WELL-BEING AND POLARIZATION IN UNITED STATES

By

Derong Liu

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ABSTRACT

This thesis has two-fold objective: one is to study the extent of polarization in wellbeing among U.S. counties, and the other one is to examine the determinants of self-reported happiness in Arizona. In doing so, I first provide an overall view of wellbeing in the United States. Then in the second part, I provide more analysis into factors of wellbeing using survey data from Arizona.

I use U.S. county Per Capita Income (PCI) data (2,992 observations) to study the extent and evaluation of Polarization, Welfare and Poverty over the period 1959-1989. Non-parametric and Stochastic Dominance techniques are employed. The methods compare mass relocation by evaluating various degrees of right and left separation between distributions. Results show that regardless of time and method of analysis, wellbeing has improved in all counties. But polarization still exists in spite of improved welfare. I also weight Per Capita Income by the population share for each county. But I did not find a noticeable difference between the weighted and un-weighted results, except for the time periods of 1969 to 1979 and 1959 to 1989. “No decision” results were obtained for these periods of the polarization dependent weighted sample.

Income is an important factor of happiness. But it is not the only factor which contributes to self-satisfaction or happiness. In this thesis, I also used regression analysis to quantify factors which affect the overall self-reported happiness of Arizona farmers. Self-reported

happiness is measured by a categorical variable representing overall life satisfaction of individual farmers. An ordered probit model is used to estimate the happiness model econometrically. Results are consistent with our hypothesis that income is not the only factor that makes people happy. Other factors such as, having health insurance, race, planting organic crops, education, and the emotional attachment to their farms are also very important factors identified.

INTRODUCTION

Following Anderson (2004), I examine the evaluation of wellbeing and polarization using U.S. county-level data. Thus, my analysis overcomes problems of data as well as methodology.

In general, there are two ways to study the wellbeing of a country or a region. One way is to study the growth in Per Capita Gross Domestic Product (GDP) (Barrow, 1998), Per Capita Gross National Product (GNP) (Wade, 2001; Anderson, 2004), or Per Capita Income (PCI) (Higgins et al., 2006). The alternative way is to the study the determinants of wellbeing (Easterlin, 1995; Kahneman, et al, 2006). I have overlaid both methods to study wellbeing in the United States.

There are two chapters in this thesis. Chapter 1 examines improvement in wellbeing and polarization among U.S. counties. Chapter 2 provides evidence on the determinants of wellbeing. The motivation of chapter 1 is from the papers of Higgins, Levy, and Young (2006) and Anderson (2004a). Higgins and coworkers (2006) used regression to study the convergence of U.S. county level data. Their method has some shortcomings because they only consider the 2^{nd} moment of the distribution, but using county level data is an improvement over studies examining the inequality and polarization of wellbeing using cross-sectional countries data. Anderson (2004) used a stochastic dominance method to study the gap between the rich and poor using country level data. His method is more

robust because he considers the entire distribution instead of just the 2nd moment. Thus we use the stochastic dominance methods to analyze county level income data.

We make two contributions to the empirical literature on wellbeing and polarization for the U.S. First, we study convergence and polarization in wellbeing using both U.S. county level data and the stochastic dominance method. U.S. county data are collected by a single institution using uniform variable definitions. Also, there is no exchange rate variation between the counties and the price variation across counties is smaller than across countries. Furthermore, U.S. counties are far more homogeneous than countries (cited from Higgins et al., 2006).

Secondly, we provide insights of well-being into using individual response data from AZ farmers. The results should have implication for the policy makers.

Thus, this thesis research contributes an important contribution to well-being through empirical analyses.

CHAPTER 1

INFERENCES ABOUT WELLBEING AND POLARIZATION OF U.S. COUNTIES

1.1 Introduction

Motivation for the analysis of convergence in wellbeing lies in Solow's prediction of convergence in economic growth across-countries.

Barro and Sala-i-Martin (1992) showed the existence of convergence in the sense that poor economies tend to grow faster than rich ones in per capita terms using U.S. state level data. Convergence is a very appealing hypothesis for studying the growth in Per Capita Gross Domestic Product (GDP) (Barrow, 1998) and in Per Capita Gross National Product (GNP) (Wade, 2001; Anderson, 2004). Two major concepts of convergence have been examined in the literature: β-convergence and σ-convergence. Barro and Sala-i-Martin (1991; 1995) and Sala-i-Martin (1996) draw a useful distinction between two types of convergence. When the partial correlation between growth in income over time and its initial level is negative, there is β-convergence. This implies poor counties will grow faster than rich counties, and thereby narrow the gap in income, controlling for other characteristics. If the dispersion of per capita income between countries or regions decreases over time, it is called σ-convergence.

Barro (1991) and Barro and Sala-i-Martin (1992) concluded that the estimated speeds of β-convergence are surprisingly similar across cross-sectional data sets and a rate of convergence around 2% has been found under a variety of different conditions, resulting in a widespread belief that the rate of convergence is a natural constant. Quah (1996) argued that the observed rate of convergence of 2 percent per year may reflect the econometric properties of the estimation techniques involved rather than an actual process of convergence.

Quah (1993) and Friedman (1992) suggest that σ-convergence should be used since it captures whether the distribution of income across economies is moving to more equitable leads. Wodon and Yitzhaki (2005; 2006) showed that if there is σ-convergence, then there must be β-convergence, but β-convergence does not necessarily imply σ-convergence. And *β*-convergence may be observed both forward and backward in a univariate setting (Wodon and Yitzhaki, 2005; 2006). Furceri (2005) shows that *σ*-convergence implies *β*-convergence. But this is only a necessary condition for *σ*-convergence.

A problem exists in that most of the convergence studies are based on the assumption of homogeneity among different countries. Thus using county instead of country level data to study convergence is arguably more appropriate. But Higgins et al. (2006) concluded that σ-convergence did not occur using U.S. county level data, suggesting that σ-convergence and β-convergence are probably not the best way to study the inequality.

Polarization is another methodology to evaluate the income gap between the rich and the poor. An income gap does not necessarily imply lower economic welfare. Greater inequality or greater absolute poverty has more to do with polarization, a relocation of mass from the centre towards the tails of the distribution. But multiple modes are not necessary for polarization (Esteban and Ray, 1994; Foster and Wolfson, 1992; Wolfson, 1994; Paap and van Dijk, 1998). Even if their respective means or variances do not change, it is still possible to generate a widening gap in the distribution by left skewing of a poor county and/or right skewing of a rich county (Anderson, 2004).

Stochastic dominance is a technique which is used to analyze income distributions and income inequality by comparing a pair of distributions unambiguously, typically by evaluating various degrees of right or left separation between distributions. We can use it to study the extent of polarization and convergence (Anderson, 2004). The advantage of this method is we do not need to impose any structure on the nature of the polarization process and the development of multiple modes is not necessary. Anderson (2004) applied this method using country level data and did not see a consistent welfare improvement, but he found constant polarization over time. Due to the similarity of policies and economic forces among different counties from the same country verse different countries, we believe that county level data is most appropriate for evaluating polarization.

In order to determine which is dominating distribution, I first characterize them by their cumulative distribution functions (CDFs). Suppose that we consider two distributions A and B, their CDFs are F_A and F_B respectively. If it is true that $F_A(y) \geq F_B(y)$ for any argument y, then distribution B dominates distribution A stochastically at first order. Higher orders of stochastic dominance can also be defined. We define repeated integrals of the CDF for each distribution. Formally, we define a sequence of functions by the recursive definition

$$D^1(y) = F(y), D^{q+1}(y) = \int_0^y D^q(z)dz \text{, for } q = 1, 2, 3. \ldots. \quad (1)$$

Thus the CDF of the distribution under study is defined as D^1, $D^2(y)$ is the integral of D^1 from 0 to y, $D^3(y)$ is the integral of D^2 from 0 to y, and so on. By definition, distribution B dominates A at order q if $D^q{}_A(y) \geq D^q{}_B(y)$ for all arguments y. It is very obvious that first-order dominance implies dominance of all higher orders, but not the converse.

1.2 Methodology and Estimation

In this study, we use the stochastic dominance technique developed by Anderson (2004). To examine the exact wellbeing and polarization of U.S. counties, some basic statistics are calculated and the kernel density estimates are plotted. We also calculated several inequality and polarization indices. Most importantly, we adopted his stochastic dominance and polarization technique and applied it to U.S. county level data to study inequality and the gap between the rich and the poor.

1.2.1 Statistics and Kernel Density Estimates

Following convention, I took the natural logarithm of per capita income (PCI). Several basic statistics, mean, median, standard deviation, minimum and maximum are calculated to show how PCI is distributed and how it has changed over time. I also weighted PCI by the population share of each county. Plots of the kernel density estimates give us a direct impression of how the distributions look and how they have changed over time. The kernel density estimate, f(n), of a set of n points from a density f is defined as:

$$f_h(x) = \frac{1}{nh}\sum_{i=1}^{n} K\left\{\frac{(x - x_i)}{h}\right\} \tag{2}$$

where K is the kernel function and h is the smoothing parameter or window width ($h = 3$ in this study), x is the natural logarithm of per capita income, and n is the total number of counties.

1.2.2 Inequality and Polarization Indices

The Gini Index was developed by Gini (1912) and is strictly linked to the measurement of income inequality through the Lorenze Curve. In particular, it measures the ratio of the area between the Lorenz Curve and the equidistribution line to the area of maximum concentration. There are several different equations to calculate the Gini index. One is

$$G(S) = \frac{1}{n-1}\left(n + 1 - 2\left(\frac{\sum_{i=1}^{n}(n+1-i)\,y_i}{\sum_{i=1}^{n} y_i}\right)\right) \tag{3}$$

Where y is the natural logarithm of per capita income, and n is the total number of counties. And the other is

$$G(S) = 1 - \sum_{i=1}^{n}\left(q_{i+1} + q_i\right) * \sum_{i=1}^{n}\left(p_{i+1} - p_i\right) \tag{4}$$

Where q is cumulative proportion of natural logarithm of per capita income, p is cumulative proportion of population, and n is the total number of counties. They are the same theoretically but their results are slightly different. In this research, I use equation (4).

The inter-quartile range is the range which includes the middle 50% of the distribution. This can help us discard the two extreme values which might be quite informative.

The Esteban and Ray polarization index for the discretely distributed random variable y which takes on any one of n values y_i with probabilities π_i, i = 1, 2, . . . , n. For constants K and α, it is defined as

$$\mathrm{P}(\pi, y) = K\sum_{i=1}^{n}\sum_{j=1}^{n}\pi_i^{1+\alpha}\,\pi_j\left|y_i - y_j\right| \tag{5}$$

K is a multiplicative constant which does not affect the ordering ($K= 10^{-22}$ in this study). And α is a parameter reflecting the polarization sensitivity of the index where $0 < \alpha < 1.6$ ($\alpha = 1$ in this study). The larger its value the further the measures depart from an inequality measure. Here the ith country's population share in the overall sample

corresponds to π_i. Note that this index is designed to pick up clustering around many modes whereas the much simpler range-based indices are focused upon bimodal structures and are thus potentially more powerful in the present context (Esteban and Ray, 1994; Anderson, 2004)

1.2.3 Well-being, Poverty and Stochastic Dominance: Idea of Mass Relocation

Because I adopted the method from Anderson (2004), the rest of my methods and notation follow him. Atkinson (1970), Kolm (1976), Foster and Shorrocks (1988) and Anderson (2004) have highlighted the importance of the mass relocation in income distributions for empirical well-being comparisons. They provide specific definitions of the distributional change necessary and sufficient to engender a well-being improvement for well-being functions in particular classes. The change is defined in terms of Stochastic Dominance Orderings which emerge from considering the average utility gained in moving from one income distribution to another. Consider ∇, the change in the expected value of societal utility $u(x)$ [1] which has properties

[1] In general $E(u(x))$ is thought of as the welfare function but if $u(x) = -P(x)$ where $P(x)$ is a poverty index based upon incomes, the same dominance criteria can be used to evaluate poverty states measured by poverty indices in a given class (Atkinson, 1987). In terms of social welfare, first order dominance corresponds to an ordering of social preferences based upon monotonic utilitarian social welfare functions, second order to a social preference for mean-preserving progressive transfers and third order to a social preference for mean-preserving progressive transfers at lower income levels. In the case of poverty indices, different levels of dominance ensure for any poverty line the same direction of change for all indices in the class defined by the order of dominance. Hence first order dominance implies coherence between all continuous non-decreasing in X poverty measures and third order implies coherence between all continuous non-decreasing strictly concave measures.

$(-1)^{j-1}\partial^j u/\partial x^j \geq 0, j = 1,...,i$ for some $i > 0$, based upon moving from density function $G(x)$ to $F(x)$ both defined on the interval [a, b]. It may be written as:

$$\nabla = E_F(u(x)) - E_G(u(x)) = \int_a^b u(x)(dF - dG)$$

A necessary and sufficient condition for $\nabla > 0$ for a given i is:

$$\int_a^x (F_{i-1}(z) - G_{i-1}(z))dz \leq 0 \text{ for all } x \wedge \int_a^x (F_{i-1}(z) - G_{i-1}(z))dz < 0 \text{ for some } x \in [a,b] \quad (2)$$

where, letting $f(x) = F_0(x)$, $F_i(x)$ is defined recursively as:

$$F_i(x) = \int_a^x F_{i-1}(z)dz \quad (x \leq b, i \geq 1)$$

and $G_i(x)$ is defined similarly. When (2) is satisfied $f(x)$ is said to stochastically dominate $g(x)$ at order i. In the following $f(x) \succeq_j g(x)$ denotes dominance of $g(x)$ by $f(x)$ of at least order j. For convenience, $f(x) \succ_j g(x)$ denotes strict order j dominance where strict inequality in (2) obtains over the relevant range. Note for $i < j$, $f(x) \succeq_i g(x)$ implies $f(x) \succeq_j g(x)$, furthermore the relationship is transitive I that if $f(x) \succeq_j g(x)$ and $g(x) \succeq_j h(x)$ then $f(x) \succeq_j h(x)$. The ordering is not complete it is unambiguous and, given the properties of $u(.)$, facilitates orderings of unobservable distributions of $u(x)$ in terms of observable distributions of x.

Here it is convenient to interpret i^{th}-order dominance as the degree of 'i^{th}-order right separation' of two distributions. When $f(x) \succeq_i g(x)$, $F_i(x_1) = G_i(x_2)$ implies $x_2 \leq x_1$, so

that F_i is everywhere not to the left of G_i and to the right of it at least somewhere, implying a sense of right separation of $f(x)$ from $g(x)$ at the i^{th} level of integration. As limiting examples let *x* be a transformation of *y* with respective distribution functions $g(y)$ and $f(x)$, then a positive location shift transformation[2] implies $f(x) \succeq_1 g(x)$: if the transformation is a location and scale preserving, scale-reducing shift then $f(x) \succeq_2 g(x)$ and if the transformation is a location and scale-preserving, positive-skewing shift then $f(x) \succeq_3 g(x)$.

Of equal interest is the idea of 'i^{th}-order left separation' characterized by a condition of the form:

$$\int_x^b (F_{i-1}(z) - G_{i-1}(z))dz \le 0 \text{ for all } x \wedge \int_x^b (F_{i-1}(z) - G_{i-1}(z))dz < 0 \text{ for some } x \in [a,b] \quad (2a)$$

Defining $w = -x$ and $f(w)$ from $g(w)$ as appropriately transformed distributions on [-b, -a] this condition is equivalent to $f(w) \succeq_i g(w)$ (with $F_i(w)$ and $G_i(x)$ defined as before) and has the analogous 'i^{th}-order left separation of $f(x)$ from $g(x)$' interpretation.[3] In this context the relationship $f(w) \succeq_1 g(w)$ may be thought of as a negative location shift transformation: if the transformation is a location-preserving,

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[2] This is easily demonstrated for distributions confined to the positive orthant, $f(x) \succeq_1 g(x)$ is sufficient for $E(x \mid f) > E(x \mid g)$ since:

$$E(x \mid f) - E(x \mid g) = \int_0^\infty [(1 - F(x)) - (1 - G(x))]dx > 0 \Rightarrow \int_0^\infty (G(x) - F(x))dx > 0$$

[3] This type of dominance is used in the finance literature and relates to the analysis of risk-loving behavior (see Levy and Weiner, 1998).

scale-reducing shift then $f(w) \succeq_2 g(w)$ and if the transformation is a location and scale-preserving, negative-skewing shift then $f(w) \succeq_3 g(w)$.

Assuming relative club sizes remain constant, polarization between rich and poor counties of the U.S. may now be thought of in terms of rich club distribution right separating the poor club distribution left separating at some order (of course one club separating in the appropriate direction while the other remains unchanged would also constitute polarization). When the club distributions are separately identified, polarization can be examined statistically by performing the relevant stochastic dominance tests jointly on successive realizations of the relevant club distributions. Letting $f^j(x)$ and $g^j(x)$ be the period j rich and poor club distributions respectively, three conditions need to hold simultaneously for i^{th}-order polarization:

1. $f^1(x) \succeq_1 g^1(x)$ (establishing that the rich club is first-order right separated from the poor club).
2. $f^2(x) \succeq_i f^1(x)$ (establishing that the rich club at least i-th order right separates in period 2).
3. $g^2(w) \succeq_i g^1(w)$ (establishing that the poor club at least i-th order left separates in period 2).

Thus, as limiting cases, first order polarization is engendered by the respective club means moving further apart, second order polarization arises when the clubs become more concentrated around their respectively unchanged means and third order

polarization occurs when the poor club skews left and the rich club skews right with their means and variances remaining unchanged.

If the observed distribution is an unknown mixture of unobserved rich and poor county distributions, the problem is to analyze the consequences of polarization within the observed mixtures. Inferences can be drawn by associating the lower and upper tails of the observed mixtures with the respective poor and rich clubs. Thus partitioning the distributions at some common defining point x^* (in the present case it will be the pooled sample medians respectively) and considering the relative progress of the distributions $f^1(x \mid x < x^*), f^2(x \mid x < x^*), f^1(x \mid x > x^*), f^2(x \mid x > x^*)$, two conditions need to hold simultaneously:

1. $f^2(w \mid x < x^*) \succeq_i f^1(w \mid x < x^*)$ (the left tail at least i-th order left separates in period 2).
2. $f^2(w \mid x > x^*) \succeq_i f^1(w \mid x > x^*)$ (the right tail at least i-th order right separates in period 2).

Clearly $f^1(x \mid x > x^*) \preceq_1 f^1(x \mid x > x^*)$ is always true in this case and does not need to be established so that an analogue to condition (1) employed when both rich and poor club are separately observed is no longer required.

1.2.4 Statistical Tests for Stochastic Dominance

Tests for stochastic dominance conditions have been widely used in the recent empirical growth literature. Anderson (1996) employed the distribution of integral approximations,

Davidson and Duclos (2000) employed the distribution of incomplete moments, and McFadden (1989) and Barrett and Donald (1999) employed distributions of functions of the empirical distribution function. The first two families of tests are attractive because they are easily adapted to situations where samples are non-i.i.d. (Anderson, 1998; Davidson and Duclos, 2000). In essence they are a sequence of joint inequality tests for examining $\ell_i(f,g)$, a vector of asymptotically normally distributed estimates of $F_i(x)-G_i(x)$ at a selection of pre-specified values of x. The latter approach is attractive because, unlike the first two approaches, it is a consistent test focusing on the maximum distance $F_i(x)-G_i(x)$ over the whole range of x, however Anderson (2000) has shown that, under smoothness assumptions, the inconsistency problem is not substantive. Anderson (2004b) provides taxonomy of tests appropriate for examining both within and between-population polarization.[4] Here I use tests formulated in Anderson (2004b), modified to account for the between-sample dependence engendered by the 'panel' type nature of the data as outlined in Anderson (2003).

The practice has been to employ either Maximum Modulus Distribution (tables for which are provided in Stoline and Ury, 1979) to a collection of asymptotically standard normal statistics (which is a conservative test) based upon the K individual elements of

[4] A cautionary note is in order. These tests are designed to detect the 'hollowing out of' the centre of the distribution (Beach *et al*., 1998) identified with within-distribution polarization. Unfortunately it can be shown that when the distribution to hand is a mixture of two closely located sub-distributions and polarization takes the form of limited reductions of subpopulation variances (increased concentration around the respective poles), polarization will manifest itself in the observed mixture as an increase in central mass. Fortunately it appears that this phenomenon only occurs when the sub-population distributions are located fairly close together and long before bimodality occurs in the mixture (which, for example in a 50/50 mixture of normals with equal variances less than one, occurs when the means are more than one standard deviation apart). Thus we can be sure that, if the mixture is bimodal, sub-population polarization will manifest itself in a loss of mass at the centre of the distribution.

vector $\ell_i(f,g)$ and their corresponding standard deviations, or to employ the joint testing procedures advocated by Kodde and Palm (1986) and Wolak (1989). The advantage of the former is that the inequality relations may be studied in detail, the advantage of the latter is that is not a conservative test. For the joint test let $\ell_{iw}(f,g)$ be the inequality-constrained estimate of the vector $\ell_i(f,g)$ and let $(\Omega_{\ell i})^+$ be a generalized inverse of the covariance matrix of ℓ_i , then for

$$W = (\ell_i(f,g) - \ell_{iw}(f,g))'(\Omega_{li})^+(\ell_i(f,g) - \ell_{iw}(f,g))$$

the distribution of *W* is such that:

$$P(W \geq c) = \sum_{i=0}^{k-1} P\left(\chi_i^2 \geq c\right) w(k, k-i, \Omega_{li})$$

Where $w(k,k-i,\Omega)$ is a weight function corresponding to the probability that ℓ , with covariance matrix Ω , has $k-i-1$ of its $k-1$ independent elements positive. Closed form expressions for the weight function only exist for $k-1$ up to 4, however following the suggestion in Wolak (1989) they can readily be approximated via pseudo-normal random number generation.

For the polarization tests the vector $\ell_i(f,g)$ is redefined as:

$$\ell_i(f^1, f^2) = \begin{Bmatrix} \ell_i(f^1(w \mid x < x*), f^2(w \mid x < x*)) \\ \ell_i(f^1(x \mid x > x*), f^2(x \mid x > x^*)) \end{Bmatrix}$$

with the covariance matrix redefined accordingly.

1.3 Data

Data from the U.S. Census Bureau on per capita income in 1989 $US constant prices and population size were collected for 2,992 U.S. counties for the years 1959, 1969, 1979, and 1989. Population share was used to weight the PCI. There are two reasons why we want to weight PCI. First, it is crucial for theoretical consistency when using techniques such as described in this paper to study individual welfare with household-based data. In this analysis, the county is the unit of analysis and with much greater variation in its population size, re-weighting sample observations by the relative population share is debatably, but more important from an individual welfare perspective. Second, the statistical tests and kernel estimation techniques employed in this paper assume within-year i.i.d. sampling and re-weighting is necessary to refine the stratified sampling inherent in the data. For comparison, I present results on both weighted and unweighted samples. Moreover, the use of panel data without the i.i.d. assumptions is usually invoked in this work. Thus, I present results both under an assumed i.i.d. and a panel-based dependent sample scheme.

1.4 Empirical Results

Table 1.1 presents the summary statistics for log per capita income. Notable from the table is the increasing of the mean in both un-weighted and weighted samples for all comparison periods. Given the weighted mean is slighted higher than the unweighted

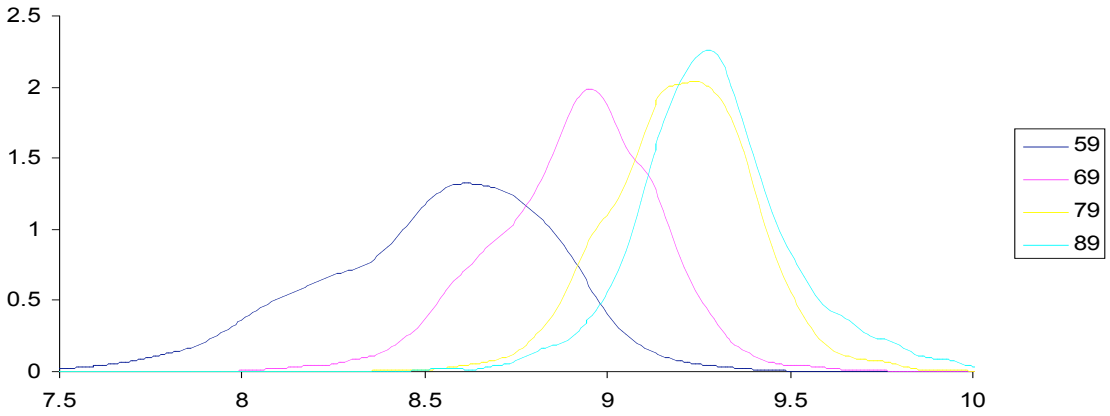
mean, this suggests that mean incomes have been increasing more in the high than low population counties. The variation has no obvious pattern in both unweighted and weighted samples. But it decreased during the 1959–1969–1979 period and increased again in 1979-1989. To put this into perspective, the ratio of the richest to the poorest county per capita incomes was approximately 8.14 in 1959 and 8.31 in 1989. We also see the increasing pattern of maximum and minimum other than the 1979-1989 years.

Table 1.1 Statistics for the natural logarithm of per capita income (CPI adjusted 1989 $) weighted and un-weighted by population share

	1959	**1969**	**1979**	**1989**
Mean	8.5318	8.9106	9.2026	9.2933
Weighted mean	8.8450	9.1645	9.3898	9.5467
Median	8.5705	8.9293	9.2093	9.2796
Weighted median	8.9067	9.1860	9.4050	9.5489
Standard deviation	0.3172	0.2306	0.1987	0.2213
Weighted standard deviation	0.3061	0.2353	0.1996	0.2504
Maximum	9.5393	9.7492	10.5000	10.2535
Minimum	7.4425	8.0330	8.3937	8.1365

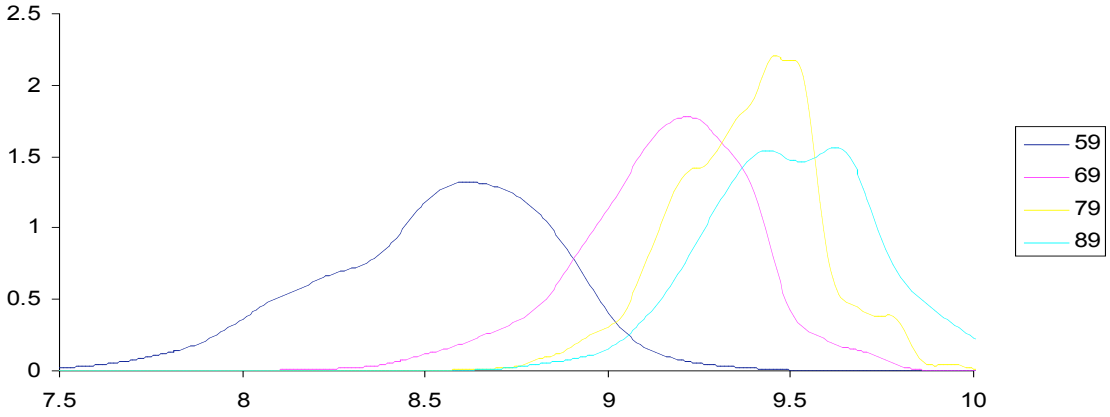
The kernel density estimates described in Figures 1.1 and 1.2 correspond to the unweighted and weighted samples respectively. The distributions of weighted sample for 1979 and 1989 are slightly bimodal, but we did not find a similar pattern in other years in the unweighted sample. We can see both rich and poor counties shift right and are getting

better over time in both the weighted and unweighted samples. The biggest shift occurs from 1959 to 1969 in both weighted and unweighted samples.



ln (per capita income constant $US)

Figure 1.1 Distribution of per capita income



ln (per capita income constant $US)

Figure 1.2 Population-weighted per capita income

Table 1.2 Inequality and polarization indices for the natural logarithm of per capita income (constant $US)

	1959	1969	1979	1989
Unweighted Gini of ln PCI[a] (inequality)	0.0293	0.0048	0.0061	0.0140
Weighted Gini of ln PCI[a,b] (inequality)	0.0136	0.0061	0.0237	0.0263
Inter-quartile range/σ (polarization)	1.3698	1.2809	1.2913	1.0975
Inter-quartile range/range (polarization)	0.2071	0.1718	0.1215	0.1143
Esteban-Ray index (α = 1)[c](polarization)	0.7761	0.8598	0.8468	1.3974

[a] Strictly speaking this is not a Gini coefficient since it relates to the logarithm of income rather than its level.
[b] A sample weighted Gini of the logarithms of incomes is equivalent to the Esteban–Ray polarization index with α = 0.
[c] A range of values for α (0.5, 1, 1.5) each yielded the same qualitative direction of the polarization index.

Several inequality and polarization indices are reported in Table 1.2. Note that the weighted and unweighted Gini coefficients indicate a decrease, increase and then an increase in inequality throughout the sample period. It means that the inequality between the rich and the poor counties are increasing since 1969. This indicates that the rich counties improved more than the poor counties. Thus the poor counties have become relatively worse off. The inter-quartile range/range records a decrease, increase and then a decrease in polarization whilst the inter-quartile range/standard deviation shows a monotonic decrease in polarization. The Esteban–Ray records an increase, decrease and then an increase in polarization. Polarization did not show a constant trend from different indices.

Table 1.3 reports social welfare comparisons based upon stochastic dominance criteria. The results clearly indicate that welfare improved over all the period, regardless of assumed sampling model or population weighting. Neither the weighting nor the statistical model specification appears to have had a substantive effect on the conclusion of these results, which also have profound implications for a commentary on poverty. This can be observed in Figures 1.1 and 1.2 very clearly.

Table 1.3 Stochastic dominance rankings of per capita income distributions [a–c]

Comparison years	i.i.d. Unweighted	i.i.d. Weighted	Dependent sample unweighted	Dependent sample weighted
1959-1969	(↑, 1) [1.000, 0.000] {0.510, 0.000}	(↑, 1) [1.000, 0.000] {0.502, 0.000}	(↑, 1) [0.998, 0.000] {0.847, 0.000}	(↑, 1) [0.998, 0.000] {0.835, 0.000}
1969-1979	(↑, 1) [1.000, 0.000] {0.510, 0.000}	(↑, 1) [1.000, 0.000] {0.504, 0.000}	(↑, 1) [1.000, 0.000] {0.825, 0.000}	(↑, 1) [0.992, 0.000] {0.811, 0.000}
1979-1989	(↑, 1) [1.000, 0.000] {0.500, 0.000}	(↑, 1) [1.000, 0.000] {0.506, 0.000}	(↑, 1) [0.990, 0.000] {0.800, 0.000}	(↑, 1) [0.990, 0.000] {0.769, 0.000}
1959-1989	(↑, 1) [1.000, 0.000] {0.510, 0.000}	(↑, 1) [1.000, 0.000] {0.519, 0.000}	(↑, 1) [0.997, 0.000] {0.799, 0.000}	(↑, 1) [0.994, 0.000] {0.810, 0.000}

[a] (↑, i) Indicates a social welfare improvement of order '*i*' and (↓, i) indicates a social welfare decline of order '*i*' based upon a P(null) <0.05 decision criterion.
[b] [p1, p2] Correspond to respective upper tail probabilities of Wald criteria for the first order dominance comparison year B dominates year A and year A dominates year B.
[c] {p1, p2} Correspond to respective upper tail probabilities of Wald criteria for the second order dominance comparison year B dominates year A and year A dominates year B.

Table 1.4 Polarization rankings of per capita income distributions [a–d]

Comparison years	i.i.d. Unweighted	i.i.d. Weighted	Dependent sample unweighted	Dependent sample weighted
1959-1969	(↑, 2) [0.000, 0.000] {0.911, 0.000}	(↑, 2) [0.000, 0.000] {0.916, 0.000}	(↓, 1) [0.000, 1.000] {0.000, 0.905}	(↓, 2) [0.000, 0.000] {0.000, 0.849}
1969-1979	(↑, 2) [0.003, 0.000] {0.912, 0.000}	(↑, 2) [0.004, 0.000] {0.914, 0.000}	(↓, 1) [0.000, 1.000] {0.000, 0.902}	No decision [0.000, 0.000] {0.028, 0.000}
1979-1989	(↓, 1) [0.000, 0.181] {0.000, 0.000}	(↓, 1) [0.000, 0.188] {0.000, 0.000}	(↓, 2) [0.000, 0.000] {0.000, 0.909}	(↑, 1) [1.000, 0.000] {0.000, 0.000}
1959-1989	(↑, 2) [0.000, 0.000] {0.921, 0.000}	(↑, 2) [0.000, 0.000] {0.922, 0.000}	(↓, 1) [0.000, 1.000] {0.000, 0.918}	No decision [0.000, 0.000] {0.000, 0.000}

[a] (↑, i) Indicates polarization of order '*i* ' and (↓, i) indicates depolarization of order '*i* ' based upon a P(null) <0.05 decision criterion.
[b] [p1, p2] Correspond to respective upper tail probabilities of Wald criteria for the first order polarization comparison year B relative to year A and year A relative to year B.
[c] {p1, p2} Correspond to respective upper tail probabilities of Wald criteria for the second order polarization comparison year B relative to year A and year A relative to year B.
[d] For the purposes of the polarization test the distributions in each of the comparison years were partitioned at the median of the pooled sample.

From Table 1.4, other than 1969-1979 and 1959-1989 in the weighted dependent sample which give us the "no decision" results, it is evident that the data are assumed to be drawn from an i.i.d. scheme or dependent sample provided almost completely opposite the polarization results and weighting the data by population share yields results are almost consistent to the results of the unweighted sample. This is perhaps not surprising given the result of re-weighting apparent in Figures 1.1 and 1.2. In the i.i.d. samples, polarization between rich and poor countries continued unabated throughout the period, with the exception of 1979-1989. There is no polarization index in Table 1.2 consistent

with the polarization results. The rich and poor counties continue to separate but it appears that their relative sizes have changed (refer to Table A1), which violates the constant relative county size assumption invoked in developing the polarization tests. This maybe the source of contradiction between the polarization tests and the polarization indices reported in Table 1.2. Interestingly, the county polarization process increases or decreases through periods of welfare improvement, indicating clearly the possibility of simultaneous polarization (or depolarization) and welfare improvement. Inequality and polarization are independent from each other.

1.5 Conclusions

Interpreting convergence (depolarization) and welfare improvement having to do with the relocation of the mass within a distribution require empirical techniques which facilitate assessment of the manner in which mass has relocated. Such techniques for identifying polarization in a collection or mixture of rich and poor counties have been outlined which draw on, and provide companions to, stochastic dominance techniques for analyzing the progress of the U.S. economic well-being and poverty. They do not rely upon the existence of bimodality in the distribution and do not impose any structure on the polarization process. Employing these techniques in an analysis of the distribution of per capita income over the period 1959–1989 for a broad sample of counties has revealed that, whilst welfare increased for all periods, both polarization and depolarization between rich and poor counties is found throughout the period.

Re-weighting the data by the relative population share of the county was needed for both theoretical consistency and statistical reasons. Using unweighted data may be understood as employing a social welfare function over counties whereas employing weighted data may be thought of as employing a social welfare function over the individuals in those counties. Is there some preference using one approach to the other? Qualitatively there appears to be little difference in the two sets of results. In our case, re-weighting appears to weaken the polarization conclusions because of the "no decision" conclusion from periods 1969-1979 and 1959-1989. Perhaps the most significant effect was on the kernel estimates of the distribution of PCI. Slightly bimodal estimates were found in the weighted distributions.

In particular the results emphasize the distinction between polarization and inequality and the notion that one does not imply the other. Thus, in the periods 1959–1969, 1969-1979, and 1959-1989, poor counties improved in terms of their per capita income, but the gap between the poor and wealthier counties widened, indicating that the position of the poor worsened in a relative sense. This result is robust when the sample is weighted by population size with the i.i.d. assumption. We found almost the opposite result in the dependent samples regardless of the weighting by population share. This indicates that their PCI improved, and their gap has also narrowed.

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CHAPTER 2

DETERMINANTS OF SELF-REPORTED WELLBEING: SOME EVIDENCE FROM ARIZONA

2.1 Introduction

Happiness is defined by Veenhoven (1984) as "the degree to which an individual judges the overall quality of his life favorably" (p. 22). There are two components: "hedonic level of affect" and "contentment". The former is the individual affective experience and the latter one is a matter of individual perception of goal achievement.

The study of happiness is a very important topic. For most people, happiness is an ultimate goal in life if it is not the only one. Studies have shown that a happy person is more efficient at work and friendly in their social life (Oswald, 1997). A population with more happy people will also have fewer incidences of criminal activities.

According to the classical theory of utility, people with higher incomes should be happier as utility is directly a function of goods and services consumed that, in turn, is constrained by income. But studies show that the correlation between income and happiness is much exaggerated and mainly an illusion (Easterlin, 1995; Kahneman, et al, 2006). Duesenberry (1949) and Easterlin (1995) argue that happiness varies positively with one's own income and negatively with the incomes of others. An individual's

overall happiness is affected more by his relative position than by his absolute possessions (Solnick and Hemenway, 1998). Easterlin (2003) also argues that individuals adapt to material goods fast. The material desire increases directly with wealth, and the greater the increase in wealth, the greater the increase in desire. If people tend to keep the same distance from their material goals, then their well-being is unchanged (Easterlin, 2003). Esterlin's adaptive theory also supports the notion that the number of goods owned is greater for those with more education based on their greater income growth. People with more education also have a greater desire for more goods. Thus, people who have more education are not necessarily happier than the people with less education (Easterlin, 2003; Easterlin, 2005). Another study shows that the group with a non-vocational intermediate education level scored the highest in happiness (Hartog and Oosterbeek, 1998).

Scitovsky (1976) argues that the consumption of goods is similar to activities like sex, sports, and games, which give pleasure by stimulus because the activities can increase our electroencephalograph waves and produce physical pleasure. But consumers can not acquire as much joy from their consumption of goods because of the restraint of the market. Kahneman et al. (2006)'s explanation is that people do not devote more time to enjoyable activities like they expect to when income increases. People with higher incomes spend more of their time to "obligatory" activities, such as, work, shopping, and childcare.

In addition to material possessions, health, marital status, race, and the Nation's inflation and employment can affect people's overall happiness (Easterlin, 2003; Di Tella, MacCulloch, and Oswald. 2001; Lieske, 1990; Winkelmann and Winkelmann, 1998). On average, people with disabilities are significantly less happy than healthy people. Married people also report higher levels of happiness than single adults. A broken marriage has a negative impact on overall happiness (Easterlin, 2003). Lieske (1990) shows that the overall quality of life is significantly lower in metropolitan areas with a high density of black residents, but is unrelated to the density of Spanish speaking residents. Di Tella (2001) shows that people are happier when inflation and unemployment are low.

Some studies show that people's age and gender are not significant factors for people's overall happiness. But the results show that happiness is U-shaped with respect to age. That is the people in their 30s have the lowest level of happiness (Oswald, 1997). Compared with men, women have less wealth, but they are healthier and definitely happier. This is possible because women are less dependent on wealth for their happiness (Hartog and Oosterbeek, 1998).

Farmers are a special population in our society. What is the overall satisfaction of their lives? What factors influence their life quality? Limited research has addressed on this topic so far. A health study in Norway indicated that farmers had higher depression levels, particularly male farmers, compared with non-farmers. Male farmers reported working longer hours, lower income, and higher psychological help demands (Sanne et

al, 2004). From the data of ERS (USDA economics research service), one-fifth of the Nation's people live in rural America, which covers over 2,000 counties, and contains 75% of the Nation's land. Because of the steady decline of employment in production agriculture since the early 1900s, many farmers have relocated to metropolitan area for new jobs or rely on off-farm work to make ends meet. One-half million U.S. farmers' household incomes are below the poverty line. More than 40% of Wisconsin dairy farmers either have no health insurance or plans that do not cover all family members (Foltz et al, 2002). From our Arizona survey data considered, 35.8% of farmers have annual market agricultural sales less than $10,000, 17.9% do not have health insurance, 35.2% are 65 or older, 55.2% do not have a bachelor degree or higher education, 3.8% are non-white, and 17.8% expressed that they are somewhat dis-satisfied on how things, overall, are going for them. If we can better understand what factors are important to their self-reported well-being, policies maybe better targeted to help them improve their life quality and increase the level of their overall well-being.

2.2 Data and Empirical Strategy

2.2.1 Data

Data utilized for the empirical analysis of Arizona farmers is from the "2005 National Agricultural, Food, and Public Policy Preference Survey" in Arizona (Figure A1). The total sample consists of 394 individuals. After correcting for missing values, the sample was reduced to 259 observations. The survey includes data regarding farm policy issues

as well as demographic and personal data. The dependent variable for this analysis was derived from the question of "Taken all together, how would you say that things are today for you and your family - not so good, pretty good, or very good?".

2.2.2 Measure of Happiness

A self-reported rating of overall life satisfaction, SAT_i, has three possible discrete and ordered values, a value of 1, 2, and 3 indicates that a farmer does not feel so good, feels pretty good, and feels very good with their overall satisfaction with how things are going for them, respectively.

2.2.3 Explanatory Variables

Explanatory Variables include the location of their farms in the state: southeast (SE_i), southwest (SWi) and northern ($NORT_i$) and theses estimates are relative to the central region which contains Maricopa, Pima and Pinal counties; the closest driving distance between their primary land holdings in the state and either downtown Phoenix or Tucson ($DIST_i$); if they have an estate plan ($ESTP_i$); if they have health insurance ($INSU_i$); if they have the ability to sell or rent out their water right ($WATE_i$); did they have to draw on existing farm or personal equity in the last 3 years to finance their operation; secure financing for their farms in last 3 years ($FINA_i$); age (AGE_i); gender ($GEND_i$); race of white or non-white ($RACE_i$); education ($EDUC_i$); annual value of market sales ($MRKV_i$); how diversified is their product mix by sales ($INDEX_i$), level of government subsidies received ($SUBSID_i$); percentage that organic products out of their sales ($ORGA_i$);

percentage of their income is from farming ($FINC_i$); how much land do they own that they farm or ranch ($OWNP_i$); and who will take over their operation after they retire: spouse ($SPOU_i$), children ($CHIL_i$), relatives ($RELA_i$), nonrelatives ($NONR_i$), or other individuals ($OTHER_i$). Variables are described in more detail in table 2.1. More statistics can be found in the appendix table A2.

2.2.4 Econometric Model

We use descriptive statistics to study the data in general. We also use an ordered probit model to explain the determinants which are hypothesized to affect Arizona farmers' overall happiness. The ordered probit model is given by

$$SAT_i = \beta_0 + \beta_1 SE_i + \beta_2 SW_i + \beta_3 NORT_i + \beta_4 DIST_i + \beta_5 ESTP_i + \beta_6 INSU_i + \beta_7 DINS_i + \beta_8 WATE_i + \beta_9 FINA_i + \beta_{10} AGE_i + \beta_{11} GEND_i + \beta_{12} RACE_i + \beta_{13} MRKV_i + \beta_{14} INDEX_i + \beta_{15} SUBSID_i + \beta_{16} ORGA_i + \beta_{17} FINC_i + \beta_{18} EDUC_i + \beta_{19} OWNP_i + \beta_{20} SPOU_i + \beta_{21} CHIL_i + \beta_{22} RELA_i + \beta_{23} NONR_i + \beta_{24} OTHER_i + \mu_i$$

Where SAT_i is the farmer's self reported overall satisfaction (the question is "Taken all together, how would you say that things are today for you and your family?" And the answer can be "(1) not so good, (2) pretty good, and (3) very good"). The β_is are unknown parameters to be estimated. Explanatory variables are summarized in table 2.1 and appendix A2.

We hypothesized that having an estate plan, health insurance, race, sex, age, percentage of organic crops, and percentage of farm ownership will impact the happiness of farmers. Also, a more diversified product and more subsidies are expected to make farmers happier. Education may not make difference for their overall happiness due to higher expectation with higher education level, transiting the farm to non-farm and non-family members will make them unhappier due to their emotional attachment to their farms. Income, proxied by annual market sales is expected to increase farmer's overall happiness.

Table 2.1 Variable definitions and sample means

Variables	Variable Definition (i = individual producer response; i=1,2 …n)	Sample Mean
Dependent variable		
SAT_i	Represents the ith Arizona farmer's satisfaction with their overall life: 1 = Not very good, 2 = Pretty good, 3 = Very good.	2.036
Exogenous variables		
SE_i	Southeast, which includes Cochise, Graham, Greenlee, and Santa Cruz.	0.386
SW_i	Southwest, which includes La Paz and Yuma	0.081
$NORT_i$	Northern, which includes Apache, Coconino, Gila, Mohave, Navajo, and Yavapai.	0.193
$CENT_i$	(base) Central, which includes Maricopa, Pima, and Pinal.	0.444
$DIST_i$	The closest driving distance between their primary land holdings in the state and either downtown Phoenix or Tucson	100.223
$ESTP_i$	A binary variable: 1 = they have an estate plan in place and 0 = they do not have an estate plan in place.	0.590
$INSU_i$	A binary variable: 1 = they have health insurance in place and 0 = they do not have health insurance in place.	0.822
$DINS_i$	A binary variable: 1 = they have short-term disability insurance in place and 0 = they do not have short-term disability insurance in place.	0.310
$WATE_i$	A binary variable: 1 = they agree that farms or ranches with water supplies or water rights should be allowed to rent out or sell their water for non-agricultural purposes and 0 = they do not agree that farms or ranches with water supplies or water rights should be	0.432

	allowed to rent out or sell their water for non-agricultural purposes or they do not have opinion.	
$FINA_i$	A binary variable: 1 = they drew on existing farm or personal equity to finance their farm or ranch in the past 3 years and 0 = they did not draw on existing farm or personal equity to finance their farm or ranch in the past 3 years.	0.459
AGE_i	1 = younger than 25, 2 = 25 to 34, 3 = 35 to 44, 4 = 45 to 54, 5 = 55 to 64, and 6 = older than 64	58.236
$GEND_i$	Binary variable: 1 = male and 0 = female.	0.868
$RACE_i$	Binary variable: 1 = white and 2 = nonwhite	0.962
$MRKV_i$	Average annual market value: 5 thousand dollars (under $10,000), 30 thousand dollars ($10,000 - $49,999), 75 thousand dollars ($50,000 - $99,999), 175 thousand dollars ($100,000 - $249,999), 375 thousand dollars ($250,000 – $499,999), 750 thousand dollars ($500,000 - $999,999) and 1.5 million dollars (above $1,000,000).	244.805
$INDEX_i$	Based on question 45, recreated farm or ranch product diversity index, which is between 0 and 1. index = $(\Sigma(\text{crop percentage})^2)/100^2$	0.795
$SUBSID_i$	Based on 44, 45a, c, n, o, q and 49a, g, recreated the new variable to reflect overall subsidies. (total subsidy / total value of production)	7.783
$ORGA_i$	The percent of their total farm or ranch cash receipts in recent years came from sales of organic products.	15.000
$FINC_i$	The percent of their family income is typically earned from farming or Ranching: 1 (None), 2 (1-25%), 3 (26-50%), 4 (51-75%) and 5 (76-100%).	3.017
$EDUC_i$	1 = grade school, 2 = some high school, 3 = high school/GED, 4 = some College/Tech. school, 5 = College Bachelor's degree, 6 = College advanced degree	4.367
$OWNP_i$	the percent of the land operated in their farm or ranch they own. 1 (None), 2 (1-25%), 3 (26-50%), 4 (51-75%) and 5 (76-100%).	3.701
$SPOU_i$	1 = After the farmer retire, their spouse will operate the farm, 0 = otherwise.	0.056
$CHIL_i$	1 = After the farmer retire, their children will operate the farm, 0 = otherwise.	0.302
$RELA_i$	1 = After the farmer retire, their relatives will operate the farm, 0 = otherwise.	0.050
$NONR_i$	1 = After the farmer retire, non-relative who is currently involved in the operation will operate the farm, 0 = otherwise	0.036
$OTHER_i$	1 = After the farmer retire, other individual will operate the farm, 0 = otherwise.	0.170
$NONF_i$	(base) 1 = After the farmer retire, the farm will be converted to non-farm use, 0 = otherwise.	0.318

2.3 Empirical Results

The descriptive statistics indicate some very interesting results. Farmers with health insurance are much happier than the people without it. Among individuals that indicated things are not so good, many do not have health insurance (Table 2.2). We get a similar result with regard to an estate plan. Among the pretty happy and very happy population, more have an estate plan (Table 2.3).

Table 2.2 Self-reported happiness distribution by health insurance

	Health insurance	
	Yes	No
Very good	57 (19.9%)	5 (8.1%)
Pretty good	204 (71.1%)	34 (54.8%)
Not so good	26 (9.0%)	23 (37.1%)

Table 2.3 Self-reported happiness distribution by estate plan

	Estate Plan	
	Yes	No
Very good	47 (22.8%)	15 (10.5%)
Pretty good	138 (67.0%)	98 (68.5)
Not so good	21 (10.2%)	30 (21.0%)

Table 2.4 Self-reported happiness distribution by race

	Race	
	White	Non-White
Very good	60 (18.0%)	1 (7.7%)
Pretty good	229 (68.8&)	7 (53.8%)
Not so good	44 (13.2%)	5 (38.5%)

Self-reported responses regarding race show that white people are relatively happier than the minority of non-white people (table 4).

In looking at age, we see a U-shape relationship between age and happiness. The lowest happiness rating is in the 35-44 age group. This is consistent with the literature (Oswald, 1997) and also reflects difficult financial and/or family strengths with management decisions.

Table 2.5 Self-reported happiness distribution by age

	Age				
	34-	35-44	45-54	55-64	65+
Very good	2 (25.0%)	3 (13.0%)	18 (18.4%)	19 (18.3%)	21 (17.1%)
Pretty good	6 (75%)	14 (60.9%)	62 (63.3%)	72 (69.2%)	88 (71.5%)
Not so good	0 (0%)	6 (26.1%)	18 (18.4%)	13 (12.5%)	14 (11.4%)

Maximum likelihood estimates of parameters for the ordered probit model are provided in table 2. As hypothesized, regressors of health insurance and being white are positive and significant on SAT_i. Being young has a negative and significant effect on SAT_i. The proxy for income, annual market sales, has no significant effect on their overall life satisfaction. This may be because sales and income are not as correlated as needed to be statistically significant. Surprisingly, the regressor of education has a positive and significant effect on SAT_i. Both the product diversity index and level of subsidies received are not statistically significant, which is different from we expected. Producing

organic products and the percentage of farm ownership are significant, but the sign is different from we hypothesized. Having estate plan is not significant. We also found that farms located in southwest have a positive and significant effect on SAT_i.

Table 2.6 Estimated parameters from the ordered probit model regarding self-reported happiness (N=259)[a]

Variables	Estimate	Standard Error	P-value
SE_i	-0.0660	0.2145	0.7582
SW_i	0.6493*	0.3478	0.0619*
$NORT_i$	0.3984	0.2783	0.1523
$DIST_i$	-0.0017	0.0015	0.2368
$ESTP_i$	0.2597	0.1891	0.1698
$INSU_i$	0.7003***	0.2249	0.0018***
$DINS_i$	0.2695	0.1867	0.1487
$WATE_i$	0.0543	0.1661	0.7438
$FINA_i$	-0.2326	0.1639	0.1558
AGE_i	-0.0139*	0.0084	0.0977*
$GEND_i$	-0.0334	0.2480	0.8928
$RACE_i$	1.3833**	0.5415	0.0106**
$MRKV_i$	0.0003	0.0002	0.1566
$INDEX_i$	-0.0646	0.2869	0.8217
$SUBSID_i$	-0.0015	0.0015	0.3056
$ORGA_i$	-0.0063**	0.0026	0.0129**
$FINC_i$	-0.0491	0.0774	0.5255
$EDUC_i$	0.1417*	0.0742	0.0561*
$OWNP_i$	-0.1245**	0.0564	0.0273**
$SPOU_i$	0.2903	0.3894	0.4560
$CHIL_i$	0.3563*	0.2079	0.0865*
$RELA_i$	0.4424	0.4008	0.2696
$NONR_i$	-0.4342	0.3986	0.2760
$OTHER_i$	-0.0893	0.2340	0.7027
Log Likelihood = -178.2632; LR $\chi 2$ (24) = 76.98; Pseudo R^2 = 0.1776 [b]			

*: statistically significant at 10% level
**: statistically significant at 5% level
***: statistically significant at 1% level

[a]: ordered probit model
[b]: McFadden's pseudo R-squared:

$$R^2 = 1 - \frac{\ln \hat{L}(M_{Full})}{\ln \hat{L}(M_{Intercept})}$$

M_{full} = Model with predictors
$M_{intercept}$ = Model without predictors
$\hat{L}$ = Estimated likelihood

(http://www.ats.ucla.edu/stat/stata/output/stata_ologit_output.htm
http://www.ats.ucla.edu/stat/mult_pkg/faq/general/Psuedo_RSquareds.htm)

The coefficient of annual market value is 0.0003, which is positive, but not significant. It means income is not the significant factor for people's happiness. The coefficient of variable southwest is 0.6493, which is positive and significant. The southwest includes counties Yuma and La Paz, which are not the richest counties at all. But the farmers there are happier than the rich central area, which includes Maricopa and Pima. The coefficient of having health insurance is 0.7003, which is positive and significant at 1% level. It means people will be happier if they own health insurance. But the coefficient of having estate plan is not significant. The coefficient of race is 1.3833 which is positive and significant. The white people are more satisfied with their life. Other minorities are less happy with their life. The coefficient of variable having organic product is -0.0063, which is negative and significant. It means farmers are not happy with planting organic crops. Maybe this is because that most farmers who plant organic crops are relatively small. It is hard for them to compete with the large one. But the coefficients of having more diversified products or having more subsidies are not significant. This is different from we expected. Maybe the share of the subsidy for each product is not the best

combination. The coefficient of variable education is 0.1417, which is positive and significant. People with high level education are happier than the people with lower level education, which is not consistent with the previous studies. We believe that the people with higher education can benefit from other aspects, such as social life, other than income. The coefficient of variable of "the percent of the land operated in their farm or ranch they own" is -0.1245, which is negative and significant. They are relative unhappier if they own higher percentage of the farm or ranch. Two factors are believed to be contributing to this result. One is most ranchers operate on public lands. The second one is most central Arizona farmers have sold their land to developers, but are still farming the land while the projects did not start yet.

The coefficient of variable gender is -0.0334, which is negative and not significant. It is different from previous study. The coefficient of variable age is -0.0139, which is significant at relative high level. Maybe it means that young people are relatively happier than older people. That also makes sense intuitively. The older people need to take care of their career, family, and own health. After they retire, if their spouse, children or relatives take over the farm, they are very satisfied with that. All the coefficients are positive, but not significant except for the CHILi. But if non-relatives or other individual take over the farm, or it is converted to non-farm, they are less happy with that. This is probably because they are attached to their farm or ranch emotionally. They still can be involved with the operation of the farm or ranch if their spouse, children or relatives take

over it. But they will lose the control of the farm or ranch if non-relatives take over it or it is converted to non-farm.

Table 2.7 Estimated marginal effects

Variables	Estimated Marginal Effects on Prob (SATi=1)	Prob (SATi=2)	Prob (SATi=3)
SE_i	0.0110	0.0021	-0.0131
	(0.0361)	(0.0067)	(0.0424)
SW_i	-0.0741***	-0.0977	0.1718
	(0.0279)	(0.0898)	(0.1129)
$NORT_i$	-0.0553*	-0.0369	0.0922
	(0.0329)	(0.0431)	(0.07310)
$DIST_i$	0.0003	6.22E-05	-0.0004
	(0.0002)	(0.0000)	(0.0003)
$ESTP_i$	-0.0439	-0.0073	0.0512
	(0.0330)	(0.0010)	(0.0368)
$INSU_i$	-0.1513**	0.0430	0.1083***
	(0.0605)	(0.0410)	(0.0287)
$DINS_i$	-0.0415	-0.0161	0.0576
	(0.0272)	(0.0182)	(0.0424)
$WATE_i$	-0.0090	-0.0020	0.0109
	(0.0273)	(0.0066)	(0.0335)
$FINA_i$	0.0387	0.0077	-0.0464
	(0.0277)	(0.0096)	(0.0326)
AGE_i	-0.0023	-0.0005	0.0028*
	(0.0014)	(0.0006)	(0.0017)
$GEND_i$	0.0054	0.0014	-0.0068
	(0.0396)	(0.0117)	(0.0512)
$RACE_i$	-0.4182**	0.2938	0.1244***
	(0.2109)	(0.2013)	(0.0232)
$MRKV_i$	-5.4E-05	-1.17E-05	6.58E-05
	(0.0000)	(0.0000)	(0.0000)
$INDEX_i$	0.0107	0.0023	-0.0130
	(0.0474)	(0.0105)	(0.0576)
$SUBSID_i$	0.0003	5.41E-05	-0.0003
	(0.0003)	(0.0000)	(0.0003)
$ORGA_i$	0.0011**	0.0002	-0.0013**
	(0.0004)	(0.0002)	(0.0005)
$FINC_i$	0.0081	0.0018	-0.0099
	(0.0128)	(0.0033)	(0.0150)

$EDUC_i$	-0.0234*	-0.0051	0.0284*
	(0.0124)	(0.0057)	(0.0149)
$OWNP_i$*	0.0205**	0.0045	-0.0250**
	(0.0095)	(0.0049)	(0.0114)
$SPOU_i$	-0.0400	-0.0274	0.0674
	(0.044)	(0.0598)	(0.1027)
$CHIL_i$	-0.0530*	-0.0255	0.0784
	(0.0283)	(0.0254)	(0.0500)
$RELA_i$	-0.0557	-0.0540	0.1097
	(0.0373)	(0.0829)	(0.1180)
$NONR_i$	0.0915	-0.0232	-0.0683
	(0.1032)	(0.0580)	(0.4761)
$OTHER_i$	0.0153	0.0021	-0.0173
	(0.0416)	(0.0039)	(0.4393)

Notes: Standard errors are in parentheses under estimated marginal effects.
*: statistically significant at 10% level
**: statistically significant at 5% level
***: statistically significant at 1% level

Table 2.7 provides the marginal effects and accompanying standard errors of all variables on SAT_i. Prob (SAT_i=1) has opposite sign and has same sign with the sign of the model coefficients. The sign of the marginal effects in Prob (SAT_i=2) are random and none of them are significant. Among all the significant marginal effects on Prob (SAT_i=1), $RACE_i$ has the largest marginal impact, 0.4182. The marginal effect of $RACE_i$ is estimated to decrease Prob (SAT_i=1) by 41.82% at 4.7% significant level. The marginal effect of $INSU_i$ has the 2nd largest marginal impact, 0.1513. Among all the significant marginal effects on Prob (SAT_i=3), RACE also has the largest marginal impact, 0.1244. The marginal effect of $RACE_i$ is estimated to increase Prob (SAT_i=1) by 12.44% at 0% significant level. $INSU_i$ also has the 2nd largest marginal impact, 0.1083. The marginal effect of $INSU_i$ is estimated to increase Prob (SAT_i=3) by 10.83% at 0% significant level. All the results show the race and having health insurance have the biggest effect on

people's happiness, especially on the down side. If you are minority and/or do not have health insurance, you will feel very bad about your overall life.

The marginal effect of SW_i is estimated to decrease Prob (SAT_i=1) by 7.40% at 0.8% significant level. It is the third one which is significant at 1% other than $RACE_i$ and $INSU_i$. It means the location of the farms also can affect people's feeling. If the farms are in the bad location, it probably will make farmers feel bad. This maybe because of the transportation challenge of the products or they are lack of social life.

2. 4 Conclusions

Based on our study, the income is not significant for people's overall happiness, which is consistent with the previous study. After the income reaches a threshold level, it can not increase people's happiness anymore. The health insurance is the most significant factor for farmers overall life satisfaction. But some of them do not have health insurance at all and their health insurance is the worst among the self-employed population. Maybe the agricultural policy makers should pay more attention to the benefit of farmers and help all the farmers to get health insurance.

The policy makers also should pay more attention to the minority farmers. Arizona is a border state and there are a lot of immigrants. If we can improve the minority farmers' life quality, the society will benefit from that regarding the issue of law and order.

Planting organic crops does not make farmers happier. This maybe related with some policy changes that have occurred with the 2002 National Organic Programs. If they only have small amount of organic, it is hard for them to compete with the big farms which produce more organic products. Also, the larger organic producers may feel that the market has pushed them into organic production. Organic production may be riskier because fewer tools are available for dealing with insects and disease outbreaks. Maybe that is why they are not very happy with that. Having diversified products or giving subsidies could not make them happier, maybe we need to adjust the policy regarding of them.

The result of variable education is not consistent with previous studies. People who have more education are happier than the people who have less education. I think it is still consistent with the adaptive theory. People with more education would expect to have more desire to have more goods. I believe that people with more education can have extra benefit other than material possession. For example, they have better health insurance, they have less risk losing their job, they have better living and working environment etc. So we should encourage and help farmers to get more education.

Based our study, it is possible that farmers need have off-farm jobs. In this case they do not enjoy having too much responsibility on the farm. If they do not own the farm or

ranch at all, they are more flexible to find a job outside of the farm. But if they own part of the farm, it is hard for them to leave the farm and work in other place.

Older people are relatively unhappy. They are also attached to their farms or ranches emotionally, so the policy makers or the society should produce some program to help the older people and/or farmers plan their retirement in advance. This should increase the level of their overall happiness.

Based on our study, policy makers and our society can help farmers to improve their overall life quality from several aspects, such as, helping them get health insurance, have more education, plan retirement in advance etc.

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CONCLUSIONS

Based on our study, the well-being of US counties is increasing continually over the last 40 years. But in general, the polarization becomes worse too. So relatively the poor are worse off. We also looked closely at the wellbeing of Arizona state farmers. Eighteen percent of farmers are not very happy with their overall life. Based on our study, health insurance, education, and retirement plan are several very important factors for that. So maybe the policy makers should try to help them to improve their well-being and try to narrow the gap between rich and poor.

APPENDIX

Table A1 Statistics of population variables

Label	N	Mean	Std Dev	Minimum	Maximum
POP_60	2992	58091	207156	208	6038771
POP_70	2992	66033	232881	164	7032075
POP_80	2992	72551	239164	91	7477503
POP_90	2992	79687	267187	107	8863164
POP_WT_60	2992	0.9997	3.5648	0.0036	103.9183
POP_WT_70	2992	0.9997	3.5255	0.0025	106.4576
POP_WT_80	2992	0.9997	3.2954	0.0013	103.0306
POP_WT_90	2992	0.9997	3.3518	0.0013	111.1877

Table A2 Variable definitions and sample means

Variables	Variable Definition (i = individual producer response; i=1,2 …n)	Sample Mean	Std. dev.	Min.	Max.
Dependent variable					
SAT_i	Represents the ith Arizona farmer's satisfaction with their overall life: 3 = Very good, 2 = Pretty good, 1 = Not very good.	2.036	0.566	1	3
Exogenous variables					
SE_i	Southeast, which includes Cochise, Graham, Greenlee, and Santa Cruz.	0.386	0.487	0	1
SW_i	Southwest, which includes La Paz and Yuma	0.081	0.273	0	1
$NORT_i$	Northern, which includes Apache, Coconino, Gila, Mohave, Navajo, and Yavapai.	0.193	0.395	0	1
$CENT_i$	(base) Central, which includes Maricopa, Pima, and Pinal.	0.444	0.498	0	1
$DIST_i$	The closest driving distance between their primary land holdings in the state and either downtown Phoenix or Tucson	100.223	80.454	0	600
$ESTP_i$	A binary variable: 1 = they have an estate plan in place and 0 =	0.590	0.492	0	1

	they do not have an estate plan in place.				
$INSU_i$	A binary variable: 1 = they have health insurance in place and 0 = they do not have health insurance in place.	0.822	0.383	0	1
$DINS_i$	A binary variable: 1 = they have short-term disability insurance in place and 0 = they do not have short-term disability insurance in place.	0.310	0.463	0	1
$WATE_i$	A binary variable: 1 = they agree that farms or ranches with water supplies or water rights should be allowed to rent out or sell their water for non-agricultural purposes and 0 = they do not agree that farms or ranches with water supplies or water rights should be allowed to rent out or sell their water for non-agricultural purposes or they do not have opinion.	0.432	0.496	0	1
$FINA_i$	A binary variable: 1 = they drew on existing farm or personal equity to finance their farm or ranch in the past 3 years and 0 = they did not draw on existing farm or personal equity to finance their farm or ranch in the past 3 years.	0.459	0.499	0	1
AGE_i	1 = younger than 25, 2 = 25 to 34, 3 = 35 to 44, 4 = 45 to 54, 5 = 55 to 64, and 6 = older than 64	58.236	10.337	29.5	69.5
$GEND_i$	Binary variable: 1 = male and 0 = female.	0.868	0.339	0	1
$RACE_i$	Binary variable: 1 = white and 2 = nonwhite	0.962	0.190	0	1
$MRKV_i$	Average annual market value: 5 thousand dollars (under $10,000), 30 thousand dollars ($10,000 - $49,999), 75 thousand dollars ($50,000 - $99,999), 175 thousand dollars ($100,000 -	244.805	454.893	0	1500

	$249,999), 375 thousand dollars ($250,000 – $499,999), 750 thousand dollars ($500,000 - $999,999) and 1500 thousand dollars (above $1,000,000).				
$INDEX_i$	Based on question q35, recreated farm or ranch product diversity index, which is between 0 and 1.	0.795	0.325	0	1
$SUBSID_i$	Based on q34, q35a, c, n, o, q and q39a, g, recreated the new variable to reflect overall subsidies.	7.783	53.505	0	664.435
$ORGA_i$	The percent of their total farm or ranch cash receipts in recent years came from sales of organic products.	15.000	34.840	0	100
$FINC_i$	The percent of their family income is typically earned from farming or Ranching: 1 (None), 2 (1-25%), 3 (26-50%), 4 (51-75%) and 5 (76-100%).	3.017	1.414	1	5
$EDUC_i$	1 = grade school, 2 = some high school, 3 = high school/GED, 4 = some College/Tech. school, 5 = College Bachelor's degree, 6 = College advanced degree	4.367	1.121	1	6
$OWNP_i$	the percent of the land operated in their farm or ranch they own. 1 (None), 2 (1-25%), 3 (26-50%), 4 (51-75%) and 5 (76-100%).	3.701	1.597	1	5
$SPOU_i$	1 = After the farmer retire, their spouse will operate the farm, 0 = otherwise.	0.056	0.230	0	1
$CHIL_i$	1 = After the farmer retire, their children will operate the farm, 0 = otherwise.	0.302	0.460	0	1
$RELA_i$	1 = After the farmer retire, their relatives will operate the farm, 0 = otherwise.	0.050	0.219	0	1
$NONR_i$	1 = After the farmer retire, non-relative who is currently involved in the operation will operate the farm, 0 = otherwise	0.036	0.187	0	1
$OTHER_i$	1 = After the farmer retire, other	0.170	0.377	0	1

	individual will operate the farm, 0 = otherwise.				
$NONF_i$	(base) 1 = After the farmer retire, the farm will be converted to non-farm use, 0 = otherwise.	0.318	0.467	0	1

Figure A1 Questionnaire of National Agricultural, Food, and Public Policy Preference Survey

2005 National Agricultural, Food, and Public Policy Preference Survey

This survey asks for your preferences and opinions on the 2007 Farm Bill. Congress will face many challenges, constraints, and trade-offs in writing this legislation. Budget deficits, trade issues and agreements, changing farm policy priorities, and new emerging issues will all affect the debate. The opinions of farm or ranch operators who respond to this survey will be reported in a national Extension publication that will help guide what is proposed, what is traded off, and what is ultimately authorized and funded in the upcoming Farm Bill.

If you are currently a farm or ranch operator and grew any crops, raised any livestock, or had any crops or livestock in inventory on your operation in 2005, please fill out this questionnaire and provide your opinion about the selected policy issues and alternatives and return the questionnaire in the enclosed envelope. If you are not currently a farm or ranch operator, please return this questionnaire in the enclosed envelope and provide the name and address of the current operator in the available space above.

Section A - Farm Programs and Budget Priorities

The 2007 Farm Bill may need to reduce or reallocate federal funding for current farm programs. The 2007 Farm Bill may also support new programs with new or reallocated federal funding. With these significant questions and possible trade-offs, your opinions are sought on the overall goals and priorities for federal legislation.

Please indicate how important you feel each of the following goals or programs is by circling the appropriate number. (1 = least important (LI), 2 = less important, 3 = neutral, 4 = important, 5 = most important (MI), X = don't know/no opinion (DK))

	LI				MI	DK
1. The goals of the Farm Bill should be to:						
a. Enhance farm income	1	2	3	4	5	X
b. Reduce price/income risk	1	2	3	4	5	X
c. Increase the competitiveness of U.S. agriculture in the global marketplace	1	2	3	4	5	X
d. Enhance opportunities for small farms/ ranches and beginning farms/ranches	1	2	3	4	5	X
e. Contribute to protecting the nation's land, water, and environmental resources	1	2	3	4	5	X
f. Enhance rural economies	1	2	3	4	5	X
g. Assure a safe, secure, abundant, and affordable food supply	1	2	3	4	5	X
h. Reduce the nation's dependency on non-renewable sources of energy	1	2	3	4	5	X
2. How important is it to maintain funding for the following existing programs?						
a. Fixed, decoupled crop commodity payments (direct payments)	1	2	3	4	5	X
b. Crop commodity payments tied to price (counter-cyclical payments)	1	2	3	4	5	X
c. Crop commodity payments tied to price and production (commodity loans, LDPs, etc.)	1	2	3	4	5	X
d. Livestock commodity supports tied to price and production (milk support programs/, MILC payments, etc.)	1	2	3	4	5	X
e. Land retirement conservation programs (CRP, WRP)	1	2	3	4	5	X
f. Working land conservation programs (EQIP, WHIP, CSP, etc.)	1	2	3	4	5	X
g. Wildlife habitat, agricultural land, and grassland preservation programs (WHIP, FRPP, GRP)	1	2	3	4	5	X
h. Risk management programs (crop and livestock insurance programs)	1	2	3	4	5	X
i. Agricultural credit programs (FSA direct and guaranteed loans)	1	2	3	4	5	X
j. Disaster assistance programs	1	2	3	4	5	X
3. How important is it to provide new or reallocated funds for the following programs?						
a. Support payments tied to farm income level	1	2	3	4	5	X
b. Support payments for commodities not included in existing programs (fruits, vegetables, nursery crops, livestock, wood products, etc.)	1	2	3	4	5	X
c. Incentives for farm savings accounts	1	2	3	4	5	X
d. Bioenergy production incentives	1	2	3	4	5	X
e. Biosecurity incentives and assistance	1	2	3	4	5	X
f. Food safety programs and assistance	1	2	3	4	5	X
g. Traceability and certification programs	1	2	3	4	5	X

Section B - Commodity Programs and Risk Management Policy

Commodity programs and related risk management programs have been a fundamental part of federal farm policy over the years. The design of these programs and their impact on producers and production decisions is a critical part of the Farm Bill debate. Because of the impact of these programs, your opinions are sought on the following issues.

Please indicate how strongly you agree or disagree with the following statements. (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree, X = no opinion or don't know)

	SD				SA	DK
4. Farm program commodity payments should be phased out over the length of the 2007 Farm Bill.	1	2	3	4	5	X
5. Farm program commodity payments should be reduced, but not phased out in the 2007 Farm Bill.	1	2	3	4	5	X
6. Farm program commodity payments should be targeted to small farmers.	1	2	3	4	5	X
7. Existing commodity program payment limits should be reduced to lower levels.	1	2	3	4	5	X
8. Existing commodity program payment limits should be changed to apply to a single individual, eliminating what is known as the three-entity rule.	1	2	3	4	5	X
9. Existing commodity program payment limits on marketing loans should be changed to eliminate the unlimited use of certificate and forfeiture gains.	1	2	3	4	5	X

10. Some have suggested that current commodity programs could offer a buy-out program similar to that recently implemented for tobacco. In a buy-out program, producers would be offered a lump-sum payment or series of payments in exchange for eliminating all future rights to federal commodity program payments. Please indicate your preference for each of the following buy-out options.

	Yes	No	No Opin./ Don't Know
a. Producers should be offered a buy-out of existing commodity programs.	☐	☐	☐
b. If a buy-out were offered in a single lump-sum equal to 15 years worth of my current commodity payments in today's dollars, I would take it.	☐	☐	☐
c. I would accept an equal value of the buy-out described in 10b if it were paid in a series of annual installments.	☐	☐	☐
d. If a buy-out were offered in a single lump-sum equal to 25 years worth of my current commodity payments in today's dollars, I would take it.	☐	☐	☐
e. I would accept an equal value of the buy-out described in 10d if it were paid in a series of annual installments.	☐	☐	☐

11. Federal dairy programs have included both a dairy price support program backed by government purchases and a direct payment program based on milk prices called the milk income loss contract (MILC). What should be the policy regarding future dairy programs? (Check one)

- a. Eliminate all dairy support programs ☐
- b. Eliminate the MILC program and retain only the dairy price support program ☐
- c. Eliminate the dairy price support program and provide direct payments only in a method similar to the MILC program ☐
- d. Reauthorize both the current dairy price support program and the MILC program ☐

Section C - Conservation and Environmental Policy

Conservation of the nation's land and water resources is a well-recognized national priority. Effective federal program design must deal with targeting conservation priorities, streamlining program delivery, managing partnerships with state and local governments, recognizing changes in farming and land ownership, and encouraging farmers and rural landowners to be conservation-minded. Because of the significant issues involved in these programs, your opinions are sought on the following issues.

12. Considering the following environmental goals, please indicate your preference for organizing federal technical and financial assistance to private landowners. (Check one for each listed goal)

	No Fed. Assist.	Tech. Assist. Only	Tech. and Fin. Assist.	No Opin./ Don't Know
a. Water quality protection	☐	☐	☐	☐
b. Soil erosion control	☐	☐	☐	☐
c. Air quality protection	☐	☐	☐	☐
d. Wildlife habitat protection	☐	☐	☐	☐
e. Open space protection	☐	☐	☐	☐
f. Management of animal wastes	☐	☐	☐	☐
g. Carbon sequestration	☐	☐	☐	☐
h. Maintenance of biodiversity	☐	☐	☐	☐

13. One option for tailoring conservation programs to local needs is to transfer federal funding through block grants to states and give them more authority to implement conservation programs. Please indicate how strongly you agree or disagree with this approach.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No Opinion/ Don't Know
☐	☐	☐	☐	☐	☐

14. Most contracts for land currently enrolled in the Conservation Reserve Program (CRP) will expire by 2010. If changes to the CRP policy are considered, which of the following alternatives would you prefer? (Check one)

- a. Keep current rules and allow current contracts to expire on schedule and compete for re-enrollment against other land being offered for enrollment. ☐
- b. Allow current contracts ranking highest in environmental benefits to be automatically eligible for re-enrollment at existing annual rental rates. ☐
- c. Reduce the acreage in the CRP as current contracts expire by restricting future enrollments to high-priority, environmentally sensitive lands. ☐
- d. Eliminate the CRP as current contracts expire. ☐

15. The Conservation Security Program (CSP) provides cost-share assistance, incentive payments, and technical assistance to producers for adopting and/or maintaining targeted conservation practices on working lands. How should the CSP be addressed in the next Farm Bill? (Check one)

- a. Continue the current policy of implementing the CSP on a watershed-by-watershed basis as funding allows. ☐
- b. Increase funding to allow immediate nationwide implementation of the CSP. ☐
- c. Eliminate the CSP as existing contracts in pilot watersheds expire. ☐

Section D - Trade Policy

Most U.S. agricultural commodities are substantially impacted by international trade and competition from imports or demand for exports. The United States participates in bilateral and regional trade agreements and in the multinational World Trade Organization (WTO). Because of the impact of international trade, your opinions are sought on these issues.

Please indicate how strongly you agree or disagree with the following statements. (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree, X = no opinion or don't know)

	SD				SA	DK
16. The United States should continue to pursue free trade agreements (WTO, CAFTA, etc.) to reduce and eliminate trade barriers.	1	2	3	4	5	X
17. Labor laws, environmental impacts, and food safety standards should be included as part of international trade negotiations.	1	2	3	4	5	X
18. To comply with the recent WTO ruling on cotton, the United States should eliminate export credits and industry payments such as Step 2 cotton payments.	1	2	3	4	5	X
19. The United States should emphasize domestic economic and social policy goals rather than trade policies.	1	2	3	4	5	X
20. The United States should withdraw from the WTO.	1	2	3	4	5	X
21. If the United States withdraws from the WTO, U.S. producers will face greater market access problems getting agricultural exports into other countries.	1	2	3	4	5	X
22. The United States should eliminate unilateral sanctions prohibiting food trade with certain other countries.	1	2	3	4	5	X

Section E - Food System and Regulatory Policy

There are many policies developed in the Farm Bill or in closely related legislation that affect the nation's food system and regulatory framework. Because of the impact of these food system policies on U.S. agriculture, your opinions are sought on the following issues.

Please indicate how strongly you agree or disagree with the following statements. (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree, X = no opinion or don't know)

	SD				SA	DK
23. The government should implement mandatory labeling rules to identify the country of origin on food products.	1	2	3	4	5	X
24. The government should develop voluntary labeling guidelines to better establish what the identification of the country of origin means for food products.	1	2	3	4	5	X
25. The government should increase efforts to improve traceability of food products from the consumer back to the producer.	1	2	3	4	5	X
26. The government should adopt mandatory animal identification rules to improve animal health and food safety monitoring efforts.	1	2	3	4	5	X
27. The government should adopt mandatory BSE testing of all cattle over 30 months of age.	1	2	3	4	5	X
28. The government should establish guidelines for voluntary BSE testing of cattle by private industry.	1	2	3	4	5	X
29. Food products made with biotechnology should be labeled regardless of whether there is a scientifically-determined difference in the product.	1	2	3	4	5	X

Section F - Related Policy Issues

Many other policy issues affect agriculture and rural America. Because of the significance of these various policies, your opinions are sought on the following issues.

30. In which counties do you farm or ranch? (Check all that apply)

Apache ☐	Cochise ☐	Coconino ☐
Gila ☐	Graham ☐	Greenlee ☐
La Paz ☐	Maricopa ☐	Mohave ☐
Navajo ☐	Pima ☐	Pinal ☐
Santa Cruz ☐	Yavapai ☐	Yuma ☐

31. What is the closest driving distance between your primary land holdings in the state and either downtown Phoenix or Tucson? (Please insert the number of miles as a whole number) ☐

32. Do you as an individual or entity have: (Check one in each row)

	Yes	No
a. an estate plan in place?	☐	☐
b. health insurance in place?	☐	☐
c. short-term disability insurance in place?	☐	☐

33. Should farms or ranches with water supplies or water rights be allowed to rent out or sell their water for non-agricultural purposes? (Check one)

Yes	No	No Opin./ Don't Know
☐	☐	☐

34. Taken all together, how would you say that things are today for you and your family? (Check one)

Very good	Pretty good	Not so good
☐	☐	☐

35. Did you draw on existing farm or personal equity to finance your farm or ranch in the past 3 years? (Check one)

Yes	No
☐	☐

36. Please indicate how important the following weather data are for your production and marketing decisions.(1 = least important (LI), 2 = less important, 3 = neutral, 4 = important, 5 = most important (MI), X = don't know/no opinion (DK))

	LI				MI	DK
a. Temperature	1	2	3	4	5	X
b. Precipitation	1	2	3	4	5	X
c. Wind speed	1	2	3	4	5	X
d. Wind direction	1	2	3	4	5	X
e. Soil moisture	1	2	3	4	5	X
f. Soil temperature	1	2	3	4	5	X
g. Frost/freeze conditions	1	2	3	4	5	X
h. Degree days	1	2	3	4	5	X
i. Relative humidity	1	2	3	4	5	X

37. Do you use weather information (such as temperature, precipitation, humidity, degree days, or wind speed, frost/freeze conditions) for any of the following production or marketing decisions? (Check all that apply)

Crop choice	☐	Crop variety choice	☐
Timing planting(s)	☐	Timing cultivation	☐
Timing pesticides	☐	Timing irrigation	☐
Timing harvest	☐	Crop insurance	☐
Crop/livestock sales	☐	Crop storage	☐
Hedging	☐	Livestock grazing	☐
Moving livestock	☐	Livestock pest control	☐

38. What communication and information technologies do you currently utilize? (Check all that apply)

Cell phone	☐	PDA	☐	Satellite TV	☐
GPS	☐	E-mail	☐		

39. What technologies did you use in production during 2004 or 2005? (Please check all that apply)

a. E-commerce (transactions on the Internet)	☐
b. Herbicide-tolerant crops	☐
c. Seed that was multiplied (increased) through tissue culture technology	☐
d. Genetically modified seed	☐
e. Plant growth stimulants and regulators	☐
f. Insect growth regulators	☐
g. Precision agriculture technologies such as global positioning systems, variable rate applications, and GPS-linked yield monitors	☐
h. Precision irrigation technologies such as laser leveling, drip irrigations, and low-pressure sprinkler systems	☐
i. Livestock production stimulants such as shots and implants	☐

Section G - Personal Data

40. What is the your age? (Check one)

Under 25 ☐ | 25-34 ☐ | 35-44 ☐ | 45-54 ☐ | 55-64 ☐ | 65 and over ☐

41. What is your gender? (Check one) — Male ☐ Female ☐

42. Are you of Spanish, Hispanic, or Latino origin or background such as Mexican, Cuban, or Puerto Rican, regardless of race? (Check one) — Yes ☐ No ☐

43. What is your race or ethnicity? (Check one)

a. White ☐
b. Black or African American ☐
c. American Indian or Alaska Native ☐
d. Native Hawaiian or Other Pacific Islander ☐
e. Asian ☐

44. What is the approximate average annual market value of agricultural products sold from your farm or ranch in recent years, **not including government payments?** (Check one)

a. Under $10,000 ☐
b. $10,000 - $49,999 ☐
c. $50,000 - $99,999 ☐
d. $100,000 - $249,999 ☐
e. $250,000 - $499,999 ☐
f. $500,000 - $999,999 ☐
g. $1,000,000 and over ☐

45. What percent of your total farm or ranch cash receipts in recent years came from the following sources? (Insert whole percentages-numbers should add to 100%)

a. Food and feed grains
b. Soybeans and other oilseeds
c. Cotton
d. Dry beans, dry peas, lentils, and chickpeas
e. Peanuts
f. Sugar beets and sugar cane
g. Tobacco
h. Fruits, tree nuts, and berries
i. Vegetables, melons, and potatoes
j. Nursery, greenhouse, floriculture, and sod
k. Forages
l. All other crops
m. Aquaculture
n. Cattle and calves
o. Dairy cattle and dairy products
p. Hogs and pigs
q. Sheep, goats, and their products
r. Poultry and poultry products
s. All other livestock and livestock products

46. What percent of your total farm or ranch cash receipts in recent years came from sales of organic products? (Insert percentage as a whole number)

47. What percent of your family income is typically earned from farming or ranching? (Check one)

None ☐ | 1 - 25% ☐ | 26 - 50% ☐ | 51 - 75% ☐ | 76 - 100% ☐

48. What was the last year of school you completed? (Check one)

Grade School ☐ | Some High School ☐ | High School/ GED ☐ | Some College/ Tech School ☐ | College Bachelor's Degree ☐ | College Advanced Degree ☐

49. What federal farm programs did your operation participate in or receive benefits from in recent years? (Check all that apply)

a. Commodity programs (direct payments, price supports, commodity loans, LDPs, etc.) ☐
b. Land retirement conservation programs (CRP, WRP) ☐
c. Working land conservation programs (EQIP, CSP, etc.) ☐
d. Wildlife habitat, agricultural land, and grassland preservation programs (WHIP, FRPP, GRP) ☐
e. Risk management programs (crop and livestock insurance programs) ☐
f. Agricultural credit programs ☐
g. Disaster assistance programs ☐
h. Trade adjustment assistance programs ☐
i. Other federal farm programs ☐

50. What percent of the land operated in your farm or ranch do you own? (Check one)

None ☐ | 1 - 25% ☐ | 26 - 50% ☐ | 51 - 75% ☐ | 76 - 100% ☐

51. When you are no longer operating your farm or ranch, what do you expect will happen to the operation? (Check one)

a. It will be operated by my spouse ☐
b. It will be operated by my children. ☐
c. It will be operated by other relatives. ☐
d. It will be operated by a non-relative who is currently involved in the operation. ☐
e. It will be operated by individuals not involved in the current operation. ☐
f. It will be converted to a non-farm use ☐

52. If farm size is defined by the value of agricultural products sold, what size level would you suggest defines a small farm? (Check one)

a. Under $10,000 ☐
b. Under $50,000 ☐
c. Under $100,000 ☐
d. Under $250,000 ☐
e. Under $500,000 ☐
f. Under $1,000,000 ☐
g. Small farms cannot be easily defined by sales ☐

Thank you for your effort to complete this survey. Please return it in the enclosed envelope.