Rent Dispersion in the U.S. Agricultural Insurance Industry

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Regulations that restrict price competition in product markets often result in other forms of competition among firms and, in markets where rents are available, the reallocation of those rents to suppliers of relatively scarce inputs. Firms and input suppliers will also use some of the rents in a search for market power (Posner, 1975) and seek to capture industry regulators (Stigler 1971). The U.S. agricultural insurance industry reflects these realities. The industry, for the most part, was created by legislation to deliver federally subsidized insurance products for which premiums (prices) for each product are fixed independently by the USDA Risk Management Agency (RMA).[1] The agricultural insurance sector involves three types of economic agent: primary insurance companies, reinsurance companies, and insurance agents. Many agents operate independently as providers of agent services to farmers and the insurance companies and, effectively, control the supply of insurance policies to those companies. As a result, as Babcock has argued (2007, 2013), insurance agents are likely receive many of the rents available to the crop insurance industry. The agents may compete for those rents in ways that increase their own costs and waste resources while insurance companies compete for policies, in the process disseminating rents to the agents.[2]

This paper investigates why and when crop insurance companies may disburse many of the rents that accrue to the agricultural insurance industry to insurance agents. We construct a model of the market for insurance agent services in which independent insurance agents sell federally subsidized crop insurance policies to farmers at a price determined exogenously by the government. Under the terms of a Standard Reinsurance

Agreement (SRA) between the government and the companies, insurance companies then obtain those policies from the agents. The theoretical analysis, which examines the consequences of this structure for rent sharing among insurance companies and insurance agents, indicates that increases in expected returns to policies lead companies to compete for insurance policies by increasing compensation payments offered to agents. However, in markets where companies appear to have some oligopsonistic market power, or through legislative action have formed a buying cartel, such compensation rates will be lower.

Predictions of the model are explored through an original data set on company payments to insurance agents, underwriting gains, and measures of market concentration. The data consist of company specific information on compensation rates in the 48 contiguous states for two years (2007 and 2008) and underwriting gains for a seven year period (2001-2008).[3] Each state is viewed as a separate market because insurance companies operate under state specific provisions in the SRA. The SRA requires companies to accept crop insurance policies covering any farmer in each state in which they operate (they cannot deny coverage for any farmer), but not in other states. The empirical results indicate that insurance agents receive higher compensation rates in markets with higher expected returns and, *ceteris paribus*, lower compensation rates in markets served by fewer companies operate. The findings indicate that increasing company revenues to cover increasing costs serves only to increase those costs, but lowering company revenues reduces them.

We conclude the paper by examining the implications of changes in the SRA that resulted from the renegotiation of the SRA in 2010 for agent compensation and insurance company revenues and profits. Effectively, in the new SRA, the USDA Risk Management Agency acts as a monopsony cartel coordinator for the insurance companies, enforcing limits on agent compensation. Thus, especially in cornbelt states, agent compensation rates are likely to be lower than under previous SRAs. These savings in agent compensation payments could be substantial and may offset any reductions in insurance company revenues resulting from decreases in administrative and operating (A&O) subsidies and insurance company shares in underwriting gains mandated by the 2010 SRA.

The Agricultural Insurance Industry

The federal government first offered multiple peril (all risk) insurance products to corn and wheat farmers in 1938 (Kramer 1983)[4] but until 1980 only offered yield insurance products for a limited number of crops (Goodwin and Smith, 1995). During this period, the Federal Crop Insurance Corporation (FCIC) sold and serviced crop insurance policies using its employees and independent insurance agents,[5] and all losses were reinsured by the federal government. The 1980 Crop Insurance Act required FCIC to substantially increase the number of crops covered by the program, provide comprehensive geographic coverage, and to use the private sector "to the maximum extent possible" to sell and service crop insurance policies (Kramer 1983). During the 1980s, the terms under which insurance companies operated were made increasingly attractive, and, by 1991, private insurance companies and the independent agents who worked with them were effectively

the sole source for subsidized crop insurance policies (Goodwin and Smith 1995). The 1994 Crop Insurance Reform Act required RMA to expand the range of subsidized insurance products to include crop revenue insurance, livestock insurance, and whole farm insurance. Premium rates for all products were to be established by RMA but those products were to be sold and serviced by the private crop insurance industry.

Standard Reinsurance Agreements

Since 1981, in the current federal crop insurance program, the government has shared underwriting losses and gains with insurance companies through SRAs that are periodically renegotiated (Glauber 2004). This approach has encouraged companies to participate in the program by giving them a disproportionate share of underwriting gains. Under the SRA's, private insurance companies also receive an additional subsidy payment for administration and operations (A&O) costs which is defined as a proportion of the total premium paid into the insurance pool (including famer paid premiums and government paid premium subsidies). In addition to the A&O subsidies, to the extent that insurance companies retain some risk of loss, they also receive underwriting gains. The SRA's set the terms of trade for insurance companies on a state by state basis. However, under the SRA in effect in 2008 and 2009, companies received the same fixed percentage of the total premiums from each type of policy in their portfolios as the A&O subsidy in all states. Companies also earned underwriting gains for policies on which they retained premiums and obligations for some risk of loss (details of which are presented in Appendix A).

Critically, the SRAs prohibit insurance companies from any role in determining either the prices farmers are charged for federally subsidized crop insurance contracts or the structure of those contracts. Premium rates, underwriting provisions, loss adjustment standards, and other contract provisions have been always been approved by the Federal Crop Insurance Corporation and established and administered by RMA. A private insurance company, therefore, cannot compete by offering a different premium rate or contract terms to farmers without facing severe legal and financial penalties (U.S. D.A. Risk Management Agency, 2013).

In unregulated markets where entry is relatively easy, the existence of economic profits typically generates price competition between firms. However, such price competition is prohibited in all markets for federally subsidized agricultural insurance products. Hence, insurance companies must compete along "non-price" dimensions. One such dimension is competition for the books of business of independent crop insurance agents. Agents sell crop insurance policies to farmers and then allocate them back to insurance companies. Companies, therefore, seek books of business that are likely to provide relatively high underwriting gains, and compete with one another for those policies. Prior to 2011, companies were free to offer insurance agents any compensation rate they chose. Since 2011, under the provisions of the 2010 SRA, compensation payments to agents have been capped and the government agency, RMA, has essentially become the policeman that ensures the new rules of the game are enforced.[6] By implication, therefore, RMA has effectively become the manager of an insurance company monopsony cartel with respect to crop insurance agent services.

Underwriting gain histories have systematically differed among states. For example, in corn-belt states like Iowa and Indiana underwriting gains have generally been much higher than in states like Montana and North Dakota, where major crops are grown on dry-land in semi-arid climates (see table 1). Further, as participation rates increased substantially in the 2000's in response to the increased premium subsidies instituted by the 2000 Agricultural Risk Protection Act (ARPA), adverse selection became less extensive, improving the underwriting gain performance of each state's book of business. Hence, data generated under the pre-2010 SRA can be used to test hypotheses about the link between compensation rates for insurance agents, expected underwriting gains, and the extent of competition in a crop insurance market.

Crop Insurance Subsidies, Income Transfers, and Rents

Effectively, all government crop insurance program subsidies can be viewed as transfers and rents (Glauber and Smith, 2012; Goodwin and Smith, 2013). In the United States, most farmers buy multiple peril crop yield and revenue insurance policies because they are subsidized (Wright and Hewitt 1994). Farmers currently pay an average of about 38 percent of the actuarially fair premium rate (which is defined as the expected average indemnity per dollar of insurance coverage or liability) for the federal crop insurance they buy (Glauber, 2013) and insure about 80 percent of the acreage eligible for such coverage. Prior to 1938, when no subsidies were available, no private company successfully offered commercially priced all risk crop insurance (Kramer, 1983). Between 1938 and 1980, when the government covered administrative costs but attempted to set actuarially fair premiums, participation rates were less than 20 percent

(Gardner and Kramer 1986). Between 1980 and 1994, farmers were given additional subsidies of up to 30 percent of the actuarially fair premium, but insured less than 50 percent of their eligible acreage.[7] Participation rates only increased to about 80 percent after 2000 (Goodwin and Smith, 2010), when average premium subsidies were increased to 62% of expected indemnities. Generally, therefore, U.S. farmers are willing to purchase crop insurance only if it is heavily subsidized.

The question with respect to the federal crop insurance program, however, is transfers to whom? Between 2001 and 2009, net indemnity payments to farmers accounted for 40 percent of total crop insurance program subsidies; the other 60 percent went to primary insurance companies, insurance agents, and reinsurance companies, providing the agricultural insurance industry with annual average revenues of $2.7 billion. For the period 2001-2009, figures 1(a) and 1(b) show the total crop acres insured by farmers, the total premiums they paid for those policies, insurance company gross incomes and insurance company incomes per insured acre. The area insured increased by 29 percent from 211 million acres in 2001 to 272 million acres in 2009, but total premiums paid for the policies increased by 333 percent from 2.96 billion dollars to 9.85 billion dollars (figure 1(a)). Thus total revenues obtained by primary insurance companies increased by 383 percent from 1.02 billion dollars in 2001 to 3.91 billion dollars in 2009 (figure 1(b)).

The increase in insurance company incomes resulted from substantial increases in both A&O subsidy payments and underwriting gains. In 2009, underwriting gains continued to increase but, because of reductions in A&O subsidy rates required by the

2008 Farm Bill and moderating prices for some major crops, A&O reimbursements fell by about 25 percent. Nevertheless, average company income per acre insured increased by about 300 percent from $4.81in 2001 to $14.36 in 2009. The U.S. Government Accountability Office (2009) attributed much of this increase to the direct link between A&O expenses and market prices, which rose substantially after 2004, and noted that companies used the additional revenues to increase agent commissions in an effort to compete for crop insurance policies. Thus Babcock and Hart (2006), Smith and Glauber (2012) and Goodwin and Smith (2013) have argued that the crop insurance program is an extremely inefficient income transfer program.

Insurance companies have argued that while their total revenues increased substantially between 2001 and 2009, their expenses rose even more quickly and that they could not sustain the current scope of their operations if substantial reductions were made either to A&O reimbursements or underwriting gains.[8] In fact, the companies' expenses that increased most rapidly were commissions paid to insurance agents. Effectively, at least prior to 2011, increases in crop insurance company revenues appear to have been disbursed by the companies to insurance agents through competition for those agents' books of business.

A Model of Rent Dissipation under Competition

Given the structure of the SRA and the premium subsidies provided to farmers, we present a stylized model that links the market for crop insurance liability (coverage) at the farm level, where farmers purchase crop insurance from insurance agents, to the market for the premium associated with the crop insurance policies purchased by the

farmers. In the market for premium, which is also the market for insurance agent services, insurance agents supply the premium and associated policies purchased by farmers to insurance companies. The model is used to develop a set of empirical testable hypotheses about the determinants of compensation rates for insurance agents and the distribution of industry revenues between insurance companies and agents

The Market for Insurance Coverage (Liability)

Farmers are assumed to purchase crop insurance solely on the basis of price; that is, the premium rate they have to pay for coverage out of their own pockets.[9] As is standard in insurance models, the market level demand for insurance coverage is expressed as the demand for liability, L, the maximum indemnity payable under the insurance contract.[10] The price for such coverage to each insured person, in this case farmers, is the premium rate they pay per dollar of liability, f, and their total expenditures on insurance coverage at the market level equal the premium rate they are charged multiplied by the amount of liability they purchased, $f\,L$.

As discussed above, insurance companies and insurance agents play no role in establishing the premium rates associated with federal crop insurance policies. The government (through RMA) develops an estimate of the actuarially fair premium rate, p (the premium rate required to cover expected indemnities) and determines a proportional premium subsidy rate, s. The premium rate paid by the farmer is therefore $f = (1 - s)\,p$. The farmer's demand for liability is assumed to be a decreasing function of the farmer paid premium rate; that is, $L = L(f)$, where $\partial L/\partial f < 0$. However, the supply of liability is perfectly elastic at any given farmer paid premium rate, f, because, by law, if they enter

the market (state), insurance agents are required to sell federally subsidized crop insurance to any farmer who wants to purchase it at that rate and insurance companies are required to accept the associated policies.

The market for insurance coverage is illustrated in figure 2(a). If, in figure 2(a), the government increases the premium subsidy rate, s, from s_0 to s_1 and reduces f from f_0 to f_1, then the increase in liability, from L_0 to L_1, is determined only by the farmer's demand function for insurance coverage and the size of the change in f. However, the total premiums, P, paid into the companies' insurance pools consist of both the total farmer paid premiums, $f\,L = (1 - s)p\,L$, and the total premium subsidies contributed by the government, which equal spL (the government's share of the actuarially fair premium rate, sp, multiplied by the liability purchased by farmers, L). Thus, $P = (1 - s)p\,L + sp\,L = pL$ and insurance industry total revenues from farmer paid premiums and premium subsidies are proportional to the total amount of liability purchased by farmers. An increase in the premium subsidy rate increases L and has indeterminate effects on farmer paid premiums (the effect on total farmer paid premiums depends on the price elasticity of demand for insurance coverage). However, any shortfalls in farmer paid premiums relative to the revenues associated with the actuarially fair premium rate, p, are covered by government subsidies. The companies therefore always receive the estimated actuarially fair premium rate, p, on each dollar of liability purchased by farmers and their revenues from premiums always increase when the subsidy rate increases.

The Market for Premium and Insurance Agent Services

In the market for insurance agent services, insurance companies seek to obtain premium from the insurance agents who sell crop insurance policies to farmers. At the same time, the companies also have to accept responsibility for servicing the policies and for ensuring that indemnity payments are made. Each company's demand for premium (and agent services) will therefore depend on the compensation rate, c, per dollar of premium they must pay an agent to obtain that premium and other factors that also affect an individual company's demand for premium. These include the costs they incur with respect to inputs other than agent services required for servicing the insurance policies to which premiums are tied (for example, the prices paid to loss adjusters for their services, the prices paid for other forms of labor such as data managers, the costs of physical capital inputs, and the costs of providing adequate financial depth). However, a company's demand for premium and agent services will also be affected by the revenues they expect to obtain from the policies they obtain.

In the U.S. crop insurance program, under the SRA a crop insurance company has two sources of expected revenues. The first is the company's expected underwriting gains per dollar of premium acquired by the company, u (the difference between the premium and the expected indemnity payments). Those expected underwriting gains are assumed to be an increasing function of the total premium available to all insurance companies in the entire market place, P; that is, $u = g(P)$ where $u' = \partial u/\partial P > 0$. The rationale for this assumption is as follows. As total liability purchased by farmers in response to higher subsidies and lower farmer paid premium rates, the insurance pool is likely to become less adversely selected as farmers with lower expected indemnities per

dollar of coverage (lower loss ratios) enter the insurance pool (see, for example, Goodwin, 1993; Smith and Baquet, 1996; Coble and Knight, 1997). The second revenue source is the direct subsidy payment for administration and operations costs received from the government, which is a fixed proportion, a, of the company's total premium.

Assuming that insurance companies are risk neutral and that, in acquiring one dollar of premium, a company requires one unit of agent services at a market determined compensation rate of c,[11] the expected profit function for a representative insurance company, company i, can be represented as:

$$(1) \qquad \pi(P_i) = (u + a)P_i - c\,P_i - h(P_i).$$

where P_i is the amount of premium obtained and serviced by representative company i. In equation (1), $h(Pi)$ represents all costs incurred by the crop insurance company in obtaining and servicing insurance contracts *other* than agent compensation payments (cP_i). Optimizing equation (1) with respect to P_i yields the first order condition:

$$(2) \qquad u + a = c + h',$$

where h' is the derivatives of $h(P_i)$ with respect to P_i. Ideally, a company acquires premium up to the point at the marginal revenue from underwriting gains and the A&O subsidy ($u + a$) equals the marginal cost, of obtaining additional premium $c + h'$.

We initially assume that insurance companies operate as price takers in a competitive market for agent services and, therefore, the representative insurance company views u, a, and c to be exogenous to their own decisions. In that setting, if $h'' > 0$, then an individual company's optimal quantity of premium and agent services demanded, P_i^d, will be inversely related to c, and directly related to u (expected

underwriting gains) and a.[12] As a result, holding the total market wide amount of premium available to all companies constant (as discussed above, P is effectively determined by the premium subsidy rate in the primary crop insurance market), the market wide quantity of premium and agent services demanded, $P^d = \sum_i P_i^d$, will be inversely related to the market wide agent compensation rate. However, if P, the total amount of premium (and liability) available in the market, increases because of a reduction in the farmer paid premium rate, then u increases (because the extent of adverse selection decreases). Thus, at any given agent compensation rate the market wide quantity demanded for premium and agent services increases because each insurance company's quantity of premium and agents services demanded increases.

The market for premium and agent services is illustrated in figure 2(b), where one unit of premium is assumed to require one unit of agent services. The location of the initial market demand curve, $D^0_{IC,}$ is determined by the amount of liability purchased by purchased by farmers, which itself determines the initial value of expected underwriting gains. The supply function for premium and agent services is determined by the marginal costs incurred by agents in obtaining premium through sales efforts and supplying that premium to insurance companies. In figure 2(b), those marginal costs are assumed to be constant and equal to w_0. Hence, the supply of agent services is perfectly elastic at that marginal cost (note that qualitatively similar results are obtained when the marginal cost of agent services is assumed to be increasing in total premium but the exposition is simpler if the agent supply curve is assumed to be perfectly elastic). Nevertheless, the total premium available in the market for agent services, P_0, is determined in the primary

market for insurance by the amount of liability purchased by farmers and the estimated actuarially fair premium rate established by the government ($P_0 = pL_0$). Thus the supply of premium becomes perfectly inelastic at P_0.

Given that companies compete with one another for the agents' books of business, in figure 2(b) the equilibrium compensation rate will be c_0, not w_0. Thus the agents will be the recipients of economic rents of $c_0 - w_0$ on each dollar of premium, and total rents accruing to the agents will be $(c_0 - w_0)P_0$. These are unambiguously transfers of economic rent from the companies, who would retain those rents if they could collude, establish a monopsony, and only offer a compensation rate equal to the agents' marginal costs.

An increase in the premium subsidy rate, represented by a shift from s_0 to s_1 in figure 2(a), reduces the premium rate paid by farmers from f_0 to f_1, and increases the liability they purchase from L_0 to L_1. The effect of the subsidy rate increase in the market for premium, as shown in figure 2(c), is to increase total premium from P_0 to P_1 in proportion to the increase in liability (as p has not changed).

If the reduction in the subsidy rate and the increase in total liability had no effect on expected underwriting gains, then, in a competitive market for premium and agents services, the compensation rate paid to agents would fall. The total amount of economic rent accruing to insurance agents could either increase or decrease, depending on the elasticity of demand for agent services, although at the margin agents' rents would fall because of the decline in the agent compensation rate. However, the increase in the subsidy will increase market wide expected underwriting gains by reducing the extent of

adverse selection in the insurance pool (that is, $\partial u/\partial P > 0$), shifting the companies' market wide demand curve for premium to the right (to D^0_{IC} in figure 2(b)). The net effect of increasing the premium subsidy rate on agent compensation rates and their marginal rents is therefore ambiguous (illustrated to be zero in figure 2(b) simply because the shocks to the demand curve for agent services and total premium are assumed to be exactly offsetting).

Events that increase the insurance companies' demands for agent services, while not affecting total liability, will unambiguously increase agent compensation rates and the aggregate rents that jointly accrue to insurance agents. From equation (2), increases in the market wide demand for agent services occur when expected underwriting gains increase, A&O payment rates increase, or marginal costs of other inputs decrease. All of these shifts result in higher compensation rates for agents.

The above analysis, which assume that both the supply side and demand side of the market for agent services is competitive, yields the following hypotheses. First, an exogenous increase in either expected underwriting gains or A&O reimbursements will increase the demand for agent services and increase (decrease) agent compensation rates. Second, an increase in compensation rates, resulting either from a direct increase in demand for agent services or from an increase in premium subsidies will increase the share of total insurance industry revenues received by insurance agents. The effects of changes in expected underwriting gains on compensation rates are explicitly investigated in the empirical analysis and implications for the allocation of rents between the insurance companies and agents are assessed.

In fact, as shown in table 1, the number of companies operating in each state (which each represent separate markets) varies substantially. In 2008, for example, in some states were served by fewer than five companies while others were served by 14 or 15 companies. Market share-based measures of the extent of competition such as the Herfindahl index also indicated substantial differences among states and the potential for monopsony power in some markets for agent services.[13] As discussed above, in the context of figure 2(b), where the supply of agent services is perfectly elastic, a pure monopsonist would only offer a compensation rate of w_0, exactly equal to the agents' marginal cost of supplying premium. In a "few firm" oligopsony, under Cournot competition, companies would offer a compensation rate between the competitive compensation rate, c_0, and w_0, approaching w_0 as the degree of concentration on the demand side of the market increases. This implies that, *ceteris paribus*, the greater the degree of monopsony power, the lower the compensation rate received by insurance agents. It also implies that the introduction of a cartel would reduce the agent compensation rate relative to either a competitive or oligopoly equilibrium value.

Empirical Implications and Estimation Models

The implications of the theoretical analysis for empirical models of the determinants of compensation rates are as follows. First, in any given market, total compensation payments and the compensation rate paid to insurance agents will be positively related to the expected underwriting gains per dollar of paid premium. Second, those compensation rates are likely to be affected by the degree of oligopsony based market power, as reflected in indicators such as Herfindahl indexes (HI).

In practice, companies establish contractual relationships with insurance agents about compensation prior to the determination of underwriting gains in any given year. Thus companies' expectations rather than their realized underwriting gains are likely to be a major determinant of compensation rates. However, a company may also link agent compensation to the performance of agents' books of business in term of actual (ex post) underwriting gains through bonuses and other performance-related rewards. Thus, observed compensation rates in any given year may also be directly related to the difference between actual and expected underwriting gains.

The volatility of underwriting gains also varies among different markets, as illustrated by the coefficients of variation estimated for the period 2002-2008 reported for selected states in table 1. In some states, coefficients of variation (CV) were large because average underwriting gains or losses were small (for example, Kansas and Utah). However, in several states where average underwriting gains were relatively large (for example, Indiana and Nebraska), estimated CVs were still larger than one. Hence, uncertainty about the potential underwriting gains available in a market may also affect the compensation rates companies offer insurance agents.[14]

Other factors may also be important. For example, within a market, economies of scale may exist for individual companies because of operational efficiencies in loss adjustment, reinsurance, and other company functions that affect their demand for, and compensation of, insurance agent services. Thus, agent compensation rates may be linked to the size of a company's book of business in a market and its overall structure (diversification among lines of insurance, overall size its national crop insurance book of

business, etc.). Delivery costs may also vary among markets because of the spatial location (for example, distance between farms) and size of farms (measured in value of sales), also affecting compensation rates. Finally, new entrants in a market may have to offer insurance agents higher payments than companies already there to compensate them for risks associated with changing their business relationships.

Thus, the compensation rate paid by an insurance company (i) for agents in any given market (j) in any given year (t), $CR_{t,i,j}$, will be a function of the following variables;

(3) $$CR_{t,i,j} = f(EUG_{t,i,j}, DIFFUG_{t,i,j}, EHI_{t,j}, EGP_{t,i,j}, NE_{t,j}, \mathbf{Z}_{t,j}, \mathbf{F}_{t,j}, u_{t,i,j}),$$

where $EUG_{t,i,j}$ denotes expected underwriting gains, $DIFFUG_{t,i,j}$ denotes the difference between actual and expected underwriting gains, $EHI_{t,j}$ is the expected degree of competition between companies, $EGP_{t,i,j}$ is company *i*'s expected gross premium in market *j*, and $NE_{t,j}$ the entry of new companies into market *j*. $\mathbf{Z}_{t,j}$ is a vector of market characteristics, $\mathbf{F}_{t,j}$ is a vector of insurance company characteristics, and $u_{t,i,j}$ is the error term.

Data

For each company in each state, data were obtained from RMA on annual underwriting gains, gross premiums, and compensation paid to insurance agents for 2007 and 2008. These data were used to construct annual average compensation rates (the ratio of total agent compensation to gross premiums) by company for each state. Similar RMA data were used to calculate annual underwriting gains relative to gross premium for 2002-2006 as well as 2007 and 2008. The ratios of underwriting gains to gross premiums were calculated for each company and for the aggregate of all companies in each state. If

company-level underwriting data was not available because the company did not operate in the state in that year, the company was assumed to have experienced the statewide underwriting gain per dollar of premium.

Expected underwriting gains are estimated in three different ways. The first measure, EUG, is a simple average of the company's actual or estimated ratio of underwriting gains to gross premiums over the previous five years. The second, EUG1, is a weighted average of the previous five years' underwriting gains where weights are formed using a truncated declining geometric lag and the weight in t-1 is 0.5. The third approach is to use Almon lags to account for the effects of previous underwriting gains on compensation rates. The difference between expected and actual underwriting gains, DIFF, is then calculated using each measure of expected gains.

The companies' annual gross premiums in each state are also used to construct a Herfindahl Index, HI, normalized to range between zero and one. Larger values for HI potentially indicate oligopsony market power and, therefore, lower agent compensation rates. Hausman tests indicated some potential for simultaneity between HI and compensation rates. Because we could not identify appropriate instrumental variables to obtain predicted HI values, one period lagged values of HI were used in the estimate compensation rate models. Additional Hausman tests failed to reject the exogeneity hypothesis for HI_{t-1}.

A company's gross premium in a state, GPR, may be an indicator of potential economies of scale. Larger values for gross premiums may be associated with lower costs for the provision of inputs other than insurance agent services and, therefore,

increased derived demand for those services. Hausman tests indicated that gross premiums and compensation rates may also be endogenous. Hence, an instrumental variables approach was used to obtain predicted gross premium values for each company in each state using company and regional dummy variables as instruments.

When a company enters a new market (state), agent compensation rates in that state may increase because the companies already in the market believe they will face more competition for agent services. However, new entrants may also be attracted to states in which, ceteris paribus, costs and agent compensation rates are low. To account for new entrant effects, a dummy variable, NEW, equals one if any company enters the state with company premium in excess of $250,000. A second dummy variable, NEWC, indicates whether the company itself is a new entrant in a state.

Data on two additional state-wide variables, average value of crop sales per farm, ASF, and number of farms per square mile, were used to account for potential differences in the costs of delivering insurance. The latter variable was dropped because of extreme collinearity with expected underwriting gains.

Descriptive statistics for the above variables are presented in table 2. The full data set consists of 872 observations for 48 states (Alaska and Hawaii are excluded). Fourteen 14 of the 50 states have legislatively been designated as “underserved”, mainly because they have small amounts of insurable crops and are served by few companies. these fourteen states are potentially atypical and systematically different from the other 36 states. Therefore, compensation rate models are also estimated for the 36 states that are not underserved. This data set consists of 760 observations.

Estimation Models, Procedures, and Results

Empirical models of the determinants of compensation rates are estimated with fixed effects based on company dummies to account for company specific effects, applying White's procedures to correct for potential heteroskedasticity and to obtain robust standard errors. The models have the following general form:

(4) $CR_{t,i,j} = f(EUG_{t,i,j}, DIFF_{t,i,j}, HI\ t\text{-}1,j, GRPP_{t,i,j}, ASF_t, NEW_t, NEWC_t, u_{t,i,j})$.

Results are reported in table 3 for all 48 states and in table 4 for the 36 states that are not "underserved." In each table, results are presented for two estimated models, which differ only with respect to measures of expected underwriting gains. Model 1 includes EUG, the company's average underwriting gains over the previous five years; model 2 includes EUG1, the measure of expected underwriting gains constructed using truncated geometrically declining weights. Parameter estimates are generally consistent in sign and statistical significance in the two model specifications and the two data sets and appear to be robust. Results obtained using Almon lags (not reported here) are similar.

The effect of a company's expected underwriting gains on compensation paid to insurance agents is a central focus of this study. Regardless of estimation procedures, data sets, and measure of expected underwriting gains, the coefficient for the expected underwriting gains variable is positive and statistically significant at the one percent level, with parameter estimates that range from 0.0587 to 0.0817. The estimated coefficient for EUG is larger when data from atypical "underserved" states are excluded. This implies that, in states where markets are large and more companies compete for business, compensation rates for agents are more closely linked to underwriting gains.

As reported in table 2, values for EUG range from a low of -58.8 percent (although negative values occur infrequently) to a high of 41.6 percent with a mean of 14.3 percent. When negative values are omitted, the range of expected underwriting gains is about 40 percentage points. Assuming a value of 0.07 for the expected underwriting gains coefficient, a company at the high end of the range for EUG would offer insurance agents compensation rates that are 2.8 percentage points higher than a company at the low end of the range. Relative to the actual average compensation rate for 2007-2008, 15.6 percent, a 2.8 percentage point increase the compensation rate would result in a 17 percent increase in the dollar amount paid to the agents.

The model results indicate that federal government policy innovations that increase underwriting gains will increase agent compensation and the shares of company income received by agents. Similarly, reductions in expected underwriting gains are likely to reduce agent compensation rates and, correspondingly, the companies' costs of doing business. In each model, the compensation rate, c, and underwriting gain rate, EUG, are defined relative to company premiums, P. If C denotes the dollar amount of compensation and EU the total dollar amount of expected underwriting gains then $c = C/P$ and $EUG = EU/P$. Hence there is a linear relationship in the model between c and EUG as $C/P = a + b\ EU/P$ and $C = aP + b\ EU$. If b is zero, then the compensation rate would be unaffected by EU/P, but the result would be economically relevant because total agent compensation would be proportional to total premiums ($C = aP$). If $b > 0$, as our results indicate, then as expected underwriting gains increase, total agent

compensation increases at a faster rate than premiums and the agents' share of total premiums also increases.

The difference between the actual and expected underwriting gains rate, DIFF, also has a positive and statistically significant effect on agent compensation rates. This result is consistent with anecdotal evidence that agents receive bonuses based on the underwriting performance of a company's business.

The theoretical analysis also indicates that agent compensation rates may be affected by the degree of competition in a market. The parameter estimates for the competition variable, the normalized Herfindahl Index, are consistent with this hypothesis. In every model, the coefficient for HI_{t-1} is negative and significant at the one percent level with parameter values that range from -6.05 to -8.29. This implies, for example, that if the number of companies in a state (with equal market shares) decreases from 12 to 8, the resulting decrease in competition would reduce the compensation rate by about 0.49 percentage points (using the midpoint of the range of HI_{t-1} coefficient estimates), a decrease of 3.1 percent relative to the sample average compensation rate of 15.6 percent.

In tables 3 and 4, parameter estimate results are also presented for two additional state-wide variables, the coefficient of variation of underwriting gains (CVSUG) and average crop sales by farms (ASF), and a company specific variable, the predicted size of a company's book of business (GPRP). Estimated coefficients for CVSUG are negative, as expected, in all but one model, and statistically significant at the five percent level in the models using data for all 48 states, indicating that agent compensation is inversely

related to the volatility of underwriting gains. ASF and GPPP, however, are not statistically significant in any of the models presented in table 3 and 4, suggesting that difference in delivery costs per dollar of premium among markets and company size do not affect agent compensation rates.

Parameter estimates for NEW, which indicates that new companies have entered a state, are negative and statistically significant at the one percent level, suggesting that states with low compensation rates for insurance agents may attract new entrants. Parameter estimates for NEWC, which indicates that the company itself is a new entrant, are positive and generally statistically significant at the five or ten percent level, with estimated values that range from 2.20 to 2.78. This suggests that new entrants pay compensation rates that are 14 to 20 percent higher than those paid by companies already in the state.

Economic and Policy Implications

The empirical evidence is consistent with the following hypotheses. The first is that, given the provisions of the Standard Reinsurance Agreements that determined insurance company obligations for the period 2001-2010, increases in revenues and economic received by insurance companies would be disproportionately dispersed towards agricultural insurance agents. The econometric results indicate that increases in expected underwriting gains result in insurance agents receiving higher compensation rates, with the agents obtain a larger share of the total premium pie. However, reductions in underwriting gains will decrease agent compensation rates and, therefore, more than proportionately reduce insurance companies' costs of doing business. These results raise

serious questions about company claims that they can never survive any reductions in revenues from either underwriting gains or A&O reimbursements because their costs have increased. Reductions in those revenues will almost surely reduce the companies' costs at a faster rate.

The extent of competition between insurance companies for agents' books of business also affects compensation rates. In states with less competition among agricultural insurance companies for the books of business (as reflected by larger values for the normalized Herfindahl index), agent compensation rates are significantly lower. This finding also suggests that in some states insurance agents were earning significant rents in 2008 and 2009 (especially in the corn-belt states where competition between companies has been most intense).

In 2011, companies began to operate under a new Standard Reinsurance Agreement (SRA). The new SRA was the outcome of several rounds of negotiations between the private insurance companies and the USDA Risk Management Agency (representing the FCIC). It contained several innovations, some of which were strongly opposed by insurance companies. These included reductions in the A&O subsidy rate, reductions in the proportion of total underwriting gains that can accrue to the companies, and increased requirements for the companies (and/or their private reinsurers) to retain obligations for losses associated with relatively high risk farm policies. To the extent that these provisions reduced the companies' underwriting gains, the results of this study indicate that agent compensation rates would decline and agents would obtain a smaller share of the total premiums paid for insurance by the government and farmers.

Reductions in underwriting gains were expected to be greatest in the states where historically gains were large (the so-called Tier 1 states). USDA (2011) estimated that these provisions would reduce total annual payments to the crop insurance industry for delivering the federal crop insurance program by about $600 million.

The 2011 SRA also contains two provisions affecting agent compensation rates. The first limits agent compensation to 80 percent of total A&O payments to companies when underwriting gains are not available from their books of business, effectively placing a cap on agent compensation of about 15 percent of total premiums.[15] The second allows companies to increase agent compensation rates when they have underwriting gains and implicitly provide agents with incentives to obtain and provide low risk books of business, but at rates that limit agent compensation to no more than a hard cap equal to the total A&O payments the companies receive, about 19 percent of total premiums.

The 19 percent hard cap on agent compensation rates is likely to be binding for companies located in states like Iowa, Illinois and Indiana with large books of business, relatively large expected underwriting gains, and considerable competition between companies, but not for companies in states in which underwriting gains are more volatile, generally lower (for example, Montana, Colorado, Texas), or in which competition between companies is less intense (for example, Wyoming).[16] Thus, the cap effectively limits the price of agent services and, in so doing, shifts the distribution of industry rents from insurance agents to the primary insurance companies themselves (and, to some extent, the reinsurance companies with whom they are linked). Not surprisingly,

agricultural insurance agents and their organizations complained that the new SRA is anti-competitive and, in testimony before Congress, questioned its legality (Dalton 2010; Roach 2010).

Whether or not the 2011 SRA caps on agent compensation would in fact be effective is not obvious, as legal maximum limits on wages have proved difficult to monitor and enforce. However, data on projected compensation rates by state for 2013 obtained from RMA indicate that companies plan to pay agents much lower compensation rates than in 2008. Actual average statewide compensation rates across all companies for 2008 and companies' projected state wide compensation rates for 2013 (based on company specific reports submitted to RMA) are presented in table 5. In some states such as Montana, Wyoming, Arizona, and Texas, statewide compensation rates paid in 2008 were below the 15% cap introduced by the 2011 SRA, ranging from 13.6% (Texas, Montana, and Wyoming) to 14.7% (Wyoming). In these states, which also have relatively modest underwriting gains, projected compensation rates for 2013 are very similar to the actual compensation rates paid in 2008, with changes ranging from - 0.43 percentage points to + 0.11percentage points.

However, in the cornbelt states of Iowa, Illinois, Indiana, Minnesota and Ohio, along with Nebraska and South Dakota (where corn and soybeans are also raised) the picture is very different. In 2008 actual state wide average compensation rates in these states were much higher, ranging from17.1% in Minnesota to 18.9% in Iowa, as were actual and expected underwriting gains as well as total premiums. Projected compensation rates for 2013 in these seven states were much lower, in the 12% to 13.8%

range, with decreases averaging about 5 percentage points and representing proportional cuts of between 23% and 30%. This, in part, reflects the expected decrease in underwriting gains due to changes in the gain sharing provisions of the 2011 SRA. However, the contrast between the states in which, in 2008, compensation rates exceeded the 2011 SRA cap and those in which they did not is dramatic. In 2011, in the five cornbelt states of Illinois, Indiana, Iowa, Ohio and Minnesota, RMA reported that total premiums for federal crop insurance amounted to $3.69 billion dollars. If the 2011 SRA cap reduced agent compensation rates by five percentage points in just those five states, then it also reduced company payments for agent services in those states by $180 million, about one third of the $600 billion USDA estimated would be lost by the companies because of reduced A&O subsidies and changes in their shares of underwriting gains and losses. Effectively, much of what the 2011 SRA took away from agricultural insurance companies with one hand, it returned to them with the other by implementing a cartel like cap on agent compensation.

Conclusion

Policies that create private industries to deliver public policies are rarely inexpensive, not least because those industries then often attempt to capture both policy makers and the agencies that regulate them. The federal crop insurance program is an archetypal example of this process and the result has been the creation of a private delivery system that, relative to almost any other used by developing countries to provided subsidized crop insurance and transfer income to farmers, is very expensive (Smith and Glauber 2012). A question of central importance, therefore, is whether the

delivery of subsidized insurance through the private sector is the least cost way of providing that insurance to farmers.

A serious cause for concern is that while private insurance companies have incentives to minimize many of their costs, through their industry organizations they have incentives to capture the government agencies that manage and regulate their operations in order to increase industry profits. A second is that, as the results of this study imply, competition among those companies for agents' books of business may raise the companies' total delivery costs. Other countries provide publicly subsidized agricultural insurance in other ways. For example, Canada delivers most public agricultural insurance through public or quasi-public agencies[17] and, prior to 1981, the FCIC hired independent agents to sell policies, loss adjusters to assess losses, and public employees to manage data bases, subsidies, investigate fraud, and make indemnity payments. These and other approaches such as auctions in which insurance companies make competing bids with respect to A&O rates to serve individual markets may or may not be more cost effective and economically efficient, but they deserve serious consideration.

Endnotes

[1] Prior to 1938, some insurance companies offered farmers single peril insurance against crop losses from hail and fire but no company successfully offered multiple peril insurance coverage and the market for single peril coverage was small.

[2] Fudenberg and Tirole (1987) point out that competition for rents may not always completely dissipate those rents by wasting resources (for example, excess capacity that exists to deter entry may also generate some efficiency gains). In the context of agricultural insurance, competition among agents for rents may improve service for farmers as well as wasting some resources (for example, unnecessary farm visits).

[3] Over the period 2002-2008, premium subsidy rates were determined under the 2000 Agricultural Risk Protection Act (ARPA). By 2002, farmers had become familiar with the new subsidy structure and participation rates had begun to adjust to the lower premium rates paid by farmers under ARPA.

[4] Prior to 1938, private companies successfully offered insurance against crop losses from specific perils (fire or hail), but attempts to provide coverage for losses from multiple perils all collapsed rapidly (Kramer 1983).

[5] The Federal Crop Insurance Corporation is a government-owned corporation created in 1938 to "promote the economic stability of agriculture through a sound system of crop insurance and providing the means for the research and experience helpful in devising and establishing such insurance." Management is vested in a Board of Directors**,** subject to the general supervision of the Secretary of Agriculture.

[6] The 2011 SRA includes a provision that places a formal cap on the percentage of total premiums that can be paid to the agent as compensation. Enforcing such wage controls is notoriously difficult as individual companies frequently have incentives to violate the constraints they place on their actions and the controls often fail to deal with fringe benefit issues. Insurance agents and their organizations have also questioned the legality of those caps on their compensation (Dalton 2010; Roach 2010). Nevertheless, RMA issued a detailed memorandum to companies that in principle limits many forms of compensation, including commissions, profit sharing payments, bonuses, consulting fees, loans, advance and deferred payments, insurance coverage provided by the companies to agents, trips or entertainment with a value in excess of $600, and advertising and promotion payments (RMA 2010a). In addition, RMA mandated that insurance companies require all insurance agents sign a covenant that they would not institute or file any judicial or administrative procedures (or assist in such procedures) against the Federal Crop Insurance Corporation or RMA (RMA 2010b).

[7] Throughout the period 1938-2000, adverse selection played some role in limiting participation (Gardner and Kramer, 1986; Goodwin 1993; Smith and Baquet 1996; Smith and Goodwin 1996; Smith and Glauber (2012).

[8] Reductions along these lines were recommended by the USDA Risk Management Agencies in proposed revisions to the Standard Reinsurance Agreement (SRA) which dictates the terms on which companies participate in the federal crop insurance program. During the recent negotiations over the SRA, two insurance industry-funded reports

(Grant Thornton 2009; Aon 2010) claimed that the proposed reductions would make agricultural insurance an unprofitable line of business for insurance companies relative to other lines of business like property and casualty.

[9] The econometric evidence (for example, Goodwin (1993), Smith and Baquet (1996), Knight and Coble (1997), Just et al. (1999), and Goodwin and Smith (2003)), and evidence on the history of participation in the U.S. program, strongly suggests that reductions in the premium rates paid by farmers have been the major determinants of increased participation rates.

[10] Alternatively, coverage could be measured in terms of number of policies or acres insured.

[11] Insurance companies are often assumed to be risk neutral but may also be modeled as risk averse, although less risk averse than the individuals who purchase insurance from them. For examples of agricultural insurance markets in which insurers are assumed to be risk averse, see Bardsley and Davenport (1984) and Fraser (1992).

[12] A reviewer has correctly pointed out that if crop insurance companies have the same constant returns to scale production functions and are price takers in the markets for all inputs except agent services, then the market demand curve for agent services will be perfectly elastic and all rents will accrue to insurance agents.

[13] For example, values are reported in table 1 for normalized Herfindahl Indexes (HI) in which raw HI values for 2008 are divided by 10,000. These normalized values range from 0.114 for Indiana to 0.869 for Nevada, states that are very different in the size of the crop insurance market as well as agronomic conditions. However, there are substantial

differences among states that are less obviously different with respect to location, crop mix, and market size. For example, the HI for Ohio is 0.225, but less than half that in Indiana.

[14] In states where underwriting gains are more volatile, companies may offer insurance agents contracts in which payments are linked more closely to how well the company's book of business performs those markets or, even more specifically, how well the agent's specific book of business performs.

[15] The maximum A&O rate in the new SRA is 21.9 percent for a few individual farm insurance products, 18.5 percent for several widely purchased individual farm revenue insurance products, and 12 percent for area yield insurance products. In testimony on behalf of the American Association of Crop Insurers before a House of Representatives Agriculture Subcommittee on Genera Farm Commodities and Risk Management, Stephen Frerichs, an executive with Rain and Hail, LLC, argued that the agent compensation cap would effectively be about 14.9 percent of total premiums.

[16] In several corn-belt states, as well as some other states, several companies paid compensation rates well in excess of 20 percent of total premiums and, in some cases, in excess of 30 percent of total premiums.

[17] Mahul and Statley (2010), for example, report an estimate by the Canadian government that delivery costs for publicly subsidized, managed, and delivered crop insurance in Canada amount to eight percent of total premiums, as compared to well over one third of total premiums in the United States. However, they caution that the Canadian estimate

may be too low because of questions about the allocation of public expenditures between crop insurance and other programs.

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Table 1. Agricultural Insurance Industry Indicators for Selected States in 2008.

	Number of Companies Operating in the State [A]	Herfindahl Index (normalized to range from 0 to 1) [B]	Total Liability (millions of dollars) [C]	Total Premium (millions of dollars) [D]	State Wide Average Underwriting Gains: 2002-2008 [E]	State Wide Coefficient of Variation of Underwriting Gains: 2002-2008	State Wide Compensation Rates [F]
Corn Belt/Lake Region							
Iowa	14	0.148	11,656.5	914.6	31.4%	0.68	18.9%
Illinois	15	0.137	10,119.0	866.6	29.4%	0.29	18.7%
Indiana	15	0.114	4,617.7	449.2	18.8%	1.13	18.1%
Minnesota	14	0.193	7,823.2	845.0	27.7%	0.46	17.1%
Ohio	15	0.225	2,938.6	296.6	8.0%	4.72	18.0%
Central and Southern Great Plains							
Colorado	12	0.173	1,064.9	183.0	-5.9%	3.21	15.1%
Kansas	14	0.164	3,987.9	664.5	4.6%	50.63	16.1%
Nebraska	14	0.146	6,622.4	678.5	23.0%	1.25	18.5%
Texas	12	0.156	3,327.2	604.4	10.9%	2.52	13.6%
Northern Great Plains							
Montana	12	0.287	1,044.4	191.5	12.6%	1.76	13.6%
North Dakota	12	0.198	5,792.3	1,065.6	11.4%	1.68	16.0%
South Dakota	14	0.192	4,101.8	685.1	16.1%	3.89	17.2%
Wyoming	10	0.165	136.9	18.5	4.5%	7.94	14.7%
South West and West							
Arizona	8	0.242	154.3	9.5	14.7%	0.51	13.6%
Utah	6	0.280	21.6	3.1	4.5%	64.2	11.4%
Nevada	4	0.869	13,.3	0.9	3.7%	13.82	9.1%

California and Florida							
California	9	0.222	3,912.1	198.0	29.0%	0.27	16.3%
Florida	8	0.244	3,210.2	122.4	4.1%	7.77	15.1%

A. The number of companies selling RMA crop insurance policies in each state.
B. The Herfindahl Index (HI) for each state normalized to range from zero to one (the HI divided by 10,000)
C. Total liability under all policies sold by all companies in the state.
D. Total premium received by insurance companies in each state (the sum of producer paid premiums and premium subsidies)
E. Annual state wide underwriting gains as a percent of total premium, averaged over the period 2002-2008.
F. Compensation paid to insurance agents as a percent of total premiums.

Table 2. Variable Definitions and Average, Minimum, and Maximum Values.

Variable Name	Variable Definition	Combined Data: 2007 and 2008 (872 Observations)		
		Average	Minimum Value	Maximum Value
CR	Compensation Rate (Percent of Gross Premium)	15.618	0.929	42.952
EUG [A]	Expected Underwriting Gains (Percent of Gross Premium)	14.199	-58.813	41.619
DIFF	Difference between actual underwriting gains and expected underwriting gains in year t	-0.169	-63.980	71.462
HI	Herfindahl Index in Year t-1	0.264	0.119	0.854
GPR	Company Gross Premium ($ million)	18.780	0.0002	318.692
CVSUG	Coefficient of Variation for State Underwriting Gains	4.853	0.247	64.204
ASF	Average Value of Crop Sales per Farm in a State ($ thousand)	92.891	4.027	374.141
NEWC	Dummy Variable =1 if Company is a new entrant in a state	0.049	0	1
NEW	Dummy Variable =1 if a state has at least one new company in 2008	0.398	0	1

[A] In constructing this variable, a company's expected underwriting gains are measured as the simple average value of the company's underwriting gains (as a percent of gross premium) over the past years. If a company did not do any business in the state in one of those years, the state wide underwriting gain for that year was used as a substitute in computing the company's expected underwriting gain.

Table 3. Fixed Effect Models Estimated with Robust Standard Errors using Observations from all lower 48 States (excludes Alaska and Hawaii)[A]

Explanatory Variables	Model 1	Model 2
Constant	16.246***	16.528***
	(0.584)	(0.576)
EUG	0.0672***	
	(0.0124)	
EUG1		0.0587***
		(0.0112)
DIFF	0.0163***	0.0163***
	(0.0070)	(0.0070)
HI	-6.050***	-6.277***
	(0.879)	(0.874)
ASF	0.0002	0.0004
	(0.0018)	(0.0018)
CVSUG	-0.0202**	-0.0242**
	(0.0099)	(0.0097)
GPRP	0.0163	-0.0032
	(0.0252)	(0.0256)
NEWC	2.197***	2.277***
	(0.585)	(0.559)
NEW	-0.814***	-0.746***
	(0.237)	(0.239)
R2	0.34	0.34
N	872	872

[A] EUG1 denotes expected underwriting gains computed using truncated geometrically declining weights. Parameter standard errors are presented below each estimate in parentheses.

[B] GPRP is the predicted value of gross premium obtained from an instrumental variables regression of GPR using selected company and region dummy variables

Table 4. OLS Estimates with Robust Standard Errors using Observations from 34 States (excluding 14 underserved states, Alaska and Hawaii).[A]

Explanatory Variables	Model 1	Model2
Constant	16.8612***	17.3136***
	(0.7717)	(0.7187)
EUG	0.0817***	
	(0.0136)	
EUG1		0.0701***
		(0.0117)
DIFF	0.0209**	0.0197**
	(0.0072)	(0.0072)
HI	-7.58162***	-8.2879***
	(1.7832)	(1.7556)
ASF	-0.00137	-0.0001
	(0.0019)	(0.0019)
CVSUG	-0.0014	0.0022
	(0.0019)	(0.0094)
GPRP	0.00048	-0.0139
	(0.0256)	(0.0189)
NEWC	2.73444***	2.7789***
	(0.8239)	(0.8409)
NEW	-1.03064***	-0.9612***
	(0.2747)	(0.2766)
R2	0.35	0.35
N	760	760

[A] EUG1 denotes expected underwriting gains computed using truncated geometrically declining weights. Parameter standard errors are presented below each estimate in parentheses.

[B] GPRP is the predicted value of gross premium obtained from an instrumental variables regression of GPR using selected company and region dummy variables.

Table 5: State-wide Compensation Rates for Selected States in 2008 and 2013

	2008 Actual Compensation Rate [A]	2013 Predicted Compensation Rate [A]	Difference
Corn Belt/Lake Region			
Iowa	18.90%	13.51%	-5.39%
Illinois	18.70%	13.78%	-4.92%
Indiana	18.10%	13.05%	-5.05%
Minnesota	17.10%	13.05%	-4.05%
Ohio	18.00%	12.63%	-5.37%
Central and Southern Great Plains			
Colorado	15.10%	13.34%	-1.76%
Kansas	16.10%	13.71%	-2.39%
Nebraska	18.50%	13.22%	-5.28%
Texas	13.60%	13.71%	0.11%
Northern Great Plains			
Montana	13.60%	13.17%	-0.43%
North Dakota	16.00%	13.08%	-2.92%
South Dakota	17.20%	13.08%	-4.12%
Wyoming	14.70%	14.21%	-0.49%
California and Florida			
California	16.30%	11.69%	-4.61%
Florida	15.10%	12.58%	-2.52%

[A] Actual compensation for 2008 are those reported in table 1, computed by dividing actual state wide total compensation payments by state wide total premiums. Projected compensation rates are computed by dividing state wide projected compensation rates and projected premiums, as reported to RMA by the companies in their plans of business activity for 2013.

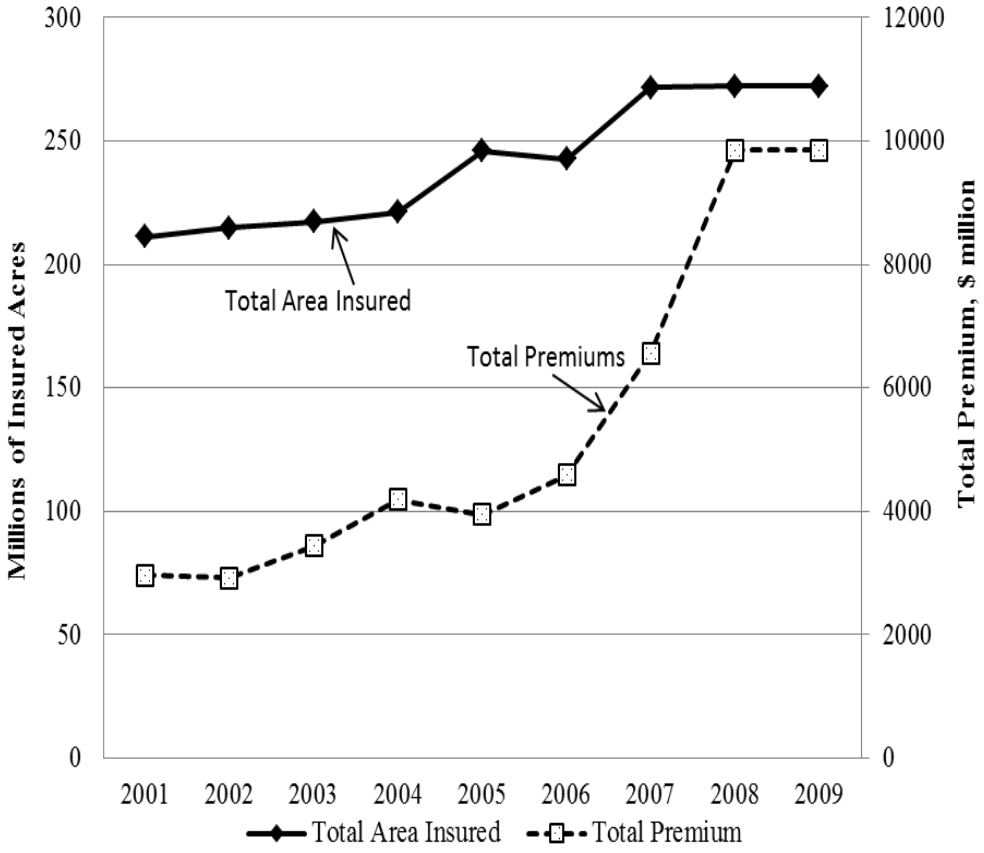

Figure 1(a). Total acres insured and total premiums paid by farmers and the federal government: 2001-2009

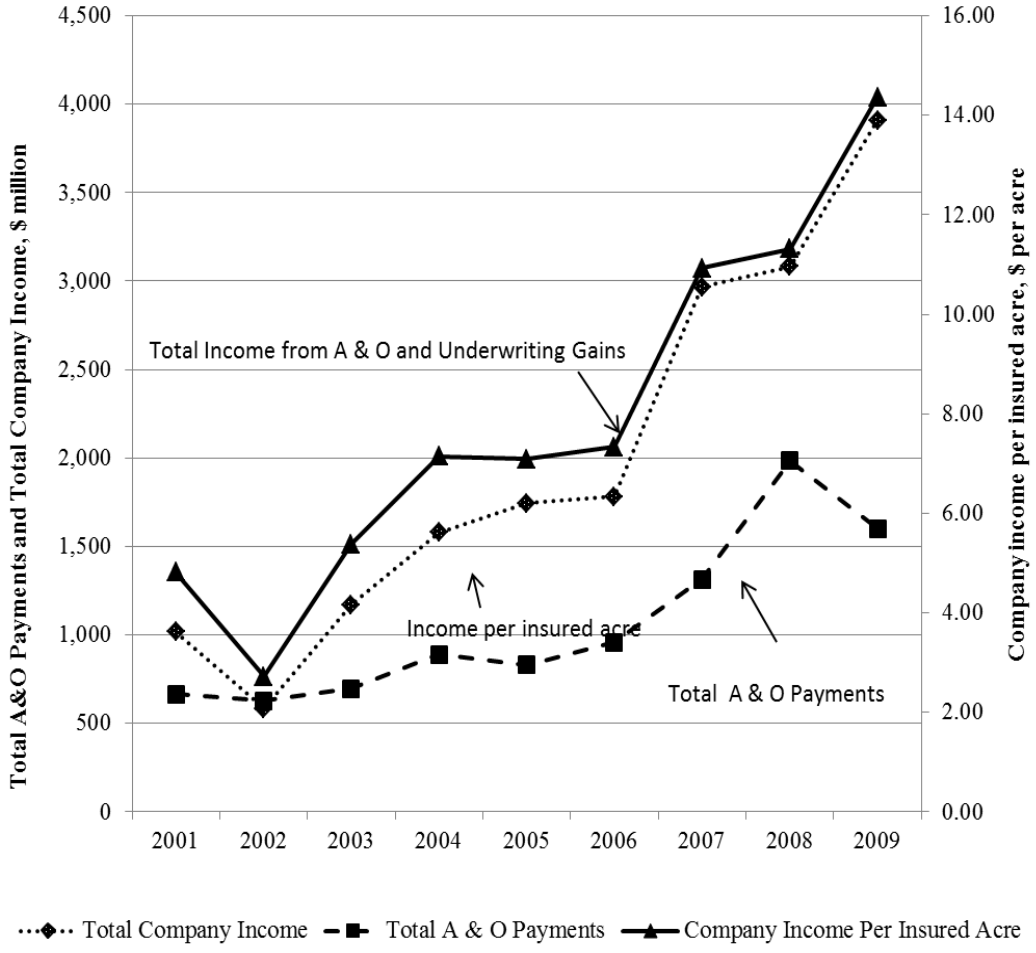

Figure 1(b). Total U.S. agricultural insurance company income by source of income and per insured acre: 2001-2009

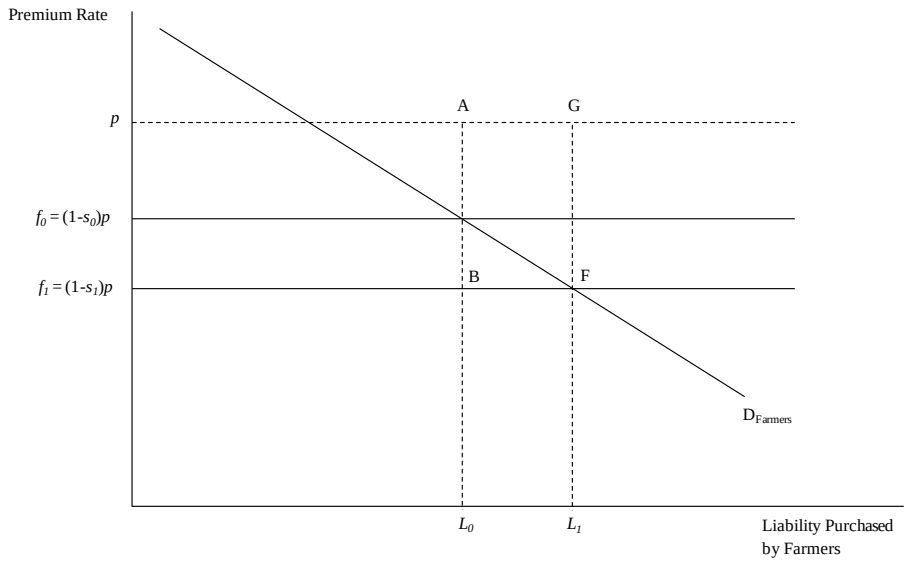

Figure 2(a). Primary market for crop insurance purchased by farmers

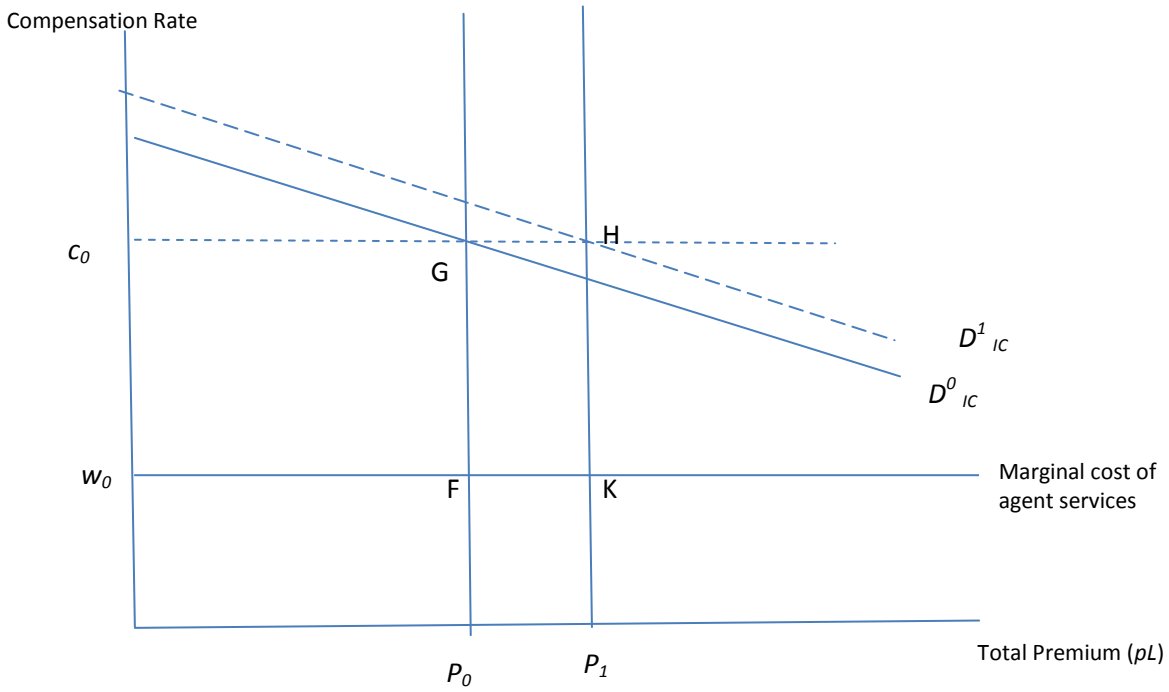

Figure 2(b). The market for insurance agency services market

Appendix A

The SRA combined both proportional and disproportional reinsurance features. Each company could allocate crop insurance policies within a state to one of three different state specific insurance pools or funds; the assigned risk fund, the commercial fund, and the development fund. The funds differed in the required level of retention and also in the shares of gains and losses from retained business under the disproportional features of the agreement but each company operated under the same terms in each state. Under the Commercial Fund, companies retained up to 100 percent of the premium and associated liabilities and shared in a substantial portion of gains and losses on the retained business.

In the Assigned Risk Fund, companies ceded 80 percent of the premium to the government and shared in a limited portion of the gains and losses on the retained business. In many states which have had a history of relatively high loss ratios (for example, Colorado, Connecticut, Montana, South Carolina, and Louisiana) up to 75 percent of total premiums could be ceded to the federal government, although companies must retain 15 percent of the premiums associated with those policies. In other states with histories of relatively low loss ratios, companies were constrained to cede smaller percentages of the total premium. For example, in Illinois, Indiana and Iowa, companies were allowed to cede only 25 percent of their total premiums and to retain 25 percent of the premiums associated with those ceded policies. Companies also had to retain at least 35 percent of all premiums and liability associated with their total book of business in any state in which they operated.

In the Developmental Fund, companies retained up to 50 percent of the premium and liabilities and shared in more gains and losses than under the Assigned Risk fund but less than under the Commercial Fund. Companies have typically assigned polices to the Developmental Fund when Assigned Risk Fund limits have been reached or if the policy reflect insurance products with limited actuarially history. In addition to sharing risks with the government, companies usually also retrocede some or all of their retained liability to the private reinsurance market. Arrangements with private reinsurers differ among companies. Some use quota share arrangements and stop less provisions while others may cede as much as 100 percent of their retained premium and liability in exchange for a ceding commission. The structure of the Commercial, Assigned Risk, and Development funds allowed insurance companies to place high risk policies in the assigned risk fund while retaining less risky policies in the commercial fund, and the empirical evidence suggests that they were relatively successful in making those allocations (Coble et al. 2007; Vedenov et al. 2006).