

Appendix 5

Price Outlook

Technical Note.....	170
5-1. ITTO Benchmark Log Products Price Outlook to December 2000	171
5-2. ITTO Benchmark Sawnwood Products Price Outlook to December 2000.....	172
5-3. ITTO Benchmark Plywood Products Price Outlook to December 2000	173

Technical Note

The autoregressive integrated moving-average (ARIMA) models are also referred to as Box-Jenkins models and are denoted by the notation ARIMA (p, d, q), where

- p is the order of the autoregressive part
- d is the order of the differencing
- q is the order of the moving-average process

Mathematically, the ARIMA model for the price series is written as

$$P_t = \mu + \frac{\theta(B)}{\phi(B)} a_t$$

where

- t is the time index
- P_t is the price series [or a difference of it, for instance if $d=1$ then the differenced series correspond to $(1-B)P_t = P_t - P_{t-1} = \Delta P_t$]
- μ is the mean term
- B is the backshift operator (e.g., $BP_t = P_{t-1}$)
- $\phi(B)$ is the autoregressive operator, represented as a polynomial in the back shift operator: $\phi(B) = 1 - \phi_1 B - \dots - \phi_p B^p$
- $\theta(B)$ is the moving-average operator, represented as a polynomial in the back shift operator: $\theta(B) = 1 - \theta_1 B - \dots - \theta_q B^q$
- a_t is the independent disturbance, also called random error

In the estimation process, p , d and q were selected in such manner that the random error was white noise, that is, with no autocorrelation to the series. As a case in point, the dark red meranti sawnwood price series was identified to be ARIMA (1,1,1), which is equivalent to:

$$(1-B)P_t = \mu + \frac{(1-\theta_1 B)}{(1-\phi_1 B)} a_t$$

which turned out to be:

$$(1-B)P_t = \frac{(1+0.61B)}{(1+0.26B)} a_t \quad \text{with } a_t \text{ random error and } \mu = 0$$

References:

Box, G.E.P., and G.M. Jenkins. 1976. Time Series Analysis: Forecasting and Control. Rev. ed. San Francisco, Holden-Day.

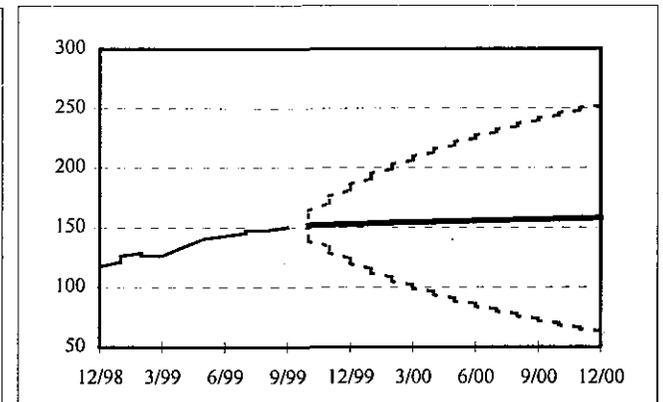
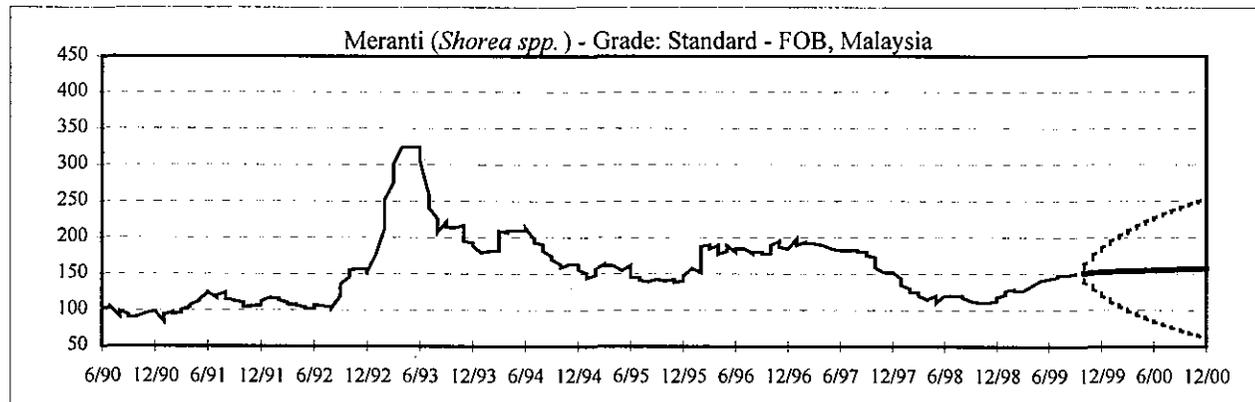
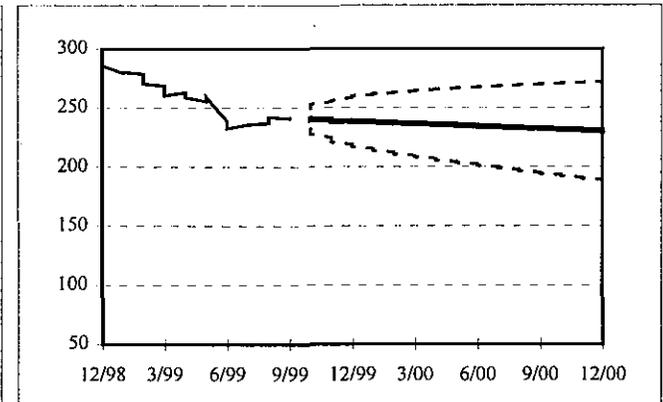
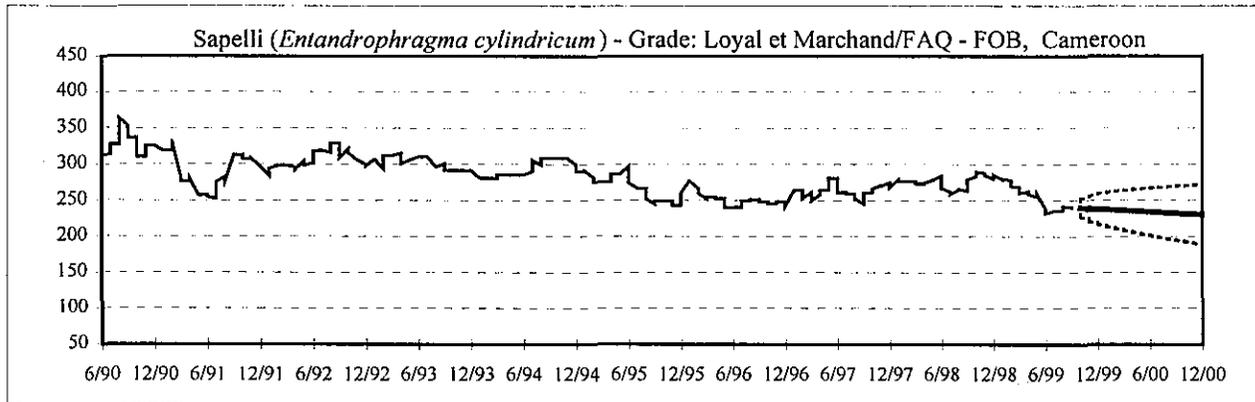
SAS/ETS Users Guide 1993. Version 6, Second Edition.

Castañó, J. 1997. Econometria, First Edition.

5-1. ITTO Benchmark Log Products Price Outlook to December 2000

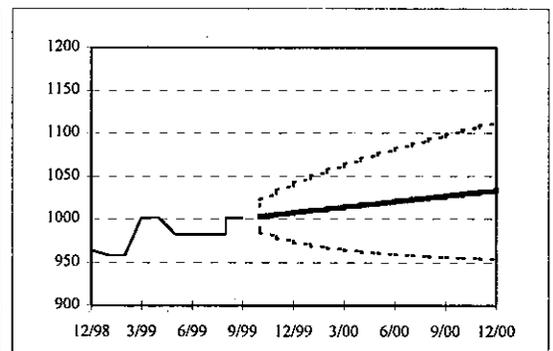
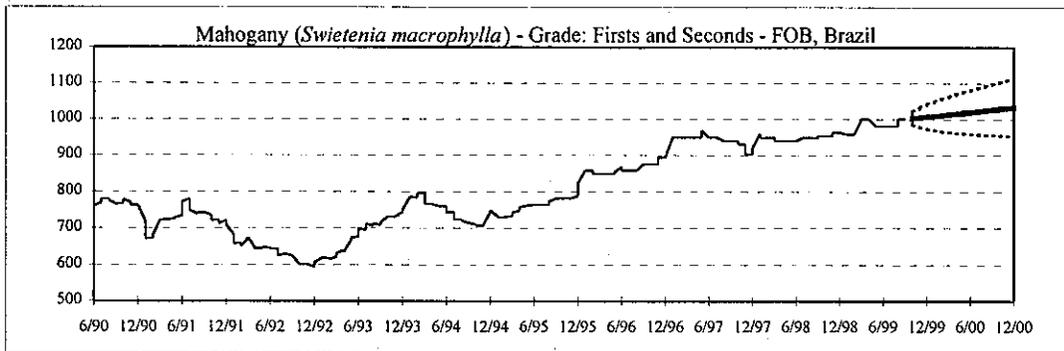
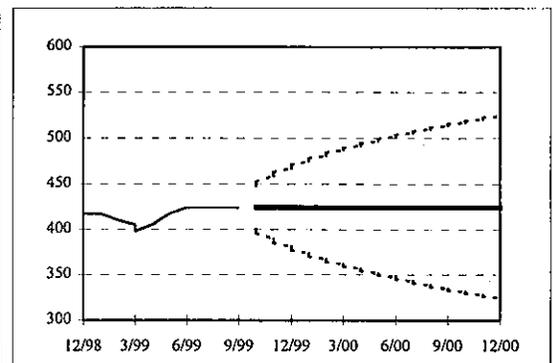
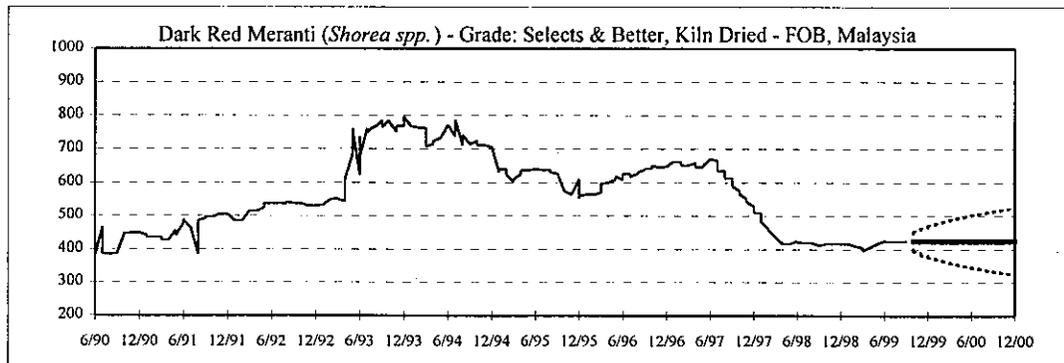
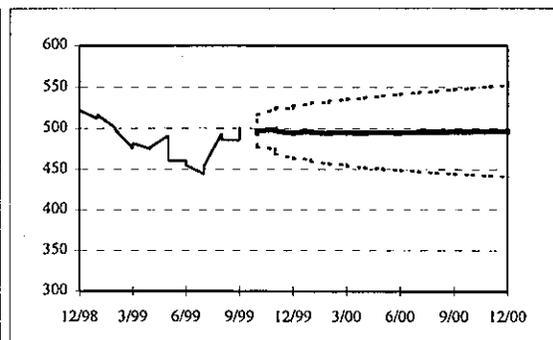
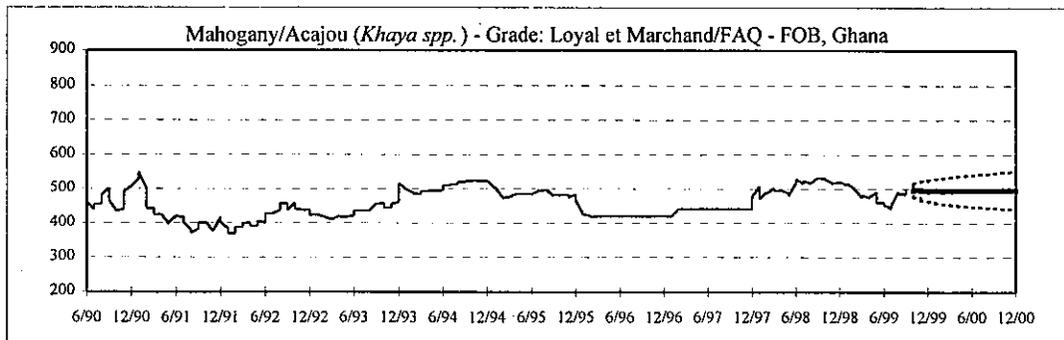
Normal lines show prices in constant 1990 US\$ per cubic meter (deflated by the G-5 MUV Index used by the World Bank for deriving real commodity prices).

Bold lines show forecasted price trends and dotted lines show 70% confidence intervals.



5.2. IFTO Benchmark Sawwood Products Price Outlook to December 2000

Normal lines show prices in constant 1990 US\$ per cubic meter (deflated by the G-5 MUV Index used by the World Bank for deriving real commodity prices). Bold lines show forecasted price trends and dotted lines show 70% confidence intervals.



5-3. ITTO Benchmark Plywood Products Price Outlook to December 2000

Normal lines show prices in constant 1990 US\$ per cubic meter (deflated by the G-5 MUV Index used by the World Bank for deriving real commodity prices).

Bold lines show forecasted price trends and dotted lines show 70% confidence intervals.

