almond_profit_fun.R

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2026-01-25

almond_profit_fun

Computes almond temp anomalies given January precipitation avg and February minimum temperature avgs
@param almond_df dataframe of almond min and max temperatures and precipitation over time

```
almond_profit_fun <- function(almond_df) {

  #.....................PULL OUT VARAIBLES FOR EQUATION.....................
  # Pulling out Feb min temps
  tmin_feb <- almond_df %>%
    filter(month == 2) %>%
    select(tmin)

  # Pulling out January precipitation
  precip_jan <- almond_df %>%
    filter(month == 1) %>%
    select(precip)

  # Creating df of years
  yr <- almond_df %>%
    filter(month == 1) %>%
    select(year)

  #.........................YIELD ANOMALY.........................

  # Equation for Almond YIELD ANOMALY
  Y = -0.015 * (tmin_feb) - 0.0046 * (tmin_feb)^2 - 0.07 * (precip_jan) + 0.0043 * (prec
ip_jan)^2 + 0.28


  # Create a dataframe of year and ANOMALY
  almond <- data.frame(year = yr,
                       yield_anomaly = Y)

  # Change column names (`data.frame` function was not changing the colnames)
  colnames(almond) <- c("year", "yield_anomaly")


  #.............................PRICE.............................

  # Dataframe of almond prices from 2024 California Almond Objective Measurement Report
  price_lb_df <- data.frame(year = c(1995:2023),
                            price_lb = c(2.48, 2.08, 1.56, 1.41, 0.86, 0.97, 0.91, 1.11,
1.57, 2.21, 2.81, 2.06, 1.75, 1.45, 1.65, 1.79, 1.99, 2.58, 3.21, 4.00, 3.13, 2.39, 2.5
3, 2.50, 2.45, 1.71, 1.86, 1.40, 1.40))


  # Predicting prices of 1988:1994 with above data with an lm_model
  lm_model <- lm(price_lb ~ year,
                 data = price_lb_df)

  missing_years <- data.frame(year = 1988:1994) # dataframe of missing year

  missing_years$price_lb <- predict(lm_model, newdata = missing_years) # predict price o
f missing years with `lm_model`

  price_lb_df <- rbind(missing_years, price_lb_df) # Make one dataframe of prices
```

```r
  # Convert price ($/lb) to price ($/ton)
  price_lb_df$price_ton <- price_lb_df$price_lb * (1/0.005) ## 1lb = 0.005 tons

  # Add prices ($/ton) to almond df
  almond <- left_join(almond, price_lb_df, by= "year") %>%
    select(-c("price_lb")) # Remove price per lb


  #.............................COST.............................
  # Discount Rate function
  cost_function <- function(t, base_price = 1569, discount_rate = 0.09) {
    base_price / (1 + discount_rate)^(2024-t) } # base price and discount rates from pap
er

  almond$cost <- cost_function(t = almond$year) # apply `cost_function` to almond years


  #.............................PROFIT.............................
  almond$yield = (0.9 + almond$yield_anomaly) # baseline + nomaly = yield (ton /acre)

  almond$revenue = almond$yield * almond$price_ton # yield (ton /acre) * price ($/ton) =
rev ($/acre)

  almond$profit = almond$revenue - almond$cost # revenue ($/acre) - cost ($/acre) = prof
it ($/acre)

  almond # return entire df
}
```