Almond Yield Profit

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Import and subset climate data

```
almond_climate_original <- read.table(here("data", "clim.txt")) %>%
  clean_names()

almond_climate <- almond_climate_original %>%
  mutate(date = as_date(d)) %>%
  mutate(year = year(date)) %>%
  mutate(month = month(date))

# temp in february
almond_temp <- almond_climate %>%
  filter(month == 2) %>%
  group_by(year) %>%
  summarize(mean_min = mean(tmin_c)) %>%
  select(year, mean_min)

# precip in january
almond_precip <- almond_climate %>%
  filter(month == 1) %>%
  group_by(year) %>%
  summarize(mean_p = mean(precip), sum_p = sum(precip)) %>%
  select(year, sum_p)
```

Import and execute function to estimate almond yield anomalies

```
source(here("R", "almond_yield.R"))

yield <- almond_yield(year = almond_temp$year, p = almond_precip$sum_p, Tn = almond_temp$mean_min)
```

Profit

```
source(here("R", "compute_NPV.R"))
source(here("R", "almond_profit.R"))

price <- 50

acres <- 1000

base_almonds <- 2000

profit <- compute_profit_almond(yield = yield$almond_yield, year=yield$year, price=price, discount=0.12
```

#Sensitivity Analysis

```
#here's a start to something...not sure if it's quite right though

deviation = 0.15
base_price = 50
base_acres = 1000

price = runif(min = base_price-deviation*base_price,
              max = base_price+deviation*base_price,
              n = 22)

acres = runif(min = base_acres-deviation*base_acres,
              max = base_acres+deviation*base_acres,
              n = 22)

parameters = cbind.data.frame(price, acres)

profit_sensitivity = parameters %>%
  pmap(~compute_profit_almond(yield = yield$almond_yield, year=yield$year, price=.x, discount=0.12, acr

profit_almonds = map_df(profit_sensitivity,`[`, c("net", "year"))

profit_almonds_df = data.frame(year = profit_almonds$year,
                     net= profit_almonds$net)

profit_almonds_df_final <- profit_almonds_df %>%
  group_by(year) %>%
  summarise(mean_netprofit = mean(net))

#when we vary 2 parameters we can bind them together here
#parms = cbind.data.frame(price)
```

Summary figures

```
# now we could plot
ggplot(profit_almonds_df,
       aes(as.factor(year), net, group=year))+
  geom_boxplot() +
```

```
  theme_minimal() +
  labs(x = "Years", y = "Profit", title = "Profit over Years 1989-2010")
```

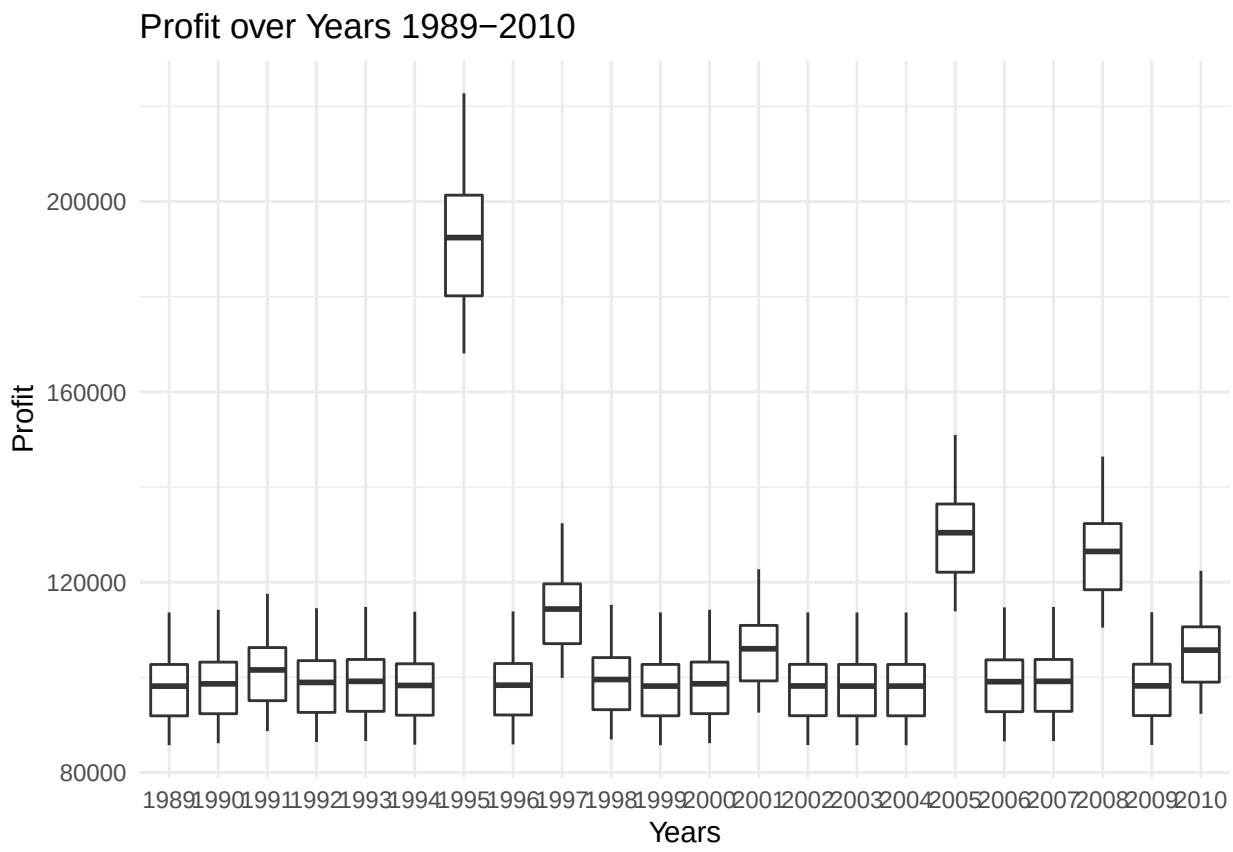

Figure 1: These are the profits from 1989-2010 for almond yield when the parameters for price and acres are both varied by 15%.

```
#Make scatter plots comparison
mean_profit = cbind.data.frame(profit_almonds_df_final, parameters)

p1 = ggplot(mean_profit, aes(price, mean_netprofit, col=acres))+geom_point(cex=2)+
  labs(y="Mean Annual Profits", x="Annual Price")
p2 = ggplot(mean_profit, aes(acres, mean_netprofit, col=price))+geom_point(cex=2)+
  labs(y="Mean Annual Profits", x="Almond Acres")
p1|p2
```

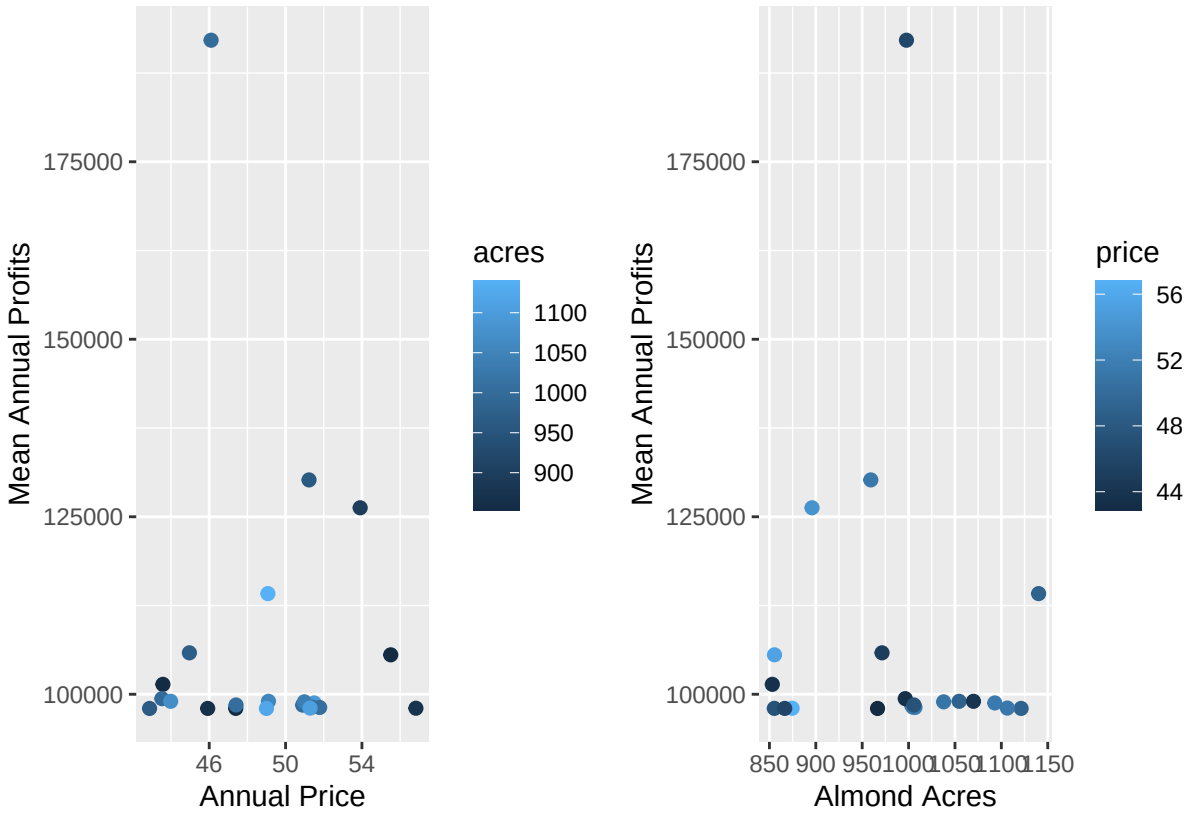

Figure 2: Here we have the relationship between the mean anual profits and annual price, and the relationship between the mean annual profits and acres of almonds planted. We can see from these figures that both of these parameters (price and acres) do not have a strong relationship with profit.