

Use a Dummy for Smarter Forecasting

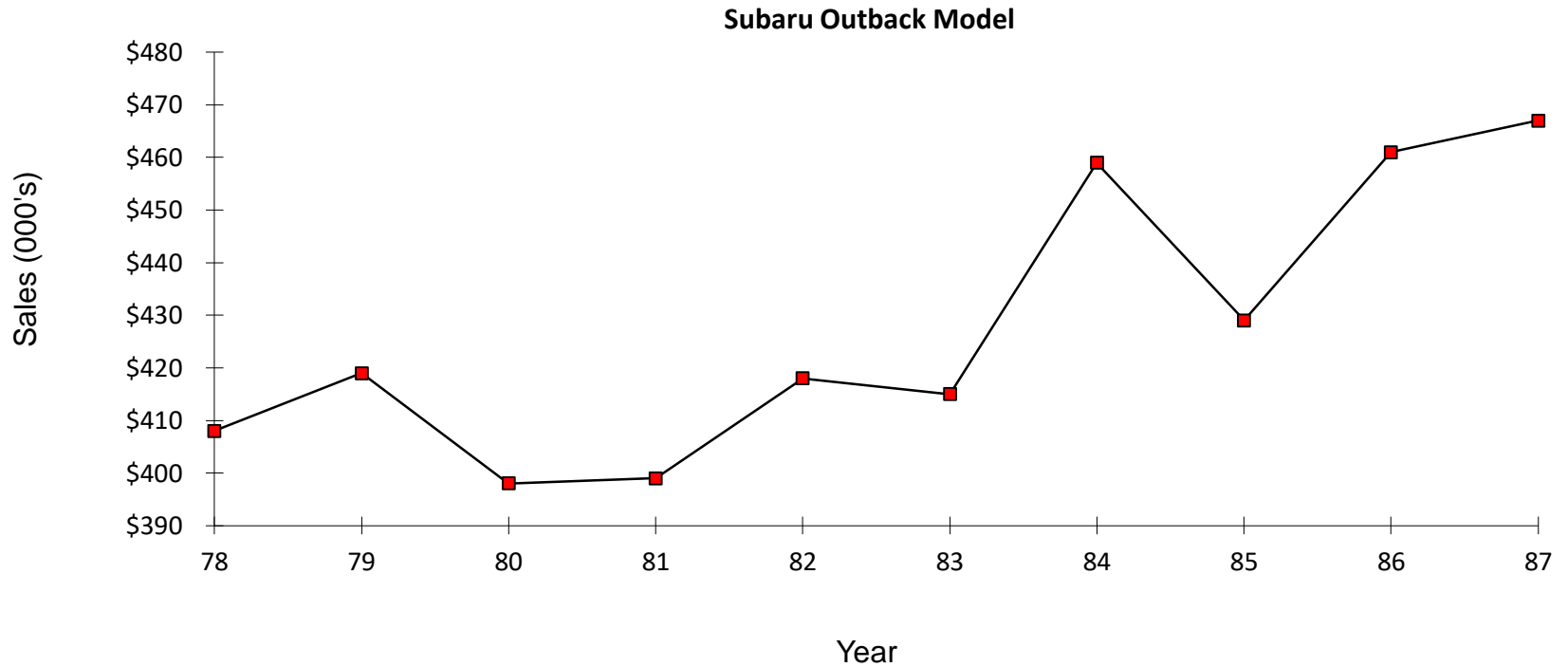
- A Typical Sales Forecasting Exercise
 - Historical Sales (Dependent Variable) & Independent variables (IV's)
 - Typically a time series or regression
 - Fit a regression curve (equation) to historical data
 - Examine the goodness of fit R^2
 - Fit satisfactory? Use equation to forecast future sales (DV) from values of IV's (controllable or non-controllable)

**Example from Lilien, 1988, Analytic Exercises with Lotus 1-2-3

Hypothetical Historical Data and Forecast

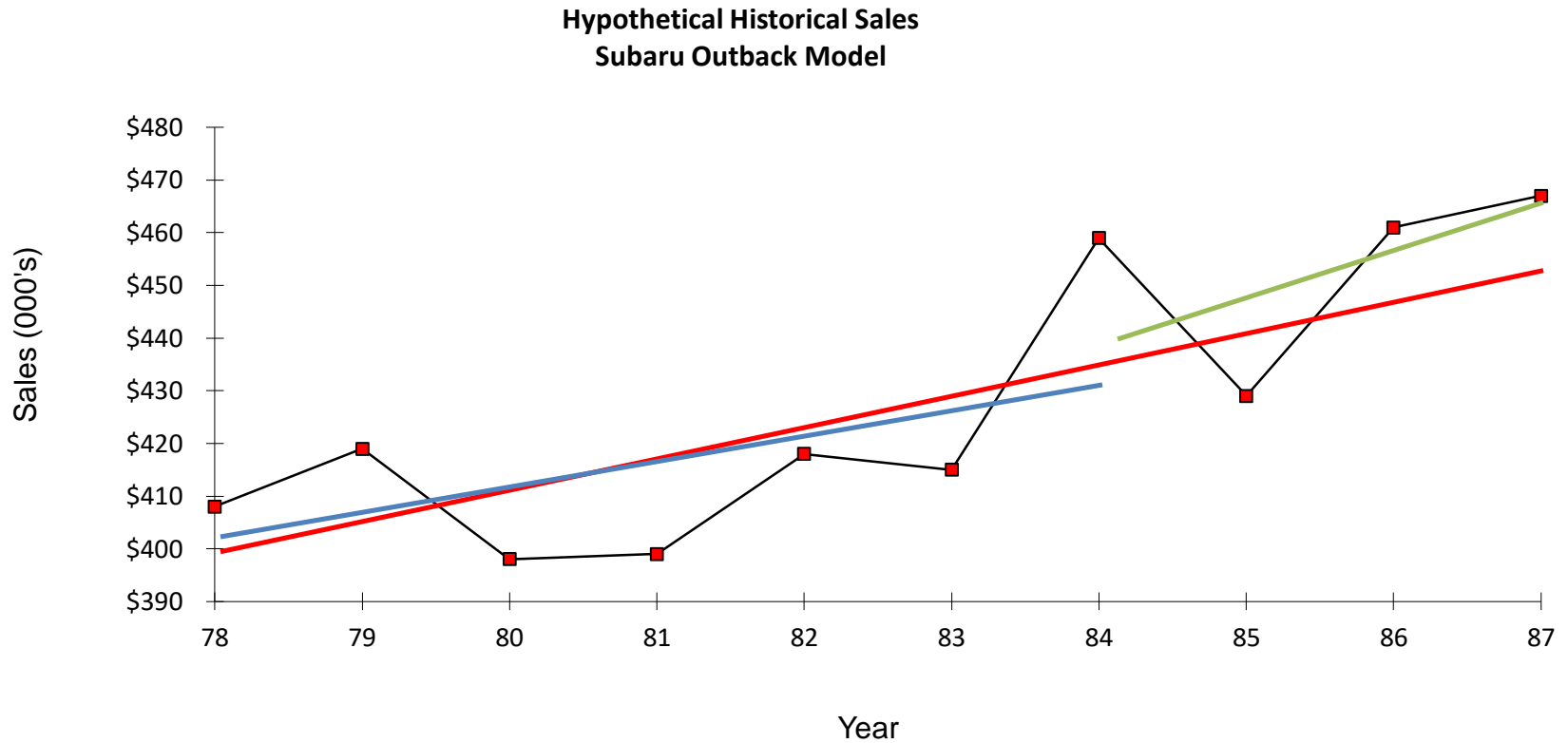
	Year	Outback Sales (\$1000s)	Industry Sales (\$Millions)	Ind Prod Index
	1982	\$408	\$9.00	103.1
	1983	\$419	\$9.50	108.0
	1984	\$398	\$9.30	101.7
	1985	\$399	\$10.10	99.4
Actual	1986	\$418	\$12.30	98.6
Sales	1987	\$415	\$11.60	99.8
	1988	\$459	\$10.50	101.2
	1989	\$429	\$9.10	96.1
	1990	\$461	\$11.50	98.9
	1991	\$467	\$10.70	103.5
Forecast	1992F	\$450	\$10.60	98.3
Sales	1993F	\$452	\$10.40	99.3
	1994F	\$468	\$11.30	102.0

Hypothetical Historical Sales(Plot)



Eyeball-Which curve fits best

Red, Blue or Green?



Three Possible Linear Models

1. Simple time series-One indep var.

$$\text{Sales} = a_0 + a_1 \text{Year}$$

2. Multi regression-Two indep var.

$$\text{Sales} = a_0 + a_1 \text{Ind Sales} + a_2 \text{Ind Pdn. Index}$$

3. Multi regression-two indep var. plus Dummy

$$\text{Sales} = a_0 + a_1 \text{Ind Sales} + a_2 \text{Ind Pdn. Index} + a_3 D$$

Simple Time Series

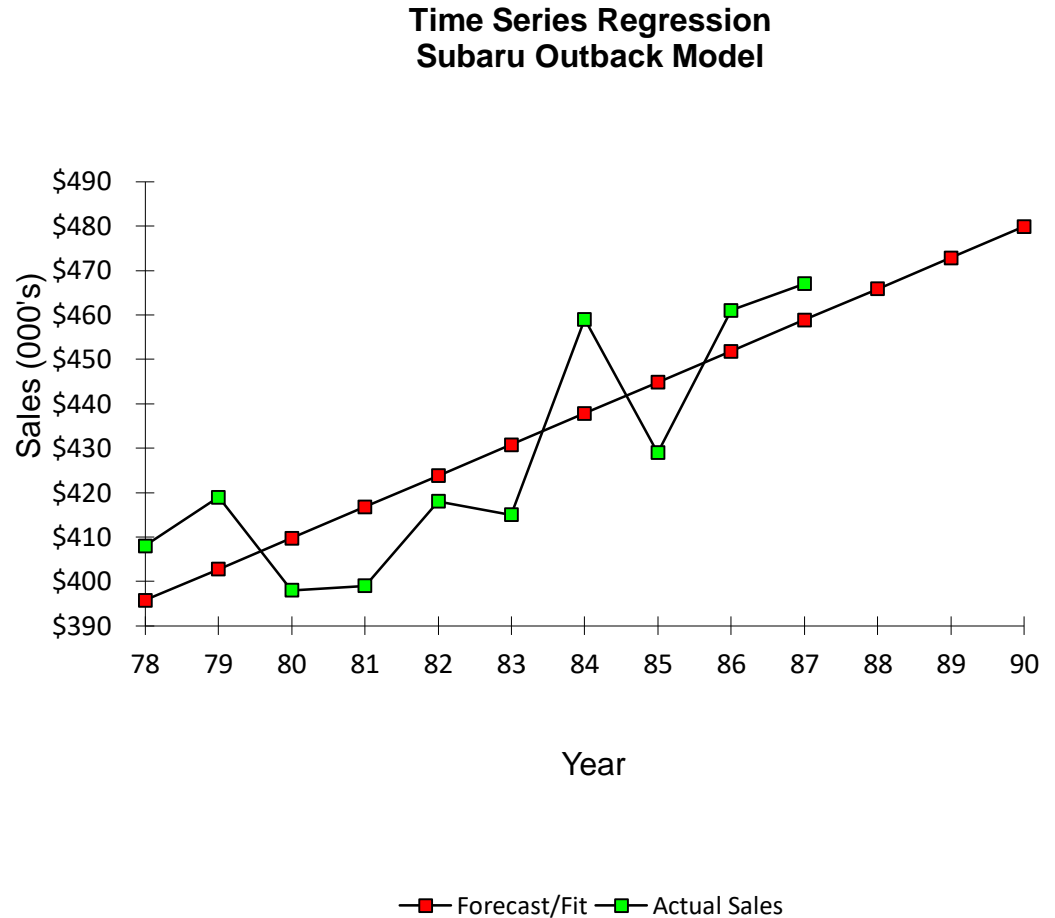
Simple time series

$$\text{Sales} = a_0 + a_1 \text{Year}$$

Very poor fit

$R^2 = .13$

No confidence in
in forecast



Multiple Regression

Multi regression w/2 IV's

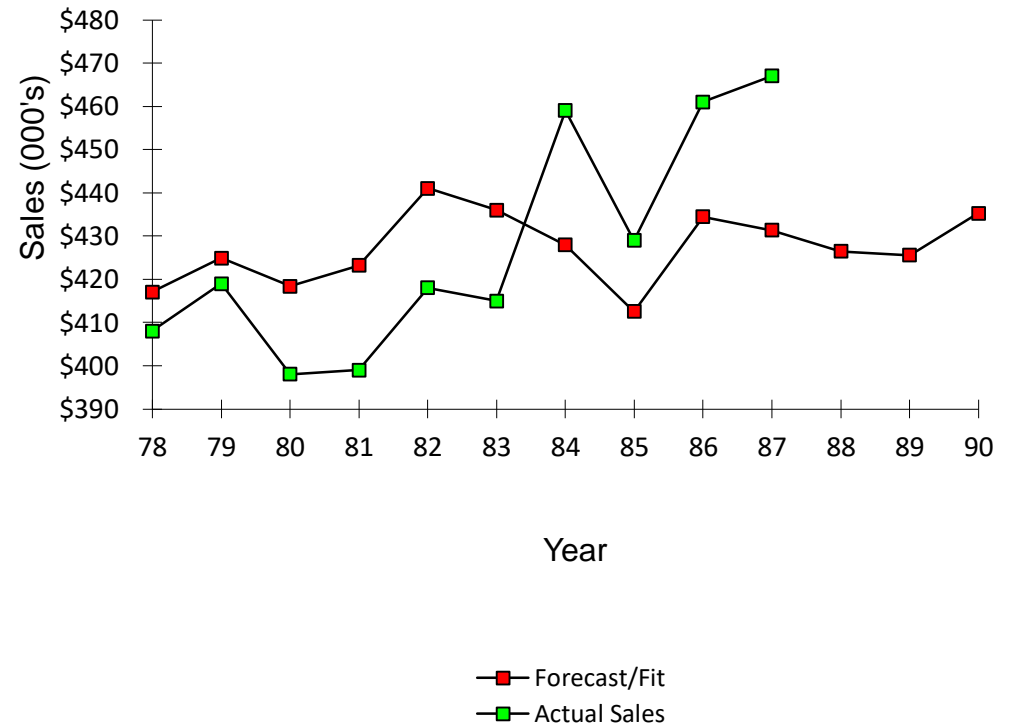
$$\text{Sales} = a_0 + a_1 \text{Ind Sales} + a_2 \text{Ind Pdn. Index}$$

- Fit is better $R^2=.67$
- Captures positive trend

Not great confidence;

forecast is high before '84
and low after '84, year of
repositioning

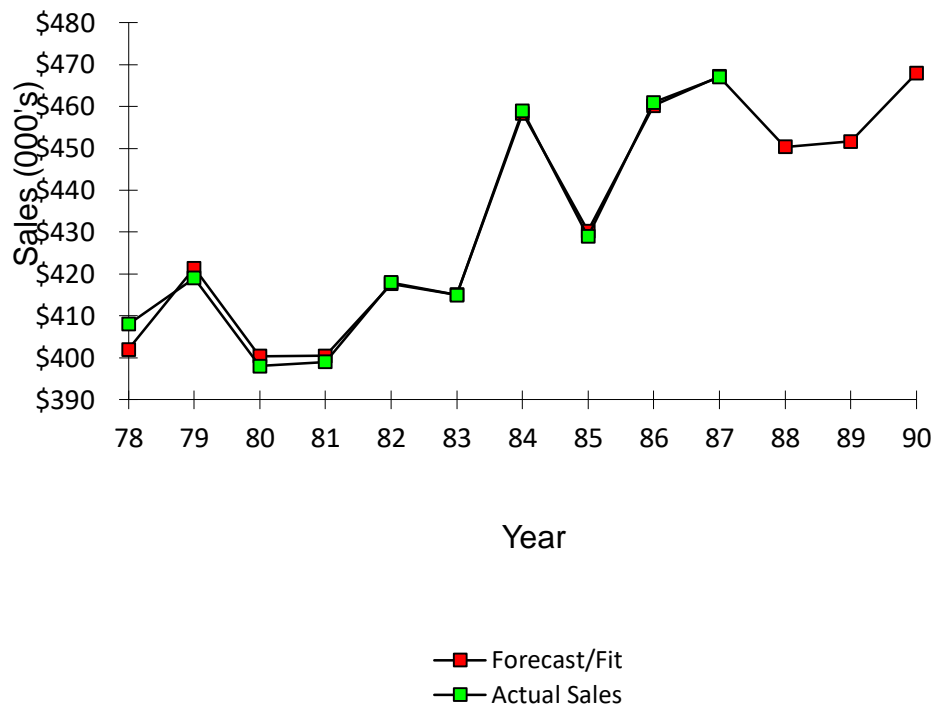
Multi Linear Regression
Subaru Outback Model



Linear 2-part with Dummy pre '84 Paul Hogan=0 '84 on Ellen DeGeneres=1

- Multi regression with Dummy for new positioning;
- Fit is much better $R^2=.99$
- Model captures trend and repositioning.
- Confident about forecast.

Linear, 2-Part Regression
Subaru Outback Model



Thunderous Applause!!!!

