What to pull? What to plant? Economic basics

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Daniel A. Sumner
University of California, Davis
and
U.C. Agricultural Issues Center

One simple equation

Compare across potential crops:

Profit = Price X Quantity – Costs

But, we must look far into the future, so the equation is really a little less simple.

Discounted present value of expected future profits =

1/D{Sum (t)[Expected Price(t) X Expected quantity(t) – Expected cost(t)]},

where D is the discount factor determined by the expected interest rates and 'Sum' means we add up all the relevant future years.

Consider each term in this equation one-by-one

Expected Quantity

- **Future crop yields for each crop will be driven by the specific parcel used for that crop, technology available in the future and choice of inputs**
- **Each parcel has different relative yields so the decision must start there. Obviously, some land is just not well suited to some crops**
- **Also, high crop price or low input prices may stimulate higher yields**
- **Future technology must be projected to see how relative yields grow across crops**

Expected costs

Expected costs =

Sum(i){Input price(i)X input use(i)}

where i refers to each input used for each tree crop.

- **Key costs are land, hired labor, equipment, water, materials, value of managerial time and effort**
- **Technology affects the usage and may affect how crops differ by input intensity (e.g. labor saving technology or energy saving technology)**
- **Other factors affect the input prices, which do not differ much across crops**
- **But relative input intensity determines importance of each input in how expected costs will differ over time for each crop**

Expected prices

Expected prices hinge on the interaction of expected long run tree crop supply conditions in competitive regions and long run tree crop demand conditions in relevant markets.

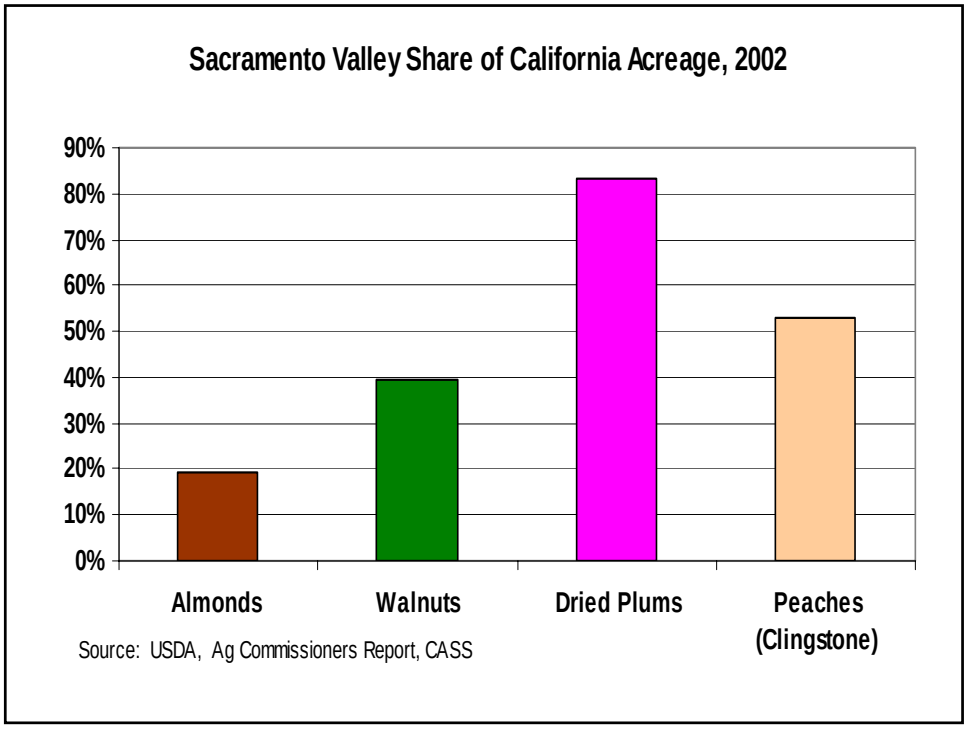
Expected future demand includes the US market and potential export markets.

- **In all markets, expected future demand depends on expectations about prices of substitute foods, new product developments, nutritional benefits, income growth, demographic trends such as age distributions, ethnicity and etc.**
- **In export markets, tariffs and other barriers to access also determine relevant demands.**

Expected prices

Expected future supply in competitive regions depends on changes in costs per unit of output if output were to expand or contract.

- **Important competitors are in Europe, South America, and Asia, but also importantly, the San Joaquin Valley**
- **Must project resource constraints faced by other producers, their input prices and potential technological improvements**
- **Also land prices and competition from other crops is crucial in other regions, as in the local area**
- **For some regions (Europe) farm subsidies drive current supplies and subsidies will likely be declining over the decades to come.**



Additional Specific Issues

- The importance of interest rates differs by crop and individual farm
- Economies of scale by crop…may encourage specialization
- Pressures of seasonality… may encourage multiple crops
- Management expertise and crop-specific experience… may encourage specialization
- Diversification and risk…may encourage multiple crops

Interest Rates

- The importance of interest rates differs by crop and individual farm
  - Rates will surely rise from here, but with little inflation on the horizon rates will stay low.
  - Long-term interest rates are important for tree crops and vine investments and most important for crops that have the longest span before reaching full production… Walnuts more than peaches
  - A significant rise in rates would be more troublesome for new walnut acreage

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Economies of size and scale

- Costs fall with more acreage, large size and specialization pays…special equipment, labor use efficiency, management efficiency all suggest larger sizes have lower per-unit costs, but this is limited.
- Some size economies are per crop and some apply to the whole farm size.
  - Niche markets may be an exception
  - Size economies are limited by crop
  - Larger farms are more diversified
- Part-time farms have a different economic focus
- Major drivers to expansion relate to smaller margins and larger size required to use management and to generate acceptable/comparable family income

Seasonality

- For part-time farms seasonality may encourage of specialization for larger farms seasonal peaks encourage multiple crops.
- Labor demand seasonality encourages multiple tree crops to spread labor use over more weeks.
- Peak demand on management time also encourages spreading intense manager demand over more weeks or months

Variability Risk and diversification

- **Yields and prices both vary unpredictably**
- **The more a crop is centralized geographically (prunes) the more price moves inversely with production to create a natural hedge**
- **Diversification is one obvious response to risk is diversification. To smooth income over time, plant crops with low correlations in yield, price, gross revenue, cost or especially net return.**
- **Other responses are crop insurance, long-term credit relationships, economic diversification to non-farm earnings**

Size and diversification

Sac Valley	Almonds	Walnuts	Dried Plums	Peaches, All
Average Acreage	153	82	93	71
Average, farms >100	399	357	270	179
Specialized	65%	73%	52%	17%
S J Valley				
Average Acreage	112	56	108	70
Average, farms >100	387	279	271	198
Specialized	76%	73%	52%	19%

Diversification patterns

- **Patterns of size and diversification across valleys are similar.**
- **Average acreage is largest for almonds for all farms and for those with more than 100 acres of the crop**
- **Almond and walnut growers are most specialized**
- **Peaches* are least specialized and tend to get revenue from prunes and other tree cops.**

***Data for all peaches but the pattern in the Sacramento Valley is similar to that in the San Joaquin where more freestones are grown.**

Risk characteristics by crop

To deal with risk and to hedge effectively with diversification requires understanding the individual farms expected future variability of net revenue by potential crop.

The important variability is the based on deviations from trends, because predicated movements in prices or yields may often be built into planning.

Also, how variability in one crop correlates with other potential crops shows how diversification may help smooth income flows.

Aggregate data can be helpful but local data is the key because individual farm yields often do not correlate well with state or even county averages. That is also an argument for geographic diversification.

Conclusions

There are no easy obvious answers.

- **Fortunately, the choice should and will be different for different farms.**
- **We have a good idea of the information needed and how to use such information.**
- **The problem is that projections must depend on information that cannot be known for sure.**
- **That does not mean that efforts to understand the forces at work are useless, but it does not guarantee the result.**
- **The rest of this workshop is designed to put the flesh on the bones of the framework just outlined.**