almond_profit_function.R

meganhessel

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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 @param price The default is the average price from the 2024 California Almond Objective Measurement Report or user can input a list of prices in which the function will average @param discount_rate The discount rate of almond costs over time. The default is the discount rate from the paper (9%), but could be changed.

```r
almond_profit_function <- function(almond_df, prices = 398.7586, discount_rate = 0.09) {

  #.....................PULL OUT VARAIBLES FOR EQUATION.....................

  # get T_n,2
  Tn2 <- almond_df %>%
    filter(month == 2) %>% # will filter out years that don't have data in Feb
    group_by(year) %>%
    summarise(avg_tmin_c = mean(tmin_c, na.rm = TRUE))

  # get P_1
  P1 <- almond_df %>%
    filter(month == 1) %>% # will filter out years that don't have data in Jan
    group_by(year) %>%
    summarise(sum_precip = sum(precip, na.rm = TRUE))

  # combine back to one df
  result <- merge(Tn2, P1, by = "year", all = TRUE)

  #.............................YIELD ANOMALIES.............................

  # get Y
  almond <- result %>%
    mutate(
      yield_anomaly = if_else(
        is.na(avg_tmin_c) | is.na(sum_precip),
        NA_real_,
        (-0.015 * avg_tmin_c) + (-0.0046 * avg_tmin_c^2) +
          (-0.07 * sum_precip) + (0.0043 * sum_precip^2) + 0.28
        )
      )

  #............................AVG PRICE.................................

  # AVERAGE almond prices & Convert price ($/lb) to price ($/ton)
  avg_price_ton <- mean(prices) * (1/0.005) ## 1lb = 0.005 tons

  almond$avg_price_ton <- avg_price_ton

  #.................................COST.................................
  base_price <- 3807
  almond$cost <- base_price / (1 + discount_rate)^(2024 - almond$year) # Discount rate e
quation

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

  almond$revenue = almond$yield * almond$avg_price_ton # yield (ton /acre) * price ($/to
n) = rev ($/acre)

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

```
almond # return entire df

}
```