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THESIS

TIME-SERIES FORECASTING MODELS FOR AUTOMOBILE SALES IN THAILAND

TAWEESIN APIWATTANACHAI

A Thesis Submitted in Partial Fulfillment of
the Requirements for the Degree of
Master of Engineering (Engineering Management)
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Inventory management at car dealers is generally not efficient because dealers place orders based on their prior sales experiences to ensure that cars will be readily available to customers. If stocks are held at dealers for a long time, especially until the end of model life, it will be difficult to clear out those stocks. Customers are thus offered financial incentives (such as free insurance) which are then subsidized by car manufacturers. To help car dealers to better forecast their sales, a modified Holt-Winter's forecasting model is proposed to estimate customer demand, instead of using just historical sales data. This research evaluates a forecasting model by comparing forecasts (from the Holt-Winter's and our modified model) with actual data.

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Student's signature Thesis Advisor's signature

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Taweesin Apiwattanachai

September 2008

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INTRODUCTION

In Thailand, automobile industry is considered one of the main industries which play a leading role contributing to the nation economy. It is one of the top industries which generate high Gross Domestic Product (GDP) to Thailand as well as acquire a high employment rate. Furthermore, automobile parts exports also generate high amount of income to the country (see Figure 1) (TAIA information 2007). In addition, the Royal Thai government is promoting Thailand to become the Detroit of Asia by providing funds and adjusting tax structure such as reducing import duty of vehicles under Free Trade Area (FTA) agreements.

	10 EXPORT ITEMS	US$ VALUE
1	Computers & components	14,876
2	Autos & parts	9,541
3	Integrated circuits	7,029
4	Rubber	5,384
5	Plastic pellets	4,500
6	Gems and jewelry	3,644
7	Refine Oil	3,635
8	Iron and steel	3,527
9	Radios, TVs	3,462
10	Chemical	3,443

	10 IMPORT ITEMS	US$ VALUE
1	Crude Oil	20,112
2	Industrial Machinery	11,448
3	Elect. Machinery, part	9,581
4	Chemicals	9,109
5	Integrated circuits	8,609
6	Computers, Parts, Accessories	7,442
7	Iron & Steel	7,357
8	Metal Manufactures	6,040
9	Jewelry, Silver Bars, Gold	3,879
10	Auto Parts& accessories	3,055

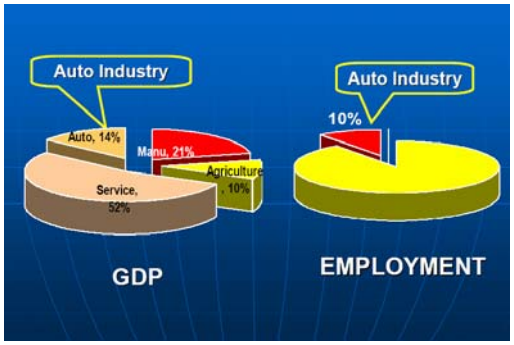

Figure 1 Current status of automobile industries in Thailand, TAIA information 2007.

By reason of many supports from Government to promote automobile industries in Thailand, competitions among all car manufactures become obvious and excessive. They realize that if they are unable to know customer buying behaviors exactly, their product would not be strong enough to survive in the highly competitive situation. According to J.D. Power and Associates Reports about top 10 reasons for avoiding a vehicle (J.D. Power and Associates), 3 main factors are generally based on three of the following items:

1. Styling
2. Reliability
3. Price.

By analyzing each factor, styling of the vehicle is considered as personal preferences. Reliabilities of the vehicles usually are not significantly different among manufacturers because they apply international standards such as Economic Commission for Europe (ECE). Moreover, benchmarking method is widely used to analyze strong points and weakness of competitors. As a result, automobile manufacturers aim to set vehicle price to be as competitive as possible within the same car segment. Accordingly, manufacturers focus on production cost reduction to obtain competitive price as well as to gain more profit for the company.

Many cost reduction methods have been implemented, for example, waste reduction, value engineering (Value engineering) and inventory reduction. Waste reduction method includes both waste of the product reduction and waste of working time reduction. Value engineering approach aims to measure the value of a product in terms of quality, performance and reliability at an acceptable price and to remove non value-added aspects where value is defined as worth/cost (Fowler, 1981). The generally applied method mainly involves inventory reduction. In general, manufacturers mostly concentrate on the reduction of production inventory. Inventory level is kept up to the production amount in order to decrease stock management cost and increase work space which normally is occupied by those extra stocks. However, not only production inventory should be taken into consideration but also those completed vehicles that stocked at dealers.

On practical basis, the terms of inventory reduction usually refer to production inventory reduction. However, inventory at car dealers are also important to manufacturers. These costs occur from poor inventory management at dealers which consequently cost the manufacturers extra expenditure from attempting to reduce those stocks.

Problem background.

The poor inventory management arises because dealers place orders before knowing the actual demand of customers. Usually, dealers estimate order quantities based on their prior sales experiences on how many of each models and colors should be ordered to support customers demand each day. The advantage of using this method is to ensure that cars will be readily available for customers (see Figure 2).

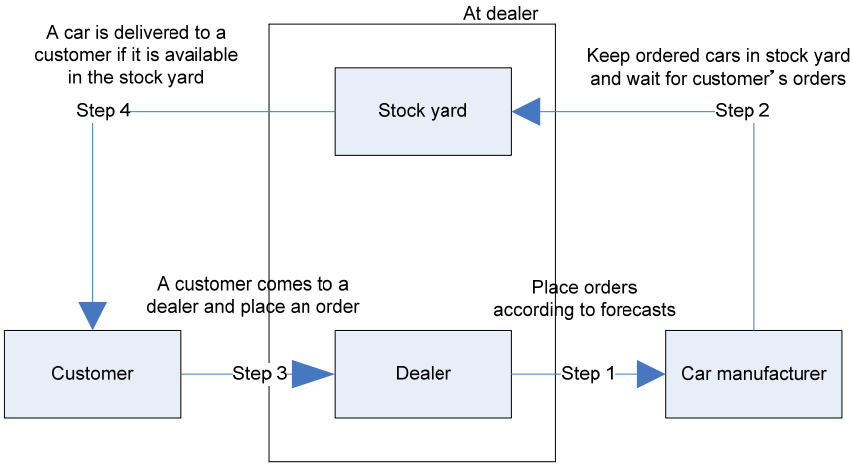

Figure 2 Actual car ordering process at dealers.

By definition, forecasted demand is not to the actual demand; therefore, dealers have to be responsible for holding those stocks (see Figure 3). However, if stocks are held at the dealer for a long time, especially until at the end of the model life, it would be difficult to clear out those stocks. Thus, it is necessary for the manufacturer to subsidize car dealers by offering financial supports to dealers. Then dealers will use this money to offer customers discounts and other promotions as to persuade customers to buy those stocks. Some car manufacturers have to spend up to ten million Bahts each year to clear out this dead stock.

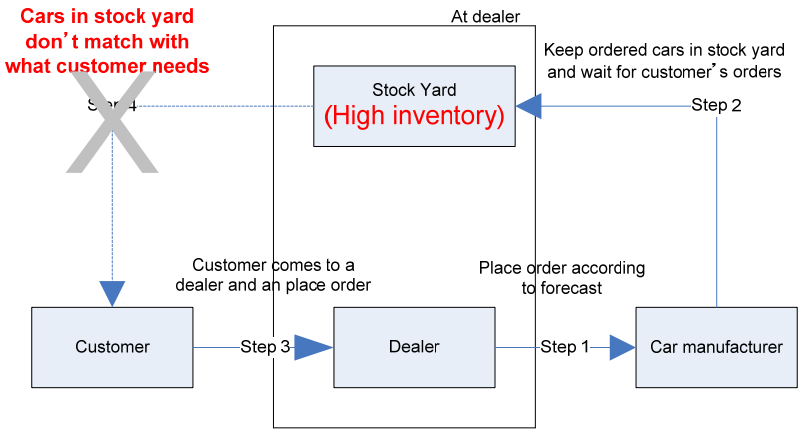

Figure 3 Problem occurred because of imprecise forecasting process.

This research proposes to set up an Information Database Center to collect sales data in real time. The database center will generate a forecasting model from sales data to estimate customers demand. Finally, future trend of customers demand can also be used to estimate order volume instead of using only sales experiences (see Figure 4).

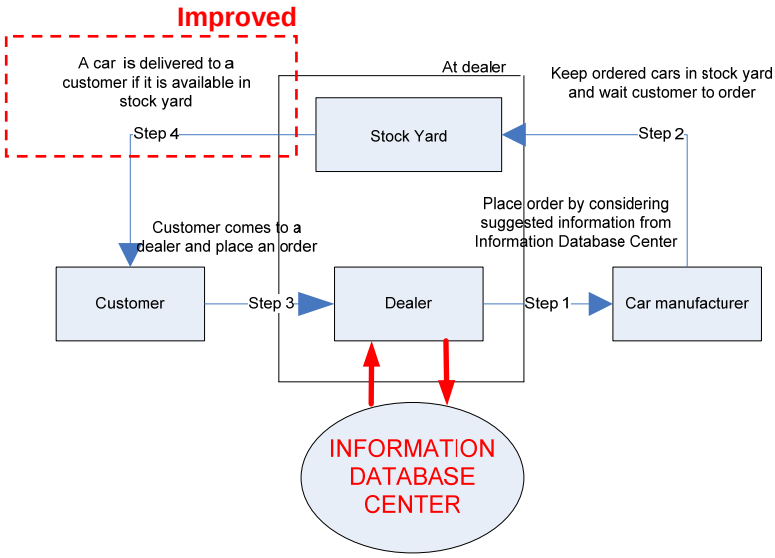

Figure 4 How Information Database Center facilitates the ordering process at dealers.

A forecasting model which is obtained from the Information Database Center should take into consideration the distinctive nature of the automobile market in Thailand, for example, external factors such as petrol price, loan interest rate, and average household income together with a seasonal characteristic due to annual sale events (see Figure5 and Appendix A for detailed data). In this research, the "Triple Exponential Smoothing" known as "Holt-Winter's (HW) method" is applied to time-series data that exhibit trend and seasonality.

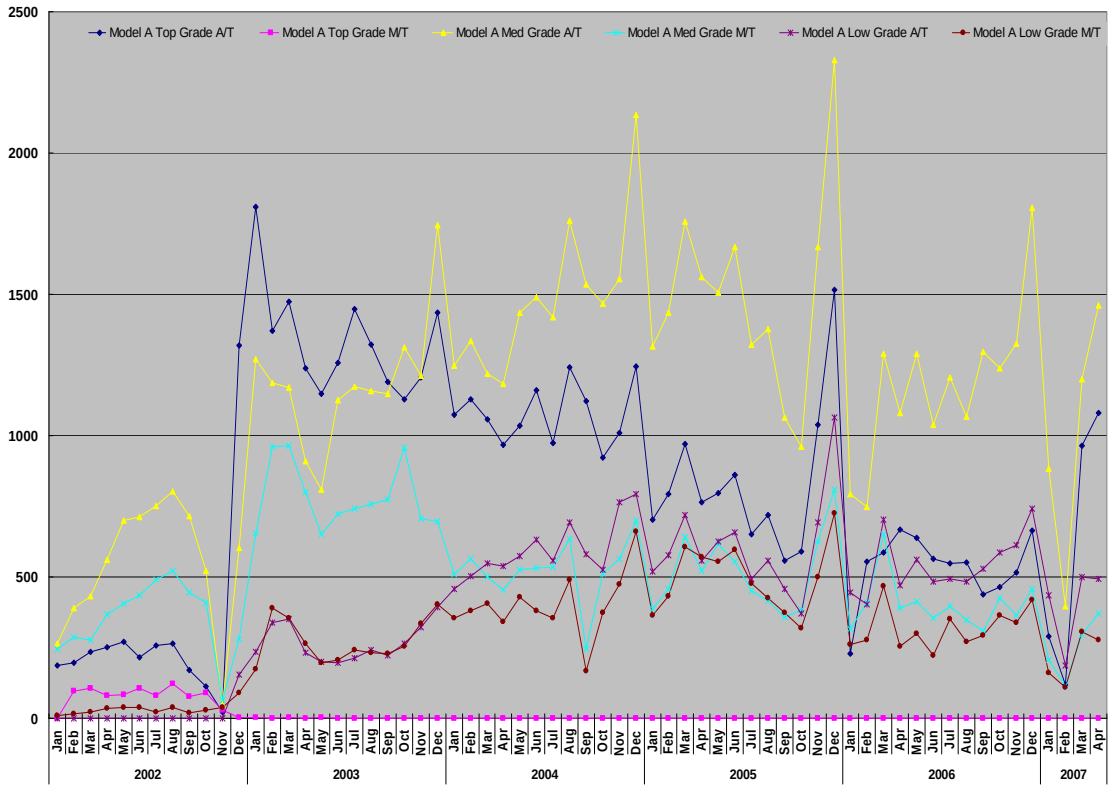

Figure 5 Sale volume of one particular model in Thailand since Jan'02 – Apr'07.

HW is essentially a quantitative method that uses mathematical recursive functions to predict trend and seasonality behaviors. It assumes that the future will follow the same pattern as the past. In our case, we have seasonal patterns corresponding to weekly, quarterly or annual periodicity; therefore, we should include factors in our model that utilize the historical information (Haro, *et al.*). After the HW model is formulated, we evaluate it by comparing the forecasts with the actual data to see if it provides more accurate forecasts than the current method.

Research questions.

This research attempts to following issues:

1. The HW method has two variations: a multiplicative seasonal model and an additive seasonal model used for different data characters. Therefore, this study has to identify which HW model is more suitable for data of this research.

2. Are there any observable problems resulting from forecasting with the HW method?

OBJECTIVES

There are 2 main objectives of this research as follows:

1. To propose the HW model for car demand.

2. To evaluate the proposed model by comparing its forecasts and the existing forecasts with the actual data.

To achieve research objective, this research should replies on research scopes as follows:

1. Due to variety of the represented car model (grade, types of transmission, safety equipments, colors), the data is classified into five groups: top grade with automatic transmission (Top A/T), medium grade with automatic transmission (Med A/T), medium grade with manual transmission (Med M/T), low grade with automatic transmission (Low A/T), and low grade with manual transmission (Low M/T)**.**

2. The data which is used to formulate time series forecasting model is selected from one model of a major car manufacturer in Thailand since January 2002 to April 2007 except Low A/T which has data since December 2002 to April 2007.

3. Result verification uses recent data, from May 2007 to March 2008, comparing with actual company’s forecasts in the same period.

LITERATURE REVIEW

This section provides background knowledge related to this research. The literature review consists of three parts: time series forecasting models, exponential smoothing method and the Holt-Winter's (HW) method.

1. Time series forecasting model.

Forecasting is important to firms because it can help ensure effective uses of resources. It can be an important aid in identifying trends in sales and the purchase of raw materials in the correct amounts (Caruana, 2001). One of forecasting techniques that can address an environment that is predictable or fairly predictable is time series analysis (Aiken and West, 1991; Seber, 1977; Weisberg, 1985). Time series models represent a group of techniques most associated with predictable futures. They include regression, decomposition and various adaptive methods. With such techniques, one essentially seeks to identify patterns in the data over time and moves to project established patterns into the future. However, in utilizing the identified patterns for forecasting, it must be stressed that any resultant forecasts assume that "what has happened in the past will continue to happen in the future", i.e., future is predictable. If for any reason this basic assumption is violated, whether as a result of external or internal changes (e.g., the firm intends to launch a massive advertising campaign), the accuracy of the forecasts becomes very questionable (Caruana, 2001).

Time-series analysis is extensively utilized in many areas of applications, such as economic forecasting, budgetary analysis, and inventory studies. There are many methods of model fitting, such as Moving Average, Box-Jenkins, Autoregressive Integrated Moving Average model (ARIMA), Box-Jenkins Multivariate model, Exponential Smoothing model. Users select method based on application on hand as well as preference. In this paper, we adopt the exponential smoothing method to provide these forecasts.

Other studies by Bauman (1965), Geurts and Ibrahim (1975) and Newbould (1974) have suggested that simpler methods such as exponential smoothing do as well as or better than more sophisticated models, such as ARIMA, in terms of accuracy. Both Geurts and Ibrahim (1975) and Makridakis and Hibon (1979) show that exponential smoothing outperforms the more sophisticated Box-Jenkins models.

2. Exponential smoothing.

Exponential smoothing can be further classified into 3 distinct depending on the number of times smoothing has been performed.

2.1 Single exponential smoothing.

Sometimes this model is also known as simple exponential smoothing. Simple smoothing is effective for short-range forecasting, usually just one time period into the future. The model assumes that the data fluctuates around a reasonably stable mean (no trend or consistent pattern of growth).

The specific formula for simple exponential smoothing is:

$$R_t = \alpha y_{t-1} + (1-\alpha) R_{t-1} \qquad 0 \le \alpha \le 1 \quad t \ge 3$$

where: R_t is the smoothed observation at time t or Exponentially Weighted Moving Average (EWMA) at time t

y_t is the original observation at time t

α is a smoothing constant

When applied recursively to each successive observations in the series, each new smoothed value (forecast) is computed as the weighted average of the current observation and the previous smoothed observation (the previous smoothed observation was computed, in turn, from the previous observed value and the

smoothed value before the previous observation, and so on). Hence, each smoothed value is the weighted average of the previous observations, where the weights decrease exponentially depending on the value of smoothing parameter (α). If it is equal to 1 then the previous observations are ignored entirely. If it is equal to 0, then the current observation is ignored entirely as well, and the smoothed value consists entirely of the previous smoothed value (which in turn is computed from the smoothed observation before it, and so on; thus, all smoothed values will be equal to the initial smoothed value R_1).

Initializing the single exponential smoothing model.

The initial EWMA plays an important role in computing all the subsequent values (as mentioned above). Setting R_2 to y_1 is one method of initialization. Another way is to average the first four or five observations. Notice that the smaller the value of α, the more important it is the selection of the initial EWMA.

2.2 Double exponential smoothing.

The previous method, single exponential smoothing, is not effective in forecasting data with a trend. This situation can be improved by expanding one more equation into single exponential smoothing model with different weights or known as second smoothing constant, β, which is in conjunction with α. In general, this pattern is called *double exponential smoothing* which works in a similar way as the single exponential smoothing except that two components must be updated in each period/level. The level, R_t, is a smoothed estimate of the value of the data at the end of each period. The trend, G_t, is a smoothed estimate of average growth at the end of each period. The specific formula for double exponential smoothing are:

$$R_t = \alpha y_t + (1-\alpha)(R_{t-1} + G_{t-1}) \qquad 0 \le \alpha \le 1 \qquad t \ge 2$$

$$G_t = \beta(R_t - R_{t-1}) + (1-\beta)G_{t-1} \qquad 0 \le \beta \le 1 \qquad t \ge 2$$

$$F_{t+1} = R_t + G_t \qquad t \geq 1$$

where: R_t is the smoothed observation at time t or Exponentially Weighted Moving Average (EWMA) at time t

G_t is a linear trend component at time t

F is the forecasted value

α is the smoothing constant

β is the second smoothing constant

Initializing EWMA and linear trend component value

Usually R_1 is set to y_1 and G_1 is suggested to be estimated as follows;

$$G_1 = y_2 - y_1 \qquad \text{or}$$

$$G_1 = \frac{[(y_2 - y_1) + (y_3 - y_2) + (y_4 - y_3)]}{3} \qquad \text{or}$$

$$G_1 = \frac{(y_n - y_1)}{(n-1)}$$

where n denoted as numbers of observations

2.3 Triple exponential smoothing

This method is used when the data shows trend and seasonality. To handle seasonality, either Equation (4) or Equation (12) is added with the third smoothing constant, γ, which takes care of seasonality. The resulting set of equations is called the ”Holt-Winters” (HW) method after the names of the inventors. Details of HM

method will be explained in section 2.3

3. Holt-Winter's method

Depending on the type of seasonality, HW models can be either a multiplicative seasonal model (Section 3.1) or an additive seasonal model (Section 3.2).

3.1 Multiplicative seasonal model

The multiplicative seasonal model is appropriate for a time series in which the amplitude of the seasonal pattern is proportional to the average level of the series (Kalekar, 2004). It assumes that the time series is represented by Equation (1):

$$F_t = (b_1 + b_2 t) S_t + \varepsilon_t \qquad (1)$$

where: F_t is the forecasted value at time $t = 1, 2, 3, \ldots$,

b_1 is the base signal or the permanent component

b_2 is a linear trend component

S_t is a multiplicative seasonal factor

ε_t is the random error component which is a standard normal random variable $N(0,1)$.

From Equation (1), we obtain the following recursive formula:

$$F_t = (R_{t-1} + G_{t-1}) S_{t-L}$$

where: R_t is the estimator of the permanent component b_1 at time t,

G_t is the estimator of the trend component b_2

L is the number of periods of historical data that is used to obtain forecasts.

Let y_t stand for the actual data at time t. Parameters R_t, G_t, and S_t are updated as follows:

$$R_t = \alpha \frac{y_t}{S_{t-L}} + (1-\alpha)(R_{t-1} + G_{t-1}) \qquad 0 \le \alpha \le 1 \qquad (2)$$

$$G_t = \beta(S_t - S_{t-1}) + (1-\beta)G_{t-1} \qquad 0 \le \beta \le 1 \qquad (3)$$

$$S_t = \gamma\left(\frac{y_t}{R_t}\right) + (1-\gamma)S_{t-L} \qquad 0 \le \gamma \le 1 \qquad (4)$$

where: α, β and γ are the first smoothing constant, the second smoothing constant and the third smoothing constant respectively.

The value of forecast T periods after time t is given by:

$$F_{t+T} = (R_{t-1} + TG_{t-1})S_{t+T-L} \; . \qquad (5)$$

To initialize seasonal factors, a minimum historical data of one full season (or m periods) is needed:

$$G_0 = \frac{y_m - y_1}{m-1} \qquad (6)$$

$$R_0 = \frac{1}{n}\sum_{i=1}^{m} y_i \qquad (7)$$

$$S_t = y_t - \overline{R}_0 . \qquad (8)$$

3.2 Additive Seasonal Model

The additive seasonal model is suitable for data whose amplitude of seasonality is independent of the average level of the series. The additive seasonal model has the following form:

$$F_t = b_1 + b_2 t + S_t + \varepsilon_t \quad (9)$$

where all variables have previously been defined in Equation (1). Parameters R_t, G_t, and S_t are updated as follows:

$$R_t = \alpha(y_t - S_{t-L}) + (1-\alpha)(R_{t-1} + G_{t-1}) \quad 0 \le \alpha \le 1 \quad (10)$$

$$G_t = \beta(S_t - S_{t-1}) + (1-\beta)G_{t-1} \quad 0 \le \beta \le 1 \quad (11)$$

$$S_t = \gamma(y_t - R_t) + (1-\gamma)S_{t-L} \quad 0 \le \gamma \le 1 \quad (12)$$

The forecast for the next period is given by:

$$F_t = R_{t-1} + G_{t-1} + S_{t-L} \quad (13)$$

MATERIALS AND METHODS

Materials

1. Hardware

1.1 Toshiba Personnel Computer, Microsoft Window XP Home edition Version 2002 Service Pack 2, RAM 512MB, and disk space 80GB.

2. Software

2.1 Microsoft Excel.

2.2 Microsoft Word.

Methods

Model development which is used in this research as base model is describe in section 1., Model development, and section 2., Modified Holt-Winter's method with a smoothing seasonal factor, as follows describe the way to improve model which is given from section 1.

1. Model development

This study considers one particular car model which has a lot of sales data. For this study, we divide the data into 5 groups; top grade automatic transmission (Top A/T), medium grade automatic transmission (Med A/T) and manual transmission (Med M/T), low grade automatic transmission (Low A/T) and manual transmission (Low M/T).

Either a multiplicative seasonal model (Equation (1)) or additive seasonal model HW model (Equation (9)) is chosen by considering Mean Absolute Percentage Error (MAPE) as shown in Equation (14). For this data set, time t is in month and

m is 12 because automobiles are classified by calendar years. The data used in this study are from January 2002 to April 2007.

$$\text{MAPE} = \frac{1}{n}\sum_{t=1}^{n}\left|\frac{y_t - F_t}{y_t}\right| \quad (14)$$

where n is the total number of data.

Both the multiplicative and the additive model require smoothing constants; α, β, and γ. As a rule of thumb, values between 0.01 and 0.3 are used when the forecasts depend on a large number of past values, while larger values of smoothing constants are used when forecasts depend more heavily on a few recent values (Exponential smoothing). An Excel's solver is used to determine smoothing constants (Table 1) by identifying target as lowest Mean Absolute Percentage Error (MAPE).

Table 1 Smoothing constants of each configuration.

	α		β		γ	
	Multi	Add	Multi	Add	Multi	Add
Top A/T	0.30	0.59	0.30	0.30	0.81	0.30
Med A/T	0.30	0.33	0.30	0.30	0.69	0.54
Med M/T	0.60	0.30	0.30	0.30	0.90	0.62
Low A/T	0.81	0.30	0.30	0.30	1.00	0.77
Low M/T	0.66	0.54	0.30	0.30	1.00	0.30

According to smoothing constants determined by Excel's solver as shown in Table 1, we will calculate forecasted demand by using both multiplicative seasonal model and additive seasonal model in order to confirm which one can be better representative of automobile sale demand in Thailand. This comparison will use MAPE to be criterion. The calculation example of the original HW method and

detailed result of 5 car groups, for both the multiplicative seasonal model and the additive seasonal model, are shown in Appendix B and Appendix C in Appendix Table C1 to Appendix Table C10 respectively.

Table 2 shows the resulting MAPE. Because the additive model has a lower MAPE, we only consider this model from now on. The forecasts can be graphically compared with the actual data as shown in Figure 6 to Figure 10.

Table 2 MAPE comparison between multiplicative model and additive model.

	MAPE	
	Multiplicative seasonal model	Additive seasonal model
Top A/T	1.14	**0.33**
Med A/T	0.64	**0.25**
Med M/T	0.55	**0.32**
Low A/T	0.41	**0.23**
Low M/T	0.45	**0.32**

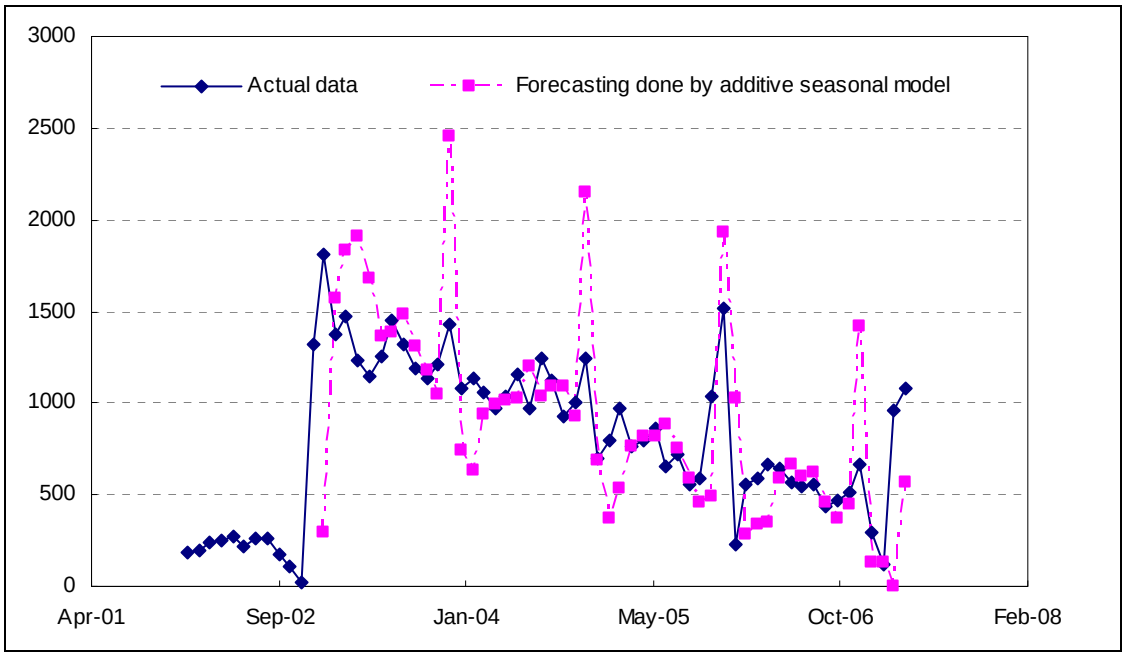

Figure 6 Comparison of forecasts from the additive model with the actual data for the Top A/T configuration.

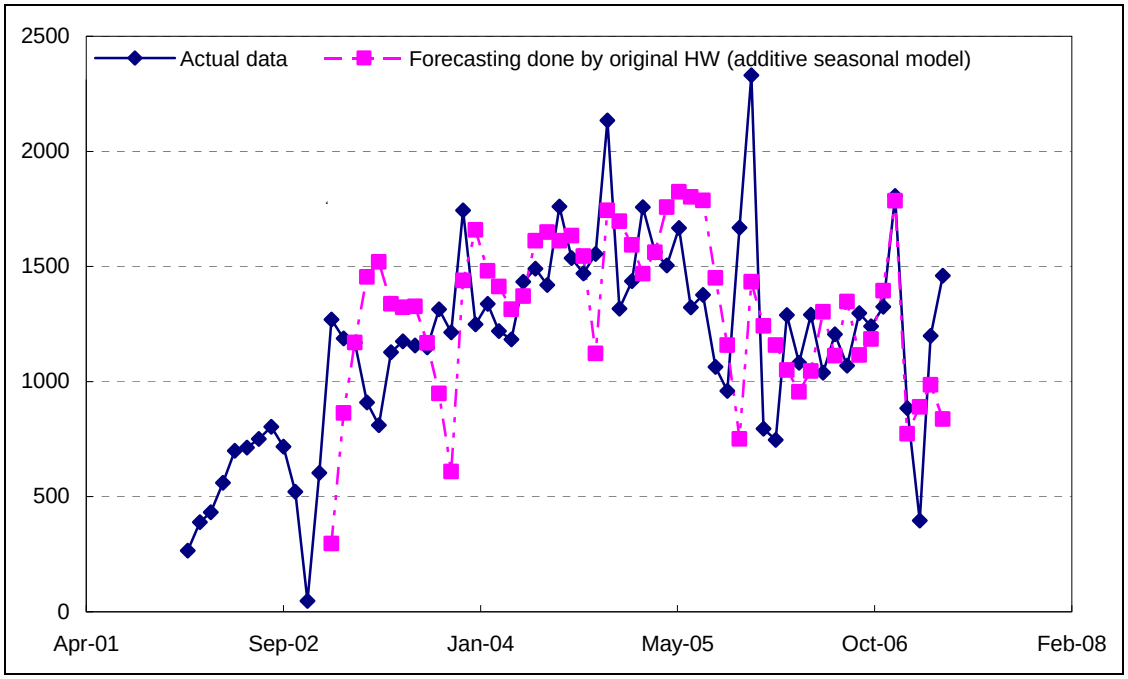

Figure 7 Comparison of forecasts from the additive model with the actual data for the Med A/T configuration.

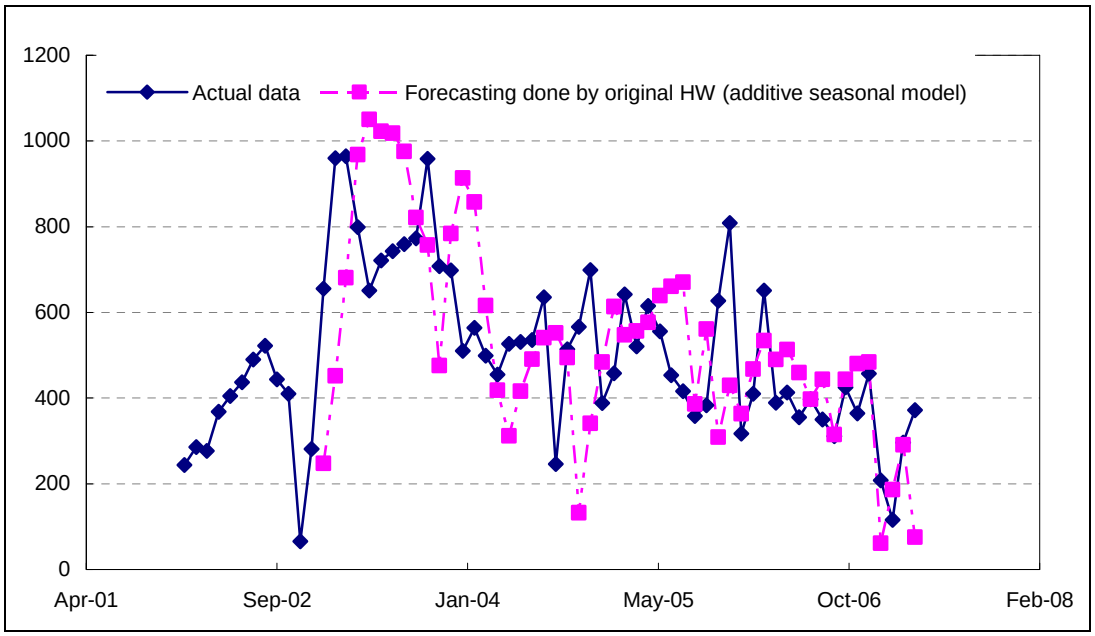

Figure 8 Comparison of forecasts from the additive model with the actual data for the Med MT configuration.

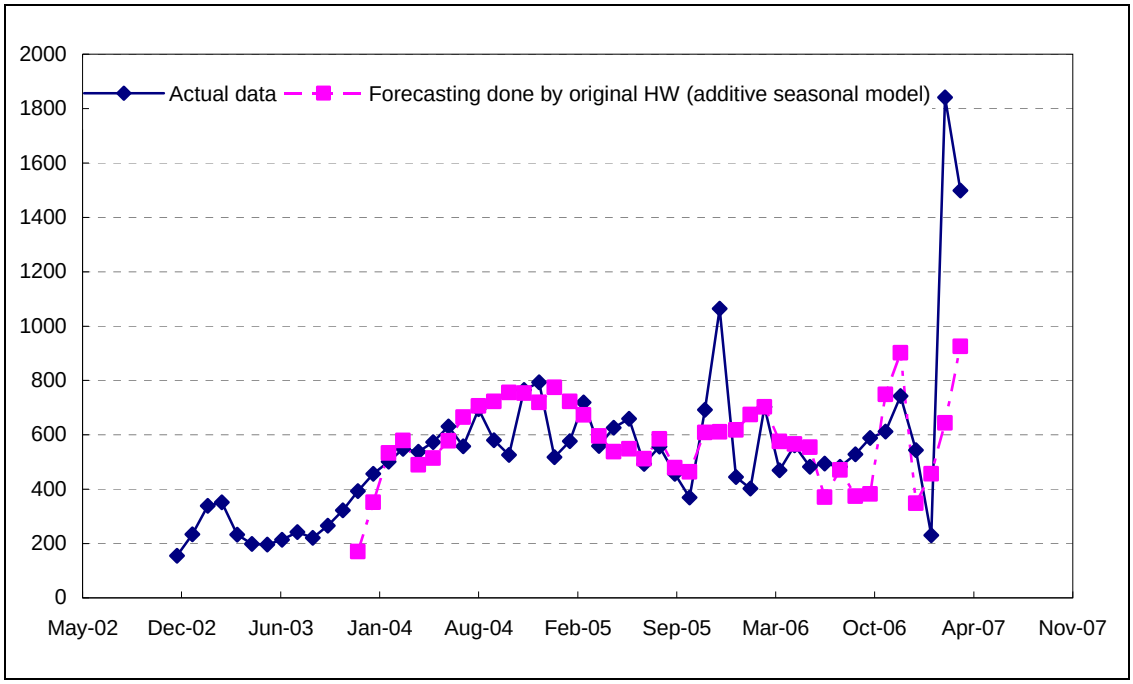

Figure 9 Comparison of forecasts from the additive model with the actual data for the Low A/T configuration.

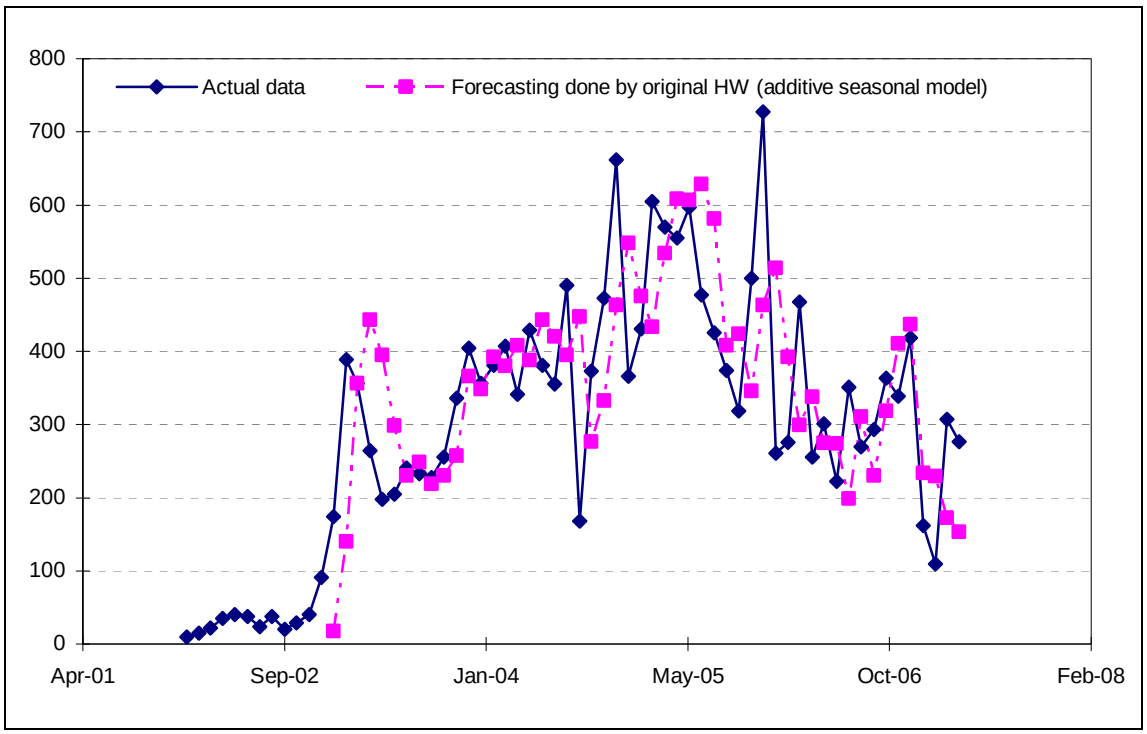

Figure 10 Comparison of forecasts from the additive model with the actual data for the Low M/T configuration.

Since the overall look of this automobile model was completely overhauled in December 2002, it might cause a drastic increase in customer demand. To better respond to this kind of fluctuation, this study uses modification the seasonal component. In addition, this study considers "smoothing" the collected data before fitting a forecasting model.

2. Modified Holt-Winter's method with a smoothing seasonal factor

The data is modified by using moving averages. The smoothing technique focuses on the seasonal factor to reduce its fluctuation since the seasonal factor should remain relatively constant from one season to the next. The smoothing of seasonal factors are done on two groups of collected data; the data during the first season (when a model is "warmed up" and forecasting cannot be done) and the data after the first season (when forecasts exist).

Data during the first season

For $t \le m$, if the change in basic observations

$$\Delta y_t = \left| \frac{y_t - y_{t-1}}{y_{t-1}} \right| \quad (15)$$

is greater than some threshold c, S_t will be replaced by the interpolated seasonal factor which is calculated from the seasonal factor of the most recent observation and the impedance observation whose change is lower than c.

Data after the first season (when forecasts exist)

For $t > m$, if the error between actual value and forecasted value

$$\text{Error} = \left| \frac{y_t - F_t}{y_t} \right| \quad (16)$$

is greater than some threshold c, S_t will be replaced by an interpolated seasonal factor which is calculated from seasonal factor of the most recent past observation and the impedance future data whose error between the actual value and forecasted value lower than c.

Even after smoothing the data, our forecasting model still cannot capture the fluctuation pattern in the data and sometimes makes greater error than the original HW model due to inappropriate value of interpolated seasonal factors. Therefore, we should screen out those inappropriate interpolated seasonal factors. The interpolated seasonal factors are S_t that satisfy the following condition

$$\left|(y_t - F_t) - I_t\right| < \left|(y_t - F_t) - S_t\right| \qquad (17)$$

where I_t is interpolated seasonal factor of the seasonal factor of the most recent past observation and the future observation which have error between actual value and forecasted value lower than c.

However, there is a chance that the interpolated seasonal factors make forecasted values equal to or less than zero. In this case, the interpolated seasonal factor will be ignored and be put the actual value is used instead. The threshold c of 10%, 20%, …, 100% are considered to see which threshold value gives the lowest MAPE.

The calculation example according to the modified HW method and the calculated results done by modified HW method when vary c from 10% to 100% for all configurations; Top A/T, Med A/T, Med M/T, Low A/T and Low M/T, are shown in Appendix D and Appendix E in Appendix Table E1 to Appendix Table E50 respectively.

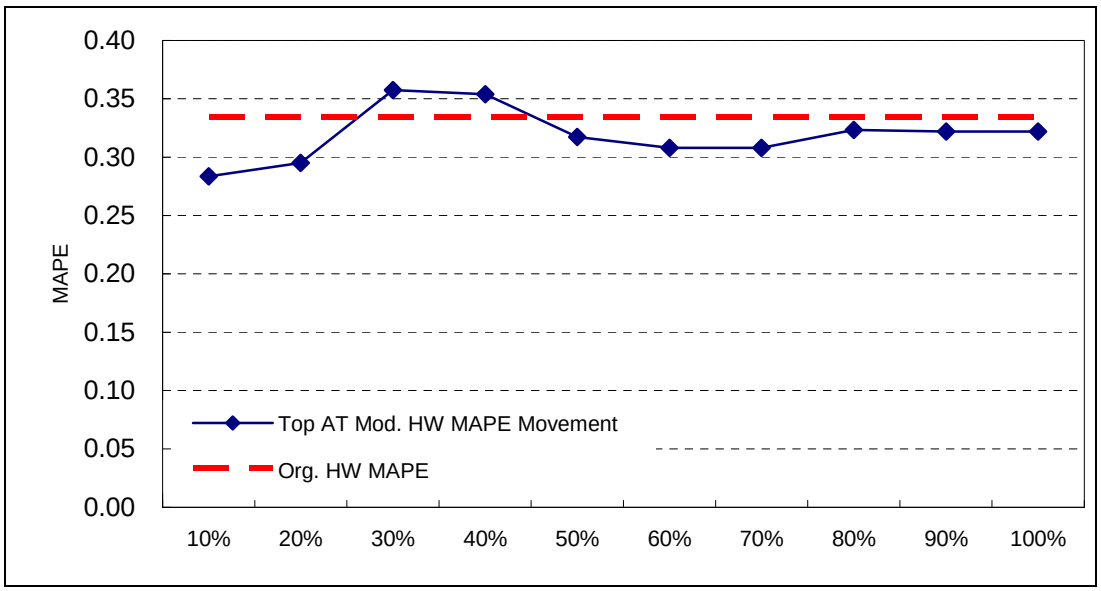

Figure 11 Comparison of MAPE of modified HW for Top A/T when vary c = 10%, 20%,…, 100%

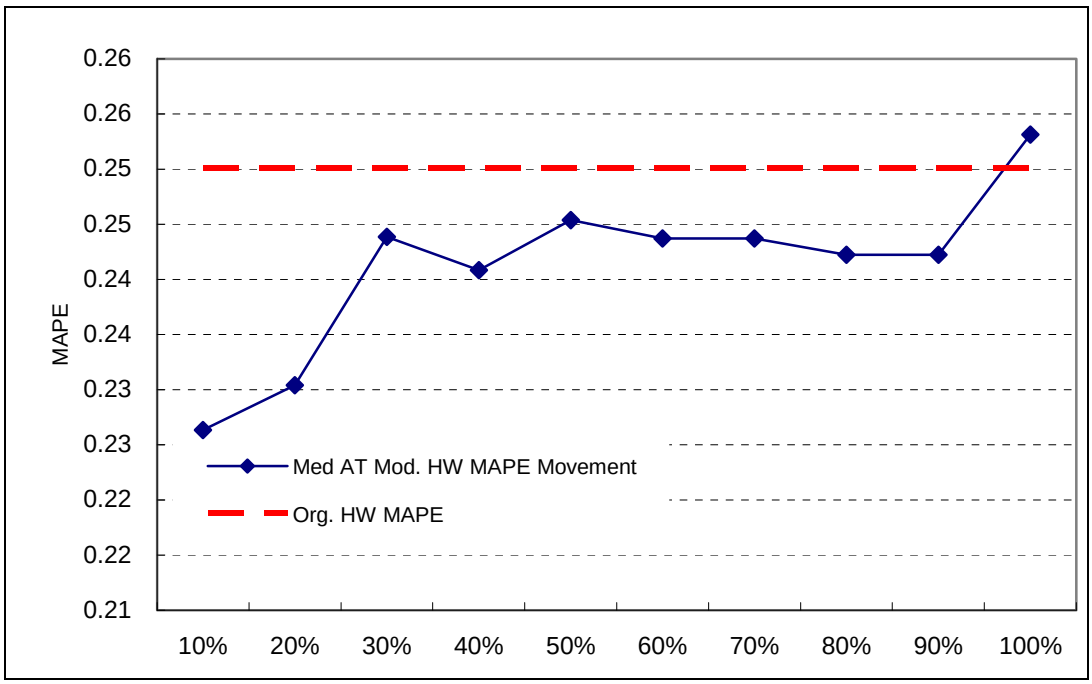

Figure 12 Comparison of MAPE of modified HW for Med A/T when vary c = 10%, 20%,…, 100%

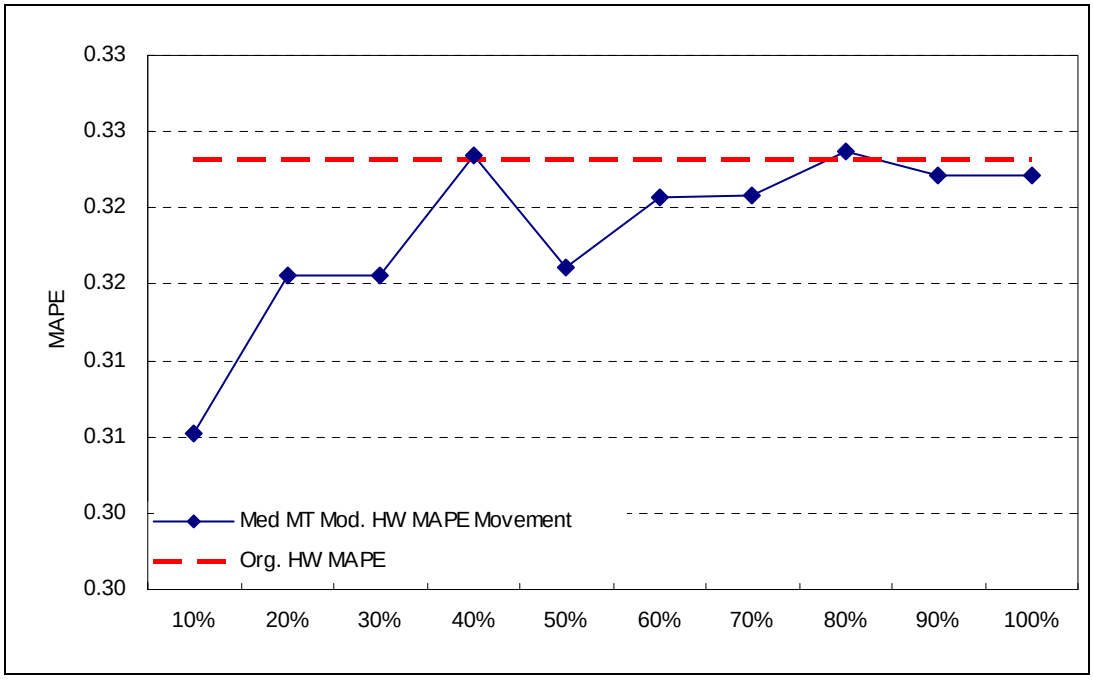

Figure 13 Comparison of MAPE of modified HW for Med M/T when vary c = 10%, 20%,…, 100%

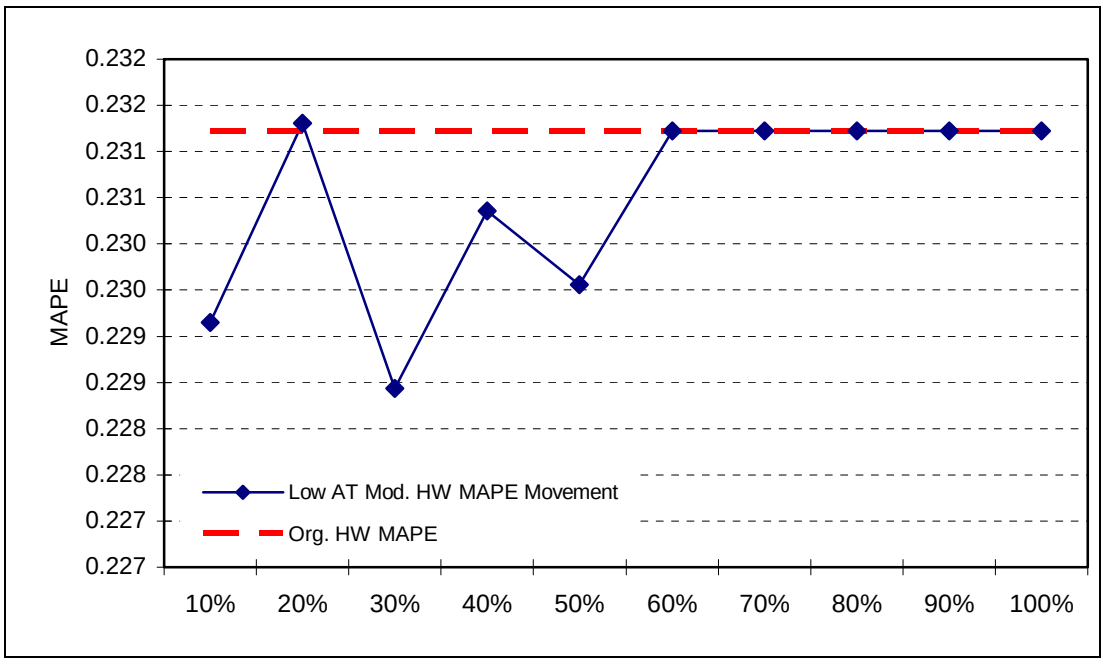

Figure 14 Comparison of MAPE of modified HW for Low A/T when vary c = 10%, 20%,…, 100%

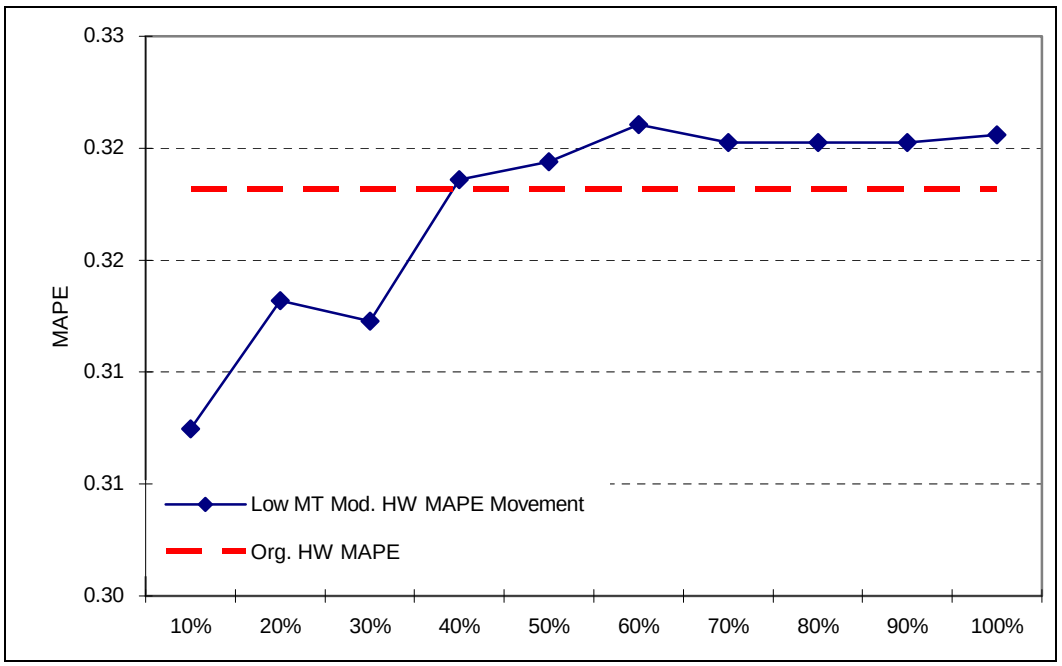

Figure 15 Comparison of MAPE of modified HW for Low A/T when vary c = 10%, 20%,…, 100%

According to Figure 11 to Figure 15, our results show that setting C to 10% is the best since it makes the lowest MAPE calculated by modified HW for almost all configurations.

Figure 16 to Figure 20 show the comparison between the original HW and our modified HW with the actual data. The original HW model produces highly inaccurate forecasts for December sales of every year due to the unusual observation in the first season. Our modified HW model can reduce the effect of this outlier and produce forecasts that better track the general trend in the data.

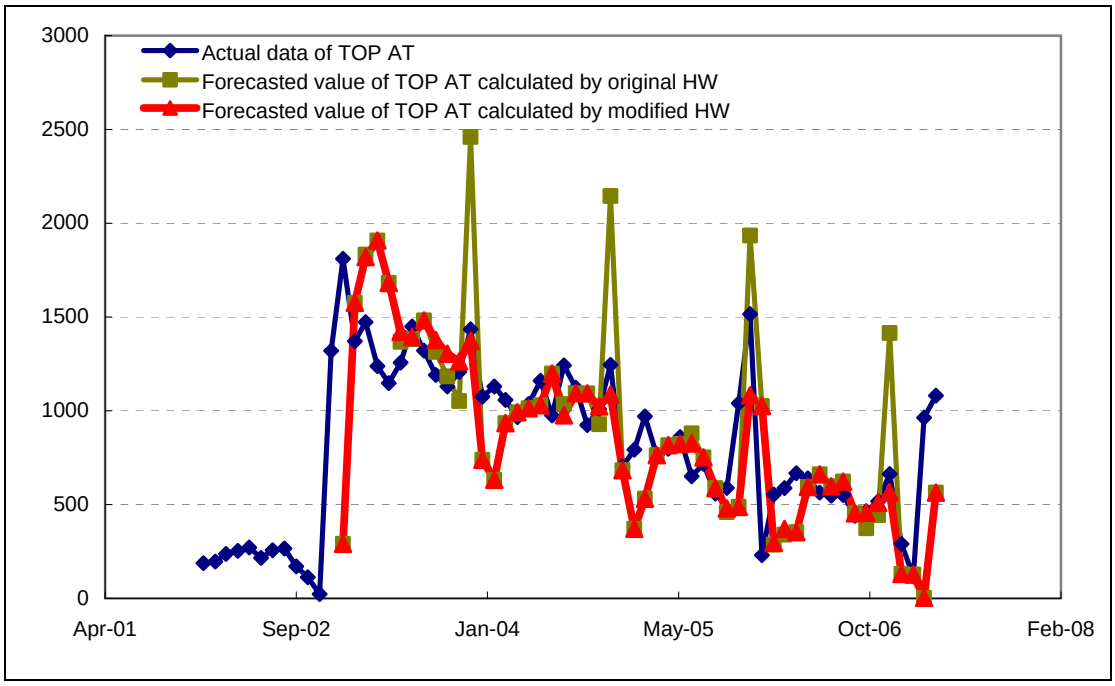

Figure 16 Comparison of two types of forecasts from the additive model with actual data for Top A/T configuration.

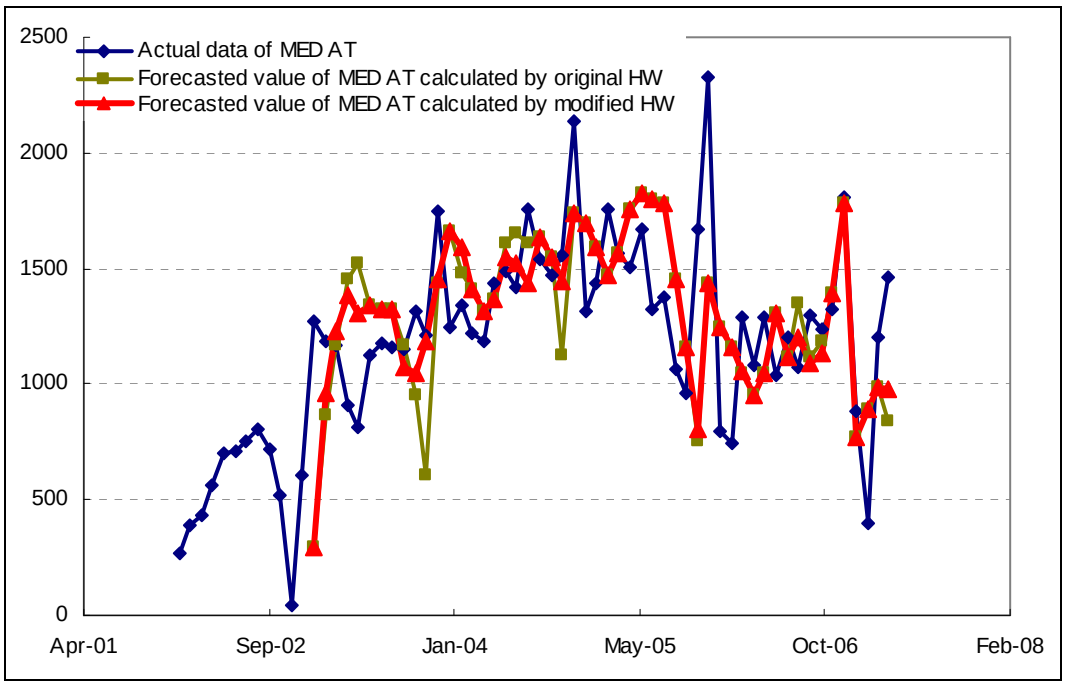

Figure 17 Comparison of two types of forecasts from the additive model with actual data for Med A/T configuration.

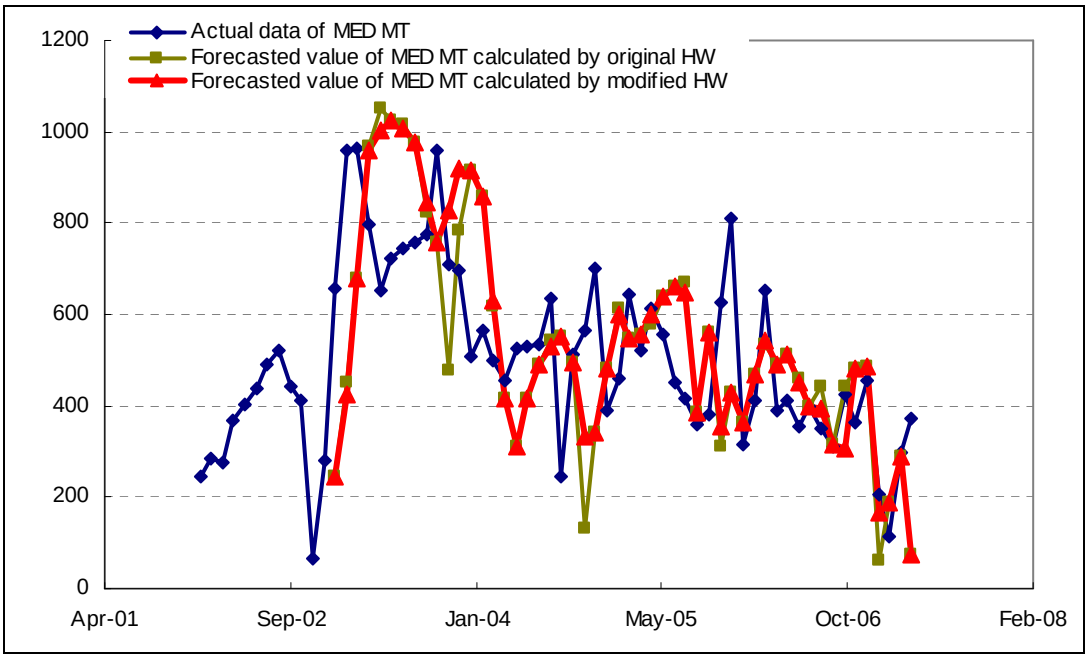

Figure 18 Comparison of two types of forecasts from the additive model with actual data for Med M/T configuration.

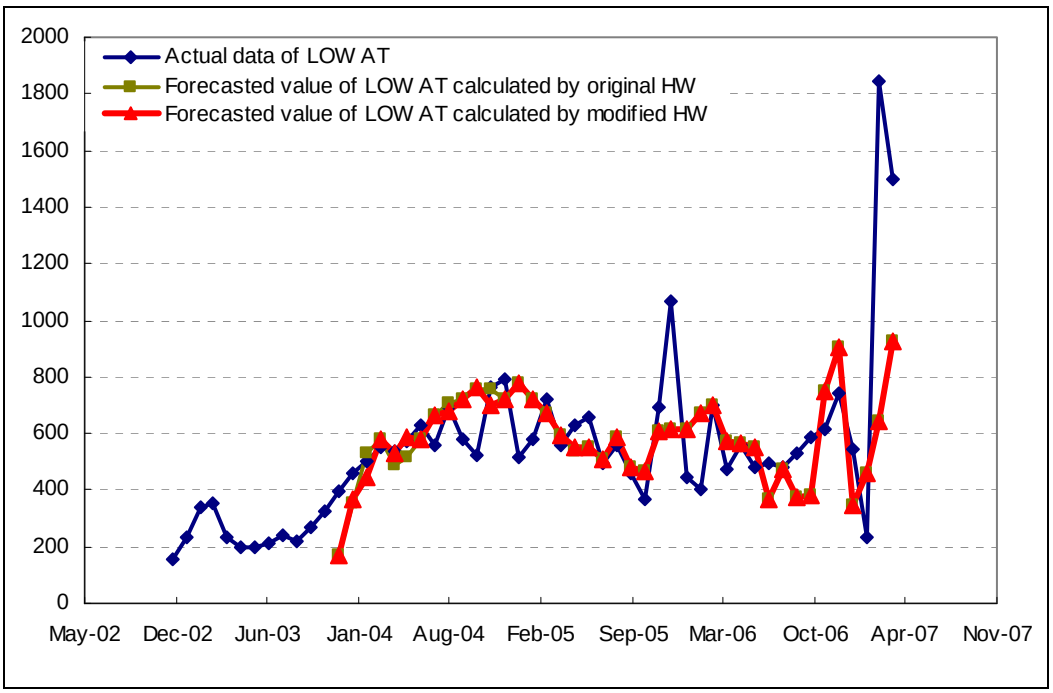

Figure 19 Comparison of two types of forecasts from the additive model with actual data for Low A/T configuration.

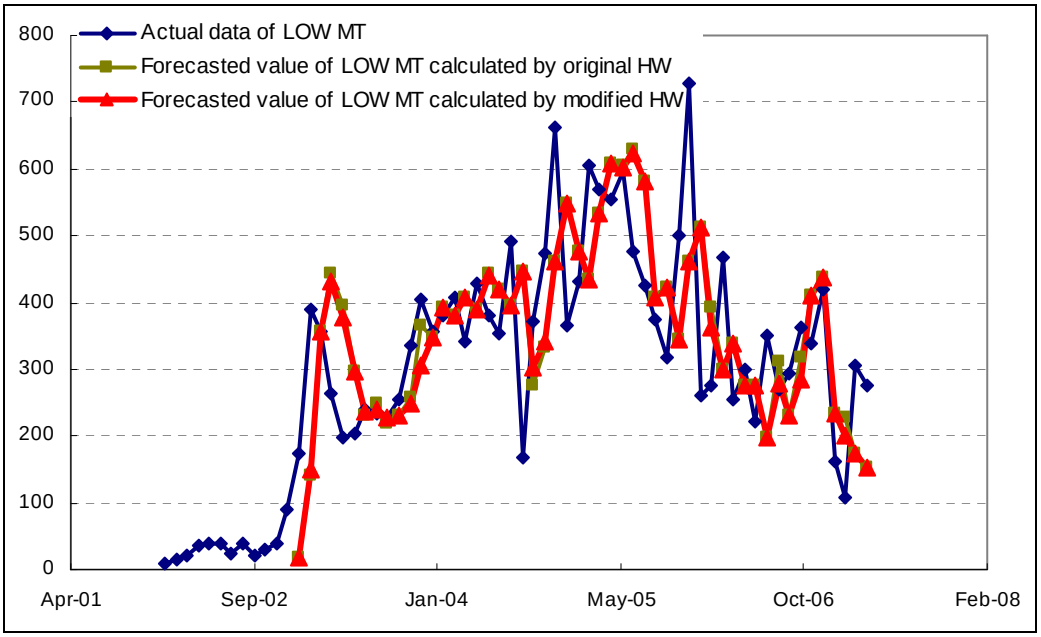

Figure 20 Comparison of two types of forecasts from the additive model with actual data for Low A/T configuration.

RESULTS AND DISCUSSION

Results

This research uses the data during January 2002 to April 2007 for 4 configurations; Top A/T, Med A/T, Med M/T and Low M/T, and the data during December 2002 to April 2007 for Low A/T, to estimate parameters for the proposed forecasting model. The result shows that the additive seasonal model with threshold value of 10% gives the best fit with our proposed model. Subsequently, the proposed models are evaluated on the data that are not used for model fitting (May 2007 to March 2008) by comparing MAPE of the company's forecast which has been used so far with the forecasts calculated from the original HW and the forecasts from the modified HW. Table 3 to Table 7 show verification results according to the proposed model.

Table 3 Verification result of Top A/T calculated by additive seasonal model with $\alpha = 0.59$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.1$

						Alpha	0.59					
						Beta	0.30					
		Diff (%)				Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			188			-104.58				
2	Feb-02	4.26			196			-96.58				
3	Mar-02	20.92			237			-55.58	-68.08			
4	Apr-02	6.75			253			-39.58				
5	May-02	7.11			271			-21.58				
6	Jun-02	-20.30			216			-76.58	-24.08			
7	Jul-02	18.98			257			-35.58	-24.08			
8	Aug-02	3.50			266			-26.58				
9	Sep-02	-35.71			171			-121.58	-58.34			
10	Oct-02	-33.92			113			-179.58	-58.34			
11	Nov-02	-79.65			23			-269.58	-58.34			
12	Dec-02	5639.13			1320	292.58	102.91	1027.42	-58.34			
13	Jan-03		83.94	NG	1811	1298.99	373.96	80.40		290.91	1520.09	0.84
14	Feb-03		-14.98	NG	1371	1550.88	337.34	-121.57		1576.36	-205.36	0.15
15	Mar-03		-24.42	NG	1473	1674.46	273.21	-99.35		1820.14	-347.14	0.24
16	Apr-03		-54.13	NG	1238	1549.39	153.73	-121.13		1908.09	-670.09	0.54
17	May-03		-46.48	NG	1148	1386.00	58.59	-86.51		1681.54	-533.54	0.46
18	Jun-03		-8.83		1257	1378.61	38.80	-90.09		1420.51	-163.51	0.13
19	Jul-03		4.70		1450	1457.93	50.95	-27.29		1393.33	56.67	0.04
20	Aug-03		-12.21	OK	1321	1413.01	22.19	-46.21	-106.66	1482.30	-161.30	0.12
21	Sep-03		-10.30	NG	1191	1362.32	0.33	-136.50		1376.87	-185.87	0.16
22	Oct-03		-4.70		1130	1331.11	-9.13	-186.04		1304.31	-174.31	0.15
23	Nov-03		12.81	OK	1207	1413.87	18.43	-250.77	-155.13	1263.64	-56.64	0.05
24	Dec-03		-71.53	OK	1434	822.65	-164.46	902.60	-155.13	1373.96	60.04	0.04
25	Jan-04		31.29	NG	1075	858.14	-104.48	121.33		738.58	336.42	0.31
26	Feb-04		44.06	NG	1130	1049.61	-15.69	-60.98		632.09	497.91	0.44
27	Mar-04		11.67	NG	1058	1107.28	6.32	-84.33		934.57	123.43	0.12
28	Apr-04		-2.63		967	1098.46	1.77	-124.23		992.47	-25.47	0.03
29	May-04		2.24		1037	1114.07	5.93	-83.68		1013.72	23.28	0.02
30	Jun-04		11.22	NG	1160	1197.32	29.12	-74.26		1029.90	130.10	0.11
31	Jul-04		-22.99	OK	975	1093.21	-10.85	-54.56	-108.33	1199.16	-224.16	0.23
32	Aug-04		16.57	NG	1242	1204.71	25.86	-21.16		975.70	266.30	0.21
33	Sep-04		2.58		1123	1247.77	31.02	-132.98		1094.07	28.93	0.03
34	Oct-04		-18.26	OK	924	1178.49	0.93	-206.58	-186.99	1092.75	-168.75	0.18
35	Nov-04		7.96		1009	1227.18	15.26	-240.99		1024.28	-15.28	0.02
36	Dec-04		-72.29	OK	1245	707.48	-145.23	793.07	-58.65	1087.30	157.70	0.13
37	Jan-05		2.76		703	573.79	-141.77	123.70		683.59	19.41	0.03

Table 3 (Continued)

						Alpha	0.59					
						Beta	0.30					
		Diff (%)				Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
38	Feb-05		53.21	OK	793	682.82	-66.53	-9.64	-0.26	371.04	421.96	0.53
39	Mar-05		45.16	OK	970	876.65	11.58	-31.02	-0.26	531.97	438.03	0.45
40	Apr-05		0.00		764	888.23	11.58	-124.23		764.00	0.00	0.00
41	May-05		-2.27		798	889.03	8.35	-85.88		816.13	-18.13	0.02
42	Jun-05		4.29		860	919.30	14.92	-69.77		823.11	36.89	0.04
43	Jul-05		-35.12	NG	651	798.32	-25.85	-82.39		825.89	-174.89	0.27
44	Aug-05		-4.64		718	752.67	-31.79	-25.22		751.30	-33.30	0.05
45	Sep-05		-5.17		559	703.71	-36.94	-136.50		587.90	-28.90	0.05
46	Oct-05		21.87	OK	589	743.33	-13.97	-190.90	-108.38	479.78	109.22	0.19
47	Nov-05		53.04	OK	1040	1057.23	84.39	-173.86	-108.38	488.36	551.64	0.53
48	Dec-05		-27.70	OK	1515	892.17	9.55	742.00	-108.38	1082.97	432.03	0.29
49	Jan-06		-345.83	OK	230	428.95	-132.28	26.90	-108.38	1025.42	-795.42	3.46
50	Feb-06		48.19	NG	554	455.35	-84.67	22.85		296.41	257.59	0.46
51	Mar-06		42.24	NG	588	518.28	-40.39	-0.80		370.41	217.59	0.37
52	Apr-06		46.98	NG	667	664.13	15.48	-86.10		353.67	313.33	0.47
53	May-06		7.23		640	707.11	23.73	-80.25		593.72	46.28	0.07
54	Jun-06		-17.21	OK	564	673.15	6.42	-81.58	-84.31	661.07	-97.07	0.17
55	Jul-06		-8.97		548	650.34	-2.35	-88.37		597.18	-49.18	0.09
56	Aug-06		-13.03	NG	551	605.33	-15.15	-33.95		622.78	-71.78	0.13
57	Sep-06		-3.11		440	582.05	-17.59	-138.17		453.68	-13.68	0.03
58	Oct-06		19.66	OK	465	618.81	-1.28	-179.77	-58.23	456.09	8.91	0.02
59	Nov-06		14.18	OK	517	661.12	11.79	-164.94	-58.23	509.15	7.85	0.02
60	Dec-06		-113.41	OK	663	226.00	-122.28	650.50	-58.23	564.53	98.47	0.15
61	Jan-07		54.96	NG	290	198.45	-93.86	46.30		130.62	159.38	0.55
62	Feb-07		-8.00		118	98.98	-95.54	21.70		127.44	-9.44	0.08
63	Mar-07		99.73	NG	963	574.25	75.70	116.07		2.63	960.37	1.00
64	Apr-07		47.84	OK	1081	957.32	167.91	-23.16		563.85	517.15	0.48
65	May-07		-11.76	NG	935	1059.87	148.30	-93.64		1044.99	-109.99	0.12
66	Jun-07		-59.80	NG	705	957.59	73.13	-132.89		1123.85	-418.85	0.59
67	Jul-07		-63.04	NG	578	814.16	8.16	-132.71		942.35	-364.35	0.63
68	Aug-07		-67.03	NG	472	634.28	-48.25	-72.45		788.38	-316.38	0.67
69	Sep-07		-11.69	OK	401	558.18	-56.61	-143.87		447.87	-46.87	0.12
70	Oct-07		31.24	OK	468	588.47	-30.54	-161.98		443.34	24.66	0.05
71	Nov-07		43.54	OK	696	738.03	23.49	-128.07		499.70	196.30	0.28
72	Dec-07		-99.72	OK	707	342.48	-102.22	564.71		703.29	3.71	0.01
73	Jan-08		45.83	NG	529	384.36	-58.99	75.80		286.55	242.45	0.46
74	Feb-08		34.27	NG	528	432.91	-26.73	43.72		347.07	180.93	0.34
75	Mar-08		21.35	NG	664	490.43	-1.45	133.32		522.24	141.76	0.21

Table 4 Verification result of Med A/T calculated by additive seasonal model with $\alpha = 0.33,\ \beta = 0.30,\ \gamma = 0.54$ and $c = 0.1$

						Alpha	0.33				
						Beta	0.30				
		Diff (%)				Gamma	0.54				
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			265			-277.08				
2	Feb-02	**47.17**			390			-152.08	-53.08			
3	Mar-02	**11.03**			433			-109.08	-53.08			
4	Apr-02	**29.56**			561			18.92	-53.08			
5	May-02	**24.60**			699			156.92	-53.08			
6	Jun-02	2.00			713			170.92				
7	Jul-02	5.33			751			208.92				
8	Aug-02	7.06			804			261.92				
9	Sep-02	**-10.82**			717			174.92	76.53			
10	Oct-02	**-27.20**			522			-20.08	76.53			
11	Nov-02	**-91.00**			47			-495.08	76.53			
12	Dec-02	**1182.98**			603	542.08	30.73	60.92	76.53			
13	Jan-03		**76.71**	OK	1270	889.95	125.87	74.98	76.53	295.73	974.27	0.77
14	Feb-03		**27.23**	OK	1187	1121.04	157.44	-35.27	76.53	**962.73**	224.27	0.19
15	Mar-03		0.05		1170	1278.67	157.50	-108.86		**1225.39**	-55.39	0.05
16	Apr-03		**-60.08**	NG	909	1258.41	104.17	-178.42		**1383.09**	-474.09	0.52
17	May-03		**-87.36**	NG	811	1131.96	34.98	-99.11		**1309.50**	-498.50	0.61
18	Jun-03		**-18.71**	OK	1127	1098.30	14.39	94.72	29.39	1337.86	-210.86	0.19
19	Jul-03		**-12.48**	OK	1175	1064.97	0.07	155.94	29.39	1321.61	-146.61	0.12
20	Aug-03		**-14.69**	OK	1157	1009.72	-16.52	200.50	29.39	1326.96	-169.96	0.15
21	Sep-03		-1.75		1148	986.65	-18.49	167.65		**1069.72**	78.28	0.07
22	Oct-03		**27.85**	NG	1314	1087.27	17.25	112.15		**1044.69**	269.31	0.20
23	Nov-03		**49.80**	OK	1214	1301.31	76.28	-276.62	45.69	**1181.04**	32.96	0.03
24	Dec-03		**17.52**	NG	1744	1477.03	106.11	171.31		**1454.12**	289.88	0.17
25	Jan-04		**-32.86**	NG	1248	1449.65	66.06	-73.22		**1659.67**	-411.67	0.33
26	Feb-04		**-10.73**	NG	1337	1469.02	52.06	-87.10		**1592.24**	-255.24	0.19
27	Mar-04		**-15.76**	NG	1220	1458.51	33.29	-178.32		1412.21	-192.21	0.16
28	Apr-04		**-11.02**	NG	1183	1449.36	20.55	-225.53		1313.38	-130.38	0.11
29	May-04		4.41		1434	1490.48	26.73	-76.27		1370.81	63.19	0.04
30	Jun-04		-8.11		1491	1477.84	14.92	51.02		**1546.60**	-55.60	0.04
31	Jul-04		**-16.11**	NG	1420	1418.32	-7.42	73.29		**1522.15**	-102.15	0.07
32	Aug-04		8.44		1760	1459.27	7.10	254.20		**1440.29**	319.71	0.18
33	Sep-04		-6.31		1537	1434.79	-2.38	132.59		1634.02	-97.02	0.06
34	Oct-04		-5.14		1469	1407.82	-9.76	84.84		1544.55	-75.55	0.05
35	Nov-04		**27.88**	OK	1555	1539.19	32.58	-119.95	-70.34	**1443.75**	111.25	0.07
36	Dec-04		**18.32**	NG	2134	1699.02	70.76	312.57		1743.08	390.92	0.18
37	Jan-05		**-28.82**	NG	1317	1646.23	33.69	-210.38		1696.55	-379.55	0.29

Table 4 (Continued)

						Alpha	0.33					
						Beta	0.30					
		Diff (%)				Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
38	Feb-05		-10.92	NG	1436	1628.87	18.38	-143.77		1592.82	-156.82	0.11
39	Mar-05		16.40	OK	1757	1741.02	46.51	-74.22	-70.34	1468.93	288.07	0.16
40	Apr-05		0.00		1562	1787.53	46.51	-225.53		1562.00	0.00	0.00
41	May-05		-16.80	NG	1505	1751.76	21.83	-167.61		1757.77	-252.77	0.17
42	Jun-05		-9.45		1667	1722.28	6.43	-5.93		1824.61	-157.61	0.09
43	Jul-05		-36.31	NG	1322	1572.47	-40.44	-100.16		1802.01	-480.01	0.36
44	Aug-05		-29.81	OK	1376	1398.50	-80.50	105.96	-36.03	1786.23	-410.23	0.30
45	Sep-05		-36.46	OK	1063	1191.83	-118.35	-7.47	-36.03	1450.59	-387.59	0.36
46	Oct-05		-20.66	OK	960	1008.93	-137.72	13.18	-36.03	1158.33	-198.33	0.21
47	Nov-05		54.96	NG	1668	1169.62	-48.19	211.32		800.87	867.13	0.52
48	Dec-05		38.46	NG	2330	1413.08	39.30	636.35		1434.00	896.00	0.38
49	Jan-06		-56.23	NG	795	1306.88	-4.35	-371.91		1242.01	-447.01	0.56
50	Feb-06		-55.12	NG	747	1168.50	-44.56	-292.56		1158.76	-411.76	0.55
51	Mar-06		18.56	NG	1289	1201.83	-21.19	12.24		1053.60	235.40	0.18
52	Apr-06		11.73	OK	1082	1221.94	-8.80	-179.68	-36.03	955.11	126.89	0.12
53	May-06		19.01	OK	1291	1293.05	15.17	-78.91	-36.03	1045.53	245.47	0.19
54	Jun-06		-25.34	NG	1039	1222.51	-10.54	-101.07		1302.28	-263.28	0.25
55	Jul-06		7.81		1206	1242.63	-1.34	-66.13		1111.81	94.19	0.08
56	Aug-06		-26.03	OK	1069	1150.72	-28.51	5.41	-16.36	1205.26	-136.26	0.13
57	Sep-06		14.05	NG	1297	1181.53	-10.72	58.39		1086.18	210.82	0.16
58	Oct-06		4.52		1240	1189.05	-5.25	33.41		1134.79	105.21	0.08
59	Nov-06		-5.29		1325	1160.98	-12.09	185.98		1395.13	-70.13	0.05
60	Dec-06		1.15		1806	1155.64	-10.07	643.86		1785.23	20.77	0.01
61	Jan-07		12.48	OK	884	1181.49	0.71	-332.04	344.73	773.67	110.33	0.12
62	Feb-07		-124.66	NG	396	1021.51	-47.50	-470.94		889.63	-493.63	1.25
63	Mar-07		17.74	NG	1199	1043.27	-26.72	89.12		986.26	212.74	0.18
64	Apr-07		42.68	OK	1460	1219.38	34.13	45.50	344.73	980.52	479.48	0.33
65	May-07		-11.69	NG	2050	1538.46	119.61	237.43		1217.48	832.52	0.41
66	Jun-07		-19.65	NG	1935	1781.11	156.53	35.52		1557.00	378.00	0.20
67	Jul-07		-23.90	NG	1640	1862.28	133.92	-149.79		1871.51	-231.51	0.14
68	Aug-07		-23.77	NG	1587	1861.24	93.43	-144.41		1979.84	-392.84	0.25
69	Sep-07		-17.46	NG	1586	1815.66	51.73	-95.93		2013.07	-427.07	0.27
70	Oct-07		1.67		2021	1906.51	63.46	76.85		1900.80	120.20	0.06
71	Nov-07		9.27	NG	2410	2052.67	88.27	277.78		2155.96	254.04	0.11
72	Dec-07		-7.69	OK	2505	2049.86	60.95	542.75	101.41	2784.80	-279.80	0.11
73	Jan-08		35.69	OK	2214	2252.48	103.45	-174.77	101.41	2455.55	-241.55	0.11
74	Feb-08		28.88	OK	2479	2549.29	161.46	-256.29	101.41	1884.99	594.01	0.24
75	Mar-08		1.20		2842	2724.46	165.57	104.34		2799.86	42.14	0.01

Table 5 Verification result of Med M/T calculated by additive seasonal model with $\alpha = 0.30,\ \beta = 0.30,\ \gamma = 0.62$ and $c = 0.1$

						Alpha	0.30					
						Beta	0.30					
		Diff (%)				Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			244			-108.50				
2	Feb-02	**17.21**			286			-66.50	-92.00			
3	Mar-02	-3.15			277			-75.50				
4	Apr-02	**32.85**			368			15.50	4.50			
5	May-02	**10.05**			405			52.50	4.50			
6	Jun-02	7.90			437			84.50				
7	Jul-02	**12.13**			490			137.50	127.00			
8	Aug-02	6.53			522			169.50				
9	Sep-02	**-14.94**			444			91.50	113.50			
10	Oct-02	-7.66			410			57.50				
11	Nov-02	**-83.90**			66			-286.50	64.01			
12	Dec-02	**325.76**			281	352.50	3.36	-71.50	64.01			
13	Jan-03		**62.23**	NG	655	478.15	40.05	68.21		247.36	407.64	0.62
14	Feb-03		**52.95**	NG	960	670.69	85.80	153.85		**426.21**	533.79	0.56
15	Mar-03		**29.36**	OK	964	841.39	111.27	47.19	64.01	680.99	283.01	0.29
16	Apr-03		**-21.17**	NG	799	901.91	96.04	-57.83		**957.16**	-158.16	0.20
17	May-03		**-61.36**	NG	651	878.12	60.09	-120.67		**1002.46**	-351.46	0.54
18	Jun-03		**-41.85**	NG	721	847.70	32.94	-46.29		1022.71	-301.71	0.42
19	Jul-03		**-37.03**	NG	743	798.10	8.18	18.23		**1007.64**	-264.64	0.36
20	Aug-03		**-28.56**	OK	759	741.24	-11.33	75.53	64.01	975.77	-216.77	0.29
21	Sep-03		-6.26		773	715.38	-15.69	70.52		**843.41**	-70.41	0.09
22	Oct-03		**20.96**	NG	958	759.94	2.38	144.55		757.19	200.81	0.21
23	Nov-03		**32.79**	OK	708	831.97	23.28	-185.85	14.38	**826.33**	-118.33	0.17
24	Dec-03		**-12.29**	NG	698	829.53	15.56	-108.67		**919.26**	-221.26	0.32
25	Jan-04		**-79.08**	NG	510	724.10	-20.74	-106.62		913.30	-403.30	0.79
26	Feb-04		**-51.99**	OK	564	615.40	-47.12	26.74	14.38	857.21	-293.21	0.52
27	Mar-04		**-23.34**	NG	499	533.34	-57.61	-3.30		**632.28**	-133.28	0.27
28	Apr-04		8.15		455	486.86	-54.27	-41.75		417.90	37.10	0.08
29	May-04		**40.81**	OK	527	497.12	-34.91	-27.43	-1.88	311.93	215.07	0.41
30	Jun-04		**21.67**	NG	531	496.73	-24.55	3.60		415.91	115.09	0.22
31	Jul-04		8.51		536	485.86	-20.45	37.99		490.41	45.59	0.09
32	Aug-04		**14.81**	OK	635	493.63	-11.98	116.30	95.43	**529.42**	105.58	0.17
33	Sep-04		**-124.46**	NG	246	389.80	-39.54	-62.21		552.16	-306.16	1.24
34	Oct-04		3.73		514	356.02	-37.81	152.87		494.81	19.19	0.04
35	Nov-04		**76.62**	OK	566	448.30	1.22	2.14	47.81	**332.59**	233.41	0.41
36	Dec-04		**51.24**	OK	699	556.96	33.45	46.59	47.81	340.84	358.16	0.51
37	Jan-05		**-24.69**	NG	388	561.68	24.83	-148.15		483.79	-95.79	0.25

Table 5 (Continued)

						Alpha	0.30					
						Beta	0.30					
		Diff (%)				Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
38	Feb-05		-33.90	NG	458	539.93	10.86	-40.56		600.89	-142.89	0.31
39	Mar-05		14.72	OK	642	579.14	19.36	37.67	47.81	547.49	94.51	0.15
40	Apr-05		-6.86		521	587.78	16.15	-57.25		556.76	-35.76	0.07
41	May-05		6.26		615	615.48	19.61	-10.74		602.05	12.95	0.02
42	Jun-05		-14.87	OK	556	610.28	12.17	-32.25	-42.53	638.69	-82.69	0.15
43	Jul-05		-45.79	NG	453	560.22	-6.50	-51.94		660.44	-207.44	0.46
44	Aug-05		-61.06	OK	416	477.51	-29.36	6.18	-42.53	649.15	-233.15	0.56
45	Sep-05		-7.80		358	439.77	-31.88	-74.32		385.94	-27.94	0.08
46	Oct-05		-46.41	OK	383	354.56	-47.88	75.81	-63.13	560.76	-177.76	0.46
47	Nov-05		50.75	NG	627	402.14	-19.24	140.07		354.50	272.50	0.43
48	Dec-05		46.91	NG	809	496.75	14.92	211.11		430.71	378.29	0.47
49	Jan-06		-14.68	OK	317	497.71	10.73	-168.31	-63.13	363.52	-46.52	0.15
50	Feb-06		-14.12	OK	410	491.08	5.52	-65.65	-63.13	467.88	-57.88	0.14
51	Mar-06		17.93	NG	651	531.62	16.03	88.27		544.41	106.59	0.16
52	Apr-06		-26.07	NG	389	517.23	6.90	-101.20		490.39	-101.39	0.26
53	May-06		-24.31	OK	413	494.01	-2.13	-54.26	-63.13	513.39	-100.39	0.24
54	Jun-06		-29.47	NG	355	460.49	-11.55	-77.60		449.35	-94.35	0.27
55	Jul-06		0.00		397	448.94	-11.55	-51.94		397.00	0.00	0.00
56	Aug-06		-26.73	OK	350	409.31	-19.97	-34.38	-64.00	394.86	-44.86	0.13
57	Sep-06		-1.29		311	388.14	-20.33	-76.06		315.02	-4.02	0.01
58	Oct-06		-4.38		425	362.22	-22.01	67.74		304.67	120.33	0.28
59	Nov-06		-31.94	NG	364	305.33	-32.47	89.66		480.28	-116.28	0.32
60	Dec-06		-5.90		457	264.76	-34.90	199.42		483.96	-26.96	0.06
61	Jan-07		70.41	OK	208	273.80	-21.72	-104.83	144.90	166.73	41.27	0.20
62	Feb-07		-60.71	NG	116	230.95	-28.06	-96.18		188.95	-72.95	0.63
63	Mar-07		1.63		296	204.34	-27.62	90.37		291.17	4.83	0.02
64	Apr-07		79.70	NG	372	265.66	-0.94	27.32		75.51	296.49	0.80
65	May-07		56.15	NG	480	345.58	23.32	62.59		201.60	278.40	0.58
66	Jun-07		34.69	OK	446	415.31	37.24	-10.54	19.52	291.30	154.70	0.35
67	Jul-07		0.34		402	452.97	37.37	-51.34		400.62	1.38	0.00
68	Aug-07		-14.56	NG	398	472.95	32.15	-59.50		426.34	-28.34	0.07
69	Sep-07		-12.61	NG	381	490.69	27.83	-96.89		429.03	-48.03	0.13
70	Oct-07		-20.13	OK	488	489.04	18.98	25.15	11.86	586.26	-98.26	0.20
71	Nov-07		-5.97		564	497.92	15.95	75.06		597.68	-33.68	0.06
72	Dec-07		-41.25	OK	505	451.38	-2.79	109.13	83.86	513.87	-8.87	0.02
73	Jan-08		24.61	OK	456	482.26	7.31	-56.17	83.86	343.76	112.24	0.25
74	Feb-08		30.86	OK	569	542.25	23.11	-20.05	83.86	393.38	175.62	0.31
75	Mar-08		0.80	OK	661	566.94	23.59	92.65		655.73	5.27	0.01

Table 6 Verification result of Low A/T calculated by additive seasonal model with $\alpha = 0.30,\ \beta = 0.30,\ \gamma = 0.77$ and $c = 0.1$

						Alpha	0.30					
						Beta	0.30					
		Diff (%)				Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Dec-02	0.00			155			-93.00				
2	Jan-03	**50.97**			234			-14.00	5.50			
3	Feb-03	**44.87**			339			91.00	5.50			
4	Mar-03	3.83			352			104.00				
5	Apr-03	**-33.81**			233			-15.00	26.50			
6	May-03	**-14.59**			199			-49.00	26.50			
7	Jun-03	-1.01			197			-51.00				
8	Jul-03	8.63			214			-34.00				
9	Aug-03	**13.55**			243			-5.00	-30.50			
10	Sep-03	-9.05			221			-27.00				
11	Oct-03	**20.36**			266			18.00	23.66			
12	Nov-03	**21.43**			323	248.00	15.27	75.00	23.66			
13	Dec-03		**56.67**	NG	393	330.09	35.32	27.26		170.27	222.73	0.57
14	Jan-04		**23.11**	NG	457	397.09	44.82	43.01		**370.91**	86.09	0.19
15	Feb-04		-6.16		502	432.64	42.04	74.31		**447.41**	54.59	0.11
16	Mar-04		-5.60		548	465.47	39.28	87.44		578.68	-30.68	0.06
17	Apr-04		8.97		538	519.23	43.62	11.05		**531.25**	6.75	0.01
18	May-04		**10.32**	OK	573	580.59	48.95	-17.06	-5.81	**589.35**	-16.35	0.03
19	Jun-04		8.31		631	645.28	53.67	-22.67		578.54	52.46	0.08
20	Jul-04		**-19.17**	NG	558	666.86	44.04	-91.74		664.94	-106.94	0.19
21	Aug-04		-1.71		694	707.33	42.97	-11.43		**680.40**	13.60	0.02
22	Sep-04		**-24.71**	NG	580	707.31	30.07	-104.37		723.30	-143.30	0.25
23	Oct-04		**-43.61**	NG	526	668.57	9.43	-105.85		**761.04**	-235.04	0.45
24	Nov-04		1.57		765	681.60	10.51	81.48		**701.65**	63.35	0.08
25	Dec-04		9.29		793	714.20	17.14	67.01		719.36	73.64	0.09
26	Jan-05		**-49.49**	NG	518	654.43	-5.93	-95.40		774.35	-256.35	0.49
27	Feb-05		**-25.27**	NG	577	604.75	-19.06	-4.41		722.81	-145.81	0.25
28	Mar-05		6.38		719	599.46	-14.93	112.20		673.13	45.87	0.06
29	Apr-05		-6.54		559	573.55	-18.22	-8.70		595.58	-36.58	0.07
30	May-05		**14.01**	NG	626	581.65	-10.33	30.31		**549.52**	76.48	0.12
31	Jun-05		**16.75**	NG	659	604.43	-0.39	36.91		548.65	110.35	0.17
32	Jul-05		-3.91		493	598.25	-2.13	-102.16		512.29	-19.29	0.04
33	Aug-05		-4.97		557	587.81	-4.62	-26.38		584.69	-27.69	0.05
34	Sep-05		-4.77		457	576.64	-6.59	-116.15		478.81	-21.81	0.05
35	Oct-05		**-25.46**	NG	370	541.79	-15.06	-156.71		464.21	-94.21	0.25
36	Nov-05		**12.11**	NG	692	551.87	-7.52	126.72		608.21	83.79	0.12
37	Dec-05		**42.54**	NG	1064	680.14	33.21	311.41		611.36	452.64	0.43

Table 6 (Continued)

						Alpha	0.30					
						Beta	0.30					
		Diff (%)				Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
38	Jan-06		-38.87	NG	445	661.46	17.65	-188.78		617.95	-172.95	0.39
39	Feb-06		-67.42	NG	403	597.60	-6.80	-151.11		674.70	-271.70	0.67
40	Mar-06		0.00		703	590.80	-6.80	112.20		703.00	0.00	0.00
41	Apr-06		-22.40	NG	470	552.40	-16.28	-65.55		575.30	-105.30	0.22
42	May-06		-0.97		561	534.49	-16.77	27.37		566.43	-5.43	0.01
43	Jun-06		-14.83	NG	483	496.24	-23.22	-1.77		554.63	-71.63	0.15
44	Jul-06		24.93	OK	494	509.96	-12.13	-35.67	3.62	370.86	123.14	0.25
45	Aug-06		2.39		483	501.29	-11.09	-20.14		471.45	11.55	0.02
46	Sep-06		29.16	OK	528	536.38	2.76	-33.03	-21.02	374.05	153.95	0.29
47	Oct-06		34.96	OK	588	600.82	21.26	-45.72	-21.02	382.43	205.57	0.35
48	Nov-06		-22.35	OK	612	581.04	8.95	52.86	-21.02	748.80	-136.80	0.22
49	Dec-06		-21.32	OK	743	542.47	-5.30	225.89	-21.02	901.40	-158.40	0.21
50	Jan-07		35.96	OK	544	595.85	12.30	-83.16	-21.02	348.39	195.61	0.36
51	Feb-07		-97.85	NG	231	540.34	-8.04	-273.15		457.04	-226.04	0.98
52	Mar-07		64.99	NG	1841	891.25	99.64	758.22		644.50	1196.50	0.65
53	Apr-07		38.23	NG	1498	1162.69	151.18	243.64		925.34	572.66	0.38
54	May-07		-7.30		1250	1286.49	142.97	-21.89		1341.24	-91.24	0.07
55	Jun-07		-21.61	NG	1174	1353.36	120.14	-138.75		1427.70	-253.70	0.22
56	Jul-07		-40.96	NG	1020	1348.15	82.53	-261.26		1477.11	-457.11	0.45
57	Aug-07		-28.58	NG	1097	1336.62	54.31	-189.43		1410.54	-313.54	0.29
58	Sep-07		-15.17	NG	1179	1337.26	38.21	-129.62		1369.92	-190.92	0.16
59	Oct-07		1.72		1353	1382.45	40.31	-33.17		1354.46	-1.46	0.00
60	Nov-07		0.43		1482	1424.67	40.88	56.31		1401.74	80.26	0.05
61	Dec-07		13.35	NG	1952	1543.72	64.33	366.57		1444.54	507.46	0.26
62	Jan-08		-1.59		1501	1600.88	62.18	-96.06		1587.04	-86.04	0.06
63	Feb-08		-26.24	NG	1101	1576.39	36.18	-429.14		1389.91	-288.91	0.26
64	Mar-08		-102.63	OK	1170	1252.33	-71.89	109.89		2370.79	-1200.79	1.03

Table 7 Verification result of Low M/T calculated by additive seasonal model with $\alpha = 0.54,\ \beta = 0.30,\ \gamma = 0.30$ and $c = 0.1$

						Alpha	0.54					
						Beta	0.30					
		Diff (%)				Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			10			-23.50				
2	Feb-02	**50.00**			15			-18.50	-9.50			
3	Mar-02	**46.67**			22			-11.50	-9.50			
4	Apr-02	**59.09**			35			1.50	-9.50			
5	May-02	**14.29**			40			6.50	-9.50			
6	Jun-02	-5.00			38			4.50				
7	Jul-02	**-36.84**			24			-9.50	-3.50			
8	Aug-02	**58.33**			38			4.50	-3.50			
9	Sep-02	**-47.37**			20			-13.50	-3.50			
10	Oct-02	**45.00**			29			-4.50	-3.50			
11	Nov-02	**37.93**			40			6.50	-3.50			
12	Dec-02	**127.50**			91	33.50	7.36	57.50	-3.50			
13	Jan-03		**90.02**	NG	174	126.02	32.91	-2.06		17.36	156.64	0.90
14	Feb-03		**63.90**	NG	389	294.07	73.45	15.53		**149.43**	239.57	0.62
15	Mar-03		-0.01		356	367.51	73.45	-11.50		**358.02**	-2.02	0.01
16	Apr-03		**-67.60**	NG	264	343.94	44.34	-22.93		**431.46**	-167.46	0.63
17	May-03		**-99.38**	NG	198	281.30	12.25	-20.44		**378.78**	-180.78	0.91
18	Jun-03		**-45.39**	OK	205	242.96	-2.93	-8.24	-9.78	298.04	-93.04	0.45
19	Jul-03		4.34		241	245.72	-1.22	-8.07		**236.53**	4.47	0.02
20	Aug-03		-6.87		233	235.80	-3.83	2.31		**241.00**	-8.00	0.03
21	Sep-03		4.18		228	237.15	-2.28	-12.20		**228.47**	-0.47	0.00
22	Oct-03		**10.01**	OK	256	248.81	1.90	-0.99	25.27	**231.37**	24.63	0.10
23	Nov-03		**23.45**	OK	336	293.55	14.75	17.29	25.27	**247.21**	88.79	0.26
24	Dec-03		9.46		404	329.07	20.98	62.73		**304.80**	99.20	0.25
25	Jan-04		2.25		356	354.40	22.29	-0.96		348.00	8.00	0.02
26	Feb-04		-2.95		381	370.59	20.46	13.99		392.22	-11.22	0.03
27	Mar-04		6.74		407	405.98	24.94	-7.75		379.55	27.45	0.07
28	Apr-04		**-19.64**	NG	341	394.50	14.01	-32.10		407.98	-66.98	0.20
29	May-04		9.54		429	430.76	20.69	-14.84		388.07	40.93	0.10
30	Jun-04		**-16.33**	OK	381	417.63	10.54	-16.75	-21.02	**441.66**	-60.66	0.16
31	Jul-04		**-18.34**	OK	355	392.77	-0.08	-16.98	-21.02	420.10	-65.10	0.18
32	Aug-04		**19.39**	NG	490	444.34	15.42	15.31		395.01	94.99	0.19
33	Sep-04		**-166.41**	NG	168	307.77	-30.18	-50.47		447.56	-279.56	1.66
34	Oct-04		**25.85**	NG	373	330.00	-14.46	12.21		**302.85**	70.15	0.19
35	Nov-04		**29.63**	NG	473	391.75	8.41	36.48		**340.81**	132.19	0.28
36	Dec-04		**30.08**	NG	662	508.41	40.88	89.99		462.88	199.12	0.30
37	Jan-05		**-49.82**	NG	366	450.16	11.14	-25.92		548.33	-182.33	0.50

Table 7 (Continued)

						Alpha	0.54					
						Beta	0.30					
		Diff (%)				Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
38	Feb-05		-10.28	OK	431	437.22	3.92	7.93	-21.02	475.30	-44.30	0.10
39	Mar-05		28.36	NG	605	534.44	31.91	15.75		433.39	171.61	0.28
40	Apr-05		6.27		570	585.78	37.74	-27.21		534.24	35.76	0.06
41	May-05		-9.67		555	594.33	28.98	-22.19		608.69	-53.69	0.10
42	Jun-05		-1.60		597	618.12	27.42	-18.06		602.30	-5.30	0.01
43	Jul-05		-31.77	NG	477	563.14	2.70	-37.73		624.52	-147.52	0.31
44	Aug-05		-36.74	OK	425	480.95	-22.77	-6.06	-36.57	581.16	-156.16	0.37
45	Sep-05		-9.01		374	439.85	-28.27	-55.08		407.71	-33.71	0.09
46	Oct-05		-32.85	OK	319	354.61	-45.36	-2.14	-36.86	423.79	-104.79	0.33
47	Nov-05		30.85	NG	500	393.13	-20.20	57.59		345.73	154.27	0.31
48	Dec-05		36.32	NG	727	516.50	22.88	126.14		462.92	264.08	0.36
49	Jan-06		-96.73	NG	261	402.13	-18.30	-60.48		513.46	-252.46	0.97
50	Feb-06		-41.94	OK	276	320.89	-37.18	-7.92	-36.86	362.81	-86.81	0.31
51	Mar-06		35.88	NG	467	374.80	-9.85	38.68		299.46	167.54	0.36
52	Apr-06		-31.93	NG	256	320.51	-23.19	-38.40		337.74	-81.74	0.32
53	May-06		8.59		301	311.38	-18.97	-18.64		275.14	25.86	0.09
54	Jun-06		-23.58	NG	222	263.95	-27.51	-25.23		274.35	-52.35	0.24
55	Jul-06		43.38	OK	351	319.24	-2.67	-16.88	52.46	198.72	152.28	0.43
56	Aug-06		-15.00	NG	270	294.55	-9.28	-11.61		280.00	-10.00	0.04
57	Sep-06		21.44	OK	293	319.42	0.97	-46.48	52.46	230.19	62.81	0.21
58	Oct-06		12.33	OK	363	344.72	8.27	3.99	52.46	283.53	79.47	0.22
59	Nov-06		-21.12	NG	339	314.07	-3.41	47.80		410.58	-71.58	0.21
60	Dec-06		-4.50		418	300.44	-6.47	123.57		436.80	-18.80	0.04
61	Jan-07		-44.13	NG	162	255.10	-18.13	-70.27		233.48	-71.48	0.44
62	Feb-07		-110.14	NG	109	171.70	-37.71	-24.35		200.11	-91.11	0.84
63	Mar-07		43.76	OK	307	207.02	-15.80	57.07	62.57	172.67	134.33	0.44
64	Apr-07		44.83	OK	277	258.73	4.45	-21.40	62.57	152.82	124.18	0.45
65	May-07		51.38	OK	503	403.70	46.61	16.74	62.57	244.53	258.47	0.51
66	Jun-07		-11.86	NG	380	425.80	39.25	-31.40		425.08	-45.08	0.12
67	Jul-07		-20.48	NG	372	423.64	26.83	-27.31		517.51	-145.51	0.39
68	Aug-07		-17.34	NG	374	415.21	16.25	-20.49		438.86	-64.86	0.17
69	Sep-07		11.09	OK	433	457.57	24.08	-39.91	62.57	483.92	-50.92	0.12
70	Oct-07		-3.77		468	472.06	21.21	1.57		534.11	-66.11	0.14
71	Nov-07		-14.39	OK	473	456.27	10.11	38.48	-11.70	541.07	-68.07	0.14
72	Dec-07		-36.24	OK	433	381.05	-15.49	102.08	-11.70	589.94	-156.94	0.36
73	Jan-08		39.24	OK	486	469.24	15.61	-44.16	-11.70	295.29	190.71	0.39
74	Feb-08		-0.99		456	482.41	14.88	-24.97		460.50	-4.50	0.01
75	Mar-08		-9.13		508	472.08	7.32	50.73		559.86	-51.86	0.10

From Figure 21 to Figure 25, they show that the proposed model generally better track the actual data than the company's forecasts, except when there are wide fluctuation from one month to the
next.

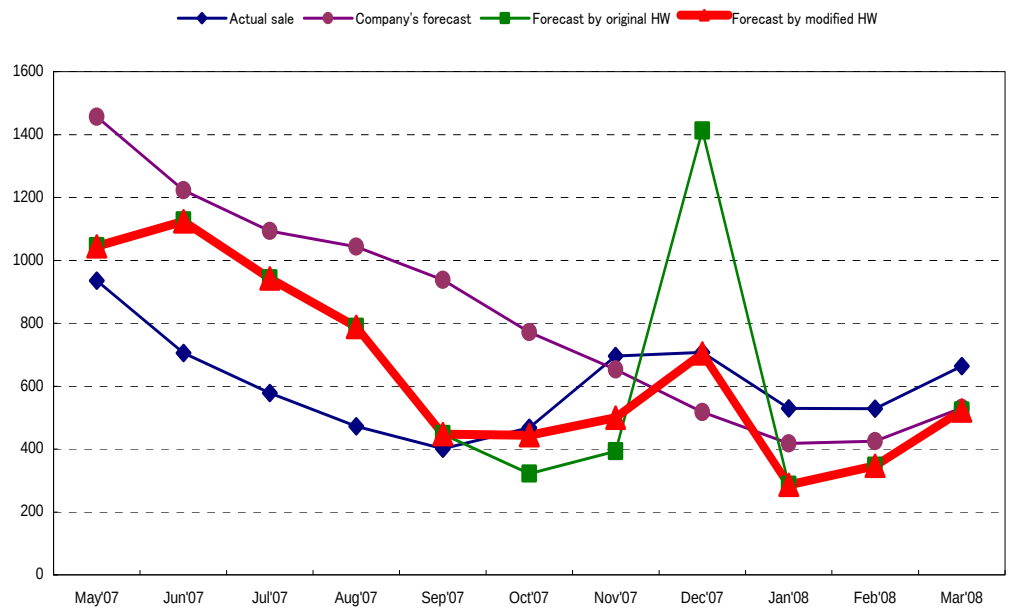

Figure 21 Comparison among actual sale data, company's forecast, forecast by original HW and forecast by modified HW during May'07 to March'08 for Top A/T.

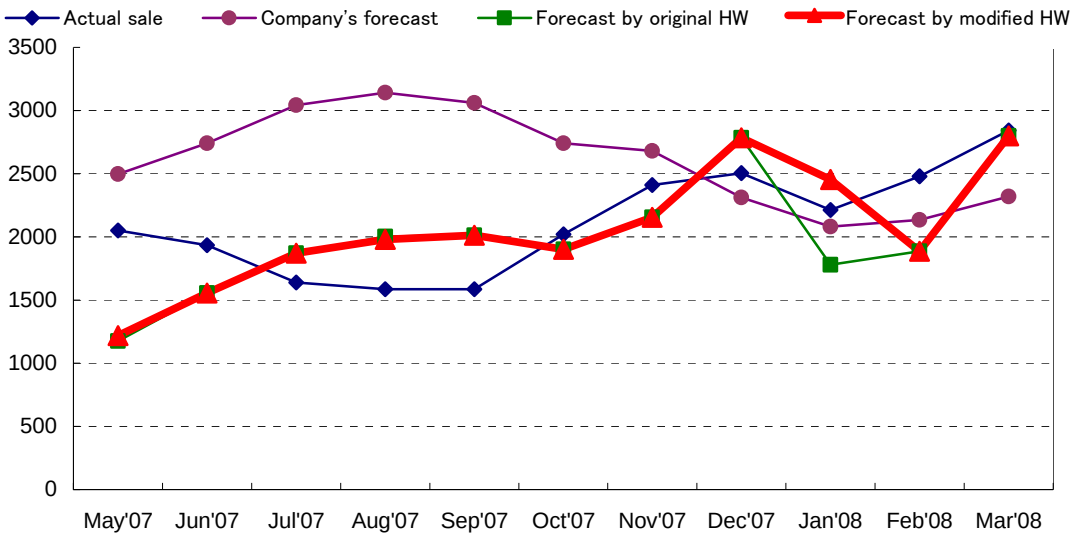

Figure 22 Comparison among actual sale data, company's forecast, forecast by original HW and forecast by modified HW during May'07 to March'08 for Med A/T.

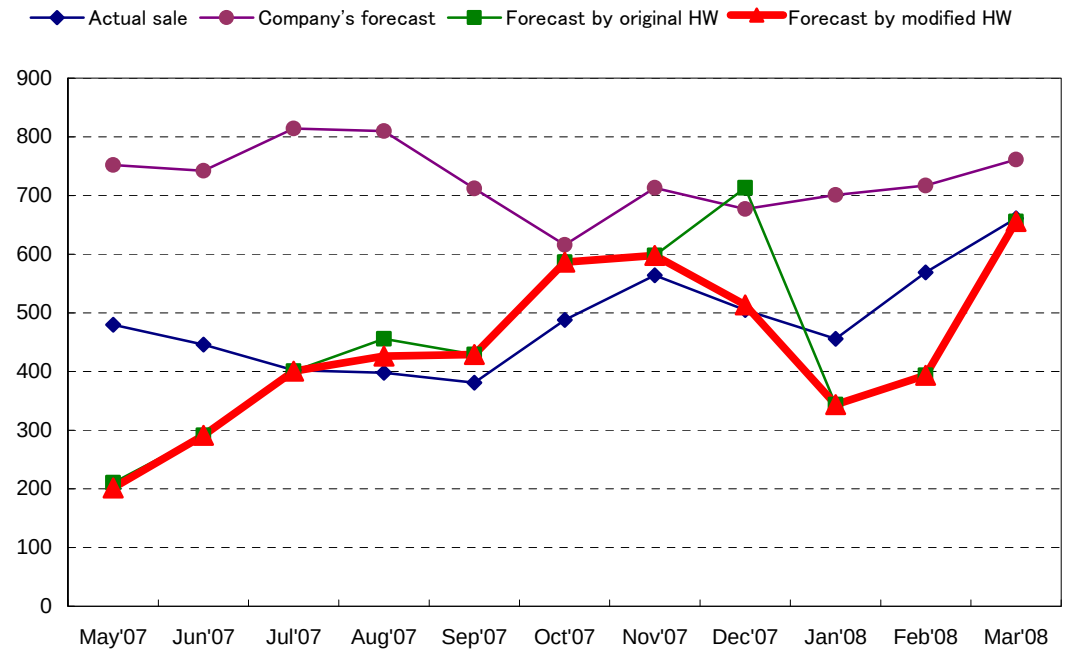

Figure 23 Comparison among actual sale data, company's forecast, forecast by original HW and forecast by modified HW during May'07 to March'08 for Med M/T.

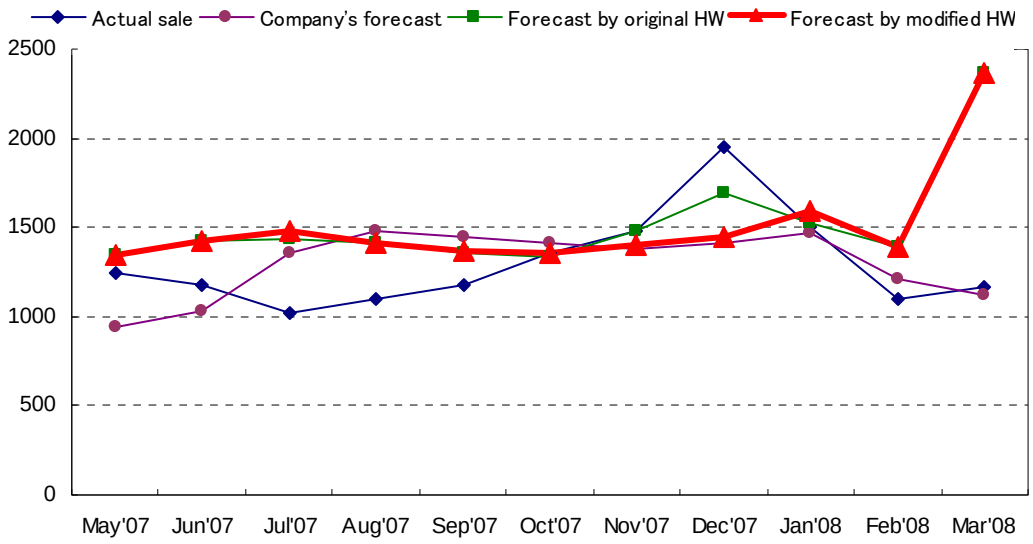

Figure 24 Comparison among actual sale data, company's forecast, forecast by original HW and forecast by modified HW during May'07 to March'08 for Low A/T.

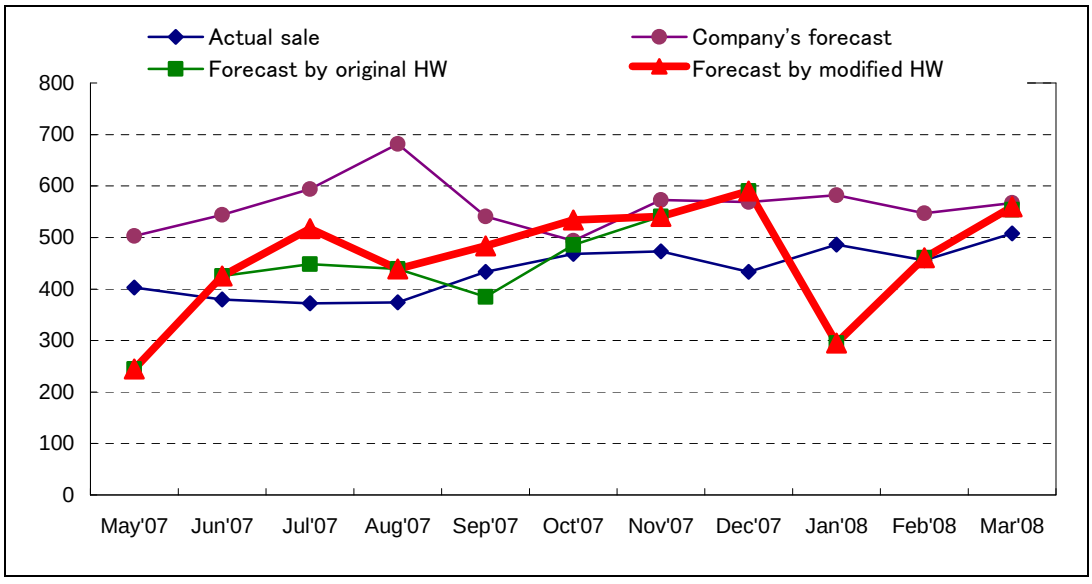

Figure 25 Comparison among actual sale data, company's forecast, forecast by original HW and forecast by modified HW during May'07 to March'08 for Low M/T.

Discussion

Table 8 shows the MAPE of the forecasts that this automobile company had (see Appendix F) , the forecasts from the original HW and the forecasts from our modified model.

Table 8 MAPE of the company's forecasts, the original HW forecasts and the modified HW forecasts.

	MAPE		
	Company's forecasts	**Original HW forecasts**	**Modified HW forecasts**
Top A/T	0.574	0.445	**0.317**
Med A/T	0.394	0.594	**0.173**
Med M/T	0.543	0.220	**0.179**
Low A/T	**0.167**	0.236	0.259
Low M/T	0.313	**0.196**	0.224
Average	**0.398**	**0.338**	**0.230**

The result from Table 8 shows that both HW models, altogether, perform better than the company's forecasts for 4 out of 5 data sets. The modified HW, by itself, wins in three out of five cases, but the original HW wins for the Low M/T data set, and the company's forecasts fares the best for the Low A/T data set.

To see whether the MAPE of the modified HW has any statistical difference compared to the MAPE of original, hypothesis test on the ratio of two variances is conducted with the confidential level equal to 0.95 or type I error (α) equal to 0.05. A null hypothesis and an alternative hypothesis are described respectively as

$$H_0 : \sigma^2_{Mod.HW} = \sigma^2_{Org.HW}$$

$$H_1 : \sigma^2_{Mod.HW} < \sigma^2_{Org.HW}$$

where $\sigma^2_{Mod.HW}$ is variance of the modified HW, and $\sigma^2_{Org.HW}$ is variance of the original HW.

Table 9 Hypothesis test result when $\alpha = 0.05$ and degree of freedom of the modified HW = 10 and degree of freedom of the original HW = 10

	$f_0 = \frac{s_1^2}{s_2^2}$	$f_{0.95,10,10}$	**Conclusion of hypothesis test**
Top A./T	0.51	0.34	Fail to reject null hypothesis
Med A/T	0.08	0.34	**Reject null hypothesis**
Med M/T	0.66	0.34	Fail to reject null hypothesis
Low A/T	1.20	0.34	Fail to reject null hypothesis
Low M/T	1.31	0.34	Fail to reject null hypothesis

The result from Table 9 shows that only the MAPE of the Med A/T is statistically different. It means that the MAPE of the modified HW is statistically lower than the MAPE of original HW for only the Med A/T configuration. However, we may be able to improve this by increasing sample size more.

To apply the modified HW into the inventory management for car dealers, historical sale record should be periodically uploaded onto Information Database Center. This data are then fed to some computer program to calculate sale forecasts which can be used for production planning.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study shows that a modification of the HW method according to the proposed model can reduce a fluctuation of data noticeably as shown in Figure 11 to Figure 14. The proposed model can perform forecast of car ordering well with threshold value c = 10% as proved in Figure 11 – Figure 15.

To prove how the proposed model improves the forecasting process, data during May 2007 to March 2008 are used to compare company's forecasts and forecasts from the original HW. The MAPE comparison result (Table 8) shows that the modified HW can perform better than others especially for Top A/T, Med A/T and Med M/T configurations which have large data size with wide data fluctuation. Noticeably, the modified HW is unable to work well with data which have a small data size with narrow data fluctuation such as both Low A/T and Low M/T. This is probably because we cannot estimate HW parameter well when the sample size is small.

Nevertheless, in statistical point of view, MAPE result does not show statistical difference except Med A/T. Result of the F-Test shows that the difference in MAPE are statistically different only Med A/T. However, in the real world, what entrepreneurs care is magnitude of data rather than statistical significance because increasing or decreasing magnitude of data means money they save or lose.

This study can be implemented into another industry which shows characteristic such as trend and seasonality by reconsidering the type of HW model (either additive seasonal model or multiplicative seasonal model) and a proper threshold value. Although, the modified HW can help manage forecasts especially forecasts with high fluctuation, users should consider circumstances and consult experienced analysts altogether before using results estimated from the modified HW.

In this way, utilization would be better than a user trusts the calculated result without any further consideration.

Recommendations

For further study in the future, this study can be improved further if a better job of determining smoothing constants (α, β and γ in Equations (2)—(4) and (10)—(12)) will be done by using non-linear programming. In addition, scale transformation by taking logarithm for highly different value of collected data would help forecasting models to perform better.

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APPENDICES

Appendix A

Raw data of all 5 configurations
(Top A/T, Med A/T, Med M/T, Low A/T and Low M/T)

Appendix Table A1 Actual sale volume of all configuration since Jan 2002 – March 2008

	Configuration / Month	Top A/T	Med A/T	Med M/	Low A/T	Low M/T
1	Jan-02	188	265	244		10
2	Feb-02	196	390	286		15
3	Mar-02	237	433	277		22
4	Apr-02	253	561	368		35
5	May-02	271	699	405		40
6	Jun-02	216	713	437		38
7	Jul-02	257	751	490		24
8	Aug-02	266	804	522		38
9	Sep-02	171	717	444		20
10	Oct-02	113	522	410		29
11	Nov-02	23	47	66		40
12	Dec-02	1320	603	281	155	91
13	Jan-03	1811	1270	655	234	174
14	Feb-03	1371	1187	960	339	389
15	Mar-03	1473	1170	964	352	356
16	Apr-03	1238	909	799	233	264
17	May-03	1148	811	651	199	198
18	Jun-03	1257	1127	721	197	205
19	Jul-03	1450	1175	743	214	241
20	Aug-03	1321	1157	759	243	233
21	Sep-03	1191	1148	773	221	228
22	Oct-03	1130	1314	958	266	256
23	Nov-03	1207	1214	708	323	336
24	Dec-03	1434	1744	698	393	404
25	Jan-04	1075	1248	510	457	356
26	Feb-04	1130	1337	564	502	381
27	Mar-04	1058	1220	499	548	407
28	Apr-04	967	1183	455	538	341
29	May-04	1037	1434	527	573	429
30	Jun-04	1160	1491	531	631	381
31	Jul-04	975	1420	536	558	355
32	Aug-04	1242	1760	635	694	490
33	Sep-04	1123	1537	246	580	168
34	Oct-04	924	1469	514	526	373
35	Nov-04	1009	1555	566	765	473
36	Dec-04	1245	2134	699	793	662
37	Jan-05	703	1317	388	518	366

Appendix Table A1 (Continued)

	Configuration / Month	Top A/T	Med A/T	Med M/	Low A/T	Low M/T
38	Feb-05	793	1436	458	577	431
39	Mar-05	970	1757	642	719	605
40	Apr-05	764	1562	521	559	570
41	May-05	798	1505	615	626	555
42	Jun-05	860	1667	556	659	597
43	Jul-05	651	1322	453	493	477
44	Aug-05	718	1376	416	557	425
45	Sep-05	559	1063	358	457	374
46	Oct-05	589	960	383	370	319
47	Nov-05	1040	1668	627	692	500
48	Dec-05	1515	2330	809	1064	727
49	Jan-06	230	795	317	445	261
50	Feb-06	554	747	410	403	276
51	Mar-06	588	1289	651	703	467
52	Apr-06	667	1082	389	470	256
53	May-06	640	1291	413	561	301
54	Jun-06	564	1039	355	483	222
55	Jul-06	548	1206	397	494	351
56	Aug-06	551	1069	350	483	270
57	Sep-06	440	1297	311	528	293
58	Oct-06	465	1240	425	588	363
59	Nov-06	517	1325	364	612	339
60	Dec-06	663	1806	457	743	418
61	Jan-07	290	884	208	544	162
62	Feb-07	118	396	116	231	109
63	Mar-07	963	1199	296	1841	307
64	Apr-07	1081	1460	372	1498	277
65	May-07	935	2050	480	1250	503
66	Jun-07	705	1935	446	1174	380
67	Jul-07	578	1640	402	1020	372
68	Aug-07	472	1587	398	1097	374
69	Sep-07	401	1586	381	1179	433
70	Oct-07	468	2021	488	1353	468
71	Nov-07	696	2410	564	1482	473
72	Dec-07	707	2505	505	1952	433
73	Jan-08	529	2214	456	1501	486
74	Feb-08	528	2479	569	1101	456
75	Mar-08	664	2842	661	1170	508

Appendix B

Calculation example of HW method for Top A/T configuration

When t = 1

$$S_1 = Y_1 - R_{12}$$

$$= Y_1 - \frac{\sum_{t=1}^{12} Y_t}{12}$$

$$= 188 - \frac{(188+196+237+253+271+216+257+266+171+113+23+1320)}{12}$$

$$= -104.58$$

When t = 2

$$S_2 = Y_2 - R_{12}$$

$$= Y_2 - \frac{\sum_{t=1}^{12} Y_t}{12}$$

$$= 196 - \frac{(188+196+237+253+271+216+257+266+171+113+23+1320)}{12}$$

$$= -96.58$$

When t = 3

$$S_3 = Y_3 - R_{12}$$

$$= Y_3 - \frac{\sum_{t=1}^{12} Y_t}{12}$$

$$= 237 - \frac{(188+196+237+253+271+216+257+266+171+113+23+1320)}{12}$$

$$= -55.58$$

When t =4

$$S_4 = Y_4 - R_{12}$$

$$= Y_4 - \frac{\sum_{t=1}^{12} Y_t}{12}$$

$$= 253 - \frac{(188+196+237+253+271+216+257+266+171+113+23+1320)}{12}$$

= -39.58

When t = 5

$$S_5 = Y_5 - R_{12}$$

$$= Y_5 - \frac{\sum_{t=1}^{12} Y_t}{12}$$

$$= 271 - \frac{(188+196+237+253+271+216+257+266+171+113+23+1320)}{12}$$

= -21.58

When t = 6

$$S_6 = Y_6 - R_{12}$$

$$= Y_6 - \frac{\sum_{t=1}^{12} Y_t}{12}$$

$$= 271 - \frac{(188+196+237+253+271+216+257+266+171+113+23+1320)}{12}$$

= -76.58

When t = 7

$$S_7 = Y_7 - R_{12}$$

$$= Y_7 - \frac{\sum_{t=1}^{12} Y_t}{12}$$

$$= 257 - \frac{(188+196+237+253+271+216+257+266+171+113+23+1320)}{12}$$

= -35.58

When t = 8

$$S_8 = Y_8 - R_{12}$$

$$= Y_8 - \frac{\sum_{t=1}^{12} Y_t}{12}$$

$$= 266 - \frac{(188+196+237+253+271+216+257+266+171+113+23+1320)}{12}$$

= -26.58

When t = 9

$$S_9 = Y_9 - R_{12}$$

$$= Y_9 - \frac{\sum_{t=1}^{12} Y_t}{12}$$

$$= 171 - \frac{(188+196+237+253+271+216+257+266+171+113+23+1320)}{12}$$

= -121.58

When t = 10

$$S_{10} = Y_{10} - R_{12}$$

$$= Y_{10} - \frac{\sum_{t=1}^{12} Y_t}{12}$$

$$= 113 - \frac{(188+196+237+253+271+216+257+266+171+113+23+1320)}{12}$$

= -179.58

When t = 11

$$S_{11} = Y_{11} - R_{12}$$

$$= Y_{11} - \frac{\sum_{t=1}^{12} Y_t}{12}$$

$$= 23 - \frac{(188+196+237+253+271+216+257+266+171+113+23+1320)}{12}$$

= -269.58

When t = 12

$$R_{12} = \frac{\sum_{t=1}^{12} Y_t}{12}$$

$$= \frac{188+196+237+253+271+216+257+266+171+113+23+1320}{12}$$

= 292.58

$$G_{12} = \frac{Y_{12} - Y_1}{12-1}$$

$$= \frac{1320-188}{11}$$

= 102.91

$$S_{12} = Y_{12} - R_{12}$$

$$= Y_{12} - \frac{\sum_{t=1}^{12} Y_t}{12}$$

$$= 1320 - \frac{(188+196+237+253+271+216+257+266+171+113+23+1320)}{12}$$

= 1027.42

When t = 13

$$R_{13} = \alpha(Y_{13} - S_1) + (1-\alpha)(R_{12} + G_{12})$$
$$= 0.59 \times [1811 - (-104.58)] + (1 - 0.59) \times (292.58 + 102.91)$$
$$= 1298.99$$

$$G_{13} = \beta(R_{13} - R_{12}) + (1-\beta)G_{12}$$
$$= 0.30 \times (1298.99 - 292.58) + (1 - 0.30) \times 102.91$$
$$= 373.96$$

$$S_{13} = \gamma(Y_{13} - R_{13}) + (1-\gamma)S_1$$
$$= 0.30 \times (1811 - 1298.99) + (1 - 0.30) \times (-104.58)$$
$$= 80.40$$

$$F_{13} = R_{12} + G_{12} + S_1$$
$$= 292.58 + 102.91 + (-104.58)$$
$$= 290.91$$

$$E_{13} = Y_{13} - F_{13}$$
$$= 1811 - 290.91$$
$$= 1520.09$$

When t = 14

$$R_{14} = \alpha(Y_{14} - S_2) + (1-\alpha)(R_{13} + G_{13})$$
$$= 0.59 \times [1317 - (-96.58)] + (1 - 0.59) \times (1298.99 + 373.96)$$
$$= 1550.88$$

$$G_{14} = \beta(R_{14} - R_{13}) + (1-\beta)G_{13}$$

$= 0.30 \times (1550.88 - 1298.99) + (1 - 0.30) \times 373.96$

$= 337.34$

$S_{14} = \gamma(Y_{14} - R_{14}) + (1 - \gamma)S_2$

$= 0.30 \times (1371 - 1550.88) + (1 - 0.30) \times (-96.58)$

$= -121.57$

$F_{14} = R_{13} + G_{13} + S_2$

$= 1298.99 + 373.96 + (-96.58)$

$= 1576.36$

$E_{14} = Y_{14} - F_{14}$

$= 1371 - 1576.36$

$= -205.36$

When t = 15

$R_{15} = \alpha(Y_{15} - S_3) + (1 - \alpha)(R_{14} + G_{14})$

$= 0.59 \times [1473 - (-55.58)] + (1 - 0.59) \times (1550.88 + 337.34)$

$= 1674.46$

$G_{15} = \beta(R_{15} - R_{14}) + (1 - \beta)G_{14}$

$= 0.30 \times (1674.46 - 1550.88) + (1 - 0.30) \times 337.34$

$= 273.21$

$S_{15} = \gamma(Y_{15} - R_{15}) + (1 - \gamma)S_3$

$= 0.30 \times (1473 - 1674.46) + (1 - 0.30) \times (-55.58)$

$= -99.35$

F_{15} $= R_{14} + G_{14} + S_3$

= 1550.88 + 337.34 + (-55.58)

= 1832.64

E_{15} $= Y_{15} - F_{15}$

= 1473 – 1832.64

= -359.64

When t =16

R_{16} $= \alpha(Y_{16} - S_4) + (1-\alpha)(R_{15} + G_{15})$

$= 0.59 \times [1238 - (-39.58)] + (1 - 0.59) \times (1674.46 + 273.21)$

= 1549.39

G_{16} $= \beta(R_{16} - R_{15}) + (1-\beta)G_{15}$

$= 0.30 \times (1549.39 - 1674.46) + (1 - 0.30) \times 273.21$

= 153.73

S_{16} $= \gamma(Y_{16} - R_{16}) + (1-\gamma)S_4$

$= 0.30 \times (1238 - 1549.39) + (1 - 0.30) \times (-39.58)$

= -121.13

F_{16} $= R_{15} + G_{15} + S_4$

= 1674.46 + 273.21+(-39.58)

= 1908.09

E_{16} $= Y_{16} - F_{16}$

= 1238 – 1908.09

= -670.09

When t =17

$$R_{17} = \alpha(Y_{17} - S_5) + (1-\alpha)(R_{16} + G_{16})$$
$$= 0.59 \times [1148 - (-21.58)] + (1 - 0.59) \times (1549.39 + 153.73)$$
$$= 1386$$

$$G_{17} = \beta(R_{17} - R_{16}) + (1-\beta)G_{16}$$
$$= 0.30 \times (1386 - 1549.39) + (1 - 0.30) \times 153.73$$
$$= 58.59$$

$$S_{17} = \gamma(Y_{17} - R_{17}) + (1-\gamma)S_5$$
$$= 0.30 \times (1148 - 1386) + (1 - 0.30) \times (-21.58)$$
$$= -86.51$$

$$F_{17} = R_{16} + G_{16} + S_5$$
$$= 1549.39 + 153.73 + (-21.58)$$
$$= 1681.54$$

$$E_{17} = Y_{17} - F_{17}$$
$$= 1148 - 1681.54$$
$$= -533.54$$

When t =18

$$R_{18} = \alpha(Y_{18} - S_6) + (1-\alpha)(R_{17} + G_{17})$$
$$= 0.59 \times [1257 - (-76.58)] + (1 - 0.59) \times (1386 + 58.59)$$
$$= 1378.61$$

$$G_{18} = \beta(R_{18} - R_{17}) + (1-\beta)G_{17}$$
$$= 0.30 \times (1378.61 - 1386) + (1 - 0.30) \times 58.59$$
$$= 38.80$$

$$S_{18} = \gamma(Y_{18} - R_{18}) + (1-\gamma)S_6$$
$$= 0.30 \times (1257 - 1378.61) + (1 - 0.30) \times (-76.58)$$
$$= -90.09$$

$$F_{18} = R_{17} + G_{17} + S_6$$
$$= 1386 + 58.59 + (-76.58)$$
$$= 1368.01$$

$$E_{18} = Y_{18} - F_{18}$$
$$= 1257 - 1368.01$$
$$= -111.01$$

When t =19

$$R_{19} = \alpha(Y_{19} - S_7) + (1-\alpha)(R_{18} + G_{18})$$
$$= 0.59 \times [1450 - (-35.58)] + (1 - 0.59) \times (1378.61 + 38.80)$$
$$= 1457.93$$

$$G_{19} = \beta(R_{19} - R_{18}) + (1-\beta)G_{18}$$
$$= 0.30 \times (1457.93 - 1378.61) + (1 - 0.30) \times 38.80$$
$$= 50.95$$

$$S_{19} = \gamma(Y_{19} - R_{19}) + (1-\gamma)S_7$$
$$= 0.30 \times (1450 - 1457.93) + (1 - 0.30) \times (-35.58)$$

= -27.29

F_{19} $= R_{18} + G_{18} + S_7$

= 1378.61 + 38.80+(-35.58)

= 1381.83

E_{19} $= Y_{19} - F_{19}$

= 1450 – 1381.83

= 68.17

When t =20

R_{20} $= \alpha(Y_{20} - S_8) + (1-\alpha)(R_{19} + G_{19})$

$= 0.59 \times [1321 - (-26.58)] + (1-0.59) \times (1457.93 + 50.95)$

= 1413.01

G_{20} $= \beta(R_{20} - R_{19}) + (1-\beta)G_{19}$

$= 0.30 \times (1413.01 - 1457.93) + (1-0.30) \times 50.95$

= 22.19

S_{20} $= \gamma(Y_{20} - R_{20}) + (1-\gamma)S_8$

$= 0.30 \times (1321 - 1413.01) + (1-0.30) \times (-26.58)$

= -46.21

F_{20} $= R_{19} + G_{19} + S_8$

= 1457.93 + 50.95+(-26.58)

= 1482.30

E_{20} $= Y_{20} - F_{20}$

= 1321 – 1482.30

= -161.30

When t =21

$R_{21} = \alpha(Y_{21} - S_9) + (1-\alpha)(R_{20} + G_{20})$

$= 0.59 \times [1191 - (-121.58)] + (1-0.59) \times (1413.01 + 22.19)$

= 1362.32

$G_{21} = \beta(R_{21} - R_{20}) + (1-\beta)G_{20}$

$= 0.30 \times (1362.32 - 1413.01) + (1-0.30) \times 22.19$

= 0.33

$S_{21} = \gamma(Y_{21} - R_{21}) + (1-\gamma)S_9$

$= 0.30 \times (1191 - 1362.32) + (1-0.30) \times (-121.58)$

= -136.50

$F_{21} = R_{20} + G_{20} + S_9$

= 1413.01 + 22.19+(-121.58)

= 1313.62

$E_{21} = Y_{21} - F_{21}$

= 1191 – 1313.62

= -122.62

When t = 22

$R_{22} = \alpha(Y_{22} - S_{10}) + (1-\alpha)(R_{21} + G_{21})$

$= 0.59 \times [1130 - (-179.58)] + (1-0.59) \times (1362.32 + 0.33)$

$= 1331.11$

$G_{22} = \beta(R_{22} - R_{21}) + (1-\beta)G_{21}$

$= 0.30 \times (1331.11 - 1362.32) + (1 - 0.30) \times 0.33$

= -9.31

$S_{22} = \gamma(Y_{22} - R_{22}) + (1-\gamma)S_{10}$

$= 0.30 \times (1130 - 1331.11) + (1 - 0.30) \times (-179.58)$

= -186.04

$F_{22} = R_{21} + G_{21} + S_{10}$

= 1362.32 + 0.33+(-179.58)

= 1183.07

$E_{22} = Y_{22} - F_{22}$

= 1130 – 1183.07

= -53.07

When t = 23

$R_{23} = \alpha(Y_{23} - S_{11}) + (1-\alpha)(R_{22} + G_{22})$

$= 0.59 \times [1207 - (-269.58)] + (1 - 0.59) \times [1331.11 + (-9.13)]$

= 1413.87

$G_{23} = \beta(R_{23} - R_{22}) + (1-\beta)G_{22}$

$= 0.30 \times (1413.87 - 1331.11) + (1 - 0.30) \times (-9.13)$

= 18.43

$S_{23} = \gamma(Y_{23} - R_{23}) + (1-\gamma)S_{11}$

$= 0.30 \times (1207 - 1413.87) + (1 - 0.30) \times (-269.58)$

= -250.77

$F_{23} = R_{22} + G_{22} + S_{11}$

= 1413.87 + 18.43+(-269.58)

= 1052.39

$E_{23} = Y_{23} - F_{23}$

= 1207 – 1052.39

= 154.61

When t = 24

$R_{24} = \alpha(Y_{24} - S_{12}) + (1 - \alpha)(R_{23} + G_{23})$

$= 0.59 \times (1434 - 1027.42) + (1 - 0.59) \times (1413.87 + 18.43)$

= 822.65

$G_{24} = \beta(R_{24} - R_{23}) + (1 - \beta)G_{23}$

$= 0.30 \times (822.65 - 1413.87) + (1 - 0.30) \times 18.43$

= -164.46

$S_{24} = \gamma(Y_{24} - R_{24}) + (1 - \gamma)S_{12}$

$= 0.30 \times (1434 - 822.65) + (1 - 0.30) \times 1027.42$

= 902.60

$F_{24} = R_{23} + G_{23} + S_{12}$

= 1413.87 + 18.43+1027.42

= 2459.72

$E_{24} = Y_{24} - F_{24}$

= 1434 – 2459.72

= -1025.72

When t = 25

$R_{25} = \alpha(Y_{25} - S_{13}) + (1-\alpha)(R_{24} + G_{24})$

$= 0.59 \times (1075 - 80.40) + (1 - 0.59) \times [822.65 + (-164.46)]$

= 858.14

$G_{25} = \beta(R_{25} - R_{24}) + (1-\beta)G_{24}$

$= 0.30 \times (858.14 - 822.65) + (1 - 0.30) \times (-164.46)$

= -104.48

$S_{25} = \gamma(Y_{25} - R_{25}) + (1-\gamma)S_{13}$

$= 0.30 \times (1075 - 858.14) + (1 - 0.30) \times 80.40$

= 121.33

$F_{25} = R_{24} + G_{24} + S_{13}$

= 822.65 + (-164.46)+80.40

= 738.58

$E_{25} = Y_{25} - F_{25}$

= 1075 – 738.58

= 336.42

When t =26

$R_{26} = \alpha(Y_{26} - S_{14}) + (1-\alpha)(R_{25} + G_{25})$

$= 0.59 \times [1130 - (-121.57)] + (1 - 0.59) \times [858.14 + (-104.48)]$

$= 1049.61$

$G_{26} = \beta(R_{26} - R_{25}) + (1 - \beta)G_{25}$

$= 0.30 \times (1049.61 - 858.14) + (1 - 0.30) \times (-104.48)$

$= -15.69$

$S_{26} = \gamma(Y_{26} - R_{26}) + (1 - \gamma)S_{14}$

$= 0.30 \times (1130 - 1049.61) + (1 - 0.30) \times (-121.57)$

$= -60.98$

$F_{26} = R_{25} + G_{25} + S_{14}$

$= 858.14 + (-104.48) + (-121.57)$

$= 632.09$

$E_{26} = Y_{26} - F_{26}$

$= 1130 - 632.09$

$= 497.91$

When t= 27

$R_{27} = \alpha(Y_{27} - S_{15}) + (1 - \alpha)(R_{26} + G_{26})$

$= 0.59 \times [1058 - (-99.35)] + (1 - 0.59) \times [1049.61 + (-15.69)]$

$= 1107.28$

$G_{27} = \beta(R_{27} - R_{26}) + (1 - \beta)G_{26}$

$= 0.30 \times (1107.28 - 1049.61) + (1 - 0.30) \times (-15.69)$

$= 6.32$

S_{27} $= \gamma(Y_{27} - R_{27}) + (1-\gamma)S_{15}$

$= 0.30 \times (1058 - 1107.28) + (1 - 0.30) \times (-99.35)$

= -84.33

F_{27} $= R_{26} + G_{26} + S_{15}$

= 1049.61 + (-15.69)+(-60.98)

= 934.57

E_{27} $= Y_{27} - F_{27}$

= 1058 – 934.57

= 123.43

When t = 28

R_{28} $= \alpha(Y_{28} - S_{16}) + (1-\alpha)(R_{27} + G_{27})$

$= 0.59 \times [967 - (-121.13)] + (1 - 0.59) \times (1107.28 + 6.32)$

= 1098.46

G_{28} $= \beta(R_{28} - R_{27}) + (1-\beta)G_{27}$

$= 0.30 \times (1098.46 - 1107.28) + (1 - 0.30) \times 6.32$

= 1.77

S_{28} $= \gamma(Y_{28} - R_{28}) + (1-\gamma)S_{16}$

$= 0.30 \times (967 - 1098.46) + (1 - 0.30) \times (-121.13)$

= -124.23

F_{28} $= R_{27} + G_{27} + S_{16}$

= 1107.28 + 6.32 +(-121.13)

= 992.47

E_{28} $= Y_{28} - F_{28}$

$= 967 - 992.47$

$= -25.47$

When t = 29

R_{29} $= \alpha(Y_{29} - S_{17}) + (1-\alpha)(R_{28} + G_{28})$

$= 0.59 \times [1037 - (-86.51)] + (1 - 0.59) \times (1098.46 + 1.77)$

$= 1114.07$

G_{29} $= \beta(R_{29} - R_{28}) + (1-\beta)G_{28}$

$= 0.30 \times (1114.07 - 1098.46) + (1 - 0.30) \times 1.77$

$= 5.93$

S_{29} $= \gamma(Y_{29} - R_{29}) + (1-\gamma)S_{17}$

$= 0.30 \times (1037 - 1114.07) + (1 - 0.30) \times (-86.51)$

$= -83.68$

F_{29} $= R_{28} + G_{28} + S_{17}$

$= 1098.46 + 1.77 + (-124.23)$

$= 1013.72$

E_{29} $= Y_{29} - F_{29}$

$= 1037 - 1013.72$

$= 23.28$

When t =30

$$R_{30} = \alpha(Y_{30} - S_{18}) + (1-\alpha)(R_{29} + G_{29})$$
$$= 0.59 \times [1160 - (-90.09)] + (1 - 0.59) \times (1114.07 + 5.93)$$
$$= 1197.32$$

$$G_{30} = \beta(R_{30} - R_{29}) + (1-\beta)G_{29}$$
$$= 0.30 \times (1197.32 - 1114.07) + (1 - 0.30) \times 5.93$$
$$= 29.12$$

$$S_{30} = \gamma(Y_{30} - R_{30}) + (1-\gamma)S_{18}$$
$$= 0.30 \times (1160 - 1197.32) + (1 - 0.30) \times (-90.09)$$
$$= -74.26$$

$$F_{30} = R_{29} + G_{29} + S_{18}$$
$$= 1114.07 + 5.93 + (-90.09)$$
$$= 1029.90$$

$$E_{30} = Y_{30} - F_{30}$$
$$= 1160 - 1029.90$$
$$= 130.10$$

When t = 31

$$R_{31} = \alpha(Y_{31} - S_{19}) + (1-\alpha)(R_{30} + G_{30})$$
$$= 0.59 \times [975 - (-27.29)] + (1 - 0.59) \times (1197.32 + 29.12)$$
$$= 1093.21$$

$$G_{31} = \beta(R_{31} - R_{30}) + (1-\beta)G_{30}$$

$= 0.30 \times (1093.21 - 1197.32) + (1 - 0.30) \times 29.12$

$= -10.85$

$S_{31} = \gamma(Y_{31} - R_{31}) + (1 - \gamma)S_{19}$

$= 0.30 \times (975 - 1093.21) + (1 - 0.30) \times (-27.29)$

$= -54.56$

$F_{31} = R_{30} + G_{30} + S_{19}$

$= 1197.32 + 29.12 + (-27.29)$

$= 1199.16$

$E_{31} = Y_{31} - F_{31}$

$= 975 - 1199.16$

$= -224.16$

When t = 32

$R_{32} = \alpha(Y_{32} - S_{20}) + (1 - \alpha)(R_{31} + G_{31})$

$= 0.59 \times [1242 - (-46.21)] + (1 - 0.59) \times [1093.21 + (-10.85)]$

$= 1204.71$

$G_{32} = \beta(R_{32} - R_{31}) + (1 - \beta)G_{31}$

$= 0.30 \times (1204.71 - 1093.21) + (1 - 0.30) \times (-10.85)$

$= 25.86$

$S_{32} = \gamma(Y_{32} - R_{32}) + (1 - \gamma)S_{20}$

$= 0.30 \times (1242 - 1204.71) + (1 - 0.30) \times (-46.21)$

$= -21.16$

F_{32} $= R_{31} + G_{31} + S_{20}$

= 1093.21+ (-10.85) +(-46.21)

= 1036.15

E_{32} $= Y_{32} - F_{32}$

= 1242 – 1036.15

= 205.85

When t = 33

R_{33} $= \alpha(Y_{33} - S_{21}) + (1-\alpha)(R_{32} + G_{32})$

$= 0.59 \times [1123 - (-136.50)] + (1-0.59) \times (1204.71 + 25.86)$

= 1247.77

G_{33} $= \beta(R_{33} - R_{32}) + (1-\beta)G_{32}$

$= 0.30 \times (1247.771 - 1204.71) + (1-0.30) \times 25.86$

= 31.02

S_{33} $= \gamma(Y_{33} - R_{33}) + (1-\gamma)S_{21}$

$= 0.30 \times (1123 - 1247.77) + (1-0.30) \times (-136.50)$

= -132.98

F_{33} $= R_{32} + G_{32} + S_{21}$

= 1204.71+ 25.86 +(-21.16)

= 1094.07

E_{33} $= Y_{33} - F_{33}$

= 1123 – 1094.07

= 28.93

When t = 34

$$R_{34} = \alpha(Y_{34} - S_{22}) + (1-\alpha)(R_{33} + G_{33})$$
$$= 0.59 \times [924 - (-186.04)] + (1 - 0.59) \times (1247.77 + 31.02)$$
$$= 1178.49$$

$$G_{34} = \beta(R_{34} - R_{33}) + (1-\beta)G_{33}$$
$$= 0.30 \times (1178.49 - 1247.77) + (1 - 0.30) \times 31.02$$
$$= 0.93$$

$$S_{34} = \gamma(Y_{34} - R_{34}) + (1-\gamma)S_{22}$$
$$= 0.30 \times (924 - 1178.49) + (1 - 0.30) \times (-186.04)$$
$$= -206.58$$

$$F_{34} = R_{33} + G_{33} + S_{22}$$
$$= 1247.77 + 31.02 + (-186.04)$$
$$= 1092.75$$

$$E_{34} = Y_{34} - F_{34}$$
$$= 924 - 1092.75$$
$$= -168.75$$

When t = 35

$$R_{35} = \alpha(Y_{35} - S_{23}) + (1-\alpha)(R_{34} + G_{34})$$
$$= 0.59 \times [1009 - (-250.77)] + (1 - 0.59) \times (1178.49 + 0.93)$$
$$= 1227.18$$

$G_{35} = \beta(R_{35} - R_{34}) + (1-\beta)G_{34}$

$= 0.30 \times (1227.18 - 1178.49) + (1 - 0.30) \times 0.93$

$= 15.26$

$S_{35} = \gamma(Y_{35} - R_{35}) + (1-\gamma)S_{23}$

$= 0.30 \times (1009 - 1227.18) + (1 - 0.30) \times (-250.77)$

$= -240.99$

$F_{35} = R_{34} + G_{34} + S_{23}$

$= 1178.49 + 0.93 + (-250.77)$

$= 928.65$

$E_{35} = Y_{35} - F_{35}$

$= 1009 - 928.65$

$= 80.35$

When t = 36

$R_{36} = \alpha(Y_{36} - S_{24}) + (1-\alpha)(R_{35} + G_{35})$

$= 0.59 \times (1245 - 902.60) + (1 - 0.59) \times (1227.18 + 15.26)$

$= 707.48$

$G_{36} = \beta(R_{36} - R_{35}) + (1-\beta)G_{35}$

$= 0.30 \times (707.48 - 1227.18) + (1 - 0.30) \times 15.26$

$= -145.23$

$S_{36} = \gamma(Y_{36} - R_{36}) + (1-\gamma)S_{24}$

$= 0.30 \times (1245 - 707.48) + (1 - 0.30) \times 902.60$

$= 793.07$

$F_{36} = R_{35} + G_{35} + S_{24}$

$= 707.48 + 15.26 + 902.60$

$= 2145.03$

$E_{36} = Y_{36} - F_{36}$

$= 1245 - 2145.03$

$= -900.03$

When t =37

$R_{37} = \alpha(Y_{37} - S_{25}) + (1-\alpha)(R_{36} + G_{36})$

$= 0.59 \times (703 - 121.33) + (1 - 0.59) \times [707.48 + (-145.23)]$

$= 573.79$

$G_{37} = \beta(R_{37} - R_{36}) + (1-\beta)G_{36}$

$= 0.30 \times (573.79 - 707.48) + (1 - 0.30) \times (-145.23)$

$= -141.77$

$S_{37} = \gamma(Y_{37} - R_{37}) + (1-\gamma)S_{25}$

$= 0.30 \times (703 - 573.79) + (1 - 0.30) \times 121.33$

$= -141.77$

$F_{37} = R_{36} + G_{36} + S_{25}$

$= 707.48 + (-145.23) + 121.33$

$= 683.59$

$E_{37} = Y_{37} - F_{37}$

$= 703 - 683.59$

$= 19.41$

When t = 38

$$R_{38} = \alpha(Y_{38} - S_{26}) + (1-\alpha)(R_{37} + G_{37})$$
$$= 0.59 \times [793 - (-60.98)] + (1-0.59) \times [573.79 + (-141.77)]$$
$$= 682.82$$

$$G_{38} = \beta(R_{38} - R_{37}) + (1-\beta)G_{37}$$
$$= 0.30 \times (682.82 - 573.79) + (1-0.30) \times (-141.77)$$
$$= -66.53$$

$$S_{38} = \gamma(Y_{38} - R_{38}) + (1-\gamma)S_{26}$$
$$= 0.30 \times (793 - 682.82) + (1-0.30) \times (-60.98)$$
$$= -9.64$$

$$F_{38} = R_{37} + G_{37} + S_{26}$$
$$= 573.79 + (-141.77) + (-60.98)$$
$$= 371.04$$

$$E_{38} = Y_{38} - F_{38}$$
$$= 793 - 371.04$$
$$= 421.96$$

When t = 39

$$R_{39} = \alpha(Y_{39} - S_{27}) + (1-\alpha)(R_{38} + G_{38})$$
$$= 0.59 \times [970 - (-84.33)] + (1-0.59) \times [682.82 + (-66.53)]$$

$= 876.65$

$G_{39} = \beta(R_{39} - R_{38}) + (1-\beta)G_{38}$

$= 0.30 \times (876.65 - 682.82) + (1-0.30) \times (-66.53)$

$= 11.58$

$S_{39} = \gamma(Y_{39} - R_{39}) + (1-\gamma)S_{27}$

$= 0.30 \times (970 - 876.65) + (1-0.30) \times (-84.33)$

$= -31.02$

$F_{39} = R_{38} + G_{38} + S_{27}$

$= 682.82 + (-66.53) + (-84.33)$

$= 531.97$

$E_{39} = Y_{39} - F_{39}$

$= 970 - 531.97$

$= 438.03$

When t =40

$R_{40} = \alpha(Y_{40} - S_{28}) + (1-\alpha)(R_{39} + G_{39})$

$= 0.59 \times [764 - (-124.23)] + (1-0.59) \times (876.65 + 11.58)$

$= 888.23$

$G_{40} = \beta(R_{40} - R_{39}) + (1-\beta)G_{39}$

$= 0.30 \times (888.23 - 876.65) + (1-0.30) \times 11.58$

$= 11.58$

$S_{40} = \gamma(Y_{40} - R_{40}) + (1-\gamma)S_{28}$

$= 0.30 \times (764 - 888.23) + (1 - 0.30) \times (-124.23)$

= -124.23

$F_{40} = R_{39} + G_{39} + S_{28}$

= 876.65+ 11.58 +(-124.23)

= 764.00

$E_{40} = Y_{40} - F_{40}$

= 764.00 – 764.00

= 0

When t = 41

$R_{41} = \alpha(Y_{41} - S_{29}) + (1 - \alpha)(R_{40} + G_{40})$

$= 0.59 \times [798 - (-83.68)] + (1 - 0.59) \times (888.23 + 11.58)$

= 889.03

$G_{41} = \beta(R_{41} - R_{40}) + (1 - \beta)G_{40}$

$= 0.30 \times (889.03 - 888.23) + (1 - 0.30) \times 11.58$

= 8.35

$S_{41} = \gamma(Y_{41} - R_{41}) + (1 - \gamma)S_{29}$

$= 0.30 \times (798 - 8.35) + (1 - 0.30) \times (-83.68)$

= -85.88

$F_{41} = R_{40} + G_{40} + S_{29}$

= 888.23+ 11.58 +(-83.68)

= 816.13

$$E_{41} = Y_{41} - F_{41}$$

$$= 798 - 816.13$$

$$= -18.13$$

When t =42

$$R_{41} = \alpha(Y_{41} - S_{29}) + (1-\alpha)(R_{40} + G_{40})$$

$$= 0.59 \times [798 - (-83.68)] + (1 - 0.59) \times (888.23 + 11.58)$$

$$= 889.03$$

$$G_{41} = \beta(R_{41} - R_{40}) + (1-\beta)G_{40}$$

$$= 0.30 \times (889.03 - 888.23) + (1 - 0.30) \times 11.58$$

$$= 8.35$$

$$S_{41} = \gamma(Y_{41} - R_{41}) + (1-\gamma)S_{29}$$

$$= 0.30 \times (798 - 8.35) + (1 - 0.30) \times (-83.68)$$

$$= -85.88$$

$$F_{41} = R_{40} + G_{40} + S_{29}$$

$$= 888.23 + 11.58 + (-83.68)$$

$$= 816.13$$

$$E_{41} = Y_{41} - F_{41}$$

$$= 798 - 816.13$$

$$= -18.13$$

When t = 42

$$R_{42} = \alpha(Y_{42} - S_{30}) + (1-\alpha)(R_{41} + G_{41})$$

$= 0.59 \times [860 - (-74.26)] + (1 - 0.59) \times (889.03 + 8.35)$

$= 919.30$

$G_{42} = \beta(R_{42} - R_{41}) + (1 - \beta)G_{41}$

$= 0.30 \times (919.30 - 889.03) + (1 - 0.30) \times 8.35$

$= 14.92$

$S_{42} = \gamma(Y_{42} - R_{42}) + (1 - \gamma)S_{30}$

$= 0.30 \times (860 - 919.30) + (1 - 0.30) \times (-74.26)$

$= -69.77$

$F_{42} = R_{41} + G_{41} + S_{30}$

$= 889.03 + 8.35 + (-74.26)$

$= 823.11$

$E_{42} = Y_{42} - F_{42}$

$= 860 - 823.11$

$= 36.89$

When t = 43

$R_{43} = \alpha(Y_{43} - S_{31}) + (1 - \alpha)(R_{42} + G_{42})$

$= 0.59 \times [651 - (-54.56)] + (1 - 0.59) \times (919.30 + 14.92)$

$= 798.32$

$G_{43} = \beta(R_{43} - R_{42}) + (1 - \beta)G_{42}$

$= 0.30 \times (798.32 - 919.30) + (1 - 0.30) \times 14.92$

$= -25.85$

$S_{43} = \gamma(Y_{43} - R_{43}) + (1-\gamma)S_{31}$

$= 0.30 \times (651 - 798.32) + (1 - 0.30) \times (-54.56)$

= -69.77

$F_{43} = R_{42} + G_{42} + S_{31}$

= 919.30+ 14.92 +(-54.56)

= 879.66

$E_{43} = Y_{43} - F_{43}$

= 651 – 879.66

= -228.66

When t = 44

$R_{43} = \alpha(Y_{43} - S_{31}) + (1-\alpha)(R_{42} + G_{42})$

$= 0.59 \times [651 - (-54.56)] + (1 - 0.59) \times (919.30 + 14.92)$

= 798.32

$G_{43} = \beta(R_{43} - R_{42}) + (1-\beta)G_{42}$

$= 0.30 \times (798.32 - 919.30) + (1 - 0.30) \times 14.92$

= -25.85

$S_{43} = \gamma(Y_{43} - R_{43}) + (1-\gamma)S_{31}$

$= 0.30 \times (651 - 798.32) + (1 - 0.30) \times (-54.56)$

= -69.77

$F_{43} = R_{42} + G_{42} + S_{31}$

= 919.30+ 14.92 +(-54.56)

= 879.66

$E_{43} = Y_{43} - F_{43}$

$= 651 - 879.66$

$= -228.66$

When t =44

$R_{44} = \alpha(Y_{44} - S_{32}) + (1-\alpha)(R_{43} + G_{43})$

$= 0.59 \times [718 - (-21.16)] + (1 - 0.59) \times [798.32 + (-25.85)]$

$= 752.67$

$G_{44} = \beta(R_{44} - R_{43}) + (1-\beta)G_{43}$

$= 0.30 \times (752.67 - 798.32) + (1 - 0.30) \times (-25.85)$

$= -31.79$

$S_{44} = \gamma(Y_{44} - R_{44}) + (1-\gamma)S_{32}$

$= 0.30 \times (718 - 752.67) + (1 - 0.30) \times (-21.16)$

$= -25.22$

$F_{44} = R_{43} + G_{43} + S_{32}$

$= 798.32 + (-25.85) + (-21.16)$

$= 751.30$

$E_{44} = Y_{44} - F_{44}$

$= 718 - 751.30$

$= -33.30$

When t = 45

$$R_{45} = \alpha(Y_{45} - S_{33}) + (1-\alpha)(R_{44} + G_{44})$$
$$= 0.59 \times [559 - (-132.98)] + (1 - 0.59) \times [752.67 + (-31.79)]$$
$$= 703.71$$

$$G_{45} = \beta(R_{45} - R_{44}) + (1-\beta)G_{44}$$
$$= 0.30 \times (703.71 - 752.67) + (1 - 0.30) \times (-31.79)$$
$$= -36.94$$

$$S_{45} = \gamma(Y_{45} - R_{45}) + (1-\gamma)S_{33}$$
$$= 0.30 \times (559 - 703.71) + (1 - 0.30) \times (-132.98)$$
$$= -136.50$$

$$F_{45} = R_{44} + G_{44} + S_{33}$$
$$= 752.67 \text{ (-31.79) +(-132.98)}$$
$$= 587.90$$

$$E_{45} = Y_{45} - F_{45}$$
$$=559 - 587.90$$
$$= -28.90$$

When t =46

$$R_{46} = \alpha(Y_{46} - S_{34}) + (1-\alpha)(R_{45} + G_{45})$$
$$= 0.59 \times [589 - (-206.58)] + (1 - 0.59) \times [703.71 + (-36.94)]$$
$$= 743.33$$

$$G_{46} = \beta(R_{46} - R_{45}) + (1-\beta)G_{45}$$
$$= 0.30 \times (743.33 - 703.71) + (1 - 0.30) \times (-36.94)$$

= -13.97

$S_{46} = \gamma(Y_{46} - R_{46}) + (1-\gamma)S_{34}$

$= 0.30 \times (589 - 743.33) + (1 - 0.30) \times (-206.58)$

= -190.90

$F_{46} = R_{45} + G_{45} + S_{34}$

= 703.71 + (-36.94) +(-206.58)

= 460.19

$E_{46} = Y_{46} - F_{46}$

= 589 – 460.19

= 128.81

When t = 47

$R_{47} = \alpha(Y_{47} - S_{35}) + (1-\alpha)(R_{46} + G_{46})$

$= 0.59 \times [1040 - (-240.99)] + (1 - 0.59) \times [743.33 + (-13.97)]$

= 1057.23

$G_{47} = \beta(R_{47} - R_{46}) + (1-\beta)G_{46}$

$= 0.30 \times (1057.23 - 743.33) + (1 - 0.30) \times (-13.97)$

= 84.39

$S_{47} = \gamma(Y_{47} - R_{47}) + (1-\gamma)S_{35}$

$= 0.30 \times (1040 - 1057.23) + (1 - 0.30) \times (-240.99)$

= -173.86

$F_{47} = R_{46} + G_{46} + S_{35}$

= 743.33 + (-13.97) +(-240.99)

= 488.36

E_{47} $= Y_{47} - F_{47}$

= 1040 – 488.36

= 551.64

When t =48

R_{48} $= \alpha(Y_{48} - S_{36}) + (1-\alpha)(R_{47} + G_{47})$

$= 0.59 \times (1515 - 793.07) + (1 - 0.59) \times (1057.23 + 84.39)$

= 892.17

G_{48} $= \beta(R_{48} - R_{47}) + (1-\beta)G_{47}$

$= 0.30 \times (892.17 - 1057.23) + (1 - 0.30) \times 84.39$

= 9.55

S_{48} $= \gamma(Y_{48} - R_{48}) + (1-\gamma)S_{36}$

$= 0.30 \times (1515 - 892.17) + (1 - 0.30) \times 793.07$

= 742.00

F_{48} $= R_{47} + G_{47} + S_{36}$

= 1057.23 + 84.39 +793.07

= 1934.69

E_{48} $= Y_{48} - F_{48}$

= 1515 – 1934.69

= -419.69

When t =49

$$R_{49} = \alpha(Y_{49} - S_{37}) + (1-\alpha)(R_{48} + G_{48})$$
$$= 0.59 \times (230 - 123.70) + (1 - 0.59) \times (892.17 + 9.55)$$
$$= 428.95$$

$$G_{49} = \beta(R_{49} - R_{48}) + (1-\beta)G_{48}$$
$$= 0.30 \times (428.95 - 892.17) + (1 - 0.30) \times 9.55$$
$$= -132.28$$

$$S_{49} = \gamma(Y_{49} - R_{49}) + (1-\gamma)S_{37}$$
$$= 0.30 \times (230 - 428.95) + (1 - 0.30) \times 123.70$$
$$= 26.90$$

$$F_{49} = R_{48} + G_{48} + S_{37}$$
$$= 892.17 + 9.55 + 123.70$$
$$= 1025.42$$

$$E_{49} = Y_{49} - F_{49}$$
$$= 230 - 1025.42$$
$$= -795.42$$

When t = 50

$$R_{50} = \alpha(Y_{50} - S_{38}) + (1-\alpha)(R_{49} + G_{49})$$
$$= 0.59 \times [554 - (-9.64)] + (1 - 0.59) \times [428.95 + (-132.28)]$$
$$= 455.35$$

$G_{50} = \beta(R_{50} - R_{49}) + (1-\beta)G_{49}$

$= 0.30 \times (455.35 - 428.95) + (1 - 0.30) \times (-132.28)$

= -84.67

$S_{50} = \gamma(Y_{50} - R_{50}) + (1-\gamma)S_{38}$

$= 0.30 \times (554 - 455.35) + (1 - 0.30) \times (-9.64)$

= 22.85

$F_{50} = R_{49} + G_{49} + S_{38}$

= 428.95 + (-132.28) +(-9.64)

= 287.04

$E_{50} = Y_{50} - F_{50}$

= 554 – 287.04

= 266.96

When t = 51

$R_{51} = \alpha(Y_{51} - S_{39}) + (1-\alpha)(R_{50} + G_{50})$

$= 0.59 \times [588 - (-31.02)] + (1 - 0.59) \times [455.35 + (-84.67)]$

= 518.28

$G_{51} = \beta(R_{51} - R_{50}) + (1-\beta)G_{50}$

$= 0.30 \times (518.28 - 455.35) + (1 - 0.30) \times (-84.67)$

= -40.39

$S_{51} = \gamma(Y_{51} - R_{51}) + (1-\gamma)S_{39}$

$= 0.30 \times (588 - 518.28) + (1 - 0.30) \times (-31.02)$

= -0.80

$F_{51} = R_{50} + G_{50} + S_{39}$

= 455.35 + (-84.67) +(-31.02)

= 339.65

$E_{51} = Y_{51} - F_{51}$

= 588 – 339.65

= 248.35

When t =52

$R_{52} = \alpha(Y_{52} - S_{40}) + (1 - \alpha)(R_{51} + G_{51})$

$= 0.59 \times [667 - (-124.23)] + (1 - 0.59) \times [518.28 + (-40.39)]$

= 664.13

$G_{52} = \beta(R_{52} - R_{51}) + (1 - \beta)G_{51}$

$= 0.30 \times (664.13 - 518.28) + (1 - 0.30) \times (-40.39)$

= 15.48

$S_{52} = \gamma(Y_{52} - R_{52}) + (1 - \gamma)S_{40}$

$= 0.30 \times (667 - 664.13) + (1 - 0.30) \times (-124.23)$

= -86.10

$F_{52} = R_{51} + G_{51} + S_{40}$

= 664.13 + (-40.39) +(-124.23)

= 353.67

$E_{52} = Y_{52} - F_{52}$

$= 667 - 353.67$

$= 313.33$

When t =53

$R_{53} = \alpha(Y_{53} - S_{41}) + (1-\alpha)(R_{52} + G_{52})$

$= 0.59 \times [640 - (-85.88)] + (1 - 0.59) \times (664.13 + 15.48)$

$= 707.11$

$G_{53} = \beta(R_{53} - R_{52}) + (1-\beta)G_{52}$

$= 0.30 \times (707.11 - 664.13) + (1 - 0.30) \times 15.48$

$= 23.73$

$S_{53} = \gamma(Y_{53} - R_{53}) + (1-\gamma)S_{41}$

$= 0.30 \times (640 - 707.11) + (1 - 0.30) \times (-85.88)$

$= -80.25$

$F_{53} = R_{52} + G_{52} + S_{41}$

$= 664.13 + 15.48 + (-85.88)$

$= 593.72$

$E_{53} = Y_{53} - F_{53}$

$= 640 - 593.72$

$= 46.28$

When t = 54

$$R_{54} = \alpha(Y_{54} - S_{42}) + (1-\alpha)(R_{53} + G_{53})$$
$$= 0.59 \times [564 - (-69.77)] + (1 - 0.59) \times (707.11 + 23.73)$$
$$= 673.15$$

$$G_{54} = \beta(R_{54} - R_{53}) + (1-\beta)G_{53}$$
$$= 0.30 \times (673.15 - 707.11) + (1 - 0.30) \times 23.73$$
$$= 6.42$$

$$S_{54} = \gamma(Y_{54} - R_{54}) + (1-\gamma)S_{42}$$
$$= 0.30 \times (564 - 673.15) + (1 - 0.30) \times (-69.77)$$
$$= -81.58$$

$$F_{54} = R_{53} + G_{53} + S_{42}$$
$$= 707.11 + 23.73 + (-81.58)$$
$$= 661.07$$

$$E_{54} = Y_{54} - F_{54}$$
$$= 564 - 661.07$$
$$= -97.07$$

When t = 55

$$R_{55} = \alpha(Y_{55} - S_{43}) + (1-\alpha)(R_{54} + G_{54})$$
$$= 0.59 \times [548 - (-82.39)] + (1 - 0.59) \times (673.15 + 6.42)$$
$$= 650.34$$

$$G_{55} = \beta(R_{55} - R_{54}) + (1-\beta)G_{54}$$

$= 0.30 \times (650.34 - 673.15) + (1 - 0.30) \times 6.42$

= -2.35

$S_{55} = \gamma(Y_{55} - R_{55}) + (1 - \gamma)S_{43}$

$= 0.30 \times (548 - 650.34) + (1 - 0.30) \times (-82.39)$

= -88.37

$F_{55} = R_{54} + G_{54} + S_{43}$

= 673.15 + 6.42 +(-88.37)

= 597.18

$E_{55} = Y_{55} - F_{55}$

= 548 – 597.18

= -49.18

When t = 56

$R_{56} = \alpha(Y_{56} - S_{44}) + (1 - \alpha)(R_{55} + G_{55})$

$= 0.59 \times [551 - (-25.22)] + (1 - 0.59) \times [650.34 + (-2.35)]$

= 605.33

$G_{56} = \beta(R_{56} - R_{55}) + (1 - \beta)G_{55}$

$= 0.30 \times (605.33 - 650.34) + (1 - 0.30) \times (-2.35)$

= -15.15

$S_{56} = \gamma(Y_{56} - R_{56}) + (1 - \gamma)S_{44}$

$= 0.30 \times (551 - 605.33) + (1 - 0.30) \times (-25.22)$

= -33.95

F_{56} $= R_{55} + G_{55} + S_{44}$

= 650.34 + (-2.35) +(-25.22)

= 622.78

E_{56} $= Y_{56} - F_{56}$

= 551 – 622.78

= -71.78

When t = 57

R_{57} $= \alpha(Y_{57} - S_{45}) + (1-\alpha)(R_{56} + G_{56})$

$= 0.59 \times [440 - (-136.50)] + (1 - 0.59) \times [605.33 + (-15.15)]$

= 582.05

G_{57} $= \beta(R_{57} - R_{56}) + (1-\beta)G_{56}$

$= 0.30 \times (582.05 - 605.33) + (1 - 0.30) \times (-15.15)$

= -17.59

S_{57} $= \gamma(Y_{57} - R_{57}) + (1-\gamma)S_{45}$

$= 0.30 \times (440 - 582.05) + (1 - 0.30) \times (-136.50)$

= -138.17

F_{57} $= R_{56} + G_{56} + S_{45}$

= 605.33 + (-15.15) +(-136.50)

= 453.68

E_{57} $= Y_{57} - F_{57}$

= 440 – 453.68

= -13.68

When t = 58

$$R_{58} = \alpha(Y_{58} - S_{46}) + (1-\alpha)(R_{57} + G_{57})$$
$$= 0.59 \times [465 - (-190.90)] + (1 - 0.59) \times [582.05 + (-17.59)]$$
$$= 618.81$$

$$G_{58} = \beta(R_{58} - R_{57}) + (1-\beta)G_{57}$$
$$= 0.30 \times (618.81 - 582.05) + (1 - 0.30) \times (-17.59)$$
$$= -1.28$$

$$S_{58} = \gamma(Y_{58} - R_{58}) + (1-\gamma)S_{46}$$
$$= 0.30 \times (465 - 618.81) + (1 - 0.30) \times (-190.90)$$
$$= -179.77$$

$$F_{58} = R_{57} + G_{57} + S_{46}$$
$$= 582.05 + (-17.59) + (-138.17)$$
$$= 373.57$$

$$E_{58} = Y_{58} - F_{58}$$
$$= 465 - 373.57$$
$$= 91.43$$

When t = 59

$$R_{59} = \alpha(Y_{59} - S_{47}) + (1-\alpha)(R_{58} + G_{58})$$
$$= 0.59 \times [517 - (-173.86)] + (1 - 0.59) \times [618.81 + (-1.28)]$$
$$= 661.12$$

$$G_{59} = \beta(R_{59} - R_{58}) + (1-\beta)G_{58}$$
$$= 0.30 \times (661.12 - 618.81) + (1 - 0.30) \times (-1.28)$$
$$= 11.79$$

$$S_{59} = \gamma(Y_{59} - R_{59}) + (1-\gamma)S_{47}$$
$$= 0.30 \times (517 - 661.12) + (1 - 0.30) \times (-173.86)$$
$$= -164.94$$

$$F_{59} = R_{58} + G_{58} + S_{47}$$
$$= 618.81 + (-1.28) + (-173.86)$$
$$= 443.67$$

$$E_{59} = Y_{59} - F_{59}$$
$$= 517 - 443.67$$
$$= 73.33$$

When t = 60

$$R_{60} = \alpha(Y_{60} - S_{48}) + (1-\alpha)(R_{59} + G_{59})$$
$$= 0.59 \times (663 - 742.00) + (1 - 0.59) \times (661.12 + 11.79)$$
$$= 226.00$$

$$G_{60} = \beta(R_{60} - R_{59}) + (1-\beta)G_{59}$$
$$= 0.30 \times (226.00 - 661.12) + (1 - 0.30) \times 11.79$$
$$= -122.28$$

$$S_{60} = \gamma(Y_{60} - R_{60}) + (1-\gamma)S_{48}$$
$$= 0.30 \times (663 - 226.00) + (1 - 0.30) \times 742.00$$

$= 650.50$

$F_{60} = R_{59} + G_{59} + S_{48}$

$= 661.12 + 11.79 + 742.00$

$= 1414.91$

$E_{60} = Y_{60} - F_{60}$

$= 663 - 1414.91$

$= -751.91$

When t = 61

$R_{61} = \alpha(Y_{61} - S_{49}) + (1-\alpha)(R_{60} + G_{60})$

$= 0.59 \times (290 - 26.90) + (1 - 0.59) \times [226.00 + (-122.28)]$

$= 198.45$

$G_{61} = \beta(R_{61} - R_{60}) + (1-\beta)G_{60}$

$= 0.30 \times (198.45 - 226.00) + (1 - 0.30) \times (-122.28)$

$= -93.86$

$S_{61} = \gamma(Y_{61} - R_{61}) + (1-\gamma)S_{49}$

$= 0.30 \times (290 - 198.45) + (1 - 0.30) \times 26.90$

$= 46.30$

$F_{61} = R_{60} + G_{60} + S_{49}$

$= 226.00 + (-122.28) + 26.90$

$= 130.62$

$E_{61} = Y_{61} - F_{61}$

$= 290 - 130.62$

$= 159.38$

When t = 62

$$R_{62} = \alpha(Y_{62} - S_{50}) + (1-\alpha)(R_{61} + G_{61})$$
$$= 0.59 \times (118 - 22.85) + (1 - 0.59) \times [198.45 + (-93.86)]$$
$$= 98.98$$

$$G_{62} = \beta(R_{62} - R_{61}) + (1-\beta)G_{61}$$
$$= 0.30 \times (98.98 - 198.45) + (1 - 0.30) \times (-93.86)$$
$$= -95.54$$

$$S_{62} = \gamma(Y_{62} - R_{62}) + (1-\gamma)S_{50}$$
$$= 0.30 \times (118 - 98.98) + (1 - 0.30) \times 22.85$$
$$= 21.70$$

$$F_{62} = R_{61} + G_{61} + S_{50}$$
$$= 198.45 + (-93.86) + 22.85$$
$$= 127.44$$

$$E_{62} = Y_{62} - F_{62}$$
$$= 118 - 127.44$$
$$= -9.44$$

When t = 63

$$R_{63} = \alpha(Y_{63} - S_{51}) + (1-\alpha)(R_{62} + G_{62})$$
$$= 0.59 \times [963 - (-0.80)] + (1 - 0.59) \times [98.98 + (-95.54)]$$

$= 574.25$

$G_{63} = \beta(R_{63} - R_{62}) + (1-\beta)G_{62}$

$= 0.30 \times (574.25 - 98.98) + (1 - 0.30) \times (-95.54)$

$= 75.70$

$S_{63} = \gamma(Y_{63} - R_{63}) + (1-\gamma)S_{51}$

$= 0.30 \times (963 - 574.25) + (1 - 0.30) \times (-0.80)$

$= 116.07$

$F_{63} = R_{62} + G_{62} + S_{51}$

= 98.98 + (-95.54) +(-0.80)

= 2.63

$E_{63} = Y_{63} - F_{63}$

= 963 – 2.63

$= 960.37$

When t = 64

$R_{64} = \alpha(Y_{64} - S_{52}) + (1-\alpha)(R_{63} + G_{63})$

$= 0.59 \times [1081 - (-86.10)] + (1 - 0.59) \times (574.25 + 75.70)$

$= 957.32$

$G_{64} = \beta(R_{64} - R_{63}) + (1-\beta)G_{63}$

$= 0.30 \times (957.32 - 574.25) + (1 - 0.30) \times 75.70$

$= 167.91$

$S_{64} = \gamma(Y_{64} - R_{64}) + (1-\gamma)S_{52}$

$$= 0.30 \times (1081 - 957.32) + (1 - 0.30) \times (-86.10)$$

$$= -23.16$$

$$F_{64} = R_{63} + G_{63} + S_{52}$$

$$= 574.25 + 75.50 + (-86.10)$$

$$= 563.85$$

$$E_{64} = Y_{64} - F_{64}$$

$$= 1081 - 563.85$$

$$= 517.15$$

Appendix C

Detailed result when calculation done by the additive seasonal model and multiplicative seasonal model for all five configurations.

Appendix Table C1 Forecasted demand of Top A/T calculated by additive seasonal model with α = 0.59, β = 0.30 and γ = 0.30

			Alpha	0.59			MAPE	0.33
			Beta	0.30				
			Gamma	0.30				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
1	Jan-02	188			-104.58			
2	Feb-02	196			-96.58			
3	Mar-02	237			-55.58			
4	Apr-02	253			-39.58			
5	May-02	271			-21.58			
6	Jun-02	216			-76.58			
7	Jul-02	257			-35.58			
8	Aug-02	266			-26.58			
9	Sep-02	171			-121.58			
10	Oct-02	113			-179.58			
11	Nov-02	23			-269.58			
12	Dec-02	1320	292.58	102.91	1027.42			
13	Jan-03	1811	1298.99	373.96	80.40	290.91	1520.09	0.84
14	Feb-03	1371	1550.88	337.34	-121.57	1576.36	-205.36	0.15
15	Mar-03	1473	1674.46	273.21	-99.35	1832.64	-359.64	0.24
16	Apr-03	1238	1549.39	153.73	-121.13	1908.09	-670.09	0.54
17	May-03	1148	1386.00	58.59	-86.51	1681.54	-533.54	0.46
18	Jun-03	1257	1378.61	38.80	-90.09	1368.01	-111.01	0.09
19	Jul-03	1450	1457.93	50.95	-27.29	1381.83	68.17	0.05
20	Aug-03	1321	1413.01	22.19	-46.21	1482.30	-161.30	0.12
21	Sep-03	1191	1362.32	0.33	-136.50	1313.62	-122.62	0.10
22	Oct-03	1130	1331.11	-9.13	-186.04	1183.07	-53.07	0.05
23	Nov-03	1207	1413.87	18.43	-250.77	1052.39	154.61	0.13
24	Dec-03	1434	822.65	-164.46	902.60	2459.72	-1025.72	0.72
25	Jan-04	1075	858.14	-104.48	121.33	738.58	336.42	0.31
26	Feb-04	1130	1049.61	-15.69	-60.98	632.09	497.91	0.44
27	Mar-04	1058	1107.28	6.32	-84.33	934.57	123.43	0.12
28	Apr-04	967	1098.46	1.77	-124.23	992.47	-25.47	0.03
29	May-04	1037	1114.07	5.93	-83.68	1013.72	23.28	0.02
30	Jun-04	1160	1197.32	29.12	-74.26	1029.90	130.10	0.11
31	Jul-04	975	1093.21	-10.85	-54.56	1199.16	-224.16	0.23
32	Aug-04	1242	1204.71	25.86	-21.16	1036.15	205.85	0.17

Appendix Table C1 (Continued)

			Alpha	0.59			MAPE	0.33
			Beta	0.30				
			Gamma	0.30				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
33	Sep-04	1123	1247.77	31.02	-132.98	1094.07	28.93	0.03
34	Oct-04	924	1178.49	0.93	-206.58	1092.75	-168.75	0.18
35	Nov-04	1009	1227.18	15.26	-240.99	928.65	80.35	0.08
36	Dec-04	1245	707.48	-145.23	793.07	2145.03	-900.03	0.72
37	Jan-05	703	573.79	-141.77	123.70	683.59	19.41	0.03
38	Feb-05	793	682.82	-66.53	-9.64	371.04	421.96	0.53
39	Mar-05	970	876.65	11.58	-31.02	531.97	438.03	0.45
40	Apr-05	764	888.23	11.58	-124.23	764.00	0.00	0.00
41	May-05	798	889.03	8.35	-85.88	816.13	-18.13	0.02
42	Jun-05	860	919.30	14.92	-69.77	823.11	36.89	0.04
43	Jul-05	651	798.32	-25.85	-82.39	879.66	-228.66	0.35
44	Aug-05	718	752.67	-31.79	-25.22	751.30	-33.30	0.05
45	Sep-05	559	703.71	-36.94	-136.50	587.90	-28.90	0.05
46	Oct-05	589	743.33	-13.97	-190.90	460.19	128.81	0.22
47	Nov-05	1040	1057.23	84.39	-173.86	488.36	551.64	0.53
48	Dec-05	1515	892.17	9.55	742.00	1934.69	-419.69	0.28
49	Jan-06	230	428.95	-132.28	26.90	1025.42	-795.42	3.46
50	Feb-06	554	455.35	-84.67	22.85	287.04	266.96	0.48
51	Mar-06	588	518.28	-40.39	-0.80	339.65	248.35	0.42
52	Apr-06	667	664.13	15.48	-86.10	353.67	313.33	0.47
53	May-06	640	707.11	23.73	-80.25	593.72	46.28	0.07
54	Jun-06	564	673.15	6.42	-81.58	661.07	-97.07	0.17
55	Jul-06	548	650.34	-2.35	-88.37	597.18	-49.18	0.09
56	Aug-06	551	605.33	-15.15	-33.95	622.78	-71.78	0.13
57	Sep-06	440	582.05	-17.59	-138.17	453.68	-13.68	0.03
58	Oct-06	465	618.81	-1.28	-179.77	373.57	91.43	0.20
59	Nov-06	517	661.12	11.79	-164.94	443.67	73.33	0.14
60	Dec-06	663	226.00	-122.28	650.50	1414.91	-751.91	1.13
61	Jan-07	290	198.45	-93.86	46.30	130.62	159.38	0.55
62	Feb-07	118	98.98	-95.54	21.70	127.44	-9.44	0.08
63	Mar-07	963	574.25	75.70	116.07	2.63	960.37	1.00
64	Apr-07	1081	957.32	167.91	-23.16	563.85	517.15	0.48

Appendix Table C2 Forecasted demand of Med A/T calculated by additive seasonal model with α = 0.33, β = 0.30 and γ = 0.54

			Alpha	0.33			MAPE	0.25
			Beta	0.30				
			Gamma	0.54				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
1	Jan-02	265			-277.08			
2	Feb-02	390			-152.08			
3	Mar-02	433			-109.08			
4	Apr-02	561			18.92			
5	May-02	699			156.92			
6	Jun-02	713			170.92			
7	Jul-02	751			208.92			
8	Aug-02	804			261.92			
9	Sep-02	717			174.92			
10	Oct-02	522			-20.08			
11	Nov-02	47			-495.08			
12	Dec-02	603	542.08	30.73	60.92			
13	Jan-03	1270	889.95	125.87	74.98	295.73	974.27	0.77
14	Feb-03	1187	1121.04	157.44	-35.27	863.73	323.27	0.27
15	Mar-03	1170	1278.67	157.50	-108.86	1169.39	0.61	0.00
16	Apr-03	909	1258.41	104.17	-178.42	1455.09	-546.09	0.60
17	May-03	811	1131.96	34.98	-99.11	1519.50	-708.50	0.87
18	Jun-03	1127	1098.30	14.39	94.72	1337.86	-210.86	0.19
19	Jul-03	1175	1064.97	0.07	155.94	1321.61	-146.61	0.12
20	Aug-03	1157	1009.72	-16.52	200.50	1326.96	-169.96	0.15
21	Sep-03	1148	986.65	-18.49	167.65	1168.11	-20.11	0.02
22	Oct-03	1314	1087.27	17.25	112.15	948.08	365.92	0.28
23	Nov-03	1214	1301.31	76.28	-276.62	609.44	604.56	0.50
24	Dec-03	1744	1477.03	106.11	171.31	1438.51	305.49	0.18
25	Jan-04	1248	1449.65	66.06	-73.22	1658.13	-410.13	0.33
26	Feb-04	1337	1469.02	52.06	-87.10	1480.45	-143.45	0.11
27	Mar-04	1220	1458.51	33.29	-178.32	1412.21	-192.21	0.16
28	Apr-04	1183	1449.36	20.55	-225.53	1313.38	-130.38	0.11
29	May-04	1434	1490.48	26.73	-76.27	1370.81	63.19	0.04
30	Jun-04	1491	1477.84	14.92	51.02	1611.93	-120.93	0.08
31	Jul-04	1420	1418.32	-7.42	73.29	1648.70	-228.70	0.16
32	Aug-04	1760	1459.27	7.10	254.20	1611.40	148.60	0.08

Appendix Table C2 (Continued)

			Alpha	0.33			MAPE	0.25
			Beta	0.30				
			Gamma	0.54				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
33	Sep-04	1537	1434.79	-2.38	132.59	1634.02	-97.02	0.06
34	Oct-04	1469	1407.82	-9.76	84.84	1544.55	-75.55	0.05
35	Nov-04	1555	1539.19	32.58	-119.95	1121.44	433.56	0.28
36	Dec-04	2134	1699.02	70.76	312.57	1743.08	390.92	0.18
37	Jan-05	1317	1646.23	33.69	-210.38	1696.55	-379.55	0.29
38	Feb-05	1436	1628.87	18.38	-143.77	1592.82	-156.82	0.11
39	Mar-05	1757	1741.02	46.51	-74.22	1468.93	288.07	0.16
40	Apr-05	1562	1787.53	46.51	-225.53	1562.00	0.00	0.00
41	May-05	1505	1751.76	21.83	-167.61	1757.77	-252.77	0.17
42	Jun-05	1667	1722.28	6.43	-5.93	1824.61	-157.61	0.09
43	Jul-05	1322	1572.47	-40.44	-100.16	1802.01	-480.01	0.36
44	Aug-05	1376	1398.50	-80.50	105.96	1786.23	-410.23	0.30
45	Sep-05	1063	1191.83	-118.35	-7.47	1450.59	-387.59	0.36
46	Oct-05	960	1008.93	-137.72	13.18	1158.33	-198.33	0.21
47	Nov-05	1668	1169.62	-48.19	211.32	751.26	916.74	0.55
48	Dec-05	2330	1413.08	39.30	636.35	1434.00	896.00	0.38
49	Jan-06	795	1306.88	-4.35	-371.91	1242.01	-447.01	0.56
50	Feb-06	747	1168.50	-44.56	-292.56	1158.76	-411.76	0.55
51	Mar-06	1289	1201.83	-21.19	12.24	1049.72	239.28	0.19
52	Apr-06	1082	1221.94	-8.80	-179.68	955.11	126.89	0.12
53	May-06	1291	1293.05	15.17	-78.91	1045.53	245.47	0.19
54	Jun-06	1039	1222.51	-10.54	-101.07	1302.28	-263.28	0.25
55	Jul-06	1206	1242.63	-1.34	-66.13	1111.81	94.19	0.08
56	Aug-06	1069	1150.72	-28.51	5.41	1347.25	-278.25	0.26
57	Sep-06	1297	1181.53	-10.72	58.39	1114.74	182.26	0.14
58	Oct-06	1240	1189.05	-5.25	33.41	1183.99	56.01	0.05
59	Nov-06	1325	1160.98	-12.09	185.98	1395.13	-70.13	0.05
60	Dec-06	1806	1155.64	-10.07	643.86	1785.23	20.77	0.01
61	Jan-07	884	1181.49	0.71	-332.04	773.67	110.33	0.12
62	Feb-07	396	1021.51	-47.50	-470.94	889.63	-493.63	1.25
63	Mar-07	1199	1043.27	-26.72	89.12	986.26	212.74	0.18
64	Apr-07	1460	1219.38	34.13	45.50	836.87	623.13	0.43

Appendix Table C3 Forecasted demand of Med M/T calculated by additive seasonal model with α = 0.30, β = 0.30 and γ = 0.62

			Alpha	0.30			MAPE	0.32
			Beta	0.30				
			Gamma	0.62				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
1	Jan-02	244			-108.50			
2	Feb-02	286			-66.50			
3	Mar-02	277			-75.50			
4	Apr-02	368			15.50			
5	May-02	405			52.50			
6	Jun-02	437			84.50			
7	Jul-02	490			137.50			
8	Aug-02	522			169.50			
9	Sep-02	444			91.50			
10	Oct-02	410			57.50			
11	Nov-02	66			-286.50			
12	Dec-02	281	352.50	3.36	-71.50			
13	Jan-03	655	478.15	40.05	68.21	247.36	407.64	0.62
14	Feb-03	960	670.69	85.80	153.85	451.71	508.29	0.53
15	Mar-03	964	841.39	111.27	47.19	680.99	283.01	0.29
16	Apr-03	799	901.91	96.04	-57.83	968.16	-169.16	0.21
17	May-03	651	878.12	60.09	-120.67	1050.46	-399.46	0.61
18	Jun-03	721	847.70	32.94	-46.29	1022.71	-301.71	0.42
19	Jul-03	743	798.10	8.18	18.23	1018.14	-275.14	0.37
20	Aug-03	759	741.24	-11.33	75.53	975.77	-216.77	0.29
21	Sep-03	773	715.38	-15.69	70.52	821.41	-48.41	0.06
22	Oct-03	958	759.94	2.38	144.55	757.19	200.81	0.21
23	Nov-03	708	831.97	23.28	-185.85	475.82	232.18	0.33
24	Dec-03	698	829.53	15.56	-108.67	783.75	-85.75	0.12
25	Jan-04	510	724.10	-20.74	-106.62	913.30	-403.30	0.79
26	Feb-04	564	615.40	-47.12	26.74	857.21	-293.21	0.52
27	Mar-04	499	533.34	-57.61	-3.30	615.46	-116.46	0.23
28	Apr-04	455	486.86	-54.27	-41.75	417.90	37.10	0.08
29	May-04	527	497.12	-34.91	-27.43	311.93	215.07	0.41
30	Jun-04	531	496.73	-24.55	3.60	415.91	115.09	0.22
31	Jul-04	536	485.86	-20.45	37.99	490.41	45.59	0.09
32	Aug-04	635	493.63	-11.98	116.30	540.94	94.06	0.15

Appendix Table C3 (Continued)

			Alpha	0.30			MAPE	0.32
			Beta	0.30				
			Gamma	0.62				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
33	Sep-04	246	389.80	-39.54	-62.21	552.16	-306.16	1.24
34	Oct-04	514	356.02	-37.81	152.87	494.81	19.19	0.04
35	Nov-04	566	448.30	1.22	2.14	132.36	433.64	0.77
36	Dec-04	699	556.96	33.45	46.59	340.84	358.16	0.51
37	Jan-05	388	561.68	24.83	-148.15	483.79	-95.79	0.25
38	Feb-05	458	539.93	10.86	-40.56	613.25	-155.25	0.34
39	Mar-05	642	579.14	19.36	37.67	547.49	94.51	0.15
40	Apr-05	521	587.78	16.15	-57.25	556.76	-35.76	0.07
41	May-05	615	615.48	19.61	-10.74	576.49	38.51	0.06
42	Jun-05	556	610.28	12.17	-32.25	638.69	-82.69	0.15
43	Jul-05	453	560.22	-6.50	-51.94	660.44	-207.44	0.46
44	Aug-05	416	477.51	-29.36	6.18	670.02	-254.02	0.61
45	Sep-05	358	439.77	-31.88	-74.32	385.94	-27.94	0.08
46	Oct-05	383	354.56	-47.88	75.81	560.76	-177.76	0.46
47	Nov-05	627	402.14	-19.24	140.07	308.82	318.18	0.51
48	Dec-05	809	496.75	14.92	211.11	429.49	379.51	0.47
49	Jan-06	317	497.71	10.73	-168.31	363.52	-46.52	0.15
50	Feb-06	410	491.08	5.52	-65.65	467.88	-57.88	0.14
51	Mar-06	651	531.62	16.03	88.27	534.27	116.73	0.18
52	Apr-06	389	517.23	6.90	-101.20	490.39	-101.39	0.26
53	May-06	413	494.01	-2.13	-54.26	513.39	-100.39	0.24
54	Jun-06	355	460.49	-11.55	-77.60	459.63	-104.63	0.29
55	Jul-06	397	448.94	-11.55	-51.94	397.00	0.00	0.00
56	Aug-06	350	409.31	-19.97	-34.38	443.57	-93.57	0.27
57	Sep-06	311	388.14	-20.33	-76.06	315.02	-4.02	0.01
58	Oct-06	425	362.22	-22.01	67.74	443.61	-18.61	0.04
59	Nov-06	364	305.33	-32.47	89.66	480.28	-116.28	0.32
60	Dec-06	457	264.76	-34.90	199.42	483.96	-26.96	0.06
61	Jan-07	208	273.80	-21.72	-104.83	61.55	146.45	0.70
62	Feb-07	116	230.95	-28.06	-96.18	186.43	-70.43	0.61
63	Mar-07	296	204.34	-27.62	90.37	291.17	4.83	0.02
64	Apr-07	372	265.66	-0.94	27.32	75.51	296.49	0.80

Appendix Table C4 Forecasted demand of Low A/T calculated by additive seasonal model with α = 0.30, β = 0.30 and γ = 0.77

			Alpha	0.30			MAPE	0.23
			Beta	0.30				
			Gamma	0.77				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
1	Dec-02	155			-93.00			
2	Jan-03	234			-14.00			
3	Feb-03	339			91.00			
4	Mar-03	352			104.00			
5	Apr-03	233			-15.00			
6	May-03	199			-49.00			
7	Jun-03	197			-51.00			
8	Jul-03	214			-34.00			
9	Aug-03	243			-5.00			
10	Sep-03	221			-27.00			
11	Oct-03	266			18.00			
12	Nov-03	323	248.00	15.27	75.00			
13	Dec-03	393	330.09	35.32	27.26	170.27	222.73	0.57
14	Jan-04	457	397.09	44.82	43.01	351.41	105.59	0.23
15	Feb-04	502	432.64	42.04	74.31	532.91	-30.91	0.06
16	Mar-04	548	465.47	39.28	87.44	578.68	-30.68	0.06
17	Apr-04	538	519.23	43.62	11.05	489.75	48.25	0.09
18	May-04	573	580.59	48.95	-17.06	513.85	59.15	0.10
19	Jun-04	631	645.28	53.67	-22.67	578.54	52.46	0.08
20	Jul-04	558	666.86	44.04	-91.74	664.94	-106.94	0.19
21	Aug-04	694	707.33	42.97	-11.43	705.90	-11.90	0.02
22	Sep-04	580	707.31	30.07	-104.37	723.30	-143.30	0.25
23	Oct-04	526	668.57	9.43	-105.85	755.38	-229.38	0.44
24	Nov-04	765	681.60	10.51	81.48	753.00	12.00	0.02
25	Dec-04	793	714.20	17.14	67.01	719.36	73.64	0.09
26	Jan-05	518	654.43	-5.93	-95.40	774.35	-256.35	0.49
27	Feb-05	577	604.75	-19.06	-4.41	722.81	-145.81	0.25
28	Mar-05	719	599.46	-14.93	112.20	673.13	45.87	0.06
29	Apr-05	559	573.55	-18.22	-8.70	595.58	-36.58	0.07
30	May-05	626	581.65	-10.33	30.31	538.27	87.73	0.14
31	Jun-05	659	604.43	-0.39	36.91	548.65	110.35	0.17
32	Jul-05	493	598.25	-2.13	-102.16	512.29	-19.29	0.04

Appendix Table C4 (Continued)

			Alpha	0.30			MAPE	0.23
			Beta	0.30				
			Gamma	0.77				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
33	Aug-05	557	587.81	-4.62	-26.38	584.69	-27.69	0.05
34	Sep-05	457	576.64	-6.59	-116.15	478.81	-21.81	0.05
35	Oct-05	370	541.79	-15.06	-156.71	464.21	-94.21	0.25
36	Nov-05	692	551.87	-7.52	126.72	608.21	83.79	0.12
37	Dec-05	1064	680.14	33.21	311.41	611.36	452.64	0.43
38	Jan-06	445	661.46	17.65	-188.78	617.95	-172.95	0.39
39	Feb-06	403	597.60	-6.80	-151.11	674.70	-271.70	0.67
40	Mar-06	703	590.80	-6.80	112.20	703.00	0.00	0.00
41	Apr-06	470	552.40	-16.28	-65.55	575.30	-105.30	0.22
42	May-06	561	534.49	-16.77	27.37	566.43	-5.43	0.01
43	Jun-06	483	496.24	-23.22	-1.77	554.63	-71.63	0.15
44	Jul-06	494	509.96	-12.13	-35.67	370.86	123.14	0.25
45	Aug-06	483	501.29	-11.09	-20.14	471.45	11.55	0.02
46	Sep-06	528	536.38	2.76	-33.03	374.05	153.95	0.29
47	Oct-06	588	600.82	21.26	-45.72	382.43	205.57	0.35
48	Nov-06	612	581.04	8.95	52.86	748.80	-136.80	0.22
49	Dec-06	743	542.47	-5.30	225.89	901.40	-158.40	0.21
50	Jan-07	544	595.85	12.30	-83.16	348.39	195.61	0.36
51	Feb-07	231	540.34	-8.04	-273.15	457.04	-226.04	0.98
52	Mar-07	1841	891.25	99.64	758.22	644.50	1196.50	0.65
53	Apr-07	1498	1162.69	151.18	243.64	925.34	572.66	0.38

Appendix Table C5 Forecasted demand of Low M/T calculated by additive seasonal model with α = 0.54, β = 0.30 and γ = 0.30

			Alpha	0.54			MAPE	0.32
			Beta	0.30				
			Gamma	0.30				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
1	Jan-02	10			-23.50			
2	Feb-02	15			-18.50			
3	Mar-02	22			-11.50			
4	Apr-02	35			1.50			
5	May-02	40			6.50			
6	Jun-02	38			4.50			
7	Jul-02	24			-9.50			
8	Aug-02	38			4.50			
9	Sep-02	20			-13.50			
10	Oct-02	29			-4.50			
11	Nov-02	40			6.50			
12	Dec-02	91	33.50	7.36	57.50			
13	Jan-03	174	126.02	32.91	-2.06	17.36	156.64	0.90
14	Feb-03	389	294.07	73.45	15.53	140.43	248.57	0.64
15	Mar-03	356	367.51	73.45	-11.50	356.02	-0.02	0.00
16	Apr-03	264	343.94	44.34	-22.93	442.46	-178.46	0.68
17	May-03	198	281.30	12.25	-20.44	394.78	-196.78	0.99
18	Jun-03	205	242.96	-2.93	-8.24	298.04	-93.04	0.45
19	Jul-03	241	245.72	-1.22	-8.07	230.53	10.47	0.04
20	Aug-03	233	235.80	-3.83	2.31	249.00	-16.00	0.07
21	Sep-03	228	237.15	-2.28	-12.20	218.47	9.53	0.04
22	Oct-03	256	248.81	1.90	-0.99	230.38	25.62	0.10
23	Nov-03	336	293.55	14.75	17.29	257.21	78.79	0.23
24	Dec-03	404	329.07	20.98	62.73	365.80	38.20	0.09
25	Jan-04	356	354.40	22.29	-0.96	348.00	8.00	0.02
26	Feb-04	381	370.59	20.46	13.99	392.22	-11.22	0.03
27	Mar-04	407	405.98	24.94	-7.75	379.55	27.45	0.07
28	Apr-04	341	394.50	14.01	-32.10	407.98	-66.98	0.20
29	May-04	429	430.76	20.69	-14.84	388.07	40.93	0.10
30	Jun-04	381	417.63	10.54	-16.75	443.21	-62.21	0.16
31	Jul-04	355	392.77	-0.08	-16.98	420.10	-65.10	0.18
32	Aug-04	490	444.34	15.42	15.31	395.01	94.99	0.19

Appendix Table C5 (Continued)

			Alpha	0.54			MAPE	0.32
			Beta	0.30				
			Gamma	0.30				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
33	Sep-04	168	307.77	-30.18	-50.47	447.56	-279.56	1.66
34	Oct-04	373	330.00	-14.46	12.21	276.60	96.40	0.26
35	Nov-04	473	391.75	8.41	36.48	332.83	140.17	0.30
36	Dec-04	662	508.41	40.88	89.99	462.88	199.12	0.30
37	Jan-05	366	450.16	11.14	-25.92	548.33	-182.33	0.50
38	Feb-05	431	437.22	3.92	7.93	475.30	-44.30	0.10
39	Mar-05	605	534.44	31.91	15.75	433.39	171.61	0.28
40	Apr-05	570	585.78	37.74	-27.21	534.24	35.76	0.06
41	May-05	555	594.33	28.98	-22.19	608.69	-53.69	0.10
42	Jun-05	597	618.12	27.42	-18.06	606.56	-9.56	0.02
43	Jul-05	477	563.14	2.70	-37.73	628.56	-151.56	0.32
44	Aug-05	425	480.95	-22.77	-6.06	581.16	-156.16	0.37
45	Sep-05	374	439.85	-28.27	-55.08	407.71	-33.71	0.09
46	Oct-05	319	354.61	-45.36	-2.14	423.79	-104.79	0.33
47	Nov-05	500	393.13	-20.20	57.59	345.73	154.27	0.31
48	Dec-05	727	516.50	22.88	126.14	462.92	264.08	0.36
49	Jan-06	261	402.13	-18.30	-60.48	513.46	-252.46	0.97
50	Feb-06	276	320.89	-37.18	-7.92	391.75	-115.75	0.42
51	Mar-06	467	374.80	-9.85	38.68	299.46	167.54	0.36
52	Apr-06	256	320.51	-23.19	-38.40	337.74	-81.74	0.32
53	May-06	301	311.38	-18.97	-18.64	275.14	25.86	0.09
54	Jun-06	222	263.95	-27.51	-25.23	274.35	-52.35	0.24
55	Jul-06	351	319.24	-2.67	-16.88	198.72	152.28	0.43
56	Aug-06	270	294.55	-9.28	-11.61	310.50	-40.50	0.15
57	Sep-06	293	319.42	0.97	-46.48	230.19	62.81	0.21
58	Oct-06	363	344.72	8.27	3.99	318.25	44.75	0.12
59	Nov-06	339	314.07	-3.41	47.80	410.58	-71.58	0.21
60	Dec-06	418	300.44	-6.47	123.57	436.80	-18.80	0.04
61	Jan-07	162	255.10	-18.13	-70.27	233.48	-71.48	0.44
62	Feb-07	109	171.70	-37.71	-24.35	229.05	-120.05	1.10
63	Mar-07	307	207.02	-15.80	57.07	172.67	134.33	0.44
64	Apr-07	277	258.73	4.45	-21.40	152.82	124.18	0.45

Appendix Table C6 Forecasted demand of Top A/T calculated by multiplicative seasonal model with α = 0.30, β = 0.30 and γ = 0.81

			Alpha	0.30			MAPE	1.14
			Beta	0.30				
			Gamma	0.81				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
1	Jan-02	188			0.64			
2	Feb-02	196			0.67			
3	Mar-02	237			0.81			
4	Apr-02	253			0.86			
5	May-02	271			0.93			
6	Jun-02	216			0.74			
7	Jul-02	257			0.88			
8	Aug-02	266			0.91			
9	Sep-02	171			0.58			
10	Oct-02	113			0.39			
11	Nov-02	23			0.08			
12	Dec-02	1320	292.58	102.91	4.51			
13	Jan-03	1811	1122.38	320.98	1.43	254.12	1556.88	0.86
14	Feb-03	1371	1624.33	375.27	0.81	966.90	404.10	0.29
15	Mar-03	1473	1945.25	358.96	0.77	1619.72	-146.72	0.10
16	Apr-03	1238	2042.46	280.44	0.65	1992.48	-754.48	0.61
17	May-03	1148	1997.86	182.93	0.64	2151.54	-1003.54	0.87
18	Jun-03	1257	2037.35	139.90	0.64	1609.97	-352.97	0.28
19	Jul-03	1450	2019.30	92.51	0.75	1912.45	-462.45	0.32
20	Aug-03	1321	1914.17	33.22	0.73	1919.94	-598.94	0.45
21	Sep-03	1191	1974.52	41.36	0.60	1138.15	52.85	0.04
22	Oct-03	1130	2288.87	123.25	0.47	778.56	351.44	0.31
23	Nov-03	1207	6294.76	1288.05	0.17	189.62	1017.38	0.84
24	Dec-03	1434	5403.32	634.20	1.06	34210.12	-32776.12	22.86
25	Jan-04	1075	4451.40	158.36	0.46	8648.81	-7573.81	7.05
26	Feb-04	1130	3644.54	-131.20	0.40	3741.17	-2611.17	2.31
27	Mar-04	1058	2873.12	-323.27	0.44	2694.98	-1636.98	1.55
28	Apr-04	967	2228.24	-419.75	0.48	1668.47	-701.47	0.73
29	May-04	1037	1751.91	-436.73	0.60	1157.74	-120.74	0.12
30	Jun-04	1160	1464.73	-391.86	0.76	841.17	318.83	0.27
31	Jul-04	975	1142.07	-371.10	0.83	802.46	172.54	0.18
32	Aug-04	1242	1049.43	-287.56	1.10	563.54	678.46	0.55

Appendix Table C6 (Continued)

			Alpha	0.30			MAPE	1.14
			Beta	0.30				
			Gamma	0.81				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
33	Sep-04	1123	1095.09	-187.59	0.95	456.88	666.12	0.59
34	Oct-04	924	1220.48	-93.70	0.70	429.84	494.16	0.53
35	Nov-04	1009	2562.52	337.02	0.35	192.29	816.71	0.81
36	Dec-04	1245	2383.02	182.07	0.62	3064.89	-1819.89	1.46
37	Jan-05	703	2250.53	87.70	0.34	1189.04	-486.04	0.69
38	Feb-05	793	2226.27	54.11	0.37	943.61	-150.61	0.19
39	Mar-05	970	2253.75	46.12	0.43	1009.29	-39.29	0.04
40	Apr-05	764	2092.38	-16.13	0.39	1092.58	-328.58	0.43
41	May-05	798	1851.76	-83.47	0.46	1247.66	-449.66	0.56
42	Jun-05	860	1575.70	-141.25	0.59	1350.18	-490.18	0.57
43	Jul-05	651	1238.29	-200.10	0.58	1196.33	-545.33	0.84
44	Aug-05	718	922.71	-234.74	0.84	1141.11	-423.11	0.59
45	Sep-05	559	658.83	-243.48	0.87	650.88	-91.88	0.16
46	Oct-05	589	541.65	-205.59	1.02	292.50	296.50	0.50
47	Nov-05	1040	1121.20	29.95	0.82	118.35	921.65	0.89
48	Dec-05	1515	1536.38	145.52	0.92	716.15	798.85	0.53
49	Jan-06	230	1379.94	54.93	0.20	572.78	-342.78	1.49
50	Feb-06	554	1459.72	62.39	0.38	523.77	30.23	0.05
51	Mar-06	588	1473.18	47.71	0.41	658.57	-70.57	0.12
52	Apr-06	667	1583.51	66.50	0.41	586.50	80.50	0.12
53	May-06	640	1570.02	42.50	0.42	763.34	-123.34	0.19
54	Jun-06	564	1417.31	-16.06	0.43	945.56	-381.56	0.68
55	Jul-06	548	1262.77	-57.61	0.46	817.21	-269.21	0.49
56	Aug-06	551	1040.87	-106.89	0.59	1009.91	-458.91	0.83
57	Sep-06	440	806.09	-145.26	0.61	809.46	-369.46	0.84
58	Oct-06	465	599.89	-163.54	0.82	671.39	-206.39	0.44
59	Nov-06	517	494.52	-146.09	1.00	357.93	159.07	0.31
60	Dec-06	663	460.51	-112.46	1.34	319.93	343.07	0.52
61	Jan-07	290	680.62	-12.69	0.38	69.29	220.71	0.76
62	Feb-07	118	561.49	-44.62	0.24	251.69	-133.69	1.13
63	Mar-07	963	1074.46	122.65	0.80	209.53	753.47	0.78
64	Apr-07	1081	1620.21	249.58	0.62	496.30	584.70	0.54

Appendix Table C7 Forecasted demand of Med A/T calculated by multiplicative seasonal model with α = 0.30, β = 0.30 and γ = 0.69

			Alpha	0.30			MAPE	0.64
			Beta	0.30				
			Gamma	0.69				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
1	Jan-02	265			0.49			
2	Feb-02	390			0.72			
3	Mar-02	433			0.80			
4	Apr-02	561			1.03			
5	May-02	699			1.29			
6	Jun-02	713			1.32			
7	Jul-02	751			1.39			
8	Aug-02	804			1.48			
9	Sep-02	717			1.32			
10	Oct-02	522			0.96			
11	Nov-02	47			0.09			
12	Dec-02	603	542.08	30.73	1.11			
13	Jan-03	1270	1180.34	212.99	0.90	280.02	989.98	0.78
14	Feb-03	1187	1470.29	236.08	0.78	1002.42	184.58	0.16
15	Mar-03	1170	1633.88	214.33	0.74	1363.00	-193.00	0.16
16	Apr-03	909	1557.25	127.04	0.72	1912.71	-1003.71	1.10
17	May-03	811	1367.69	32.06	0.81	2171.85	-1360.85	1.68
18	Jun-03	1127	1236.88	-16.80	1.03	1841.09	-714.09	0.63
19	Jul-03	1175	1108.49	-50.28	1.16	1690.29	-515.29	0.44
20	Aug-03	1157	974.78	-75.31	1.28	1569.51	-412.51	0.36
21	Sep-03	1148	890.01	-78.15	1.30	1189.71	-41.71	0.04
22	Oct-03	1314	977.67	-28.40	1.23	781.79	532.21	0.41
23	Nov-03	1214	4865.06	1146.33	0.20	82.30	1131.70	0.93
24	Dec-03	1744	4678.32	746.41	0.60	6686.92	-4942.92	2.83
25	Jan-04	1248	4214.89	383.46	0.48	4863.74	-3615.74	2.90
26	Feb-04	1337	3732.77	123.78	0.49	3588.90	-2251.90	1.68
27	Mar-04	1220	3193.28	-75.20	0.49	2859.04	-1639.04	1.34
28	Apr-04	1183	2674.51	-208.27	0.53	2249.90	-1066.90	0.90
29	May-04	1434	2260.27	-270.06	0.69	1987.21	-553.21	0.39
30	Jun-04	1491	1825.47	-319.48	0.88	2059.14	-568.14	0.38
31	Jul-04	1420	1421.62	-344.79	1.05	1746.06	-326.06	0.23
32	Aug-04	1760	1167.10	-317.71	1.44	1375.58	384.42	0.22

Appendix Table C7 (Continued)

			Alpha	0.30			MAPE	0.64
			Beta	0.30				
			Gamma	0.69				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
33	Sep-04	1537	949.30	-287.74	1.52	1104.12	432.88	0.28
34	Oct-04	1469	822.09	-239.58	1.62	812.12	656.88	0.45
35	Nov-04	1555	2742.76	408.50	0.45	116.38	1438.62	0.93
36	Dec-04	2134	3275.11	445.65	0.64	1886.80	247.20	0.12
37	Jan-05	1317	3428.42	357.95	0.41	1784.32	-467.32	0.35
38	Feb-05	1436	3534.69	282.45	0.43	1844.72	-408.72	0.28
39	Mar-05	1757	3743.72	260.42	0.48	1877.37	-120.37	0.07
40	Apr-05	1562	3691.01	166.48	0.46	2112.74	-550.74	0.35
41	May-05	1505	3357.65	16.53	0.52	2649.26	-1144.26	0.76
42	Jun-05	1667	2928.08	-117.30	0.67	2980.54	-1313.54	0.79
43	Jul-05	1322	2346.01	-256.73	0.71	2945.45	-1623.45	1.23
44	Aug-05	1376	1749.65	-358.62	0.99	3003.47	-1627.47	1.18
45	Sep-05	1063	1183.30	-420.94	1.09	2116.54	-1053.54	0.99
46	Oct-05	960	711.87	-436.09	1.43	1232.00	-272.00	0.28
47	Nov-05	1668	1293.38	-130.81	1.03	125.42	1542.58	0.92
48	Dec-05	2330	1913.83	94.57	1.04	738.75	1591.25	0.68
49	Jan-06	795	1982.95	86.94	0.40	830.06	-35.06	0.04
50	Feb-06	747	1968.89	56.64	0.40	892.10	-145.10	0.19
51	Mar-06	1289	2229.93	117.96	0.55	964.55	324.45	0.25
52	Apr-06	1082	2356.77	120.62	0.46	1068.53	13.47	0.01
53	May-06	1291	2477.39	120.62	0.52	1291.00	0.00	0.00
54	Jun-06	1039	2287.15	27.36	0.52	1728.34	-689.34	0.66
55	Jul-06	1206	2128.66	-28.39	0.61	1646.79	-440.79	0.37
56	Aug-06	1069	1795.64	-119.78	0.71	2069.55	-1000.55	0.94
57	Sep-06	1297	1530.49	-163.39	0.92	1824.59	-527.59	0.41
58	Oct-06	1240	1217.06	-208.40	1.14	1955.32	-715.32	0.58
59	Nov-06	1325	1090.28	-183.92	1.16	1043.52	281.48	0.21
60	Dec-06	1806	1155.60	-109.15	1.40	942.28	863.72	0.48
61	Jan-07	884	1387.82	-6.74	0.57	423.50	460.50	0.52
62	Feb-07	396	1267.39	-40.84	0.34	545.75	-149.75	0.38
63	Mar-07	1199	1516.26	46.07	0.72	670.83	528.17	0.44
64	Apr-07	1460	2050.21	192.43	0.63	715.36	744.64	0.51

Appendix Table C8 Forecasted demand of Med M/T calculated by multiplicative seasonal model with α = 0.60, β = 0.30 and γ = 0.90

			Alpha	0.60			MAPE	0.55
			Beta	0.30				
			Gamma	0.90				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
1	Jan-02	244			0.69			
2	Feb-02	286			0.81			
3	Mar-02	277			0.79			
4	Apr-02	368			1.04			
5	May-02	405			1.15			
6	Jun-02	437			1.24			
7	Jul-02	490			1.39			
8	Aug-02	522			1.48			
9	Sep-02	444			1.26			
10	Oct-02	410			1.16			
11	Nov-02	66			0.19			
12	Dec-02	281	352.50	3.36	0.80			
13	Jan-03	655	709.16	109.35	0.90	246.33	408.67	0.62
14	Feb-03	960	1036.75	174.82	0.91	664.09	295.91	0.31
15	Mar-03	964	1220.66	177.55	0.79	952.07	11.93	0.01
16	Apr-03	799	1019.50	63.94	0.81	1459.68	-660.68	0.83
17	May-03	651	774.17	-28.84	0.87	1244.81	-593.81	0.91
18	Jun-03	721	647.34	-58.24	1.13	924.00	-203.00	0.28
19	Jul-03	743	556.43	-68.04	1.34	818.90	-75.90	0.10
20	Aug-03	759	502.84	-63.70	1.51	723.24	35.76	0.05
21	Sep-03	773	543.60	-32.37	1.41	553.13	219.87	0.28
22	Oct-03	958	698.18	23.72	1.35	594.62	363.38	0.38
23	Nov-03	708	2552.67	572.95	0.27	135.16	572.84	0.81
24	Dec-03	698	1779.22	169.03	0.43	2491.63	-1793.63	2.57
25	Jan-04	510	1121.31	-79.05	0.50	1754.45	-1244.45	2.44
26	Feb-04	564	787.61	-155.45	0.74	953.18	-389.18	0.69
27	Mar-04	499	632.17	-155.45	0.79	499.00	0.00	0.00
28	Apr-04	455	527.72	-140.15	0.86	386.00	69.00	0.15
29	May-04	527	517.44	-101.19	1.00	337.82	189.18	0.36
30	Jun-04	531	449.27	-91.28	1.18	468.85	62.15	0.12
31	Jul-04	536	382.99	-83.78	1.39	479.98	56.02	0.10
32	Aug-04	635	372.38	-61.83	1.69	450.78	184.22	0.29

Appendix Table C8 (Continued)

			Alpha	0.60			MAPE	0.55
			Beta	0.30				
			Gamma	0.90				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
33	Sep-04	246	229.43	-86.17	1.11	436.58	-190.58	0.77
34	Oct-04	514	285.16	-43.60	1.76	193.59	320.41	0.62
35	Nov-04	566	1359.10	291.66	0.40	64.82	501.18	0.89
36	Dec-04	699	1629.57	285.31	0.43	714.33	-15.33	0.02
37	Jan-05	388	1234.01	81.05	0.33	956.13	-568.13	1.46
38	Feb-05	458	900.55	-43.30	0.53	967.75	-509.75	1.11
39	Mar-05	642	830.97	-51.19	0.77	676.67	-34.67	0.05
40	Apr-05	521	676.96	-82.03	0.78	668.24	-147.24	0.28
41	May-05	615	605.54	-78.85	1.01	597.20	17.80	0.03
42	Jun-05	556	494.35	-88.55	1.13	619.58	-63.58	0.11
43	Jul-05	453	357.48	-103.05	1.28	565.53	-112.53	0.25
44	Aug-05	416	249.88	-104.41	1.67	428.81	-12.81	0.03
45	Sep-05	358	252.20	-72.39	1.39	160.81	197.19	0.55
46	Oct-05	383	202.62	-65.55	1.88	316.01	66.99	0.17
47	Nov-05	627	989.14	190.07	0.61	55.06	571.94	0.91
48	Dec-05	809	1601.17	316.66	0.50	506.27	302.73	0.37
49	Jan-06	317	1340.05	143.33	0.25	638.41	-321.41	1.01
50	Feb-06	410	1057.53	15.57	0.40	788.08	-378.08	0.92
51	Mar-06	651	934.09	-26.13	0.70	830.87	-179.87	0.28
52	Apr-06	389	663.71	-99.41	0.61	706.70	-317.70	0.82
53	May-06	413	470.24	-127.62	0.89	572.45	-159.45	0.39
54	Jun-06	355	325.61	-132.73	1.09	387.12	-32.12	0.09
55	Jul-06	397	263.08	-111.67	1.49	246.86	150.14	0.38
56	Aug-06	350	186.46	-101.15	1.86	252.39	97.61	0.28
57	Sep-06	311	168.32	-76.25	1.80	118.41	192.59	0.62
58	Oct-06	425	172.47	-52.13	2.41	172.82	252.18	0.59
59	Nov-06	364	405.00	33.27	0.87	73.49	290.51	0.80
60	Dec-06	457	725.50	119.44	0.62	218.11	238.89	0.52
61	Jan-07	208	844.93	119.44	0.25	208.00	0.00	0.00
62	Feb-07	116	559.95	-1.89	0.23	387.70	-271.70	2.34
63	Mar-07	296	475.49	-26.66	0.63	393.24	-97.24	0.33
64	Apr-07	372	548.01	3.09	0.67	271.67	100.33	0.27

Appendix Table C9 Forecasted demand of Low A/T calculated by multiplicative seasonal model with α = 0.81, β = 0.30 and γ = 1.00

			Alpha	0.81			MAPE	0.41
			Beta	0.30				
			Gamma	1.00				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
1	Dec-02	155			0.63			
2	Jan-03	234			0.94			
3	Feb-03	339			1.37			
4	Mar-03	352			1.42			
5	Apr-03	233			0.94			
6	May-03	199			0.80			
7	Jun-03	197			0.79			
8	Jul-03	214			0.86			
9	Aug-03	243			0.98			
10	Sep-03	221			0.89			
11	Oct-03	266			1.07			
12	Nov-03	323	248.00	15.27	1.30			
13	Dec-03	393	558.98	103.98	0.70	164.55	228.45	0.58
14	Jan-04	457	518.46	60.63	0.88	625.54	-168.54	0.37
15	Feb-04	502	407.71	9.22	1.23	791.59	-289.59	0.58
16	Mar-04	548	391.98	1.73	1.40	591.77	-43.77	0.08
17	Apr-04	538	538.46	45.16	1.00	369.90	168.10	0.31
18	May-04	573	689.17	76.82	0.83	468.30	104.70	0.18
19	Jun-04	631	788.94	83.71	0.80	608.47	22.53	0.04
20	Jul-04	558	689.82	28.86	0.81	753.01	-195.01	0.35
21	Aug-04	694	710.27	26.34	0.98	704.19	-10.19	0.01
22	Sep-04	580	667.24	5.53	0.87	656.41	-76.41	0.13
23	Oct-04	526	525.24	-38.73	1.00	721.59	-195.59	0.37
24	Nov-04	765	568.10	-14.25	1.35	633.64	131.36	0.17
25	Dec-04	793	1018.26	125.07	0.78	389.39	403.61	0.51
26	Jan-05	518	693.81	-9.79	0.75	1007.79	-489.79	0.95
27	Feb-05	577	509.77	-62.06	1.13	842.21	-265.21	0.46
28	Mar-05	719	501.58	-45.90	1.43	625.91	93.09	0.13
29	Apr-05	559	539.65	-20.71	1.04	455.29	103.71	0.19
30	May-05	626	708.22	36.07	0.88	431.47	194.53	0.31
31	Jun-05	659	808.73	55.41	0.81	595.29	63.71	0.10
32	Jul-05	493	658.11	-6.40	0.75	699.00	-206.00	0.42

Appendix Table C9 (Continued)

			Alpha	0.81			MAPE	0.41
			Beta	0.30				
			Gamma	1.00				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
33	Aug-05	557	585.65	-26.22	0.95	636.79	-79.79	0.14
34	Sep-05	457	532.17	-34.40	0.86	486.29	-29.29	0.06
35	Oct-05	370	393.98	-65.54	0.94	498.50	-128.50	0.35
36	Nov-05	692	478.47	-20.53	1.45	442.27	249.73	0.36
37	Dec-05	1064	1192.73	199.91	0.89	356.63	707.37	0.66
38	Jan-06	445	748.20	6.58	0.59	1039.76	-594.76	1.34
39	Feb-06	403	432.21	-90.19	0.93	854.32	-451.32	1.12
40	Mar-06	703	462.07	-54.18	1.52	490.27	212.73	0.30
41	Apr-06	470	444.97	-43.05	1.06	422.52	47.48	0.10
42	May-06	561	590.22	13.44	0.95	355.26	205.74	0.37
43	Jun-06	483	594.83	10.79	0.81	491.89	-8.89	0.02
44	Jul-06	494	649.16	23.85	0.76	453.67	40.33	0.08
45	Aug-06	483	539.40	-16.23	0.90	640.09	-157.09	0.33
46	Sep-06	528	597.34	6.02	0.88	449.26	78.74	0.15
47	Oct-06	588	621.76	11.54	0.95	566.64	21.36	0.04
48	Nov-06	612	463.29	-39.46	1.32	915.93	-303.93	0.50
49	Dec-06	743	754.76	59.82	0.98	378.09	364.91	0.49
50	Jan-07	544	895.53	84.10	0.61	484.48	59.52	0.11
51	Feb-07	231	387.55	-93.52	0.60	913.43	-682.43	2.95
52	Mar-07	1841	1035.08	128.79	1.78	447.33	1393.67	0.76
53	Apr-07	1498	1369.65	190.53	1.09	1229.33	268.67	0.18

Appendix Table C10 Forecasted demand of Low M/T calculated by multiplicative seasonal model with α = 0.66, β = 0.30 and γ = 1.00

			Alpha	0.66			MAPE	0.45
			Beta	0.30				
			Gamma	1.00				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
1	Jan-02	10			0.30			
2	Feb-02	15			0.45			
3	Mar-02	22			0.66			
4	Apr-02	35			1.04			
5	May-02	40			1.19			
6	Jun-02	38			1.13			
7	Jul-02	24			0.72			
8	Aug-02	38			1.13			
9	Sep-02	20			0.60			
10	Oct-02	29			0.87			
11	Nov-02	40			1.19			
12	Dec-02	91	33.50	7.36	2.72			
13	Jan-03	174	397.79	114.44	0.44	12.20	161.80	0.93
14	Feb-03	389	747.00	184.87	0.52	229.35	159.65	0.41
15	Mar-03	356	675.21	107.87	0.53	611.98	-255.98	0.72
16	Apr-03	264	433.82	3.10	0.61	818.15	-554.15	2.10
17	May-03	198	258.41	-50.46	0.77	521.70	-323.70	1.63
18	Jun-03	205	190.02	-55.84	1.08	235.89	-30.89	0.15
19	Jul-03	241	267.34	-15.89	0.90	96.13	144.87	0.60
20	Aug-03	233	221.13	-24.99	1.05	285.22	-52.22	0.22
21	Sep-03	228	318.46	11.71	0.72	117.10	110.90	0.49
22	Oct-03	256	307.49	4.90	0.83	285.82	-29.82	0.12
23	Nov-03	336	291.98	-1.22	1.15	373.01	-37.01	0.11
24	Dec-03	404	197.23	-29.28	2.05	789.84	-385.84	0.96
25	Jan-04	356	593.27	98.32	0.60	73.47	282.53	0.79
26	Feb-04	381	717.96	106.23	0.53	360.14	20.86	0.05
27	Mar-04	407	789.78	95.91	0.52	434.55	-27.55	0.07
28	Apr-04	341	671.46	31.64	0.51	538.98	-197.98	0.58
29	May-04	429	608.80	3.35	0.70	538.74	-109.74	0.26
30	Jun-04	381	441.61	-47.81	0.86	660.39	-279.39	0.73
31	Jul-04	355	393.80	-47.81	0.90	355.00	0.00	0.00
32	Aug-04	490	424.38	-24.29	1.15	364.55	125.45	0.26

Appendix Table C10 (Continued)

			Alpha	0.66			MAPE	0.45
			Beta	0.30				
			Gamma	1.00				
Month		Y_t	R_t	G_t	S_t	F_t	E_t	Abs(Et/Yt)
33	Sep-04	168	291.15	-56.97	0.58	286.44	-118.44	0.70
34	Oct-04	373	374.99	-14.73	0.99	194.97	178.03	0.48
35	Nov-04	473	393.70	-4.70	1.20	414.57	58.43	0.12
36	Dec-04	662	345.67	-17.70	1.92	796.79	-134.79	0.20
37	Jan-05	366	513.64	38.00	0.71	196.80	169.20	0.46
38	Feb-05	431	723.20	89.47	0.60	292.74	138.26	0.32
39	Mar-05	605	1050.60	160.85	0.58	418.80	186.20	0.31
40	Apr-05	570	1152.81	143.26	0.49	615.23	-45.23	0.08
41	May-05	555	961.25	42.81	0.58	913.29	-358.29	0.65
42	Jun-05	597	798.56	-18.84	0.75	866.26	-269.26	0.45
43	Jul-05	477	614.71	-68.34	0.78	702.90	-225.90	0.47
44	Aug-05	425	428.97	-103.56	0.99	630.85	-205.85	0.48
45	Sep-05	374	537.94	-39.80	0.70	187.77	186.23	0.50
46	Oct-05	319	381.30	-74.85	0.84	495.49	-176.49	0.55
47	Nov-05	500	378.70	-53.18	1.32	368.17	131.83	0.26
48	Dec-05	727	361.13	-42.49	2.01	623.42	103.58	0.14
49	Jan-06	261	350.01	-33.08	0.75	227.05	33.95	0.13
50	Feb-06	276	413.19	-4.20	0.67	188.88	87.12	0.32
51	Mar-06	467	673.68	75.20	0.69	235.52	231.48	0.50
52	Apr-06	256	596.69	29.54	0.43	370.28	-114.28	0.45
53	May-06	301	557.15	8.82	0.54	361.57	-60.57	0.20
54	Jun-06	222	388.83	-44.32	0.57	423.12	-201.12	0.91
55	Jul-06	351	415.51	-23.02	0.84	267.33	83.67	0.24
56	Aug-06	270	313.49	-46.72	0.86	388.85	-118.85	0.44
57	Sep-06	293	368.61	-16.17	0.79	185.47	107.53	0.37
58	Oct-06	363	406.08	-0.08	0.89	294.86	68.14	0.19
59	Nov-06	339	307.72	-29.56	1.10	536.05	-197.05	0.58
60	Dec-06	418	231.72	-43.49	1.80	559.97	-141.97	0.34
61	Jan-07	162	207.34	-37.76	0.78	140.36	21.64	0.13
62	Feb-07	109	165.37	-39.02	0.66	113.27	-4.27	0.04
63	Mar-07	307	334.77	23.50	0.92	87.58	219.42	0.71
64	Apr-07	277	547.50	80.27	0.51	153.71	123.29	0.45

Appendix D

Calculation example of modified HW method for Top A/T configuration

According to equation (15) and equation (16), The original seasonal factor which would be replaced by the interpolated seasonal factor, I_t, are seasonal factor of t = 3, 6 -7, 9 – 17, 20 - 21, 23 – 27, 30 – 32, 34, 36, 38 – 39, 43, 46 – 52, 54, 56, 58 – 61, 63 – 64.

We neglect t = 1 because we cannot find the interpolated value of seasonal factor for t = 1. In addition, we also neglect to interpolate seasonal factor of t = 63 – 64, even though their errors are greater than c since we cannot calculate interpolated seasonal factor of the end data.

When t = 3

$$I_3 = \frac{S_2 + S_4}{2}$$

$$= \frac{-96.58 + (-39.58)}{2}$$

$$= -68.08$$

When t = 6 - 7

$$I_6 \text{ - } I_7 = \frac{S_5 + S_8}{2}$$

$$= \frac{-21.58 + (-26.58)}{2}$$

$$= -24.08$$

When t = 9 - 17

$$I_9 \text{ - } I_{12} = \frac{S_8 + S_1}{2}$$

$$= \frac{-26.58 + (-90.09)}{2}$$

$$= -58.34$$

When t = 20 – 21

$$I_{20} - I_{21} = \frac{S_{19} + S_{22}}{2}$$

$$= \frac{-27.29 + (-186.04)}{2}$$

$$= -106.66$$

When t = 23 - 27

$$I_{23} - I_{27} = \frac{S_{22} + S_{28}}{2}$$

$$= \frac{-186.04 + (-124.23)}{2}$$

$$= -155.13$$

When t = 30 – 32

$$I_{30} - I_{32} = \frac{S_{29} + S_{33}}{2}$$

$$= \frac{-83.68 + (-132.98)}{2}$$

$$= -108.33$$

When t = 34

$$I_{34} = \frac{S_{33} + S_{35}}{2}$$

$$= \frac{-132.98 + (-240.99)}{2}$$

$$= -186.99$$

When t = 36

$$I_{36} = \frac{S_{35} + S_{37}}{2}$$

$$= \frac{-240.99 + 123.70}{2}$$

= -58.65

When t = 38 - 39

$$I_{38} - I_{39} = \frac{S_{37} + S_{40}}{2}$$

$$= \frac{123.70 + (-124.23)}{2}$$

= -0.26

When t = 43

$$I_{43} = \frac{S_{42} + S_{44}}{2}$$

$$= \frac{-69.77 + (-25.22)}{2}$$

= -47.50

When t = 46 – 52

$$I_{46} - I_{52} = \frac{S_{45} + S_{53}}{2}$$

$$= \frac{-136.50 + 22.85}{2}$$

= -108.38

When t = 54

$$I_{54} = \frac{S_{53} + S_{55}}{2}$$

$$= \frac{-80.25 + (-88.37)}{2}$$

$$= -84.31$$

When t = 56

$$I_{56} = \frac{S_{55} + S_{57}}{2}$$

$$= \frac{-88.37 + (-138.17)}{2}$$

$$= --113.27$$

When t = 58 – 61

$$I_{58} - I_{61} = \frac{S_{57} + S_{62}}{2}$$

$$= \frac{-138.17 + 21.70}{2}$$

$$= -58.23$$

However, we get the I_t by interpolating seasonal factor which its actual data has fluctuation lower than c for during first season and its actual data has the error lower than c for after first season, we have to screen some improper I_t of the data after first season out by using Equation (17)

As the result, I_t of t = 13 – 17, 21, 25 – 27, 30, 32, 43, 50 – 52, 56 and 61 cannot represent new S_t.

Example: When t = 13

$$\left|(y_{13} - F_{13}) - I_{13}\right| > \left|(y_{13} - F_{13}) - S_{13}\right|$$

$$\left|(1811 - 290.91) - (-58.34)\right| > \left|(1811 - 290.91) - (80.40)\right|$$

$$1578.43 > 1439.69$$

Therefore, I_{16} cannot represent new S_{16}

According to above result, we have to modify forecasted value, F_t, at t = 15, 18 – 19, 21 – 24, 32, 35 – 36, 43, 46, 48, 50 – 51, 58 - 60 by replacing their seasonal factors with interpolated one.

When t = 15

$$F_{15} = R_{14} + G_{14} + I_3$$
$$= 1550.88 + 337.34 + (-68.08)$$
$$= 1820.14$$

When t = 18

$$F_{18} = R_{17} + G_{17} + I_6$$
$$= 1386.00 + 58.59 + (-24.08)$$
$$= 1420.51$$

When t = 19

$$F_{19} = R_{18} + G_{18} + I_7$$
$$= 1378.61 + 38.80 + (-90.09)$$

= 1393.33

When t = 21

F_{21} = $R_{20} + G_{20} + I_9$

= 1413.01 + 22.19 + (-58.34)

= 1376.87

When t = 22

F_{22} = $R_{21} + G_{21} + I_{10}$

= 1362.32 + 0.33 + (-58.34)

= 1304.31

When t = 23

F_{23} = $R_{22} + G_{22} + I_{11}$

= 1331.11 + (-9.13) + (-58.34)

= 1263.64

When t = 24

F_{24} = $R_{23} + G_{23} + I_{12}$

= 1413.87 + 18.43 + (-58.34)

= 1373.96

When t = 32

F_{32} = $R_{31} + G_{31} + I_{20}$

= 1093.21 + (-10.85) + (-106.66)

= 975.70

When t = 35

$$F_{35} = R_{34} + G_{34} + I_{23}$$
$$= 1178.49 + 0.93 + (-155.13)$$
$$= 1024.28$$

When t = 36

$$F_{36} = R_{35} + G_{35} + I_{24}$$
$$= 1227.18 + 15.26 + (-155.13)$$
$$= 1087.30$$

When t = 43

$$F_{43} = R_{42} + G_{42} + I_{31}$$
$$= 919.30 + 14.92 + (-108.33)$$
$$= 825.89$$

When t = 46

$$F_{46} = R_{45} + G_{45} + I_{34}$$
$$= 703.71 + (-36.94) + (-186.99)$$
$$= 479.78$$

When t = 48

$$F_{48} = R_{47} + G_{47} + I_{36}$$
$$= 1057.23 + 84.39 + (-58.65)$$
$$= 1082.97$$

When t = 50

$$F_{50} = R_{49} + G_{49} + I_{38}$$
$$= 428.95 + (-132.28) + (-0.26)$$
$$= 296.41$$

When t = 51

$$F_{51} = R_{50} + G_{50} + I_{39}$$
$$= 455.35 + (-84.67) + (-0.26)$$
$$= 370.41$$

When t= 58

$$F_{58} = R_{57} + G_{57} + I_{46}$$
$$= 582.05 + (-17.59) + (-108.38)$$
$$= 456.09$$

When t = 59

$$F_{59} = R_{58} + G_{58} + I_{47}$$
$$= 618.81 + (-1.28) + (-108.38)$$
$$= 509.15$$

When t = 60

$$F_{60} = R_{59} + G_{59} + I_{48}$$
$$= 661.12 + 11.79 + (-108.38)$$
$$= 564.53$$

Appendix E

Calculated results done by modified HW method when vary c from 10% to 100% for all configurations.

Appendix Table E1 Forecasted demand of Top A/T calculated by additive seasonal model with $\alpha = 0.59$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.1$

						Alpha	0.59				MAPE	0.28
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			188			-104.58				
2	Feb-02	4.26			196			-96.58				
3	Mar-02	20.92			237			-55.58	-68.08			
4	Apr-02	6.75			253			-39.58				
5	May-02	7.11			271			-21.58				
6	Jun-02	-20.30			216			-76.58	-24.08			
7	Jul-02	18.98			257			-35.58	-24.08			
8	Aug-02	3.50			266			-26.58				
9	Sep-02	-35.71			171			-121.58	-58.34			
10	Oct-02	-33.92			113			-179.58	-58.34			
11	Nov-02	-79.65			23			-269.58	-58.34			
12	Dec-02	5639.13			1320	292.58	102.91	1027.42	-58.34			
13	Jan-03		83.94	NG	1811	1298.99	373.96	80.40		290.91	1520.09	0.84
14	Feb-03		-14.98	NG	1371	1550.88	337.34	-121.57		1576.36	-205.36	0.15
15	Mar-03		-24.42	NG	1473	1674.46	273.21	-99.35		1820.14	-347.14	0.24
16	Apr-03		-54.13	NG	1238	1549.39	153.73	-121.13		1908.09	-670.09	0.54
17	May-03		-46.48	NG	1148	1386.00	58.59	-86.51		1681.54	-533.54	0.46
18	Jun-03		-8.83		1257	1378.61	38.80	-90.09		1420.51	-163.51	0.13
19	Jul-03		4.70		1450	1457.93	50.95	-27.29		1393.33	56.67	0.04
20	Aug-03		-12.21	OK	1321	1413.01	22.19	-46.21	-106.66	1482.30	-161.30	0.12
21	Sep-03		-10.30	NG	1191	1362.32	0.33	-136.50		1376.87	-185.87	0.16
22	Oct-03		-4.70		1130	1331.11	-9.13	-186.04		1304.31	-174.31	0.15
23	Nov-03		12.81	OK	1207	1413.87	18.43	-250.77	-155.13	1263.64	-56.64	0.05
24	Dec-03		-71.53	OK	1434	822.65	-164.46	902.60	-155.13	1373.96	60.04	0.04
25	Jan-04		31.29	NG	1075	858.14	-104.48	121.33		738.58	336.42	0.31
26	Feb-04		44.06	NG	1130	1049.61	-15.69	-60.98		632.09	497.91	0.44
27	Mar-04		11.67	NG	1058	1107.28	6.32	-84.33		934.57	123.43	0.12
28	Apr-04		-2.63		967	1098.46	1.77	-124.23		992.47	-25.47	0.03
29	May-04		2.24		1037	1114.07	5.93	-83.68		1013.72	23.28	0.02
30	Jun-04		11.22	NG	1160	1197.32	29.12	-74.26		1029.90	130.10	0.11
31	Jul-04		-22.99	OK	975	1093.21	-10.85	-54.56	-108.33	1199.16	-224.16	0.23
32	Aug-04		16.57	NG	1242	1204.71	25.86	-21.16		975.70	266.30	0.21

Appendix Table E1 (Continued)

						Alpha	0.59				MAPE	0.28
			Diff (%)			Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		2.58		1123	1247.77	31.02	-132.98		1094.07	28.93	0.03
34	Oct-04		-18.26	OK	924	1178.49	0.93	-206.58	-186.99	1092.75	-168.75	0.18
35	Nov-04		7.96		1009	1227.18	15.26	-240.99		1024.28	-15.28	0.02
36	Dec-04		-72.29	OK	1245	707.48	-145.23	793.07	-58.65	1087.30	157.70	0.13
37	Jan-05		2.76		703	573.79	-141.77	123.70		683.59	19.41	0.03
38	Feb-05		53.21	OK	793	682.82	-66.53	-9.64	-0.26	371.04	421.96	0.53
39	Mar-05		45.16	OK	970	876.65	11.58	-31.02	-0.26	531.97	438.03	0.45
40	Apr-05		0.00		764	888.23	11.58	-124.23		764.00	0.00	0.00
41	May-05		-2.27		798	889.03	8.35	-85.88		816.13	-18.13	0.02
42	Jun-05		4.29		860	919.30	14.92	-69.77		823.11	36.89	0.04
43	Jul-05		-35.12	NG	651	798.32	-25.85	-82.39		825.89	-174.89	0.27
44	Aug-05		-4.64		718	752.67	-31.79	-25.22		751.30	-33.30	0.05
45	Sep-05		-5.17		559	703.71	-36.94	-136.50		587.90	-28.90	0.05
46	Oct-05		21.87	OK	589	743.33	-13.97	-190.90	-108.38	479.78	109.22	0.19
47	Nov-05		53.04	OK	1040	1057.23	84.39	-173.86	-108.38	488.36	551.64	0.53
48	Dec-05		-27.70	OK	1515	892.17	9.55	742.00	-108.38	1082.97	432.03	0.29
49	Jan-06		-345.83	OK	230	428.95	-132.28	26.90	-108.38	1025.42	-795.42	3.46
50	Feb-06		48.19	NG	554	455.35	-84.67	22.85		296.41	257.59	0.46
51	Mar-06		42.24	NG	588	518.28	-40.39	-0.80		370.41	217.59	0.37
52	Apr-06		46.98	NG	667	664.13	15.48	-86.10		353.67	313.33	0.47
53	May-06		7.23		640	707.11	23.73	-80.25		593.72	46.28	0.07
54	Jun-06		-17.21	OK	564	673.15	6.42	-81.58	-84.31	661.07	-97.07	0.17
55	Jul-06		-8.97		548	650.34	-2.35	-88.37		597.18	-49.18	0.09
56	Aug-06		-13.03	NG	551	605.33	-15.15	-33.95		622.78	-71.78	0.13
57	Sep-06		-3.11		440	582.05	-17.59	-138.17		453.68	-13.68	0.03
58	Oct-06		19.66	OK	465	618.81	-1.28	-179.77	-58.23	456.09	8.91	0.02
59	Nov-06		14.18	OK	517	661.12	11.79	-164.94	-58.23	509.15	7.85	0.02
60	Dec-06		-113.41	OK	663	226.00	-122.28	650.50	-58.23	564.53	98.47	0.15
61	Jan-07		54.96	NG	290	198.45	-93.86	46.30		130.62	159.38	0.55
62	Feb-07		-8.00		118	98.98	-95.54	21.70		127.44	-9.44	0.08
63	Mar-07		99.73	NG	963	574.25	75.70	116.07		2.63	960.37	1.00
64	Apr-07		47.84	OK	1081	957.32	167.91	-23.16		563.85	517.15	0.48

Appendix Table E2 Forecasted demand of Med A/T calculated by additive seasonal model with $\alpha = 0.33$, $\beta = 0.30$, $\gamma = 0.54$ and $c = 0.1$

						Alpha	0.33				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			265			-277.08				
2	Feb-02	**47.17**			390			-152.08	-53.08			
3	Mar-02	**11.03**			433			-109.08	-53.08			
4	Apr-02	**29.56**			561			18.92	-53.08			
5	May-02	**24.60**			699			156.92	-53.08			
6	Jun-02	2.00			713			170.92				
7	Jul-02	5.33			751			208.92				
8	Aug-02	7.06			804			261.92				
9	Sep-02	**-10.82**			717			174.92	76.53			
10	Oct-02	**-27.20**			522			-20.08	76.53			
11	Nov-02	**-91.00**			47			-495.08	76.53			
12	Dec-02	**1182.98**			603	542.08	30.73	60.92	76.53			
13	Jan-03		**76.71**	OK	1270	889.95	125.87	74.98	76.53	295.73	974.27	0.77
14	Feb-03		**27.23**	OK	1187	1121.04	157.44	-35.27	76.53	**962.73**	224.27	0.19
15	Mar-03		0.05		1170	1278.67	157.50	-108.86		**1225.39**	-55.39	0.05
16	Apr-03		**-60.08**	NG	909	1258.41	104.17	-178.42		**1383.09**	-474.09	0.52
17	May-03		**-87.36**	NG	811	1131.96	34.98	-99.11		**1309.50**	-498.50	0.61
18	Jun-03		**-18.71**	OK	1127	1098.30	14.39	94.72	29.39	1337.86	-210.86	0.19
19	Jul-03		**-12.48**	OK	1175	1064.97	0.07	155.94	29.39	1321.61	-146.61	0.12
20	Aug-03		**-14.69**	OK	1157	1009.72	-16.52	200.50	29.39	1326.96	-169.96	0.15
21	Sep-03		-1.75		1148	986.65	-18.49	167.65		**1069.72**	78.28	0.07
22	Oct-03		**27.85**	NG	1314	1087.27	17.25	112.15		**1044.69**	269.31	0.20
23	Nov-03		**49.80**	OK	1214	1301.31	76.28	-276.62	45.69	**1181.04**	32.96	0.03
24	Dec-03		**17.52**	NG	1744	1477.03	106.11	171.31		**1454.12**	289.88	0.17
25	Jan-04		**-32.86**	NG	1248	1449.65	66.06	-73.22		**1659.67**	-411.67	0.33
26	Feb-04		**-10.73**	NG	1337	1469.02	52.06	-87.10		**1592.24**	-255.24	0.19
27	Mar-04		**-15.76**	NG	1220	1458.51	33.29	-178.32		1412.21	-192.21	0.16
28	Apr-04		**-11.02**	NG	1183	1449.36	20.55	-225.53		1313.38	-130.38	0.11
29	May-04		4.41		1434	1490.48	26.73	-76.27		1370.81	63.19	0.04
30	Jun-04		-8.11		1491	1477.84	14.92	51.02		**1546.60**	-55.60	0.04
31	Jul-04		**-16.11**	NG	1420	1418.32	-7.42	73.29		**1522.15**	-102.15	0.07
32	Aug-04		8.44		1760	1459.27	7.10	254.20		**1440.29**	319.71	0.18

Appendix Table E2 (Continued)

						Alpha	0.33				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-6.31		1537	1434.79	-2.38	132.59		1634.02	-97.02	0.06
34	Oct-04		-5.14		1469	1407.82	-9.76	84.84		1544.55	-75.55	0.05
35	Nov-04		27.88	OK	1555	1539.19	32.58	-119.95	-70.34	1443.75	111.25	0.07
36	Dec-04		18.32	NG	2134	1699.02	70.76	312.57		1743.08	390.92	0.18
37	Jan-05		-28.82	NG	1317	1646.23	33.69	-210.38		1696.55	-379.55	0.29
38	Feb-05		-10.92	NG	1436	1628.87	18.38	-143.77		1592.82	-156.82	0.11
39	Mar-05		16.40	OK	1757	1741.02	46.51	-74.22	-70.34	1468.93	288.07	0.16
40	Apr-05		0.00		1562	1787.53	46.51	-225.53		1562.00	0.00	0.00
41	May-05		-16.80	NG	1505	1751.76	21.83	-167.61		1757.77	-252.77	0.17
42	Jun-05		-9.45		1667	1722.28	6.43	-5.93		1824.61	-157.61	0.09
43	Jul-05		-36.31	NG	1322	1572.47	-40.44	-100.16		1802.01	-480.01	0.36
44	Aug-05		-29.81	OK	1376	1398.50	-80.50	105.96	-36.03	1786.23	-410.23	0.30
45	Sep-05		-36.46	OK	1063	1191.83	-118.35	-7.47	-36.03	1450.59	-387.59	0.36
46	Oct-05		-20.66	OK	960	1008.93	-137.72	13.18	-36.03	1158.33	-198.33	0.21
47	Nov-05		54.96	NG	1668	1169.62	-48.19	211.32		800.87	867.13	0.52
48	Dec-05		38.46	NG	2330	1413.08	39.30	636.35		1434.00	896.00	0.38
49	Jan-06		-56.23	NG	795	1306.88	-4.35	-371.91		1242.01	-447.01	0.56
50	Feb-06		-55.12	NG	747	1168.50	-44.56	-292.56		1158.76	-411.76	0.55
51	Mar-06		18.56	NG	1289	1201.83	-21.19	12.24		1053.60	235.40	0.18
52	Apr-06		11.73	OK	1082	1221.94	-8.80	-179.68	-36.03	955.11	126.89	0.12
53	May-06		19.01	OK	1291	1293.05	15.17	-78.91	-36.03	1045.53	245.47	0.19
54	Jun-06		-25.34	NG	1039	1222.51	-10.54	-101.07		1302.28	-263.28	0.25
55	Jul-06		7.81		1206	1242.63	-1.34	-66.13		1111.81	94.19	0.08
56	Aug-06		-26.03	OK	1069	1150.72	-28.51	5.41	-16.36	1205.26	-136.26	0.13
57	Sep-06		14.05	NG	1297	1181.53	-10.72	58.39		1086.18	210.82	0.16
58	Oct-06		4.52		1240	1189.05	-5.25	33.41		1134.79	105.21	0.08
59	Nov-06		-5.29		1325	1160.98	-12.09	185.98		1395.13	-70.13	0.05
60	Dec-06		1.15		1806	1155.64	-10.07	643.86		1785.23	20.77	0.01
61	Jan-07		12.48	OK	884	1181.49	0.71	-332.04	344.73	773.67	110.33	0.12
62	Feb-07		-124.66	NG	396	1021.51	-47.50	-470.94		889.63	-493.63	1.25
63	Mar-07		17.74	NG	1199	1043.27	-26.72	89.12		986.26	212.74	0.18
64	Apr-07		42.68	OK	1460	1219.38	34.13	45.50	344.73	980.52	479.48	0.33

Appendix Table E3 Forecasted demand of Med M/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.62$ and $c = 0.1$

						Alpha	0.30				MAPE	0.31
		Diff (%)				Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	Abs(E_t/Y_t)
1	Jan-02	0.00			244			-108.50				
2	Feb-02	17.21			286			-66.50	-92.00			
3	Mar-02	-3.15			277			-75.50				
4	Apr-02	32.85			368			15.50	4.50			
5	May-02	10.05			405			52.50	4.50			
6	Jun-02	7.90			437			84.50				
7	Jul-02	12.13			490			137.50	127.00			
8	Aug-02	6.53			522			169.50				
9	Sep-02	-14.94			444			91.50	113.50			
10	Oct-02	-7.66			410			57.50				
11	Nov-02	-83.90			66			-286.50	64.01			
12	Dec-02	325.76			281	352.50	3.36	-71.50	64.01			
13	Jan-03		62.23	NG	655	478.15	40.05	68.21		247.36	407.64	0.62
14	Feb-03		52.95	NG	960	670.69	85.80	153.85		426.21	533.79	0.56
15	Mar-03		29.36	OK	964	841.39	111.27	47.19	64.01	680.99	283.01	0.29
16	Apr-03		-21.17	NG	799	901.91	96.04	-57.83		957.16	-158.16	0.20
17	May-03		-61.36	NG	651	878.12	60.09	-120.67		1002.46	-351.46	0.54
18	Jun-03		-41.85	NG	721	847.70	32.94	-46.29		1022.71	-301.71	0.42
19	Jul-03		-37.03	NG	743	798.10	8.18	18.23		1007.64	-264.64	0.36
20	Aug-03		-28.56	OK	759	741.24	-11.33	75.53	64.01	975.77	-216.77	0.29
21	Sep-03		-6.26		773	715.38	-15.69	70.52		843.41	-70.41	0.09
22	Oct-03		20.96	NG	958	759.94	2.38	144.55		757.19	200.81	0.21
23	Nov-03		32.79	OK	708	831.97	23.28	-185.85	14.38	826.33	-118.33	0.17
24	Dec-03		-12.29	NG	698	829.53	15.56	-108.67		919.26	-221.26	0.32
25	Jan-04		-79.08	NG	510	724.10	-20.74	-106.62		913.30	-403.30	0.79
26	Feb-04		-51.99	OK	564	615.40	-47.12	26.74	14.38	857.21	-293.21	0.52
27	Mar-04		-23.34	NG	499	533.34	-57.61	-3.30		632.28	-133.28	0.27
28	Apr-04		8.15		455	486.86	-54.27	-41.75		417.90	37.10	0.08
29	May-04		40.81	OK	527	497.12	-34.91	-27.43	-1.88	311.93	215.07	0.41
30	Jun-04		21.67	NG	531	496.73	-24.55	3.60		415.91	115.09	0.22
31	Jul-04		8.51		536	485.86	-20.45	37.99		490.41	45.59	0.09
32	Aug-04		14.81	OK	635	493.63	-11.98	116.30	95.43	529.42	105.58	0.17

Appendix Table E3 (Continued)

						Alpha 0.30 Beta 0.30 Gamma 0.62					MAPE 0.31	
		Diff (%)										
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-124.46	NG	246	389.80	-39.54	-62.21		552.16	-306.16	1.24
34	Oct-04		3.73		514	356.02	-37.81	152.87		494.81	19.19	0.04
35	Nov-04		76.62	OK	566	448.30	1.22	2.14	47.81	332.59	233.41	0.41
36	Dec-04		51.24	OK	699	556.96	33.45	46.59	47.81	340.84	358.16	0.51
37	Jan-05		-24.69	NG	388	561.68	24.83	-148.15		483.79	-95.79	0.25
38	Feb-05		-33.90	NG	458	539.93	10.86	-40.56		600.89	-142.89	0.31
39	Mar-05		14.72	OK	642	579.14	19.36	37.67	47.81	547.49	94.51	0.15
40	Apr-05		-6.86		521	587.78	16.15	-57.25		556.76	-35.76	0.07
41	May-05		6.26		615	615.48	19.61	-10.74		602.05	12.95	0.02
42	Jun-05		-14.87	OK	556	610.28	12.17	-32.25	-42.53	638.69	-82.69	0.15
43	Jul-05		-45.79	NG	453	560.22	-6.50	-51.94		660.44	-207.44	0.46
44	Aug-05		-61.06	OK	416	477.51	-29.36	6.18	-42.53	649.15	-233.15	0.56
45	Sep-05		-7.80		358	439.77	-31.88	-74.32		385.94	-27.94	0.08
46	Oct-05		-46.41	OK	383	354.56	-47.88	75.81	-63.13	560.76	-177.76	0.46
47	Nov-05		50.75	NG	627	402.14	-19.24	140.07		354.50	272.50	0.43
48	Dec-05		46.91	NG	809	496.75	14.92	211.11		430.71	378.29	0.47
49	Jan-06		-14.68	OK	317	497.71	10.73	-168.31	-63.13	363.52	-46.52	0.15
50	Feb-06		-14.12	OK	410	491.08	5.52	-65.65	-63.13	467.88	-57.88	0.14
51	Mar-06		17.93	NG	651	531.62	16.03	88.27		544.41	106.59	0.16
52	Apr-06		-26.07	NG	389	517.23	6.90	-101.20		490.39	-101.39	0.26
53	May-06		-24.31	OK	413	494.01	-2.13	-54.26	-63.13	513.39	-100.39	0.24
54	Jun-06		-29.47	NG	355	460.49	-11.55	-77.60		449.35	-94.35	0.27
55	Jul-06		0.00		397	448.94	-11.55	-51.94		397.00	0.00	0.00
56	Aug-06		-26.73	OK	350	409.31	-19.97	-34.38	-64.00	394.86	-44.86	0.13
57	Sep-06		-1.29		311	388.14	-20.33	-76.06		315.02	-4.02	0.01
58	Oct-06		-4.38		425	362.22	-22.01	67.74		304.67	120.33	0.28
59	Nov-06		-31.94	NG	364	305.33	-32.47	89.66		480.28	-116.28	0.32
60	Dec-06		-5.90		457	264.76	-34.90	199.42		483.96	-26.96	0.06
61	Jan-07		70.41	OK	208	273.80	-21.72	-104.83	144.90	166.73	41.27	0.20
62	Feb-07		-60.71	NG	116	230.95	-28.06	-96.18		188.95	-72.95	0.63
63	Mar-07		1.63		296	204.34	-27.62	90.37		291.17	4.83	0.02
64	Apr-07		79.70	NG	372	265.66	-0.94	27.32		75.51	296.49	0.80

Appendix Table E4 Forecasted demand of Low A/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.77$ and $c = 0.1$

						Alpha	0.30				MAPE	0.23
						Beta	0.30					
		Diff (%)				Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Dec-02	0.00			155			-93.00				
2	Jan-03	50.97			234			-14.00	5.50			
3	Feb-03	44.87			339			91.00	5.50			
4	Mar-03	3.83			352			104.00				
5	Apr-03	-33.81			233			-15.00	26.50			
6	May-03	-14.59			199			-49.00	26.50			
7	Jun-03	-1.01			197			-51.00				
8	Jul-03	8.63			214			-34.00				
9	Aug-03	13.55			243			-5.00	-30.50			
10	Sep-03	-9.05			221			-27.00				
11	Oct-03	20.36			266			18.00	23.66			
12	Nov-03	21.43			323	248.00	15.27	75.00	23.66			
13	Dec-03		56.67	NG	393	330.09	35.32	27.26		170.27	222.73	0.57
14	Jan-04		23.11	NG	457	397.09	44.82	43.01		370.91	86.09	0.19
15	Feb-04		-6.16		502	432.64	42.04	74.31		447.41	54.59	0.11
16	Mar-04		-5.60		548	465.47	39.28	87.44		578.68	-30.68	0.06
17	Apr-04		8.97		538	519.23	43.62	11.05		531.25	6.75	0.01
18	May-04		10.32	OK	573	580.59	48.95	-17.06	-5.81	589.35	-16.35	0.03
19	Jun-04		8.31		631	645.28	53.67	-22.67		578.54	52.46	0.08
20	Jul-04		-19.17	NG	558	666.86	44.04	-91.74		664.94	-106.94	0.19
21	Aug-04		-1.71		694	707.33	42.97	-11.43		680.40	13.60	0.02
22	Sep-04		-24.71	NG	580	707.31	30.07	-104.37		723.30	-143.30	0.25
23	Oct-04		-43.61	NG	526	668.57	9.43	-105.85		761.04	-235.04	0.45
24	Nov-04		1.57		765	681.60	10.51	81.48		701.65	63.35	0.08
25	Dec-04		9.29		793	714.20	17.14	67.01		719.36	73.64	0.09
26	Jan-05		-49.49	NG	518	654.43	-5.93	-95.40		774.35	-256.35	0.49
27	Feb-05		-25.27	NG	577	604.75	-19.06	-4.41		722.81	-145.81	0.25
28	Mar-05		6.38		719	599.46	-14.93	112.20		673.13	45.87	0.06
29	Apr-05		-6.54		559	573.55	-18.22	-8.70		595.58	-36.58	0.07
30	May-05		14.01	NG	626	581.65	-10.33	30.31		549.52	76.48	0.12
31	Jun-05		16.75	NG	659	604.43	-0.39	36.91		548.65	110.35	0.17
32	Jul-05		-3.91		493	598.25	-2.13	-102.16		512.29	-19.29	0.04

Appendix Table E4 (Continued)

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Aug-05		-4.97		557	587.81	-4.62	-26.38		584.69	-27.69	0.05
34	Sep-05		-4.77		457	576.64	-6.59	-116.15		478.81	-21.81	0.05
35	Oct-05		-25.46	NG	370	541.79	-15.06	-156.71		464.21	-94.21	0.25
36	Nov-05		12.11	NG	692	551.87	-7.52	126.72		608.21	83.79	0.12
37	Dec-05		42.54	NG	1064	680.14	33.21	311.41		611.36	452.64	0.43
38	Jan-06		-38.87	NG	445	661.46	17.65	-188.78		617.95	-172.95	0.39
39	Feb-06		-67.42	NG	403	597.60	-6.80	-151.11		674.70	-271.70	0.67
40	Mar-06		0.00		703	590.80	-6.80	112.20		703.00	0.00	0.00
41	Apr-06		-22.40	NG	470	552.40	-16.28	-65.55		575.30	-105.30	0.22
42	May-06		-0.97		561	534.49	-16.77	27.37		566.43	-5.43	0.01
43	Jun-06		-14.83	NG	483	496.24	-23.22	-1.77		554.63	-71.63	0.15
44	Jul-06		24.93	OK	494	509.96	-12.13	-35.67	3.62	370.86	123.14	0.25
45	Aug-06		2.39		483	501.29	-11.09	-20.14		471.45	11.55	0.02
46	Sep-06		29.16	OK	528	536.38	2.76	-33.03	-21.02	374.05	153.95	0.29
47	Oct-06		34.96	OK	588	600.82	21.26	-45.72	-21.02	382.43	205.57	0.35
48	Nov-06		-22.35	OK	612	581.04	8.95	52.86	-21.02	748.80	-136.80	0.22
49	Dec-06		-21.32	OK	743	542.47	-5.30	225.89	-21.02	901.40	-158.40	0.21
50	Jan-07		35.96	OK	544	595.85	12.30	-83.16	-21.02	348.39	195.61	0.36
51	Feb-07		-97.85	NG	231	540.34	-8.04	-273.15		457.04	-226.04	0.98
52	Mar-07		64.99	NG	1841	891.25	99.64	758.22		644.50	1196.50	0.65

Appendix Table E5 Forecasted demand of Low M/T calculated by additive seasonal model with $\alpha = 0.54$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.1$

						Alpha	0.54				MAPE	0.31
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			10			-23.50				
2	Feb-02	50.00			15			-18.50	-9.50			
3	Mar-02	46.67			22			-11.50	-9.50			
4	Apr-02	59.09			35			1.50	-9.50			
5	May-02	14.29			40			6.50	-9.50			
6	Jun-02	-5.00			38			4.50				
7	Jul-02	-36.84			24			-9.50	-3.50			
8	Aug-02	58.33			38			4.50	-3.50			
9	Sep-02	-47.37			20			-13.50	-3.50			
10	Oct-02	45.00			29			-4.50	-3.50			
11	Nov-02	37.93			40			6.50	-3.50			
12	Dec-02	127.50			91	33.50	7.36	57.50	-3.50			
13	Jan-03		90.02	NG	174	126.02	32.91	-2.06		17.36	156.64	0.90
14	Feb-03		63.90	NG	389	294.07	73.45	15.53		149.43	239.57	0.62
15	Mar-03		-0.01		356	367.51	73.45	-11.50		358.02	-2.02	0.01
16	Apr-03		-67.60	NG	264	343.94	44.34	-22.93		431.46	-167.46	0.63
17	May-03		-99.38	NG	198	281.30	12.25	-20.44		378.78	-180.78	0.91
18	Jun-03		-45.39	OK	205	242.96	-2.93	-8.24	-9.78	298.04	-93.04	0.45
19	Jul-03		4.34		241	245.72	-1.22	-8.07		236.53	4.47	0.02
20	Aug-03		-6.87		233	235.80	-3.83	2.31		241.00	-8.00	0.03
21	Sep-03		4.18		228	237.15	-2.28	-12.20		228.47	-0.47	0.00
22	Oct-03		10.01	OK	256	248.81	1.90	-0.99	25.27	231.37	24.63	0.10
23	Nov-03		23.45	OK	336	293.55	14.75	17.29	25.27	247.21	88.79	0.26
24	Dec-03		9.46		404	329.07	20.98	62.73		304.80	99.20	0.25
25	Jan-04		2.25		356	354.40	22.29	-0.96		348.00	8.00	0.02
26	Feb-04		-2.95		381	370.59	20.46	13.99		392.22	-11.22	0.03
27	Mar-04		6.74		407	405.98	24.94	-7.75		379.55	27.45	0.07
28	Apr-04		-19.64	NG	341	394.50	14.01	-32.10		407.98	-66.98	0.20
29	May-04		9.54		429	430.76	20.69	-14.84		388.07	40.93	0.10
30	Jun-04		-16.33	OK	381	417.63	10.54	-16.75	-21.02	441.66	-60.66	0.16
31	Jul-04		-18.34	OK	355	392.77	-0.08	-16.98	-21.02	420.10	-65.10	0.18
32	Aug-04		19.39	NG	490	444.34	15.42	15.31		395.01	94.99	0.19

Appendix Table E5 (Continued)

						Alpha	0.54				MAPE	0.31
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-166.41	NG	168	307.77	-30.18	-50.47		447.56	-279.56	1.66
34	Oct-04		25.85	NG	373	330.00	-14.46	12.21		302.85	70.15	0.19
35	Nov-04		29.63	NG	473	391.75	8.41	36.48		340.81	132.19	0.28
36	Dec-04		30.08	NG	662	508.41	40.88	89.99		462.88	199.12	0.30
37	Jan-05		-49.82	NG	366	450.16	11.14	-25.92		548.33	-182.33	0.50
38	Feb-05		-10.28	OK	431	437.22	3.92	7.93	-21.02	475.30	-44.30	0.10
39	Mar-05		28.36	NG	605	534.44	31.91	15.75		433.39	171.61	0.28
40	Apr-05		6.27		570	585.78	37.74	-27.21		534.24	35.76	0.06
41	May-05		-9.67		555	594.33	28.98	-22.19		608.69	-53.69	0.10
42	Jun-05		-1.60		597	618.12	27.42	-18.06		602.30	-5.30	0.01
43	Jul-05		-31.77	NG	477	563.14	2.70	-37.73		624.52	-147.52	0.31
44	Aug-05		-36.74	OK	425	480.95	-22.77	-6.06	-36.57	581.16	-156.16	0.37
45	Sep-05		-9.01		374	439.85	-28.27	-55.08		407.71	-33.71	0.09
46	Oct-05		-32.85	OK	319	354.61	-45.36	-2.14	-36.86	423.79	-104.79	0.33
47	Nov-05		30.85	NG	500	393.13	-20.20	57.59		345.73	154.27	0.31
48	Dec-05		36.32	NG	727	516.50	22.88	126.14		462.92	264.08	0.36
49	Jan-06		-96.73	NG	261	402.13	-18.30	-60.48		513.46	-252.46	0.97
50	Feb-06		-41.94	OK	276	320.89	-37.18	-7.92	-36.86	362.81	-86.81	0.31
51	Mar-06		35.88	NG	467	374.80	-9.85	38.68		299.46	167.54	0.36
52	Apr-06		-31.93	NG	256	320.51	-23.19	-38.40		337.74	-81.74	0.32
53	May-06		8.59		301	311.38	-18.97	-18.64		275.14	25.86	0.09
54	Jun-06		-23.58	NG	222	263.95	-27.51	-25.23		274.35	-52.35	0.24
55	Jul-06		43.38	OK	351	319.24	-2.67	-16.88	52.46	198.72	152.28	0.43
56	Aug-06		-15.00	NG	270	294.55	-9.28	-11.61		280.00	-10.00	0.04
57	Sep-06		21.44	OK	293	319.42	0.97	-46.48	52.46	230.19	62.81	0.21
58	Oct-06		12.33	OK	363	344.72	8.27	3.99	52.46	283.53	79.47	0.22
59	Nov-06		-21.12	NG	339	314.07	-3.41	47.80		410.58	-71.58	0.21
60	Dec-06		-4.50		418	300.44	-6.47	123.57		436.80	-18.80	0.04
61	Jan-07		-44.13	NG	162	255.10	-18.13	-70.27		233.48	-71.48	0.44
62	Feb-07		-110.14	NG	109	171.70	-37.71	-24.35		200.11	-91.11	0.84
63	Mar-07		43.76	OK	307	207.02	-15.80	57.07	62.57	172.67	134.33	0.44
64	Apr-07		44.83	OK	277	258.73	4.45	-21.40	62.57	152.82	124.18	0.45

Appendix Table E6 Forecasted demand of Top A/T calculated by additive seasonal model with $\alpha = 0.59$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.2$

						Alpha	0.59				MAPE	0.30
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			188			-104.58				
2	Feb-02	4.26			196			-96.58				
3	Mar-02	20.92			237			-55.58	-68.08			
4	Apr-02	6.75			253			-39.58				
5	May-02	7.11			271			-21.58				
6	Jun-02	-20.30			216			-76.58	-28.58			
7	Jul-02	18.98			257			-35.58				
8	Aug-02	3.50			266			-26.58				
9	Sep-02	-35.71			171			-121.58	-74.08			
10	Oct-02	-33.92			113			-179.58	-74.08			
11	Nov-02	-79.65			23			-269.58	-74.08			
12	Dec-02	5639.13			1320	292.58	102.91	1027.42	-74.08			
13	Jan-03		83.94	NG	1811	1298.99	373.96	80.40		290.91	1520.09	0.84
14	Feb-03		-14.98		1371	1550.88	337.34	-121.57		1576.36	-205.36	0.15
15	Mar-03		-24.42	OK	1473	1674.46	273.21	-99.35	-105.83	1820.14	-347.14	0.24
16	Apr-03		-54.13	NG	1238	1549.39	153.73	-121.13		1908.09	-670.09	0.54
17	May-03		-46.48	OK	1148	1386.00	58.59	-86.51	-105.83	1681.54	-533.54	0.46
18	Jun-03		-8.83		1257	1378.61	38.80	-90.09		1416.01	-159.01	0.13
19	Jul-03		4.70		1450	1457.93	50.95	-27.29		1381.83	68.17	0.05
20	Aug-03		-12.21		1321	1413.01	22.19	-46.21		1482.30	-161.30	0.12
21	Sep-03		-10.30		1191	1362.32	0.33	-136.50		1361.12	-170.12	0.14
22	Oct-03		-4.70		1130	1331.11	-9.13	-186.04		1288.57	-158.57	0.14
23	Nov-03		12.81		1207	1413.87	18.43	-250.77		1247.90	-40.90	0.03
24	Dec-03		-71.53	OK	1434	822.65	-164.46	902.60	-167.55	1358.22	75.78	0.05
25	Jan-04		31.29	NG	1075	858.14	-104.48	121.33		738.58	336.42	0.31
26	Feb-04		44.06	NG	1130	1049.61	-15.69	-60.98		632.09	497.91	0.44
27	Mar-04		11.67		1058	1107.28	6.32	-84.33		928.08	129.92	0.12
28	Apr-04		-2.63		967	1098.46	1.77	-124.23		992.47	-25.47	0.03
29	May-04		2.24		1037	1114.07	5.93	-83.68		994.40	42.60	0.04
30	Jun-04		11.22		1160	1197.32	29.12	-74.26		1029.90	130.10	0.11
31	Jul-04		-22.99	NG	975	1093.21	-10.85	-54.56		1199.16	-224.16	0.23
32	Aug-04		16.57		1242	1204.71	25.86	-21.16		1036.15	205.85	0.17

Appendix Table E6 (Continued)

						Alpha	0.59				MAPE	0.30
			Diff (%)			Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		2.58		1123	1247.77	31.02	-132.98		1094.07	28.93	0.03
34	Oct-04		-18.26		924	1178.49	0.93	-206.58		1092.75	-168.75	0.18
35	Nov-04		7.96		1009	1227.18	15.26	-240.99		928.65	80.35	0.08
36	Dec-04		-72.29	OK	1245	707.48	-145.23	793.07	-58.65	1074.88	170.12	0.14
37	Jan-05		2.76		703	573.79	-141.77	123.70		683.59	19.41	0.03
38	Feb-05		53.21	OK	793	682.82	-66.53	-9.64	-0.26	371.04	421.96	0.53
39	Mar-05		45.16	OK	970	876.65	11.58	-31.02	-0.26	531.97	438.03	0.45
40	Apr-05		0.00		764	888.23	11.58	-124.23		764.00	0.00	0.00
41	May-05		-2.27		798	889.03	8.35	-85.88		816.13	-18.13	0.02
42	Jun-05		4.29		860	919.30	14.92	-69.77		823.11	36.89	0.04
43	Jul-05		-35.12	NG	651	798.32	-25.85	-82.39		879.66	-228.66	0.35
44	Aug-05		-4.64		718	752.67	-31.79	-25.22		751.30	-33.30	0.05
45	Sep-05		-5.17		559	703.71	-36.94	-136.50		587.90	-28.90	0.05
46	Oct-05		21.87	OK	589	743.33	-13.97	-190.90	-108.38	460.19	128.81	0.22
47	Nov-05		53.04	OK	1040	1057.23	84.39	-173.86	-108.38	488.36	551.64	0.53
48	Dec-05		-27.70	OK	1515	892.17	9.55	742.00	-108.38	1082.97	432.03	0.29
49	Jan-06		-345.83	OK	230	428.95	-132.28	26.90	-108.38	1025.42	-795.42	3.46
50	Feb-06		48.19	NG	554	455.35	-84.67	22.85		296.41	257.59	0.46
51	Mar-06		42.24	NG	588	518.28	-40.39	-0.80		370.41	217.59	0.37
52	Apr-06		46.98	NG	667	664.13	15.48	-86.10		353.67	313.33	0.47
53	May-06		7.23		640	707.11	23.73	-80.25		593.72	46.28	0.07
54	Jun-06		-17.21		564	673.15	6.42	-81.58		661.07	-97.07	0.17
55	Jul-06		-8.97		548	650.34	-2.35	-88.37		597.18	-49.18	0.09
56	Aug-06		-13.03		551	605.33	-15.15	-33.95		622.78	-71.78	0.13
57	Sep-06		-3.11		440	582.05	-17.59	-138.17		453.68	-13.68	0.03
58	Oct-06		19.66		465	618.81	-1.28	-179.77		456.09	8.91	0.02
59	Nov-06		14.18		517	661.12	11.79	-164.94		509.15	7.85	0.02
60	Dec-06		-113.41	OK	663	226.00	-122.28	650.50	-71.62	564.53	98.47	0.15
61	Jan-07		54.96	NG	290	198.45	-93.86	46.30		-4.66	294.66	1.02
62	Feb-07		-8.00		118	98.98	-95.54	21.70		127.44	-9.44	0.08
63	Mar-07		99.73	NG	963	574.25	75.70	116.07		2.63	960.37	1.00
64	Apr-07		47.84	NG	1081	957.32	167.91	-23.16		563.85	517.15	0.48

Appendix Table E7 Forecasted demand of Med A/T calculated by additive seasonal model with $\alpha = 0.33$, $\beta = 0.30$, $\gamma = 0.54$ and $c = 0.2$

						Alpha	0.33				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			265			-277.08				
2	Feb-02	47.17			390			-152.08	-193.08			
3	Mar-02	11.03			433			-109.08				
4	Apr-02	29.56			561			18.92	30.92			
5	May-02	24.60			699			156.92	30.92			
6	Jun-02	2.00			713			170.92				
7	Jul-02	5.33			751			208.92				
8	Aug-02	7.06			804			261.92				
9	Sep-02	-10.82			717			174.92				
10	Oct-02	-27.20			522			-20.08	33.03			
11	Nov-02	-91.00			47			-495.08	33.03			
12	Dec-02	1182.98			603	542.08	30.73	60.92	33.03			
13	Jan-03		76.71	NG	1270	889.95	125.87	74.98		295.73	974.27	0.77
14	Feb-03		27.23	OK	1187	1121.04	157.44	-35.27	33.03	822.73	364.27	0.31
15	Mar-03		0.05		1170	1278.67	157.50	-108.86		1169.39	0.61	0.00
16	Apr-03		-60.08	NG	909	1258.41	104.17	-178.42		1467.09	-558.09	0.61
17	May-03		-87.36	NG	811	1131.96	34.98	-99.11		1393.50	-582.50	0.72
18	Jun-03		-18.71		1127	1098.30	14.39	94.72		1337.86	-210.86	0.19
19	Jul-03		-12.48		1175	1064.97	0.07	155.94		1321.61	-146.61	0.12
20	Aug-03		-14.69		1157	1009.72	-16.52	200.50		1326.96	-169.96	0.15
21	Sep-03		-1.75		1148	986.65	-18.49	167.65		1168.11	-20.11	0.02
22	Oct-03		27.85	OK	1314	1087.27	17.25	112.15	169.48	1001.19	312.81	0.24
23	Nov-03		49.80	OK	1214	1301.31	76.28	-276.62	169.48	1137.54	76.46	0.06
24	Dec-03		17.52		1744	1477.03	106.11	171.31		1410.62	333.38	0.19
25	Jan-04		-32.86	NG	1248	1449.65	66.06	-73.22		1658.13	-410.13	0.33
26	Feb-04		-10.73		1337	1469.02	52.06	-87.10		1548.74	-211.74	0.16
27	Mar-04		-15.76		1220	1458.51	33.29	-178.32		1412.21	-192.21	0.16
28	Apr-04		-11.02		1183	1449.36	20.55	-225.53		1313.38	-130.38	0.11
29	May-04		4.41		1434	1490.48	26.73	-76.27		1370.81	63.19	0.04
30	Jun-04		-8.11		1491	1477.84	14.92	51.02		1611.93	-120.93	0.08
31	Jul-04		-16.11		1420	1418.32	-7.42	73.29		1648.70	-228.70	0.16
32	Aug-04		8.44		1760	1459.27	7.10	254.20		1611.40	148.60	0.08

Appendix Table E7 (Continued)

						Alpha	0.33				MAPE	0.23
			Diff (%)			Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-6.31		1537	1434.79	-2.38	132.59		1634.02	-97.02	0.06
34	Oct-04		-5.14		1469	1407.82	-9.76	84.84		1601.89	-132.89	0.09
35	Nov-04		27.88	OK	1555	1539.19	32.58	-119.95	198.71	1567.54	-12.54	0.01
36	Dec-04		18.32		2134	1699.02	70.76	312.57		1743.08	390.92	0.18
37	Jan-05		-28.82	NG	1317	1646.23	33.69	-210.38		1696.55	-379.55	0.29
38	Feb-05		-10.92		1436	1628.87	18.38	-143.77		1592.82	-156.82	0.11
39	Mar-05		16.40		1757	1741.02	46.51	-74.22		1468.93	288.07	0.16
40	Apr-05		0.00		1562	1787.53	46.51	-225.53		1562.00	0.00	0.00
41	May-05		-16.80		1505	1751.76	21.83	-167.61		1757.77	-252.77	0.17
42	Jun-05		-9.45		1667	1722.28	6.43	-5.93		1824.61	-157.61	0.09
43	Jul-05		-36.31	NG	1322	1572.47	-40.44	-100.16		1802.01	-480.01	0.36
44	Aug-05		-29.81	OK	1376	1398.50	-80.50	105.96	3.16	1786.23	-410.23	0.30
45	Sep-05		-36.46	NG	1063	1191.83	-118.35	-7.47		1450.59	-387.59	0.36
46	Oct-05		-20.66	OK	960	1008.93	-137.72	13.18	3.16	1158.33	-198.33	0.21
47	Nov-05		54.96	NG	1668	1169.62	-48.19	211.32		1069.92	598.08	0.36
48	Dec-05		38.46	NG	2330	1413.08	39.30	636.35		1434.00	896.00	0.38
49	Jan-06		-56.23	NG	795	1306.88	-4.35	-371.91		1242.01	-447.01	0.56
50	Feb-06		-55.12	NG	747	1168.50	-44.56	-292.56		1158.76	-411.76	0.55
51	Mar-06		18.56		1289	1201.83	-21.19	12.24		1049.72	239.28	0.19
52	Apr-06		11.73		1082	1221.94	-8.80	-179.68		955.11	126.89	0.12
53	May-06		19.01		1291	1293.05	15.17	-78.91		1045.53	245.47	0.19
54	Jun-06		-25.34	NG	1039	1222.51	-10.54	-101.07		1302.28	-263.28	0.25
55	Jul-06		7.81		1206	1242.63	-1.34	-66.13		1111.81	94.19	0.08
56	Aug-06		-26.03	OK	1069	1150.72	-28.51	5.41	-3.87	1244.45	-175.45	0.16
57	Sep-06		14.05		1297	1181.53	-10.72	58.39		1114.74	182.26	0.14
58	Oct-06		4.52		1240	1189.05	-5.25	33.41		1173.97	66.03	0.05
59	Nov-06		-5.29		1325	1160.98	-12.09	185.98		1395.13	-70.13	0.05
60	Dec-06		1.15		1806	1155.64	-10.07	643.86		1785.23	20.77	0.01
61	Jan-07		12.48		884	1181.49	0.71	-332.04		773.67	110.33	0.12
62	Feb-07		-124.66	NG	396	1021.51	-47.50	-470.94		889.63	-493.63	1.25
63	Mar-07		17.74		1199	1043.27	-26.72	89.12		986.26	212.74	0.18
64	Apr-07		42.68	OK	1460	1219.38	34.13	45.50	163.27	836.87	623.13	0.43

Appendix Table E8 Forecasted demand of Med M/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.62$ and $c = 0.2$

						Alpha	0.30				MAPE	0.32
			Diff (%)			Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			244			-108.50				
2	Feb-02	17.21			286			-66.50				
3	Mar-02	-3.15			277			-75.50				
4	Apr-02	32.85			368			15.50	-11.50			
5	May-02	10.05			405			52.50				
6	Jun-02	7.90			437			84.50				
7	Jul-02	12.13			490			137.50				
8	Aug-02	6.53			522			169.50				
9	Sep-02	-14.94			444			91.50				
10	Oct-02	-7.66			410			57.50				
11	Nov-02	-83.90			66			-286.50	64.01			
12	Dec-02	325.76			281	352.50	3.36	-71.50	64.01			
13	Jan-03		62.23	NG	655	478.15	40.05	68.21		247.36	407.64	0.62
14	Feb-03		52.95	NG	960	670.69	85.80	153.85		451.71	508.29	0.53
15	Mar-03		29.36	OK	964	841.39	111.27	47.19	64.01	680.99	283.01	0.29
16	Apr-03		-21.17	NG	799	901.91	96.04	-57.83		941.16	-142.16	0.18
17	May-03		-61.36	NG	651	878.12	60.09	-120.67		1050.46	-399.46	0.61
18	Jun-03		-41.85	NG	721	847.70	32.94	-46.29		1022.71	-301.71	0.42
19	Jul-03		-37.03	NG	743	798.10	8.18	18.23		1018.14	-275.14	0.37
20	Aug-03		-28.56	OK	759	741.24	-11.33	75.53	64.01	975.77	-216.77	0.29
21	Sep-03		-6.26		773	715.38	-15.69	70.52		821.41	-48.41	0.06
22	Oct-03		20.96	NG	958	759.94	2.38	144.55		757.19	200.81	0.21
23	Nov-03		32.79	OK	708	831.97	23.28	-185.85	-19.08	826.33	-118.33	0.17
24	Dec-03		-12.29		698	829.53	15.56	-108.67		919.26	-221.26	0.32
25	Jan-04		-79.08	NG	510	724.10	-20.74	-106.62		913.30	-403.30	0.79
26	Feb-04		-51.99	OK	564	615.40	-47.12	26.74	-75.21	857.21	-293.21	0.52
27	Mar-04		-23.34	OK	499	533.34	-57.61	-3.30	-75.21	632.28	-133.28	0.27
28	Apr-04		8.15		455	486.86	-54.27	-41.75		417.90	37.10	0.08
29	May-04		40.81	OK	527	497.12	-34.91	-27.43	-1.88	311.93	215.07	0.41
30	Jun-04		21.67	NG	531	496.73	-24.55	3.60		415.91	115.09	0.22
31	Jul-04		8.51		536	485.86	-20.45	37.99		490.41	45.59	0.09
32	Aug-04		14.81		635	493.63	-11.98	116.30		529.42	105.58	0.17

Appendix Table E8 (Continued)

						Alpha	0.30				MAPE	0.32
			Diff (%)			Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-124.46	NG	246	389.80	-39.54	-62.21		552.16	-306.16	1.24
34	Oct-04		3.73		514	356.02	-37.81	152.87		494.81	19.19	0.04
35	Nov-04		76.62	OK	566	448.30	1.22	2.14	95.27	299.13	266.87	0.47
36	Dec-04		51.24	OK	699	556.96	33.45	46.59	95.27	340.84	358.16	0.51
37	Jan-05		-24.69	NG	388	561.68	24.83	-148.15		483.79	-95.79	0.25
38	Feb-05		-33.90	NG	458	539.93	10.86	-40.56		511.30	-53.30	0.12
39	Mar-05		14.72		642	579.14	19.36	37.67		475.58	166.42	0.26
40	Apr-05		-6.86		521	587.78	16.15	-57.25		556.76	-35.76	0.07
41	May-05		6.26		615	615.48	19.61	-10.74		602.05	12.95	0.02
42	Jun-05		-14.87		556	610.28	12.17	-32.25		638.69	-82.69	0.15
43	Jul-05		-45.79	OK	453	560.22	-6.50	-51.94	-53.28	660.44	-207.44	0.46
44	Aug-05		-61.06	OK	416	477.51	-29.36	6.18	-53.28	670.02	-254.02	0.61
45	Sep-05		-7.80		358	439.77	-31.88	-74.32		385.94	-27.94	0.08
46	Oct-05		-46.41	OK	383	354.56	-47.88	75.81	-121.32	560.76	-177.76	0.46
47	Nov-05		50.75	NG	627	402.14	-19.24	140.07		401.96	225.04	0.36
48	Dec-05		46.91	NG	809	496.75	14.92	211.11		478.17	330.83	0.41
49	Jan-06		-14.68		317	497.71	10.73	-168.31		363.52	-46.52	0.15
50	Feb-06		-14.12		410	491.08	5.52	-65.65		467.88	-57.88	0.14
51	Mar-06		17.93		651	531.62	16.03	88.27		534.27	116.73	0.18
52	Apr-06		-26.07	NG	389	517.23	6.90	-101.20		490.39	-101.39	0.26
53	May-06		-24.31	NG	413	494.01	-2.13	-54.26		513.39	-100.39	0.24
54	Jun-06		-29.47	NG	355	460.49	-11.55	-77.60		459.63	-104.63	0.29
55	Jul-06		0.00		397	448.94	-11.55	-51.94		395.65	1.35	0.00
56	Aug-06		-26.73	OK	350	409.31	-19.97	-34.38	-64.00	384.10	-34.10	0.10
57	Sep-06		-1.29		311	388.14	-20.33	-76.06		315.02	-4.02	0.01
58	Oct-06		-4.38		425	362.22	-22.01	67.74		246.48	178.52	0.42
59	Nov-06		-31.94	NG	364	305.33	-32.47	89.66		480.28	-116.28	0.32
60	Dec-06		-5.90		457	264.76	-34.90	199.42		483.96	-26.96	0.06
61	Jan-07		70.41	OK	208	273.80	-21.72	-104.83	144.90	61.55	146.45	0.70
62	Feb-07		-60.71	NG	116	230.95	-28.06	-96.18		186.43	-70.43	0.61
63	Mar-07		1.63		296	204.34	-27.62	90.37		291.17	4.83	0.02
64	Apr-07		79.70	NG	372	265.66	-0.94	27.32		75.51	296.49	0.80

Appendix Table E9 Forecasted demand of Low A/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.77$ and $c = 0.2$

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Dec-02	0.00			155			-93.00				
2	Jan-03	50.97			234			-14.00	5.50			
3	Feb-03	44.87			339			91.00	5.50			
4	Mar-03	3.83			352			104.00				
5	Apr-03	-33.81			233			-15.00	27.50			
6	May-03	-14.59			199			-49.00				
7	Jun-03	-1.01			197			-51.00				
8	Jul-03	8.63			214			-34.00				
9	Aug-03	13.55			243			-5.00				
10	Sep-03	-9.05			221			-27.00				
11	Oct-03	20.36			266			18.00	23.66			
12	Nov-03	21.43			323	248.00	15.27	75.00	23.66			
13	Dec-03		56.67	NG	393	330.09	35.32	27.26		170.27	222.73	0.57
14	Jan-04		23.11	NG	457	397.09	44.82	43.01		370.91	86.09	0.19
15	Feb-04		-6.16		502	432.64	42.04	74.31		447.41	54.59	0.11
16	Mar-04		-5.60		548	465.47	39.28	87.44		578.68	-30.68	0.06
17	Apr-04		8.97		538	519.23	43.62	11.05		532.25	5.75	0.01
18	May-04		10.32		573	580.59	48.95	-17.06		513.85	59.15	0.10
19	Jun-04		8.31		631	645.28	53.67	-22.67		578.54	52.46	0.08
20	Jul-04		-19.17		558	666.86	44.04	-91.74		664.94	-106.94	0.19
21	Aug-04		-1.71		694	707.33	42.97	-11.43		705.90	-11.90	0.02
22	Sep-04		-24.71	NG	580	707.31	30.07	-104.37		723.30	-143.30	0.25
23	Oct-04		-43.61	NG	526	668.57	9.43	-105.85		761.04	-235.04	0.45
24	Nov-04		1.57		765	681.60	10.51	81.48		701.65	63.35	0.08
25	Dec-04		9.29		793	714.20	17.14	67.01		719.36	73.64	0.09
26	Jan-05		-49.49	NG	518	654.43	-5.93	-95.40		774.35	-256.35	0.49
27	Feb-05		-25.27	NG	577	604.75	-19.06	-4.41		722.81	-145.81	0.25
28	Mar-05		6.38		719	599.46	-14.93	112.20		673.13	45.87	0.06
29	Apr-05		-6.54		559	573.55	-18.22	-8.70		595.58	-36.58	0.07
30	May-05		14.01		626	581.65	-10.33	30.31		538.27	87.73	0.14
31	Jun-05		16.75		659	604.43	-0.39	36.91		548.65	110.35	0.17
32	Jul-05		-3.91		493	598.25	-2.13	-102.16		512.29	-19.29	0.04

Appendix Table E9 (Continued)

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Aug-05		-4.97		557	587.81	-4.62	-26.38		584.69	-27.69	0.05
34	Sep-05		-4.77		457	576.64	-6.59	-116.15		478.81	-21.81	0.05
35	Oct-05		-25.46	NG	370	541.79	-15.06	-156.71		464.21	-94.21	0.25
36	Nov-05		12.11		692	551.87	-7.52	126.72		608.21	83.79	0.12
37	Dec-05		42.54	NG	1064	680.14	33.21	311.41		611.36	452.64	0.43
38	Jan-06		-38.87	NG	445	661.46	17.65	-188.78		617.95	-172.95	0.39
39	Feb-06		-67.42	NG	403	597.60	-6.80	-151.11		674.70	-271.70	0.67
40	Mar-06		0.00		703	590.80	-6.80	112.20		703.00	0.00	0.00
41	Apr-06		-22.40	NG	470	552.40	-16.28	-65.55		575.30	-105.30	0.22
42	May-06		-0.97		561	534.49	-16.77	27.37		566.43	-5.43	0.01
43	Jun-06		-14.83		483	496.24	-23.22	-1.77		554.63	-71.63	0.15
44	Jul-06		24.93	OK	494	509.96	-12.13	-35.67	-10.96	370.86	123.14	0.25
45	Aug-06		2.39		483	501.29	-11.09	-20.14		471.45	11.55	0.02
46	Sep-06		29.16	OK	528	536.38	2.76	-33.03	-21.02	374.05	153.95	0.29
47	Oct-06		34.96	OK	588	600.82	21.26	-45.72	-21.02	382.43	205.57	0.35
48	Nov-06		-22.35	OK	612	581.04	8.95	52.86	-21.02	748.80	-136.80	0.22
49	Dec-06		-21.32	OK	743	542.47	-5.30	225.89	-21.02	901.40	-158.40	0.21
50	Jan-07		35.96	OK	544	595.85	12.30	-83.16	-21.02	348.39	195.61	0.36
51	Feb-07		-97.85	NG	231	540.34	-8.04	-273.15		457.04	-226.04	0.98
52	Mar-07		64.99	NG	1841	891.25	99.64	758.22		644.50	1196.50	0.65
53	Apr-07		38.23	NG	1498	1162.69	151.18	243.64		925.34	572.66	0.38

Appendix Table E10 Forecasted demand of Low M/T calculated by additive

seasonal model with $\alpha = 0.54$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.2$

						Alpha	0.54				MAPE	0.31
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	Abs(E_t/Y_t)
1	Jan-02	0.00			10			-23.50				
2	Feb-02	**50.00**			15			-18.50	-8.50			
3	Mar-02	**46.67**			22			-11.50	-8.50			
4	Apr-02	**59.09**			35			1.50	-8.50			
5	May-02	14.29			40			6.50				
6	Jun-02	-5.00			38			4.50				
7	Jul-02	**-36.84**			24			-9.50	-3.50			
8	Aug-02	**58.33**			38			4.50	-3.50			
9	Sep-02	**-47.37**			20			-13.50	-3.50			
10	Oct-02	**45.00**			29			-4.50	-3.50			
11	Nov-02	**37.93**			40			6.50	-3.50			
12	Dec-02	**127.50**			91	33.50	7.36	57.50	-3.50			
13	Jan-03		**90.02**	NG	174	126.02	32.91	-2.06		17.36	156.64	0.90
14	Feb-03		**63.90**	NG	389	294.07	73.45	15.53		**150.43**	238.57	0.61
15	Mar-03		-0.01		356	367.51	73.45	-11.50		**359.02**	-3.02	0.01
16	Apr-03		**-67.60**	NG	264	343.94	44.34	-22.93	-9.78	**432.46**	-168.46	0.64
17	May-03		**-99.38**	NG	198	281.30	12.25	-20.44	-9.78	394.78	-196.78	0.99
18	Jun-03		**-45.39**	OK	205	242.96	-2.93	-8.24	-9.78	298.04	-93.04	0.45
19	Jul-03		4.34		241	245.72	-1.22	-8.07		**236.53**	4.47	0.02
20	Aug-03		-6.87		233	235.80	-3.83	2.31		**241.00**	-8.00	0.03
21	Sep-03		4.18		228	237.15	-2.28	-12.20		**228.47**	-0.47	0.00
22	Oct-03		10.01	OK	256	248.81	1.90	-0.99		**231.37**	24.63	0.10
23	Nov-03		**23.45**	OK	336	293.55	14.75	17.29	30.87	**247.21**	88.79	0.26
24	Dec-03		9.46		404	329.07	20.98	62.73		**304.80**	99.20	0.25
25	Jan-04		2.25		356	354.40	22.29	-0.96		348.00	8.00	0.02
26	Feb-04		-2.95		381	370.59	20.46	13.99		392.22	-11.22	0.03
27	Mar-04		6.74		407	405.98	24.94	-7.75		379.55	27.45	0.07
28	Apr-04		-19.64	NG	341	394.50	14.01	-32.10		407.98	-66.98	0.20
29	May-04		9.54		429	430.76	20.69	-14.84		388.07	40.93	0.10
30	Jun-04		-16.33	NG	381	417.63	10.54	-16.75		**441.66**	-60.66	0.16
31	Jul-04		-18.34	NG	355	392.77	-0.08	-16.98		420.10	-65.10	0.18
32	Aug-04		19.39	NG	490	444.34	15.42	15.31		395.01	94.99	0.19

Appendix Table E10 (Continued)

						Alpha	0.54				MAPE	0.31
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-166.41	NG	168	307.77	-30.18	-50.47	11.62	447.56	-279.56	1.66
34	Oct-04		25.85	NG	373	330.00	-14.46	12.21	11.62	277.59	95.41	0.26
35	Nov-04		29.63	NG	473	391.75	8.41	36.48	11.62	346.41	126.59	0.27
36	Dec-04		30.08	NG	662	508.41	40.88	89.99	11.62	462.88	199.12	0.30
37	Jan-05		-49.82	NG	366	450.16	11.14	-25.92	11.62	548.33	-182.33	0.50
38	Feb-05		-10.28	OK	431	437.22	3.92	7.93		475.30	-44.30	0.10
39	Mar-05		28.36	NG	605	534.44	31.91	15.75	-9.64	433.39	171.61	0.28
40	Apr-05		6.27		570	585.78	37.74	-27.21		534.24	35.76	0.06
41	May-05		-9.67		555	594.33	28.98	-22.19		608.69	-53.69	0.10
42	Jun-05		-1.60		597	618.12	27.42	-18.06		623.32	-26.32	0.04
43	Jul-05		-31.77	NG	477	563.14	2.70	-37.73	-36.57	645.54	-168.54	0.35
44	Aug-05		-36.74	OK	425	480.95	-22.77	-6.06	-36.57	581.16	-156.16	0.37
45	Sep-05		-9.01		374	439.85	-28.27	-55.08		407.71	-33.71	0.09
46	Oct-05		-32.85	OK	319	354.61	-45.36	-2.14	-36.86	423.79	-104.79	0.33
47	Nov-05		30.85	NG	500	393.13	-20.20	57.59	-36.86	345.73	154.27	0.31
48	Dec-05		36.32	NG	727	516.50	22.88	126.14	-36.86	462.92	264.08	0.36
49	Jan-06		-96.73	NG	261	402.13	-18.30	-60.48	-36.86	513.46	-252.46	0.97
50	Feb-06		-41.94	OK	276	320.89	-37.18	-7.92	-36.86	383.83	-107.83	0.39
51	Mar-06		35.88	NG	467	374.80	-9.85	38.68	-36.86	299.46	167.54	0.36
52	Apr-06		-31.93	NG	256	320.51	-23.19	-38.40	-36.86	337.74	-81.74	0.32
53	May-06		8.59		301	311.38	-18.97	-18.64		275.14	25.86	0.09
54	Jun-06		-23.58	NG	222	263.95	-27.51	-25.23	-15.13	274.35	-52.35	0.24
55	Jul-06		43.38	OK	351	319.24	-2.67	-16.88	-15.13	198.72	152.28	0.43
56	Aug-06		-15.00	NG	270	294.55	-9.28	-11.61		280.00	-10.00	0.04
57	Sep-06		21.44	OK	293	319.42	0.97	-46.48	-3.81	230.19	62.81	0.21
58	Oct-06		12.33	NG	363	344.72	8.27	3.99		283.53	79.47	0.22
59	Nov-06		-21.12	NG	339	314.07	-3.41	47.80	63.78	410.58	-71.58	0.21
60	Dec-06		-4.50		418	300.44	-6.47	123.57		436.80	-18.80	0.04
61	Jan-07		-44.13	NG	162	255.10	-18.13	-70.27	46.08	233.48	-71.48	0.44
62	Feb-07		-110.14	NG	109	171.70	-37.71	-24.35	46.08	200.11	-91.11	0.84
63	Mar-07		43.76	NG	307	207.02	-15.80	57.07	46.08	172.67	134.33	0.44
64	Apr-07		44.83	OK	277	258.73	4.45	-21.40	46.08	152.82	124.18	0.45

Appendix Table E11 Forecasted demand of Top A/T calculated by additive

seasonal model with $\alpha = 0.59$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.3$

						Alpha	0.59				MAPE	0.36
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			188			-104.58				
2	Feb-02	4.26			196			-96.58				
3	Mar-02	20.92			237			-55.58				
4	Apr-02	6.75			253			-39.58				
5	May-02	7.11			271			-21.58				
6	Jun-02	-20.30			216			-76.58				
7	Jul-02	18.98			257			-35.58				
8	Aug-02	3.50			266			-26.58				
9	Sep-02	-35.71			171			-121.58	-74.08			
10	Oct-02	-33.92			113			-179.58	-74.08			
11	Nov-02	-79.65			23			-269.58	-74.08			
12	Dec-02	5639.13			1320	292.58	102.91	1027.42	-74.08			
13	Jan-03		83.94	NG	1811	1298.99	373.96	80.40		290.91	1520.09	0.84
14	Feb-03		-14.98		1371	1550.88	337.34	-121.57		1576.36	-205.36	0.15
15	Mar-03		-24.42		1473	1674.46	273.21	-99.35		1832.64	-359.64	0.24
16	Apr-03		-54.13	NG	1238	1549.39	153.73	-121.13		1908.09	-670.09	0.54
17	May-03		-46.48	OK	1148	1386.00	58.59	-86.51	-94.72	1681.54	-533.54	0.46
18	Jun-03		-8.83		1257	1378.61	38.80	-90.09		1368.01	-111.01	0.09
19	Jul-03		4.70		1450	1457.93	50.95	-27.29		1381.83	68.17	0.05
20	Aug-03		-12.21		1321	1413.01	22.19	-46.21		1482.30	-161.30	0.12
21	Sep-03		-10.30		1191	1362.32	0.33	-136.50		1361.12	-170.12	0.14
22	Oct-03		-4.70		1130	1331.11	-9.13	-186.04		1288.57	-158.57	0.14
23	Nov-03		12.81		1207	1413.87	18.43	-250.77		1247.90	-40.90	0.03
24	Dec-03		-71.53	OK	1434	822.65	-164.46	902.60	-167.55	1358.22	75.78	0.05
25	Jan-04		31.29	NG	1075	858.14	-104.48	121.33		738.58	336.42	0.31
26	Feb-04		44.06	NG	1130	1049.61	-15.69	-60.98		632.09	497.91	0.44
27	Mar-04		11.67		1058	1107.28	6.32	-84.33		934.57	123.43	0.12
28	Apr-04		-2.63		967	1098.46	1.77	-124.23		992.47	-25.47	0.03
29	May-04		2.24		1037	1114.07	5.93	-83.68		1005.51	31.49	0.03
30	Jun-04		11.22		1160	1197.32	29.12	-74.26		1029.90	130.10	0.11
31	Jul-04		-22.99		975	1093.21	-10.85	-54.56		1199.16	-224.16	0.23
32	Aug-04		16.57		1242	1204.71	25.86	-21.16		1036.15	205.85	0.17

Appendix Table E11 (Continued)

						Alpha	0.59				MAPE	0.36
			Diff (%)			Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		2.58		1123	1247.77	31.02	-132.98		1094.07	28.93	0.03
34	Oct-04		-18.26		924	1178.49	0.93	-206.58		1092.75	-168.75	0.18
35	Nov-04		7.96		1009	1227.18	15.26	-240.99		928.65	80.35	0.08
36	Dec-04		-72.29	OK	1245	707.48	-145.23	793.07	-58.65	1074.88	170.12	0.14
37	Jan-05		2.76		703	573.79	-141.77	123.70		683.59	19.41	0.03
38	Feb-05		53.21	OK	793	682.82	-66.53	-9.64	-0.26	371.04	421.96	0.53
39	Mar-05		45.16	OK	970	876.65	11.58	-31.02	-0.26	531.97	438.03	0.45
40	Apr-05		0.00		764	888.23	11.58	-124.23		764.00	0.00	0.00
41	May-05		-2.27		798	889.03	8.35	-85.88		816.13	-18.13	0.02
42	Jun-05		4.29		860	919.30	14.92	-69.77		823.11	36.89	0.04
43	Jul-05		-35.12	NG	651	798.32	-25.85	-82.39		879.66	-228.66	0.35
44	Aug-05		-4.64		718	752.67	-31.79	-25.22		751.30	-33.30	0.05
45	Sep-05		-5.17		559	703.71	-36.94	-136.50		587.90	-28.90	0.05
46	Oct-05		21.87		589	743.33	-13.97	-190.90		460.19	128.81	0.22
47	Nov-05		53.04	OK	1040	1057.23	84.39	-173.86	275.55	488.36	551.64	0.53
48	Dec-05		-27.70		1515	892.17	9.55	742.00		1082.97	432.03	0.29
49	Jan-06		-345.83	NG	230	428.95	-132.28	26.90		1025.42	-795.42	3.46
50	Feb-06		48.19	OK	554	455.35	-84.67	22.85	330.87	296.41	257.59	0.46
51	Mar-06		42.24	OK	588	518.28	-40.39	-0.80	330.87	370.41	217.59	0.37
52	Apr-06		46.98	OK	667	664.13	15.48	-86.10	330.87	353.67	313.33	0.47
53	May-06		7.23		640	707.11	23.73	-80.25		593.72	46.28	0.07
54	Jun-06		-17.21		564	673.15	6.42	-81.58		661.07	-97.07	0.17
55	Jul-06		-8.97		548	650.34	-2.35	-88.37		597.18	-49.18	0.09
56	Aug-06		-13.03		551	605.33	-15.15	-33.95		622.78	-71.78	0.13
57	Sep-06		-3.11		440	582.05	-17.59	-138.17		453.68	-13.68	0.03
58	Oct-06		19.66		465	618.81	-1.28	-179.77		373.57	91.43	0.20
59	Nov-06		14.18		517	661.12	11.79	-164.94		893.08	-376.08	0.73
60	Dec-06		-113.41	OK	663	226.00	-122.28	650.50	-71.62	1414.91	-751.91	1.13
61	Jan-07		54.96	NG	290	198.45	-93.86	46.30		130.62	159.38	0.55
62	Feb-07		-8.00		118	98.98	-95.54	21.70		435.46	-317.46	2.69
63	Mar-07		99.73	NG	963	574.25	75.70	116.07		334.31	628.69	0.65
64	Apr-07		47.84	NG	1081	957.32	167.91	-23.16		980.82	100.18	0.09

Appendix Table E12 Forecasted demand of Med A/T calculated by additive seasonal model with $\alpha = 0.33$, $\beta = 0.30$, $\gamma = 0.54$ and $c = 0.3$

						Alpha	0.33				MAPE	0.24
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			265			-277.08				
2	Feb-02	**47.17**			390			-152.08	-193.08			
3	Mar-02	11.03			433			-109.08				
4	Apr-02	29.56			561			18.92				
5	May-02	24.60			699			156.92				
6	Jun-02	2.00			713			170.92				
7	Jul-02	5.33			751			208.92				
8	Aug-02	7.06			804			261.92				
9	Sep-02	-10.82			717			174.92				
10	Oct-02	-27.20			522			-20.08				
11	Nov-02	**-91.00**			47			-495.08	-27.67			
12	Dec-02	**1182.98**			603	542.08	30.73	60.92	-27.67			
13	Jan-03		**76.71**	NG	1270	889.95	125.87	74.98		295.73	974.27	0.77
14	Feb-03		27.23		1187	1121.04	157.44	-35.27		**822.73**	364.27	0.31
15	Mar-03		0.05		1170	1278.67	157.50	-108.86		1169.39	0.61	0.00
16	Apr-03		**-60.08**	NG	909	1258.41	104.17	-178.42		1455.09	-546.09	0.60
17	May-03		**-87.36**	NG	811	1131.96	34.98	-99.11		1519.50	-708.50	0.87
18	Jun-03		-18.71		1127	1098.30	14.39	94.72		1337.86	-210.86	0.19
19	Jul-03		-12.48		1175	1064.97	0.07	155.94		1321.61	-146.61	0.12
20	Aug-03		-14.69		1157	1009.72	-16.52	200.50		1326.96	-169.96	0.15
21	Sep-03		-1.75		1148	986.65	-18.49	167.65		1168.11	-20.11	0.02
22	Oct-03		27.85		1314	1087.27	17.25	112.15		948.08	365.92	0.28
23	Nov-03		**49.80**	OK	1214	1301.31	76.28	-276.62	141.73	**1076.84**	137.16	0.11
24	Dec-03		17.52		1744	1477.03	106.11	171.31		**1349.92**	394.08	0.23
25	Jan-04		**-32.86**	NG	1248	1449.65	66.06	-73.22		1658.13	-410.13	0.33
26	Feb-04		-10.73		1337	1469.02	52.06	-87.10		1480.45	-143.45	0.11
27	Mar-04		-15.76		1220	1458.51	33.29	-178.32		1412.21	-192.21	0.16
28	Apr-04		-11.02		1183	1449.36	20.55	-225.53		1313.38	-130.38	0.11
29	May-04		4.41		1434	1490.48	26.73	-76.27		1370.81	63.19	0.04
30	Jun-04		-8.11		1491	1477.84	14.92	51.02		1611.93	-120.93	0.08
31	Jul-04		-16.11		1420	1418.32	-7.42	73.29		1648.70	-228.70	0.16
32	Aug-04		8.44		1760	1459.27	7.10	254.20		1611.40	148.60	0.08

Appendix Table E12 (Continued)

						Alpha	0.33				MAPE	0.24
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-6.31		1537	1434.79	-2.38	132.59		1634.02	-97.02	0.06
34	Oct-04		-5.14		1469	1407.82	-9.76	84.84		1432.41	36.59	0.02
35	Nov-04		27.88		1555	1539.19	32.58	-119.95		1121.44	433.56	0.28
36	Dec-04		18.32		2134	1699.02	70.76	312.57		1743.08	390.92	0.18
37	Jan-05		-28.82		1317	1646.23	33.69	-210.38		1696.55	-379.55	0.29
38	Feb-05		-10.92		1436	1628.87	18.38	-143.77		1592.82	-156.82	0.11
39	Mar-05		16.40		1757	1741.02	46.51	-74.22		1468.93	288.07	0.16
40	Apr-05		0.00		1562	1787.53	46.51	-225.53		1562.00	0.00	0.00
41	May-05		-16.80		1505	1751.76	21.83	-167.61		1757.77	-252.77	0.17
42	Jun-05		-9.45		1667	1722.28	6.43	-5.93		1824.61	-157.61	0.09
43	Jul-05		-36.31	NG	1322	1572.47	-40.44	-100.16		1802.01	-480.01	0.36
44	Aug-05		-29.81		1376	1398.50	-80.50	105.96		1786.23	-410.23	0.30
45	Sep-05		-36.46	NG	1063	1191.83	-118.35	-7.47		1450.59	-387.59	0.36
46	Oct-05		-20.66		960	1008.93	-137.72	13.18		1158.33	-198.33	0.21
47	Nov-05		54.96	NG	1668	1169.62	-48.19	211.32		751.26	916.74	0.55
48	Dec-05		38.46	NG	2330	1413.08	39.30	636.35		1434.00	896.00	0.38
49	Jan-06		-56.23	NG	795	1306.88	-4.35	-371.91		1242.01	-447.01	0.56
50	Feb-06		-55.12	NG	747	1168.50	-44.56	-292.56		1158.76	-411.76	0.55
51	Mar-06		18.56		1289	1201.83	-21.19	12.24		1049.72	239.28	0.19
52	Apr-06		11.73		1082	1221.94	-8.80	-179.68		955.11	126.89	0.12
53	May-06		19.01		1291	1293.05	15.17	-78.91		1045.53	245.47	0.19
54	Jun-06		-25.34		1039	1222.51	-10.54	-101.07		1302.28	-263.28	0.25
55	Jul-06		7.81		1206	1242.63	-1.34	-66.13		1111.81	94.19	0.08
56	Aug-06		-26.03		1069	1150.72	-28.51	5.41		1347.25	-278.25	0.26
57	Sep-06		14.05		1297	1181.53	-10.72	58.39		1114.74	182.26	0.14
58	Oct-06		4.52		1240	1189.05	-5.25	33.41		1183.99	56.01	0.05
59	Nov-06		-5.29		1325	1160.98	-12.09	185.98		1395.13	-70.13	0.05
60	Dec-06		1.15		1806	1155.64	-10.07	643.86		1785.23	20.77	0.01
61	Jan-07		12.48		884	1181.49	0.71	-332.04		773.67	110.33	0.12
62	Feb-07		-124.66	NG	396	1021.51	-47.50	-470.94		889.63	-493.63	1.25
63	Mar-07		17.74		1199	1043.27	-26.72	89.12		986.26	212.74	0.18
64	Apr-07		42.68	OK	1460	1219.38	34.13	45.50	163.27	836.87	623.13	0.43

Appendix Table E13 Forecasted demand of Med M/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.62$ and $c = 0.3$

						Alpha	0.30				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			244			-108.50				
2	Feb-02	17.21			286			-66.50				
3	Mar-02	-3.15			277			-75.50				
4	Apr-02	32.85			368			15.50	-11.50			
5	May-02	10.05			405			52.50				
6	Jun-02	7.90			437			84.50				
7	Jul-02	12.13			490			137.50				
8	Aug-02	6.53			522			169.50				
9	Sep-02	-14.94			444			91.50				
10	Oct-02	-7.66			410			57.50				
11	Nov-02	-83.90			66			-286.50	52.34			
12	Dec-02	325.76			281	352.50	3.36	-71.50	52.34			
13	Jan-03		62.23	NG	655	478.15	40.05	68.21		247.36	407.64	0.62
14	Feb-03		52.95	NG	960	670.69	85.80	153.85		451.71	508.29	0.53
15	Mar-03		29.36		964	841.39	111.27	47.19		680.99	283.01	0.29
16	Apr-03		-21.17		799	901.91	96.04	-57.83		941.16	-142.16	0.18
17	May-03		-61.36	NG	651	878.12	60.09	-120.67		1050.46	-399.46	0.61
18	Jun-03		-41.85	NG	721	847.70	32.94	-46.29		1022.71	-301.71	0.42
19	Jul-03		-37.03	OK	743	798.10	8.18	18.23	8.85	1018.14	-275.14	0.37
20	Aug-03		-28.56		759	741.24	-11.33	75.53		975.77	-216.77	0.29
21	Sep-03		-6.26		773	715.38	-15.69	70.52		821.41	-48.41	0.06
22	Oct-03		20.96		958	759.94	2.38	144.55		757.19	200.81	0.21
23	Nov-03		32.79	OK	708	831.97	23.28	-185.85	17.94	814.66	-106.66	0.15
24	Dec-03		-12.29		698	829.53	15.56	-108.67		907.59	-209.59	0.30
25	Jan-04		-79.08	NG	510	724.10	-20.74	-106.62		913.30	-403.30	0.79
26	Feb-04		-51.99	OK	564	615.40	-47.12	26.74	-55.99	857.21	-293.21	0.52
27	Mar-04		-23.34		499	533.34	-57.61	-3.30		615.46	-116.46	0.23
28	Apr-04		8.15		455	486.86	-54.27	-41.75		417.90	37.10	0.08
29	May-04		40.81	OK	527	497.12	-34.91	-27.43	-19.08	311.93	215.07	0.41
30	Jun-04		21.67		531	496.73	-24.55	3.60		415.91	115.09	0.22
31	Jul-04		8.51		536	485.86	-20.45	37.99		481.03	54.97	0.10
32	Aug-04		14.81		635	493.63	-11.98	116.30		540.94	94.06	0.15

Appendix Table E13 (Continued)

						Alpha	0.30				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		**-124.46**	NG	246	389.80	-39.54	-62.21		552.16	-306.16	1.24
34	Oct-04		3.73		514	356.02	-37.81	152.87		494.81	19.19	0.04
35	Nov-04		**76.62**	OK	566	448.30	1.22	2.14	2.36	**336.14**	229.86	0.41
36	Dec-04		**51.24**	NG	699	556.96	33.45	46.59		340.84	358.16	0.51
37	Jan-05		-24.69		388	561.68	24.83	-148.15		483.79	-95.79	0.25
38	Feb-05		**-33.90**	OK	458	539.93	10.86	-40.56	-55.24	**530.52**	-72.52	0.16
39	Mar-05		14.72		642	579.14	19.36	37.67		547.49	94.51	0.15
40	Apr-05		-6.86		521	587.78	16.15	-57.25		556.76	-35.76	0.07
41	May-05		6.26		615	615.48	19.61	-10.74		**584.85**	30.15	0.05
42	Jun-05		-14.87		556	610.28	12.17	-32.25		638.69	-82.69	0.15
43	Jul-05		**-45.79**	OK	453	560.22	-6.50	-51.94	-53.28	660.44	-207.44	0.46
44	Aug-05		**-61.06**	OK	416	477.51	-29.36	6.18	-53.28	670.02	-254.02	0.61
45	Sep-05		-7.80		358	439.77	-31.88	-74.32		385.94	-27.94	0.08
46	Oct-05		**-46.41**	OK	383	354.56	-47.88	75.81	-121.32	560.76	-177.76	0.46
47	Nov-05		**50.75**	NG	627	402.14	-19.24	140.07		**309.05**	317.95	0.51
48	Dec-05		**46.91**	NG	809	496.75	14.92	211.11		429.49	379.51	0.47
49	Jan-06		-14.68		317	497.71	10.73	-168.31		363.52	-46.52	0.15
50	Feb-06		-14.12		410	491.08	5.52	-65.65		**453.20**	-43.20	0.11
51	Mar-06		17.93		651	531.62	16.03	88.27		534.27	116.73	0.18
52	Apr-06		-26.07		389	517.23	6.90	-101.20		490.39	-101.39	0.26
53	May-06		-24.31		413	494.01	-2.13	-54.26		513.39	-100.39	0.24
54	Jun-06		-29.47		355	460.49	-11.55	-77.60		459.63	-104.63	0.29
55	Jul-06		0.00		397	448.94	-11.55	-51.94		**395.65**	1.35	0.00
56	Aug-06		-26.73		350	409.31	-19.97	-34.38		**384.10**	-34.10	0.10
57	Sep-06		-1.29		311	388.14	-20.33	-76.06		315.02	-4.02	0.01
58	Oct-06		-4.38		425	362.22	-22.01	67.74		**246.48**	178.52	0.42
59	Nov-06		-31.94	NG	364	305.33	-32.47	89.66		480.28	-116.28	0.32
60	Dec-06		-5.90		457	264.76	-34.90	199.42		483.96	-26.96	0.06
61	Jan-07		70.41	OK	208	273.80	-21.72	-104.83	144.90	61.55	146.45	0.70
62	Feb-07		-60.71	NG	116	230.95	-28.06	-96.18		186.43	-70.43	0.61
63	Mar-07		1.63		296	204.34	-27.62	90.37		291.17	4.83	0.02
64	Apr-07		79.70	NG	372	265.66	-0.94	27.32		75.51	296.49	0.80

Appendix Table E14 Forecasted demand of Low A/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.77$ and $c = 0.3$

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	Abs(E_t/Y_t)
1	Dec-02	0.00			155			-93.00				
2	Jan-03	**50.97**			234			-14.00	5.50			
3	Feb-03	**44.87**			339			91.00	5.50			
4	Mar-03	3.83			352			104.00				
5	Apr-03	**-33.81**			233			-15.00	27.50			
6	May-03	-14.59			199			-49.00				
7	Jun-03	-1.01			197			-51.00				
8	Jul-03	8.63			214			-34.00				
9	Aug-03	13.55			243			-5.00				
10	Sep-03	-9.05			221			-27.00				
11	Oct-03	20.36			266			18.00				
12	Nov-03	21.43			323	248.00	15.27	75.00				
13	Dec-03		**56.67**	OK	393	330.09	35.32	27.26	59.01	170.27	222.73	0.57
14	Jan-04		23.11		457	397.09	44.82	43.01		**370.91**	86.09	0.19
15	Feb-04		-6.16		502	432.64	42.04	74.31		**447.41**	54.59	0.11
16	Mar-04		-5.60		548	465.47	39.28	87.44		578.68	-30.68	0.06
17	Apr-04		8.97		538	519.23	43.62	11.05		**532.25**	5.75	0.01
18	May-04		10.32		573	580.59	48.95	-17.06		513.85	59.15	0.10
19	Jun-04		8.31		631	645.28	53.67	-22.67		578.54	52.46	0.08
20	Jul-04		-19.17		558	666.86	44.04	-91.74		664.94	-106.94	0.19
21	Aug-04		-1.71		694	707.33	42.97	-11.43		705.90	-11.90	0.02
22	Sep-04		-24.71		580	707.31	30.07	-104.37		723.30	-143.30	0.25
23	Oct-04		**-43.61**	NG	526	668.57	9.43	-105.85		755.38	-229.38	0.44
24	Nov-04		1.57		765	681.60	10.51	81.48		753.00	12.00	0.02
25	Dec-04		9.29		793	714.20	17.14	67.01		**751.11**	41.89	0.05
26	Jan-05		**-49.49**	NG	518	654.43	-5.93	-95.40		774.35	-256.35	0.49
27	Feb-05		-25.27		577	604.75	-19.06	-4.41		722.81	-145.81	0.25
28	Mar-05		6.38		719	599.46	-14.93	112.20		673.13	45.87	0.06
29	Apr-05		-6.54		559	573.55	-18.22	-8.70		595.58	-36.58	0.07
30	May-05		14.01		626	581.65	-10.33	30.31		538.27	87.73	0.14
31	Jun-05		16.75		659	604.43	-0.39	36.91		548.65	110.35	0.17
32	Jul-05		-3.91		493	598.25	-2.13	-102.16		512.29	-19.29	0.04

Appendix Table E14 (Continued)

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Aug-05		-4.97		557	587.81	-4.62	-26.38		584.69	-27.69	0.05
34	Sep-05		-4.77		457	576.64	-6.59	-116.15		478.81	-21.81	0.05
35	Oct-05		-25.46		370	541.79	-15.06	-156.71		464.21	-94.21	0.25
36	Nov-05		12.11		692	551.87	-7.52	126.72		608.21	83.79	0.12
37	Dec-05		42.54	NG	1064	680.14	33.21	311.41		611.36	452.64	0.43
38	Jan-06		-38.87	NG	445	661.46	17.65	-188.78		617.95	-172.95	0.39
39	Feb-06		-67.42	NG	403	597.60	-6.80	-151.11		674.70	-271.70	0.67
40	Mar-06		0.00		703	590.80	-6.80	112.20		703.00	0.00	0.00
41	Apr-06		-22.40		470	552.40	-16.28	-65.55		575.30	-105.30	0.22
42	May-06		-0.97		561	534.49	-16.77	27.37		566.43	-5.43	0.01
43	Jun-06		-14.83		483	496.24	-23.22	-1.77		554.63	-71.63	0.15
44	Jul-06		24.93		494	509.96	-12.13	-35.67		370.86	123.14	0.25
45	Aug-06		2.39		483	501.29	-11.09	-20.14		471.45	11.55	0.02
46	Sep-06		29.16		528	536.38	2.76	-33.03		374.05	153.95	0.29
47	Oct-06		34.96	OK	588	600.82	21.26	-45.72	9.92	382.43	205.57	0.35
48	Nov-06		-22.35		612	581.04	8.95	52.86		748.80	-136.80	0.22
49	Dec-06		-21.32		743	542.47	-5.30	225.89		901.40	-158.40	0.21
50	Jan-07		35.96	OK	544	595.85	12.30	-83.16	102.00	348.39	195.61	0.36
51	Feb-07		-97.85	NG	231	540.34	-8.04	-273.15		457.04	-226.04	0.98
52	Mar-07		64.99	NG	1841	891.25	99.64	758.22		644.50	1196.50	0.65
53	Apr-07		38.23	NG	1498	1162.69	151.18	243.64		925.34	572.66	0.38

Appendix Table E15 Forecasted demand of Low M/T calculated by additive seasonal model with $\alpha = 0.54$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.3$

						Alpha	0.54				MAPE	0.31
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Yt	Lt	bt	St	New St	Ft	Et	Abs(E_t/Y_t)
1	Jan-02	0.00			10			-23.50				
2	Feb-02	50.00			15			-18.50	-8.50			
3	Mar-02	46.67			22			-11.50	-8.50			
4	Apr-02	59.09			35			1.50	-8.50			
5	May-02	14.29			40			6.50				
6	Jun-02	-5.00			38			4.50				
7	Jul-02	-36.84			24			-9.50	-3.50			
8	Aug-02	58.33			38			4.50	-3.50			
9	Sep-02	-47.37			20			-13.50	-3.50			
10	Oct-02	45.00			29			-4.50	-3.50			
11	Nov-02	37.93			40			6.50	-3.50			
12	Dec-02	127.50			91	33.50	7.36	57.50	-3.50			
13	Jan-03		90.02	NG	174	126.02	32.91	-2.06		17.36	156.64	0.90
14	Feb-03		63.90	NG	389	294.07	73.45	15.53		150.43	238.57	0.61
15	Mar-03		-0.01		356	367.51	73.45	-11.50		359.02	-3.02	0.01
16	Apr-03		-67.60	NG	264	343.94	44.34	-22.93		432.46	-168.46	0.64
17	May-03		-99.38	NG	198	281.30	12.25	-20.44		394.78	-196.78	0.99
18	Jun-03		-45.39	OK	205	242.96	-2.93	-8.24	-9.78	298.04	-93.04	0.45
19	Jul-03		4.34		241	245.72	-1.22	-8.07		236.53	4.47	0.02
20	Aug-03		-6.87		233	235.80	-3.83	2.31		241.00	-8.00	0.03
21	Sep-03		4.18		228	237.15	-2.28	-12.20		228.47	-0.47	0.00
22	Oct-03		10.01		256	248.81	1.90	-0.99		231.37	24.63	0.10
23	Nov-03		23.45		336	293.55	14.75	17.29		247.21	88.79	0.26
24	Dec-03		9.46		404	329.07	20.98	62.73		304.80	99.20	0.25
25	Jan-04		2.25		356	354.40	22.29	-0.96		348.00	8.00	0.02
26	Feb-04		-2.95		381	370.59	20.46	13.99		392.22	-11.22	0.03
27	Mar-04		6.74		407	405.98	24.94	-7.75		379.55	27.45	0.07
28	Apr-04		-19.64		341	394.50	14.01	-32.10		407.98	-66.98	0.20
29	May-04		9.54		429	430.76	20.69	-14.84		408.51	20.49	0.05
30	Jun-04		-16.33		381	417.63	10.54	-16.75		443.21	-62.21	0.16
31	Jul-04		-18.34		355	392.77	-0.08	-16.98		420.10	-65.10	0.18
32	Aug-04		19.39		490	444.34	15.42	15.31		395.01	94.99	0.19

Appendix Table E15 (Continued)

						Alpha	0.54				MAPE	0.31
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Yt	Lt	bt	St	New St	Ft	Et	$Abs(E_t/Y_t)$
33	Sep-04		-166.41	NG	168	307.77	-30.18	-50.47		447.56	-279.56	1.66
34	Oct-04		25.85		373	330.00	-14.46	12.21		276.60	96.40	0.26
35	Nov-04		29.63		473	391.75	8.41	36.48		332.83	140.17	0.30
36	Dec-04		30.08	NG	662	508.41	40.88	89.99		462.88	199.12	0.30
37	Jan-05		-49.82	NG	366	450.16	11.14	-25.92		548.33	-182.33	0.50
38	Feb-05		-10.28		431	437.22	3.92	7.93		475.30	-44.30	0.10
39	Mar-05		28.36		605	534.44	31.91	15.75		433.39	171.61	0.28
40	Apr-05		6.27		570	585.78	37.74	-27.21		534.24	35.76	0.06
41	May-05		-9.67		555	594.33	28.98	-22.19		608.69	-53.69	0.10
42	Jun-05		-1.60		597	618.12	27.42	-18.06		606.56	-9.56	0.02
43	Jul-05		-31.77	NG	477	563.14	2.70	-37.73		628.56	-151.56	0.32
44	Aug-05		-36.74	OK	425	480.95	-22.77	-6.06	-36.57	581.16	-156.16	0.37
45	Sep-05		-9.01		374	439.85	-28.27	-55.08		407.71	-33.71	0.09
46	Oct-05		-32.85	OK	319	354.61	-45.36	-2.14	-36.86	423.79	-104.79	0.33
47	Nov-05		30.85	NG	500	393.13	-20.20	57.59		345.73	154.27	0.31
48	Dec-05		36.32	NG	727	516.50	22.88	126.14		462.92	264.08	0.36
49	Jan-06		-96.73	NG	261	402.13	-18.30	-60.48		513.46	-252.46	0.97
50	Feb-06		-41.94	OK	276	320.89	-37.18	-7.92	-36.86	391.75	-115.75	0.42
51	Mar-06		35.88	NG	467	374.80	-9.85	38.68		299.46	167.54	0.36
52	Apr-06		-31.93	NG	256	320.51	-23.19	-38.40		337.74	-81.74	0.32
53	May-06		8.59		301	311.38	-18.97	-18.64		275.14	25.86	0.09
54	Jun-06		-23.58		222	263.95	-27.51	-25.23		274.35	-52.35	0.24
55	Jul-06		43.38	NG	351	319.24	-2.67	-16.88		198.72	152.28	0.43
56	Aug-06		-15.00		270	294.55	-9.28	-11.61		280.00	-10.00	0.04
57	Sep-06		21.44		293	319.42	0.97	-46.48		230.19	62.81	0.21
58	Oct-06		12.33		363	344.72	8.27	3.99		283.53	79.47	0.22
59	Nov-06		-21.12		339	314.07	-3.41	47.80		410.58	-71.58	0.21
60	Dec-06		-4.50		418	300.44	-6.47	123.57		436.80	-18.80	0.04
61	Jan-07		-44.13	NG	162	255.10	-18.13	-70.27		233.48	-71.48	0.44
62	Feb-07		-110.14	NG	109	171.70	-37.71	-24.35		200.11	-91.11	0.84
63	Mar-07		43.76	NG	307	207.02	-15.80	57.07		172.67	134.33	0.44
64	Apr-07		44.83	OK	277	258.73	4.45	-21.40	46.08	152.82	124.18	0.45

Appendix Table E16 Forecasted demand of Top A/T calculated by additive seasonal model with $\alpha = 0.59$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.4$

						Alpha	0.59				MAPE	0.35
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			188			-104.58				
2	Feb-02	4.26			196			-96.58				
3	Mar-02	20.92			237			-55.58				
4	Apr-02	6.75			253			-39.58				
5	May-02	7.11			271			-21.58				
6	Jun-02	-20.30			216			-76.58				
7	Jul-02	18.98			257			-35.58				
8	Aug-02	3.50			266			-26.58				
9	Sep-02	-35.71			171			-121.58	-74.08			
10	Oct-02	-33.92			113			-179.58	-74.08			
11	Nov-02	-79.65			23			-269.58	-74.08			
12	Dec-02	5639.13			1320	292.58	102.91	1027.42	-74.08			
13	Jan-03		83.94	NG	1811	1298.99	373.96	80.40		290.91	1520.09	0.84
14	Feb-03		-14.98		1371	1550.88	337.34	-121.57		1576.36	-205.36	0.15
15	Mar-03		-24.42		1473	1674.46	273.21	-99.35		1832.64	-359.64	0.24
16	Apr-03		-54.13	NG	1238	1549.39	153.73	-121.13		1908.09	-670.09	0.54
17	May-03		-46.48	OK	1148	1386.00	58.59	-86.51	-94.72	1681.54	-533.54	0.46
18	Jun-03		-8.83		1257	1378.61	38.80	-90.09		1368.01	-111.01	0.09
19	Jul-03		4.70		1450	1457.93	50.95	-27.29		1381.83	68.17	0.05
20	Aug-03		-12.21		1321	1413.01	22.19	-46.21		1482.30	-161.30	0.12
21	Sep-03		-10.30		1191	1362.32	0.33	-136.50		1361.12	-170.12	0.14
22	Oct-03		-4.70		1130	1331.11	-9.13	-186.04		1288.57	-158.57	0.14
23	Nov-03		12.81		1207	1413.87	18.43	-250.77		1247.90	-40.90	0.03
24	Dec-03		-71.53	OK	1434	822.65	-164.46	902.60	-64.72	1358.22	75.78	0.05
25	Jan-04		31.29		1075	858.14	-104.48	121.33		738.58	336.42	0.31
26	Feb-04		44.06	OK	1130	1049.61	-15.69	-60.98	18.50	632.09	497.91	0.44
27	Mar-04		11.67		1058	1107.28	6.32	-84.33		934.57	123.43	0.12
28	Apr-04		-2.63		967	1098.46	1.77	-124.23		992.47	-25.47	0.03
29	May-04		2.24		1037	1114.07	5.93	-83.68		1005.51	31.49	0.03
30	Jun-04		11.22		1160	1197.32	29.12	-74.26		1029.90	130.10	0.11
31	Jul-04		-22.99		975	1093.21	-10.85	-54.56		1199.16	-224.16	0.23
32	Aug-04		16.57		1242	1204.71	25.86	-21.16		1036.15	205.85	0.17

Appendix Table E16 (Continued)

						Alpha	0.59				MAPE	0.35
			Diff (%)			Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		2.58		1123	1247.77	31.02	-132.98		1094.07	28.93	0.03
34	Oct-04		-18.26		924	1178.49	0.93	-206.58		1092.75	-168.75	0.18
35	Nov-04		7.96		1009	1227.18	15.26	-240.99		928.65	80.35	0.08
36	Dec-04		-72.29	OK	1245	707.48	-145.23	793.07	-58.65	1177.71	67.29	0.05
37	Jan-05		2.76		703	573.79	-141.77	123.70		683.59	19.41	0.03
38	Feb-05		53.21	OK	793	682.82	-66.53	-9.64	-0.26	450.53	342.47	0.43
39	Mar-05		45.16	OK	970	876.65	11.58	-31.02	-0.26	531.97	438.03	0.45
40	Apr-05		0.00		764	888.23	11.58	-124.23		764.00	0.00	0.00
41	May-05		-2.27		798	889.03	8.35	-85.88		816.13	-18.13	0.02
42	Jun-05		4.29		860	919.30	14.92	-69.77		823.11	36.89	0.04
43	Jul-05		-35.12		651	798.32	-25.85	-82.39		879.66	-228.66	0.35
44	Aug-05		-4.64		718	752.67	-31.79	-25.22		751.30	-33.30	0.05
45	Sep-05		-5.17		559	703.71	-36.94	-136.50		587.90	-28.90	0.05
46	Oct-05		21.87		589	743.33	-13.97	-190.90		460.19	128.81	0.22
47	Nov-05		53.04	OK	1040	1057.23	84.39	-173.86	275.55	488.36	551.64	0.53
48	Dec-05		-27.70		1515	892.17	9.55	742.00		1082.97	432.03	0.29
49	Jan-06		-345.83	NG	230	428.95	-132.28	26.90		1025.42	-795.42	3.46
50	Feb-06		48.19	OK	554	455.35	-84.67	22.85	330.87	296.41	257.59	0.46
51	Mar-06		42.24	OK	588	518.28	-40.39	-0.80	330.87	370.41	217.59	0.37
52	Apr-06		46.98	OK	667	664.13	15.48	-86.10	330.87	353.67	313.33	0.47
53	May-06		7.23		640	707.11	23.73	-80.25		593.72	46.28	0.07
54	Jun-06		-17.21		564	673.15	6.42	-81.58		661.07	-97.07	0.17
55	Jul-06		-8.97		548	650.34	-2.35	-88.37		597.18	-49.18	0.09
56	Aug-06		-13.03		551	605.33	-15.15	-33.95		622.78	-71.78	0.13
57	Sep-06		-3.11		440	582.05	-17.59	-138.17		453.68	-13.68	0.03
58	Oct-06		19.66		465	618.81	-1.28	-179.77		373.57	91.43	0.20
59	Nov-06		14.18		517	661.12	11.79	-164.94		893.08	-376.08	0.73
60	Dec-06		-113.41	OK	663	226.00	-122.28	650.50	-71.62	1414.91	-751.91	1.13
61	Jan-07		54.96	NG	290	198.45	-93.86	46.30		130.62	159.38	0.55
62	Feb-07		-8.00		118	98.98	-95.54	21.70		435.46	-317.46	2.69
63	Mar-07		99.73	NG	963	574.25	75.70	116.07		334.31	628.69	0.65
64	Apr-07		47.84	NG	1081	957.32	167.91	-23.16		980.82	100.18	0.09

Appendix Table E17 Forecasted demand of Med A/T calculated by additive seasonal model with $\alpha = 0.33$, $\beta = 0.30$, $\gamma = 0.54$ and $c = 0.4$

						Alpha	0.33				MAPE	0.24
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			265			-277.08				
2	Feb-02	**47.17**			390			-152.08	-193.08			
3	Mar-02	11.03			433			-109.08				
4	Apr-02	29.56			561			18.92				
5	May-02	24.60			699			156.92				
6	Jun-02	2.00			713			170.92				
7	Jul-02	5.33			751			208.92				
8	Aug-02	7.06			804			261.92				
9	Sep-02	-10.82			717			174.92				
10	Oct-02	-27.20			522			-20.08				
11	Nov-02	**-91.00**			47			-495.08	-27.67			
12	Dec-02	**1182.98**			603	542.08	30.73	60.92	-27.67			
13	Jan-03		**76.71**	NG	1270	889.95	125.87	74.98		295.73	974.27	0.77
14	Feb-03		27.23		1187	1121.04	157.44	-35.27		**822.73**	364.27	0.31
15	Mar-03		0.05		1170	1278.67	157.50	-108.86		1169.39	0.61	0.00
16	Apr-03		**-60.08**	NG	909	1258.41	104.17	-178.42		1455.09	-546.09	0.60
17	May-03		**-87.36**	NG	811	1131.96	34.98	-99.11		1519.50	-708.50	0.87
18	Jun-03		-18.71		1127	1098.30	14.39	94.72		1337.86	-210.86	0.19
19	Jul-03		-12.48		1175	1064.97	0.07	155.94		1321.61	-146.61	0.12
20	Aug-03		-14.69		1157	1009.72	-16.52	200.50		1326.96	-169.96	0.15
21	Sep-03		-1.75		1148	986.65	-18.49	167.65		1168.11	-20.11	0.02
22	Oct-03		27.85		1314	1087.27	17.25	112.15		948.08	365.92	0.28
23	Nov-03		**49.80**	OK	1214	1301.31	76.28	-276.62	141.73	**1076.84**	137.16	0.11
24	Dec-03		17.52		1744	1477.03	106.11	171.31		**1349.92**	394.08	0.23
25	Jan-04		-32.86		1248	1449.65	66.06	-73.22		1658.13	-410.13	0.33
26	Feb-04		-10.73		1337	1469.02	52.06	-87.10		1480.45	-143.45	0.11
27	Mar-04		-15.76		1220	1458.51	33.29	-178.32		1412.21	-192.21	0.16
28	Apr-04		-11.02		1183	1449.36	20.55	-225.53		1313.38	-130.38	0.11
29	May-04		4.41		1434	1490.48	26.73	-76.27		1370.81	63.19	0.04
30	Jun-04		-8.11		1491	1477.84	14.92	51.02		1611.93	-120.93	0.08
31	Jul-04		-16.11		1420	1418.32	-7.42	73.29		1648.70	-228.70	0.16
32	Aug-04		8.44		1760	1459.27	7.10	254.20		1611.40	148.60	0.08

Appendix Table E17 (Continued)

						Alpha	0.33				MAPE	0.24
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-6.31		1537	1434.79	-2.38	132.59		1634.02	-97.02	0.06
34	Oct-04		-5.14		1469	1407.82	-9.76	84.84		1544.55	-75.55	0.05
35	Nov-04		27.88		1555	1539.19	32.58	-119.95		1539.79	15.21	0.01
36	Dec-04		18.32		2134	1699.02	70.76	312.57		1743.08	390.92	0.18
37	Jan-05		-28.82		1317	1646.23	33.69	-210.38		1696.55	-379.55	0.29
38	Feb-05		-10.92		1436	1628.87	18.38	-143.77		1592.82	-156.82	0.11
39	Mar-05		16.40		1757	1741.02	46.51	-74.22		1468.93	288.07	0.16
40	Apr-05		0.00		1562	1787.53	46.51	-225.53		1562.00	0.00	0.00
41	May-05		-16.80		1505	1751.76	21.83	-167.61		1757.77	-252.77	0.17
42	Jun-05		-9.45		1667	1722.28	6.43	-5.93		1824.61	-157.61	0.09
43	Jul-05		-36.31		1322	1572.47	-40.44	-100.16		1802.01	-480.01	0.36
44	Aug-05		-29.81		1376	1398.50	-80.50	105.96		1786.23	-410.23	0.30
45	Sep-05		-36.46		1063	1191.83	-118.35	-7.47		1450.59	-387.59	0.36
46	Oct-05		-20.66		960	1008.93	-137.72	13.18		1158.33	-198.33	0.21
47	Nov-05		54.96	OK	1668	1169.62	-48.19	211.32	324.76	751.26	916.74	0.55
48	Dec-05		38.46		2330	1413.08	39.30	636.35		1434.00	896.00	0.38
49	Jan-06		-56.23	NG	795	1306.88	-4.35	-371.91		1242.01	-447.01	0.56
50	Feb-06		-55.12	NG	747	1168.50	-44.56	-292.56		1158.76	-411.76	0.55
51	Mar-06		18.56		1289	1201.83	-21.19	12.24		1049.72	239.28	0.19
52	Apr-06		11.73		1082	1221.94	-8.80	-179.68		955.11	126.89	0.12
53	May-06		19.01		1291	1293.05	15.17	-78.91		1045.53	245.47	0.19
54	Jun-06		-25.34		1039	1222.51	-10.54	-101.07		1302.28	-263.28	0.25
55	Jul-06		7.81		1206	1242.63	-1.34	-66.13		1111.81	94.19	0.08
56	Aug-06		-26.03		1069	1150.72	-28.51	5.41		1347.25	-278.25	0.26
57	Sep-06		14.05		1297	1181.53	-10.72	58.39		1114.74	182.26	0.14
58	Oct-06		4.52		1240	1189.05	-5.25	33.41		1183.99	56.01	0.05
59	Nov-06		-5.29		1325	1160.98	-12.09	185.98		1508.57	-183.57	0.14
60	Dec-06		1.15		1806	1155.64	-10.07	643.86		1785.23	20.77	0.01
61	Jan-07		12.48		884	1181.49	0.71	-332.04		773.67	110.33	0.12
62	Feb-07		-124.66	NG	396	1021.51	-47.50	-470.94		889.63	-493.63	1.25
63	Mar-07		17.74		1199	1043.27	-26.72	89.12		986.26	212.74	0.18
64	Apr-07		42.68	OK	1460	1219.38	34.13	45.50	163.27	836.87	623.13	0.43

Appendix Table E18 Forecasted demand of Med M/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.62$ and $c = 0.4$

						Alpha	0.30				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			244			-108.50				
2	Feb-02	17.21			286			-66.50				
3	Mar-02	-3.15			277			-75.50				
4	Apr-02	32.85			368			15.50				
5	May-02	10.05			405			52.50				
6	Jun-02	7.90			437			84.50				
7	Jul-02	12.13			490			137.50				
8	Aug-02	6.53			522			169.50				
9	Sep-02	-14.94			444			91.50				
10	Oct-02	-7.66			410			57.50				
11	Nov-02	**-83.90**			66			-286.50	52.34			
12	Dec-02	**325.76**			281	352.50	3.36	-71.50	52.34			
13	Jan-03		**62.23**	NG	655	478.15	40.05	68.21		247.36	407.64	0.62
14	Feb-03		**52.95**	NG	960	670.69	85.80	153.85		451.71	508.29	0.53
15	Mar-03		29.36		964	841.39	111.27	47.19		680.99	283.01	0.29
16	Apr-03		-21.17		799	901.91	96.04	-57.83		968.16	-169.16	0.21
17	May-03		**-61.36**	NG	651	878.12	60.09	-120.67		1050.46	-399.46	0.61
18	Jun-03		**-41.85**	NG	721	847.70	32.94	-46.29		1022.71	-301.71	0.42
19	Jul-03		-37.03		743	798.10	8.18	18.23		1018.14	-275.14	0.37
20	Aug-03		-28.56		759	741.24	-11.33	75.53		975.77	-216.77	0.29
21	Sep-03		-6.26		773	715.38	-15.69	70.52		821.41	-48.41	0.06
22	Oct-03		20.96		958	759.94	2.38	144.55		757.19	200.81	0.21
23	Nov-03		32.79		708	831.97	23.28	-185.85		**814.66**	-106.66	0.15
24	Dec-03		-12.29		698	829.53	15.56	-108.67		**907.59**	-209.59	0.30
25	Jan-04		**-79.08**	NG	510	724.10	-20.74	-106.62		913.30	-403.30	0.79
26	Feb-04		**-51.99**	OK	564	615.40	-47.12	26.74	-55.99	857.21	-293.21	0.52
27	Mar-04		-23.34		499	533.34	-57.61	-3.30		615.46	-116.46	0.23
28	Apr-04		8.15		455	486.86	-54.27	-41.75		417.90	37.10	0.08
29	May-04		**40.81**	OK	527	497.12	-34.91	-27.43	-19.08	311.93	215.07	0.41
30	Jun-04		21.67		531	496.73	-24.55	3.60		415.91	115.09	0.22
31	Jul-04		8.51		536	485.86	-20.45	37.99		490.41	45.59	0.09
32	Aug-04		14.81		635	493.63	-11.98	116.30		540.94	94.06	0.15

Appendix Table E18 (Continued)

						Alpha	0.30				MAPE	0.32
			Diff (%)			Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		**-124.46**	NG	246	389.80	-39.54	-62.21		552.16	-306.16	1.24
34	Oct-04		3.73		514	356.02	-37.81	152.87		494.81	19.19	0.04
35	Nov-04		**76.62**	OK	566	448.30	1.22	2.14	2.36	132.36	433.64	0.77
36	Dec-04		**51.24**	NG	699	556.96	33.45	46.59		340.84	358.16	0.51
37	Jan-05		-24.69		388	561.68	24.83	-148.15		483.79	-95.79	0.25
38	Feb-05		-33.90		458	539.93	10.86	-40.56		**530.52**	-72.52	0.16
39	Mar-05		14.72		642	579.14	19.36	37.67		547.49	94.51	0.15
40	Apr-05		-6.86		521	587.78	16.15	-57.25		556.76	-35.76	0.07
41	May-05		6.26		615	615.48	19.61	-10.74		**584.85**	30.15	0.05
42	Jun-05		-14.87		556	610.28	12.17	-32.25		638.69	-82.69	0.15
43	Jul-05		**-45.79**	OK	453	560.22	-6.50	-51.94	-53.28	660.44	-207.44	0.46
44	Aug-05		**-61.06**	OK	416	477.51	-29.36	6.18	-53.28	670.02	-254.02	0.61
45	Sep-05		-7.80		358	439.77	-31.88	-74.32		385.94	-27.94	0.08
46	Oct-05		**-46.41**	OK	383	354.56	-47.88	75.81	-121.32	560.76	-177.76	0.46
47	Nov-05		**50.75**	NG	627	402.14	-19.24	140.07		**309.05**	317.95	0.51
48	Dec-05		**46.91**	NG	809	496.75	14.92	211.11		429.49	379.51	0.47
49	Jan-06		-14.68		317	497.71	10.73	-168.31		363.52	-46.52	0.15
50	Feb-06		-14.12		410	491.08	5.52	-65.65		467.88	-57.88	0.14
51	Mar-06		17.93		651	531.62	16.03	88.27		534.27	116.73	0.18
52	Apr-06		-26.07		389	517.23	6.90	-101.20		490.39	-101.39	0.26
53	May-06		-24.31		413	494.01	-2.13	-54.26		513.39	-100.39	0.24
54	Jun-06		-29.47		355	460.49	-11.55	-77.60		459.63	-104.63	0.29
55	Jul-06		0.00		397	448.94	-11.55	-51.94		**395.65**	1.35	0.00
56	Aug-06		-26.73		350	409.31	-19.97	-34.38		**384.10**	-34.10	0.10
57	Sep-06		-1.29		311	388.14	-20.33	-76.06		315.02	-4.02	0.01
58	Oct-06		-4.38		425	362.22	-22.01	67.74		**246.48**	178.52	0.42
59	Nov-06		-31.94		364	305.33	-32.47	89.66		480.28	-116.28	0.32
60	Dec-06		-5.90		457	264.76	-34.90	199.42		483.96	-26.96	0.06
61	Jan-07		**70.41**	OK	208	273.80	-21.72	-104.83	144.90	61.55	146.45	0.70
62	Feb-07		**-60.71**	NG	116	230.95	-28.06	-96.18		186.43	-70.43	0.61
63	Mar-07		1.63		296	204.34	-27.62	90.37		291.17	4.83	0.02
64	Apr-07		**79.70**	OK	372	265.66	-0.94	27.32	39.91	75.51	296.49	0.80

Appendix Table E19 Forecasted demand of Low A/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.77$ and $c = 0.4$

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Dec-02	0.00			155			-93.00				
2	Jan-03	**50.97**			234			-14.00	5.50			
3	Feb-03	**44.87**			339			91.00	5.50			
4	Mar-03	3.83			352			104.00				
5	Apr-03	-33.81			233			-15.00				
6	May-03	-14.59			199			-49.00				
7	Jun-03	-1.01			197			-51.00				
8	Jul-03	8.63			214			-34.00				
9	Aug-03	13.55			243			-5.00				
10	Sep-03	-9.05			221			-27.00				
11	Oct-03	20.36			266			18.00				
12	Nov-03	21.43			323	248.00	15.27	75.00				
13	Dec-03		**56.67**	OK	393	330.09	35.32	27.26	59.01	170.27	222.73	0.57
14	Jan-04		23.11		457	397.09	44.82	43.01		**370.91**	86.09	0.19
15	Feb-04		-6.16		502	432.64	42.04	74.31		**447.41**	54.59	0.11
16	Mar-04		-5.60		548	465.47	39.28	87.44		578.68	-30.68	0.06
17	Apr-04		8.97		538	519.23	43.62	11.05		489.75	48.25	0.09
18	May-04		10.32		573	580.59	48.95	-17.06		513.85	59.15	0.10
19	Jun-04		8.31		631	645.28	53.67	-22.67		578.54	52.46	0.08
20	Jul-04		-19.17		558	666.86	44.04	-91.74		664.94	-106.94	0.19
21	Aug-04		-1.71		694	707.33	42.97	-11.43		705.90	-11.90	0.02
22	Sep-04		-24.71		580	707.31	30.07	-104.37		723.30	-143.30	0.25
23	Oct-04		**-43.61**	NG	526	668.57	9.43	-105.85		755.38	-229.38	0.44
24	Nov-04		1.57		765	681.60	10.51	81.48		753.00	12.00	0.02
25	Dec-04		9.29		793	714.20	17.14	67.01		**751.11**	41.89	0.05
26	Jan-05		**-49.49**	NG	518	654.43	-5.93	-95.40		774.35	-256.35	0.49
27	Feb-05		-25.27		577	604.75	-19.06	-4.41		722.81	-145.81	0.25
28	Mar-05		6.38		719	599.46	-14.93	112.20		673.13	45.87	0.06
29	Apr-05		-6.54		559	573.55	-18.22	-8.70		595.58	-36.58	0.07
30	May-05		14.01		626	581.65	-10.33	30.31		538.27	87.73	0.14
31	Jun-05		16.75		659	604.43	-0.39	36.91		548.65	110.35	0.17
32	Jul-05		-3.91		493	598.25	-2.13	-102.16		512.29	-19.29	0.04

Appendix Table E19 (Continued)

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Aug-05		-4.97		557	587.81	-4.62	-26.38		584.69	-27.69	0.05
34	Sep-05		-4.77		457	576.64	-6.59	-116.15		478.81	-21.81	0.05
35	Oct-05		-25.46		370	541.79	-15.06	-156.71		464.21	-94.21	0.25
36	Nov-05		12.11		692	551.87	-7.52	126.72		608.21	83.79	0.12
37	Dec-05		42.54	NG	1064	680.14	33.21	311.41		611.36	452.64	0.43
38	Jan-06		-38.87		445	661.46	17.65	-188.78		617.95	-172.95	0.39
39	Feb-06		-67.42	NG	403	597.60	-6.80	-151.11		674.70	-271.70	0.67
40	Mar-06		0.00		703	590.80	-6.80	112.20		703.00	0.00	0.00
41	Apr-06		-22.40		470	552.40	-16.28	-65.55		575.30	-105.30	0.22
42	May-06		-0.97		561	534.49	-16.77	27.37		566.43	-5.43	0.01
43	Jun-06		-14.83		483	496.24	-23.22	-1.77		554.63	-71.63	0.15
44	Jul-06		24.93		494	509.96	-12.13	-35.67		370.86	123.14	0.25
45	Aug-06		2.39		483	501.29	-11.09	-20.14		471.45	11.55	0.02
46	Sep-06		29.16		528	536.38	2.76	-33.03		374.05	153.95	0.29
47	Oct-06		34.96		588	600.82	21.26	-45.72		382.43	205.57	0.35
48	Nov-06		-22.35		612	581.04	8.95	52.86		748.80	-136.80	0.22
49	Dec-06		-21.32		743	542.47	-5.30	225.89		901.40	-158.40	0.21
50	Jan-07		35.96		544	595.85	12.30	-83.16		348.39	195.61	0.36
51	Feb-07		-97.85	NG	231	540.34	-8.04	-273.15		457.04	-226.04	0.98
52	Mar-07		64.99	NG	1841	891.25	99.64	758.22		644.50	1196.50	0.65
53	Apr-07		38.23		1498	1162.69	151.18	243.64		925.34	572.66	0.38

Appendix Table E20 Forecasted demand of Low M/T calculated by additive seasonal model with $\alpha = 0.54$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.4$

						Alpha	0.54				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			10			-23.50				
2	Feb-02	**50.00**			15			-18.50	-8.50			
3	Mar-02	**46.67**			22			-11.50	-8.50			
4	Apr-02	**59.09**			35			1.50	-8.50			
5	May-02	14.29			40			6.50				
6	Jun-02	-5.00			38			4.50				
7	Jul-02	-36.84			24			-9.50				
8	Aug-02	**58.33**			38			4.50	-1.50			
9	Sep-02	**-47.37**			20			-13.50	-1.50			
10	Oct-02	**45.00**			29			-4.50	-1.50			
11	Nov-02	37.93			40			6.50				
12	Dec-02	**127.50**			91	33.50	7.36	57.50	-2.50			
13	Jan-03		**90.02**	NG	174	126.02	32.91	-2.06		17.36	156.64	0.90
14	Feb-03		**63.90**	NG	389	294.07	73.45	15.53		**150.43**	238.57	0.61
15	Mar-03		-0.01		356	367.51	73.45	-11.50		**359.02**	-3.02	0.01
16	Apr-03		**-67.60**	NG	264	343.94	44.34	-22.93		**432.46**	-168.46	0.64
17	May-03		**-99.38**	NG	198	281.30	12.25	-20.44		394.78	-196.78	0.99
18	Jun-03		**-45.39**	OK	205	242.96	-2.93	-8.24	-9.78	298.04	-93.04	0.45
19	Jul-03		4.34		241	245.72	-1.22	-8.07		230.53	10.47	0.04
20	Aug-03		-6.87		233	235.80	-3.83	2.31		**243.00**	-10.00	0.04
21	Sep-03		4.18		228	237.15	-2.28	-12.20		**230.47**	-2.47	0.01
22	Oct-03		10.01		256	248.81	1.90	-0.99		**233.38**	22.62	0.09
23	Nov-03		23.45		336	293.55	14.75	17.29		257.21	78.79	0.23
24	Dec-03		9.46		404	329.07	20.98	62.73		**305.80**	98.20	0.24
25	Jan-04		2.25		356	354.40	22.29	-0.96		348.00	8.00	0.02
26	Feb-04		-2.95		381	370.59	20.46	13.99		392.22	-11.22	0.03
27	Mar-04		6.74		407	405.98	24.94	-7.75		379.55	27.45	0.07
28	Apr-04		-19.64		341	394.50	14.01	-32.10		407.98	-66.98	0.20
29	May-04		9.54		429	430.76	20.69	-14.84		388.07	40.93	0.10
30	Jun-04		-16.33		381	417.63	10.54	-16.75		**441.66**	-60.66	0.16
31	Jul-04		-18.34		355	392.77	-0.08	-16.98		420.10	-65.10	0.18
32	Aug-04		19.39		490	444.34	15.42	15.31		395.01	94.99	0.19

Appendix Table E20 (Continued)

						Alpha	0.54				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-166.41	NG	168	307.77	-30.18	-50.47		447.56	-279.56	1.66
34	Oct-04		25.85		373	330.00	-14.46	12.21		276.60	96.40	0.26
35	Nov-04		29.63		473	391.75	8.41	36.48		332.83	140.17	0.30
36	Dec-04		30.08		662	508.41	40.88	89.99		462.88	199.12	0.30
37	Jan-05		-49.82	NG	366	450.16	11.14	-25.92		548.33	-182.33	0.50
38	Feb-05		-10.28		431	437.22	3.92	7.93		475.30	-44.30	0.10
39	Mar-05		28.36		605	534.44	31.91	15.75		433.39	171.61	0.28
40	Apr-05		6.27		570	585.78	37.74	-27.21		534.24	35.76	0.06
41	May-05		-9.67		555	594.33	28.98	-22.19		608.69	-53.69	0.10
42	Jun-05		-1.60		597	618.12	27.42	-18.06		606.56	-9.56	0.02
43	Jul-05		-31.77		477	563.14	2.70	-37.73		628.56	-151.56	0.32
44	Aug-05		-36.74		425	480.95	-22.77	-6.06		581.16	-156.16	0.37
45	Sep-05		-9.01		374	439.85	-28.27	-55.08		407.71	-33.71	0.09
46	Oct-05		-32.85		319	354.61	-45.36	-2.14		423.79	-104.79	0.33
47	Nov-05		30.85		500	393.13	-20.20	57.59		345.73	154.27	0.31
48	Dec-05		36.32		727	516.50	22.88	126.14		462.92	264.08	0.36
49	Jan-06		-96.73	NG	261	402.13	-18.30	-60.48		513.46	-252.46	0.97
50	Feb-06		-41.94	NG	276	320.89	-37.18	-7.92		391.75	-115.75	0.42
51	Mar-06		35.88		467	374.80	-9.85	38.68		299.46	167.54	0.36
52	Apr-06		-31.93		256	320.51	-23.19	-38.40		337.74	-81.74	0.32
53	May-06		8.59		301	311.38	-18.97	-18.64		275.14	25.86	0.09
54	Jun-06		-23.58		222	263.95	-27.51	-25.23		274.35	-52.35	0.24
55	Jul-06		43.38	NG	351	319.24	-2.67	-16.88		198.72	152.28	0.43
56	Aug-06		-15.00		270	294.55	-9.28	-11.61		310.50	-40.50	0.15
57	Sep-06		21.44		293	319.42	0.97	-46.48		230.19	62.81	0.21
58	Oct-06		12.33		363	344.72	8.27	3.99		318.25	44.75	0.12
59	Nov-06		-21.12		339	314.07	-3.41	47.80		410.58	-71.58	0.21
60	Dec-06		-4.50		418	300.44	-6.47	123.57		436.80	-18.80	0.04
61	Jan-07		-44.13	NG	162	255.10	-18.13	-70.27		233.48	-71.48	0.44
62	Feb-07		-110.14	NG	109	171.70	-37.71	-24.35		229.05	-120.05	1.10
63	Mar-07		43.76	NG	307	207.02	-15.80	57.07		172.67	134.33	0.44
64	Apr-07		44.83	OK	277	258.73	4.45	-21.40	46.08	152.82	124.18	0.45

Appendix Table E21 Forecasted demand of Top A/T calculated by additive seasonal model with $\alpha = 0.59$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.5$

						Alpha	0.59				MAPE	0.32
			Diff (%)			Beta	0.30					
						Gamma	0.30					
Month t		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			188			-104.58				
2	Feb-02	4.26			196			-96.58				
3	Mar-02	20.92			237			-55.58				
4	Apr-02	6.75			253			-39.58				
5	May-02	7.11			271			-21.58				
6	Jun-02	-20.30			216			-76.58				
7	Jul-02	18.98			257			-35.58				
8	Aug-02	3.50			266			-26.58				
9	Sep-02	-35.71			171			-121.58				
10	Oct-02	-33.92			113			-179.58				
11	Nov-02	**-79.65**			23			-269.58	-150.58			
12	Dec-02	**5639.13**			1320	292.58	102.91	1027.42	-150.58			
13	Jan-03		**83.94**	NG	1811	1298.99	373.96	80.40		290.91	1520.09	0.84
14	Feb-03		-14.98		1371	1550.88	337.34	-121.57		1576.36	-205.36	0.15
15	Mar-03		-24.42		1473	1674.46	273.21	-99.35		1832.64	-359.64	0.24
16	Apr-03		**-54.13**	NG	1238	1549.39	153.73	-121.13		1908.09	-670.09	0.54
17	May-03		-46.48		1148	1386.00	58.59	-86.51		1681.54	-533.54	0.46
18	Jun-03		-8.83		1257	1378.61	38.80	-90.09		1368.01	-111.01	0.09
19	Jul-03		4.70		1450	1457.93	50.95	-27.29		1381.83	68.17	0.05
20	Aug-03		-12.21		1321	1413.01	22.19	-46.21		1482.30	-161.30	0.12
21	Sep-03		-10.30		1191	1362.32	0.33	-136.50		1313.62	-122.62	0.10
22	Oct-03		-4.70		1130	1331.11	-9.13	-186.04		1183.07	-53.07	0.05
23	Nov-03		12.81		1207	1413.87	18.43	-250.77		**1171.40**	35.60	0.03
24	Dec-03		**-71.53**	OK	1434	822.65	-164.46	902.60	-64.72	**1281.72**	152.28	0.11
25	Jan-04		31.29		1075	858.14	-104.48	121.33		738.58	336.42	0.31
26	Feb-04		44.06		1130	1049.61	-15.69	-60.98		632.09	497.91	0.44
27	Mar-04		11.67		1058	1107.28	6.32	-84.33		934.57	123.43	0.12
28	Apr-04		-2.63		967	1098.46	1.77	-124.23		992.47	-25.47	0.03
29	May-04		2.24		1037	1114.07	5.93	-83.68		1013.72	23.28	0.02
30	Jun-04		11.22		1160	1197.32	29.12	-74.26		1029.90	130.10	0.11
31	Jul-04		-22.99		975	1093.21	-10.85	-54.56		1199.16	-224.16	0.23
32	Aug-04		16.57		1242	1204.71	25.86	-21.16		1036.15	205.85	0.17

Appendix Table E21 (Continued)

						Alpha	0.59				MAPE	0.32
			Diff (%)			Beta	0.30					
						Gamma	0.30					
Month t		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		2.58		1123	1247.77	31.02	-132.98		1094.07	28.93	0.03
34	Oct-04		-18.26		924	1178.49	0.93	-206.58		1092.75	-168.75	0.18
35	Nov-04		7.96		1009	1227.18	15.26	-240.99		928.65	80.35	0.08
36	Dec-04		-72.29	OK	1245	707.48	-145.23	793.07	-58.65	1177.71	67.29	0.05
37	Jan-05		2.76		703	573.79	-141.77	123.70		683.59	19.41	0.03
38	Feb-05		53.21	OK	793	682.82	-66.53	-9.64	46.34	371.04	421.96	0.53
39	Mar-05		45.16		970	876.65	11.58	-31.02		531.97	438.03	0.45
40	Apr-05		0.00		764	888.23	11.58	-124.23		764.00	0.00	0.00
41	May-05		-2.27		798	889.03	8.35	-85.88		816.13	-18.13	0.02
42	Jun-05		4.29		860	919.30	14.92	-69.77		823.11	36.89	0.04
43	Jul-05		-35.12		651	798.32	-25.85	-82.39		879.66	-228.66	0.35
44	Aug-05		-4.64		718	752.67	-31.79	-25.22		751.30	-33.30	0.05
45	Sep-05		-5.17		559	703.71	-36.94	-136.50		587.90	-28.90	0.05
46	Oct-05		21.87		589	743.33	-13.97	-190.90		460.19	128.81	0.22
47	Nov-05		53.04	OK	1040	1057.23	84.39	-173.86	275.55	488.36	551.64	0.53
48	Dec-05		-27.70		1515	892.17	9.55	742.00		1082.97	432.03	0.29
49	Jan-06		-345.83	NG	230	428.95	-132.28	26.90		1025.42	-795.42	3.46
50	Feb-06		48.19		554	455.35	-84.67	22.85		343.01	210.99	0.38
51	Mar-06		42.24		588	518.28	-40.39	-0.80		339.65	248.35	0.42
52	Apr-06		46.98		667	664.13	15.48	-86.10		353.67	313.33	0.47
53	May-06		7.23		640	707.11	23.73	-80.25		593.72	46.28	0.07
54	Jun-06		-17.21		564	673.15	6.42	-81.58		661.07	-97.07	0.17
55	Jul-06		-8.97		548	650.34	-2.35	-88.37		597.18	-49.18	0.09
56	Aug-06		-13.03		551	605.33	-15.15	-33.95		622.78	-71.78	0.13
57	Sep-06		-3.11		440	582.05	-17.59	-138.17		453.68	-13.68	0.03
58	Oct-06		19.66		465	618.81	-1.28	-179.77		373.57	91.43	0.20
59	Nov-06		14.18		517	661.12	11.79	-164.94		893.08	-376.08	0.73
60	Dec-06		-113.41	OK	663	226.00	-122.28	650.50	-71.62	1414.91	-751.91	1.13
61	Jan-07		54.96	NG	290	198.45	-93.86	46.30		130.62	159.38	0.55
62	Feb-07		-8.00		118	98.98	-95.54	21.70		127.44	-9.44	0.08
63	Mar-07		99.73	NG	963	574.25	75.70	116.07		2.63	960.37	1.00
64	Apr-07		47.84		1081	957.32	167.91	-23.16		563.85	517.15	0.48

Appendix Table E22 Forecasted demand of Med A/T calculated by additive seasonal model with $\alpha = 0.33$, $\beta = 0.30$, $\gamma = 0.54$ and $c = 0.5$

						Alpha	0.33				MAPE	0.25
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month t		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			265			-277.08				
2	Feb-02	47.17			390			-152.08				
3	Mar-02	11.03			433			-109.08				
4	Apr-02	29.56			561			18.92				
5	May-02	24.60			699			156.92				
6	Jun-02	2.00			713			170.92				
7	Jul-02	5.33			751			208.92				
8	Aug-02	7.06			804			261.92				
9	Sep-02	-10.82			717			174.92				
10	Oct-02	-27.20			522			-20.08				
11	Nov-02	**-91.00**			47			-495.08	-27.67			
12	Dec-02	**1182.98**			603	542.08	30.73	60.92	-27.67			
13	Jan-03		**76.71**	NG	1270	889.95	125.87	74.98		295.73	974.27	0.77
14	Feb-03		27.23		1187	1121.04	157.44	-35.27		863.73	323.27	0.27
15	Mar-03		0.05		1170	1278.67	157.50	-108.86		1169.39	0.61	0.00
16	Apr-03		**-60.08**	NG	909	1258.41	104.17	-178.42		1455.09	-546.09	0.60
17	May-03		**-87.36**	NG	811	1131.96	34.98	-99.11		1519.50	-708.50	0.87
18	Jun-03		-18.71		1127	1098.30	14.39	94.72		1337.86	-210.86	0.19
19	Jul-03		-12.48		1175	1064.97	0.07	155.94		1321.61	-146.61	0.12
20	Aug-03		-14.69		1157	1009.72	-16.52	200.50		1326.96	-169.96	0.15
21	Sep-03		-1.75		1148	986.65	-18.49	167.65		1168.11	-20.11	0.02
22	Oct-03		27.85		1314	1087.27	17.25	112.15		948.08	365.92	0.28
23	Nov-03		49.80		1214	1301.31	76.28	-276.62		**1076.84**	137.16	0.11
24	Dec-03		17.52		1744	1477.03	106.11	171.31		**1349.92**	394.08	0.23
25	Jan-04		-32.86		1248	1449.65	66.06	-73.22		1658.13	-410.13	0.33
26	Feb-04		-10.73		1337	1469.02	52.06	-87.10		1480.45	-143.45	0.11
27	Mar-04		-15.76		1220	1458.51	33.29	-178.32		1412.21	-192.21	0.16
28	Apr-04		-11.02		1183	1449.36	20.55	-225.53		1313.38	-130.38	0.11
29	May-04		4.41		1434	1490.48	26.73	-76.27		1370.81	63.19	0.04
30	Jun-04		-8.11		1491	1477.84	14.92	51.02		1611.93	-120.93	0.08
31	Jul-04		-16.11		1420	1418.32	-7.42	73.29		1648.70	-228.70	0.16
32	Aug-04		8.44		1760	1459.27	7.10	254.20		1611.40	148.60	0.08

Appendix Table E22 (Continued)

						Alpha	0.33				MAPE	0.25
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month t		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-6.31		1537	1434.79	-2.38	132.59		1634.02	-97.02	0.06
34	Oct-04		-5.14		1469	1407.82	-9.76	84.84		1544.55	-75.55	0.05
35	Nov-04		27.88		1555	1539.19	32.58	-119.95		1121.44	433.56	0.28
36	Dec-04		18.32		2134	1699.02	70.76	312.57		1743.08	390.92	0.18
37	Jan-05		-28.82		1317	1646.23	33.69	-210.38		1696.55	-379.55	0.29
38	Feb-05		-10.92		1436	1628.87	18.38	-143.77		1592.82	-156.82	0.11
39	Mar-05		16.40		1757	1741.02	46.51	-74.22		1468.93	288.07	0.16
40	Apr-05		0.00		1562	1787.53	46.51	-225.53		1562.00	0.00	0.00
41	May-05		-16.80		1505	1751.76	21.83	-167.61		1757.77	-252.77	0.17
42	Jun-05		-9.45		1667	1722.28	6.43	-5.93		1824.61	-157.61	0.09
43	Jul-05		-36.31		1322	1572.47	-40.44	-100.16		1802.01	-480.01	0.36
44	Aug-05		-29.81		1376	1398.50	-80.50	105.96		1786.23	-410.23	0.30
45	Sep-05		-36.46		1063	1191.83	-118.35	-7.47		1450.59	-387.59	0.36
46	Oct-05		-20.66		960	1008.93	-137.72	13.18		1158.33	-198.33	0.21
47	Nov-05		54.96	OK	1668	1169.62	-48.19	211.32	324.76	751.26	916.74	0.55
48	Dec-05		38.46		2330	1413.08	39.30	636.35		1434.00	896.00	0.38
49	Jan-06		-56.23	NG	795	1306.88	-4.35	-371.91		1242.01	-447.01	0.56
50	Feb-06		-55.12	NG	747	1168.50	-44.56	-292.56		1158.76	-411.76	0.55
51	Mar-06		18.56		1289	1201.83	-21.19	12.24		1049.72	239.28	0.19
52	Apr-06		11.73		1082	1221.94	-8.80	-179.68		955.11	126.89	0.12
53	May-06		19.01		1291	1293.05	15.17	-78.91		1045.53	245.47	0.19
54	Jun-06		-25.34		1039	1222.51	-10.54	-101.07		1302.28	-263.28	0.25
55	Jul-06		7.81		1206	1242.63	-1.34	-66.13		1111.81	94.19	0.08
56	Aug-06		-26.03		1069	1150.72	-28.51	5.41		1347.25	-278.25	0.26
57	Sep-06		14.05		1297	1181.53	-10.72	58.39		1114.74	182.26	0.14
58	Oct-06		4.52		1240	1189.05	-5.25	33.41		1183.99	56.01	0.05
59	Nov-06		-5.29		1325	1160.98	-12.09	185.98		1508.57	-183.57	0.14
60	Dec-06		1.15		1806	1155.64	-10.07	643.86		1785.23	20.77	0.01
61	Jan-07		12.48		884	1181.49	0.71	-332.04		773.67	110.33	0.12
62	Feb-07		-124.66	NG	396	1021.51	-47.50	-470.94		889.63	-493.63	1.25
63	Mar-07		17.74		1199	1043.27	-26.72	89.12		986.26	212.74	0.18
64	Apr-07		42.68		1460	1219.38	34.13	45.50		836.87	623.13	0.43

Appendix Table E23 Forecasted demand of Med M/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.62$ and $c = 0.5$

						Alpha	0.30				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.62					
Month t		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			244			-108.50				
2	Feb-02	17.21			286			-66.50				
3	Mar-02	-3.15			277			-75.50				
4	Apr-02	32.85			368			15.50				
5	May-02	10.05			405			52.50				
6	Jun-02	7.90			437			84.50				
7	Jul-02	12.13			490			137.50				
8	Aug-02	6.53			522			169.50				
9	Sep-02	-14.94			444			91.50				
10	Oct-02	-7.66			410			57.50				
11	Nov-02	**-83.90**			66			-286.50	52.34			
12	Dec-02	**325.76**			281	352.50	3.36	-71.50	52.34			
13	Jan-03		**62.23**	NG	655	478.15	40.05	68.21		247.36	407.64	0.62
14	Feb-03		**52.95**	NG	960	670.69	85.80	153.85		451.71	508.29	0.53
15	Mar-03		29.36		964	841.39	111.27	47.19		680.99	283.01	0.29
16	Apr-03		-21.17		799	901.91	96.04	-57.83		968.16	-169.16	0.21
17	May-03		**-61.36**	NG	651	878.12	60.09	-120.67		1050.46	-399.46	0.61
18	Jun-03		-41.85		721	847.70	32.94	-46.29		1022.71	-301.71	0.42
19	Jul-03		-37.03		743	798.10	8.18	18.23		1018.14	-275.14	0.37
20	Aug-03		-28.56		759	741.24	-11.33	75.53		975.77	-216.77	0.29
21	Sep-03		-6.26		773	715.38	-15.69	70.52		821.41	-48.41	0.06
22	Oct-03		20.96		958	759.94	2.38	144.55		757.19	200.81	0.21
23	Nov-03		32.79		708	831.97	23.28	-185.85		**814.66**	-106.66	0.15
24	Dec-03		-12.29		698	829.53	15.56	-108.67		**907.59**	-209.59	0.30
25	Jan-04		**-79.08**	NG	510	724.10	-20.74	-106.62		913.30	-403.30	0.79
26	Feb-04		**-51.99**	OK	564	615.40	-47.12	26.74	-55.99	857.21	-293.21	0.52
27	Mar-04		-23.34		499	533.34	-57.61	-3.30		615.46	-116.46	0.23
28	Apr-04		8.15		455	486.86	-54.27	-41.75		417.90	37.10	0.08
29	May-04		40.81		527	497.12	-34.91	-27.43		311.93	215.07	0.41
30	Jun-04		21.67		531	496.73	-24.55	3.60		415.91	115.09	0.22
31	Jul-04		8.51		536	485.86	-20.45	37.99		490.41	45.59	0.09
32	Aug-04		14.81		635	493.63	-11.98	116.30		540.94	94.06	0.15

Appendix Table E23 (Continued)

						Alpha	0.30				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.62					
Month t		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		**-124.46**	NG	246	389.80	-39.54	-62.21		552.16	-306.16	1.24
34	Oct-04		3.73		514	356.02	-37.81	152.87		494.81	19.19	0.04
35	Nov-04		**76.62**	OK	566	448.30	1.22	2.14	2.36	132.36	433.64	0.77
36	Dec-04		**51.24**	NG	699	556.96	33.45	46.59		340.84	358.16	0.51
37	Jan-05		-24.69		388	561.68	24.83	-148.15		483.79	-95.79	0.25
38	Feb-05		-33.90		458	539.93	10.86	-40.56		**530.52**	-72.52	0.16
39	Mar-05		14.72		642	579.14	19.36	37.67		547.49	94.51	0.15
40	Apr-05		-6.86		521	587.78	16.15	-57.25		556.76	-35.76	0.07
41	May-05		6.26		615	615.48	19.61	-10.74		576.49	38.51	0.06
42	Jun-05		-14.87		556	610.28	12.17	-32.25		638.69	-82.69	0.15
43	Jul-05		-45.79		453	560.22	-6.50	-51.94		660.44	-207.44	0.46
44	Aug-05		**-61.06**	OK	416	477.51	-29.36	6.18	-63.13	670.02	-254.02	0.61
45	Sep-05		-7.80		358	439.77	-31.88	-74.32		385.94	-27.94	0.08
46	Oct-05		-46.41		383	354.56	-47.88	75.81		560.76	-177.76	0.46
47	Nov-05		**50.75**	OK	627	402.14	-19.24	140.07	143.46	**309.05**	317.95	0.51
48	Dec-05		46.91		809	496.75	14.92	211.11		429.49	379.51	0.47
49	Jan-06		-14.68		317	497.71	10.73	-168.31		363.52	-46.52	0.15
50	Feb-06		-14.12		410	491.08	5.52	-65.65		467.88	-57.88	0.14
51	Mar-06		17.93		651	531.62	16.03	88.27		534.27	116.73	0.18
52	Apr-06		-26.07		389	517.23	6.90	-101.20		490.39	-101.39	0.26
53	May-06		-24.31		413	494.01	-2.13	-54.26		513.39	-100.39	0.24
54	Jun-06		-29.47		355	460.49	-11.55	-77.60		459.63	-104.63	0.29
55	Jul-06		0.00		397	448.94	-11.55	-51.94		397.00	0.00	0.00
56	Aug-06		-26.73		350	409.31	-19.97	-34.38		**374.26**	-24.26	0.07
57	Sep-06		-1.29		311	388.14	-20.33	-76.06		315.02	-4.02	0.01
58	Oct-06		-4.38		425	362.22	-22.01	67.74		443.61	-18.61	0.04
59	Nov-06		-31.94		364	305.33	-32.47	89.66		**483.67**	-119.67	0.33
60	Dec-06		-5.90		457	264.76	-34.90	199.42		483.96	-26.96	0.06
61	Jan-07		**70.41**	OK	208	273.80	-21.72	-104.83	144.90	61.55	146.45	0.70
62	Feb-07		**-60.71**	NG	116	230.95	-28.06	-96.18		186.43	-70.43	0.61
63	Mar-07		1.63		296	204.34	-27.62	90.37		291.17	4.83	0.02
64	Apr-07		**79.70**	OK	372	265.66	-0.94	27.32	39.91	75.51	296.49	0.80

Appendix Table E24 Forecasted demand of Low A/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.77$ and $c = 0.5$

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month t		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Dec-02	0.00			155			-93.00				
2	Jan-03	**50.97**			234			-14.00	-1.00			
3	Feb-03	44.87			339			91.00				
4	Mar-03	3.83			352			104.00				
5	Apr-03	-33.81			233			-15.00				
6	May-03	-14.59			199			-49.00				
7	Jun-03	-1.01			197			-51.00				
8	Jul-03	8.63			214			-34.00				
9	Aug-03	13.55			243			-5.00				
10	Sep-03	-9.05			221			-27.00				
11	Oct-03	20.36			266			18.00				
12	Nov-03	21.43			323	248.00	15.27	75.00				
13	Dec-03		**56.67**	OK	393	330.09	35.32	27.26	59.01	170.27	222.73	0.57
14	Jan-04		23.11		457	397.09	44.82	43.01		**364.41**	92.59	0.20
15	Feb-04		-6.16		502	432.64	42.04	74.31		532.91	-30.91	0.06
16	Mar-04		-5.60		548	465.47	39.28	87.44		578.68	-30.68	0.06
17	Apr-04		8.97		538	519.23	43.62	11.05		489.75	48.25	0.09
18	May-04		10.32		573	580.59	48.95	-17.06		513.85	59.15	0.10
19	Jun-04		8.31		631	645.28	53.67	-22.67		578.54	52.46	0.08
20	Jul-04		-19.17		558	666.86	44.04	-91.74		664.94	-106.94	0.19
21	Aug-04		-1.71		694	707.33	42.97	-11.43		705.90	-11.90	0.02
22	Sep-04		-24.71		580	707.31	30.07	-104.37		723.30	-143.30	0.25
23	Oct-04		-43.61		526	668.57	9.43	-105.85		755.38	-229.38	0.44
24	Nov-04		1.57		765	681.60	10.51	81.48		753.00	12.00	0.02
25	Dec-04		9.29		793	714.20	17.14	67.01		**751.11**	41.89	0.05
26	Jan-05		-49.49		518	654.43	-5.93	-95.40		774.35	-256.35	0.49
27	Feb-05		-25.27		577	604.75	-19.06	-4.41		722.81	-145.81	0.25
28	Mar-05		6.38		719	599.46	-14.93	112.20		673.13	45.87	0.06
29	Apr-05		-6.54		559	573.55	-18.22	-8.70		595.58	-36.58	0.07
30	May-05		14.01		626	581.65	-10.33	30.31		538.27	87.73	0.14
31	Jun-05		16.75		659	604.43	-0.39	36.91		548.65	110.35	0.17
32	Jul-05		-3.91		493	598.25	-2.13	-102.16		512.29	-19.29	0.04

Appendix Table E24 (Continued)

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month t		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Aug-05		-4.97		557	587.81	-4.62	-26.38		584.69	-27.69	0.05
34	Sep-05		-4.77		457	576.64	-6.59	-116.15		478.81	-21.81	0.05
35	Oct-05		-25.46		370	541.79	-15.06	-156.71		464.21	-94.21	0.25
36	Nov-05		12.11		692	551.87	-7.52	126.72		608.21	83.79	0.12
37	Dec-05		42.54		1064	680.14	33.21	311.41		611.36	452.64	0.43
38	Jan-06		-38.87		445	661.46	17.65	-188.78		617.95	-172.95	0.39
39	Feb-06		**-67.42**	NG	403	597.60	-6.80	-151.11		674.70	-271.70	0.67
40	Mar-06		0.00		703	590.80	-6.80	112.20		703.00	0.00	0.00
41	Apr-06		-22.40		470	552.40	-16.28	-65.55		575.30	-105.30	0.22
42	May-06		-0.97		561	534.49	-16.77	27.37		566.43	-5.43	0.01
43	Jun-06		-14.83		483	496.24	-23.22	-1.77		554.63	-71.63	0.15
44	Jul-06		24.93		494	509.96	-12.13	-35.67		370.86	123.14	0.25
45	Aug-06		2.39		483	501.29	-11.09	-20.14		471.45	11.55	0.02
46	Sep-06		29.16		528	536.38	2.76	-33.03		374.05	153.95	0.29
47	Oct-06		34.96		588	600.82	21.26	-45.72		382.43	205.57	0.35
48	Nov-06		-22.35		612	581.04	8.95	52.86		748.80	-136.80	0.22
49	Dec-06		-21.32		743	542.47	-5.30	225.89		901.40	-158.40	0.21
50	Jan-07		35.96		544	595.85	12.30	-83.16		348.39	195.61	0.36
51	Feb-07		**-97.85**	NG	231	540.34	-8.04	-273.15		457.04	-226.04	0.98
52	Mar-07		**64.99**	NG	1841	891.25	99.64	758.22		644.50	1196.50	0.65
53	Apr-07		38.23		1498	1162.69	151.18	243.64		925.34	572.66	0.38

Appendix Table E25 Forecasted demand of Low M/T calculated by additive seasonal model with $\alpha = 0.54$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.5$

						Alpha	0.54				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month t		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	Abs(E_t/Y_t)
1	Jan-02	0.00			10			-23.50				
2	Feb-02	**50.00**			15			-18.50	-17.50			
3	Mar-02	46.67			22			-11.50				
4	Apr-02	**59.09**			35			1.50	-2.50			
5	May-02	14.29			40			6.50				
6	Jun-02	-5.00			38			4.50				
7	Jul-02	-36.84			24			-9.50				
8	Aug-02	**58.33**			38			4.50	-11.50			
9	Sep-02	-47.37			20			-13.50				
10	Oct-02	45.00			29			-4.50				
11	Nov-02	37.93			40			6.50				
12	Dec-02	**127.50**			91	33.50	7.36	57.50	-2.50			
13	Jan-03		**90.02**	NG	174	126.02	32.91	-2.06		17.36	156.64	0.90
14	Feb-03		**63.90**	NG	389	294.07	73.45	15.53		**141.43**	247.57	0.64
15	Mar-03		-0.01		356	367.51	73.45	-11.50		356.02	-0.02	0.00
16	Apr-03		**-67.60**	NG	264	343.94	44.34	-22.93		**438.46**	-174.46	0.66
17	May-03		**-99.38**	NG	198	281.30	12.25	-20.44		394.78	-196.78	0.99
18	Jun-03		-45.39		205	242.96	-2.93	-8.24		298.04	-93.04	0.45
19	Jul-03		4.34		241	245.72	-1.22	-8.07		230.53	10.47	0.04
20	Aug-03		-6.87		233	235.80	-3.83	2.31		**233.00**	0.00	0.00
21	Sep-03		4.18		228	237.15	-2.28	-12.20		218.47	9.53	0.04
22	Oct-03		10.01		256	248.81	1.90	-0.99		230.38	25.62	0.10
23	Nov-03		23.45		336	293.55	14.75	17.29		257.21	78.79	0.23
24	Dec-03		9.46		404	329.07	20.98	62.73		**305.80**	98.20	0.24
25	Jan-04		2.25		356	354.40	22.29	-0.96		348.00	8.00	0.02
26	Feb-04		-2.95		381	370.59	20.46	13.99		392.22	-11.22	0.03
27	Mar-04		6.74		407	405.98	24.94	-7.75		379.55	27.45	0.07
28	Apr-04		-19.64		341	394.50	14.01	-32.10		407.98	-66.98	0.20
29	May-04		9.54		429	430.76	20.69	-14.84		388.07	40.93	0.10
30	Jun-04		-16.33		381	417.63	10.54	-16.75		443.21	-62.21	0.16
31	Jul-04		-18.34		355	392.77	-0.08	-16.98		420.10	-65.10	0.18
32	Aug-04		19.39		490	444.34	15.42	15.31		395.01	94.99	0.19

Appendix Table E25 (Continued)

						Alpha	0.54				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month t		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		**-166.41**	NG	168	307.77	-30.18	-50.47		447.56	-279.56	1.66
34	Oct-04		25.85		373	330.00	-14.46	12.21		276.60	96.40	0.26
35	Nov-04		29.63		473	391.75	8.41	36.48		332.83	140.17	0.30
36	Dec-04		30.08		662	508.41	40.88	89.99		462.88	199.12	0.30
37	Jan-05		-49.82		366	450.16	11.14	-25.92		548.33	-182.33	0.50
38	Feb-05		-10.28		431	437.22	3.92	7.93		475.30	-44.30	0.10
39	Mar-05		28.36		605	534.44	31.91	15.75		433.39	171.61	0.28
40	Apr-05		6.27		570	585.78	37.74	-27.21		534.24	35.76	0.06
41	May-05		-9.67		555	594.33	28.98	-22.19		608.69	-53.69	0.10
42	Jun-05		-1.60		597	618.12	27.42	-18.06		606.56	-9.56	0.02
43	Jul-05		-31.77		477	563.14	2.70	-37.73		628.56	-151.56	0.32
44	Aug-05		-36.74		425	480.95	-22.77	-6.06		581.16	-156.16	0.37
45	Sep-05		-9.01		374	439.85	-28.27	-55.08		407.71	-33.71	0.09
46	Oct-05		-32.85		319	354.61	-45.36	-2.14		423.79	-104.79	0.33
47	Nov-05		30.85		500	393.13	-20.20	57.59		345.73	154.27	0.31
48	Dec-05		36.32		727	516.50	22.88	126.14		462.92	264.08	0.36
49	Jan-06		**-96.73**	NG	261	402.13	-18.30	-60.48		513.46	-252.46	0.97
50	Feb-06		-41.94		276	320.89	-37.18	-7.92		391.75	-115.75	0.42
51	Mar-06		35.88		467	374.80	-9.85	38.68		299.46	167.54	0.36
52	Apr-06		-31.93		256	320.51	-23.19	-38.40		337.74	-81.74	0.32
53	May-06		8.59		301	311.38	-18.97	-18.64		275.14	25.86	0.09
54	Jun-06		-23.58		222	263.95	-27.51	-25.23		274.35	-52.35	0.24
55	Jul-06		43.38		351	319.24	-2.67	-16.88		198.72	152.28	0.43
56	Aug-06		-15.00		270	294.55	-9.28	-11.61		310.50	-40.50	0.15
57	Sep-06		21.44		293	319.42	0.97	-46.48		230.19	62.81	0.21
58	Oct-06		12.33		363	344.72	8.27	3.99		318.25	44.75	0.12
59	Nov-06		-21.12		339	314.07	-3.41	47.80		410.58	-71.58	0.21
60	Dec-06		-4.50		418	300.44	-6.47	123.57		436.80	-18.80	0.04
61	Jan-07		-44.13		162	255.10	-18.13	-70.27		233.48	-71.48	0.44
62	Feb-07		**-110.14**	NG	109	171.70	-37.71	-24.35		229.05	-120.05	1.10
63	Mar-07		43.76		307	207.02	-15.80	57.07		172.67	134.33	0.44
64	Apr-07		44.83		277	258.73	4.45	-21.40		152.82	124.18	0.45

Appendix Table E26 Forecasted demand of Top A/T calculated by additive seasonal model with $\alpha = 0.59$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.6$

						Alpha	0.59				MAPE	0.31
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			188			-104.58				
2	Feb-02	4.26			196			-96.58				
3	Mar-02	20.92			237			-55.58				
4	Apr-02	6.75			253			-39.58				
5	May-02	7.11			271			-21.58				
6	Jun-02	-20.30			216			-76.58				
7	Jul-02	18.98			257			-35.58				
8	Aug-02	3.50			266			-26.58				
9	Sep-02	-35.71			171			-121.58				
10	Oct-02	-33.92			113			-179.58				
11	Nov-02	-79.65			23			-269.58	-150.58			
12	Dec-02	5639.13			1320	292.58	102.91	1027.42	-150.58			
13	Jan-03		83.94	NG	1811	1298.99	373.96	80.40		290.91	1520.09	0.84
14	Feb-03		-14.98		1371	1550.88	337.34	-121.57		1576.36	-205.36	0.15
15	Mar-03		-24.42		1473	1674.46	273.21	-99.35		1832.64	-359.64	0.24
16	Apr-03		-54.13		1238	1549.39	153.73	-121.13		1908.09	-670.09	0.54
17	May-03		-46.48		1148	1386.00	58.59	-86.51		1681.54	-533.54	0.46
18	Jun-03		-8.83		1257	1378.61	38.80	-90.09		1368.01	-111.01	0.09
19	Jul-03		4.70		1450	1457.93	50.95	-27.29		1381.83	68.17	0.05
20	Aug-03		-12.21		1321	1413.01	22.19	-46.21		1482.30	-161.30	0.12
21	Sep-03		-10.30		1191	1362.32	0.33	-136.50		1313.62	-122.62	0.10
22	Oct-03		-4.70		1130	1331.11	-9.13	-186.04		1183.07	-53.07	0.05
23	Nov-03		12.81		1207	1413.87	18.43	-250.77		1171.40	35.60	0.03
24	Dec-03		-71.53	OK	1434	822.65	-164.46	902.60	-64.72	1281.72	152.28	0.11
25	Jan-04		31.29		1075	858.14	-104.48	121.33		738.58	336.42	0.31
26	Feb-04		44.06		1130	1049.61	-15.69	-60.98		632.09	497.91	0.44
27	Mar-04		11.67		1058	1107.28	6.32	-84.33		934.57	123.43	0.12
28	Apr-04		-2.63		967	1098.46	1.77	-124.23		992.47	-25.47	0.03
29	May-04		2.24		1037	1114.07	5.93	-83.68		1013.72	23.28	0.02
30	Jun-04		11.22		1160	1197.32	29.12	-74.26		1029.90	130.10	0.11
31	Jul-04		-22.99		975	1093.21	-10.85	-54.56		1199.16	-224.16	0.23
32	Aug-04		16.57		1242	1204.71	25.86	-21.16		1036.15	205.85	0.17

Appendix Table E26 (Continued)

						Alpha	0.59				MAPE	0.31
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		2.58		1123	1247.77	31.02	-132.98		1094.07	28.93	0.03
34	Oct-04		-18.26		924	1178.49	0.93	-206.58		1092.75	-168.75	0.18
35	Nov-04		7.96		1009	1227.18	15.26	-240.99		928.65	80.35	0.08
36	Dec-04		-72.29	OK	1245	707.48	-145.23	793.07	-58.65	1177.71	67.29	0.05
37	Jan-05		2.76		703	573.79	-141.77	123.70		683.59	19.41	0.03
38	Feb-05		53.21		793	682.82	-66.53	-9.64		371.04	421.96	0.53
39	Mar-05		45.16		970	876.65	11.58	-31.02		531.97	438.03	0.45
40	Apr-05		0.00		764	888.23	11.58	-124.23		764.00	0.00	0.00
41	May-05		-2.27		798	889.03	8.35	-85.88		816.13	-18.13	0.02
42	Jun-05		4.29		860	919.30	14.92	-69.77		823.11	36.89	0.04
43	Jul-05		-35.12		651	798.32	-25.85	-82.39		879.66	-228.66	0.35
44	Aug-05		-4.64		718	752.67	-31.79	-25.22		751.30	-33.30	0.05
45	Sep-05		-5.17		559	703.71	-36.94	-136.50		587.90	-28.90	0.05
46	Oct-05		21.87		589	743.33	-13.97	-190.90		460.19	128.81	0.22
47	Nov-05		53.04		1040	1057.23	84.39	-173.86		488.36	551.64	0.53
48	Dec-05		-27.70		1515	892.17	9.55	742.00		1082.97	432.03	0.29
49	Jan-06		-345.83	NG	230	428.95	-132.28	26.90		1025.42	-795.42	3.46
50	Feb-06		48.19		554	455.35	-84.67	22.85		287.04	266.96	0.48
51	Mar-06		42.24		588	518.28	-40.39	-0.80		339.65	248.35	0.42
52	Apr-06		46.98		667	664.13	15.48	-86.10		353.67	313.33	0.47
53	May-06		7.23		640	707.11	23.73	-80.25		593.72	46.28	0.07
54	Jun-06		-17.21		564	673.15	6.42	-81.58		661.07	-97.07	0.17
55	Jul-06		-8.97		548	650.34	-2.35	-88.37		597.18	-49.18	0.09
56	Aug-06		-13.03		551	605.33	-15.15	-33.95		622.78	-71.78	0.13
57	Sep-06		-3.11		440	582.05	-17.59	-138.17		453.68	-13.68	0.03
58	Oct-06		19.66		465	618.81	-1.28	-179.77		373.57	91.43	0.20
59	Nov-06		14.18		517	661.12	11.79	-164.94		443.67	73.33	0.14
60	Dec-06		-113.41	OK	663	226.00	-122.28	650.50	-59.32	1414.91	-751.91	1.13
61	Jan-07		54.96		290	198.45	-93.86	46.30		130.62	159.38	0.55
62	Feb-07		-8.00		118	98.98	-95.54	21.70		127.44	-9.44	0.08
63	Mar-07		99.73	NG	963	574.25	75.70	116.07		2.63	960.37	1.00
64	Apr-07		47.84		1081	957.32	167.91	-23.16		563.85	517.15	0.48

Appendix Table E27 Forecasted demand of Med A/T calculated by additive seasonal model with $\alpha = 0.33$, $\beta = 0.30$, $\gamma = 0.54$ and $c = 0.6$

						Alpha	0.33				MAPE	0.24
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			265			-277.08				
2	Feb-02	47.17			390			-152.08				
3	Mar-02	11.03			433			-109.08				
4	Apr-02	29.56			561			18.92				
5	May-02	24.60			699			156.92				
6	Jun-02	2.00			713			170.92				
7	Jul-02	5.33			751			208.92				
8	Aug-02	7.06			804			261.92				
9	Sep-02	-10.82			717			174.92				
10	Oct-02	-27.20			522			-20.08				
11	Nov-02	**-91.00**			47			-495.08	-27.67			
12	Dec-02	**1182.98**			603	542.08	30.73	60.92	-27.67			
13	Jan-03		**76.71**	NG	1270	889.95	125.87	74.98		295.73	974.27	0.77
14	Feb-03		27.23		1187	1121.04	157.44	-35.27		863.73	323.27	0.27
15	Mar-03		0.05		1170	1278.67	157.50	-108.86		1169.39	0.61	0.00
16	Apr-03		**-60.08**	NG	909	1258.41	104.17	-178.42		1455.09	-546.09	0.60
17	May-03		**-87.36**	NG	811	1131.96	34.98	-99.11		1519.50	-708.50	0.87
18	Jun-03		-18.71		1127	1098.30	14.39	94.72		1337.86	-210.86	0.19
19	Jul-03		-12.48		1175	1064.97	0.07	155.94		1321.61	-146.61	0.12
20	Aug-03		-14.69		1157	1009.72	-16.52	200.50		1326.96	-169.96	0.15
21	Sep-03		-1.75		1148	986.65	-18.49	167.65		1168.11	-20.11	0.02
22	Oct-03		27.85		1314	1087.27	17.25	112.15		948.08	365.92	0.28
23	Nov-03		49.80		1214	1301.31	76.28	-276.62		**1076.84**	137.16	0.11
24	Dec-03		17.52		1744	1477.03	106.11	171.31		**1349.92**	394.08	0.23
25	Jan-04		-32.86		1248	1449.65	66.06	-73.22		1658.13	-410.13	0.33
26	Feb-04		-10.73		1337	1469.02	52.06	-87.10		1480.45	-143.45	0.11
27	Mar-04		-15.76		1220	1458.51	33.29	-178.32		1412.21	-192.21	0.16
28	Apr-04		-11.02		1183	1449.36	20.55	-225.53		1313.38	-130.38	0.11
29	May-04		4.41		1434	1490.48	26.73	-76.27		1370.81	63.19	0.04
30	Jun-04		-8.11		1491	1477.84	14.92	51.02		1611.93	-120.93	0.08
31	Jul-04		-16.11		1420	1418.32	-7.42	73.29		1648.70	-228.70	0.16
32	Aug-04		8.44		1760	1459.27	7.10	254.20		1611.40	148.60	0.08

Appendix Table E27 (Continued)

						Alpha	0.33				MAPE	0.24
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-6.31		1537	1434.79	-2.38	132.59		1634.02	-97.02	0.06
34	Oct-04		-5.14		1469	1407.82	-9.76	84.84		1544.55	-75.55	0.05
35	Nov-04		27.88		1555	1539.19	32.58	-119.95		1121.44	433.56	0.28
36	Dec-04		18.32		2134	1699.02	70.76	312.57		1743.08	390.92	0.18
37	Jan-05		-28.82		1317	1646.23	33.69	-210.38		1696.55	-379.55	0.29
38	Feb-05		-10.92		1436	1628.87	18.38	-143.77		1592.82	-156.82	0.11
39	Mar-05		16.40		1757	1741.02	46.51	-74.22		1468.93	288.07	0.16
40	Apr-05		0.00		1562	1787.53	46.51	-225.53		1562.00	0.00	0.00
41	May-05		-16.80		1505	1751.76	21.83	-167.61		1757.77	-252.77	0.17
42	Jun-05		-9.45		1667	1722.28	6.43	-5.93		1824.61	-157.61	0.09
43	Jul-05		-36.31		1322	1572.47	-40.44	-100.16		1802.01	-480.01	0.36
44	Aug-05		-29.81		1376	1398.50	-80.50	105.96		1786.23	-410.23	0.30
45	Sep-05		-36.46		1063	1191.83	-118.35	-7.47		1450.59	-387.59	0.36
46	Oct-05		-20.66		960	1008.93	-137.72	13.18		1158.33	-198.33	0.21
47	Nov-05		54.96		1668	1169.62	-48.19	211.32		751.26	916.74	0.55
48	Dec-05		38.46		2330	1413.08	39.30	636.35		1434.00	896.00	0.38
49	Jan-06		-56.23		795	1306.88	-4.35	-371.91		1242.01	-447.01	0.56
50	Feb-06		-55.12		747	1168.50	-44.56	-292.56		1158.76	-411.76	0.55
51	Mar-06		18.56		1289	1201.83	-21.19	12.24		1049.72	239.28	0.19
52	Apr-06		11.73		1082	1221.94	-8.80	-179.68		955.11	126.89	0.12
53	May-06		19.01		1291	1293.05	15.17	-78.91		1045.53	245.47	0.19
54	Jun-06		-25.34		1039	1222.51	-10.54	-101.07		1302.28	-263.28	0.25
55	Jul-06		7.81		1206	1242.63	-1.34	-66.13		1111.81	94.19	0.08
56	Aug-06		-26.03		1069	1150.72	-28.51	5.41		1347.25	-278.25	0.26
57	Sep-06		14.05		1297	1181.53	-10.72	58.39		1114.74	182.26	0.14
58	Oct-06		4.52		1240	1189.05	-5.25	33.41		1183.99	56.01	0.05
59	Nov-06		-5.29		1325	1160.98	-12.09	185.98		1395.13	-70.13	0.05
60	Dec-06		1.15		1806	1155.64	-10.07	643.86		1785.23	20.77	0.01
61	Jan-07		12.48		884	1181.49	0.71	-332.04		773.67	110.33	0.12
62	Feb-07		-124.66	NG	396	1021.51	-47.50	-470.94		889.63	-493.63	1.25
63	Mar-07		17.74		1199	1043.27	-26.72	89.12		986.26	212.74	0.18
64	Apr-07		42.68		1460	1219.38	34.13	45.50		836.87	623.13	0.43

Appendix Table E28 Forecasted demand of Med M/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.62$ and $c = 0.6$

						Alpha	0.30				MAPE	0.32
			Diff (%)			Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			244			-108.50				
2	Feb-02	17.21			286			-66.50				
3	Mar-02	-3.15			277			-75.50				
4	Apr-02	32.85			368			15.50				
5	May-02	10.05			405			52.50				
6	Jun-02	7.90			437			84.50				
7	Jul-02	12.13			490			137.50				
8	Aug-02	6.53			522			169.50				
9	Sep-02	-14.94			444			91.50				
10	Oct-02	-7.66			410			57.50				
11	Nov-02	**-83.90**			66			-286.50	105.67			
12	Dec-02	**325.76**			281	352.50	3.36	-71.50	105.67			
13	Jan-03		**62.23**	OK	655	478.15	40.05	68.21	105.67	247.36	407.64	0.62
14	Feb-03		52.95		960	670.69	85.80	153.85		451.71	508.29	0.53
15	Mar-03		29.36		964	841.39	111.27	47.19		680.99	283.01	0.29
16	Apr-03		-21.17		799	901.91	96.04	-57.83		968.16	-169.16	0.21
17	May-03		**-61.36**	NG	651	878.12	60.09	-120.67		1050.46	-399.46	0.61
18	Jun-03		-41.85		721	847.70	32.94	-46.29		1022.71	-301.71	0.42
19	Jul-03		-37.03		743	798.10	8.18	18.23		1018.14	-275.14	0.37
20	Aug-03		-28.56		759	741.24	-11.33	75.53		975.77	-216.77	0.29
21	Sep-03		-6.26		773	715.38	-15.69	70.52		821.41	-48.41	0.06
22	Oct-03		20.96		958	759.94	2.38	144.55		757.19	200.81	0.21
23	Nov-03		32.79		708	831.97	23.28	-185.85		**867.99**	-159.99	0.23
24	Dec-03		-12.29		698	829.53	15.56	-108.67		**960.93**	-262.93	0.38
25	Jan-04		**-79.08**	NG	510	724.10	-20.74	-106.62		**950.76**	-440.76	0.86
26	Feb-04		-51.99		564	615.40	-47.12	26.74		857.21	-293.21	0.52
27	Mar-04		-23.34		499	533.34	-57.61	-3.30		615.46	-116.46	0.23
28	Apr-04		8.15		455	486.86	-54.27	-41.75		417.90	37.10	0.08
29	May-04		40.81		527	497.12	-34.91	-27.43		311.93	215.07	0.41
30	Jun-04		21.67		531	496.73	-24.55	3.60		415.91	115.09	0.22
31	Jul-04		8.51		536	485.86	-20.45	37.99		490.41	45.59	0.09
32	Aug-04		14.81		635	493.63	-11.98	116.30		540.94	94.06	0.15

Appendix Table E28 (Continued)

						Alpha	0.30				MAPE	0.32
			Diff (%)			Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		**-124.46**	NG	246	389.80	-39.54	-62.21		552.16	-306.16	1.24
34	Oct-04		3.73		514	356.02	-37.81	152.87		494.81	19.19	0.04
35	Nov-04		**76.62**	OK	566	448.30	1.22	2.14	99.73	132.36	433.64	0.77
36	Dec-04		51.24		699	556.96	33.45	46.59		340.84	358.16	0.51
37	Jan-05		-24.69		388	561.68	24.83	-148.15		483.79	-95.79	0.25
38	Feb-05		-33.90		458	539.93	10.86	-40.56		613.25	-155.25	0.34
39	Mar-05		14.72		642	579.14	19.36	37.67		547.49	94.51	0.15
40	Apr-05		-6.86		521	587.78	16.15	-57.25		556.76	-35.76	0.07
41	May-05		6.26		615	615.48	19.61	-10.74		576.49	38.51	0.06
42	Jun-05		-14.87		556	610.28	12.17	-32.25		638.69	-82.69	0.15
43	Jul-05		-45.79		453	560.22	-6.50	-51.94		660.44	-207.44	0.46
44	Aug-05		**-61.06**	OK	416	477.51	-29.36	6.18	-63.13	670.02	-254.02	0.61
45	Sep-05		-7.80		358	439.77	-31.88	-74.32		385.94	-27.94	0.08
46	Oct-05		-46.41		383	354.56	-47.88	75.81		560.76	-177.76	0.46
47	Nov-05		50.75		627	402.14	-19.24	140.07		**406.42**	220.58	0.35
48	Dec-05		46.91		809	496.75	14.92	211.11		429.49	379.51	0.47
49	Jan-06		-14.68		317	497.71	10.73	-168.31		363.52	-46.52	0.15
50	Feb-06		-14.12		410	491.08	5.52	-65.65		467.88	-57.88	0.14
51	Mar-06		17.93		651	531.62	16.03	88.27		534.27	116.73	0.18
52	Apr-06		-26.07		389	517.23	6.90	-101.20		490.39	-101.39	0.26
53	May-06		-24.31		413	494.01	-2.13	-54.26		513.39	-100.39	0.24
54	Jun-06		-29.47		355	460.49	-11.55	-77.60		459.63	-104.63	0.29
55	Jul-06		0.00		397	448.94	-11.55	-51.94		397.00	0.00	0.00
56	Aug-06		-26.73		350	409.31	-19.97	-34.38		**374.26**	-24.26	0.07
57	Sep-06		-1.29		311	388.14	-20.33	-76.06		315.02	-4.02	0.01
58	Oct-06		-4.38		425	362.22	-22.01	67.74		443.61	-18.61	0.04
59	Nov-06		-31.94		364	305.33	-32.47	89.66		480.28	-116.28	0.32
60	Dec-06		-5.90		457	264.76	-34.90	199.42		483.96	-26.96	0.06
61	Jan-07		**70.41**	OK	208	273.80	-21.72	-104.83	144.90	61.55	146.45	0.70
62	Feb-07		**-60.71**	NG	116	230.95	-28.06	-96.18		186.43	-70.43	0.61
63	Mar-07		1.63		296	204.34	-27.62	90.37		291.17	4.83	0.02
64	Apr-07		**79.70**	OK	372	265.66	-0.94	27.32	76.48	75.51	296.49	0.80

Appendix Table E29 Forecasted demand of Low A/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.77$ and $c = 0.6$

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	Abs(E_t/Y_t)
1	Dec-02	0.00			155			-93.00				
2	Jan-03	50.97			234			-14.00				
3	Feb-03	44.87			339			91.00				
4	Mar-03	3.83			352			104.00				
5	Apr-03	-33.81			233			-15.00				
6	May-03	-14.59			199			-49.00				
7	Jun-03	-1.01			197			-51.00				
8	Jul-03	8.63			214			-34.00				
9	Aug-03	13.55			243			-5.00				
10	Sep-03	-9.05			221			-27.00				
11	Oct-03	20.36			266			18.00				
12	Nov-03	21.43			323	248.00	15.27	75.00				
13	Dec-03		56.67		393	330.09	35.32	27.26		170.27	222.73	0.57
14	Jan-04		23.11		457	397.09	44.82	43.01		351.41	105.59	0.23
15	Feb-04		-6.16		502	432.64	42.04	74.31		532.91	-30.91	0.06
16	Mar-04		-5.60		548	465.47	39.28	87.44		578.68	-30.68	0.06
17	Apr-04		8.97		538	519.23	43.62	11.05		489.75	48.25	0.09
18	May-04		10.32		573	580.59	48.95	-17.06		513.85	59.15	0.10
19	Jun-04		8.31		631	645.28	53.67	-22.67		578.54	52.46	0.08
20	Jul-04		-19.17		558	666.86	44.04	-91.74		664.94	-106.94	0.19
21	Aug-04		-1.71		694	707.33	42.97	-11.43		705.90	-11.90	0.02
22	Sep-04		-24.71		580	707.31	30.07	-104.37		723.30	-143.30	0.25
23	Oct-04		-43.61		526	668.57	9.43	-105.85		755.38	-229.38	0.44
24	Nov-04		1.57		765	681.60	10.51	81.48		753.00	12.00	0.02
25	Dec-04		9.29		793	714.20	17.14	67.01		719.36	73.64	0.09
26	Jan-05		-49.49		518	654.43	-5.93	-95.40		774.35	-256.35	0.49
27	Feb-05		-25.27		577	604.75	-19.06	-4.41		722.81	-145.81	0.25
28	Mar-05		6.38		719	599.46	-14.93	112.20		673.13	45.87	0.06
29	Apr-05		-6.54		559	573.55	-18.22	-8.70		595.58	-36.58	0.07
30	May-05		14.01		626	581.65	-10.33	30.31		538.27	87.73	0.14
31	Jun-05		16.75		659	604.43	-0.39	36.91		548.65	110.35	0.17
32	Jul-05		-3.91		493	598.25	-2.13	-102.16		512.29	-19.29	0.04

Appendix Table E29 (Continued)

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Aug-05		-4.97		557	587.81	-4.62	-26.38		584.69	-27.69	0.05
34	Sep-05		-4.77		457	576.64	-6.59	-116.15		478.81	-21.81	0.05
35	Oct-05		-25.46		370	541.79	-15.06	-156.71		464.21	-94.21	0.25
36	Nov-05		12.11		692	551.87	-7.52	126.72		608.21	83.79	0.12
37	Dec-05		42.54		1064	680.14	33.21	311.41		611.36	452.64	0.43
38	Jan-06		-38.87		445	661.46	17.65	-188.78		617.95	-172.95	0.39
39	Feb-06		**-67.42**	NG	403	597.60	-6.80	-151.11		674.70	-271.70	0.67
40	Mar-06		0.00		703	590.80	-6.80	112.20		703.00	0.00	0.00
41	Apr-06		-22.40		470	552.40	-16.28	-65.55		575.30	-105.30	0.22
42	May-06		-0.97		561	534.49	-16.77	27.37		566.43	-5.43	0.01
43	Jun-06		-14.83		483	496.24	-23.22	-1.77		554.63	-71.63	0.15
44	Jul-06		24.93		494	509.96	-12.13	-35.67		370.86	123.14	0.25
45	Aug-06		2.39		483	501.29	-11.09	-20.14		471.45	11.55	0.02
46	Sep-06		29.16		528	536.38	2.76	-33.03		374.05	153.95	0.29
47	Oct-06		34.96		588	600.82	21.26	-45.72		382.43	205.57	0.35
48	Nov-06		-22.35		612	581.04	8.95	52.86		748.80	-136.80	0.22
49	Dec-06		-21.32		743	542.47	-5.30	225.89		901.40	-158.40	0.21
50	Jan-07		35.96		544	595.85	12.30	-83.16		348.39	195.61	0.36
51	Feb-07		**-97.85**	NG	231	540.34	-8.04	-273.15		457.04	-226.04	0.98
52	Mar-07		**64.99**	NG	1841	891.25	99.64	758.22		644.50	1196.50	0.65
53	Apr-07		38.23		1498	1162.69	151.18	243.64		925.34	572.66	0.38

Appendix Table E30 Forecasted demand of Low M/T calculated by additive seasonal model with $\alpha = 0.54$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.6$

						Alpha	0.54				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			10			-23.50				
2	Feb-02	50.00			15			-18.50				
3	Mar-02	46.67			22			-11.50				
4	Apr-02	59.09			35			1.50				
5	May-02	14.29			40			6.50				
6	Jun-02	-5.00			38			4.50				
7	Jul-02	-36.84			24			-9.50				
8	Aug-02	58.33			38			4.50				
9	Sep-02	-47.37			20			-13.50				
10	Oct-02	45.00			29			-4.50				
11	Nov-02	37.93			40			6.50				
12	Dec-02	**127.50**			91	33.50	7.36	57.50	-2.50			
13	Jan-03		**90.02**	NG	174	126.02	32.91	-2.06		17.36	156.64	0.90
14	Feb-03		**63.90**	NG	389	294.07	73.45	15.53		140.43	248.57	0.64
15	Mar-03		-0.01		356	367.51	73.45	-11.50		356.02	-0.02	0.00
16	Apr-03		**-67.60**	NG	264	343.94	44.34	-22.93		442.46	-178.46	0.68
17	May-03		**-99.38**	NG	198	281.30	12.25	-20.44		394.78	-196.78	0.99
18	Jun-03		-45.39		205	242.96	-2.93	-8.24		298.04	-93.04	0.45
19	Jul-03		4.34		241	245.72	-1.22	-8.07		230.53	10.47	0.04
20	Aug-03		-6.87		233	235.80	-3.83	2.31		249.00	-16.00	0.07
21	Sep-03		4.18		228	237.15	-2.28	-12.20		218.47	9.53	0.04
22	Oct-03		10.01		256	248.81	1.90	-0.99		230.38	25.62	0.10
23	Nov-03		23.45		336	293.55	14.75	17.29		257.21	78.79	0.23
24	Dec-03		9.46		404	329.07	20.98	62.73		**305.80**	98.20	0.24
25	Jan-04		2.25		356	354.40	22.29	-0.96		348.00	8.00	0.02
26	Feb-04		-2.95		381	370.59	20.46	13.99		392.22	-11.22	0.03
27	Mar-04		6.74		407	405.98	24.94	-7.75		379.55	27.45	0.07
28	Apr-04		-19.64		341	394.50	14.01	-32.10		407.98	-66.98	0.20
29	May-04		9.54		429	430.76	20.69	-14.84		388.07	40.93	0.10
30	Jun-04		-16.33		381	417.63	10.54	-16.75		443.21	-62.21	0.16
31	Jul-04		-18.34		355	392.77	-0.08	-16.98		420.10	-65.10	0.18
32	Aug-04		19.39		490	444.34	15.42	15.31		395.01	94.99	0.19

Appendix Table E30 (Continued)

						Alpha	0.54				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-166.41	NG	168	307.77	-30.18	-50.47		447.56	-279.56	1.66
34	Oct-04		25.85		373	330.00	-14.46	12.21		276.60	96.40	0.26
35	Nov-04		29.63		473	391.75	8.41	36.48		332.83	140.17	0.30
36	Dec-04		30.08		662	508.41	40.88	89.99		462.88	199.12	0.30
37	Jan-05		-49.82		366	450.16	11.14	-25.92		548.33	-182.33	0.50
38	Feb-05		-10.28		431	437.22	3.92	7.93		475.30	-44.30	0.10
39	Mar-05		28.36		605	534.44	31.91	15.75		433.39	171.61	0.28
40	Apr-05		6.27		570	585.78	37.74	-27.21		534.24	35.76	0.06
41	May-05		-9.67		555	594.33	28.98	-22.19		608.69	-53.69	0.10
42	Jun-05		-1.60		597	618.12	27.42	-18.06		606.56	-9.56	0.02
43	Jul-05		-31.77		477	563.14	2.70	-37.73		628.56	-151.56	0.32
44	Aug-05		-36.74		425	480.95	-22.77	-6.06		581.16	-156.16	0.37
45	Sep-05		-9.01		374	439.85	-28.27	-55.08		407.71	-33.71	0.09
46	Oct-05		-32.85		319	354.61	-45.36	-2.14		423.79	-104.79	0.33
47	Nov-05		30.85		500	393.13	-20.20	57.59		345.73	154.27	0.31
48	Dec-05		36.32		727	516.50	22.88	126.14		462.92	264.08	0.36
49	Jan-06		-96.73	NG	261	402.13	-18.30	-60.48		513.46	-252.46	0.97
50	Feb-06		-41.94		276	320.89	-37.18	-7.92		391.75	-115.75	0.42
51	Mar-06		35.88		467	374.80	-9.85	38.68		299.46	167.54	0.36
52	Apr-06		-31.93		256	320.51	-23.19	-38.40		337.74	-81.74	0.32
53	May-06		8.59		301	311.38	-18.97	-18.64		275.14	25.86	0.09
54	Jun-06		-23.58		222	263.95	-27.51	-25.23		274.35	-52.35	0.24
55	Jul-06		43.38		351	319.24	-2.67	-16.88		198.72	152.28	0.43
56	Aug-06		-15.00		270	294.55	-9.28	-11.61		310.50	-40.50	0.15
57	Sep-06		21.44		293	319.42	0.97	-46.48		230.19	62.81	0.21
58	Oct-06		12.33		363	344.72	8.27	3.99		318.25	44.75	0.12
59	Nov-06		-21.12		339	314.07	-3.41	47.80		410.58	-71.58	0.21
60	Dec-06		-4.50		418	300.44	-6.47	123.57		436.80	-18.80	0.04
61	Jan-07		-44.13		162	255.10	-18.13	-70.27		233.48	-71.48	0.44
62	Feb-07		-110.14	NG	109	171.70	-37.71	-24.35		229.05	-120.05	1.10
63	Mar-07		43.76		307	207.02	-15.80	57.07		172.67	134.33	0.44
64	Apr-07		44.83		277	258.73	4.45	-21.40		152.82	124.18	0.45

Appendix Table E31 Forecasted demand of Top A/T calculated by additive seasonal model with $\alpha = 0.59$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.7$

						Alpha	0.59				MAPE	0.31
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			188			-104.58				
2	Feb-02	4.26			196			-96.58				
3	Mar-02	20.92			237			-55.58				
4	Apr-02	6.75			253			-39.58				
5	May-02	7.11			271			-21.58				
6	Jun-02	-20.30			216			-76.58				
7	Jul-02	18.98			257			-35.58				
8	Aug-02	3.50			266			-26.58				
9	Sep-02	-35.71			171			-121.58				
10	Oct-02	-33.92			113			-179.58				
11	Nov-02	-79.65			23			-269.58	-150.58			
12	Dec-02	5639.13			1320	292.58	102.91	1027.42	-150.58			
13	Jan-03		83.94	NG	1811	1298.99	373.96	80.40		290.91	1520.09	0.84
14	Feb-03		-14.98		1371	1550.88	337.34	-121.57		1576.36	-205.36	0.15
15	Mar-03		-24.42		1473	1674.46	273.21	-99.35		1832.64	-359.64	0.24
16	Apr-03		-54.13		1238	1549.39	153.73	-121.13		1908.09	-670.09	0.54
17	May-03		-46.48		1148	1386.00	58.59	-86.51		1681.54	-533.54	0.46
18	Jun-03		-8.83		1257	1378.61	38.80	-90.09		1368.01	-111.01	0.09
19	Jul-03		4.70		1450	1457.93	50.95	-27.29		1381.83	68.17	0.05
20	Aug-03		-12.21		1321	1413.01	22.19	-46.21		1482.30	-161.30	0.12
21	Sep-03		-10.30		1191	1362.32	0.33	-136.50		1313.62	-122.62	0.10
22	Oct-03		-4.70		1130	1331.11	-9.13	-186.04		1183.07	-53.07	0.05
23	Nov-03		12.81		1207	1413.87	18.43	-250.77		1171.40	35.60	0.03
24	Dec-03		-71.53	OK	1434	822.65	-164.46	902.60	-64.72	1281.72	152.28	0.11
25	Jan-04		31.29		1075	858.14	-104.48	121.33		738.58	336.42	0.31
26	Feb-04		44.06		1130	1049.61	-15.69	-60.98		632.09	497.91	0.44
27	Mar-04		11.67		1058	1107.28	6.32	-84.33		934.57	123.43	0.12
28	Apr-04		-2.63		967	1098.46	1.77	-124.23		992.47	-25.47	0.03
29	May-04		2.24		1037	1114.07	5.93	-83.68		1013.72	23.28	0.02
30	Jun-04		11.22		1160	1197.32	29.12	-74.26		1029.90	130.10	0.11
31	Jul-04		-22.99		975	1093.21	-10.85	-54.56		1199.16	-224.16	0.23
32	Aug-04		16.57		1242	1204.71	25.86	-21.16		1036.15	205.85	0.17

Appendix Table E31 (Continued)

						Alpha	0.59				MAPE	0.31
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		2.58		1123	1247.77	31.02	-132.98		1094.07	28.93	0.03
34	Oct-04		-18.26		924	1178.49	0.93	-206.58		1092.75	-168.75	0.18
35	Nov-04		7.96		1009	1227.18	15.26	-240.99		928.65	80.35	0.08
36	Dec-04		-72.29	OK	1245	707.48	-145.23	793.07	-58.65	1177.71	67.29	0.05
37	Jan-05		2.76		703	573.79	-141.77	123.70		683.59	19.41	0.03
38	Feb-05		53.21		793	682.82	-66.53	-9.64		371.04	421.96	0.53
39	Mar-05		45.16		970	876.65	11.58	-31.02		531.97	438.03	0.45
40	Apr-05		0.00		764	888.23	11.58	-124.23		764.00	0.00	0.00
41	May-05		-2.27		798	889.03	8.35	-85.88		816.13	-18.13	0.02
42	Jun-05		4.29		860	919.30	14.92	-69.77		823.11	36.89	0.04
43	Jul-05		-35.12		651	798.32	-25.85	-82.39		879.66	-228.66	0.35
44	Aug-05		-4.64		718	752.67	-31.79	-25.22		751.30	-33.30	0.05
45	Sep-05		-5.17		559	703.71	-36.94	-136.50		587.90	-28.90	0.05
46	Oct-05		21.87		589	743.33	-13.97	-190.90		460.19	128.81	0.22
47	Nov-05		53.04		1040	1057.23	84.39	-173.86		488.36	551.64	0.53
48	Dec-05		-27.70		1515	892.17	9.55	742.00		1082.97	432.03	0.29
49	Jan-06		-345.83	NG	230	428.95	-132.28	26.90		1025.42	-795.42	3.46
50	Feb-06		48.19		554	455.35	-84.67	22.85		287.04	266.96	0.48
51	Mar-06		42.24		588	518.28	-40.39	-0.80		339.65	248.35	0.42
52	Apr-06		46.98		667	664.13	15.48	-86.10		353.67	313.33	0.47
53	May-06		7.23		640	707.11	23.73	-80.25		593.72	46.28	0.07
54	Jun-06		-17.21		564	673.15	6.42	-81.58		661.07	-97.07	0.17
55	Jul-06		-8.97		548	650.34	-2.35	-88.37		597.18	-49.18	0.09
56	Aug-06		-13.03		551	605.33	-15.15	-33.95		622.78	-71.78	0.13
57	Sep-06		-3.11		440	582.05	-17.59	-138.17		453.68	-13.68	0.03
58	Oct-06		19.66		465	618.81	-1.28	-179.77		373.57	91.43	0.20
59	Nov-06		14.18		517	661.12	11.79	-164.94		443.67	73.33	0.14
60	Dec-06		-113.41	OK	663	226.00	-122.28	650.50	-59.32	1414.91	-751.91	1.13
61	Jan-07		54.96		290	198.45	-93.86	46.30		130.62	159.38	0.55
62	Feb-07		-8.00		118	98.98	-95.54	21.70		127.44	-9.44	0.08
63	Mar-07		99.73	NG	963	574.25	75.70	116.07		2.63	960.37	1.00
64	Apr-07		47.84		1081	957.32	167.91	-23.16		563.85	517.15	0.48

Appendix Table E32 Forecasted demand of Med A/T calculated by additive seasonal model with $\alpha = 0.33$, $\beta = 0.30$, $\gamma = 0.54$ and $c = 0.7$

						Alpha	0.33				MAPE	0.24
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			265			-277.08				
2	Feb-02	47.17			390			-152.08				
3	Mar-02	11.03			433			-109.08				
4	Apr-02	29.56			561			18.92				
5	May-02	24.60			699			156.92				
6	Jun-02	2.00			713			170.92				
7	Jul-02	5.33			751			208.92				
8	Aug-02	7.06			804			261.92				
9	Sep-02	-10.82			717			174.92				
10	Oct-02	-27.20			522			-20.08				
11	Nov-02	**-91.00**			47			-495.08	-27.67			
12	Dec-02	**1182.98**			603	542.08	30.73	60.92	-27.67			
13	Jan-03		**76.71**	NG	1270	889.95	125.87	74.98		295.73	974.27	0.77
14	Feb-03		27.23		1187	1121.04	157.44	-35.27		863.73	323.27	0.27
15	Mar-03		0.05		1170	1278.67	157.50	-108.86		1169.39	0.61	0.00
16	Apr-03		-60.08		909	1258.41	104.17	-178.42		1455.09	-546.09	0.60
17	May-03		**-87.36**	NG	811	1131.96	34.98	-99.11		1519.50	-708.50	0.87
18	Jun-03		-18.71		1127	1098.30	14.39	94.72		1337.86	-210.86	0.19
19	Jul-03		-12.48		1175	1064.97	0.07	155.94		1321.61	-146.61	0.12
20	Aug-03		-14.69		1157	1009.72	-16.52	200.50		1326.96	-169.96	0.15
21	Sep-03		-1.75		1148	986.65	-18.49	167.65		1168.11	-20.11	0.02
22	Oct-03		27.85		1314	1087.27	17.25	112.15		948.08	365.92	0.28
23	Nov-03		49.80		1214	1301.31	76.28	-276.62		**1076.84**	137.16	0.11
24	Dec-03		17.52		1744	1477.03	106.11	171.31		**1349.92**	394.08	0.23
25	Jan-04		-32.86		1248	1449.65	66.06	-73.22		1658.13	-410.13	0.33
26	Feb-04		-10.73		1337	1469.02	52.06	-87.10		1480.45	-143.45	0.11
27	Mar-04		-15.76		1220	1458.51	33.29	-178.32		1412.21	-192.21	0.16
28	Apr-04		-11.02		1183	1449.36	20.55	-225.53		1313.38	-130.38	0.11
29	May-04		4.41		1434	1490.48	26.73	-76.27		1370.81	63.19	0.04
30	Jun-04		-8.11		1491	1477.84	14.92	51.02		1611.93	-120.93	0.08
31	Jul-04		-16.11		1420	1418.32	-7.42	73.29		1648.70	-228.70	0.16
32	Aug-04		8.44		1760	1459.27	7.10	254.20		1611.40	148.60	0.08

Appendix Table E32 (Continued)

						Alpha	0.33				MAPE	0.24
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-6.31		1537	1434.79	-2.38	132.59		1634.02	-97.02	0.06
34	Oct-04		-5.14		1469	1407.82	-9.76	84.84		1544.55	-75.55	0.05
35	Nov-04		27.88		1555	1539.19	32.58	-119.95		1121.44	433.56	0.28
36	Dec-04		18.32		2134	1699.02	70.76	312.57		1743.08	390.92	0.18
37	Jan-05		-28.82		1317	1646.23	33.69	-210.38		1696.55	-379.55	0.29
38	Feb-05		-10.92		1436	1628.87	18.38	-143.77		1592.82	-156.82	0.11
39	Mar-05		16.40		1757	1741.02	46.51	-74.22		1468.93	288.07	0.16
40	Apr-05		0.00		1562	1787.53	46.51	-225.53		1562.00	0.00	0.00
41	May-05		-16.80		1505	1751.76	21.83	-167.61		1757.77	-252.77	0.17
42	Jun-05		-9.45		1667	1722.28	6.43	-5.93		1824.61	-157.61	0.09
43	Jul-05		-36.31		1322	1572.47	-40.44	-100.16		1802.01	-480.01	0.36
44	Aug-05		-29.81		1376	1398.50	-80.50	105.96		1786.23	-410.23	0.30
45	Sep-05		-36.46		1063	1191.83	-118.35	-7.47		1450.59	-387.59	0.36
46	Oct-05		-20.66		960	1008.93	-137.72	13.18		1158.33	-198.33	0.21
47	Nov-05		54.96		1668	1169.62	-48.19	211.32		751.26	916.74	0.55
48	Dec-05		38.46		2330	1413.08	39.30	636.35		1434.00	896.00	0.38
49	Jan-06		-56.23		795	1306.88	-4.35	-371.91		1242.01	-447.01	0.56
50	Feb-06		-55.12		747	1168.50	-44.56	-292.56		1158.76	-411.76	0.55
51	Mar-06		18.56		1289	1201.83	-21.19	12.24		1049.72	239.28	0.19
52	Apr-06		11.73		1082	1221.94	-8.80	-179.68		955.11	126.89	0.12
53	May-06		19.01		1291	1293.05	15.17	-78.91		1045.53	245.47	0.19
54	Jun-06		-25.34		1039	1222.51	-10.54	-101.07		1302.28	-263.28	0.25
55	Jul-06		7.81		1206	1242.63	-1.34	-66.13		1111.81	94.19	0.08
56	Aug-06		-26.03		1069	1150.72	-28.51	5.41		1347.25	-278.25	0.26
57	Sep-06		14.05		1297	1181.53	-10.72	58.39		1114.74	182.26	0.14
58	Oct-06		4.52		1240	1189.05	-5.25	33.41		1183.99	56.01	0.05
59	Nov-06		-5.29		1325	1160.98	-12.09	185.98		1395.13	-70.13	0.05
60	Dec-06		1.15		1806	1155.64	-10.07	643.86		1785.23	20.77	0.01
61	Jan-07		12.48		884	1181.49	0.71	-332.04		773.67	110.33	0.12
62	Feb-07		-124.66	NG	396	1021.51	-47.50	-470.94		889.63	-493.63	1.25
63	Mar-07		17.74		1199	1043.27	-26.72	89.12		986.26	212.74	0.18
64	Apr-07		42.68		1460	1219.38	34.13	45.50		836.87	623.13	0.43

Appendix Table E33 Forecasted demand of Med M/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.62$ and $c = 0.7$

						Alpha	0.30				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			244			-108.50				
2	Feb-02	17.21			286			-66.50				
3	Mar-02	-3.15			277			-75.50				
4	Apr-02	32.85			368			15.50				
5	May-02	10.05			405			52.50				
6	Jun-02	7.90			437			84.50				
7	Jul-02	12.13			490			137.50				
8	Aug-02	6.53			522			169.50				
9	Sep-02	-14.94			444			91.50				
10	Oct-02	-7.66			410			57.50				
11	Nov-02	**-83.90**			66			-286.50	62.86			
12	Dec-02	**325.76**			281	352.50	3.36	-71.50	62.86			
13	Jan-03		62.23		655	478.15	40.05	68.21		247.36	407.64	0.62
14	Feb-03		52.95		960	670.69	85.80	153.85		451.71	508.29	0.53
15	Mar-03		29.36		964	841.39	111.27	47.19		680.99	283.01	0.29
16	Apr-03		-21.17		799	901.91	96.04	-57.83		968.16	-169.16	0.21
17	May-03		-61.36		651	878.12	60.09	-120.67		1050.46	-399.46	0.61
18	Jun-03		-41.85		721	847.70	32.94	-46.29		1022.71	-301.71	0.42
19	Jul-03		-37.03		743	798.10	8.18	18.23		1018.14	-275.14	0.37
20	Aug-03		-28.56		759	741.24	-11.33	75.53		975.77	-216.77	0.29
21	Sep-03		-6.26		773	715.38	-15.69	70.52		821.41	-48.41	0.06
22	Oct-03		20.96		958	759.94	2.38	144.55		757.19	200.81	0.21
23	Nov-03		32.79		708	831.97	23.28	-185.85		**825.18**	-117.18	0.17
24	Dec-03		-12.29		698	829.53	15.56	-108.67		**918.11**	-220.11	0.32
25	Jan-04		**-79.08**	NG	510	724.10	-20.74	-106.62		913.30	-403.30	0.79
26	Feb-04		-51.99		564	615.40	-47.12	26.74		857.21	-293.21	0.52
27	Mar-04		-23.34		499	533.34	-57.61	-3.30		615.46	-116.46	0.23
28	Apr-04		8.15		455	486.86	-54.27	-41.75		417.90	37.10	0.08
29	May-04		40.81		527	497.12	-34.91	-27.43		311.93	215.07	0.41
30	Jun-04		21.67		531	496.73	-24.55	3.60		415.91	115.09	0.22
31	Jul-04		8.51		536	485.86	-20.45	37.99		490.41	45.59	0.09
32	Aug-04		14.81		635	493.63	-11.98	116.30		540.94	94.06	0.15

Appendix Table E33 (Continued)

						Alpha	0.30				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		**-124.46**	NG	246	389.80	-39.54	-62.21		552.16	-306.16	1.24
34	Oct-04		3.73		514	356.02	-37.81	152.87		494.81	19.19	0.04
35	Nov-04		**76.62**	OK	566	448.30	1.22	2.14	99.73	132.36	433.64	0.77
36	Dec-04		51.24		699	556.96	33.45	46.59		340.84	358.16	0.51
37	Jan-05		-24.69		388	561.68	24.83	-148.15		483.79	-95.79	0.25
38	Feb-05		-33.90		458	539.93	10.86	-40.56		613.25	-155.25	0.34
39	Mar-05		14.72		642	579.14	19.36	37.67		547.49	94.51	0.15
40	Apr-05		-6.86		521	587.78	16.15	-57.25		556.76	-35.76	0.07
41	May-05		6.26		615	615.48	19.61	-10.74		576.49	38.51	0.06
42	Jun-05		-14.87		556	610.28	12.17	-32.25		638.69	-82.69	0.15
43	Jul-05		-45.79		453	560.22	-6.50	-51.94		660.44	-207.44	0.46
44	Aug-05		-61.06		416	477.51	-29.36	6.18		670.02	-254.02	0.61
45	Sep-05		-7.80		358	439.77	-31.88	-74.32		385.94	-27.94	0.08
46	Oct-05		-46.41		383	354.56	-47.88	75.81		560.76	-177.76	0.46
47	Nov-05		50.75		627	402.14	-19.24	140.07		**406.42**	220.58	0.35
48	Dec-05		46.91		809	496.75	14.92	211.11		429.49	379.51	0.47
49	Jan-06		-14.68		317	497.71	10.73	-168.31		363.52	-46.52	0.15
50	Feb-06		-14.12		410	491.08	5.52	-65.65		467.88	-57.88	0.14
51	Mar-06		17.93		651	531.62	16.03	88.27		534.27	116.73	0.18
52	Apr-06		-26.07		389	517.23	6.90	-101.20		490.39	-101.39	0.26
53	May-06		-24.31		413	494.01	-2.13	-54.26		513.39	-100.39	0.24
54	Jun-06		-29.47		355	460.49	-11.55	-77.60		459.63	-104.63	0.29
55	Jul-06		0.00		397	448.94	-11.55	-51.94		397.00	0.00	0.00
56	Aug-06		-26.73		350	409.31	-19.97	-34.38		443.57	-93.57	0.27
57	Sep-06		-1.29		311	388.14	-20.33	-76.06		315.02	-4.02	0.01
58	Oct-06		-4.38		425	362.22	-22.01	67.74		443.61	-18.61	0.04
59	Nov-06		-31.94		364	305.33	-32.47	89.66		480.28	-116.28	0.32
60	Dec-06		-5.90		457	264.76	-34.90	199.42		483.96	-26.96	0.06
61	Jan-07		**70.41**	OK	208	273.80	-21.72	-104.83	51.62	61.55	146.45	0.70
62	Feb-07		-60.71		116	230.95	-28.06	-96.18		186.43	-70.43	0.61
63	Mar-07		1.63		296	204.34	-27.62	90.37		291.17	4.83	0.02
64	Apr-07		**79.70**	OK	372	265.66	-0.94	27.32	76.48	75.51	296.49	0.80

Appendix Table E34 Forecasted demand of Low A/T calculated by additive seasonal model with α = 0.30, β = 0.30, γ = 0.77 and c = 0.7

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Dec-02	0.00			155			-93.00				
2	Jan-03	50.97			234			-14.00				
3	Feb-03	44.87			339			91.00				
4	Mar-03	3.83			352			104.00				
5	Apr-03	-33.81			233			-15.00				
6	May-03	-14.59			199			-49.00				
7	Jun-03	-1.01			197			-51.00				
8	Jul-03	8.63			214			-34.00				
9	Aug-03	13.55			243			-5.00				
10	Sep-03	-9.05			221			-27.00				
11	Oct-03	20.36			266			18.00				
12	Nov-03	21.43			323	248.00	15.27	75.00				
13	Dec-03		56.67		393	330.09	35.32	27.26		170.27	222.73	0.57
14	Jan-04		23.11		457	397.09	44.82	43.01		351.41	105.59	0.23
15	Feb-04		-6.16		502	432.64	42.04	74.31		532.91	-30.91	0.06
16	Mar-04		-5.60		548	465.47	39.28	87.44		578.68	-30.68	0.06
17	Apr-04		8.97		538	519.23	43.62	11.05		489.75	48.25	0.09
18	May-04		10.32		573	580.59	48.95	-17.06		513.85	59.15	0.10
19	Jun-04		8.31		631	645.28	53.67	-22.67		578.54	52.46	0.08
20	Jul-04		-19.17		558	666.86	44.04	-91.74		664.94	-106.94	0.19
21	Aug-04		-1.71		694	707.33	42.97	-11.43		705.90	-11.90	0.02
22	Sep-04		-24.71		580	707.31	30.07	-104.37		723.30	-143.30	0.25
23	Oct-04		-43.61		526	668.57	9.43	-105.85		755.38	-229.38	0.44
24	Nov-04		1.57		765	681.60	10.51	81.48		753.00	12.00	0.02
25	Dec-04		9.29		793	714.20	17.14	67.01		719.36	73.64	0.09
26	Jan-05		-49.49		518	654.43	-5.93	-95.40		774.35	-256.35	0.49
27	Feb-05		-25.27		577	604.75	-19.06	-4.41		722.81	-145.81	0.25
28	Mar-05		6.38		719	599.46	-14.93	112.20		673.13	45.87	0.06
29	Apr-05		-6.54		559	573.55	-18.22	-8.70		595.58	-36.58	0.07
30	May-05		14.01		626	581.65	-10.33	30.31		538.27	87.73	0.14
31	Jun-05		16.75		659	604.43	-0.39	36.91		548.65	110.35	0.17
32	Jul-05		-3.91		493	598.25	-2.13	-102.16		512.29	-19.29	0.04

Appendix Table E34 (Continued)

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Aug-05		-4.97		557	587.81	-4.62	-26.38		584.69	-27.69	0.05
34	Sep-05		-4.77		457	576.64	-6.59	-116.15		478.81	-21.81	0.05
35	Oct-05		-25.46		370	541.79	-15.06	-156.71		464.21	-94.21	0.25
36	Nov-05		12.11		692	551.87	-7.52	126.72		608.21	83.79	0.12
37	Dec-05		42.54		1064	680.14	33.21	311.41		611.36	452.64	0.43
38	Jan-06		-38.87		445	661.46	17.65	-188.78		617.95	-172.95	0.39
39	Feb-06		-67.42		403	597.60	-6.80	-151.11		674.70	-271.70	0.67
40	Mar-06		0.00		703	590.80	-6.80	112.20		703.00	0.00	0.00
41	Apr-06		-22.40		470	552.40	-16.28	-65.55		575.30	-105.30	0.22
42	May-06		-0.97		561	534.49	-16.77	27.37		566.43	-5.43	0.01
43	Jun-06		-14.83		483	496.24	-23.22	-1.77		554.63	-71.63	0.15
44	Jul-06		24.93		494	509.96	-12.13	-35.67		370.86	123.14	0.25
45	Aug-06		2.39		483	501.29	-11.09	-20.14		471.45	11.55	0.02
46	Sep-06		29.16		528	536.38	2.76	-33.03		374.05	153.95	0.29
47	Oct-06		34.96		588	600.82	21.26	-45.72		382.43	205.57	0.35
48	Nov-06		-22.35		612	581.04	8.95	52.86		748.80	-136.80	0.22
49	Dec-06		-21.32		743	542.47	-5.30	225.89		901.40	-158.40	0.21
50	Jan-07		35.96		544	595.85	12.30	-83.16		348.39	195.61	0.36
51	Feb-07		-97.85	NG	231	540.34	-8.04	-273.15		457.04	-226.04	0.98
52	Mar-07		64.99	NG	1841	891.25	99.64	758.22		644.50	1196.50	0.65
53	Apr-07		38.23		1498	1162.69	151.18	243.64		925.34	572.66	0.38

Appendix Table E35 Forecasted demand of Low M/T calculated by additive seasonal model with $\alpha = 0.54$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.7$

						Alpha	0.54				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Yt	Lt	bt	St	New St	Ft	Et	$Abs(E_t/Y_t)$
1	Jan-02	0.00			10			-23.50				
2	Feb-02	50.00			15			-18.50				
3	Mar-02	46.67			22			-11.50				
4	Apr-02	59.09			35			1.50				
5	May-02	14.29			40			6.50				
6	Jun-02	-5.00			38			4.50				
7	Jul-02	-36.84			24			-9.50				
8	Aug-02	58.33			38			4.50				
9	Sep-02	-47.37			20			-13.50				
10	Oct-02	45.00			29			-4.50				
11	Nov-02	37.93			40			6.50				
12	Dec-02	**127.50**			91	33.50	7.36	57.50	11.01			
13	Jan-03		**90.02**	OK	174	126.02	32.91	-2.06	11.01	17.36	156.64	0.90
14	Feb-03		63.90		389	294.07	73.45	15.53		140.43	248.57	0.64
15	Mar-03		-0.01		356	367.51	73.45	-11.50		356.02	-0.02	0.00
16	Apr-03		-67.60		264	343.94	44.34	-22.93		442.46	-178.46	0.68
17	May-03		**-99.38**	NG	198	281.30	12.25	-20.44		394.78	-196.78	0.99
18	Jun-03		-45.39		205	242.96	-2.93	-8.24		298.04	-93.04	0.45
19	Jul-03		4.34		241	245.72	-1.22	-8.07		230.53	10.47	0.04
20	Aug-03		-6.87		233	235.80	-3.83	2.31		249.00	-16.00	0.07
21	Sep-03		4.18		228	237.15	-2.28	-12.20		218.47	9.53	0.04
22	Oct-03		10.01		256	248.81	1.90	-0.99		230.38	25.62	0.10
23	Nov-03		23.45		336	293.55	14.75	17.29		257.21	78.79	0.23
24	Dec-03		9.46		404	329.07	20.98	62.73		**319.31**	84.69	0.21
25	Jan-04		2.25		356	354.40	22.29	-0.96		**361.07**	-5.07	0.01
26	Feb-04		-2.95		381	370.59	20.46	13.99		392.22	-11.22	0.03
27	Mar-04		6.74		407	405.98	24.94	-7.75		379.55	27.45	0.07
28	Apr-04		-19.64		341	394.50	14.01	-32.10		407.98	-66.98	0.20
29	May-04		9.54		429	430.76	20.69	-14.84		388.07	40.93	0.10
30	Jun-04		-16.33		381	417.63	10.54	-16.75		443.21	-62.21	0.16
31	Jul-04		-18.34		355	392.77	-0.08	-16.98		420.10	-65.10	0.18
32	Aug-04		19.39		490	444.34	15.42	15.31		395.01	94.99	0.19

Appendix Table E35 (Continued)

						Alpha	0.54				MAPE	0.32
			Diff (%)			Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Yt	Lt	bt	St	New St	Ft	Et	Abs(E_t/Y_t)
33	Sep-04		-166.41	NG	168	307.77	-30.18	-50.47		447.56	-279.56	1.66
34	Oct-04		25.85		373	330.00	-14.46	12.21		276.60	96.40	0.26
35	Nov-04		29.63		473	391.75	8.41	36.48		332.83	140.17	0.30
36	Dec-04		30.08		662	508.41	40.88	89.99		462.88	199.12	0.30
37	Jan-05		-49.82		366	450.16	11.14	-25.92		548.33	-182.33	0.50
38	Feb-05		-10.28		431	437.22	3.92	7.93		475.30	-44.30	0.10
39	Mar-05		28.36		605	534.44	31.91	15.75		433.39	171.61	0.28
40	Apr-05		6.27		570	585.78	37.74	-27.21		534.24	35.76	0.06
41	May-05		-9.67		555	594.33	28.98	-22.19		608.69	-53.69	0.10
42	Jun-05		-1.60		597	618.12	27.42	-18.06		606.56	-9.56	0.02
43	Jul-05		-31.77		477	563.14	2.70	-37.73		628.56	-151.56	0.32
44	Aug-05		-36.74		425	480.95	-22.77	-6.06		581.16	-156.16	0.37
45	Sep-05		-9.01		374	439.85	-28.27	-55.08		407.71	-33.71	0.09
46	Oct-05		-32.85		319	354.61	-45.36	-2.14		423.79	-104.79	0.33
47	Nov-05		30.85		500	393.13	-20.20	57.59		345.73	154.27	0.31
48	Dec-05		36.32		727	516.50	22.88	126.14		462.92	264.08	0.36
49	Jan-06		-96.73	NG	261	402.13	-18.30	-60.48		513.46	-252.46	0.97
50	Feb-06		-41.94		276	320.89	-37.18	-7.92		391.75	-115.75	0.42
51	Mar-06		35.88		467	374.80	-9.85	38.68		299.46	167.54	0.36
52	Apr-06		-31.93		256	320.51	-23.19	-38.40		337.74	-81.74	0.32
53	May-06		8.59		301	311.38	-18.97	-18.64		275.14	25.86	0.09
54	Jun-06		-23.58		222	263.95	-27.51	-25.23		274.35	-52.35	0.24
55	Jul-06		43.38		351	319.24	-2.67	-16.88		198.72	152.28	0.43
56	Aug-06		-15.00		270	294.55	-9.28	-11.61		310.50	-40.50	0.15
57	Sep-06		21.44		293	319.42	0.97	-46.48		230.19	62.81	0.21
58	Oct-06		12.33		363	344.72	8.27	3.99		318.25	44.75	0.12
59	Nov-06		-21.12		339	314.07	-3.41	47.80		410.58	-71.58	0.21
60	Dec-06		-4.50		418	300.44	-6.47	123.57		436.80	-18.80	0.04
61	Jan-07		-44.13		162	255.10	-18.13	-70.27		233.48	-71.48	0.44
62	Feb-07		-110.14	NG	109	171.70	-37.71	-24.35		229.05	-120.05	1.10
63	Mar-07		43.76		307	207.02	-15.80	57.07		172.67	134.33	0.44
64	Apr-07		44.83		277	258.73	4.45	-21.40		152.82	124.18	0.45

Appendix Table E36 Forecasted demand of Top A/T calculated by additive seasonal model with $\alpha = 0.59$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.8$

						Alpha	0.59				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	Abs(E_t/Y_t)
1	Jan-02	0.00			188			-104.58				
2	Feb-02	4.26			196			-96.58				
3	Mar-02	20.92			237			-55.58				
4	Apr-02	6.75			253			-39.58				
5	May-02	7.11			271			-21.58				
6	Jun-02	-20.30			216			-76.58				
7	Jul-02	18.98			257			-35.58				
8	Aug-02	3.50			266			-26.58				
9	Sep-02	-35.71			171			-121.58				
10	Oct-02	-33.92			113			-179.58				
11	Nov-02	-79.65			23			-269.58				
12	Dec-02	5639.13			1320	292.58	102.91	1027.42	-195.58			
13	Jan-03		83.94	NG	1811	1298.99	373.96	80.40		290.91	1520.09	0.84
14	Feb-03		-14.98		1371	1550.88	337.34	-121.57		1576.36	-205.36	0.15
15	Mar-03		-24.42		1473	1674.46	273.21	-99.35		1832.64	-359.64	0.24
16	Apr-03		-54.13		1238	1549.39	153.73	-121.13		1908.09	-670.09	0.54
17	May-03		-46.48		1148	1386.00	58.59	-86.51		1681.54	-533.54	0.46
18	Jun-03		-8.83		1257	1378.61	38.80	-90.09		1368.01	-111.01	0.09
19	Jul-03		4.70		1450	1457.93	50.95	-27.29		1381.83	68.17	0.05
20	Aug-03		-12.21		1321	1413.01	22.19	-46.21		1482.30	-161.30	0.12
21	Sep-03		-10.30		1191	1362.32	0.33	-136.50		1313.62	-122.62	0.10
22	Oct-03		-4.70		1130	1331.11	-9.13	-186.04		1183.07	-53.07	0.05
23	Nov-03		12.81		1207	1413.87	18.43	-250.77		1052.39	154.61	0.13
24	Dec-03		-71.53		1434	822.65	-164.46	902.60		1236.72	197.28	0.14
25	Jan-04		31.29		1075	858.14	-104.48	121.33		738.58	336.42	0.31
26	Feb-04		44.06		1130	1049.61	-15.69	-60.98		632.09	497.91	0.44
27	Mar-04		11.67		1058	1107.28	6.32	-84.33		934.57	123.43	0.12
28	Apr-04		-2.63		967	1098.46	1.77	-124.23		992.47	-25.47	0.03
29	May-04		2.24		1037	1114.07	5.93	-83.68		1013.72	23.28	0.02
30	Jun-04		11.22		1160	1197.32	29.12	-74.26		1029.90	130.10	0.11
31	Jul-04		-22.99		975	1093.21	-10.85	-54.56		1199.16	-224.16	0.23
32	Aug-04		16.57		1242	1204.71	25.86	-21.16		1036.15	205.85	0.17

Appendix Table E36 (Continued)

						Alpha	0.59				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		2.58		1123	1247.77	31.02	-132.98		1094.07	28.93	0.03
34	Oct-04		-18.26		924	1178.49	0.93	-206.58		1092.75	-168.75	0.18
35	Nov-04		7.96		1009	1227.18	15.26	-240.99		928.65	80.35	0.08
36	Dec-04		-72.29		1245	707.48	-145.23	793.07		2145.03	-900.03	0.72
37	Jan-05		2.76		703	573.79	-141.77	123.70		683.59	19.41	0.03
38	Feb-05		53.21		793	682.82	-66.53	-9.64		371.04	421.96	0.53
39	Mar-05		45.16		970	876.65	11.58	-31.02		531.97	438.03	0.45
40	Apr-05		0.00		764	888.23	11.58	-124.23		764.00	0.00	0.00
41	May-05		-2.27		798	889.03	8.35	-85.88		816.13	-18.13	0.02
42	Jun-05		4.29		860	919.30	14.92	-69.77		823.11	36.89	0.04
43	Jul-05		-35.12		651	798.32	-25.85	-82.39		879.66	-228.66	0.35
44	Aug-05		-4.64		718	752.67	-31.79	-25.22		751.30	-33.30	0.05
45	Sep-05		-5.17		559	703.71	-36.94	-136.50		587.90	-28.90	0.05
46	Oct-05		21.87		589	743.33	-13.97	-190.90		460.19	128.81	0.22
47	Nov-05		53.04		1040	1057.23	84.39	-173.86		488.36	551.64	0.53
48	Dec-05		-27.70		1515	892.17	9.55	742.00		1934.69	-419.69	0.28
49	Jan-06		-345.83	NG	230	428.95	-132.28	26.90		1025.42	-795.42	3.46
50	Feb-06		48.19		554	455.35	-84.67	22.85		287.04	266.96	0.48
51	Mar-06		42.24		588	518.28	-40.39	-0.80		339.65	248.35	0.42
52	Apr-06		46.98		667	664.13	15.48	-86.10		353.67	313.33	0.47
53	May-06		7.23		640	707.11	23.73	-80.25		593.72	46.28	0.07
54	Jun-06		-17.21		564	673.15	6.42	-81.58		661.07	-97.07	0.17
55	Jul-06		-8.97		548	650.34	-2.35	-88.37		597.18	-49.18	0.09
56	Aug-06		-13.03		551	605.33	-15.15	-33.95		622.78	-71.78	0.13
57	Sep-06		-3.11		440	582.05	-17.59	-138.17		453.68	-13.68	0.03
58	Oct-06		19.66		465	618.81	-1.28	-179.77		373.57	91.43	0.20
59	Nov-06		14.18		517	661.12	11.79	-164.94		443.67	73.33	0.14
60	Dec-06		-113.41	OK	663	226.00	-122.28	650.50	-59.32	1414.91	-751.91	1.13
61	Jan-07		54.96		290	198.45	-93.86	46.30		130.62	159.38	0.55
62	Feb-07		-8.00		118	98.98	-95.54	21.70		127.44	-9.44	0.08
63	Mar-07		99.73	NG	963	574.25	75.70	116.07		2.63	960.37	1.00
64	Apr-07		47.84		1081	957.32	167.91	-23.16		563.85	517.15	0.48

Appendix Table E37 Forecasted demand of Med A/T calculated by additive seasonal model with $\alpha = 0.33$, $\beta = 0.30$, $\gamma = 0.54$ and $c = 0.8$

						Alpha	0.33				MAPE	0.24
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			265			-277.08				
2	Feb-02	47.17			390			-152.08				
3	Mar-02	11.03			433			-109.08				
4	Apr-02	29.56			561			18.92				
5	May-02	24.60			699			156.92				
6	Jun-02	2.00			713			170.92				
7	Jul-02	5.33			751			208.92				
8	Aug-02	7.06			804			261.92				
9	Sep-02	-10.82			717			174.92				
10	Oct-02	-27.20			522			-20.08				
11	Nov-02	**-91.00**			47			-495.08	27.45			
12	Dec-02	**1182.98**			603	542.08	30.73	60.92	27.45			
13	Jan-03		76.71		1270	889.95	125.87	74.98		295.73	974.27	0.77
14	Feb-03		27.23		1187	1121.04	157.44	-35.27		863.73	323.27	0.27
15	Mar-03		0.05		1170	1278.67	157.50	-108.86		1169.39	0.61	0.00
16	Apr-03		-60.08		909	1258.41	104.17	-178.42		1455.09	-546.09	0.60
17	May-03		**-87.36**	NG	811	1131.96	34.98	-99.11		1519.50	-708.50	0.87
18	Jun-03		-18.71		1127	1098.30	14.39	94.72		1337.86	-210.86	0.19
19	Jul-03		-12.48		1175	1064.97	0.07	155.94		1321.61	-146.61	0.12
20	Aug-03		-14.69		1157	1009.72	-16.52	200.50		1326.96	-169.96	0.15
21	Sep-03		-1.75		1148	986.65	-18.49	167.65		1168.11	-20.11	0.02
22	Oct-03		27.85		1314	1087.27	17.25	112.15		948.08	365.92	0.28
23	Nov-03		49.80		1214	1301.31	76.28	-276.62		**1131.97**	82.03	0.07
24	Dec-03		17.52		1744	1477.03	106.11	171.31		**1405.04**	338.96	0.19
25	Jan-04		-32.86		1248	1449.65	66.06	-73.22		1658.13	-410.13	0.33
26	Feb-04		-10.73		1337	1469.02	52.06	-87.10		1480.45	-143.45	0.11
27	Mar-04		-15.76		1220	1458.51	33.29	-178.32		1412.21	-192.21	0.16
28	Apr-04		-11.02		1183	1449.36	20.55	-225.53		1313.38	-130.38	0.11
29	May-04		4.41		1434	1490.48	26.73	-76.27		1370.81	63.19	0.04
30	Jun-04		-8.11		1491	1477.84	14.92	51.02		1611.93	-120.93	0.08
31	Jul-04		-16.11		1420	1418.32	-7.42	73.29		1648.70	-228.70	0.16
32	Aug-04		8.44		1760	1459.27	7.10	254.20		1611.40	148.60	0.08

Appendix Table E37 (Continued)

						Alpha	0.33				MAPE	0.24
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-6.31		1537	1434.79	-2.38	132.59		1634.02	-97.02	0.06
34	Oct-04		-5.14		1469	1407.82	-9.76	84.84		1544.55	-75.55	0.05
35	Nov-04		27.88		1555	1539.19	32.58	-119.95		1121.44	433.56	0.28
36	Dec-04		18.32		2134	1699.02	70.76	312.57		1743.08	390.92	0.18
37	Jan-05		-28.82		1317	1646.23	33.69	-210.38		1696.55	-379.55	0.29
38	Feb-05		-10.92		1436	1628.87	18.38	-143.77		1592.82	-156.82	0.11
39	Mar-05		16.40		1757	1741.02	46.51	-74.22		1468.93	288.07	0.16
40	Apr-05		0.00		1562	1787.53	46.51	-225.53		1562.00	0.00	0.00
41	May-05		-16.80		1505	1751.76	21.83	-167.61		1757.77	-252.77	0.17
42	Jun-05		-9.45		1667	1722.28	6.43	-5.93		1824.61	-157.61	0.09
43	Jul-05		-36.31		1322	1572.47	-40.44	-100.16		1802.01	-480.01	0.36
44	Aug-05		-29.81		1376	1398.50	-80.50	105.96		1786.23	-410.23	0.30
45	Sep-05		-36.46		1063	1191.83	-118.35	-7.47		1450.59	-387.59	0.36
46	Oct-05		-20.66		960	1008.93	-137.72	13.18		1158.33	-198.33	0.21
47	Nov-05		54.96		1668	1169.62	-48.19	211.32		751.26	916.74	0.55
48	Dec-05		38.46		2330	1413.08	39.30	636.35		1434.00	896.00	0.38
49	Jan-06		-56.23		795	1306.88	-4.35	-371.91		1242.01	-447.01	0.56
50	Feb-06		-55.12		747	1168.50	-44.56	-292.56		1158.76	-411.76	0.55
51	Mar-06		18.56		1289	1201.83	-21.19	12.24		1049.72	239.28	0.19
52	Apr-06		11.73		1082	1221.94	-8.80	-179.68		955.11	126.89	0.12
53	May-06		19.01		1291	1293.05	15.17	-78.91		1045.53	245.47	0.19
54	Jun-06		-25.34		1039	1222.51	-10.54	-101.07		1302.28	-263.28	0.25
55	Jul-06		7.81		1206	1242.63	-1.34	-66.13		1111.81	94.19	0.08
56	Aug-06		-26.03		1069	1150.72	-28.51	5.41		1347.25	-278.25	0.26
57	Sep-06		14.05		1297	1181.53	-10.72	58.39		1114.74	182.26	0.14
58	Oct-06		4.52		1240	1189.05	-5.25	33.41		1183.99	56.01	0.05
59	Nov-06		-5.29		1325	1160.98	-12.09	185.98		1395.13	-70.13	0.05
60	Dec-06		1.15		1806	1155.64	-10.07	643.86		1785.23	20.77	0.01
61	Jan-07		12.48		884	1181.49	0.71	-332.04		773.67	110.33	0.12
62	Feb-07		-124.66	NG	396	1021.51	-47.50	-470.94		889.63	-493.63	1.25
63	Mar-07		17.74		1199	1043.27	-26.72	89.12		986.26	212.74	0.18
64	Apr-07		42.68		1460	1219.38	34.13	45.50		836.87	623.13	0.43

Appendix Table E38 Forecasted demand of Med M/T calculated by additive seasonal model with α = 0.30, β = 0.30, γ = 0.62 and c = 0.8

						Alpha	0.30				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			244			-108.50				
2	Feb-02	17.21			286			-66.50				
3	Mar-02	-3.15			277			-75.50				
4	Apr-02	32.85			368			15.50				
5	May-02	10.05			405			52.50				
6	Jun-02	7.90			437			84.50				
7	Jul-02	12.13			490			137.50				
8	Aug-02	6.53			522			169.50				
9	Sep-02	-14.94			444			91.50				
10	Oct-02	-7.66			410			57.50				
11	Nov-02	**-83.90**			66			-286.50	62.86			
12	Dec-02	**325.76**			281	352.50	3.36	-71.50	62.86			
13	Jan-03		62.23		655	478.15	40.05	68.21		247.36	407.64	0.62
14	Feb-03		52.95		960	670.69	85.80	153.85		451.71	508.29	0.53
15	Mar-03		29.36		964	841.39	111.27	47.19		680.99	283.01	0.29
16	Apr-03		-21.17		799	901.91	96.04	-57.83		968.16	-169.16	0.21
17	May-03		-61.36		651	878.12	60.09	-120.67		1050.46	-399.46	0.61
18	Jun-03		-41.85		721	847.70	32.94	-46.29		1022.71	-301.71	0.42
19	Jul-03		-37.03		743	798.10	8.18	18.23		1018.14	-275.14	0.37
20	Aug-03		-28.56		759	741.24	-11.33	75.53		975.77	-216.77	0.29
21	Sep-03		-6.26		773	715.38	-15.69	70.52		821.41	-48.41	0.06
22	Oct-03		20.96		958	759.94	2.38	144.55		757.19	200.81	0.21
23	Nov-03		32.79		708	831.97	23.28	-185.85		**825.18**	-117.18	0.17
24	Dec-03		-12.29		698	829.53	15.56	-108.67		**918.11**	-220.11	0.32
25	Jan-04		-79.08		510	724.10	-20.74	-106.62		913.30	-403.30	0.79
26	Feb-04		-51.99		564	615.40	-47.12	26.74		857.21	-293.21	0.52
27	Mar-04		-23.34		499	533.34	-57.61	-3.30		615.46	-116.46	0.23
28	Apr-04		8.15		455	486.86	-54.27	-41.75		417.90	37.10	0.08
29	May-04		40.81		527	497.12	-34.91	-27.43		311.93	215.07	0.41
30	Jun-04		21.67		531	496.73	-24.55	3.60		415.91	115.09	0.22
31	Jul-04		8.51		536	485.86	-20.45	37.99		490.41	45.59	0.09
32	Aug-04		14.81		635	493.63	-11.98	116.30		540.94	94.06	0.15

Appendix Table E38 (Continued)

						Alpha 0.30					MAPE 0.32	
		Diff (%)				Beta 0.30						
						Gamma 0.62						
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		**-124.46**	NG	246	389.80	-39.54	-62.21		552.16	-306.16	1.24
34	Oct-04		3.73		514	356.02	-37.81	152.87		494.81	19.19	0.04
35	Nov-04		76.62		566	448.30	1.22	2.14		132.36	433.64	0.77
36	Dec-04		51.24		699	556.96	33.45	46.59		340.84	358.16	0.51
37	Jan-05		-24.69		388	561.68	24.83	-148.15		483.79	-95.79	0.25
38	Feb-05		-33.90		458	539.93	10.86	-40.56		613.25	-155.25	0.34
39	Mar-05		14.72		642	579.14	19.36	37.67		547.49	94.51	0.15
40	Apr-05		-6.86		521	587.78	16.15	-57.25		556.76	-35.76	0.07
41	May-05		6.26		615	615.48	19.61	-10.74		576.49	38.51	0.06
42	Jun-05		-14.87		556	610.28	12.17	-32.25		638.69	-82.69	0.15
43	Jul-05		-45.79		453	560.22	-6.50	-51.94		660.44	-207.44	0.46
44	Aug-05		-61.06		416	477.51	-29.36	6.18		670.02	-254.02	0.61
45	Sep-05		-7.80		358	439.77	-31.88	-74.32		385.94	-27.94	0.08
46	Oct-05		-46.41		383	354.56	-47.88	75.81		560.76	-177.76	0.46
47	Nov-05		50.75		627	402.14	-19.24	140.07		308.82	318.18	0.51
48	Dec-05		46.91		809	496.75	14.92	211.11		429.49	379.51	0.47
49	Jan-06		-14.68		317	497.71	10.73	-168.31		363.52	-46.52	0.15
50	Feb-06		-14.12		410	491.08	5.52	-65.65		467.88	-57.88	0.14
51	Mar-06		17.93		651	531.62	16.03	88.27		534.27	116.73	0.18
52	Apr-06		-26.07		389	517.23	6.90	-101.20		490.39	-101.39	0.26
53	May-06		-24.31		413	494.01	-2.13	-54.26		513.39	-100.39	0.24
54	Jun-06		-29.47		355	460.49	-11.55	-77.60		459.63	-104.63	0.29
55	Jul-06		0.00		397	448.94	-11.55	-51.94		397.00	0.00	0.00
56	Aug-06		-26.73		350	409.31	-19.97	-34.38		443.57	-93.57	0.27
57	Sep-06		-1.29		311	388.14	-20.33	-76.06		315.02	-4.02	0.01
58	Oct-06		-4.38		425	362.22	-22.01	67.74		443.61	-18.61	0.04
59	Nov-06		-31.94		364	305.33	-32.47	89.66		480.28	-116.28	0.32
60	Dec-06		-5.90		457	264.76	-34.90	199.42		483.96	-26.96	0.06
61	Jan-07		70.41		208	273.80	-21.72	-104.83		61.55	146.45	0.70
62	Feb-07		-60.71		116	230.95	-28.06	-96.18		186.43	-70.43	0.61
63	Mar-07		1.63		296	204.34	-27.62	90.37		291.17	4.83	0.02
64	Apr-07		79.70		372	265.66	-0.94	27.32		75.51	296.49	0.80

Appendix Table E39 Forecasted demand of Low A/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.77$ and $c = 0.8$

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Dec-02	0.00			155			-93.00				
2	Jan-03	50.97			234			-14.00				
3	Feb-03	44.87			339			91.00				
4	Mar-03	3.83			352			104.00				
5	Apr-03	-33.81			233			-15.00				
6	May-03	-14.59			199			-49.00				
7	Jun-03	-1.01			197			-51.00				
8	Jul-03	8.63			214			-34.00				
9	Aug-03	13.55			243			-5.00				
10	Sep-03	-9.05			221			-27.00				
11	Oct-03	20.36			266			18.00				
12	Nov-03	21.43			323	248.00	15.27	75.00				
13	Dec-03		56.67		393	330.09	35.32	27.26		170.27	222.73	0.57
14	Jan-04		23.11		457	397.09	44.82	43.01		351.41	105.59	0.23
15	Feb-04		-6.16		502	432.64	42.04	74.31		532.91	-30.91	0.06
16	Mar-04		-5.60		548	465.47	39.28	87.44		578.68	-30.68	0.06
17	Apr-04		8.97		538	519.23	43.62	11.05		489.75	48.25	0.09
18	May-04		10.32		573	580.59	48.95	-17.06		513.85	59.15	0.10
19	Jun-04		8.31		631	645.28	53.67	-22.67		578.54	52.46	0.08
20	Jul-04		-19.17		558	666.86	44.04	-91.74		664.94	-106.94	0.19
21	Aug-04		-1.71		694	707.33	42.97	-11.43		705.90	-11.90	0.02
22	Sep-04		-24.71		580	707.31	30.07	-104.37		723.30	-143.30	0.25
23	Oct-04		-43.61		526	668.57	9.43	-105.85		755.38	-229.38	0.44
24	Nov-04		1.57		765	681.60	10.51	81.48		753.00	12.00	0.02
25	Dec-04		9.29		793	714.20	17.14	67.01		719.36	73.64	0.09
26	Jan-05		-49.49		518	654.43	-5.93	-95.40		774.35	-256.35	0.49
27	Feb-05		-25.27		577	604.75	-19.06	-4.41		722.81	-145.81	0.25
28	Mar-05		6.38		719	599.46	-14.93	112.20		673.13	45.87	0.06
29	Apr-05		-6.54		559	573.55	-18.22	-8.70		595.58	-36.58	0.07
30	May-05		14.01		626	581.65	-10.33	30.31		538.27	87.73	0.14
31	Jun-05		16.75		659	604.43	-0.39	36.91		548.65	110.35	0.17
32	Jul-05		-3.91		493	598.25	-2.13	-102.16		512.29	-19.29	0.04

Appendix Table E39 (Continued)

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Aug-05		-4.97		557	587.81	-4.62	-26.38		584.69	-27.69	0.05
34	Sep-05		-4.77		457	576.64	-6.59	-116.15		478.81	-21.81	0.05
35	Oct-05		-25.46		370	541.79	-15.06	-156.71		464.21	-94.21	0.25
36	Nov-05		12.11		692	551.87	-7.52	126.72		608.21	83.79	0.12
37	Dec-05		42.54		1064	680.14	33.21	311.41		611.36	452.64	0.43
38	Jan-06		-38.87		445	661.46	17.65	-188.78		617.95	-172.95	0.39
39	Feb-06		-67.42		403	597.60	-6.80	-151.11		674.70	-271.70	0.67
40	Mar-06		0.00		703	590.80	-6.80	112.20		703.00	0.00	0.00
41	Apr-06		-22.40		470	552.40	-16.28	-65.55		575.30	-105.30	0.22
42	May-06		-0.97		561	534.49	-16.77	27.37		566.43	-5.43	0.01
43	Jun-06		-14.83		483	496.24	-23.22	-1.77		554.63	-71.63	0.15
44	Jul-06		24.93		494	509.96	-12.13	-35.67		370.86	123.14	0.25
45	Aug-06		2.39		483	501.29	-11.09	-20.14		471.45	11.55	0.02
46	Sep-06		29.16		528	536.38	2.76	-33.03		374.05	153.95	0.29
47	Oct-06		34.96		588	600.82	21.26	-45.72		382.43	205.57	0.35
48	Nov-06		-22.35		612	581.04	8.95	52.86		748.80	-136.80	0.22
49	Dec-06		-21.32		743	542.47	-5.30	225.89		901.40	-158.40	0.21
50	Jan-07		35.96		544	595.85	12.30	-83.16		348.39	195.61	0.36
51	Feb-07		-97.85	NG	231	540.34	-8.04	-273.15		457.04	-226.04	0.98
52	Mar-07		64.99		1841	891.25	99.64	758.22		644.50	1196.50	0.65
53	Apr-07		38.23		1498	1162.69	151.18	243.64		925.34	572.66	0.38

Appendix Table E40 Forecasted demand of Low M/T calculated by additive seasonal model with $\alpha = 0.54$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.8$

						Alpha	0.54				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			10			-23.50				
2	Feb-02	50.00			15			-18.50				
3	Mar-02	46.67			22			-11.50				
4	Apr-02	59.09			35			1.50				
5	May-02	14.29			40			6.50				
6	Jun-02	-5.00			38			4.50				
7	Jul-02	-36.84			24			-9.50				
8	Aug-02	58.33			38			4.50				
9	Sep-02	-47.37			20			-13.50				
10	Oct-02	45.00			29			-4.50				
11	Nov-02	37.93			40			6.50				
12	Dec-02	**127.50**			91	33.50	7.36	57.50	11.01			
13	Jan-03		**90.02**	OK	174	126.02	32.91	-2.06	11.01	17.36	156.64	0.90
14	Feb-03		63.90		389	294.07	73.45	15.53		140.43	248.57	0.64
15	Mar-03		-0.01		356	367.51	73.45	-11.50		356.02	-0.02	0.00
16	Apr-03		-67.60		264	343.94	44.34	-22.93		442.46	-178.46	0.68
17	May-03		**-99.38**	NG	198	281.30	12.25	-20.44		394.78	-196.78	0.99
18	Jun-03		-45.39		205	242.96	-2.93	-8.24		298.04	-93.04	0.45
19	Jul-03		4.34		241	245.72	-1.22	-8.07		230.53	10.47	0.04
20	Aug-03		-6.87		233	235.80	-3.83	2.31		249.00	-16.00	0.07
21	Sep-03		4.18		228	237.15	-2.28	-12.20		218.47	9.53	0.04
22	Oct-03		10.01		256	248.81	1.90	-0.99		230.38	25.62	0.10
23	Nov-03		23.45		336	293.55	14.75	17.29		257.21	78.79	0.23
24	Dec-03		9.46		404	329.07	20.98	62.73		**319.31**	84.69	0.21
25	Jan-04		2.25		356	354.40	22.29	-0.96		**361.07**	-5.07	0.01
26	Feb-04		-2.95		381	370.59	20.46	13.99		392.22	-11.22	0.03
27	Mar-04		6.74		407	405.98	24.94	-7.75		379.55	27.45	0.07
28	Apr-04		-19.64		341	394.50	14.01	-32.10		407.98	-66.98	0.20
29	May-04		9.54		429	430.76	20.69	-14.84		388.07	40.93	0.10
30	Jun-04		-16.33		381	417.63	10.54	-16.75		443.21	-62.21	0.16
31	Jul-04		-18.34		355	392.77	-0.08	-16.98		420.10	-65.10	0.18
32	Aug-04		19.39		490	444.34	15.42	15.31		395.01	94.99	0.19

Appendix Table E40 (Continued)

						Alpha	0.54				MAPE	0.32
			Diff (%)			Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		**-166.41**	NG	168	307.77	-30.18	-50.47		447.56	-279.56	1.66
34	Oct-04		25.85		373	330.00	-14.46	12.21		276.60	96.40	0.26
35	Nov-04		29.63		473	391.75	8.41	36.48		332.83	140.17	0.30
36	Dec-04		30.08		662	508.41	40.88	89.99		462.88	199.12	0.30
37	Jan-05		-49.82		366	450.16	11.14	-25.92		548.33	-182.33	0.50
38	Feb-05		-10.28		431	437.22	3.92	7.93		475.30	-44.30	0.10
39	Mar-05		28.36		605	534.44	31.91	15.75		433.39	171.61	0.28
40	Apr-05		6.27		570	585.78	37.74	-27.21		534.24	35.76	0.06
41	May-05		-9.67		555	594.33	28.98	-22.19		608.69	-53.69	0.10
42	Jun-05		-1.60		597	618.12	27.42	-18.06		606.56	-9.56	0.02
43	Jul-05		-31.77		477	563.14	2.70	-37.73		628.56	-151.56	0.32
44	Aug-05		-36.74		425	480.95	-22.77	-6.06		581.16	-156.16	0.37
45	Sep-05		-9.01		374	439.85	-28.27	-55.08		407.71	-33.71	0.09
46	Oct-05		-32.85		319	354.61	-45.36	-2.14		423.79	-104.79	0.33
47	Nov-05		30.85		500	393.13	-20.20	57.59		345.73	154.27	0.31
48	Dec-05		36.32		727	516.50	22.88	126.14		462.92	264.08	0.36
49	Jan-06		**-96.73**	NG	261	402.13	-18.30	-60.48		513.46	-252.46	0.97
50	Feb-06		-41.94		276	320.89	-37.18	-7.92		391.75	-115.75	0.42
51	Mar-06		35.88		467	374.80	-9.85	38.68		299.46	167.54	0.36
52	Apr-06		-31.93		256	320.51	-23.19	-38.40		337.74	-81.74	0.32
53	May-06		8.59		301	311.38	-18.97	-18.64		275.14	25.86	0.09
54	Jun-06		-23.58		222	263.95	-27.51	-25.23		274.35	-52.35	0.24
55	Jul-06		43.38		351	319.24	-2.67	-16.88		198.72	152.28	0.43
56	Aug-06		-15.00		270	294.55	-9.28	-11.61		310.50	-40.50	0.15
57	Sep-06		21.44		293	319.42	0.97	-46.48		230.19	62.81	0.21
58	Oct-06		12.33		363	344.72	8.27	3.99		318.25	44.75	0.12
59	Nov-06		-21.12		339	314.07	-3.41	47.80		410.58	-71.58	0.21
60	Dec-06		-4.50		418	300.44	-6.47	123.57		436.80	-18.80	0.04
61	Jan-07		-44.13		162	255.10	-18.13	-70.27		233.48	-71.48	0.44
62	Feb-07		**-110.14**	NG	109	171.70	-37.71	-24.35		229.05	-120.05	1.10
63	Mar-07		43.76		307	207.02	-15.80	57.07		172.67	134.33	0.44
64	Apr-07		44.83		277	258.73	4.45	-21.40		152.82	124.18	0.45

Appendix Table E41 Forecasted demand of Top A/T calculated by additive seasonal model with α = 0.59, β = 0.30, γ = 0.30 and c = 0.9

						Alpha	0.59				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.3					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	Abs(E_t/Y_t)
1	Jan-02	0.00			188			-104.58				
2	Feb-02	4.26			196			-96.58				
3	Mar-02	20.92			237			-55.58				
4	Apr-02	6.75			253			-39.58				
5	May-02	7.11			271			-21.58				
6	Jun-02	-20.30			216			-76.58				
7	Jul-02	18.98			257			-35.58				
8	Aug-02	3.50			266			-26.58				
9	Sep-02	-35.71			171			-121.58				
10	Oct-02	-33.92			113			-179.58				
11	Nov-02	-79.65			23			-269.58				
12	Dec-02	5639.13			1320	292.58	102.91	1027.42	-94.59			
13	Jan-03		83.94		1811	1298.99	373.96	80.40		290.91	1520.09	0.84
14	Feb-03		-14.98		1371	1550.88	337.34	-121.57		1576.36	-205.36	0.15
15	Mar-03		-24.42		1473	1674.46	273.21	-99.35		1832.64	-359.64	0.24
16	Apr-03		-54.13		1238	1549.39	153.73	-121.13		1908.09	-670.09	0.54
17	May-03		-46.48		1148	1386.00	58.59	-86.51		1681.54	-533.54	0.46
18	Jun-03		-8.83		1257	1378.61	38.80	-90.09		1368.01	-111.01	0.09
19	Jul-03		4.70		1450	1457.93	50.95	-27.29		1381.83	68.17	0.05
20	Aug-03		-12.21		1321	1413.01	22.19	-46.21		1482.30	-161.30	0.12
21	Sep-03		-10.30		1191	1362.32	0.33	-136.50		1313.62	-122.62	0.10
22	Oct-03		-4.70		1130	1331.11	-9.13	-186.04		1183.07	-53.07	0.05
23	Nov-03		12.81		1207	1413.87	18.43	-250.77		1052.39	154.61	0.13
24	Dec-03		-71.53		1434	822.65	-164.46	902.60		1337.71	96.29	0.07
25	Jan-04		31.29		1075	858.14	-104.48	121.33		738.58	336.42	0.31
26	Feb-04		44.06		1130	1049.61	-15.69	-60.98		632.09	497.91	0.44
27	Mar-04		11.67		1058	1107.28	6.32	-84.33		934.57	123.43	0.12
28	Apr-04		-2.63		967	1098.46	1.77	-124.23		992.47	-25.47	0.03
29	May-04		2.24		1037	1114.07	5.93	-83.68		1013.72	23.28	0.02
30	Jun-04		11.22		1160	1197.32	29.12	-74.26		1029.90	130.10	0.11
31	Jul-04		-22.99		975	1093.21	-10.85	-54.56		1199.16	-224.16	0.23
32	Aug-04		16.57		1242	1204.71	25.86	-21.16		1036.15	205.85	0.17

Appendix Table E41 (Continued)

						Alpha	0.59				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.3					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		2.58		1123	1247.77	31.02	-132.98		1094.07	28.93	0.03
34	Oct-04		-18.26		924	1178.49	0.93	-206.58		1092.75	-168.75	0.18
35	Nov-04		7.96		1009	1227.18	15.26	-240.99		928.65	80.35	0.08
36	Dec-04		-72.29		1245	707.48	-145.23	793.07		2145.03	-900.03	0.72
37	Jan-05		2.76		703	573.79	-141.77	123.70		683.59	19.41	0.03
38	Feb-05		53.21		793	682.82	-66.53	-9.64		371.04	421.96	0.53
39	Mar-05		45.16		970	876.65	11.58	-31.02		531.97	438.03	0.45
40	Apr-05		0.00		764	888.23	11.58	-124.23		764.00	0.00	0.00
41	May-05		-2.27		798	889.03	8.35	-85.88		816.13	-18.13	0.02
42	Jun-05		4.29		860	919.30	14.92	-69.77		823.11	36.89	0.04
43	Jul-05		-35.12		651	798.32	-25.85	-82.39		879.66	-228.66	0.35
44	Aug-05		-4.64		718	752.67	-31.79	-25.22		751.30	-33.30	0.05
45	Sep-05		-5.17		559	703.71	-36.94	-136.50		587.90	-28.90	0.05
46	Oct-05		21.87		589	743.33	-13.97	-190.90		460.19	128.81	0.22
47	Nov-05		53.04		1040	1057.23	84.39	-173.86		488.36	551.64	0.53
48	Dec-05		-27.70		1515	892.17	9.55	742.00		1934.69	-419.69	0.28
49	Jan-06		-345.83	NG	230	428.95	-132.28	26.90		1025.42	-795.42	3.46
50	Feb-06		48.19		554	455.35	-84.67	22.85		287.04	266.96	0.48
51	Mar-06		42.24		588	518.28	-40.39	-0.80		339.65	248.35	0.42
52	Apr-06		46.98		667	664.13	15.48	-86.10		353.67	313.33	0.47
53	May-06		7.23		640	707.11	23.73	-80.25		593.72	46.28	0.07
54	Jun-06		-17.21		564	673.15	6.42	-81.58		661.07	-97.07	0.17
55	Jul-06		-8.97		548	650.34	-2.35	-88.37		597.18	-49.18	0.09
56	Aug-06		-13.03		551	605.33	-15.15	-33.95		622.78	-71.78	0.13
57	Sep-06		-3.11		440	582.05	-17.59	-138.17		453.68	-13.68	0.03
58	Oct-06		19.66		465	618.81	-1.28	-179.77		373.57	91.43	0.20
59	Nov-06		14.18		517	661.12	11.79	-164.94		443.67	73.33	0.14
60	Dec-06		-113.41	OK	663	226.00	-122.28	650.50	-59.32	1414.91	-751.91	1.13
61	Jan-07		54.96		290	198.45	-93.86	46.30		130.62	159.38	0.55
62	Feb-07		-8.00		118	98.98	-95.54	21.70		127.44	-9.44	0.08
63	Mar-07		99.73	NG	963	574.25	75.70	116.07		2.63	960.37	1.00
64	Apr-07		47.84		1081	957.32	167.91	-23.16		563.85	517.15	0.48

Appendix Table E42 Forecasted demand of Med A/T calculated by additive seasonal model with $\alpha = 0.33$, $\beta = 0.30$, $\gamma = 0.54$ and $c = 0.9$

						Alpha	0.33				MAPE	0.24
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			265			-277.08				
2	Feb-02	47.17			390			-152.08				
3	Mar-02	11.03			433			-109.08				
4	Apr-02	29.56			561			18.92				
5	May-02	24.60			699			156.92				
6	Jun-02	2.00			713			170.92				
7	Jul-02	5.33			751			208.92				
8	Aug-02	7.06			804			261.92				
9	Sep-02	-10.82			717			174.92				
10	Oct-02	-27.20			522			-20.08				
11	Nov-02	**-91.00**			47			-495.08	27.45			
12	Dec-02	**1182.98**			603	542.08	30.73	60.92	27.45			
13	Jan-03		76.71		1270	889.95	125.87	74.98		295.73	974.27	0.77
14	Feb-03		27.23		1187	1121.04	157.44	-35.27		863.73	323.27	0.27
15	Mar-03		0.05		1170	1278.67	157.50	-108.86		1169.39	0.61	0.00
16	Apr-03		-60.08		909	1258.41	104.17	-178.42		1455.09	-546.09	0.60
17	May-03		-87.36		811	1131.96	34.98	-99.11		1519.50	-708.50	0.87
18	Jun-03		-18.71		1127	1098.30	14.39	94.72		1337.86	-210.86	0.19
19	Jul-03		-12.48		1175	1064.97	0.07	155.94		1321.61	-146.61	0.12
20	Aug-03		-14.69		1157	1009.72	-16.52	200.50		1326.96	-169.96	0.15
21	Sep-03		-1.75		1148	986.65	-18.49	167.65		1168.11	-20.11	0.02
22	Oct-03		27.85		1314	1087.27	17.25	112.15		948.08	365.92	0.28
23	Nov-03		49.80		1214	1301.31	76.28	-276.62		**1131.97**	82.03	0.07
24	Dec-03		17.52		1744	1477.03	106.11	171.31		**1405.04**	338.96	0.19
25	Jan-04		-32.86		1248	1449.65	66.06	-73.22		1658.13	-410.13	0.33
26	Feb-04		-10.73		1337	1469.02	52.06	-87.10		1480.45	-143.45	0.11
27	Mar-04		-15.76		1220	1458.51	33.29	-178.32		1412.21	-192.21	0.16
28	Apr-04		-11.02		1183	1449.36	20.55	-225.53		1313.38	-130.38	0.11
29	May-04		4.41		1434	1490.48	26.73	-76.27		1370.81	63.19	0.04
30	Jun-04		-8.11		1491	1477.84	14.92	51.02		1611.93	-120.93	0.08
31	Jul-04		-16.11		1420	1418.32	-7.42	73.29		1648.70	-228.70	0.16
32	Aug-04		8.44		1760	1459.27	7.10	254.20		1611.40	148.60	0.08

Appendix Table E42 (Continued)

						Alpha	0.33				MAPE	0.24
			Diff (%)			Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-6.31		1537	1434.79	-2.38	132.59		1634.02	-97.02	0.06
34	Oct-04		-5.14		1469	1407.82	-9.76	84.84		1544.55	-75.55	0.05
35	Nov-04		27.88		1555	1539.19	32.58	-119.95		1121.44	433.56	0.28
36	Dec-04		18.32		2134	1699.02	70.76	312.57		1743.08	390.92	0.18
37	Jan-05		-28.82		1317	1646.23	33.69	-210.38		1696.55	-379.55	0.29
38	Feb-05		-10.92		1436	1628.87	18.38	-143.77		1592.82	-156.82	0.11
39	Mar-05		16.40		1757	1741.02	46.51	-74.22		1468.93	288.07	0.16
40	Apr-05		0.00		1562	1787.53	46.51	-225.53		1562.00	0.00	0.00
41	May-05		-16.80		1505	1751.76	21.83	-167.61		1757.77	-252.77	0.17
42	Jun-05		-9.45		1667	1722.28	6.43	-5.93		1824.61	-157.61	0.09
43	Jul-05		-36.31		1322	1572.47	-40.44	-100.16		1802.01	-480.01	0.36
44	Aug-05		-29.81		1376	1398.50	-80.50	105.96		1786.23	-410.23	0.30
45	Sep-05		-36.46		1063	1191.83	-118.35	-7.47		1450.59	-387.59	0.36
46	Oct-05		-20.66		960	1008.93	-137.72	13.18		1158.33	-198.33	0.21
47	Nov-05		54.96		1668	1169.62	-48.19	211.32		751.26	916.74	0.55
48	Dec-05		38.46		2330	1413.08	39.30	636.35		1434.00	896.00	0.38
49	Jan-06		-56.23		795	1306.88	-4.35	-371.91		1242.01	-447.01	0.56
50	Feb-06		-55.12		747	1168.50	-44.56	-292.56		1158.76	-411.76	0.55
51	Mar-06		18.56		1289	1201.83	-21.19	12.24		1049.72	239.28	0.19
52	Apr-06		11.73		1082	1221.94	-8.80	-179.68		955.11	126.89	0.12
53	May-06		19.01		1291	1293.05	15.17	-78.91		1045.53	245.47	0.19
54	Jun-06		-25.34		1039	1222.51	-10.54	-101.07		1302.28	-263.28	0.25
55	Jul-06		7.81		1206	1242.63	-1.34	-66.13		1111.81	94.19	0.08
56	Aug-06		-26.03		1069	1150.72	-28.51	5.41		1347.25	-278.25	0.26
57	Sep-06		14.05		1297	1181.53	-10.72	58.39		1114.74	182.26	0.14
58	Oct-06		4.52		1240	1189.05	-5.25	33.41		1183.99	56.01	0.05
59	Nov-06		-5.29		1325	1160.98	-12.09	185.98		1395.13	-70.13	0.05
60	Dec-06		1.15		1806	1155.64	-10.07	643.86		1785.23	20.77	0.01
61	Jan-07		12.48		884	1181.49	0.71	-332.04		773.67	110.33	0.12
62	Feb-07		-124.66	NG	396	1021.51	-47.50	-470.94		889.63	-493.63	1.25
63	Mar-07		17.74		1199	1043.27	-26.72	89.12		986.26	212.74	0.18
64	Apr-07		42.68		1460	1219.38	34.13	45.50		836.87	623.13	0.43

Appendix Table E43 Forecasted demand of Med M/T calculated by additive seasonal model with $\alpha = 0.30$, $\beta = 0.30$, $\gamma = 0.62$ and $c = 0.9$

						Alpha	0.30				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			244			-108.50				
2	Feb-02	17.21			286			-66.50				
3	Mar-02	-3.15			277			-75.50				
4	Apr-02	32.85			368			15.50				
5	May-02	10.05			405			52.50				
6	Jun-02	7.90			437			84.50				
7	Jul-02	12.13			490			137.50				
8	Aug-02	6.53			522			169.50				
9	Sep-02	-14.94			444			91.50				
10	Oct-02	-7.66			410			57.50				
11	Nov-02	**-83.90**			66			-286.50				
12	Dec-02	**325.76**			281	352.50	3.36	-71.50	-109.14			
13	Jan-03		62.23		655	478.15	40.05	68.21		247.36	407.64	0.62
14	Feb-03		52.95		960	670.69	85.80	153.85		451.71	508.29	0.53
15	Mar-03		29.36		964	841.39	111.27	47.19		680.99	283.01	0.29
16	Apr-03		-21.17		799	901.91	96.04	-57.83		968.16	-169.16	0.21
17	May-03		-61.36		651	878.12	60.09	-120.67		1050.46	-399.46	0.61
18	Jun-03		-41.85		721	847.70	32.94	-46.29		1022.71	-301.71	0.42
19	Jul-03		-37.03		743	798.10	8.18	18.23		1018.14	-275.14	0.37
20	Aug-03		-28.56		759	741.24	-11.33	75.53		975.77	-216.77	0.29
21	Sep-03		-6.26		773	715.38	-15.69	70.52		821.41	-48.41	0.06
22	Oct-03		20.96		958	759.94	2.38	144.55		757.19	200.81	0.21
23	Nov-03		32.79		708	831.97	23.28	-185.85		475.82	232.18	0.33
24	Dec-03		-12.29		698	829.53	15.56	-108.67		**746.11**	-48.11	0.07
25	Jan-04		-79.08		510	724.10	-20.74	-106.62		913.30	-403.30	0.79
26	Feb-04		-51.99		564	615.40	-47.12	26.74		857.21	-293.21	0.52
27	Mar-04		-23.34		499	533.34	-57.61	-3.30		615.46	-116.46	0.23
28	Apr-04		8.15		455	486.86	-54.27	-41.75		417.90	37.10	0.08
29	May-04		40.81		527	497.12	-34.91	-27.43		311.93	215.07	0.41
30	Jun-04		21.67		531	496.73	-24.55	3.60		415.91	115.09	0.22
31	Jul-04		8.51		536	485.86	-20.45	37.99		490.41	45.59	0.09
32	Aug-04		14.81		635	493.63	-11.98	116.30		540.94	94.06	0.15

Appendix Table E43 (Continued)

						Alpha	0.30				MAPE	0.32
			Diff (%)			Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		**-124.46**	NG	246	389.80	-39.54	-62.21		552.16	-306.16	1.24
34	Oct-04		3.73		514	356.02	-37.81	152.87		494.81	19.19	0.04
35	Nov-04		76.62		566	448.30	1.22	2.14		132.36	433.64	0.77
36	Dec-04		51.24		699	556.96	33.45	46.59		340.84	358.16	0.51
37	Jan-05		-24.69		388	561.68	24.83	-148.15		483.79	-95.79	0.25
38	Feb-05		-33.90		458	539.93	10.86	-40.56		613.25	-155.25	0.34
39	Mar-05		14.72		642	579.14	19.36	37.67		547.49	94.51	0.15
40	Apr-05		-6.86		521	587.78	16.15	-57.25		556.76	-35.76	0.07
41	May-05		6.26		615	615.48	19.61	-10.74		576.49	38.51	0.06
42	Jun-05		-14.87		556	610.28	12.17	-32.25		638.69	-82.69	0.15
43	Jul-05		-45.79		453	560.22	-6.50	-51.94		660.44	-207.44	0.46
44	Aug-05		-61.06		416	477.51	-29.36	6.18		670.02	-254.02	0.61
45	Sep-05		-7.80		358	439.77	-31.88	-74.32		385.94	-27.94	0.08
46	Oct-05		-46.41		383	354.56	-47.88	75.81		560.76	-177.76	0.46
47	Nov-05		50.75		627	402.14	-19.24	140.07		308.82	318.18	0.51
48	Dec-05		46.91		809	496.75	14.92	211.11		429.49	379.51	0.47
49	Jan-06		-14.68		317	497.71	10.73	-168.31		363.52	-46.52	0.15
50	Feb-06		-14.12		410	491.08	5.52	-65.65		467.88	-57.88	0.14
51	Mar-06		17.93		651	531.62	16.03	88.27		534.27	116.73	0.18
52	Apr-06		-26.07		389	517.23	6.90	-101.20		490.39	-101.39	0.26
53	May-06		-24.31		413	494.01	-2.13	-54.26		513.39	-100.39	0.24
54	Jun-06		-29.47		355	460.49	-11.55	-77.60		459.63	-104.63	0.29
55	Jul-06		0.00		397	448.94	-11.55	-51.94		397.00	0.00	0.00
56	Aug-06		-26.73		350	409.31	-19.97	-34.38		443.57	-93.57	0.27
57	Sep-06		-1.29		311	388.14	-20.33	-76.06		315.02	-4.02	0.01
58	Oct-06		-4.38		425	362.22	-22.01	67.74		443.61	-18.61	0.04
59	Nov-06		-31.94		364	305.33	-32.47	89.66		480.28	-116.28	0.32
60	Dec-06		-5.90		457	264.76	-34.90	199.42		483.96	-26.96	0.06
61	Jan-07		70.41		208	273.80	-21.72	-104.83		61.55	146.45	0.70
62	Feb-07		-60.71		116	230.95	-28.06	-96.18		186.43	-70.43	0.61
63	Mar-07		1.63		296	204.34	-27.62	90.37		291.17	4.83	0.02
64	Apr-07		79.70		372	265.66	-0.94	27.32		75.51	296.49	0.80

Appendix Table E44 Forecasted demand of Low A/T calculated by additive seasonal model with α = 0.30, β = 0.30, γ = 0.77 and c = 0.9

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Dec-02	0.00			155			-93.00				
2	Jan-03	50.97			234			-14.00				
3	Feb-03	44.87			339			91.00				
4	Mar-03	3.83			352			104.00				
5	Apr-03	-33.81			233			-15.00				
6	May-03	-14.59			199			-49.00				
7	Jun-03	-1.01			197			-51.00				
8	Jul-03	8.63			214			-34.00				
9	Aug-03	13.55			243			-5.00				
10	Sep-03	-9.05			221			-27.00				
11	Oct-03	20.36			266			18.00				
12	Nov-03	21.43			323	248.00	15.27	75.00				
13	Dec-03		56.67		393	330.09	35.32	27.26		170.27	222.73	0.57
14	Jan-04		23.11		457	397.09	44.82	43.01		351.41	105.59	0.23
15	Feb-04		-6.16		502	432.64	42.04	74.31		532.91	-30.91	0.06
16	Mar-04		-5.60		548	465.47	39.28	87.44		578.68	-30.68	0.06
17	Apr-04		8.97		538	519.23	43.62	11.05		489.75	48.25	0.09
18	May-04		10.32		573	580.59	48.95	-17.06		513.85	59.15	0.10
19	Jun-04		8.31		631	645.28	53.67	-22.67		578.54	52.46	0.08
20	Jul-04		-19.17		558	666.86	44.04	-91.74		664.94	-106.94	0.19
21	Aug-04		-1.71		694	707.33	42.97	-11.43		705.90	-11.90	0.02
22	Sep-04		-24.71		580	707.31	30.07	-104.37		723.30	-143.30	0.25
23	Oct-04		-43.61		526	668.57	9.43	-105.85		755.38	-229.38	0.44
24	Nov-04		1.57		765	681.60	10.51	81.48		753.00	12.00	0.02
25	Dec-04		9.29		793	714.20	17.14	67.01		719.36	73.64	0.09
26	Jan-05		-49.49		518	654.43	-5.93	-95.40		774.35	-256.35	0.49
27	Feb-05		-25.27		577	604.75	-19.06	-4.41		722.81	-145.81	0.25
28	Mar-05		6.38		719	599.46	-14.93	112.20		673.13	45.87	0.06
29	Apr-05		-6.54		559	573.55	-18.22	-8.70		595.58	-36.58	0.07
30	May-05		14.01		626	581.65	-10.33	30.31		538.27	87.73	0.14
31	Jun-05		16.75		659	604.43	-0.39	36.91		548.65	110.35	0.17
32	Jul-05		-3.91		493	598.25	-2.13	-102.16		512.29	-19.29	0.04

Appendix Table E44 (Continued)

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Aug-05		-4.97		557	587.81	-4.62	-26.38		584.69	-27.69	0.05
34	Sep-05		-4.77		457	576.64	-6.59	-116.15		478.81	-21.81	0.05
35	Oct-05		-25.46		370	541.79	-15.06	-156.71		464.21	-94.21	0.25
36	Nov-05		12.11		692	551.87	-7.52	126.72		608.21	83.79	0.12
37	Dec-05		42.54		1064	680.14	33.21	311.41		611.36	452.64	0.43
38	Jan-06		-38.87		445	661.46	17.65	-188.78		617.95	-172.95	0.39
39	Feb-06		-67.42		403	597.60	-6.80	-151.11		674.70	-271.70	0.67
40	Mar-06		0.00		703	590.80	-6.80	112.20		703.00	0.00	0.00
41	Apr-06		-22.40		470	552.40	-16.28	-65.55		575.30	-105.30	0.22
42	May-06		-0.97		561	534.49	-16.77	27.37		566.43	-5.43	0.01
43	Jun-06		-14.83		483	496.24	-23.22	-1.77		554.63	-71.63	0.15
44	Jul-06		24.93		494	509.96	-12.13	-35.67		370.86	123.14	0.25
45	Aug-06		2.39		483	501.29	-11.09	-20.14		471.45	11.55	0.02
46	Sep-06		29.16		528	536.38	2.76	-33.03		374.05	153.95	0.29
47	Oct-06		34.96		588	600.82	21.26	-45.72		382.43	205.57	0.35
48	Nov-06		-22.35		612	581.04	8.95	52.86		748.80	-136.80	0.22
49	Dec-06		-21.32		743	542.47	-5.30	225.89		901.40	-158.40	0.21
50	Jan-07		35.96		544	595.85	12.30	-83.16		348.39	195.61	0.36
51	Feb-07		-97.85	NG	231	540.34	-8.04	-273.15		457.04	-226.04	0.98
52	Mar-07		64.99		1841	891.25	99.64	758.22		644.50	1196.50	0.65
53	Apr-07		38.23		1498	1162.69	151.18	243.64		925.34	572.66	0.38

Appendix Table E45 Forecasted demand of Low M/T calculated by additive seasonal model with $\alpha = 0.54$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 0.9$

						Alpha	0.54				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			10			-23.50				
2	Feb-02	50.00			15			-18.50				
3	Mar-02	46.67			22			-11.50				
4	Apr-02	59.09			35			1.50				
5	May-02	14.29			40			6.50				
6	Jun-02	-5.00			38			4.50				
7	Jul-02	-36.84			24			-9.50				
8	Aug-02	58.33			38			4.50				
9	Sep-02	-47.37			20			-13.50				
10	Oct-02	45.00			29			-4.50				
11	Nov-02	37.93			40			6.50				
12	Dec-02	**127.50**			91	33.50	7.36	57.50	11.01			
13	Jan-03		**90.02**	OK	174	126.02	32.91	-2.06	11.01	17.36	156.64	0.90
14	Feb-03		63.90		389	294.07	73.45	15.53		140.43	248.57	0.64
15	Mar-03		-0.01		356	367.51	73.45	-11.50		356.02	-0.02	0.00
16	Apr-03		-67.60		264	343.94	44.34	-22.93		442.46	-178.46	0.68
17	May-03		**-99.38**	NG	198	281.30	12.25	-20.44		394.78	-196.78	0.99
18	Jun-03		-45.39		205	242.96	-2.93	-8.24		298.04	-93.04	0.45
19	Jul-03		4.34		241	245.72	-1.22	-8.07		230.53	10.47	0.04
20	Aug-03		-6.87		233	235.80	-3.83	2.31		249.00	-16.00	0.07
21	Sep-03		4.18		228	237.15	-2.28	-12.20		218.47	9.53	0.04
22	Oct-03		10.01		256	248.81	1.90	-0.99		230.38	25.62	0.10
23	Nov-03		23.45		336	293.55	14.75	17.29		257.21	78.79	0.23
24	Dec-03		9.46		404	329.07	20.98	62.73		**319.31**	84.69	0.21
25	Jan-04		2.25		356	354.40	22.29	-0.96		**361.07**	-5.07	0.01
26	Feb-04		-2.95		381	370.59	20.46	13.99		392.22	-11.22	0.03
27	Mar-04		6.74		407	405.98	24.94	-7.75		379.55	27.45	0.07
28	Apr-04		-19.64		341	394.50	14.01	-32.10		407.98	-66.98	0.20
29	May-04		9.54		429	430.76	20.69	-14.84		388.07	40.93	0.10
30	Jun-04		-16.33		381	417.63	10.54	-16.75		443.21	-62.21	0.16
31	Jul-04		-18.34		355	392.77	-0.08	-16.98		420.10	-65.10	0.18
32	Aug-04		19.39		490	444.34	15.42	15.31		395.01	94.99	0.19

Appendix Table E45 (Continued)

						Alpha	0.54				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-166.41	NG	168	307.77	-30.18	-50.47		447.56	-279.56	1.66
34	Oct-04		25.85		373	330.00	-14.46	12.21		276.60	96.40	0.26
35	Nov-04		29.63		473	391.75	8.41	36.48		332.83	140.17	0.30
36	Dec-04		30.08		662	508.41	40.88	89.99		462.88	199.12	0.30
37	Jan-05		-49.82		366	450.16	11.14	-25.92		548.33	-182.33	0.50
38	Feb-05		-10.28		431	437.22	3.92	7.93		475.30	-44.30	0.10
39	Mar-05		28.36		605	534.44	31.91	15.75		433.39	171.61	0.28
40	Apr-05		6.27		570	585.78	37.74	-27.21		534.24	35.76	0.06
41	May-05		-9.67		555	594.33	28.98	-22.19		608.69	-53.69	0.10
42	Jun-05		-1.60		597	618.12	27.42	-18.06		606.56	-9.56	0.02
43	Jul-05		-31.77		477	563.14	2.70	-37.73		628.56	-151.56	0.32
44	Aug-05		-36.74		425	480.95	-22.77	-6.06		581.16	-156.16	0.37
45	Sep-05		-9.01		374	439.85	-28.27	-55.08		407.71	-33.71	0.09
46	Oct-05		-32.85		319	354.61	-45.36	-2.14		423.79	-104.79	0.33
47	Nov-05		30.85		500	393.13	-20.20	57.59		345.73	154.27	0.31
48	Dec-05		36.32		727	516.50	22.88	126.14		462.92	264.08	0.36
49	Jan-06		-96.73	NG	261	402.13	-18.30	-60.48		513.46	-252.46	0.97
50	Feb-06		-41.94		276	320.89	-37.18	-7.92		391.75	-115.75	0.42
51	Mar-06		35.88		467	374.80	-9.85	38.68		299.46	167.54	0.36
52	Apr-06		-31.93		256	320.51	-23.19	-38.40		337.74	-81.74	0.32
53	May-06		8.59		301	311.38	-18.97	-18.64		275.14	25.86	0.09
54	Jun-06		-23.58		222	263.95	-27.51	-25.23		274.35	-52.35	0.24
55	Jul-06		43.38		351	319.24	-2.67	-16.88		198.72	152.28	0.43
56	Aug-06		-15.00		270	294.55	-9.28	-11.61		310.50	-40.50	0.15
57	Sep-06		21.44		293	319.42	0.97	-46.48		230.19	62.81	0.21
58	Oct-06		12.33		363	344.72	8.27	3.99		318.25	44.75	0.12
59	Nov-06		-21.12		339	314.07	-3.41	47.80		410.58	-71.58	0.21
60	Dec-06		-4.50		418	300.44	-6.47	123.57		436.80	-18.80	0.04
61	Jan-07		-44.13		162	255.10	-18.13	-70.27		233.48	-71.48	0.44
62	Feb-07		-110.14	NG	109	171.70	-37.71	-24.35		229.05	-120.05	1.10
63	Mar-07		43.76		307	207.02	-15.80	57.07		172.67	134.33	0.44
64	Apr-07		44.83		277	258.73	4.45	-21.40		152.82	124.18	0.45

Appendix Table E46 Forecasted demand of Top A/T calculated by additive seasonal model with α = 0.59, β = 0.30, γ = 0.30 and $c = 1.0$

						Alpha	0.59				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			188			-104.58				
2	Feb-02	4.26			196			-96.58				
3	Mar-02	20.92			237			-55.58				
4	Apr-02	6.75			253			-39.58				
5	May-02	7.11			271			-21.58				
6	Jun-02	-20.30			216			-76.58				
7	Jul-02	18.98			257			-35.58				
8	Aug-02	3.50			266			-26.58				
9	Sep-02	-35.71			171			-121.58				
10	Oct-02	-33.92			113			-179.58				
11	Nov-02	-79.65			23			-269.58				
12	Dec-02	5639.13			1320	292.58	102.91	1027.42	-94.59			
13	Jan-03		83.94		1811	1298.99	373.96	80.40		290.91	1520.09	0.84
14	Feb-03		-14.98		1371	1550.88	337.34	-121.57		1576.36	-205.36	0.15
15	Mar-03		-24.42		1473	1674.46	273.21	-99.35		1832.64	-359.64	0.24
16	Apr-03		-54.13		1238	1549.39	153.73	-121.13		1908.09	-670.09	0.54
17	May-03		-46.48		1148	1386.00	58.59	-86.51		1681.54	-533.54	0.46
18	Jun-03		-8.83		1257	1378.61	38.80	-90.09		1368.01	-111.01	0.09
19	Jul-03		4.70		1450	1457.93	50.95	-27.29		1381.83	68.17	0.05
20	Aug-03		-12.21		1321	1413.01	22.19	-46.21		1482.30	-161.30	0.12
21	Sep-03		-10.30		1191	1362.32	0.33	-136.50		1313.62	-122.62	0.10
22	Oct-03		-4.70		1130	1331.11	-9.13	-186.04		1183.07	-53.07	0.05
23	Nov-03		12.81		1207	1413.87	18.43	-250.77		1052.39	154.61	0.13
24	Dec-03		-71.53		1434	822.65	-164.46	902.60		1337.71	96.29	0.07
25	Jan-04		31.29		1075	858.14	-104.48	121.33		738.58	336.42	0.31
26	Feb-04		44.06		1130	1049.61	-15.69	-60.98		632.09	497.91	0.44
27	Mar-04		11.67		1058	1107.28	6.32	-84.33		934.57	123.43	0.12
28	Apr-04		-2.63		967	1098.46	1.77	-124.23		992.47	-25.47	0.03
29	May-04		2.24		1037	1114.07	5.93	-83.68		1013.72	23.28	0.02
30	Jun-04		11.22		1160	1197.32	29.12	-74.26		1029.90	130.10	0.11
31	Jul-04		-22.99		975	1093.21	-10.85	-54.56		1199.16	-224.16	0.23
32	Aug-04		16.57		1242	1204.71	25.86	-21.16		1036.15	205.85	0.17

Appendix Table E46 (Continued)

						Alpha	0.59				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		2.58		1123	1247.77	31.02	-132.98		1094.07	28.93	0.03
34	Oct-04		-18.26		924	1178.49	0.93	-206.58		1092.75	-168.75	0.18
35	Nov-04		7.96		1009	1227.18	15.26	-240.99		928.65	80.35	0.08
36	Dec-04		-72.29		1245	707.48	-145.23	793.07		2145.03	-900.03	0.72
37	Jan-05		2.76		703	573.79	-141.77	123.70		683.59	19.41	0.03
38	Feb-05		53.21		793	682.82	-66.53	-9.64		371.04	421.96	0.53
39	Mar-05		45.16		970	876.65	11.58	-31.02		531.97	438.03	0.45
40	Apr-05		0.00		764	888.23	11.58	-124.23		764.00	0.00	0.00
41	May-05		-2.27		798	889.03	8.35	-85.88		816.13	-18.13	0.02
42	Jun-05		4.29		860	919.30	14.92	-69.77		823.11	36.89	0.04
43	Jul-05		-35.12		651	798.32	-25.85	-82.39		879.66	-228.66	0.35
44	Aug-05		-4.64		718	752.67	-31.79	-25.22		751.30	-33.30	0.05
45	Sep-05		-5.17		559	703.71	-36.94	-136.50		587.90	-28.90	0.05
46	Oct-05		21.87		589	743.33	-13.97	-190.90		460.19	128.81	0.22
47	Nov-05		53.04		1040	1057.23	84.39	-173.86		488.36	551.64	0.53
48	Dec-05		-27.70		1515	892.17	9.55	742.00		1934.69	-419.69	0.28
49	Jan-06		-345.83	NG	230	428.95	-132.28	26.90		1025.42	-795.42	3.46
50	Feb-06		48.19		554	455.35	-84.67	22.85		287.04	266.96	0.48
51	Mar-06		42.24		588	518.28	-40.39	-0.80		339.65	248.35	0.42
52	Apr-06		46.98		667	664.13	15.48	-86.10		353.67	313.33	0.47
53	May-06		7.23		640	707.11	23.73	-80.25		593.72	46.28	0.07
54	Jun-06		-17.21		564	673.15	6.42	-81.58		661.07	-97.07	0.17
55	Jul-06		-8.97		548	650.34	-2.35	-88.37		597.18	-49.18	0.09
56	Aug-06		-13.03		551	605.33	-15.15	-33.95		622.78	-71.78	0.13
57	Sep-06		-3.11		440	582.05	-17.59	-138.17		453.68	-13.68	0.03
58	Oct-06		19.66		465	618.81	-1.28	-179.77		373.57	91.43	0.20
59	Nov-06		14.18		517	661.12	11.79	-164.94		443.67	73.33	0.14
60	Dec-06		-113.41	OK	663	226.00	-122.28	650.50	-59.32	1414.91	-751.91	1.13
61	Jan-07		54.96		290	198.45	-93.86	46.30		130.62	159.38	0.55
62	Feb-07		-8.00		118	98.98	-95.54	21.70		127.44	-9.44	0.08
63	Mar-07		99.73		963	574.25	75.70	116.07		2.63	960.37	1.00
64	Apr-07		47.84		1081	957.32	167.91	-23.16		563.85	517.15	0.48

Appendix Table E47 Forecasted demand of Med A/T calculated by additive seasonal model with α = 0.33, β = 0.30, γ = 0.54 and $c = 1.0$

						Alpha	0.33				MAPE	0.25
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	Abs(E_t/Y_t)
1	Jan-02	0.00			265			-277.08				
2	Feb-02	47.17			390			-152.08				
3	Mar-02	11.03			433			-109.08				
4	Apr-02	29.56			561			18.92				
5	May-02	24.60			699			156.92				
6	Jun-02	2.00			713			170.92				
7	Jul-02	5.33			751			208.92				
8	Aug-02	7.06			804			261.92				
9	Sep-02	-10.82			717			174.92				
10	Oct-02	-27.20			522			-20.08				
11	Nov-02	-91.00			47			-495.08				
12	Dec-02	1182.98			603	542.08	30.73	60.92	-210.05			
13	Jan-03		76.71		1270	889.95	125.87	74.98		295.73	974.27	0.77
14	Feb-03		27.23		1187	1121.04	157.44	-35.27		863.73	323.27	0.27
15	Mar-03		0.05		1170	1278.67	157.50	-108.86		1169.39	0.61	0.00
16	Apr-03		-60.08		909	1258.41	104.17	-178.42		1455.09	-546.09	0.60
17	May-03		-87.36		811	1131.96	34.98	-99.11		1519.50	-708.50	0.87
18	Jun-03		-18.71		1127	1098.30	14.39	94.72		1337.86	-210.86	0.19
19	Jul-03		-12.48		1175	1064.97	0.07	155.94		1321.61	-146.61	0.12
20	Aug-03		-14.69		1157	1009.72	-16.52	200.50		1326.96	-169.96	0.15
21	Sep-03		-1.75		1148	986.65	-18.49	167.65		1168.11	-20.11	0.02
22	Oct-03		27.85		1314	1087.27	17.25	112.15		948.08	365.92	0.28
23	Nov-03		49.80		1214	1301.31	76.28	-276.62		609.44	604.56	0.50
24	Dec-03		17.52		1744	1477.03	106.11	171.31		1167.54	576.46	0.33
25	Jan-04		-32.86		1248	1449.65	66.06	-73.22		1658.13	-410.13	0.33
26	Feb-04		-10.73		1337	1469.02	52.06	-87.10		1480.45	-143.45	0.11
27	Mar-04		-15.76		1220	1458.51	33.29	-178.32		1412.21	-192.21	0.16
28	Apr-04		-11.02		1183	1449.36	20.55	-225.53		1313.38	-130.38	0.11
29	May-04		4.41		1434	1490.48	26.73	-76.27		1370.81	63.19	0.04
30	Jun-04		-8.11		1491	1477.84	14.92	51.02		1611.93	-120.93	0.08
31	Jul-04		-16.11		1420	1418.32	-7.42	73.29		1648.70	-228.70	0.16
32	Aug-04		8.44		1760	1459.27	7.10	254.20		1611.40	148.60	0.08

Appendix Table E47 (Continued)

						Alpha	0.33				MAPE	0.25
		Diff (%)				Beta	0.30					
						Gamma	0.54					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		-6.31		1537	1434.79	-2.38	132.59		1634.02	-97.02	0.06
34	Oct-04		-5.14		1469	1407.82	-9.76	84.84		1544.55	-75.55	0.05
35	Nov-04		27.88		1555	1539.19	32.58	-119.95		1121.44	433.56	0.28
36	Dec-04		18.32		2134	1699.02	70.76	312.57		1743.08	390.92	0.18
37	Jan-05		-28.82		1317	1646.23	33.69	-210.38		1696.55	-379.55	0.29
38	Feb-05		-10.92		1436	1628.87	18.38	-143.77		1592.82	-156.82	0.11
39	Mar-05		16.40		1757	1741.02	46.51	-74.22		1468.93	288.07	0.16
40	Apr-05		0.00		1562	1787.53	46.51	-225.53		1562.00	0.00	0.00
41	May-05		-16.80		1505	1751.76	21.83	-167.61		1757.77	-252.77	0.17
42	Jun-05		-9.45		1667	1722.28	6.43	-5.93		1824.61	-157.61	0.09
43	Jul-05		-36.31		1322	1572.47	-40.44	-100.16		1802.01	-480.01	0.36
44	Aug-05		-29.81		1376	1398.50	-80.50	105.96		1786.23	-410.23	0.30
45	Sep-05		-36.46		1063	1191.83	-118.35	-7.47		1450.59	-387.59	0.36
46	Oct-05		-20.66		960	1008.93	-137.72	13.18		1158.33	-198.33	0.21
47	Nov-05		54.96		1668	1169.62	-48.19	211.32		751.26	916.74	0.55
48	Dec-05		38.46		2330	1413.08	39.30	636.35		1434.00	896.00	0.38
49	Jan-06		-56.23		795	1306.88	-4.35	-371.91		1242.01	-447.01	0.56
50	Feb-06		-55.12		747	1168.50	-44.56	-292.56		1158.76	-411.76	0.55
51	Mar-06		18.56		1289	1201.83	-21.19	12.24		1049.72	239.28	0.19
52	Apr-06		11.73		1082	1221.94	-8.80	-179.68		955.11	126.89	0.12
53	May-06		19.01		1291	1293.05	15.17	-78.91		1045.53	245.47	0.19
54	Jun-06		-25.34		1039	1222.51	-10.54	-101.07		1302.28	-263.28	0.25
55	Jul-06		7.81		1206	1242.63	-1.34	-66.13		1111.81	94.19	0.08
56	Aug-06		-26.03		1069	1150.72	-28.51	5.41		1347.25	-278.25	0.26
57	Sep-06		14.05		1297	1181.53	-10.72	58.39		1114.74	182.26	0.14
58	Oct-06		4.52		1240	1189.05	-5.25	33.41		1183.99	56.01	0.05
59	Nov-06		-5.29		1325	1160.98	-12.09	185.98		1395.13	-70.13	0.05
60	Dec-06		1.15		1806	1155.64	-10.07	643.86		1785.23	20.77	0.01
61	Jan-07		12.48		884	1181.49	0.71	-332.04		773.67	110.33	0.12
62	Feb-07		**-124.66**	NG	396	1021.51	-47.50	-470.94		889.63	-493.63	1.25
63	Mar-07		17.74		1199	1043.27	-26.72	89.12		986.26	212.74	0.18
64	Apr-07		42.68		1460	1219.38	34.13	45.50		836.87	623.13	0.43

Appendix Table E48 Forecasted demand of Med M/T calculated by additive seasonal model with α = 0.30, β = 0.30, γ = 0.62 and $c = 1.0$

						Alpha	0.30				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	Abs(E_t/Y_t)
1	Jan-02	0.00			244			-108.50				
2	Feb-02	17.21			286			-66.50				
3	Mar-02	-3.15			277			-75.50				
4	Apr-02	32.85			368			15.50				
5	May-02	10.05			405			52.50				
6	Jun-02	7.90			437			84.50				
7	Jul-02	12.13			490			137.50				
8	Aug-02	6.53			522			169.50				
9	Sep-02	-14.94			444			91.50				
10	Oct-02	-7.66			410			57.50				
11	Nov-02	-83.90			66			-286.50				
12	Dec-02	325.76			281	352.50	3.36	-71.50	-109.14			
13	Jan-03		62.23		655	478.15	40.05	68.21		247.36	407.64	0.62
14	Feb-03		52.95		960	670.69	85.80	153.85		451.71	508.29	0.53
15	Mar-03		29.36		964	841.39	111.27	47.19		680.99	283.01	0.29
16	Apr-03		-21.17		799	901.91	96.04	-57.83		968.16	-169.16	0.21
17	May-03		-61.36		651	878.12	60.09	-120.67		1050.46	-399.46	0.61
18	Jun-03		-41.85		721	847.70	32.94	-46.29		1022.71	-301.71	0.42
19	Jul-03		-37.03		743	798.10	8.18	18.23		1018.14	-275.14	0.37
20	Aug-03		-28.56		759	741.24	-11.33	75.53		975.77	-216.77	0.29
21	Sep-03		-6.26		773	715.38	-15.69	70.52		821.41	-48.41	0.06
22	Oct-03		20.96		958	759.94	2.38	144.55		757.19	200.81	0.21
23	Nov-03		32.79		708	831.97	23.28	-185.85		475.82	232.18	0.33
24	Dec-03		-12.29		698	829.53	15.56	-108.67		746.11	-48.11	0.07
25	Jan-04		-79.08		510	724.10	-20.74	-106.62		913.30	-403.30	0.79
26	Feb-04		-51.99		564	615.40	-47.12	26.74		857.21	-293.21	0.52
27	Mar-04		-23.34		499	533.34	-57.61	-3.30		615.46	-116.46	0.23
28	Apr-04		8.15		455	486.86	-54.27	-41.75		417.90	37.10	0.08
29	May-04		40.81		527	497.12	-34.91	-27.43		311.93	215.07	0.41
30	Jun-04		21.67		531	496.73	-24.55	3.60		415.91	115.09	0.22
31	Jul-04		8.51		536	485.86	-20.45	37.99		490.41	45.59	0.09
32	Aug-04		14.81		635	493.63	-11.98	116.30		540.94	94.06	0.15

Appendix Table E48 (Continued)

						Alpha	0.30				MAPE	0.32
			Diff (%)			Beta	0.30					
						Gamma	0.62					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	Abs(E_t/Y_t)
33	Sep-04		**-124.46**	NG	246	389.80	-39.54	-62.21		552.16	-306.16	1.24
34	Oct-04		3.73		514	356.02	-37.81	152.87		494.81	19.19	0.04
35	Nov-04		76.62		566	448.30	1.22	2.14		132.36	433.64	0.77
36	Dec-04		51.24		699	556.96	33.45	46.59		340.84	358.16	0.51
37	Jan-05		-24.69		388	561.68	24.83	-148.15		483.79	-95.79	0.25
38	Feb-05		-33.90		458	539.93	10.86	-40.56		613.25	-155.25	0.34
39	Mar-05		14.72		642	579.14	19.36	37.67		547.49	94.51	0.15
40	Apr-05		-6.86		521	587.78	16.15	-57.25		556.76	-35.76	0.07
41	May-05		6.26		615	615.48	19.61	-10.74		576.49	38.51	0.06
42	Jun-05		-14.87		556	610.28	12.17	-32.25		638.69	-82.69	0.15
43	Jul-05		-45.79		453	560.22	-6.50	-51.94		660.44	-207.44	0.46
44	Aug-05		-61.06		416	477.51	-29.36	6.18		670.02	-254.02	0.61
45	Sep-05		-7.80		358	439.77	-31.88	-74.32		385.94	-27.94	0.08
46	Oct-05		-46.41		383	354.56	-47.88	75.81		560.76	-177.76	0.46
47	Nov-05		50.75		627	402.14	-19.24	140.07		308.82	318.18	0.51
48	Dec-05		46.91		809	496.75	14.92	211.11		429.49	379.51	0.47
49	Jan-06		-14.68		317	497.71	10.73	-168.31		363.52	-46.52	0.15
50	Feb-06		-14.12		410	491.08	5.52	-65.65		467.88	-57.88	0.14
51	Mar-06		17.93		651	531.62	16.03	88.27		534.27	116.73	0.18
52	Apr-06		-26.07		389	517.23	6.90	-101.20		490.39	-101.39	0.26
53	May-06		-24.31		413	494.01	-2.13	-54.26		513.39	-100.39	0.24
54	Jun-06		-29.47		355	460.49	-11.55	-77.60		459.63	-104.63	0.29
55	Jul-06		0.00		397	448.94	-11.55	-51.94		397.00	0.00	0.00
56	Aug-06		-26.73		350	409.31	-19.97	-34.38		443.57	-93.57	0.27
57	Sep-06		-1.29		311	388.14	-20.33	-76.06		315.02	-4.02	0.01
58	Oct-06		-4.38		425	362.22	-22.01	67.74		443.61	-18.61	0.04
59	Nov-06		-31.94		364	305.33	-32.47	89.66		480.28	-116.28	0.32
60	Dec-06		-5.90		457	264.76	-34.90	199.42		483.96	-26.96	0.06
61	Jan-07		70.41		208	273.80	-21.72	-104.83		61.55	146.45	0.70
62	Feb-07		-60.71		116	230.95	-28.06	-96.18		186.43	-70.43	0.61
63	Mar-07		1.63		296	204.34	-27.62	90.37		291.17	4.83	0.02
64	Apr-07		79.70		372	265.66	-0.94	27.32		75.51	296.49	0.80

Appendix Table E49 Forecasted demand of Low A/T calculated by additive seasonal model with α = 0.30, β = 0.30, γ = 0.77 and $c = 1.0$

						Alpha	0.30				MAPE	0.23
		Diff (%)				Beta	0.30					
						Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Dec-02	0.00			155			-93.00				
2	Jan-03	50.97			234			-14.00				
3	Feb-03	44.87			339			91.00				
4	Mar-03	3.83			352			104.00				
5	Apr-03	-33.81			233			-15.00				
6	May-03	-14.59			199			-49.00				
7	Jun-03	-1.01			197			-51.00				
8	Jul-03	8.63			214			-34.00				
9	Aug-03	13.55			243			-5.00				
10	Sep-03	-9.05			221			-27.00				
11	Oct-03	20.36			266			18.00				
12	Nov-03	21.43			323	248.00	15.27	75.00				
13	Dec-03		56.67		393	330.09	35.32	27.26		170.27	222.73	0.57
14	Jan-04		23.11		457	397.09	44.82	43.01		351.41	105.59	0.23
15	Feb-04		-6.16		502	432.64	42.04	74.31		532.91	-30.91	0.06
16	Mar-04		-5.60		548	465.47	39.28	87.44		578.68	-30.68	0.06
17	Apr-04		8.97		538	519.23	43.62	11.05		489.75	48.25	0.09
18	May-04		10.32		573	580.59	48.95	-17.06		513.85	59.15	0.10
19	Jun-04		8.31		631	645.28	53.67	-22.67		578.54	52.46	0.08
20	Jul-04		-19.17		558	666.86	44.04	-91.74		664.94	-106.94	0.19
21	Aug-04		-1.71		694	707.33	42.97	-11.43		705.90	-11.90	0.02
22	Sep-04		-24.71		580	707.31	30.07	-104.37		723.30	-143.30	0.25
23	Oct-04		-43.61		526	668.57	9.43	-105.85		755.38	-229.38	0.44
24	Nov-04		1.57		765	681.60	10.51	81.48		753.00	12.00	0.02
25	Dec-04		9.29		793	714.20	17.14	67.01		719.36	73.64	0.09
26	Jan-05		-49.49		518	654.43	-5.93	-95.40		774.35	-256.35	0.49
27	Feb-05		-25.27		577	604.75	-19.06	-4.41		722.81	-145.81	0.25
28	Mar-05		6.38		719	599.46	-14.93	112.20		673.13	45.87	0.06
29	Apr-05		-6.54		559	573.55	-18.22	-8.70		595.58	-36.58	0.07
30	May-05		14.01		626	581.65	-10.33	30.31		538.27	87.73	0.14
31	Jun-05		16.75		659	604.43	-0.39	36.91		548.65	110.35	0.17
32	Jul-05		-3.91		493	598.25	-2.13	-102.16		512.29	-19.29	0.04

Appendix Table E49 (Continued)

						Alpha	0.30				MAPE	0.23
						Beta	0.30					
		Diff (%)				Gamma	0.77					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Aug-05		-4.97		557	587.81	-4.62	-26.38		584.69	-27.69	0.05
34	Sep-05		-4.77		457	576.64	-6.59	-116.15		478.81	-21.81	0.05
35	Oct-05		-25.46		370	541.79	-15.06	-156.71		464.21	-94.21	0.25
36	Nov-05		12.11		692	551.87	-7.52	126.72		608.21	83.79	0.12
37	Dec-05		42.54		1064	680.14	33.21	311.41		611.36	452.64	0.43
38	Jan-06		-38.87		445	661.46	17.65	-188.78		617.95	-172.95	0.39
39	Feb-06		-67.42		403	597.60	-6.80	-151.11		674.70	-271.70	0.67
40	Mar-06		0.00		703	590.80	-6.80	112.20		703.00	0.00	0.00
41	Apr-06		-22.40		470	552.40	-16.28	-65.55		575.30	-105.30	0.22
42	May-06		-0.97		561	534.49	-16.77	27.37		566.43	-5.43	0.01
43	Jun-06		-14.83		483	496.24	-23.22	-1.77		554.63	-71.63	0.15
44	Jul-06		24.93		494	509.96	-12.13	-35.67		370.86	123.14	0.25
45	Aug-06		2.39		483	501.29	-11.09	-20.14		471.45	11.55	0.02
46	Sep-06		29.16		528	536.38	2.76	-33.03		374.05	153.95	0.29
47	Oct-06		34.96		588	600.82	21.26	-45.72		382.43	205.57	0.35
48	Nov-06		-22.35		612	581.04	8.95	52.86		748.80	-136.80	0.22
49	Dec-06		-21.32		743	542.47	-5.30	225.89		901.40	-158.40	0.21
50	Jan-07		35.96		544	595.85	12.30	-83.16		348.39	195.61	0.36
51	Feb-07		-97.85		231	540.34	-8.04	-273.15		457.04	-226.04	0.98
52	Mar-07		64.99		1841	891.25	99.64	758.22		644.50	1196.50	0.65
53	Apr-07		38.23		1498	1162.69	151.18	243.64		925.34	572.66	0.38

Appendix Table E50 Forecasted demand of Low M/T calculated by additive seasonal model with $\alpha = 0.54$, $\beta = 0.30$, $\gamma = 0.30$ and $c = 1.0$

						Alpha	0.54				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
1	Jan-02	0.00			10			-23.50				
2	Feb-02	50.00			15			-18.50				
3	Mar-02	46.67			22			-11.50				
4	Apr-02	59.09			35			1.50				
5	May-02	14.29			40			6.50				
6	Jun-02	-5.00			38			4.50				
7	Jul-02	-36.84			24			-9.50				
8	Aug-02	58.33			38			4.50				
9	Sep-02	-47.37			20			-13.50				
10	Oct-02	45.00			29			-4.50				
11	Nov-02	37.93			40			6.50				
12	Dec-02	**127.50**			91	33.50	7.36	57.50	6.74			
13	Jan-03		90.02		174	126.02	32.91	-2.06		17.36	156.64	0.90
14	Feb-03		63.90		389	294.07	73.45	15.53		140.43	248.57	0.64
15	Mar-03		-0.01		356	367.51	73.45	-11.50		356.02	-0.02	0.00
16	Apr-03		-67.60		264	343.94	44.34	-22.93		442.46	-178.46	0.68
17	May-03		-99.38		198	281.30	12.25	-20.44		394.78	-196.78	0.99
18	Jun-03		-45.39		205	242.96	-2.93	-8.24		298.04	-93.04	0.45
19	Jul-03		4.34		241	245.72	-1.22	-8.07		230.53	10.47	0.04
20	Aug-03		-6.87		233	235.80	-3.83	2.31		249.00	-16.00	0.07
21	Sep-03		4.18		228	237.15	-2.28	-12.20		218.47	9.53	0.04
22	Oct-03		10.01		256	248.81	1.90	-0.99		230.38	25.62	0.10
23	Nov-03		23.45		336	293.55	14.75	17.29		257.21	78.79	0.23
24	Dec-03		9.46		404	329.07	20.98	62.73		**315.04**	88.96	0.22
25	Jan-04		2.25		356	354.40	22.29	-0.96		348.00	8.00	0.02
26	Feb-04		-2.95		381	370.59	20.46	13.99		392.22	-11.22	0.03
27	Mar-04		6.74		407	405.98	24.94	-7.75		379.55	27.45	0.07
28	Apr-04		-19.64		341	394.50	14.01	-32.10		407.98	-66.98	0.20
29	May-04		9.54		429	430.76	20.69	-14.84		388.07	40.93	0.10
30	Jun-04		-16.33		381	417.63	10.54	-16.75		443.21	-62.21	0.16
31	Jul-04		-18.34		355	392.77	-0.08	-16.98		420.10	-65.10	0.18
32	Aug-04		19.39		490	444.34	15.42	15.31		395.01	94.99	0.19

Appendix Table E50 (Continued)

						Alpha	0.54				MAPE	0.32
		Diff (%)				Beta	0.30					
						Gamma	0.30					
Month		$(Y_t-Y_{t-1})/Y_{t-1}$	$(Y_t-F_t)/Y_t$	Interpolation value	Y_t	R_t	G_t	S_t	New S_t	F_t	E_t	$Abs(E_t/Y_t)$
33	Sep-04		**-166.41**	NG	168	307.77	-30.18	-50.47		447.56	-279.56	1.66
34	Oct-04		25.85		373	330.00	-14.46	12.21		276.60	96.40	0.26
35	Nov-04		29.63		473	391.75	8.41	36.48		332.83	140.17	0.30
36	Dec-04		30.08		662	508.41	40.88	89.99		462.88	199.12	0.30
37	Jan-05		-49.82		366	450.16	11.14	-25.92		548.33	-182.33	0.50
38	Feb-05		-10.28		431	437.22	3.92	7.93		475.30	-44.30	0.10
39	Mar-05		28.36		605	534.44	31.91	15.75		433.39	171.61	0.28
40	Apr-05		6.27		570	585.78	37.74	-27.21		534.24	35.76	0.06
41	May-05		-9.67		555	594.33	28.98	-22.19		608.69	-53.69	0.10
42	Jun-05		-1.60		597	618.12	27.42	-18.06		606.56	-9.56	0.02
43	Jul-05		-31.77		477	563.14	2.70	-37.73		628.56	-151.56	0.32
44	Aug-05		-36.74		425	480.95	-22.77	-6.06		581.16	-156.16	0.37
45	Sep-05		-9.01		374	439.85	-28.27	-55.08		407.71	-33.71	0.09
46	Oct-05		-32.85		319	354.61	-45.36	-2.14		423.79	-104.79	0.33
47	Nov-05		30.85		500	393.13	-20.20	57.59		345.73	154.27	0.31
48	Dec-05		36.32		727	516.50	22.88	126.14		462.92	264.08	0.36
49	Jan-06		-96.73		261	402.13	-18.30	-60.48		513.46	-252.46	0.97
50	Feb-06		-41.94		276	320.89	-37.18	-7.92		391.75	-115.75	0.42
51	Mar-06		35.88		467	374.80	-9.85	38.68		299.46	167.54	0.36
52	Apr-06		-31.93		256	320.51	-23.19	-38.40		337.74	-81.74	0.32
53	May-06		8.59		301	311.38	-18.97	-18.64		275.14	25.86	0.09
54	Jun-06		-23.58		222	263.95	-27.51	-25.23		274.35	-52.35	0.24
55	Jul-06		43.38		351	319.24	-2.67	-16.88		198.72	152.28	0.43
56	Aug-06		-15.00		270	294.55	-9.28	-11.61		310.50	-40.50	0.15
57	Sep-06		21.44		293	319.42	0.97	-46.48		230.19	62.81	0.21
58	Oct-06		12.33		363	344.72	8.27	3.99		318.25	44.75	0.12
59	Nov-06		-21.12		339	314.07	-3.41	47.80		410.58	-71.58	0.21
60	Dec-06		-4.50		418	300.44	-6.47	123.57		436.80	-18.80	0.04
61	Jan-07		-44.13		162	255.10	-18.13	-70.27		233.48	-71.48	0.44
62	Feb-07		**-110.14**	NG	109	171.70	-37.71	-24.35		229.05	-120.05	1.10
63	Mar-07		43.76		307	207.02	-15.80	57.07		172.67	134.33	0.44
64	Apr-07		44.83		277	258.73	4.45	-21.40		152.82	124.18	0.45

Appendix F

Company's forecasts data during May'07 to Mar'08

Appendix Table F1 Company's forecast data comparing with actual sale

		Top A/T	Med A/T	Med M/T	Low A/T	Low M/T
May'07	Actual	935	2050	480	1250	403
	Forecast	1456	2498	752	942	503
	Error	-0.56	-0.22	-0.57	0.25	-0.25
	Abs (Error)	0.56	0.22	0.57	0.25	0.25
Jun'07	Actual	705	1935	446	1174	380
	Forecast	1222	2741	742	1035	544
	Error	-0.73	-0.42	-0.66	0.12	-0.43
	Abs (Error)	0.73	0.42	0.66	0.12	0.43
Jul'07	Actual	578	1640	402	1020	372
	Forecast	1093	3044	814	1362	594
	Error	-0.89	-0.86	-1.02	-0.34	-0.60
	Abs (Error)	0.89	0.86	1.02	0.34	0.60
Aug'07	Actual	472	1587	398	1097	374
	Forecast	1043	3143	810	1485	682
	Error	-1.21	-0.98	-1.04	-0.35	-0.82
	Abs (Error)	1.21	0.98	1.04	0.35	0.82
Sep'07	Actual	401	1586	381	1179	433
	Forecast	938	3062	712	1450	541
	Error	-1.34	-0.93	-0.87	-0.23	-0.25
	Abs (Error)	1.34	0.93	0.87	0.23	0.25
Oct'07	Actual	468	2021	488	1353	468
	Forecast	771	2742	616	1412	494
	Error	-0.65	-0.36	-0.26	-0.04	-0.06
	Abs (Error)	0.65	0.36	0.26	0.04	0.06
Nov'07	Actual	696	2410	564	1482	473
	Forecast	653	2680	713	1380	573
	Error	0.06	-0.11	-0.26	0.07	-0.21
	Abs (Error)	0.06	0.11	0.26	0.07	0.21
Dec'07	Actual	707	2505	505	1952	433
	Forecast	518	2311	677	1413	569
	Error	0.27	0.08	-0.34	0.28	-0.31
	Abs (Error)	0.27	0.08	0.34	0.28	0.31
Jan'08	Actual	529	2214	456	1501	486
	Forecast	418	2082	701	1465	582
	Error	0.21	0.06	-0.54	0.02	-0.20
	Abs (Error)	0.21	0.06	0.54	0.02	0.20
Feb'08	Actual	528	2479	569	1101	456
	Forecast	425	2134	717	1209	547
	Error	0.20	0.14	-0.26	-0.10	-0.20
	Abs (Error)	0.20	0.14	0.26	0.10	0.20
Mar'08	Actual	664	2842	661	1170	508
	Forecast	531	2320	761	1119	567
	Error	0.20	0.18	-0.15	0.04	-0.12
	Abs (Error)	0.20	0.18	0.15	0.04	0.12
MAPE		0.57	0.39	0.54	0.17	0.31

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