

CHAPTER 5

THE FORECAST OF FUTURE DEMAND

After the demand model for zinc were constructed and their empirical results were interpreted in the previous chapter, now it is the time to deal with the second objective, forecasting the future demand. This chapter will start with introducing the forecast method used in this study, then, follows by the forecast result and its analysis.

5.1 Forecast Method

As all informations in the future are not exactly known, thus, the future zinc demand will be forecast based on the existing statistics in the past. The basic statistical technique which will be used is a simple regression. That is, all independent variables in the seven demand equations will be set as functions of time, then their forecasts are made (the regression results of these independent variables can be seen in Appendix C). The standard error from each regression result will be added and subtracted to the forecast result of each independent variable to be assumed to be the high and low level of forecast respectively. The time trend (forecast result) of each independent variable is assumed to be the middle level of forecast.

Then, these forecast values of the independent variables will be substituted in each zinc demand equation. Finally, the forecast of future demand for zinc by the seven industries will be obtained in three level, i.e. high, middle and low level. By adding up the

forecast of zinc demand by those seven industries, the forecast total demand for zinc will also be obtained.

5.2 Analysis of Forecast Results

Based on the past observations, the forecast result from table 5.1 indicates that the amount of zinc used in galvanized sheet (Z1) and galvanized pipe (Z2) still dominate the major shares in the total demand for zinc. The average annual share of zinc used in galvanized sheet industry through the forecast period is 31.36 percent while galvanized pipe's share is 28.29 percent. The third major share is the brass products which accounts for 12.23 percent. The average annual shares of the other are still less than 10 percent (except the miscellaneous) the same as the studied period. Those shares are ranked in order as die-casting (Z6), zinc oxide (Z4) and dry cell (Z5) which account for 7.09, 5.17 and 5.14 percent respectively.

The average annual growth rate of die-casting of 4.98 percent is relatively the highest, follow by galvanized pipe, brass and the miscellaneous with the average growth rate of 4.90, 4.68 and 4.25 percent respectively. Next are zinc oxide and galvanized sheet, their average growth are 3.76 and 3.362 percent respectively. The last is dry cell with average growth of only 2.93 percent. For the total demand for zinc, its average growth rate is 4.16 percent.

The statistical projection indicates that the high, middle and low level of forecast demand for zinc by galvanized sheet industry (Z1) in 1988 were 17709, 16531 and 15353 ton respectively while the actual amount was 17,022 ton (can be seen in Table 5.2). It

Table 5.1
Forecast Zinc Demand by Each Industry

unit: ton

	1988	1989	1990	1991	1992	1993	average
1. Galvanized Sheet	17,709	18,309	18,908	19,508	20,107	20,707	
	16,531	17,131	17,730	18,330	18,922	19,529	31.36
	15,353	15,953	16,553	17,152	17,752	18,351	3.36
2. Galvanized Pipe	15,674	16,487	17,300	18,113	18,927	19,740	
	14,642	15,455	16,268	17,081	17,895	18,708	28.29
	13,610	14,424	15,237	16,050	16,863	17,676	4.90
3. Brass Products	7,323	7,655	7,987	8,319	8,651	8,983	
	6,351	6,683	7,015	7,347	7,675	8,011	12.23
	5,379	5,711	6,043	6,375	6,707	7,039	4.68
4. Zinc Oxide	3,039	3,151	3,263	3,375	3,487	3,599	
	2,711	2,823	2,935	3,047	3,159	3,271	5.17
	2,383	2,495	2,607	2,719	2,831	2,943	3.76
5. Dry Cell	3,211	3,297	3,383	3,469	3,555	3,641	
	2,725	2,811	2,897	2,983	3,069	3,155	5.14
	2,239	2,325	2,411	2,497	2,583	2,669	2.93
6. Die-Casting	4,234	4,441	4,649	4,856	5,063	5,270	
	3,665	3,873	4,080	4,287	4,494	4,701	7.09
	3,097	3,304	3,511	3,718	3,925	4,133	4.98
7. Miscellaneous	6,047	6,312	6,577	6,842	7,107	7,372	
	5,598	5,863	6,128	6,393	6,658	6,923	10.73
	5,148	5,413	5,679	5,944	6,209	6,474	4.25
Total Demand	57,064	59,479	61,894	64,309	66,724	69,139	
	52,223	54,638	57,053	59,468	61,883	64,298	4.16
	47,382	49,797	52,212	54,627	57,042	59,457	

Note: The upper, middle and lower figures are high, middle and low level of demand respectively. In the column of "average", the upper figures are average share of zinc demand by each industry in total demand and the lower figures are average growth rate of zinc demand, both are calculated on the middle level demand.

Table 5.2
Structure of Zinc-Uses Classified in This Study
(1979-1983)

	1979	1980	1981	1982	1983
Galvanized Sheet	11,954	12,435	13,533	11,866	11,208
Galvanized Pipe	9,137	8,735	9,306	7,744	9,536
Brass Products	2,202	2,534	2,851	3,191	2,953
Zinc Oxide	1,610	1,633	2,176	1,868	2,277
Dry Cell	2,005	2,434	3,152	2,693	2,669
Die-Casting	1,742	1,700	2,477	1,629	2,811
Miscellaneous	4,207	3,867	4,028	4,247	4,127
Total	32,857	33,338	37,523	33,238	35,581

Table 5.2(con)
Structure of Zinc-Uses Classified in This Study
(1984-1988)

	1984	1985	1986	1987	1988
Galvanized Sheet	13,849	9,862	12,958	16,533	17,022
Galvanized Pipe	12,874	13,852	13,460	15,574	15,848
Brass Products	4,619	3,824	4,440	5,355	4,577
Zinc Oxide	1,993	1,267	2,311	2,818	3,072
Dry Cell	3,276	3,476	2,851	3,045	2,630
Die-Casting	2,303	2,297	3,806	3,880	4,241
Miscellaneous	5,589	3,783	5,483	5,952	8,415
Total	44,503	38,361	45,309	53,157	55,805

Source: Department of Customs, Ministry of Finance.

can be seen that the actual amount lines between the middle and high level. In such a booming situation of construction sector due to the high demand for housing nowadays, the high level demand of 20,707 ton in 1993 is more probable to occur as it is expected that this situation should also continue in the near future. The low level demand of 18,351 ton is less probable though the construction will stop booming in the future as major target group of galvanized sheet should still be maintained and this group should not change their pattern of consumption much.

The quantity of zinc purchased by galvanized pipe (Z2) indicated by the statistical projection in 1993 is 18,708 ton. Though this product has to compete with PVC pipe, but it can maintain a certain level of growth rate. Galvanized pipe might probably lose its market share gradually to PVC pipe, however, this degree of substitution is outweighed by an increasing demand accompanied the growth rate of the economy. Moreover, a high level demand of 19,740 ton could also occur if most construction projects occurring from a construction boom select galvanized pipe instead of PVC pipe. A low level demand of 17,676 ton is also possible if the degree of substitution is too fierce. However, this amount exceeds 15,848 ton which was the demand in 1988.

A statistical projection of the quantity of zinc purchased by brass industry (Z3) shows that in 1993 its amount will be 8,011 ton. In this case, the forecast amount is quite high. It can be seen that the high, middle and low level of forecast in 1988 are 7,323, 6,381 and 5,379 ton respectively, while the actual amount is only 4,577 ton. Thus, the middle and high level demand of 8,011 and 8,983 ton in 1993 are less probable to occur. However, the low level demand of

7,039 ton in 1993 may not be able to be the accurate forecast as the degree of change of zinc used by brass products in the past was very high. This is resulted from a high increment or decline in brass end-uses whose behaviors are not exactly known as they are various and very trouble to systematically study.

The quantity of zinc purchased by zinc oxide industry (Z4) in 1993 is forecast to be 3,277 ton. This amount is quite low as in 1988 it was already 3,072 ton and is higher than the forecast high level demand of 3,039 ton. This is because the amount of zinc purchased by zinc oxide industry was quite high in the last two year (1987 and 1988). Nowadays a radial-type tyre is very popular for consumers causing a boom in domestic tyre industry who is a major user of zinc oxide. Hence, the high level demand of 3,599 ton is more probable to occur in 1993. For a low level demand of 2,943 ton, it is almost not possible as this amount is already less than the actual amount in 1988. In fact, the forecast interval in this case is quite low and the forecast high level demand may still not be able to give an accurate forecast as it is too low.

The statistical projection shows that the quantity of zinc purchased by dry cell industry in 1993 is 3,155 ton whereas in 1988 it was 2,725 ton. The high and low level is forecast to be 3,641 and 2,669 ton respectively. The low and middle level demand are quite low, thus the high level demand should be most probable as the dry cell market situation in the near future should not change much. Especially, other satisfactory substitutions for dry cell for a specific purpose such as radio, toys, camera, etc. should not be able to develop. However, if big dry cell factories can enlarge their market share so much until the small factories have to be shut up,

then the case of low and middle level demand are almost not possible. Because the production process of these big factories require zinc more than the small one.

The quantity of zinc purchased by die-casting (Z6) has its forecast in 1993 of 4,701 ton whereas it was 4,241 ton in 1988. The statistical projection also shows that its average growth rate is highest. This is due to the properties of zinc in die-casting which can promote wide applications in various industries as already described in chapter 2.5. The forecast is consistent with the expectation that, in the near future, other substitutions can hardly compete with zinc in die-casting. The high level demand of 5,270 ton is most probable, as it is reasonable to believe that many new users will switch to use zinc for this purpose in the future. There is no any reason to support a low and middle level demand which in 1988 were 3,097 and 3,665 ton respectively and were less than the actual amount of 4,241 ton.

The statistical projection shows that in 1993 the quantity of zinc purchased by the miscellaneous (Z7) is 6,923 ton. The forecast high and low level demand is 7,372 and 6,474 ton respectively. Whereas in 1989 it was 8,415 ton. However, this does not mean that this forecast has a negative growth rate, but because the amount of zinc demanded by the miscellaneous in 1988 was irregularly high. As the miscellaneous itself is composed of many sources and most of the shares in this item can not investigate to their end-uses, so it is very difficult to analyze for the most probable occur for the demand level. Statistically, the middle level demand should be selected.

Finally, the total demand for zinc is forecast by aggregating the forecast amount of the previous seven industries. The middle level of forecast total zinc demand in 1993 is 64,298 ton. The high and low level demand is 69,139 and 59,457 ton respectively. Whereas in 1988 the total demand was 55,805 ton and the forecast amount of low, middle and high level demand were 47,382, 52,223 and 57,064 ton respectively. From the previous seven forecast items, the high and middle level demand are the case of most probable to occur. Hence, the most probable total demand in 1993 should be between 64,298 and 69,139 ton and is rather close to 69,139 ton. The reason for this clearly comes from the contributions of the previous seven items.

As it is stated earlier that zinc domestic production capacity is about 72,000 ton a year, based on the forecast result, the zinc demand in 1993 will be almost 70,000 ton. It is clearly seen that within the next five years the Padaeng Industry Company will still be able to supply zinc to those domestic users. However, it is likely that in the period next to the forecast period, the amount of zinc domestic demand will tend to exceed the production capacity and some of domestic zinc users have to import.

Figure 5.1
Actual and Forecast Quarterly Z1

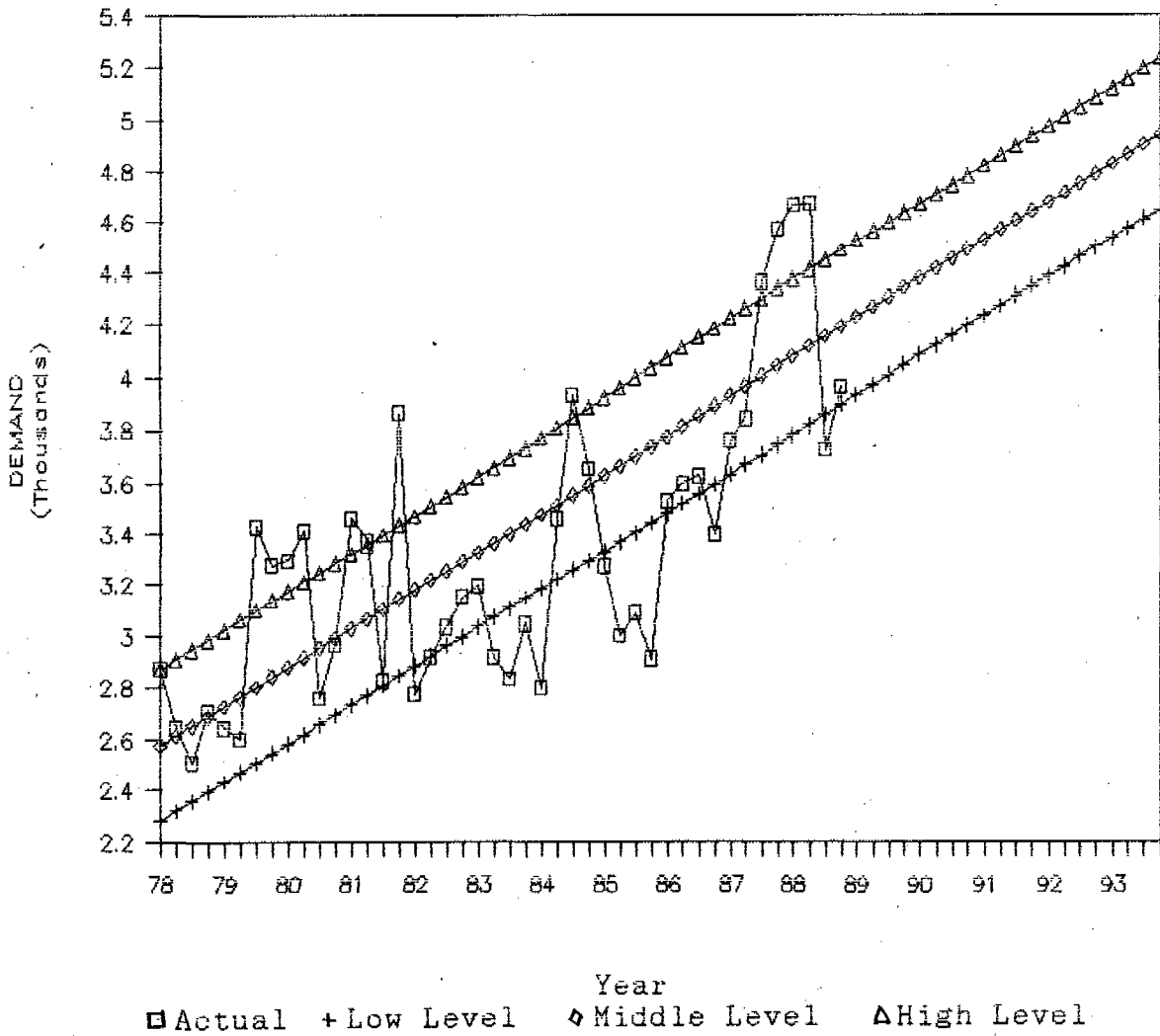


Figure 5.2
Actual and Forecast Annual Z1

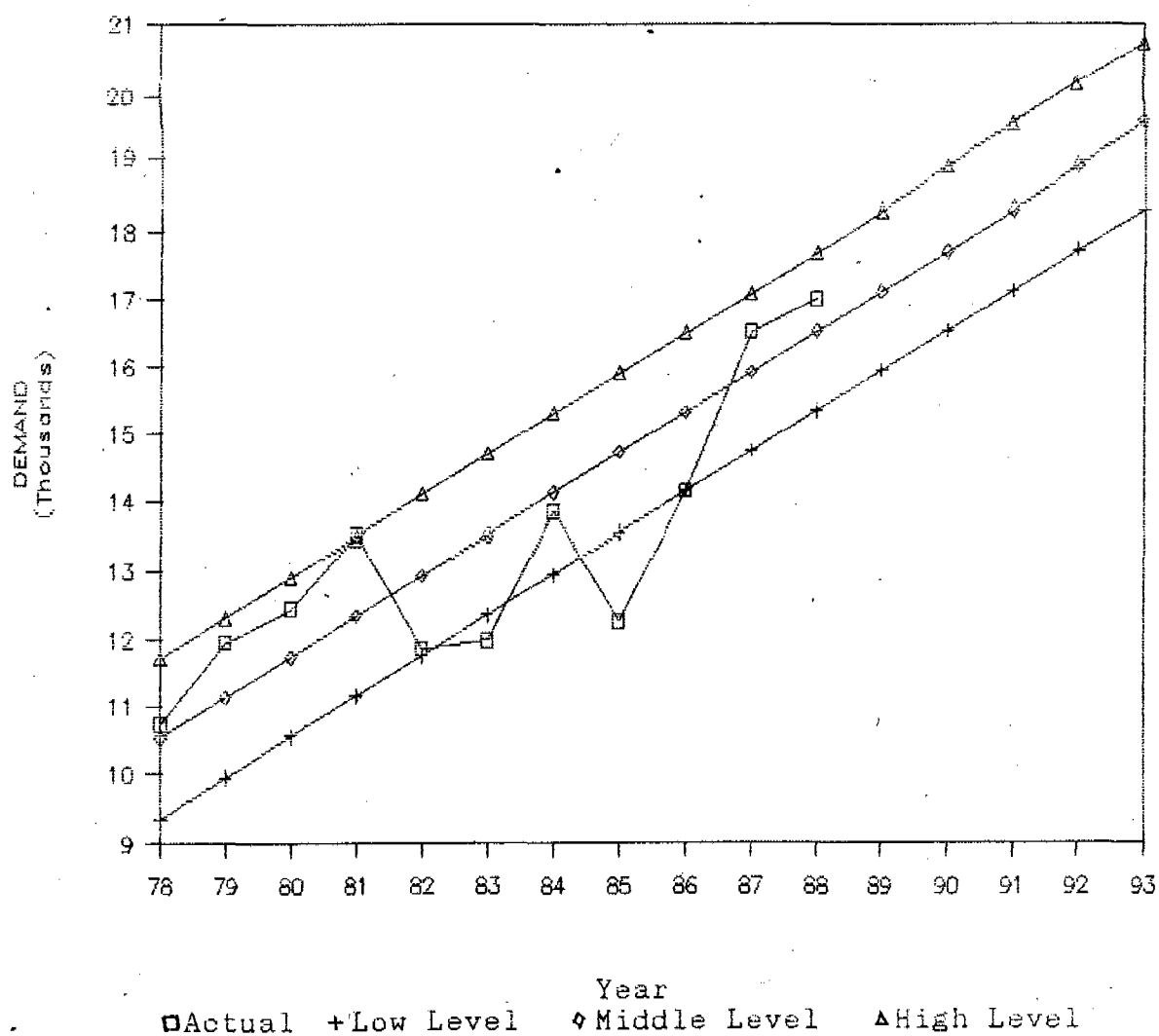


Figure 5.3
Actual and Forecast Quarterly Z2

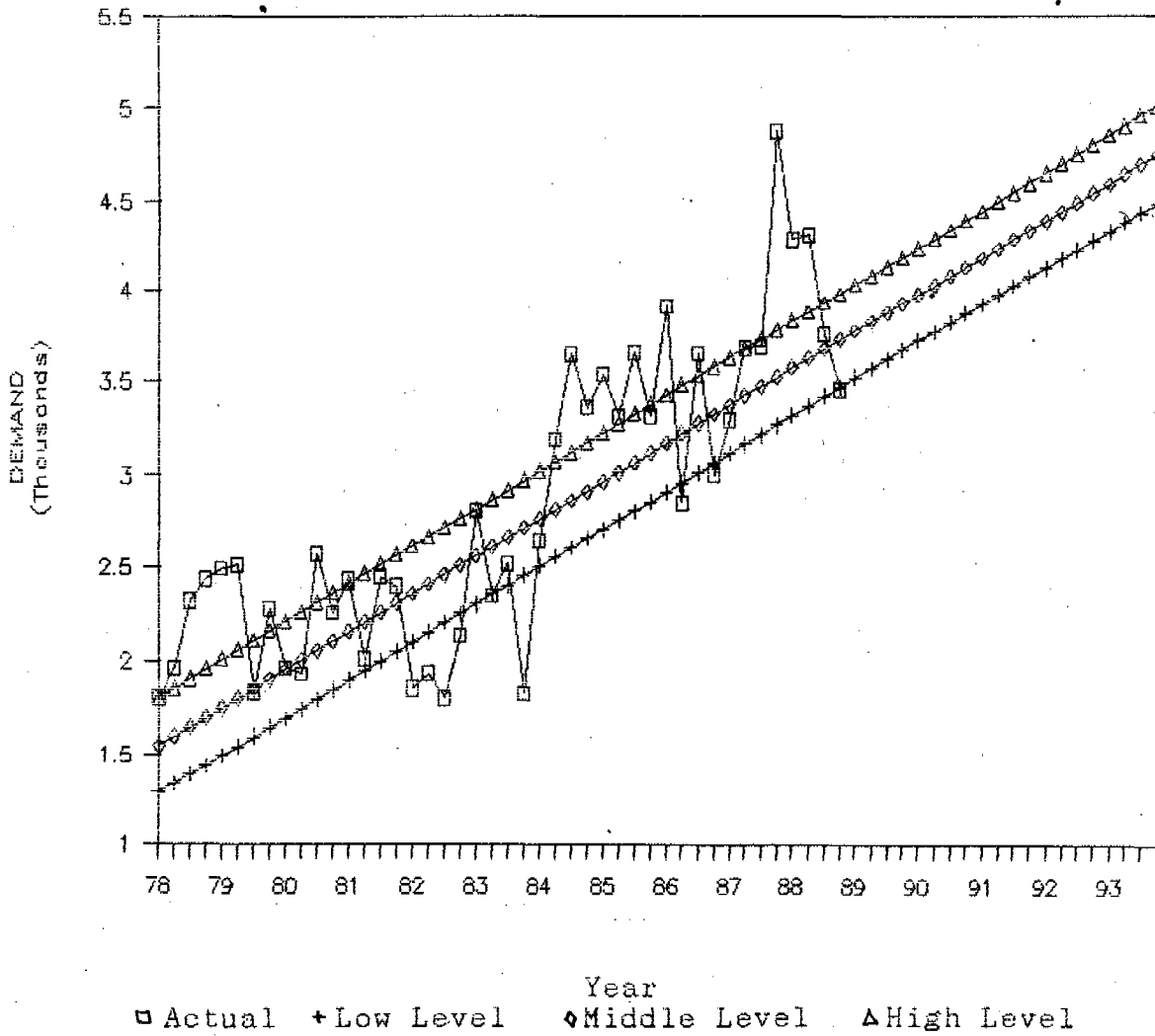


Figure 5.4
Actual and Forecast Annual Z2

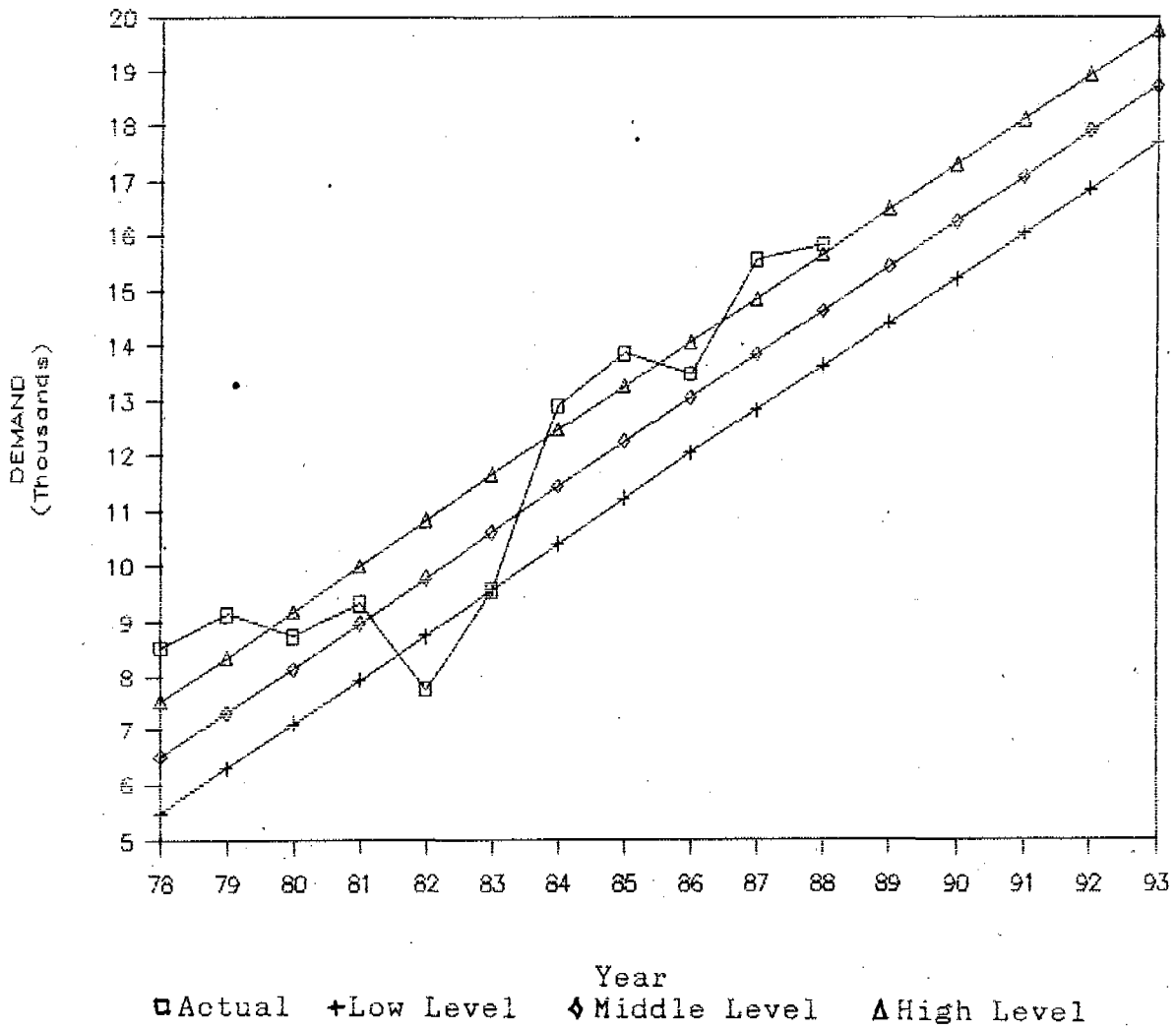


Figure 5.5
Actual and Forecast Quarterly ZS

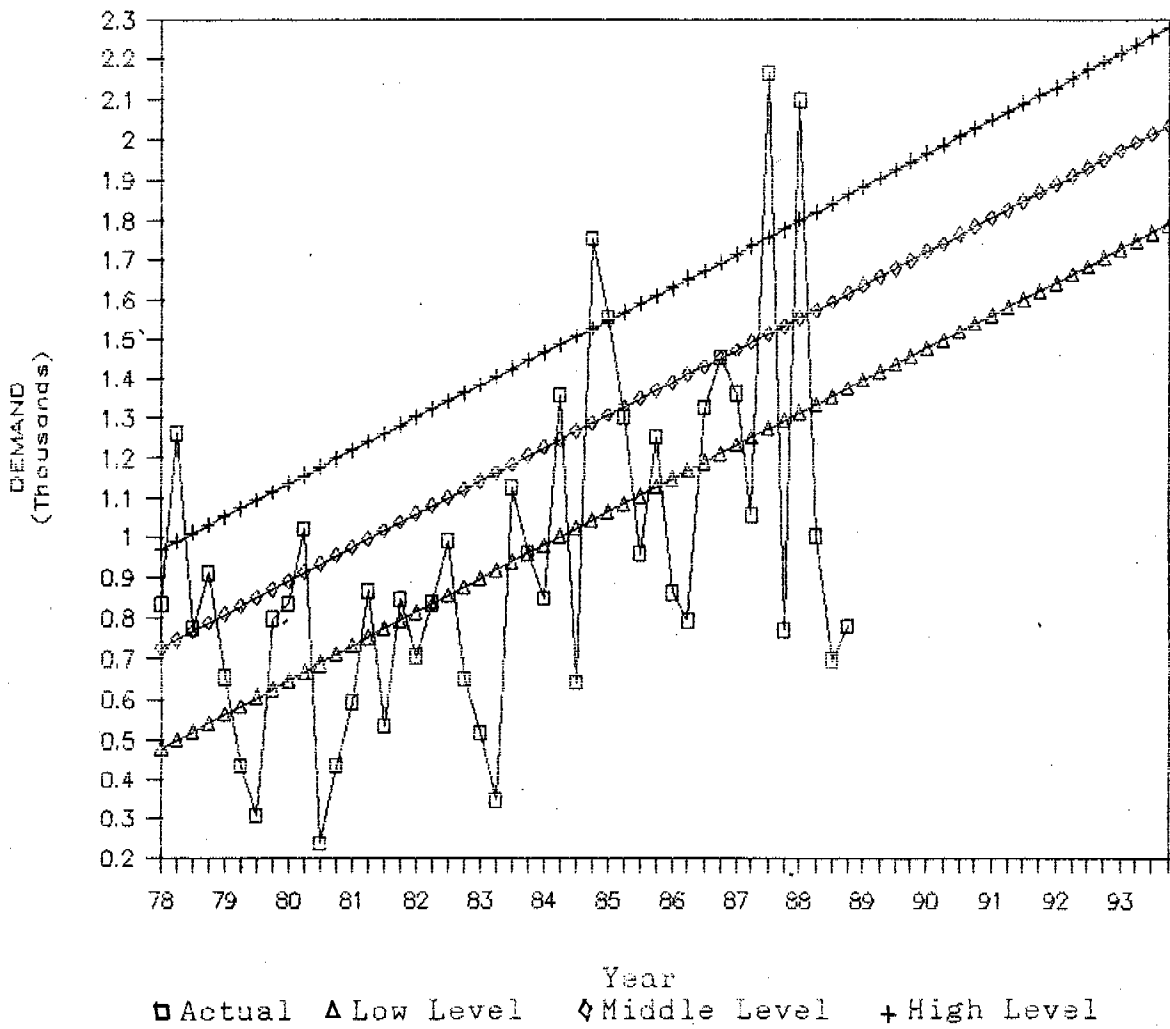


Figure 5.6
Actual and Forecast Annual Z3

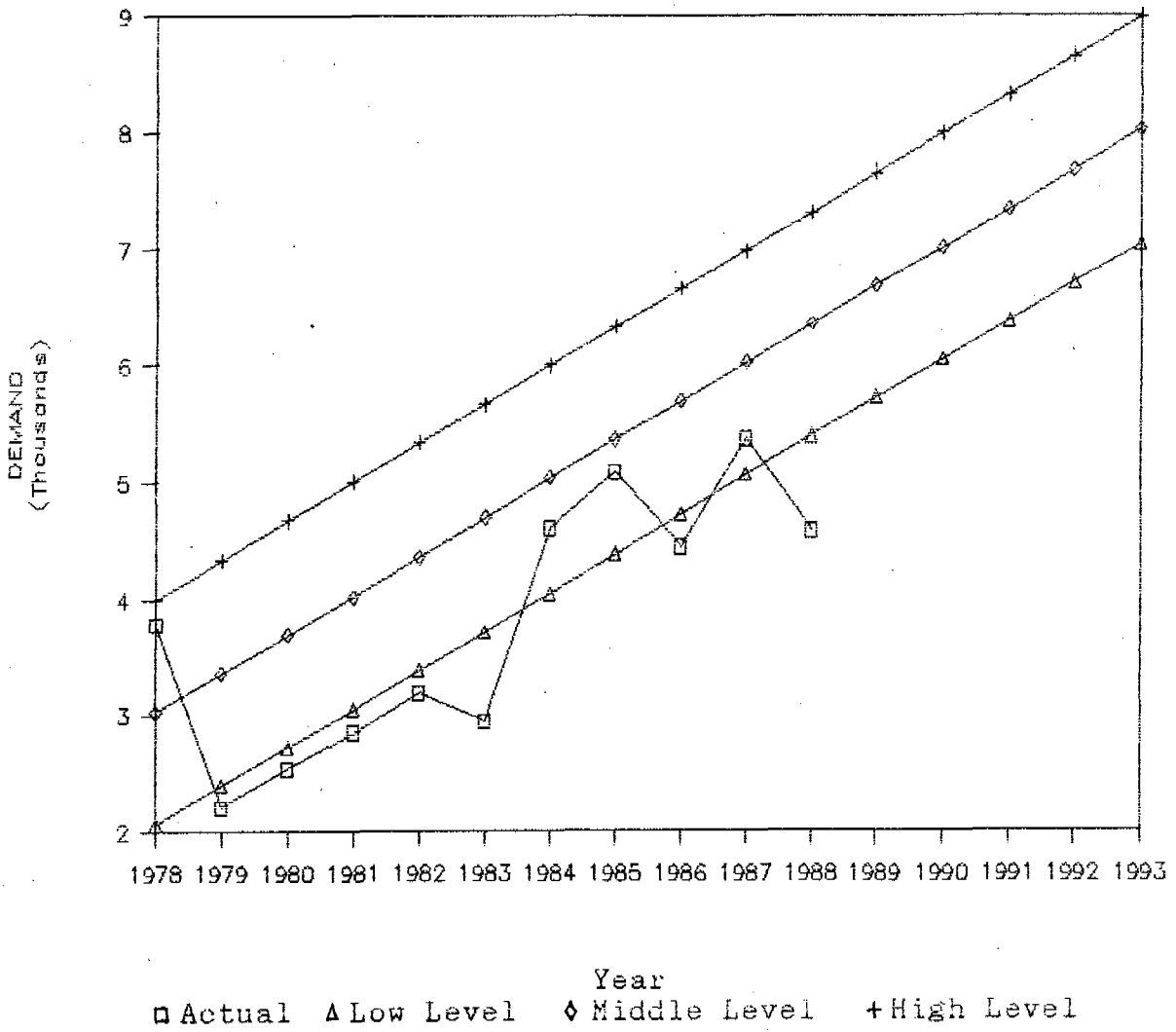


Figure 5.7
Actual and Forecast Quarterly Z4

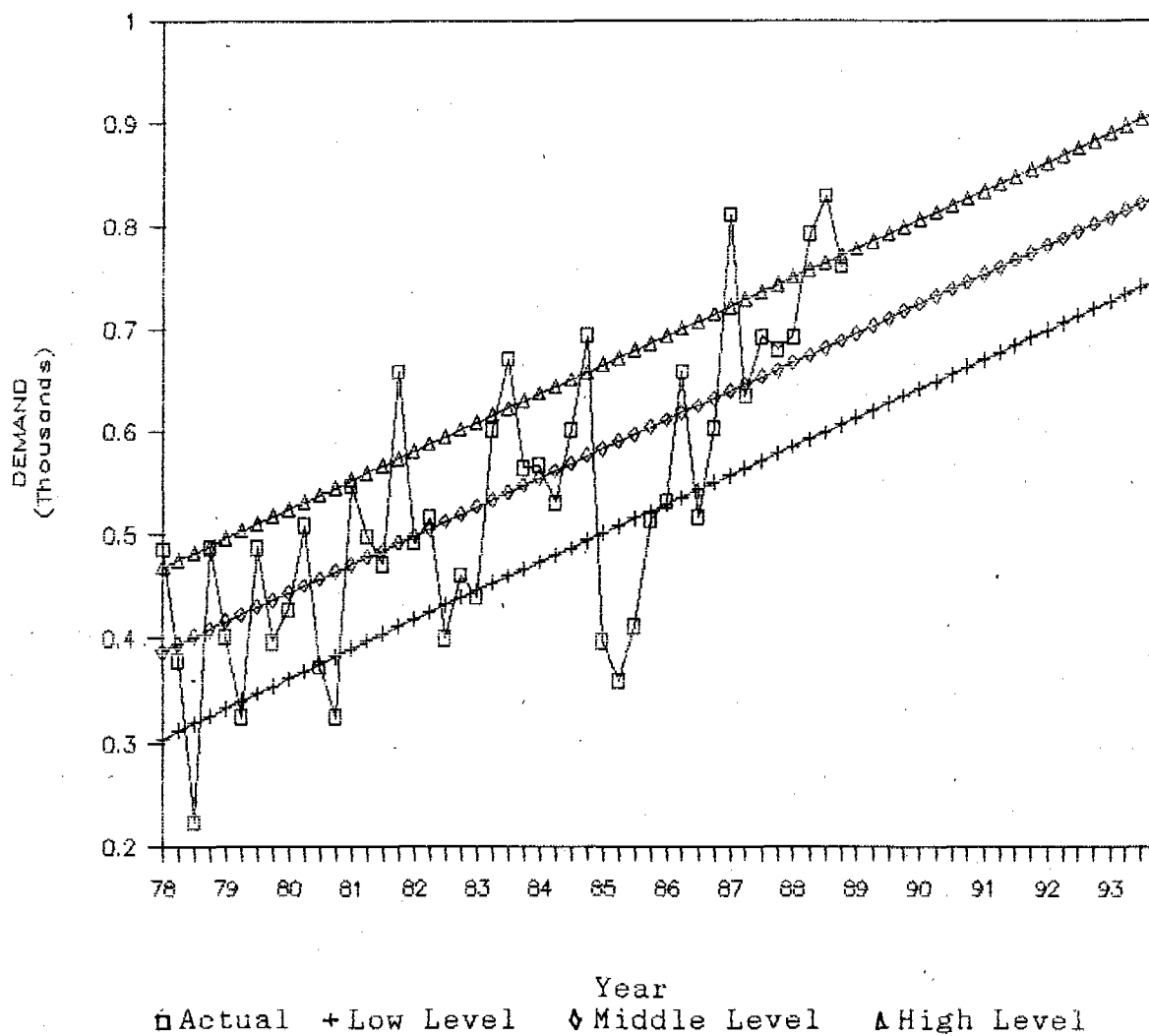


Figure 5.8
Actual and Forecast Annual Z4

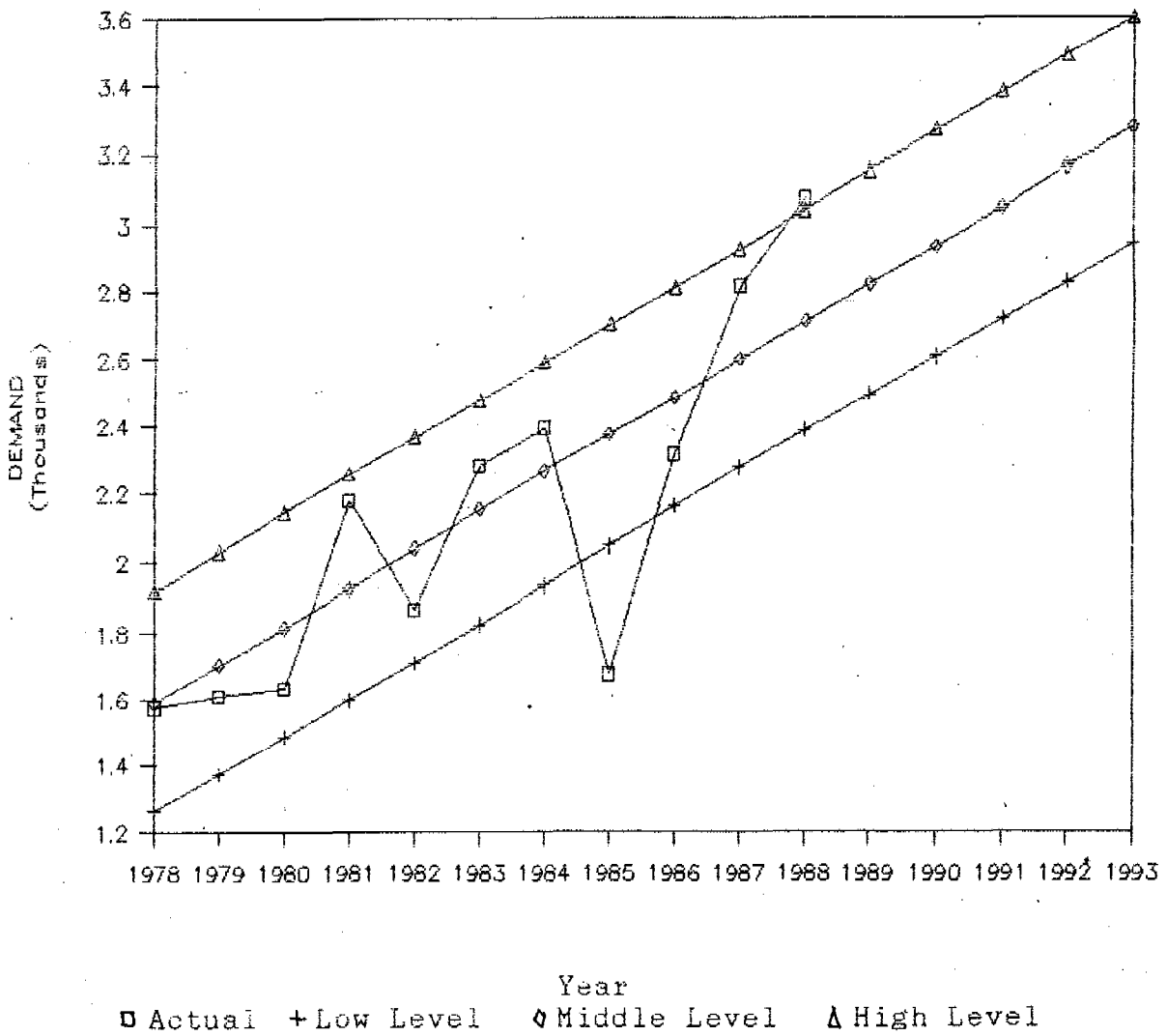


Figure 5.9
Actual and Forecast Quarterly Z5

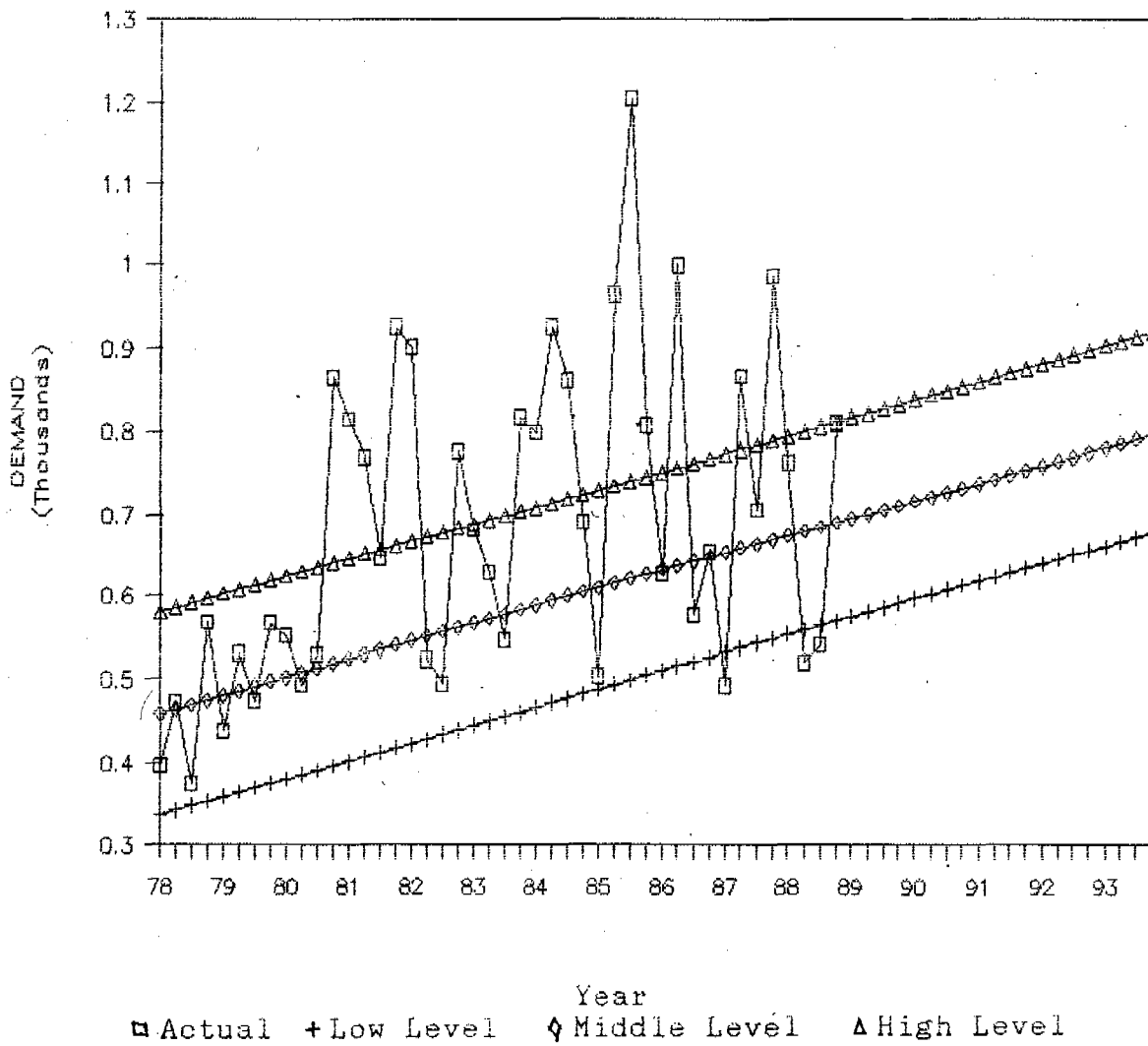


Figure 5.10
Actual and Forecast Annual Z5

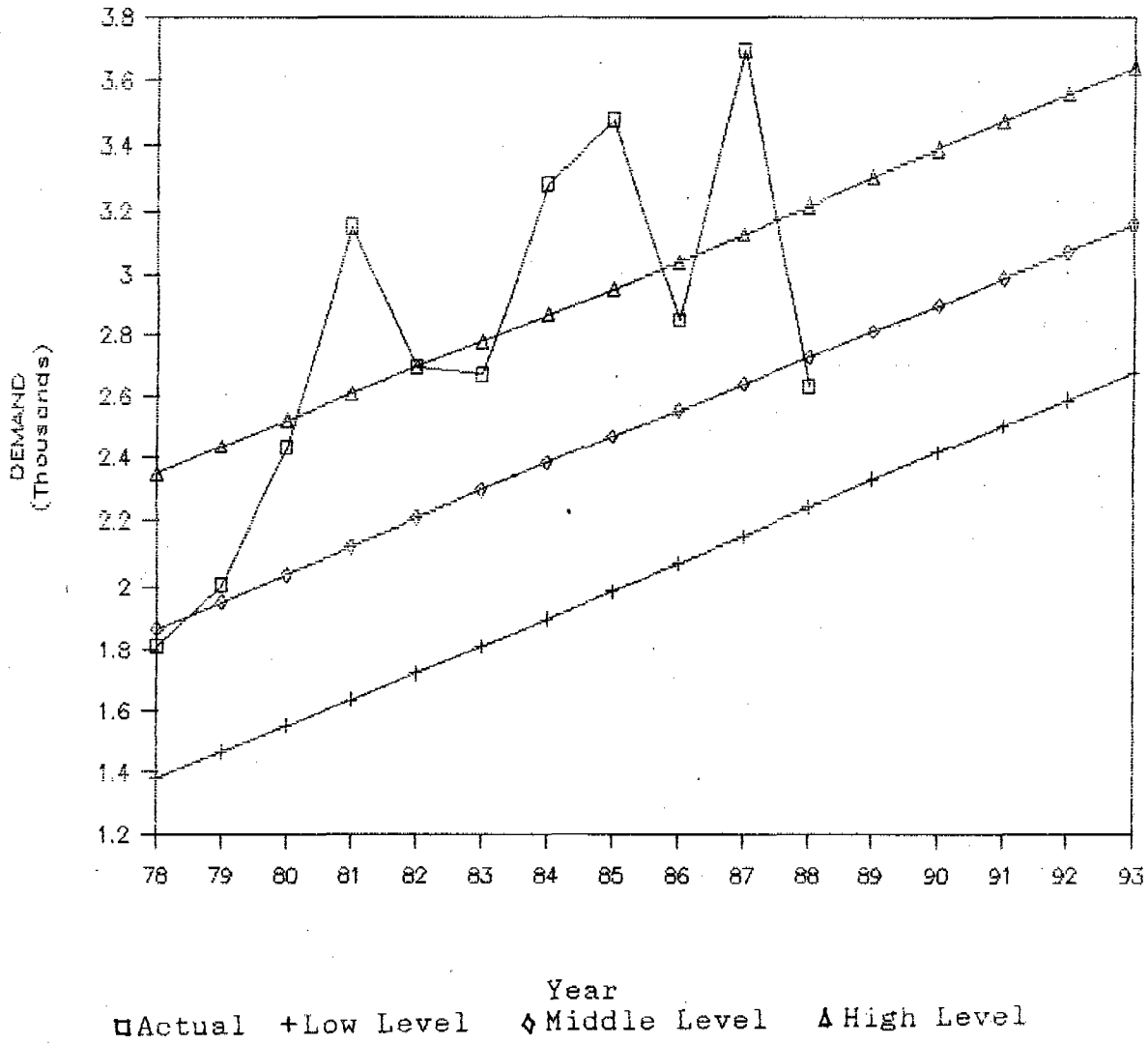


Figure 5.11
Actual and Forecast Quarterly Z6

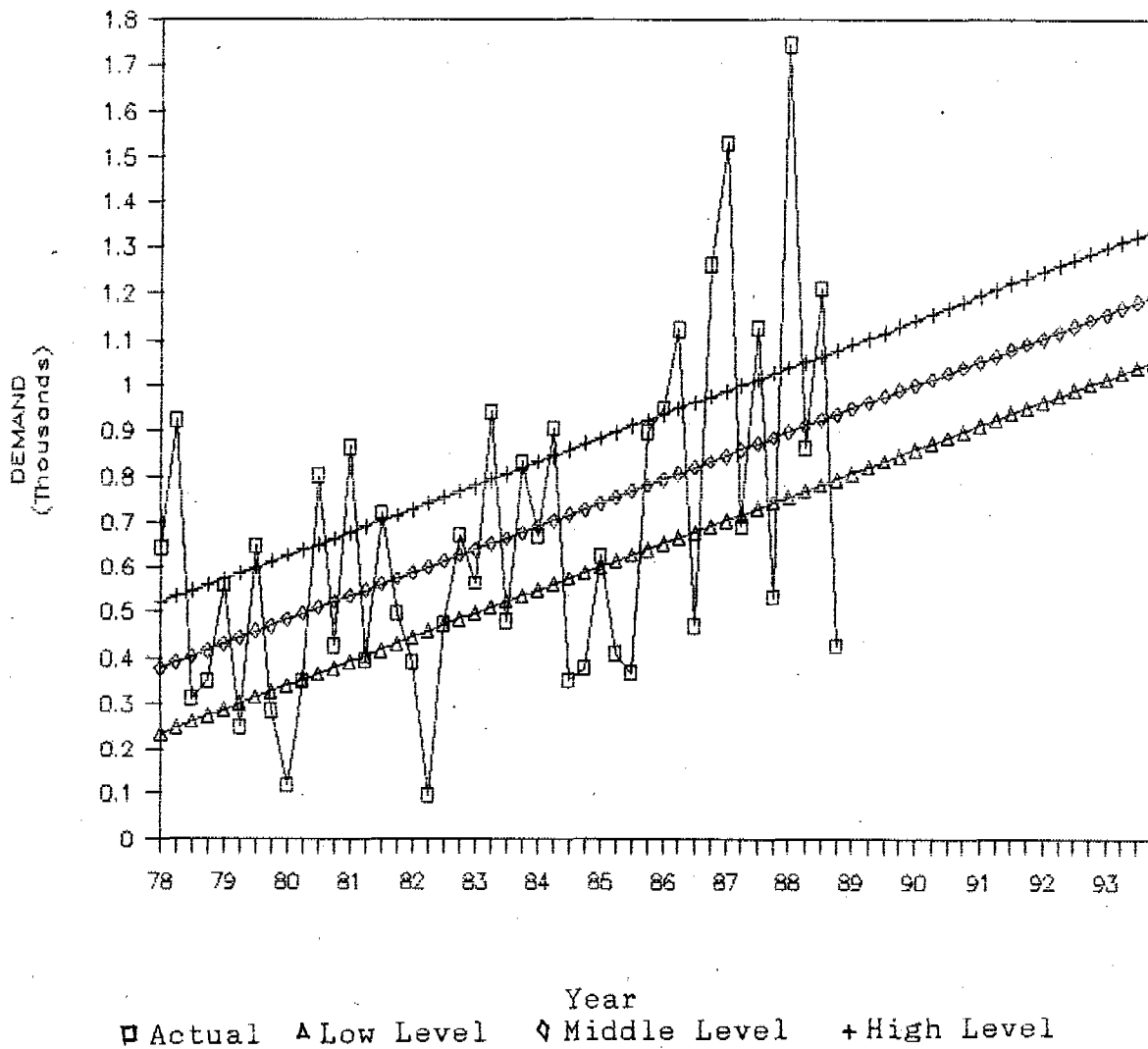


Figure 5.12
Actual and Forecast Annual ZB

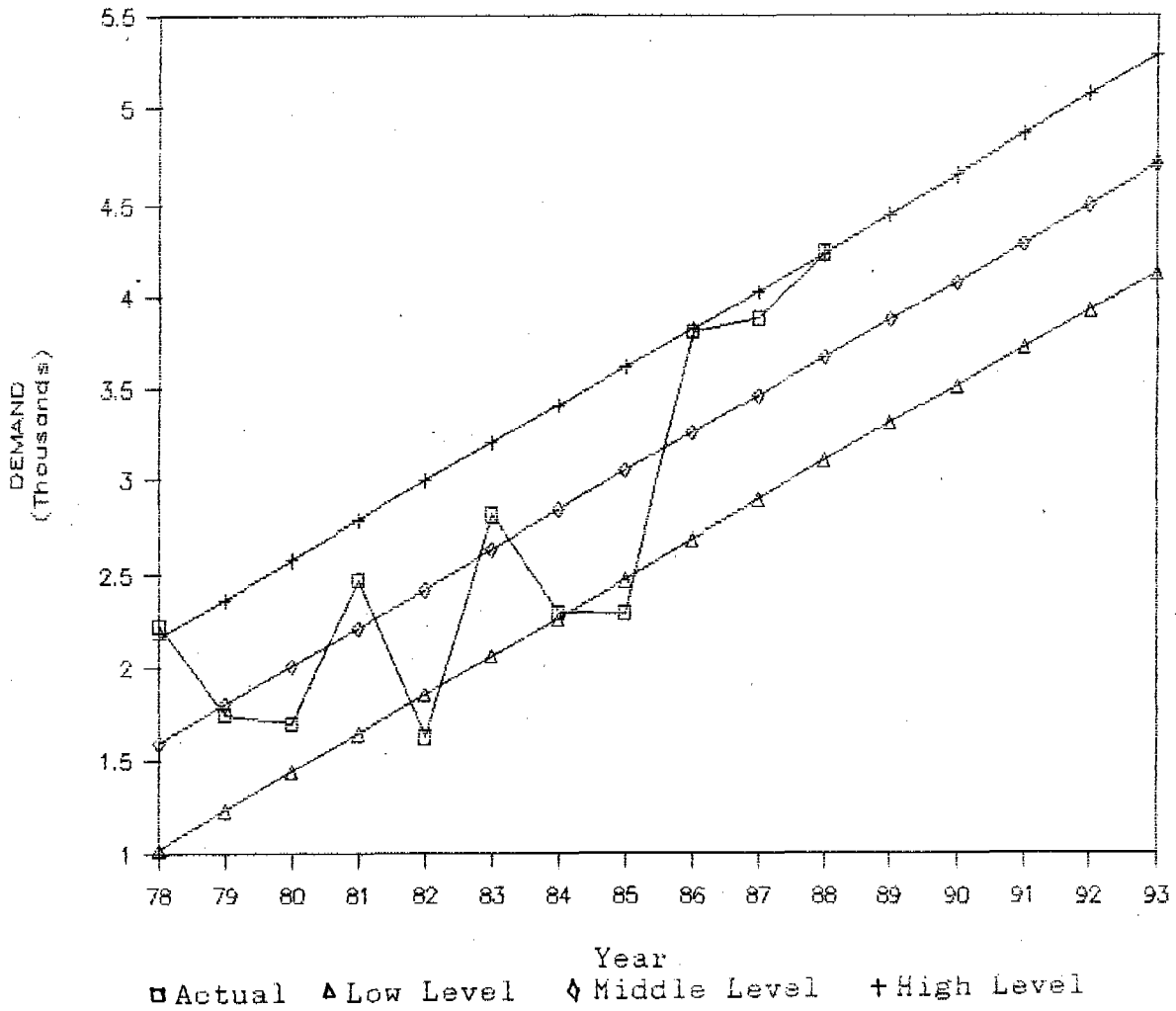


Figure 5.13
Actual and Forecast Quarterly Z7

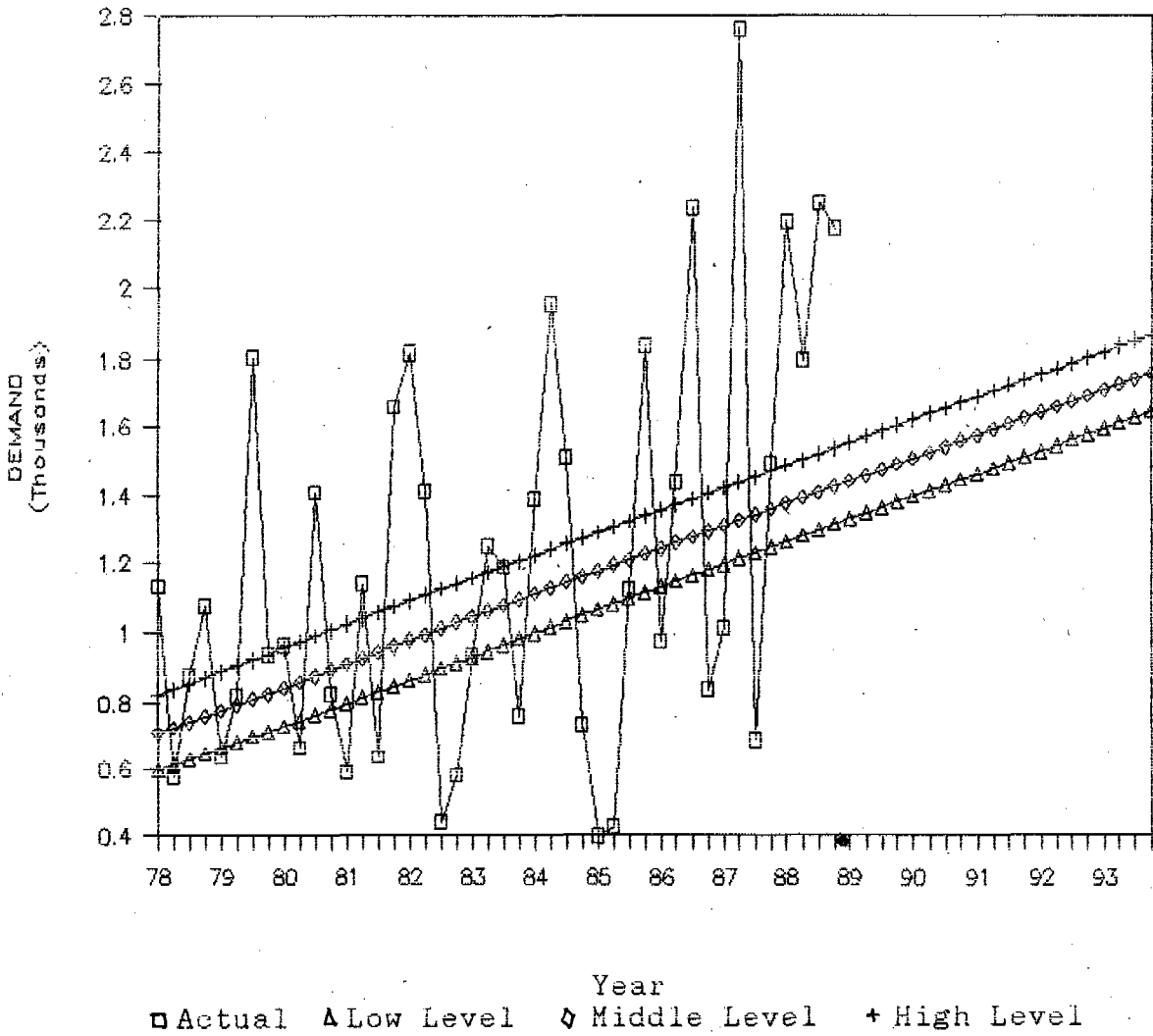


Figure 5.14
Actual and Forecast Annual Z7

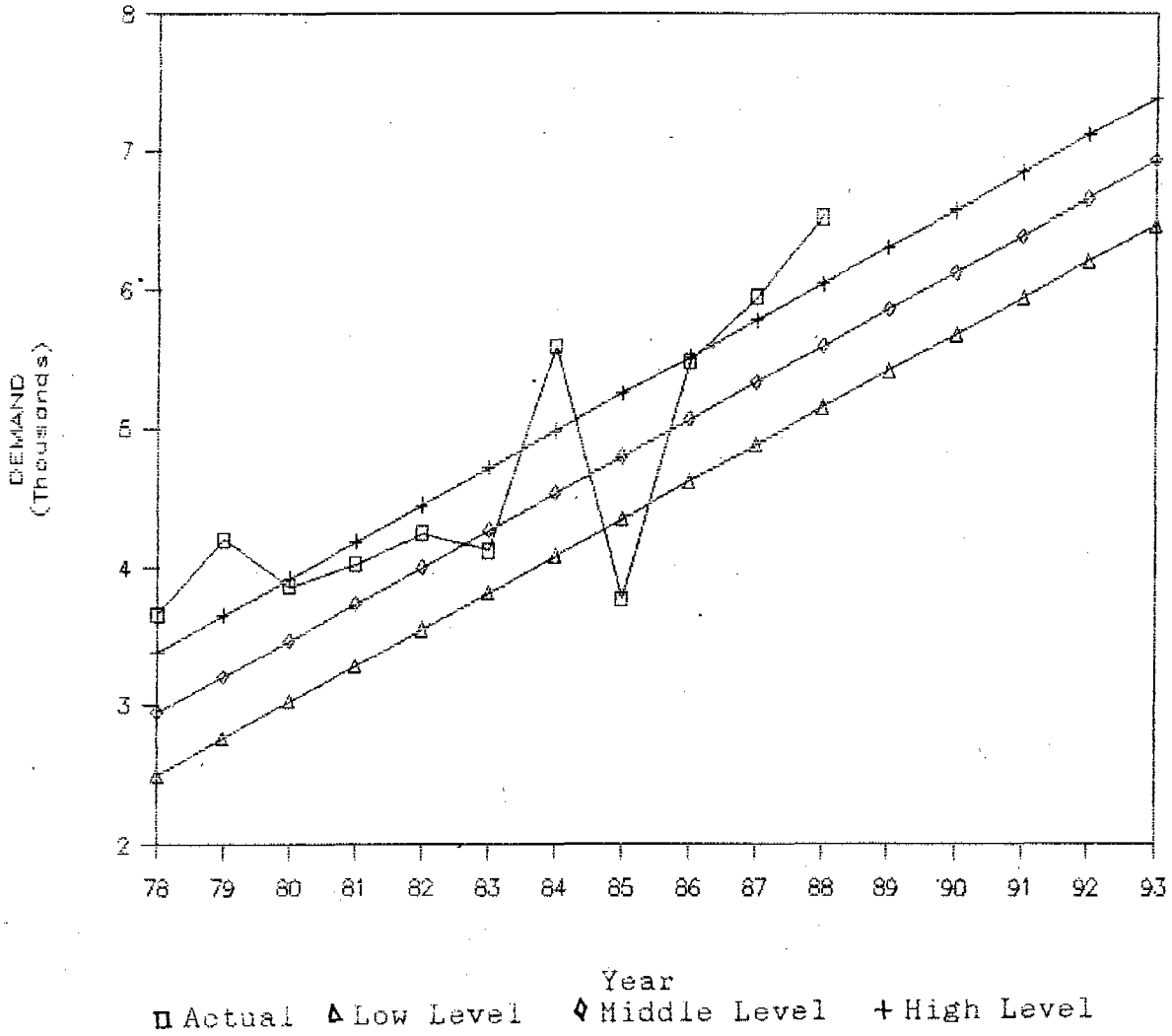


Figure 5.15
Actual and Forecast Quarterly Z

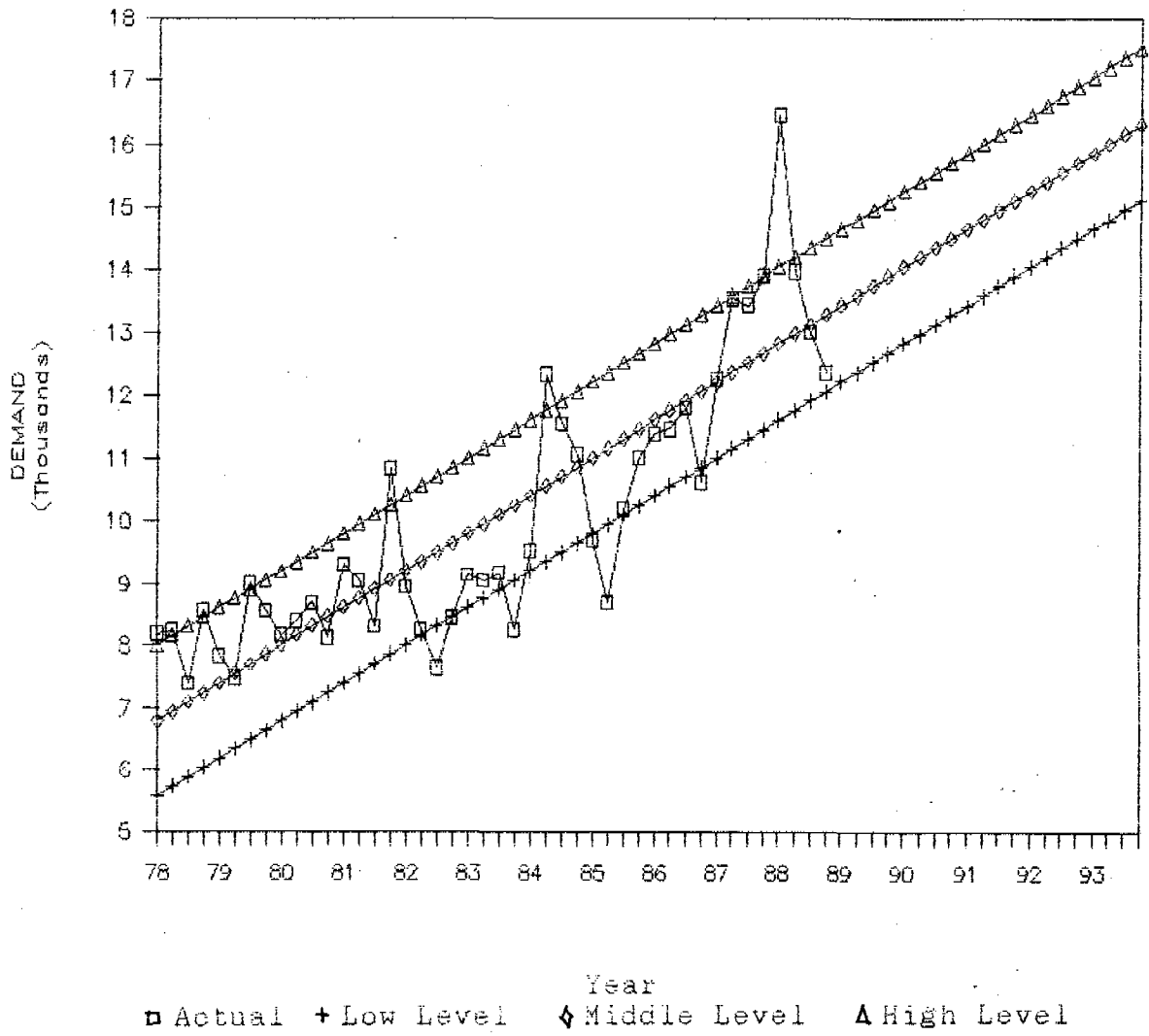


Figure 5.18
Actual and Forecast Annual Z

