
An Efficacy of Receivables Management of Selected Two and Three Wheelers Sector in India

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ABSTRACT

This paper examines the efficiency of receivables management of the selected two and three wheelers sector in India. The period covered in this study is fifteen years commencing from 1994-95 to 2008-09, which is supposed as a normal and stable period. The study was mainly based on secondary data and required information were collected from PROWESS, which is the most reliable and empowered corporate database of CMIE. Finally he concluded the collection period of all companies was less than the Tandon Committee's suggested norms in case of Kinetic Engineering Ltd, Majestic Auto Ltd and Kinetic Motors Ltd, it was higher than the industry average and in case of Hero Honda Motors Ltd, TVS Motor Company Ltd, Maharashtra Scooters Ltd and Scooters India Ltd collection period was lower than the industry average.

Introduction

Receivables are usually provided to push up the overall sales revenue that eventually helps a firm to report higher profit. However, credit sales not only result in blockage of funds on account receivables, but also increase chances of bad debts. Still firms resort to credit in order to grow faster (Hutson and Butterworth, 1974) and to keep its manufacturing function insulated from the vagaries of the market (Alchain, 1970). Firms also allow receivables to fluctuate in response to deviation in demand that manufacturing firms would remain undistributed (Emery, 1984). Referring trade credit to financial motive, Schwartz (1974) observed that the seller with better access to the capital market would profit more by extending trade credit to the buyer who has relatively poor access to the capital.

Among many factors that influence the size of receivables, sales volume, terms of trade, credit

period and cash discount assume importance. Credit policy adopted by a firm should be optimum. Evaluating the credit worthiness of the customer is the key factor in credit management. The firm will have to pay a higher price if it does not extend the facility to good customer (popularly known as type I error) and if it extends the facility to bad customers (popularly known as type II error). In order to avoid these types of mistakes there are proven methods of evaluating the credit worthiness of customers. It should, however,

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be noted that these methods may not prove to be 100 per cent fault-free. Traditional credit analysis calls for assessing the customer in terms of his character, capacity to pay, capital position, collateral security offered and general economic conditions in which his business is operated.

This paper aims to assess the effectiveness of receivables management of selected two and three wheelers sector in India. After the economic liberalization in the 1990s, the two and three wheelers sectors has gained significant momentum. As this industry is capital intensive and has several players who are listed companies, it is worth asking if these companies are efficiently managing their receivables. In particular, the objectives of this paper is to analyze the constitution of receivables in select units and to assess the effectiveness of receivables management in these units.

Data Analysis and Interpretation

Apart from critically examining the percentage of receivables to current assets, total assets and sales the study, attempts to analysis the efficiency of receivable management in terms of receivables turnover, average collection period and the relationship between receivables and payables. Besides using simple ratio analysis, the study also uses one-way ANOVA analysis. In order to meet the objectives of the study, data were collected from secondary sources such as prowess, captaline etc. All the nine major players in the two and three wheelers industry were selected for the study. They are Bajaj Auto Ltd (BAL), LML Ltd (LML), Maharashtra Scooters Ltd (MSL), TVS Motors Company Ltd (TVS), Kinetic Motors Ltd (KML), Hero Honda Motors Ltd (HHML), Kinetic Engineering Ltd (KEL), Majestic Auto Ltd (MAL), Scooters India Ltd (SIL). The period of study were ten years.

Ratio of Receivables to Current Assets

Receivables as a percentage of current assts would reveals the size of receivables in current assets and the opportunity cost associated with the same; higher the percentage higher the cost of carrying the receivables. It is therefore desired that a firm needs to carry the least percentage of receivables as possible without affecting the sales volume.

$$\text{This ratio is} = \frac{\text{Ending Receivables}}{\text{Current Assets}} \times 100$$

The ratio of receivables to current assets of the sample companies is presented in Table 1 which shows that of all the companies Kinetic Engineering Ltd and Majestic Auto Ltd had the highest average percentage of receivables to current assts followed by Maharashtra Scooters Ltd, Bajaj Auto Ltd, TVS Motors Company Ltd, LML Ltd and Hero Honda Motors Ltd, Scooters India Ltd on the other hand was only the company to have the least percentage of receivables to current assets, which is very far away from industry averages. As suggested by Gitman (2001), an average manufacturing firm could afford to have the percentage of receivables to current assets less than or equal to 37 per cent. When we compare with this suggested standard, we find the situation across the industry is better, with the overall percentage of receivables to current assets at 47.22 per cent. While Kinetic Engineering Ltd had a much higher percentage of receivables to current assets as against the standards, Scooters India Ltd had a much lower percentage.

The one-way ANOVA results, as given in Table 7-A shows that, F calculated value (31.99) is greater than F ctical value (1.94), which leads to the conclusion that the ratios of receivables to current assts of sample companies differ significantly.

Ratio Receivables to Total Assets

Percentage of receivables to total assets, another indicator of effective management of receivables is found out using the following formula:

$$\text{This ratio is} = \frac{\text{Ending Receivables}}{\text{Total Assets}} \times 100$$

Though Gitman (2001) suggested that an average manufacturing firm could not afford to have more than 16 per cent of receivables to total assets, Mian and Clifford (1992) observed that even in an advanced economy like the US, the percentage of receivables to total assets was 20 per cent in an average manufacturing firm. However as far as the Indian context is concerned, Bhattacharya (2003)

observed that an average Indian economy maintained 26 per cent of receivables to total assets, which is higher than the suggested standard and that of us manufacturing firms. The percentage of receivables to total assets of sample companies is presented in Table 2.

As shown in Table 2, the 15 years industry average percentage of receivables to total assets was 27.52 per cent. Hero Honda Motors Ltd and Scooters India Ltd has managed receivables more effectively than other sample companies whereas Knetic Engineering Ltd and Bajaj Auto Ltd held much higher percentage of receivables to total assets. Maharashtra Scooter Ltd, Kinetic Motors Ltd, TVS Motor Company Ltd, Majestic Auto Ltd, LML Ltd on the other hand maintained a reasonable percentage of receivables to total assets closer to the industry aggregate.

The one-way ANOVA results for the ratio of receivables to total assets (Table 7-B) shows that F calculated value (13.67) > F critical value (1.94). It suggested that the ratio differed significantly across the samples.

Ratio of Receivables to Sales

This ratio indicates the amount of receivables held by the company as a percentage of sales during a given period of time. This is computed to know the efficiency of receivables management.

The efficiency of receivables management is inversely related to this ratio. Lower ratio reflects the firm's ability in doing larger business with lesser debtors. Increase in sales and decrease in debtors indicate the company's collection mechanism. As suggested by Hampton (1983), this could be computed as follows.

$$\text{This ratio is} = \frac{\text{Ending Receivables}}{\text{Sales}} \times 100$$

This ratio of receivables to sales of sample companies is presented in Table 3.

The data in Table 3 reveal that the amount of receivables as percentage of sales across the industry. On an average, was the highest of 35.49

per cent in 2008-09 and the lowest of 23.75 per cent in 1998-99 of all the companies. Hero Honda Motors Ltd and Scooters India Ltd were more efficient by holding less amount of investment in receivables as percentage of sales when compared to the yearly industry average, whereas Maharashtra Scooters Ltd, Kinetic Engineering Ltd and Bajaj Auto Ltd was inefficient as it had the ratio above industry average. On an aggregate basis, LML Ltd, Kinetic Motors Ltd, TVS Motor Company Ltd were the companies to maintain the receivables as percentage of sales below the industry aggregate. Majestic Auto Ltd on an average could maintain the receivables almost on par with the industry aggregate.

The one-way ANOVA results for the ratios of receivables to sales of sample companies are given in Table 7-C. Since F calculated value (40.80) is greater than the F critical value (1.94), we conclude that the ratios of receivables to sales of sample companies differ significantly.

Receivable turnover ratio and average collection period

Receivable turnover ratio measures the liquidity of debtors of a firm and average collection period indicates the average time lag (in days) between sales and collection thereof. The debtors velocity also indicates receivables management efficiency rate. Higher turnover and lower collection period of receivables reflect the firm's ability in transacting a larger business without corresponding increase in receivables. The reverse is the case with lower turnover and higher collection period. Mathur (2002) suggested that these ratios could be computed by the following formulae.

$$\text{Receivables turnover ratio (times)} = \frac{\text{Sales}}{\text{Average receivables}} \times 100$$

$$\text{Average collection period (in days)} = \frac{365}{\text{Receivables turnover ratio}} \times 100$$

The value of average receivables is obtained by dividing the sum of opening and closing receivables by two. The average collection period of the companies could be compared with the Tandon

Committee's suggested norm of 68 days for the purpose of assessing the efficiency of receivables turnover (Table 4).

As shown in Table 4 the receivables turnover of the industry varied between 34.87 times in 2006-07 and 15.11 times in 1995-96 and the overall industry aggregate ratio was 23.05 times.

The receivable turnover of Kinetic Engineering Ltd and Majestic Auto Ltd were much below the yearly industry average. The data indicate that, on an aggregate basis Hero Honda Motors Ltd was only the efficiently company to achieve higher turnover of receivables (54.86 times) than the overall industry aggregate.

The one-way ANOVA results for the receivables turnover ratios of sample companies are shown in Table 7-D. Since F calculated value (14.32) > F critical value (1.94), we conclude that the receivables turnover ratio of sample companies differ significantly.

Average collection period of sample companies is presented in Table 5. On an aggregate basis, the receivable collection period across the industry varied between the highest of 24 days in 1995-96 and the lowest of 10 days in 2006-07 and the overall aggregate period was 17 days. As in the case of receivables turnover Hero Honda Motors Ltd was only the vary effective companies by holding receivables for a lesser period than the yearly industry average, whereas Kinetic Engineering Ltd was highly ineffective by holding the receivables for a higher time period than the yearly industry average through out the study period. On the other hand the remaining sample companies are some what better in collection period.

The one-way ANOVA results for the average collection periods of sample companies are presented in Table 7-E. Since F calculated value (30.70) is greater than the F critical value (1.94), we conclude that the average collection periods of sample companies differ significantly.

Receivables to payable ratio of sample companies

The ratio of receivables to payables would help the finance manager to establish the relationship between credit offered to the customers and credit obtained from the suppliers of the company. This ratio is computed as follows.

$$\text{Receivables to payable ratio is} = \frac{\text{Sales}}{\text{Average Receivables}}$$

Though there are no specific standards to measures the effectiveness of this ratio Vause (2004) suggests that this ratio could be measured in unitary terms and be compared with the similar companies in the industry. The receivables to payables ratio of samples companies is shown in Table 6.

As we could observe in Table 6 Maharashtra Scooters Ltd higher units of credit to its customers during the entire period under review, when compared to other sample companies. Hero Honda Motors Ltd extended much lower units of credit to its customers for every its suppliers. The ten year average ratios indicated that Maharashtra Scooters Ltd extended the credit by 58.40 units for every units of credit from its creditors which is higher than that of industry aggregate of 28.50 units. The whole sample companies credit to their customer than the ten years industry average of 28.50 for every unit of credit from suppliers. However, the overall picture reveals that all the sample companies had extended liberal credit facilities to their customers than the credit facility they enjoyed from their suppliers. The one-way ANOVA results pertaining to receivables to payable ratios of sample companies are depicted in Table 7-F.

Since F calculated value (40.80) > F critical value (1.94), we conclude that the ratios of receivables to payable of sample companies differ significantly.

Conclusion

The study reveals that the level of investment in receivables as a percentage of sales across the industry was reasonably less. When benchmarked against the industry average, Maharashtra Scooters Ltd and Kinetic Engineering Ltd had recorded poor performance in receivable management. Whereas LML Ltd, Majestic Auto Ltd and Kinetic Motors Ltd did

well. The average collection period across the industry was much less than the suggested norm during the study period. Though the collection period of all companies was less than the Tandon Committee's suggested norms, in case of Kinetic Engineering Ltd, Majestic Auto Ltd and Kinetic Motors Ltd it was higher than the industry average and in case of Hero Honda Motors Ltd, TVS Motor Company Ltd, Maharashtra Scooters Ltd and Scooters India Ltd collection period was lower than the industry average.

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Table 1
Receivables to Current Assets Ratio

Year	Bajaj Auto Ltd.	LML Ltd.	Maharashtra Scooters Ltd.	TVS Motor Company Ltd.	Kinetic Motors Ltd.	Hero Honda Motors Ltd.	Kinetic Engineering Ltd.	Majestic Auto Ltd.	Scooters India Ltd.	Mean
1994-95	58.61	56.57	92.56	56.70	32.34	39.70	62.21	61.31	18.49	53.16
1995-96	59.91	59.21	73.09	47.53	30.49	35.56	58.33	66.27	16.08	49.61
1996-97	58.84	50.91	58.71	40.04	28.11	27.66	62.00	69.67	13.87	45.53
1997-98	68.19	44.22	90.65	60.51	31.86	37.98	60.32	55.47	7.71	50.77
1998-99	57.53	43.02	72.47	48.69	47.46	47.19	67.35	62.77	6.51	50.33
1999-00	61.54	36.82	72.52	47.53	56.29	43.79	77.09	69.68	12.01	53.03
2000-01	66.20	36.00	69.26	54.93	39.41	44.05	79.47	68.09	18.77	52.91
2001-02	54.03	36.75	60.25	59.24	46.57	43.02	70.43	66.31	24.85	51.27
2002-03	68.50	25.49	51.37	55.64	46.70	20.42	74.22	72.97	22.29	48.62
2003-04	55.43	36.00	41.51	45.62	53.78	44.46	73.95	63.01	18.16	47.99
2004-05	57.24	32.89	31.20	33.92	52.71	15.08	69.97	66.04	19.06	42.01
2005-06	50.53	31.79	35.52	44.02	62.85	13.71	66.95	57.17	24.83	43.04
2006-07	33.05	22.19	25.65	36.96	59.92	12.91	63.24	58.75	19.34	36.89
2007-08	30.85	23.65	29.83	40.02	67.22	15.27	69.23	67.55	25.34	40.99
2008-09	35.50	31.50	47.44	36.69	51.30	21.21	72.36	62.86	19.64	42.06
Mean	54.40	37.80	56.80	47.20	47.13	30.80	68.47	64.53	17.80	47.22

Sources: Computed from the Annual reports of the respective units

Table 2
Receivables to Total Assets Ratio

Year	Bajaj Auto Ltd.	LML Ltd.	Maharashtra Scooters Ltd.	TVS Motor Company Ltd.	Kinetic Motors Ltd.	Hero Honda Motors Ltd.	Kinetic Engineering Ltd.	Majestic Auto Ltd.	Scooters India Ltd.	Mean
1994-95	34.74	33.00	68.56	29.20	19.90	22.78	43.95	35.35	14.70	31.15
1995-96	38.47	38.83	53.35	29.95	20.87	19.95	41.65	38.00	13.26	32.15
1996-97	38.56	36.49	47.22	29.45	19.70	16.97	41.31	39.21	11.97	31.21
1997-98	39.29	30.92	61.16	35.98	22.40	21.23	37.70	26.67	6.85	31.36
1998-99	36.77	25.57	45.42	29.95	31.37	21.94	41.73	25.80	5.87	29.38
1999-00	70.55	20.12	42.16	26.45	38.24	21.93	49.19	29.97	10.83	34.38
2000-01	42.91	21.54	41.01	29.56	25.74	19.18	41.89	26.92	16.94	29.52
2001-02	38.09	19.48	41.45	26.03	30.48	15.72	39.73	24.83	22.82	28.74
2002-03	38.50	13.56	21.32	29.65	29.94	12.05	42.97	26.53	20.04	26.06
2003-04	33.02	16.01	17.75	28.65	37.11	13.60	45.14	20.43	16.35	25.34
2004-05	30.38	14.81	14.15	32.65	38.16	11.48	40.42	22.90	7.23	23.58
2005-06	24.20	14.12	9.54	24.65	39.55	10.65	37.45	20.44	20.89	22.19
2006-07	26.97	10.20	4.85	28.56	38.96	10.09	40.64	27.66	16.27	22.69
2007-08	24.89	11.04	5.56	29.65	36.26	11.24	36.68	32.29	21.88	23.28
2008-09	28.64	12.36	4.58	29.56	22.42	14.18	37.56	30.05	17.17	21.84
Mean	36.40	21.20	31.87	29.33	30.07	16.20	41.20	28.47	14.87	27.52

Sources: Computed from the Annual reports of the respective units

Table 3
Receivables to Sales Ratio

Year	Bajaj Auto Ltd.	LML Ltd.	Maharashtra Scooters Ltd.	TVS Motor Company Ltd.	Kinetic Motors Ltd.	Hero Honda Motors Ltd.	Kinetic Engineering Ltd.	Majestic Auto Ltd.	Scooters India Ltd.	Mean
1994-95	31.45	42.02	102.56	18.24	7.11	12.32	43.44	19.95	20.99	33.12
1995-96	31.85	42.10	84.25	11.89	10.67	10.49	46.23	20.42	15.94	30.43
1996-97	40.26	32.69	63.78	10.90	10.13	8.26	40.26	27.01	10.98	27.14
1997-98	42.07	24.52	75.35	14.86	8.63	8.80	38.60	24.04	4.69	26.84
1998-99	40.51	21.64	50.45	11.04	15.05	11.49	38.07	21.85	3.61	23.75
1999-00	54.56	16.58	53.10	12.24	20.19	8.88	53.01	19.32	8.25	27.03
2000-01	64.67	12.80	48.84	10.91	13.18	8.47	43.99	21.92	13.32	26.25
2001-02	65.85	19.04	52.84	12.93	13.61	6.00	47.81	23.72	17.67	28.52
2002-03	58.53	15.99	26.95	11.77	12.96	4.27	46.56	26.28	23.28	25.18
2003-04	49.07	20.52	37.92	9.83	21.39	5.34	64.68	26.88	16.28	27.99
2004-05	45.33	16.13	20.22	5.69	27.26	4.93	71.09	24.02	15.14	25.53
2005-06	36.56	11.56	54.36	7.22	36.08	4.86	69.76	35.20	18.66	30.47
2006-07	38.67	10.40	36.41	7.16	53.03	4.48	63.13	56.02	16.70	31.78
2007-08	32.91	11.46	63.18	8.49	24.04	5.01	53.06	31.37	22.57	28.01
2008-09	35.70	15.66	105.71	8.83	21.70	6.08	71.94	31.90	21.89	35.49
Mean	44.53	20.87	58.40	10.80	19.67	7.31	52.77	27.33	15.33	28.50

Sources: Computed from the Annual reports of the respective units

Table 4
Receivables Turnover Ratio

Year	Bajaj Auto Ltd.	LML Ltd.	Maharashtra Scooters Ltd.	TVS Motor Company Ltd.	Kinetic Motors Ltd.	Hero Honda Motors Ltd.	Kinetic Engineering Ltd.	Majestic Auto Ltd.	Scooters India Ltd.	Mean
1994-95	26.70	9.25	18.69	9.90	40.09	17.13	8.90	9.46	12.50	16.96
1995-96	24.41	10.63	19.53	12.42	19.13	19.19	6.30	11.19	13.15	15.11
1996-97	25.77	12.15	28.46	18.87	18.85	34.78	8.03	10.20	25.58	20.30
1997-98	26.07	17.89	28.56	26.57	26.24	38.77	12.49	8.68	65.14	27.82
1998-99	24.41	17.99	19.23	26.32	14.64	33.48	9.03	8.46	100.46	28.22
1999-00	21.56	19.59	17.30	19.73	8.55	39.27	5.16	8.36	46.58	20.68
2000-01	19.64	26.74	31.73	23.36	8.12	52.70	4.49	6.74	19.19	21.41
2001-02	18.83	13.83	32.95	22.22	12.02	76.74	4.29	6.16	11.58	22.07
2002-03	23.68	17.43	24.44	18.42	11.57	85.32	4.66	6.23	8.37	22.24
2003-04	26.17	17.66	12.93	22.88	8.89	62.98	3.22	4.92	10.63	18.92
2004-05	26.46	25.82	9.68	44.85	7.24	42.35	2.26	6.59	13.82	19.90
2005-06	36.73	36.93	12.70	62.63	6.34	63.03	2.46	5.63	13.25	26.63
2006-07	42.83	40.04	10.32	72.63	6.51	129.08	2.98	7.30	9.45	34.87
2007-08	36.13	39.51	7.02	76.35	6.94	81.36	3.10	4.94	8.49	29.32
2008-09	25.75	38.83	4.63	52.76	7.66	46.78	2.82	5.02	8.02	21.36
Mean	27.01	22.95	18.54	33.99	13.52	54.86	5.35	7.33	24.41	23.05

Sources: Computed from the Annual reports of the respective units

Table 5
Average Collection Period

Year	Bajaj Auto Ltd.	LML Ltd.	Maharastra Scooters Ltd.	TVS Motor Company Ltd.	Kinetic Motors Ltd.	Hero Honda Motors Ltd.	Kinetic Engineering Ltd.	Majestic Auto Ltd.	Scooters India Ltd.	Mean
1994-95	14	39	20	37	9	21	41	39	29	22
1995-96	15	34	19	29	19	19	58	33	28	24
1996-97	14	30	13	19	19	10	45	36	14	18
1997-98	14	20	13	14	14	9	29	42	6	13
1998-99	15	20	19	14	25	11	40	43	4	13
1999-00	17	19	21	18	43	11	71	44	8	18
2000-01	19	14	12	16	45	7	81	54	19	17
2001-02	20	26	11	16	30	5	86	59	32	17
2002-03	15	21	15	20	32	4	78	59	44	16
2003-04	4	21	28	16	41	6	113	74	34	19
2004-05	14	14	38	8	50	9	162	55	26	18
2005-06	10	10	29	6	58	6	148	62	28	14
2006-07	9	9	35	5	56	3	122	3	39	10
2007-08	10	9	52	5	53	4	118	74	43	12
2008-09	14	9	79	7	48	8	129	73	46	17
Mean	14	20	27	15	36	9	88	50	27	17

Sources: Computed from the Annual reports of the respective units

Table 6
Receivables to Payable Ratio

Year	Bajaj Auto Ltd.	LML Ltd.	Maharastra Scooters Ltd.	TVS Motor Company Ltd.	Kinetic Motors Ltd.	Hero Honda Motors Ltd.	Kinetic Engineering Ltd.	Majestic Auto Ltd.	Scooters India Ltd.	Mean
1994-95	31.45	42.02	102.56	18.24	7.11	12.32	43.44	19.95	20.99	33.12
1995-96	31.85	42.10	84.25	11.89	10.67	10.49	46.23	20.42	15.94	30.43
1996-97	40.26	32.69	63.78	10.90	10.13	8.26	40.26	27.01	10.98	27.14
1997-98	42.07	24.52	75.35	14.86	8.63	8.80	38.60	24.04	4.69	26.84
1998-99	40.51	21.64	50.45	11.04	15.05	11.49	38.07	21.85	3.61	23.75
1999-00	54.56	16.58	53.10	12.24	20.19	8.88	53.01	19.32	8.25	27.03
2000-01	64.67	12.80	48.84	10.91	13.18	8.47	43.99	21.92	13.32	26.25
2001-02	65.85	19.04	52.84	12.93	13.61	6.00	47.81	23.72	17.67	28.52
2002-03	58.53	15.99	26.95	11.77	12.96	4.27	46.56	26.28	23.28	25.18
2003-04	49.07	20.52	37.92	9.83	21.39	5.34	64.68	26.88	16.28	27.99
2004-05	45.33	16.13	20.22	5.69	27.26	4.93	71.09	24.02	15.14	25.53
2005-06	36.56	11.56	54.36	7.22	36.08	4.86	69.76	35.20	18.66	30.47
2006-07	38.67	10.40	36.41	7.16	53.03	4.48	63.13	56.02	16.70	31.78
2007-08	32.91	11.46	63.18	8.49	24.04	5.01	53.06	31.37	22.57	28.01
2008-09	35.70	15.66	105.71	8.83	21.70	6.08	71.94	31.90	21.89	35.49
Mean	44.53	20.87	58.40	10.80	19.67	7.31	52.77	27.33	15.33	28.50

Sources: Computed from the Annual reports of the respective units

Table 7-A ANOVA

Source of Variation	SS	df	MS	F cal	P-value	F crit
Between Groups	33899.072	9	3766.563586	31.99428	1.03535E-30	1.9428
Within Groups	17658.924	150	117.7261615			
Total	51557.996	159				

Table 7-B ANOVA

Source of Variation	SS	df	MS	F cal	P-value	F crit
Between Groups	9971.933	9	1107.993	13.674	6.95E-16	1.942796
Within Groups	12154.372	150	81.029			
Total	22126.305	159				

Table 7-C ANOVA

Source of Variation	SS	df	MS	F cal	P-value	F crit
Between Groups	45010.19	9	5001.132	40.80143	5.14E-36	1.942796
Within Groups	18385.87	150	122.573			
Total	63396.06	159				

Table 7-D ANOVA

Source of Variation	SS	df	MS	F cal	P-value	F crit
Between Groups	29139.98	9	3237.776	14.32371	1.55E-16	1.942796
Within Groups	33906.47	150	226.043			
Total	63046.45	159				

Table 7-E ANOVA

Source of Variation	SS	df	MS	F cal	P-value	F crit
Between Groups	80773.84	9	8974.871	30.70455	7.39E-30	1.942796
Within Groups	43844.67	150	292.298			
Total	124618.50	159				

Table 7-F ANOVA

Source of Variation	SS	df	MS	F cal	P-value	F crit
Between Groups	45010.19	9	5001.132	40.80143	5.14E-36	1.942796
Within Groups	18385.87	150	122.5725			
Total	63396.06	159				

Sources: Computed