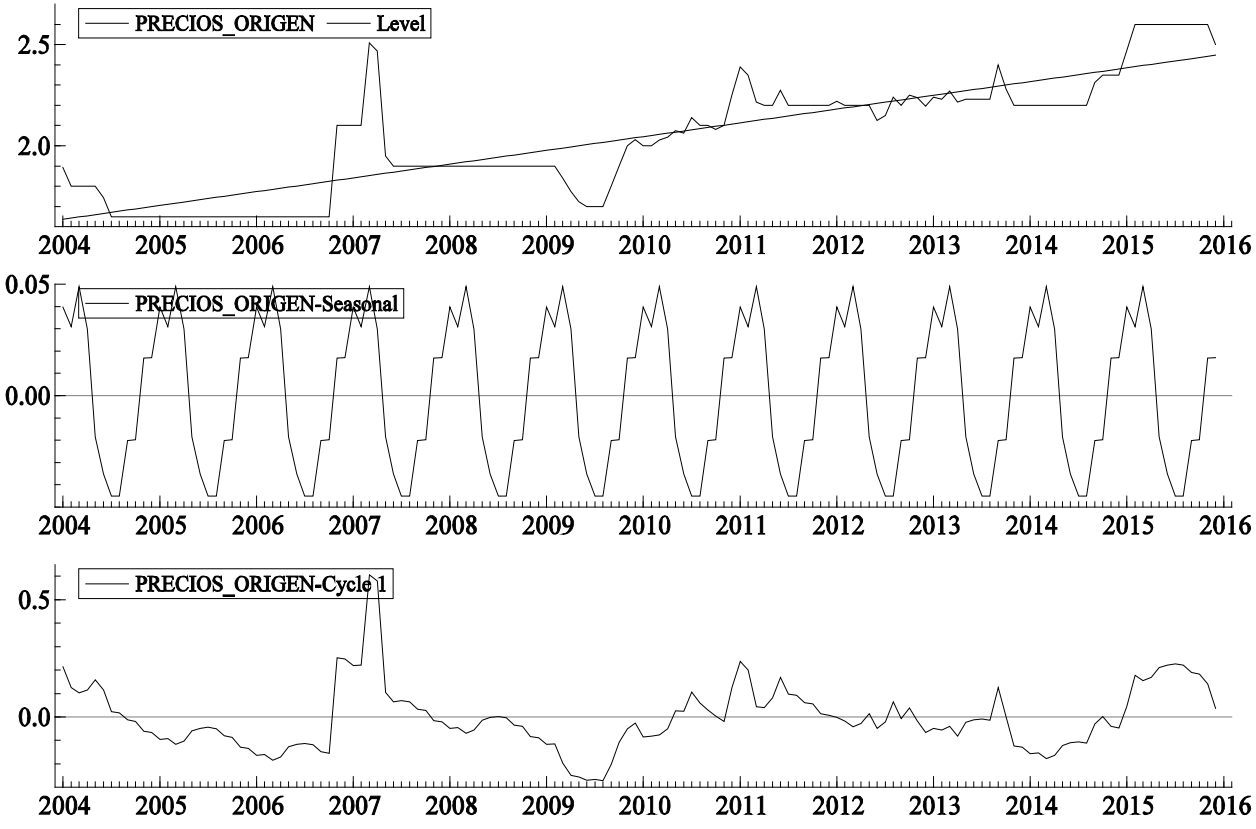
Discussion

- The analysis of trends and cycles are based on the decomposition of the phenomenon observed in different components : price trend , increasing or decreasing trend , seasonality , cyclical and irregular component.
- The analisys has been carried out with the statistical method called Kalman filters .
- This methodological approach enables us to break the trend of prices for components and assign each part the features of stochasticity and determination.
- The classification of a component as a stochastic or deterministic is of particular importance since it allows to understand more in detail what inside on the price trend analysis can be considered as " fixed " or “probabilistic“.

LANDING (Fig.1)

- The analysis on the landing market (even if not fully reliable due to poor data) show a regular growth of prices during the observed time period and not characterized by stochastic components.
- The price fluctuation range is from € 1.65 to € 2.60 and has a strong regularity of seasonality with amplitude equal to 1 € (lowest prices in August and the highest prices in February) .
- This ten-year trend is particularly significant component of the cycle which is stochastic in nature and has a duration of about 47 months with price boom in 2007 and 2015 .
- Because the starting data seem not of good quality, it is useless to use the model to make predictions .

Fig. 1: Trend in LANDING price

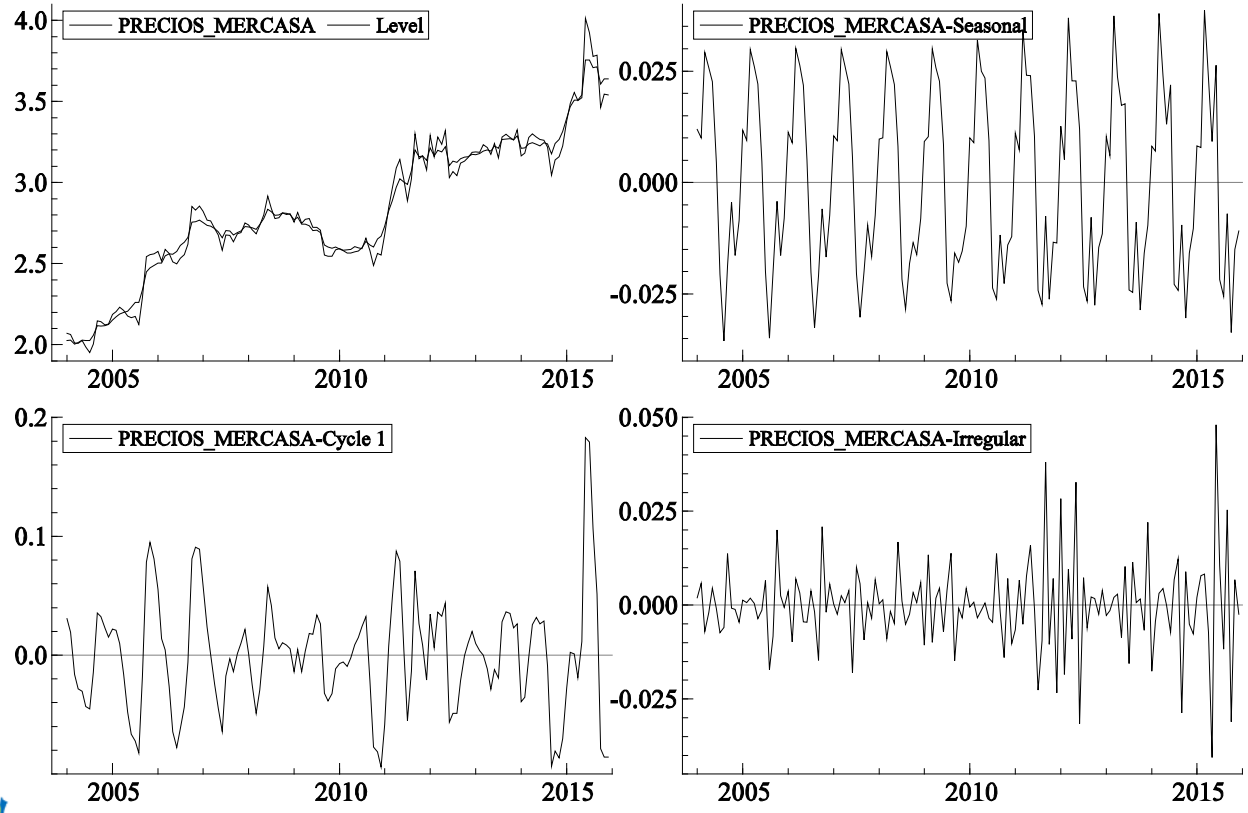


Period Lenght in months. Deterministic or stochastics ratio (0 det, 1 sto)

WHOLESALE

- Price at wholesale market are growthing until the middle of 2008, fall in 2010 and continued with steady growth until 2015.
- During the time period the price level is affected by strong stochasticity.
- The price fluctuation range is from € 1.55 to 4.00 € and has a considerable regularity of the seasonal amplitude of 0.5 € (lowest prices in August and higher prices in February as the landing).
- In this ten-year trend it is important that the cycle component is stochastic in nature and has a duration of about 13 months with price boom, as in the case of lending, in 2007-2008 and in 2015.
- The presence of an irregular component implies that the model is able to explain the trend with a satisfactory level but not “fully”.
- (Fig.2)
- The forecast prices for the next two years shows an upward trend. It is bounded by a large “confidence band” caused by the presence of the irregular component (Figure 3).

Fig. 2 : Trend in WHOLESALE price



Period Lenght in months. Deterministic or stochastics ratio (0 det, 1 sto)

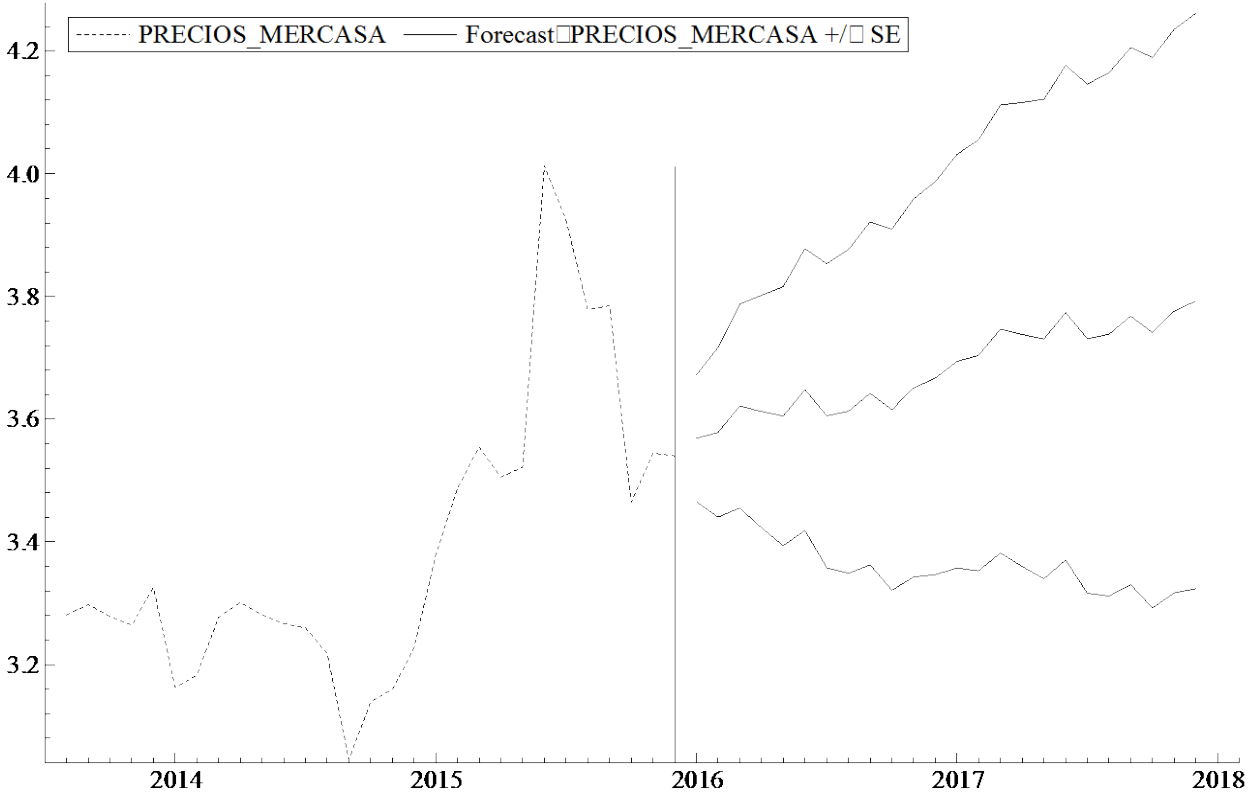
Variances of disturbances:	(q-ratio)
Level	(1.000)
Slope	(0.0000)
Seasonal	(0.0002916)
Cycle	(0.5364)
Irregular	(0.2252)
Period	12.83038

PrimeFish

IFET 2016 SCOTLAND

Horizon 2020 Programme

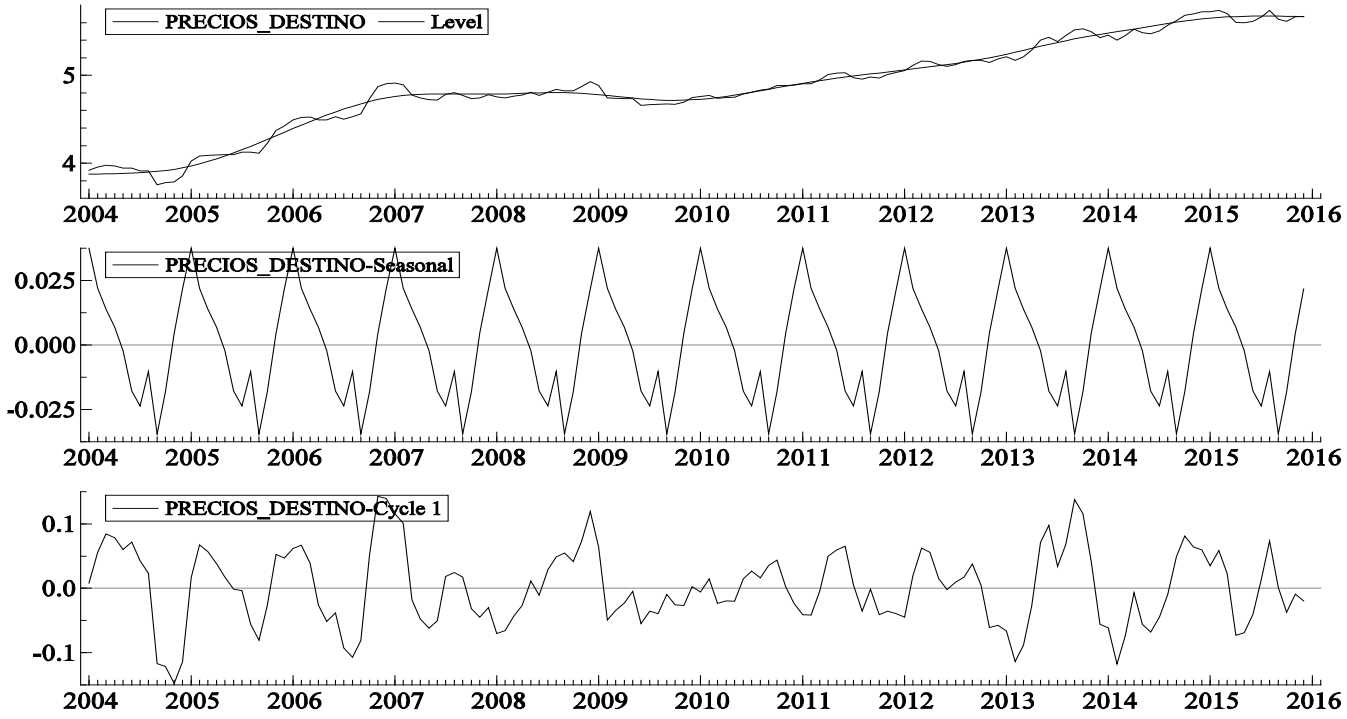
Fig.3: Wholesale Price Forecasting



RETAIL

- Prices are growing up to mid-2008, and show a slight decline in 2010 and continued with steady growth until 2015.
- During the studied time period the price level is absolutely deterministic. The price fluctuation range is from € 3.75 to € 5.74 and has a great regularity of the seasonality with a magnitude of 0.6 € (even lower prices in August and the highest prices in December and January).
- In this “ten-year trend” assumes great importance the cycle, that is stochastic in nature and has a duration of about 12.5 months with price boom, as in previous cases, in 2007-2008 and in 2015.
- This model is totally lacking in the irregular component and this leads us to say that the model is well suited to the trend.
- Fig. 4
- Price Forecasting. The price forecast for the next two years (2016 jan - dec 2017) shows an upward trend and is bounded by “confidence band” smaller than previous case, due to the absence of the irregular component (Fig. 5).

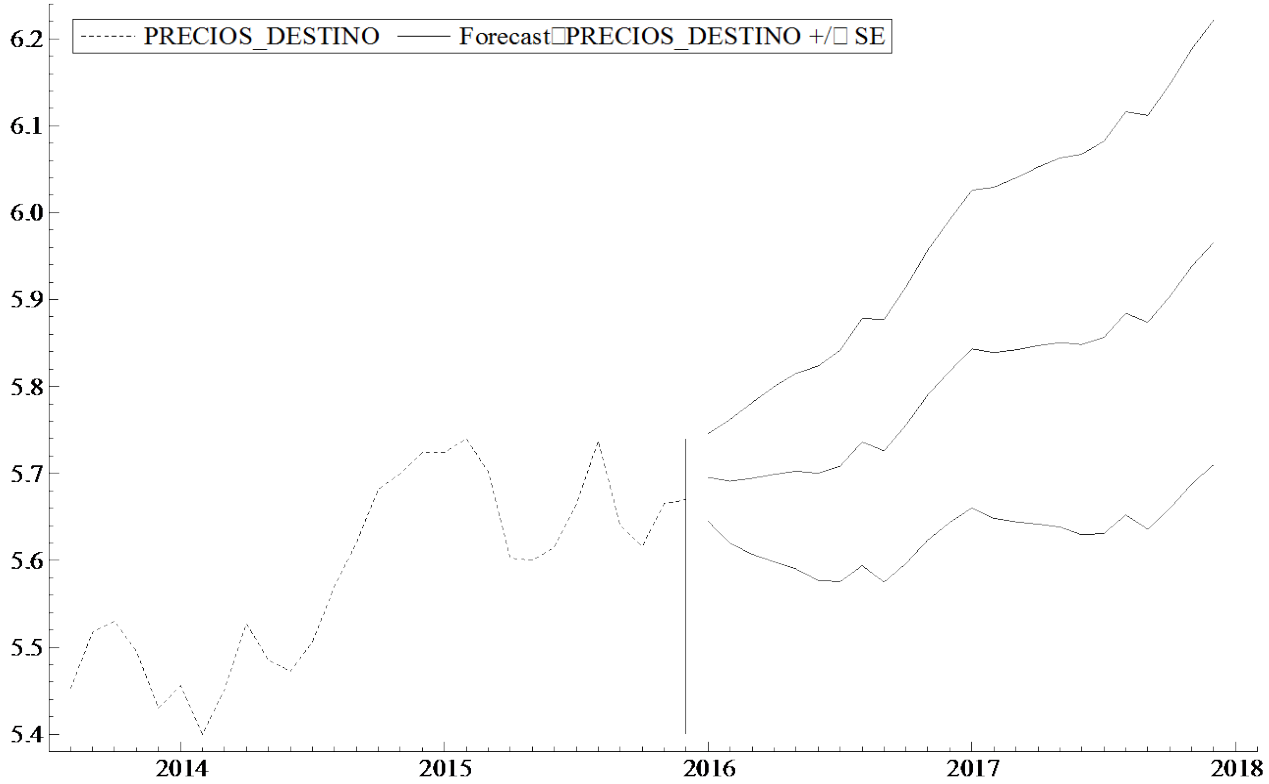
Fig. 4: Trend, cycle and seasonality in retail price



Period Lenght in months. Deterministic or stochastics ratio (0 det, 1 sto)

Variances of disturbances:	(q-ratio)
Level	(0.0000)
Slope	(0.02761)
Seasonal	(0.0000)
Cycle	(1.000)
Irregular	(0.0000)
Period	12.49322

Fig. 5: Retail Price Forecasting



Preliminary conclusion

- The cycles are present in each time series and show boom in the same year
- Seasonality affect all the three time series
- Landing : The source data do not seem good quality . Since this problem is useless to use the model to make predictions.
- Wholesale: The presence of an irregular component implies that the model is able to explain the trend satisfactory but not “fully” great . The price forecast for the next two years shows an upward trend and is bounded by a confidence band quite large due to the presence of the irregular component.
- Retail : In this model is totally lacking the irregular component. This leads us to say that the model is well suited to the trend.
- The price forecast for the next two years shows an upward trend and is bounded by the confidence band less extensive than wholesale price, due to the absence of the irregular component.

1. Availability of Good Data is the pre-conditions for Detection of Cycles and Forecasting and causes/prevention analysis

2. Model Fitting explain the Forecasting attitude for specific time serie of prices

Next Steps

- To go on with testing the model for other data set (different species)
- To identify the causal relationship among different potential drivers for prices
  - the market fundamentals, demand and supply growth, changes in prices of raw materials and other inputs as well as the policy about stocking
  - and other phenomena that are important such as weather conditions, macroeconomics variables, volatility in exchange rates, the increasing finance activities, etc. common in agricultural commodity markets to explain price fluctuations.
- To verify price differences over geographical area for the same species and price transmission along the supply chains

Thank you for the attention

Cristina Mora
Cristina.mora@unipr.it

PrimeFish

IIFET 2016 SCOTLAND

Horizon 2020 Programme