Decoupled Farm Payments and the Role of Base Updating under Uncertainty

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November 16, 2007

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- Expectations - Sumner (2003), McIntosh et al. (2006) and Coble et al. (2007)

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- National level analysis

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$$\pi_t = \tilde{P}_t \tilde{Y}_t A_t + LDP + DP + CCP - TC(A_t)$$

Maximize Expected Present Value of profits over 2002-2011

$$\max_{A_t} E\left[\sum_{t=0}^{4} \beta^t \pi_t(A_t, \tilde{P}_t, \tilde{Y}_t) + \beta^5(\delta * VB + (1-\delta) * VNB)\right]$$

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- δ captures farmer's beliefs about possibility of base update
- Supply effect of the expectation of base update: $\bar{A}_{|\delta>0}-\bar{A}_{|\delta=0}$

Value function associated with base update

$$VB_t(S_t) = \max_{A_t} \left[\sum_{k=1}^{8} \sum_{l=1}^{8} M^{i,j,k,l} \pi_t + \beta \sum_{k=1}^{8} \sum_{l=1}^{8} M^{i,j,k,l} VB_{t+1}(S_{t+1}) \right], \; t = 1, 2, ...5.$$

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- Total number of states $64 * 32768 = 2097152$

Value function associated with no base update

$$VNB_t(S_t) = \max_{A_t} \left[\sum_{k=1}^{8} \sum_{l=1}^{8} M^{i,j,k,l} \pi_t + \beta \sum_{k=1}^{8} \sum_{l=1}^{8} M^{i,j,k,l} VNB_{t+1}(S_{t+1}) \right], \ t = 1, 2, \ldots 5$$

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- $S_t = (\tilde{P}_t, \tilde{Y}_t)$
- Total number of states equal 64
- Base acreage for DP and CCP remain the same as the 2002-06 period

Main Problem

$$\max_{A_t} \sum_{t=0}^{4} \sum_{k=1}^{8} \sum_{l=1}^{8} \beta^t M^{i,j,k,l} \overrightarrow{\pi_t} + \beta^5 \sum_{k=1}^{8} \sum_{l=1}^{8} M^{i,j,k,l} (\delta * \overrightarrow{VB} + (1-\delta) * \overrightarrow{VNB})$$

- Farmer maximizes the Expected Present Value of the stream of income over 2002-2011, over all base states

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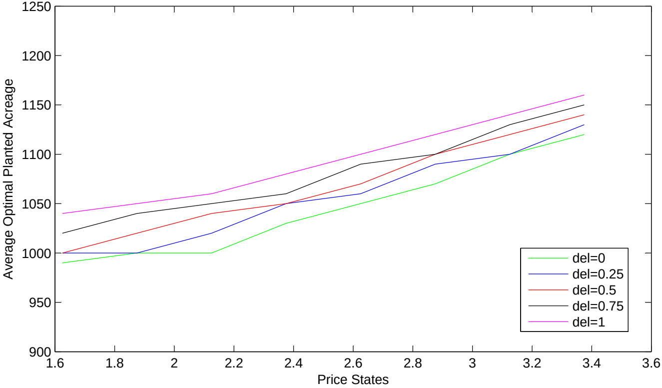
Average Optimal Planted Acreage over 2002-06

	δ				
Price State	0	0.25	0.5	0.75	1
1.625	990	1000	1000	1020	1040
1.875	1000	1000	1020	1040	1050
2.125	1000	1020	1040	1050	1060
2.375	1030	1050	1050	1060	1080
2.625	1050	1060	1070	1090	1100
2.875	1070	1090	1100	1100	1120
3.125	1100	1100	1120	1130	1140
3.375	1120	1130	1140	1150	1160

$\bar{A}$ over 2002-06



Percent change in $\bar{A}$ relative to $\delta = 0$

Price State	δ			
	0.25	0.5	0.75	1
1.625	1.01	1.01	3.03	5.05
1.875	0.00	2.00	4.00	5.00
2.125	**2.00**	**4.00**	**5.00**	**6.00**
2.375	1.94	1.94	2.91	4.85
2.625	0.95	1.90	3.81	4.76
2.875	1.87	2.80	2.8	4.67
3.125	0.00	1.82	2.73	3.64
3.375	0.89	1.79	2.68	3.57

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