Empirical Results

In this section we present the empirical results from the Generalized Polytomous Logit (GPL) and the three-stage least-squares (TSLS) models. The GPL model analyzes the discrete choice of insurance product as a function of risk type, income level, and insurance cost, while the TSLS model analyzes the choice of coverage levels and premium rates in a simultaneous equation system. We present the results of our analysis for both corn and soybeans, but limit the discussion to corn.

Choice of Insurance Products

The maximum likelihood analysis of variance results are presented in table 4, which summarizes the main effects of models 1 and 2. The likelihood ratio statistic indicates goodness of fit of the model, while chi-square values indicate the significance of the explanatory variables. The likelihood ratio statistic for model 1 has a value of 253 with 60 degrees of freedom, which is indicative of a good fit. Model 2 is also a good fit, with a likelihood ratio of 367 with 80 degrees of freedom. A likelihood ratio test is performed to test whether the two specifications are statistically different. Test results indicate that the two models are indeed different. Since models 1 and 2 represent choices with respect to APH, which is a partially subsidized product, and CAT, which is a completely subsidized product, we infer that premium subsidies are likely to influence farmers' decisions in choosing an insurance product.

The hypothesis to be tested is that the insurance market entails low-risk types selecting products that provide lower protection, while high-risk types select products that provide higher protection. Results presented in table 4 reveal a strong relationship between risk type and the choice of insurance products. The risk type variable has Wald Chi-Square values of 1,712 with 6 degrees of freedom in model 1, and 1,920 with 8 degrees of freedom in model 2. We reject the hypothesis that risk type has no influence on the choice of insurance products at less than the 1-percent level of significance.[16] These results are consistent with the presence of a *separating equilibrium* in crop insurance markets, where low- and high-risk farmers choose different products depending on their risk types.

Our results also indicate that income has a significant influence on the choice of insurance products (table 4). The Wald Chi-Square values for income are 630 with 6 degrees of freedom in model 1, and 744 with 8 degrees of freedom in model 2. The cost of insurance, captured by the premium per dollar of liability (RATE), is also a critical factor in choosing a product. RATE is statistically significant, with Wald Chi-Square

Table 4—Maximum likelihood analysis of model fit and variable significance[1]

	Model 1			Model 2		
Variable	**df**	**Chi-square[2]**	**Probability**	**df**	**Chi-square**	**Probability**
Corn						
Risk type (RISK)	6	1712.58	0.00	8	1920.40	0.00
Level of income (M)	6	629.95	0.00	8	743.65	0.00
Cost of insurance (RATE)	6	6225.10	0.00	8	9553.60	0.00
Likelihood ratio	60	253.13	0.00	80	367.27	0.00
Likelihood ratio test[3]			228.28			
Variable	**df**	**Chi-square**	**Probability**	**df**	**Chi-square**	**Probability**
Soybeans						
Risk type (RISK)	6	619.86	0.00	8	1167.25	0.00
Level of income (M)	6	532.64	0.00	8	843.28	0.00
Cost of insurance (RATE)	6	1099.30	0.00	8	1932.89	0.00
Likelihood ratio	60	411.85	0.00	80	550.74	0.00
Likelihood ratio test[3]			277.78			

[1] Model 1 is a GPL specification with product choices GRP, CRC, and RA with APH as the reference choice, while model 2 is a GPL specification with product choices APH, GRP, CRC, and RA with CAT as the reference choice.
[2] The table Chi-square values at 1% level of significance are 16.81 and 20.1 for 6 and 8 degrees of freedom, respectively.
[3] The likelihood ratio test statistic is given by $-2\log\lambda$, where λ is the ratio of two likelihood ratios from models 1 and 2 (Kennedy 1992).

The statistic is distributed asymptotically as Chi-square with degrees of freedom equal to the number of restrictions imposed.

values of 6,225 with 6 degrees of freedom in model 1, and 9,554 with 8 degrees of freedom in model 2.

Table 5 presents the parameter estimates for models 1 and 2, along with the standard errors that indicate the statistical significance of the estimated parameters (table 6 presents the parameter estimates for soybeans). Parameter estimates are arranged according to the logits they reference. In what follows, we limit our discussion to model 1.

Odds ratios facilitate interpretation of the estimated parameters (Long, 1997). We compare the odds of choosing CRC, RA, and GRP over APH for different risk types and for different income levels. The odds ratio measures the likelihood of choosing an insurance

Table 5—Generalized multinomial logit model, corn

Model 1	**logit(GRP/APH)**			**logit(CRC/APH)**			**logit(RA/APH)**		
Variable		Coefficient	Std. error		Coefficient	Std. error		Coefficient	Std. error
Intercept	α_1	-4.7946*	0.3358	α_2	-1.9052*	0.1186	α_3	-1.7419*	0.0318
High-risk	β_1	-0.5190*	0.1087	β_2	0.1808*	0.0164	β_3	0.1790*	0.0380
Med risk	β_4	0.1562**	0.0644	β_5	0.2985*	0.0115	β_6	0.2965*	0.0240
High income	β_7	0.7740*	0.0531	β_8	0.1635*	0.0152	β_9	0.1742*	0.0278
Med income	β_{10}	-0.6460*	0.0568	β_{11}	0.0687*	0.0118	β_{12}	-0.0722*	0.0226
High rate	β_{13}	-2.8672*	0.6689	β_{14}	2.3900*	0.1199	β_{15}	-0.7536*	0.0563
Med rate	β_{16}	-0.5619^{n}	0.3385	β_{17}	1.7001*	0.1186	β_{18}	-0.8095*	0.0314

Model 2	**logit(APH/CAT)**		**logit(GRP/CAT)**		**logit(CRC/CAT)**		**logit(RA/CAT)**	
Variable	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error
Intercept	2.9172*	0.1284	-1.8759*	0.3579	1.0082*	0.1741	1.1727*	0.1312
High-risk	2.4752*	0.2534	2.9882*	0.2740	2.6570*	0.2534	2.6460*	0.2554
Med risk	-1.2144*	0.1277	-1.0885*	0.1414	-0.9123*	0.1279	-0.9319*	0.1290
High income	-0.4167*	0.0287	0.3260*	0.0540	-0.2497*	0.0305	-0.2609*	0.0332
Med income	0.2176*	0.0253	-0.4227*	0.0582	0.2853*	0.0266	0.1494*	0.0289
High rate	0.1798*	0.0618	-2.6828*	0.6688	2.5760*	0.1325	-0.5664*	0.0794
Med rate	1.4135*	0.0367	0.8632*	0.3389	3.1174*	0.1232	0.6097*	0.0459

* Significant at 1% level; ** Significant at 5% level; n is non-significance.

Table 6—Generalized multinomial logit model, soybeans

Model 1	**logit(GRP/APH)**			**logit(CRC/APH)**			**logit(RA/APH)**		
Variable		Coefficient	Std. error		Coefficient	Std. error		Coefficient	Std. error
Intercept	α_1	-4.3203*	0.0824	α_2	-0.2932*	0.0126	α_3	-2.0431*	0.0240
High-risk	β_1	-0.8553*	0.1373	β_2	0.0751*	0.0159	β_3	0.2764*	0.0294
Med risk	β_4	0.2492*	0.0867	β_5	0.2178*	0.0130	β_6	0.0958*	0.0252
High income	β_7	1.0597*	0.0749	β_8	0.1984*	0.0185	β_9	0.2738*	0.0347
Med income	β_{10}	-0.5302*	0.0757	β_{11}	0.0839*	0.0135	β_{12}	0.0735*	0.0261
High rate	β_{13}	0.0738^{n}	0.1065	β_{14}	0.3661*	0.0169	β_{15}	0.1514*	0.0326
Med rate	β_{16}	-0.2270*	0.0725	β_{17}	-0.3988*	0.0130	β_{18}	-0.3505*	0.0253

Model 2	**logit(APH/CAT)**		**logit(GRP/CAT)**		**logit(CRC/CAT)**		**logit(RA/CAT)**	
Variable	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error
Intercept	3.7447*	0.822	-0.5747*	0.1157	3.4517*	0.0823	1.7022*	0.0848
High-risk	2.5763*	0.1367	1.7202*	0.1931	2.6512*	0.1370	2.8521*	0.1392
Med risk	-1.1394*	0.0704	-0.8933*	0.1110	-0.9203*	0.0707	-1.0436*	0.0739
High income	-0.5630*	0.0287	0.4989*	0.0784	-0.3634*	0.0301	-0.2890*	0.0422
Med income	0.1983*	0.0240	-0.3321*	0.0785	0.2828*	0.0250	0.2725*	0.0337
High rate	-0.8010*	0.0571	-0.7235*	0.1192	-0.4309*	0.0570	-0.6455*	0.0636
Med rate	-1.1916*	0.0487	-1.4202*	0.0863	-1.5924*	0.0490	-1.5441*	0.0536

* Significant at 1% level; ** Significant at 5% level; n is non-significance.

product over any other choice. For example, the odds of choosing CRC over APH by high- vs. low-risk types are computed using equation 23 and the model 1 parameters in table 5 as:

$$\frac{e^{\alpha_2+\beta_2+\beta_8+\beta_{14}}}{e^{\alpha_2-\beta_2-\beta_5+\beta_8+\beta_{14}}}=\frac{2.30}{1.18}=1.95.$$

Thus, the odds ratio indicates that high-risk farmers are 1.95 times more likely to choose CRC over APH than low-risk farmers. Our analysis also indicates that the expected indemnity payoffs (expressed as percent of liability) from the revenue insurance products, CRC and RA, are about 12 percent for high-risk farmers relative to about 2 percent for low-risk farmers (table 7).

Since GRP indemnities are based on county-level losses, high-risk farmers would find it less attractive relative to APH. The expected indemnity payoffs for high-risk farmers were 4 and 9 percent for GRP and APH products (table 7). In general, the results indicate a preference for revenue insurance by high-risk farmers and yield insurance by low-risk farmers.

Results presented in table 5 suggest that high-income farmers prefer CRC and RA over APH, within the same risk class. The odds of choosing CRC over APH by high-income farmers relative to low-income farmers is given by:

$$\frac{e^{\alpha_2+\beta_2+\beta_8+\beta_{14}}}{e^{\alpha_2+\beta_2-\beta_8-\beta_{11}+\beta_{14}}}=\frac{2.30}{1.54}=1.5.$$

This odds ratio indicates that high-income farmers are 1.5 times more likely to choose CRC over APH relative to low-income farmers within the same risk category. One possible explanation for high-income farmers' greater willingness to buy revenue insurance products is that they attempt to maximize payoffs from these crop insurance contracts that are subsidized by the Federal Government. Another possible explanation is that the accumulated savings used as a proxy for income is more a measure of liquidity constraint rather than a measure of risk aversion.[17]

The cost of insurance is also a critical factor that influences farmers' choice of insurance product. This finding is consistent with Just et al. (1999), who found that farmers' participation in crop insurance is primarily driven by the cost of insurance and the premium subsidy.

Using the estimated model, we explore further the relationship between risk type and choice of insurance product by calculating the probability of choosing an insurance product given the farmer's risk type. The probabilities presented in table 8 are estimated from the GPL model 2. The results indicate that high-risk farmers are more likely to choose revenue insurance contracts CRC or RA, over CAT or GRP, while low-risk farmers are more likely to choose GRP or CAT (table 8). This is because high-risk farmers have a greater incentive than low-risk farmers to select contracts that provide greater protection in the absence of full information.

Choice of Coverage Levels

The system of equations 23 and 24 is estimated by the three-stage least-squares method because coverage level and premium rates are determined simultaneously. We estimate the system for each insurance product separately. Tables 9 and 10 present the estimated coefficients of the empirical model for corn and soybeans. We limit our discussion to corn.

The estimated functions reveal a strong relationship between risk type and choice of coverage level (table 9). The positive and significant coefficients for risk type indicate that those farms that have a higher probability of yield or revenue falling below the guaranteed level are more likely to choose higher coverage contracts. Results are consistent across all products. This

Table 7—Expected indemnity payoffs from alternative contracts for different risk types

	Corn			**Soybeans**		
	Risk type			Risk type		
	Low-risk	Medium-risk	High-risk	Low-risk	Medium-risk	High-risk
APH (65% coverage)	0.81	4.50	9.30	0.83	3.82	7.31
CRC (65% coverage)	2.10	5.10	11.60	0.97	5.22	10.13
RA (all coverage)[1]	1.80	5.20	11.50	0.80	4.05	9.06
GRP (all coverage)[1]	0.76	1.70	3.74	0.41	1.20	2.14

[1] All coverage levels are combined for RA and GRP for lack of sufficient number of contracts under different risk types.

Table 8—Probability of choosing an insurance product, by risk type

	Corn			Soybeans		
	Low-risk	Medium-risk	High-risk	Low-risk	Medium-risk	High-risk
Prob{INSPLAN = CAT}[1]	0.32	0.16	0.003	0.26	0.22	0.01
Prob{INSPLAN = APH}	0.19	0.20	0.29	0.18	0.19	0.28
Prob{INSPLAN = GRP}	0.22	0.20	0.15	0.29	0.17	0.08
Prob{INSPLAN = CRC}	0.09	0.24	0.36	0.13	0.22	0.29
Prob{INSPLAN = RA}	0.17	0.21	0.20	0.13	0.20	0.35

[1] INSPLAN is the insurance plan or product.

Table 9—Three-stage least-squares model, corn

Insurance Plan	Dependent Variable	Explanatory variables[1]							
		Coverage level	Premium rate	Risk type	Income	Yield span	Practice	Ownership share	R-square
APH	**Coverage level**	*	0.0607	0.1579	0.0015	0.0660	-0.0250	-0.0256	
			(159.65)	(26.24)	(11.20)	(229.57)	(-1.91)	(-11.57)	
									0.9791
	Premium rate[1]	2.2340	*	6.7994	*	-0.8345	0.3781	0.1275	
		(135.79)	(72.91)			(96.82)	(1.87)	(3.82)	
CRC	**Coverage level**	*	0.0521	0.1482	0.0012	0.0565	0.0182	-0.0309	
			(129.66)	(22.58)	(9.70)	(151.15)	(1.30)	(-11.80)	
									0.9810
	Premium rate	14.5456	*	6.6021	*	-0.9050	-0.1624	0.3108	
		(110.05)		(54.40)		(-73.53)	(-0.62)	(6.64)	
RA	**Coverage level**	*	0.1460	0.1070	0.0020	0.0350	-0.1836	-0.0678	
			(24.70)	(2.72)	(3.82)	(9.92)	(-1.85)	(-4.16)	
									0.9325
	Premium rate	4.5621	*	7.4577	*	-0.2212	1.0500	0.1874	
		(17.48)		(28.95)		(-7.34)	(1.63)	(1.88)	
GRP	**Coverage level**	*	0.4022	0.8100	-0.0034			-0.1512	
			(11.58)	(3.77)	(-1.51)			(-2.04)	
									0.9436
	Premium rate	0.1970	*	11.40	*			0.1470	
		(1.70)		(33.13)				(1.50)	
CAT	**Premium rate**[2]			11.9283		0.1034	1.1431	1.9680	0.7142
				(25.52)		(8.44)	(2.34)	(18.93)	

[1] Numbers in parentheses indicate t-statistics.
[2] Premium rate for CAT is the fee per dollar of liability.

again indicates a separating equilibrium in crop insurance markets, where farmers choose coverage levels depending on their risk type.

The estimated relationship between income and choice of coverage level is positive and significant for APH, CRC, and RA (table 9). The positive coefficient implies a preference for greater coverage by high-income farmers, and does *not* support the hypothesis that high-income farmers prefer lower coverage levels and retain the risk of some losses. Possible explanations for this behavior can be that income is uncorrelated with risk and that farmers maximize the premium subsidy they receive from the Government.

The coefficients for ownership share show a negative association with coverage level (table 9). This implies that as the ownership share decreases, farmers are more likely to choose higher coverage levels. One explanation for this result is that farmers who lease land (lower ownership share) are often required to purchase insurance, particularly when external financing is involved. This result is consistent with the findings of Wu (1999). A negative coefficient for farm practice indicates that farmers who irrigate their land prefer lower coverage compared with non-irrigated farms. This is likely because irrigation generally reduces risk.

Table 10—Three-stage least-squares model, soybeans

Insurance Plan	Dependent Variable	Explanatory variables[1]						
		Coverage level	Premium rate	Risk type	Income	Yield span	Ownership	R-square share
APH	**Coverage level**	*	0.0850	0.1300	0.0048	0.0660	-0.0180	
			(156.33)	(20.06)	(25.77)	(183.87)	(-7.24)	0.9789
	Premium rate	10.2456	*	3.3477	*	-0.6415	0.1062	
		(145.60)		(43.64)		(-97.05)	(3.76)	
CRC	**Coverage level**	*	0.0740	0.1170	0.0030	0.0563	-0.0277	
			(126.13)	(17.36)	(14.10)	(131.24)	(-9.41)	0.9818
	Premium rate	11.7445	*	3.1164	*	-0.7251	0.3204	
		(116.96)		(34.91)		(-73.32)	(7.96)	
RA	**Coverage level**	*	0.1405	0.0982	0.0017	0.0275	-0.0225	
			(27.04)	(2.93)	(3.73)	(8.06)	(1.50)	0.9498
	Premium rate	5.5934	*	4.0430	*	-0.1878	-0.2495	
		(22.21)		(17.35)		(-6.40)	(-2.36)	
GRP	**Coverage level**	*	0.6812	0.8147	-0.0069	*	-0.0701	
			(10.30)	(2.82)	(-1.40)		(-0.87)	0.9745
	Premium rate	0.4952	*	7.80	*	*	-0.0209	
		(9.88)		(46.88)			(-0.50)	
CAT	**Premium rate[2]**	*	*	4.4344	*	0.1.475	1.3700	0.6994
				(11.888)		(15.13)	(17.16)	

[1] Numbers in parentheses indicate t-statistics.
[2] Premium rate for CAT is the fee per dollar of liability.

Results show that the yield-span—the ratio of actual yield to the county-level average—is a significant variable (table 9). The positive relationship between coverage level and yield-span implies that farmers with high expected yields are more likely to buy higher coverage levels, while farmers with low expected yields are more likely to buy lower coverage levels. Yield-span is a key factor in the RMA rating design. A standard RMA assumption is that expected loss decreases as expected yield increases, which implies that farmers with high expected yields represent low risks. If this were true, then the results would imply that low-risk farmers purchase higher coverage levels and vice versa.

Empirical Evidence on Market Signaling

Although evidence that low-risk farmers tend to choose lower coverage levels and high-risk farmers tend to choose higher coverage levels is consistent with the theory that predicts separation by risk type, this finding alone is not sufficient to demonstrate that individuals effectively signal their risk type. We compared the estimated premium rates by introducing three dummy variables to represent three coverage levels: 55 percent, 65 percent, and 75 percent. The results presented in table 11 indicate that the premium rates, evaluated at their mean values, are significantly different from one another, suggesting a *nonlinear relationship between premium rates and coverage levels*. The premium rates per $100 of liability for APH are estimated to be 0.78, 1.65, and 3.80, respectively, for 55 percent, 65 percent, and 75 percent coverage levels (table 11). For CRC, the estimated premium rates per $100 of liability are 1.17, 2.61, and 5.35 for 55 percent, 65 percent, and 75 percent coverage levels (table 11).

The nonlinear relationship between premium rates and coverage levels is also captured in figures 2A and 2B. A visual examination of figures 2A and 2B suggests that the premium-coverage schedule is non-linear for both APH and CRC. The premium rates across coverage levels provide evidence of the hypothesized relationships in our model of the crop insurance market. The nonlinear coverage-premium schedule implies that farmers do signal their risk types through their choice of coverage levels to the insurance company.

Table 11—Marginal premium rates for APH and CRC, corn, Iowa

Insurance Plan	Explanatory variables[1]							R-square
	Risk type	Yield span	Practice	Ownership share	Coverage level			
					55%	65%	75%	
APH	0.0436	-0.0091	0.0058	0.0021	0.0855	0.0857	0.1025	0.4362
	(37.35)	(-115.55)	(4.59)	(6.29)	(37.79)	(143.02)	158.22)	
	Marginal premium rates (per 100 dollars of liability):				0.78	1.65	3.80	
CRC	0.0367	-0.0095	-0.0024	0.0039	0.0940	0.1017	0.1247	0.3459
	(22.20)	(-83.50)	(-0.47)	(23.55)	(23.55)	(109.83)	(106.34)	
	Marginal premium rates (per 100 dollar of liability):				1.17	2.61	5.35	

[1] Numbers in parentheses indicate t-statistics.

Evidence of a nonlinear premium-coverage schedule, taken together with the finding that different risk types choose different contracts supports the hypothesis that equilibrium in the market for multiple crop insurance products entails *market signaling and a separating equilibrium*.

Empirical Evidence on Adverse Selection

We present a two-step procedure to test adverse selection in the market for multiple yield and revenue insurance products. First, we test for independence of the choice of insurance contract and the risk type using non-parametric methods. Failure to reject independence would suggest that there is no evidence of adverse selection in the crop insurance market. Second, we test for the difference between the actual and the competitive premium rates for different risk types using non-

Figure 2A

Premium rates (% of liability), APH-buy-up and CRC, Corn

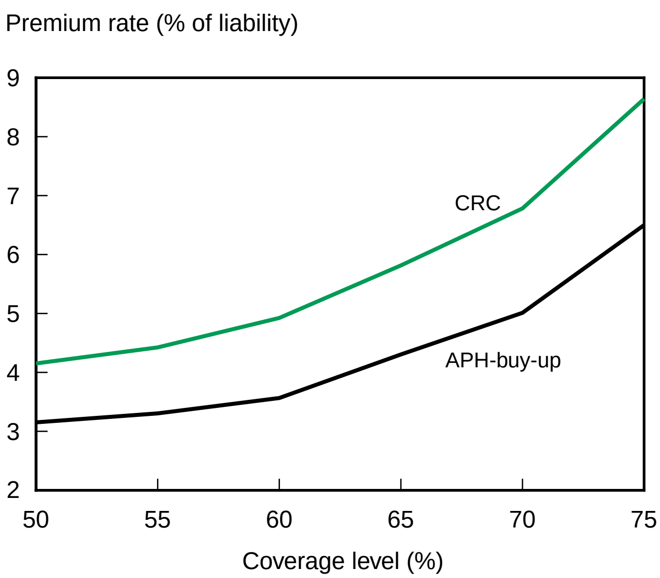
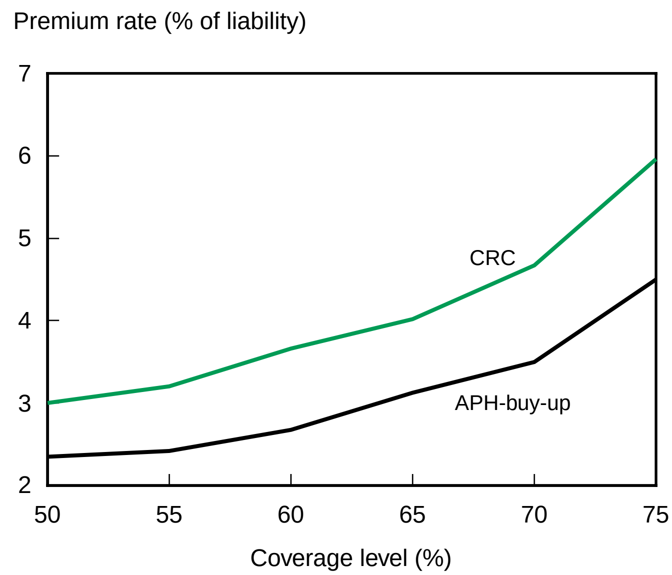


Figure 2B

Premium rates (% of liability), APH-buy-up and CRC, Soybeans



parametric methods as well as graphical illustrations. If the two rates are not different across risk types, then there is no evidence suggesting the presence of adverse selection in the crop insurance market.

1. Testing for independence of insurance contract choice and risk type. Both the Kruskal-Wallis and the Kolmogorov-Smirnov tests reject the hypothesis of independence between the choice of insurance product and the level of risk at the 1 percent significance level (table 12). The computed value of $\chi^2 = 1251.5$ for the Kruskal-Wallis test is much larger than the 1 percent critical value, which is 9.21 at 2 degrees of freedom. The computed value of K = 18.98 for the Kolmogorov-Smirnov test is much larger than the 1 percent critical value, which is 1.36. These results imply that farmers have better knowledge of their risk than insurance companies when choosing their crop insurance contracts. The non-parametric tests also reject the independence of the choice of coverage and the risk type for each insurance product at the 1-percent significance level. Thus, non-parametric tests suggest that adverse selection may not be a negligible phenomenon in the market for multiple yield and revenue insurance products.

2. Testing for the difference between actual and competitive premium rates. We test for the difference between actual and competitive premium rates for various risk types using non-parametric tests followed by a graphical illustration of the difference. The two non-parametric tests, Kruskal-Wallis and the Kolmogorov-Smirnov, reject the hypothesis that the actual and competitive rates are not different for different risk types at the 1-percent significance level for all products except GRP (table 12). The computed values of Kruskal-Wallis χ^2 for APH, CRC, RA, and GRP are 13668, 10397, 2738, and 1.96 compared with the critical value of 9.21 at 2 degrees of freedom. For GRP, non-parametric tests indicate that the actual and competitive rates are not statistically different from each other at different risk levels. This finding is consistent with Mahul (1999), who argues that an area yield insurance program mitigates adverse selection problems because information about area yields is more easily available and is more accurate than information about individual farm yields.

Table 12—Non-parametric test results

	Kruskal-Wallis Test	Kolmogorov-Smirnov Test
Independence of products and risk type	1,251.50	18.98
Independence of coverage and risk type		
APH	2,272.60	20.37
CRC	3,136.70	25.36
RA	363.83	8.73
GRP	671.60	11.98
Testing for the difference between actual and competitive premium rates across different risk types		
APH	13,668.00	55.33
CRC	10,397.00	46.02
RA	2,737.50	24.53
GRP	1.96	1.09
Critical Values	9.21	1.36

Figures 3 (A through D) and 4 (A through D) illustrate the differences between the actual and competitive premium rates (calculated as percent of liability) across different risk types and insurance products.[18] Actual premium rates are obtained by dividing premium by liability, while competitive rates are calculated by dividing expected indemnity by liability. The horizontal axis indicates the level of risk, measured by the probability of yield or revenue falling below the guaranteed level, while the vertical axis indicates actual and competitive premium rates as a percentage of liability.

Figure 3A compares the actual and competitive premium rates at the 65 percent coverage level across different risk types for APH contract. The figure shows that low-risk farmers are overcharged (pay more than their competitive rates) and high-risk farmers are undercharged (pay less than their competitive rates) for their respective insurance contracts. For example, a farmer with a risk level of 0.25 (slightly more than average) pays a premium of $5.06 for a 65-percent coverage level contract, while his/her competitive rate is $8.63. In other words, the actual premium rates fail to accurately reflect individual farmers' likelihood of losses. Figure 3A also indicates that the disparity between the actual and competitive rates is greater at lower and higher risk levels, implying the underlying difficulty in assessing individual farmers' risks accurately. The results are similar in the case of CRC (figure 3B) and RA (figure 3C), and different in the case of GRP (figure 3D). Figure 3D indicates that actual and competitive premium rates for GRP are similar across all risk types.

In sum, we find a significant relationship between the contract choice and risk type. When farmers choose their crop insurance contract, they behave as though they have better knowledge of their risk than insurers. Our analysis indicates that individual risk types are not assessed accurately and that premium rates do not reflect the likelihood of losses. We find evidence of adverse selection in the individualized crop insurance market for Iowa corn in 1997.

Figure 3A

Actual and competitive premium rates, Corn APH, 65%

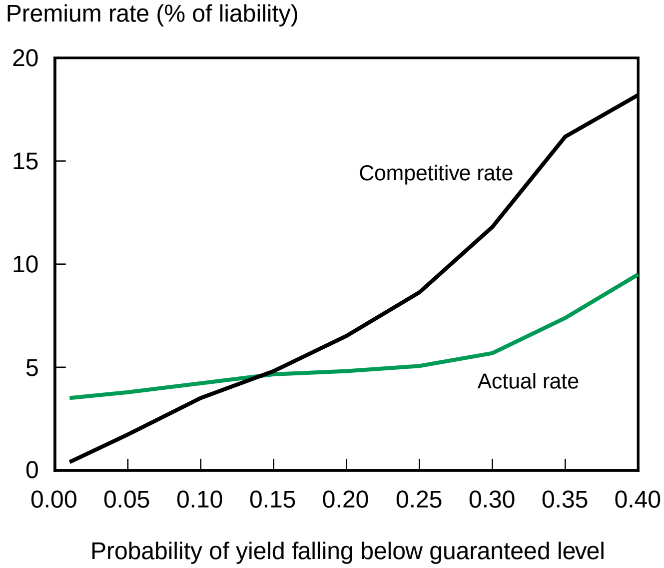


Figure 3C

Actual and competitive premium rates, Corn RA

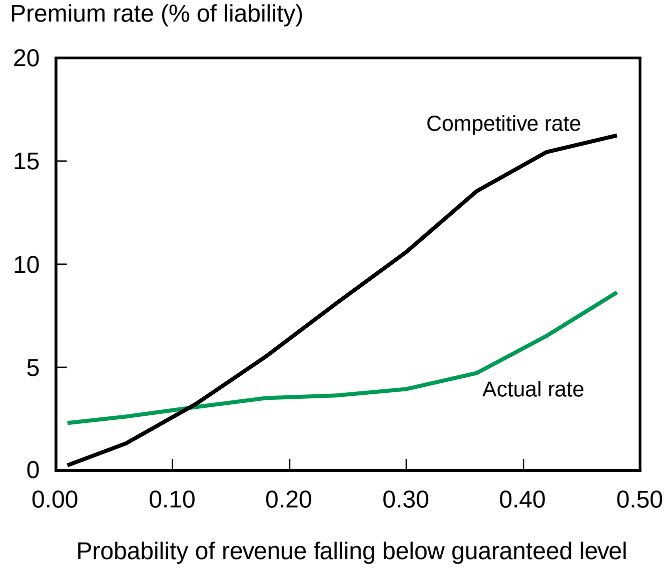


Figure 3B

Actual and competitive premium rates, Corn CRC, 65%

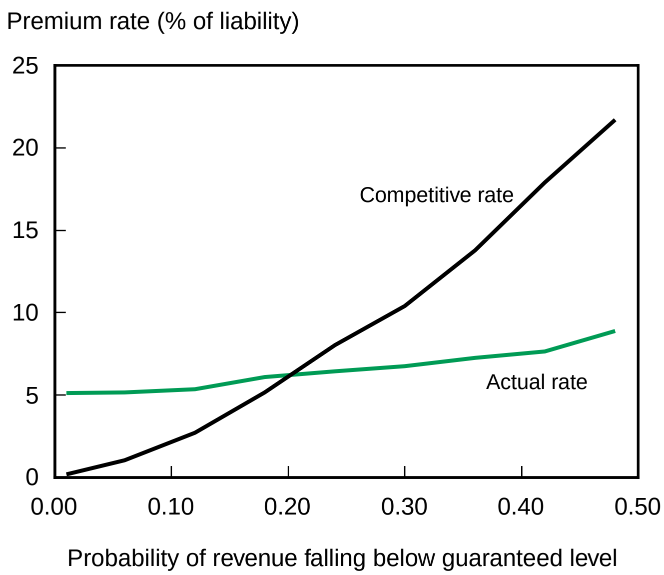


Figure 3D

Actual and competitive premium rates, Corn GRP

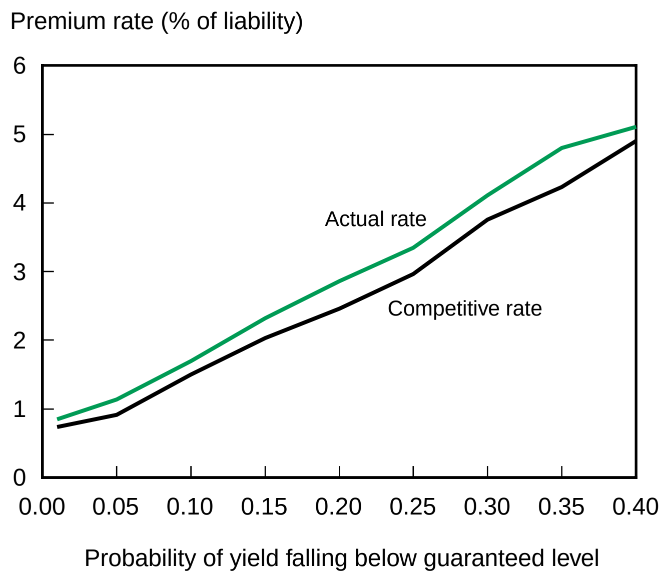


Figure 4A

Actual and competitive premium rates, Soybeans APH, 65%

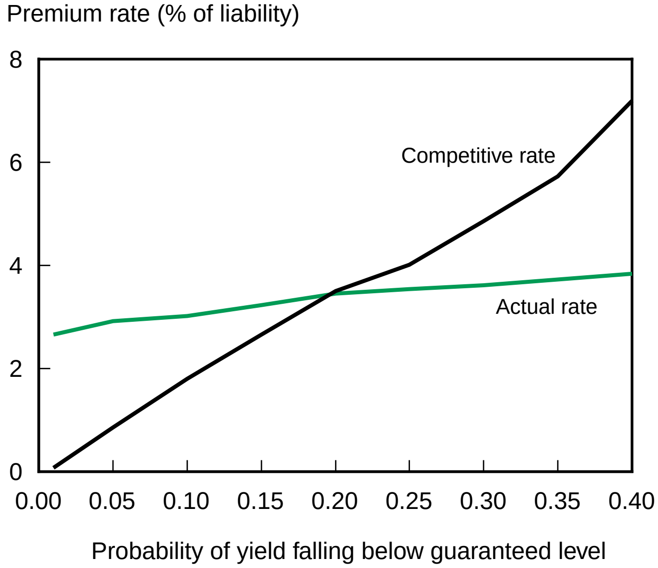


Figure 4B

Actual and competitive premium rates, Soybeans CRS, 65%

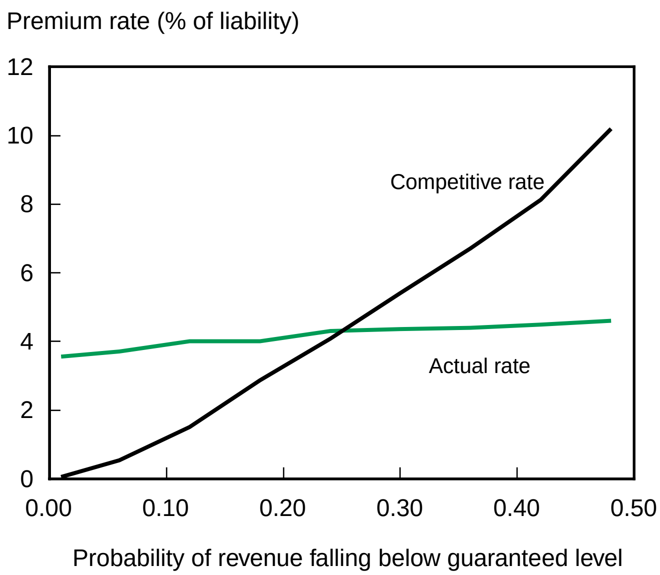


Figure 4C

Actual and competitive premium rates, Soybeans RA

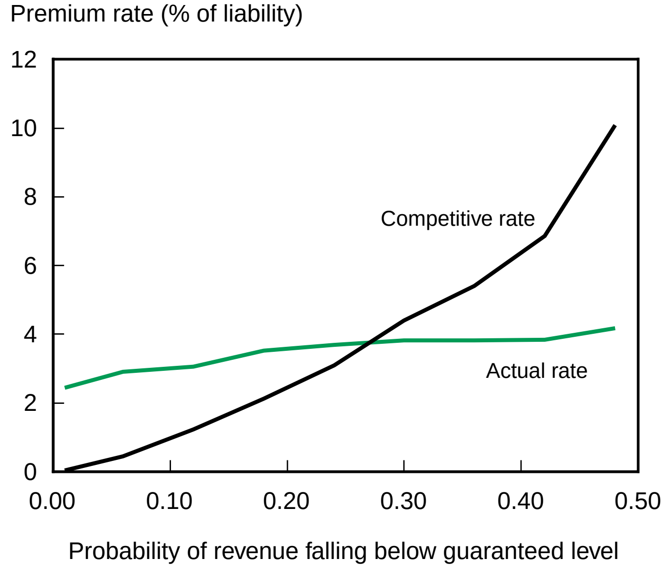


Figure 4D

Actual and competitive premium rates, Soybeans GRP