

CROP PRODUCTION AND OPTIMAL IRRIGATION STRATEGIES IN THE UNITED STATES:
FOUR CLIMATE SCENARIOS

by

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(Under the Direction of Jeffery Mullen)

ABSTRACT

The harnessing of fossil energy use, and the accompanying emission of greenhouse gases (GHGs) has facilitated the most rapid and extensive accumulation of wealth in human history. However, as economists are well-aware, all activity carries a cost. Along with the extraction and refining costs associated with fossil fuel use, there are a host of measurable, local externalities, primarily related to the degradation of air and water quality, that manifest in short to medium run. The world community is also increasingly concerned with the potential long-run effects of GHGs accumulating in the atmosphere, changing atmospheric chemistry and the climatic system itself. Researches on the impacts of climate change suggest there could be profound changes to ecosystems around the globe threatening a wide variety of plant and animal life, catalyzing the expansion of vector-borne diseases and, among other things, disrupting food production systems.

By the end of this century, the projected temperatures in the U.S were expected to increase $1^{\circ}C$ to $4^{\circ}C$, depended on emission scenarios and GCMs used. Perez et al. (2016) applied an integrated assessment model to analyze the likelihood of four representative pathways. We were more likely to face RCP 6.0 and RCP 8.5. According, the probability of exceeding $2^{\circ}C$ was very high(more than 88%).

Increasing temperature and change in precipitation patterns through changes in the water cycle by increasing evaporation. It could result in more storms(risk of flooding), along with drying some lands(drought). The agricultural system is vulnerable to extreme weather, but this vulnerability subject to farmers adaption behavior and resources availability.

This dissertation focus on the impact of climate change on crop yield, farmer's adoption behavior under different objective functions and resource sustainability.

INDEX WORDS: DSSAT crop yield simulation, centuries future climate model simulation, global circulation model, irrigation efficiency fraction, profit-maximizing behavior, water demand function, divergence water price, expected utility theory, utility maximization, constant risk aversion, crop pattern shift, water resource sustainability

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DEDICATION

To my parents, major professor and committee members

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

According to the 2014 Intergovernmental Panel on Climate Change (IPCC) report[2], concentrations of greenhouse gases (GHGs) are now at their highest level since 1750. This rapid increase in GHG concentrations will have profound impacts on humans since the frequency of extreme weather events is increasing in many parts of the U.S. and throughout the world. The agricultural sector is the most vulnerable areas of production within the U.S. because increasing temperatures and changes in precipitation distributions are likely to bring supply disruptions and more volatile crop prices.

According to the Intergovernmental Panel on Climate Change(IPCC)'s 2014 report[2], the concentration of GHGs are now at their highest level(Figure 1.1).

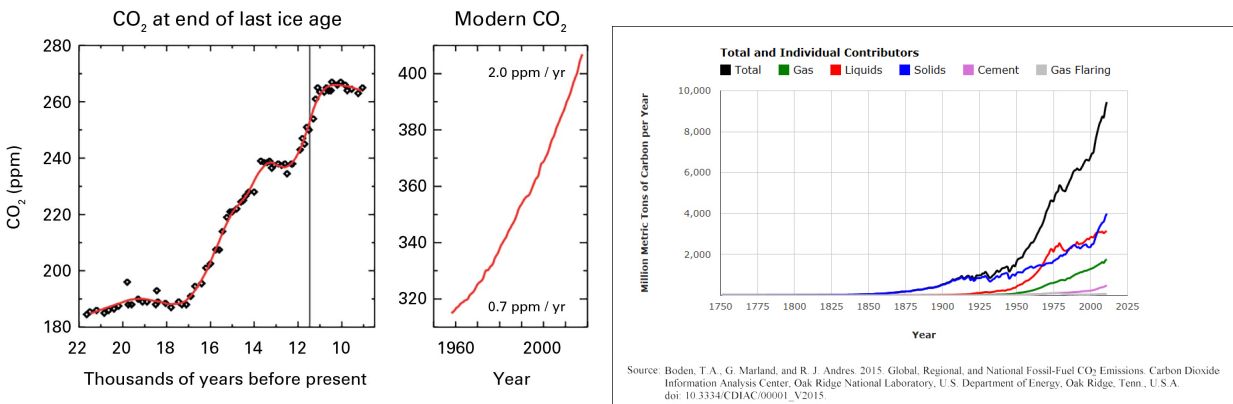


Figure 1.1: Trend of GHG Concentration and Emission

Significant empirical research has been conducted to study the impact of the changing climate on agricultural systems through statistical modeling, which uses historical temperature, spatial distributions of crop yields, behavioral responses of farmers, and projected climate scenarios. The most up to date and commonly used climate projection scenarios are proposed on the IPCCs Fifth Assessment Report (2014)[3].

There are four primary GHG concentration trajectories (The Representative Pathways)¹, which represent four likely climate pathways for this century (See Appendix Table A.11); these trajectories are widely used in projecting crop yield and ecological assessments. Along with statistical models, agronomics models have been widely used by researchers as well. These mathematic models have been shown to have substantial explanatory power when studying behaviors that farmers use when attempting to adapt to climate change, such as irrigation technology and crop variety selection, etc[19].

Previous studies have shown strong evidence of the overall negative impact of climate change on U.S. agricultural production, suggesting that farmers may benefit from taking adaptive actions. However, most prior studies failed to take the economic objective functions of farmers into account, which results in non-optimized decision-making and loss of welfare. By including a range of input and output prices within the model, this dissertation builds a bridge between agronomic models (crop simulation model)² and economic objective functions. I find that the optimal decision deviates from a yield-maximizing decision under different sets of input and output prices. Farmers can be better off by increasing their profits, while at the same time society as a whole benefits from improvements to resource allocations.

¹The RCP 2.6, RCP 4.5, RCP 6.0, and RCP 8.5, are named after a possible range of radiative forcing values in the year 2100 relative to pre-industrial values: +2.6, +4.5, +6.0, and +8.5 W/m², respectively.

²For mitigating large error bar in predicting long term yield and water use.

1.2 OBJECTIVES

The first objective of this dissertation is to construct the methodology to simulate a range of potential future climates under different GHG concentrations, which enables the simulation of future crop yields and water demands. The second objective of this dissertation is to simulate future crop yields and water usage under different production scenarios. The third objective of this dissertation is to use the simulated results to combine farmers' economic objective functions based on their risk preferences in order to optimize irrigation decision making. The final, but most important objective of this dissertation, is to identify a range of economic parameters that would provide the yield maximization equivalent to profit or utility maximization behavior, and which are not and the associate the water use by the selection of objective functions.

1.3 HYPOTHESIS

The average temperature during the crop growing season will increase in the future, though the degree to which changes in GHG concentrations will impact cumulative precipitation is uncertain. Simultaneously, most current popular crop planting areas will experience yield declines, accompanied by increasing agricultural water consumption. Such yield losses may be mitigated by switching from rain-fed production to irrigated production, but higher crop water demands are inevitable. The economic parameters that influence yield-maximization and optimal irrigation decision making show that water price strictly increases with crop prices, nonetheless the relationship with temperature and precipitation change is unclear. As farmers become more risk averse they are more likely to use irrigation as a risk management tool.

CHAPTER 2

LITERATURE REVIEW

2.1 CROP SIMULATION MODELS AND WEATHER SIMULATION MODELS

Crop simulation models are computer programs that simulate crop growth and development as a dynamic function of weather, soil, and management. The first crop simulation model was built in the 1960s. More and more models emerge as society pays more attention to climate change, food sustainability in the 1990s.[4]. The most widely used models are DSSAT, APSIM, DAISY, and EPI&APEX Models, each model has its expertise. The DSSAT system is a software application program that comprises crop simulation models for over 42 crops that stimulate growth, development, and yield as a function of the soil-plant-atmosphere dynamics.[11] while APSIM more designed for simulating environmental and economic outcomes in the face of climate change[7].

DAISY developed towards studies in dynamic soil quality change over time[8]. EPIC & APEX Models are complex systems designed for regional ecological and economic assessments.[10] Weather data is an important component in simulating crop growth and development, weather gen and MarkSim are software applications that are generating and projecting daily weather.

Weather Gen generates estimates of daily precipitation, maximum and minimum temperatures, and solar radiation, and it is designed to preserve interdependence between variables as well as persistence and seasonal characteristics of each variable(Included in DSSAT Model), but it generates weather only by observed means and standard deviations.

Maksim is specially designed for DSSAT users. It uses 720 classes of weather, worldwide, to calculate the coefficients of a third order Markov rainfall generator. That included

17 Global circulation models that simulate future climate using PCC 5th approximation (CMIP5)[23].

2.2 IMPACT OF CLIMATE CHANGE ON CROP YIELDS

Pérez et al.[1] established the method using the availability of fuel resources to estimate the likelihood of the four RCPs the society are going to meet. The two highest emission pathways have probabilities of being surpassed by 42% and 12% under the assumption of no climate policies. In terms of temperature change, the probability of exceeding the $2^{\circ}C$ level by 2100 remains very high (88%).

In studying the impact of climate change on crop yields statistic models and crop yield simulation models both lead to the same conclusion- crop yield loss and food supply disruptions would occur shortly holding crop patterns constant. Major crops would benefit from shifting to further north part to avoid high temperature and extreme weather.

Mjelde et al. (1998)) did a pioneering research to[24] summarizes the value of climate forecast. He proved that the use of climate forecast could improve farm-level net returns subject to scenarios.

Abundant of literature have used the crop simulation model to project crop yields under different climate trajectories. Izaurrealde et al. (2003)[?] used baseline weather data from historical records in the U.S and GCMs to projected future climate with $2CO_2$ concentrations. He stated the overall impact of climate change harms crop yield but the impact different by regions. The irrigation agricultural would be more favorable in later 21 century.

Similarly, Challinor et al. (2017), used the EPIC model to estimate the impact of climate change from 2015-2099 using three GHG projections. In low and medium GHG concentration scenarios, corn, and soybeans yield increases before 2034, but under high emission concentrations scenarios, Corn and soybeans yields declined significantly.

Schelenker(2008)[18] found temperature has a non-linear effect on crop yield used panel county-level yields data for cotton and soybean using climate data during the whole growing

season. His study concluded that by holding the current crop region fixed, the area-weight average yield is predicted to decrease 30-46% by the end of the twenty-one century. Other researchers relaxed fix-region assumption to study how the crop spatial distribution pattern changes accordingly.

Focus on climate variabilities' impact Leng et al. (2017)[17] did a similar study on crop yield response to climate change within the range of the United States. They also found that current plant distributions will have corn yield will reduce 20% - 40%, but by violating the fixed spatial pattern, the reduction will be 6% - 12% less.

Likewise, Cho(2017)[19] studied crop mix shift under possible climate change condition over space in the United States. He showed temperature and precipitation are among the causal factors for shifts in crop mixes, and it differs by crop. With rising temperature rises, cotton, rice, sorghum, and winter wheat are favored. Cotton, rice, and soybeans are more likely to be selected in wetter regions while barley, sorghum, winter wheat, spring wheat, and hay are more likely to be chosen in drier areas, climate change explains lots of the shifts, in the future 30 years, shifts in U.S production regions for major crops move from north to east.

Lizumi et al. (2017)[16] studied crops yield underlying warming condition from preindustrial levels using global gridded crop model, they showed the global mean yield of maize and soybean would stagnate with warming even considering the agronomic adjustment. Under limited warming trends($1.8^{\circ}C$), the low-income country in low latitudes will benefit from mitigation, preventing maize, soybean production from stagnation. In high-income nations in mid-latitude, soybean and maize yield will stagnate, while wheat and rice would not. They proved the importance of climate mitigation targets for sustainable yield growth worldwide.

2.3 LITERATURE IN IRRIGATION WATER PRICING AND WATER DEMAND

Fischer et al. (2007) studied the impact of climate change on irrigation water requirements[26] by implementing a biophysical-agronomic assessment to the global food system.

This model was to calculate crop water demand, withdrawals and water resource availability. With climate change, the irrigation water demand would increase significantly with less water resource availability. Overall, water savings is becoming more and more critical in the future.

Price and cost for irrigation water in the U.S. vary by region, water sources, and institutional arrangements. Plenty of research in irrigation water pricing focuses on laws and policies.

Water from both underground and the surface is a public good in nature; it is natural to use hedonistic in estimating the implicit price of water.

Crouter et al. (1987) did the first empirical study using county-level data to study water the efficiency of a regional water rights market in Weld County, Colorado. Bookshire et al. (2014) analyze the price history in the arid southwest region by developing a simultaneous system of market equations for price and demand. The water price depends on region, types of the buyer (very significant), water demand, population, and income.

Similar to Crouter. Faux and Perry employed the hedonic price method in revealing the shadow price for irrigation water in Oregon. Rosinne (2005) using cycle factor analysis and earning to investment ratio to analyze the relationship between water price, water allocation, and drought. They conclude water prices are not solely affected by economics factors only, investors to entitlement would consider weather factors as well. Pullen et al. (2008) studied the relationship of water price and climate factors (droughts). They concluded that water markets are strongly influenced by the characteristics of water rights, regional demand, and droughts. Apart from the hedonic pricing model, Gonzalez (2006) et al. used pumping cost in Georgia as a proxy for irrigation cost, in their specification, irrigation water demand was a function of the crop, crop water demand index, location.

According to agricultural global practice discussion paper of world bank (2015), the climate projections suggest that impacts will include shifting average growing conditions, increased climate and weather variability with more uncertainty in predicting tomorrow's

conditions. As a general average, the expected effect of climate change on crop prices is 20% increase(World Bank 2010).

2.4 LITERATURE ON FARMER'S RISK PREFERENCE

Antle(1983)[31] built the theoretical framework using the Arrow-Pratt risk aversion concept to rationalize farmer's observed behavior. He proposed dynamic production models that farmers choose more inputs to reduce the variability of production. In his later study on 1987[32], assuming single period maximization, available information before planting and fixed technology, the risk aversion measures for Indian Rice farmers, were risk averse. Moscini et al. (1999)[33] build up the framework for agricultural producers' risk management under uncertainty and risk aversion using expected utility theory. Roe(2013)[35] finds that farmers are relatively more risk averse than other groups of U.S population. Bond et al. (2019)[34]also find similar evidence that risk aversion is an important element in the farmer's decision-making process. Duell a.(2016) studied the farmers' risk aversion hedging behavior changed according to different AR coefficient[36]. Jin et al. (2015) studied farmer's perception about climate risk and adoption behavior under the influence of risk attitude for Yongdao district. Few farmers had realized the risk associated with climate change, and most farmers were risk averse towards adoption behaviors. Similarly, Liu(2013), examines the role of risk attitude in adopting Bt Cotton incorporating prospect theory, farmers who were more risk-averse adopt new cotton variety later.

Limon et al. (2002)[41] developed a methodology used multiple criteria mathematical programming to calculated absolute risk aversion coefficients.

Most of the current literature study about farmers risk attitudes are for crop insurance, and few looked at adoption behavior about technology and planting method using survey method. Except for Li et al. (2019), they assume farmers were risk averse and choose between dryland and water-intensive crops, and the optimal acreage depends on the stochastic function of stream-flow and water rights.

CHAPTER 3

DATA AND METHODOLOGY

3.1 CROP YIELD AND IRRIGATION WATER USAGE

It is better to use crop simulation models in long term yield simulation under difference production scenario than statistical models. There are many models available for use (see literature review), but I chose to use the Decision Support System for Agrotechnology Transfer (DSSAT) because it incorporates all the processes involved in soil, weather, and crop development. It has been used for a wide range of applications at different spatial and temporal scales, including on-farm and precision management, regional assessments of the impact of climate change and variability, gene-based modeling and breeding selection, water use, greenhouse gas emissions, and long-term sustainability. Before using DSSAT for future yield projection, a preliminary study was done to compare the predictive power between regressions with pooled, cross-sectional data and crop simulation modeling for four years of corn, peanut, soybean and cotton yields and water use data in Georgia[25]. The statistical model assumes irrigation demand is a function of pumping cost (a proxy for water price), crop water demand, planting year, crop variety, and region. The overall mean squared error was .07 higher than the regression model, which was not very significant for 364 observations. This showed that DSSAT is good at projecting crop water use and yield.

Figure 3.1 show the specific component of the DSSAT system, which includes inputs need to feed into the system, crop simulation model process and output from the DSSAT system.

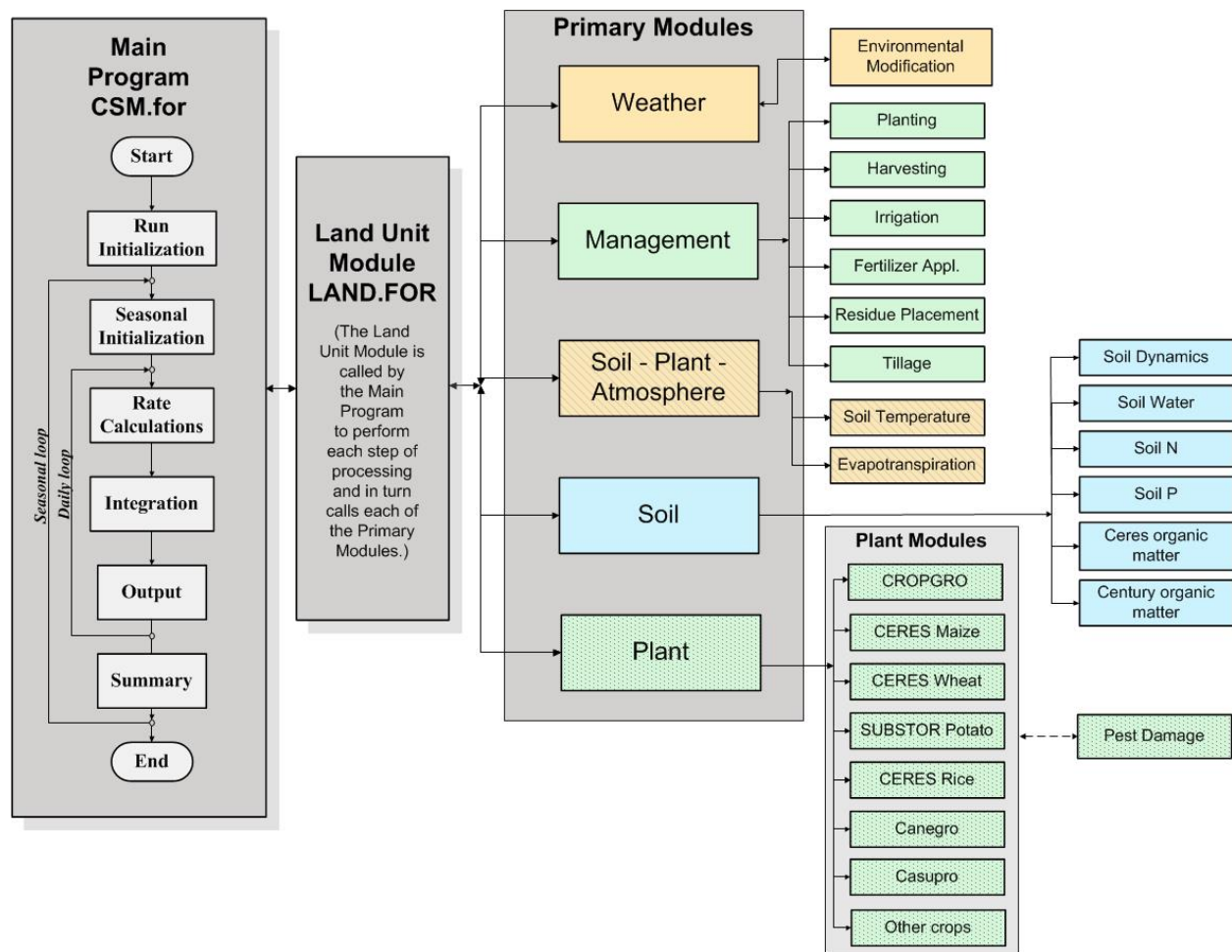


Figure 3.1: DSSAT Crop simulation model component

Source: <https://dssat.net/wp-content/uploads/2018/02/CSM-Components.color.jpg>

3.2 STUDY CROPS, REGIONS AND EXPERIMENT SETTINGS

3.2.1 STUDY CROPS

The United States produces a wide variety of crops, from apples and artichokes to yams and zucchini. A small number of primary crops, however, utilize the most land area. This dissertation examines cotton, corn, peanut, soybean, and wheat in their common producing area. These crops were selected because of their importance in the whole agricultural system and food production. Corn is the most widely produced feed grain, providing the main energy ingredient in livestock feed. Soybeans are the world's most significant crop and second largest source of protein in animal feed, as well as commonly used for vegetable oil. Wheat ranks third among U.S. field crops in terms of harvest acreage and it is essential in food sustainability. Finally, cotton is a primary source of fiber for producing textiles.

3.2.2 STUDY REGIONS

Table 3.1 shows the research stations included in my dissertation, figure 3.2 shows their geographic locations.

Crop	State	County
Corn	ILLINOIS	DE KALB
Corn	IOWA	FRANKLIN
Corn	KANSAS	MORTON
Cotton	TEXAS	CARSON
Cotton	GEORGIA	DECATUR
Cotton	GEORGIA	SEMINOLE
Peanut	GEORGIA	DECATUR
Peanut	GEORGIA	SEMINOLE
Soybean	IOWA	SIOUX
Soybean	ILLINOIS	PIATT
Wheat	KANSAS	MORTON
Wheat	ILLINOIS	DE KALB

Table 3.1: Selected Research Stations

It is critical to make the simulated yield and water use represent the current situation as well as future conditions. The study regions were chosen carefully base on long historical

harvest area data. I used state-level survey data from 1990 to 2018[14] to identify the top planting state for each of the four crops, ranked by harvest area, then identified the counties ranked by highest crop harvest within the state¹.

Location of Research Stations

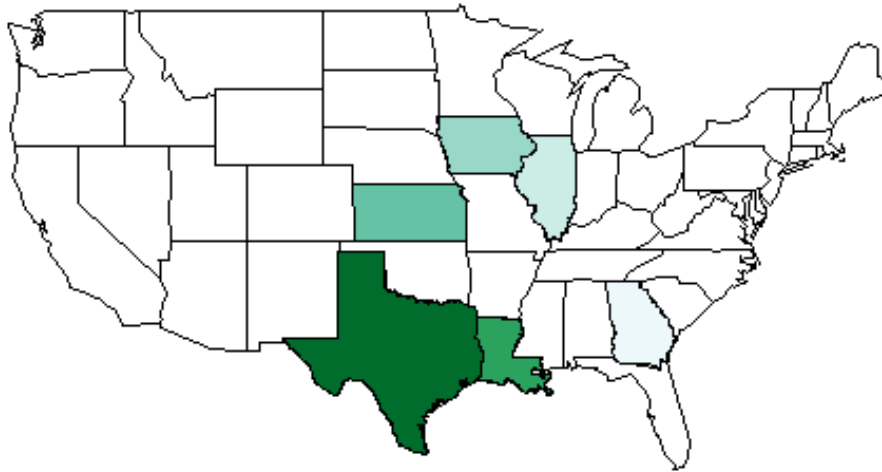


Figure 3.2: Research Stations

3.3 EXPERIMENT SETTINGS

Variety, planting, soil, weather, and management are needed for simulating crop development and growth.

These inputs can be categorized as region specific and universal.

Region specific inputs are varieties, soil type, planting dates and methods, while the universal inputs can be fixed costs and irrigation management settings

I will use an example to demonstrate the methods of experiment settings for DSSAT simulation.

¹NASS did not provide county-level harvest area data for wheat after 2008, so I used available data from 1980 - 2008

Figure 3.4 and figure 3.5 show the irrigation system used in U.S in total and by region.¹ Pressure systems account for between 65% of irrigation systems used in the United States and include applicators such as center pivot, surface drip, slide roll or wheel move, and micro sprinkler. Gravity flow, which includes furrow, and controlled/uncontrolled flooding, Accounts for approximately 35% irrigation systems in the United States[22]. Regions used the most gravity irrigation system are not included as a research station in my dissertation. The majority irrigation system farmers used in the study region is the pressure system(2013 Farm and Ranch Survey Data). The irrigation efficiency fraction is around 80%. So, I used 80% as the efficiency fraction in irrigation management setting in DSSAT.²

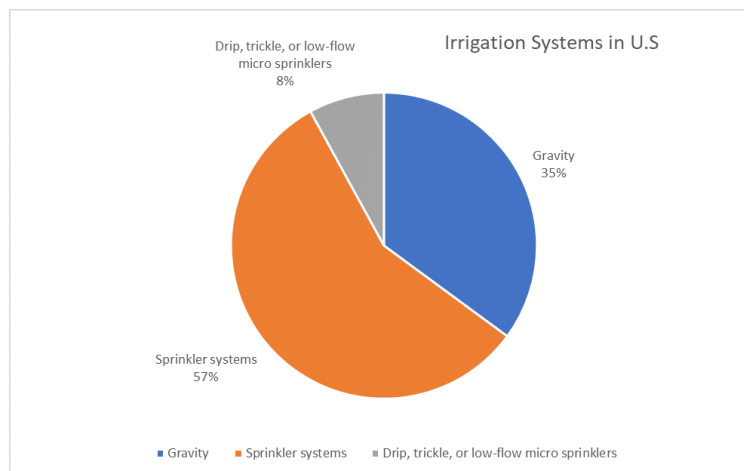


Figure 3.4: Irrigation System in U.S by Region

[https://www.nass.usda.gov/Publications/AgCensus/2012/ Online_Resources/Farm_and_Ranch_Irrigation](https://www.nass.usda.gov/Publications/AgCensus/2012/Online_Resources/Farm_and_Ranch_Irrigation)

¹Regions ranked outside 10 by irrigation acreage are not included

²The efficiency fraction is the ratio of crop water usage and irrigation water applied.

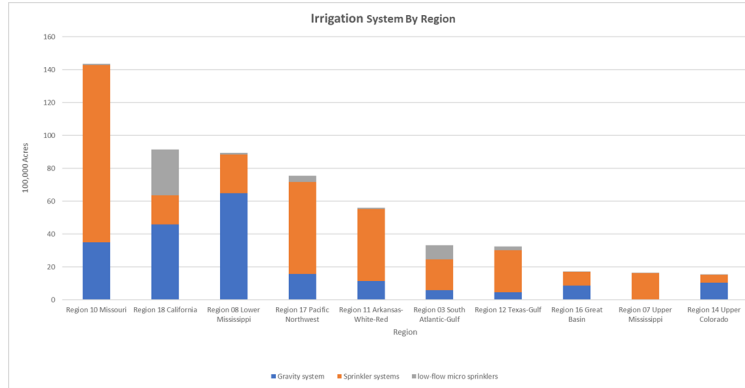


Figure 3.5: Irrigation System in U.S by Region

[https://www.nass.usda.gov/Publications/AgCensus/2012/ Online_Resources/Farm_and_Ranch_Irrigation](https://www.nass.usda.gov/Publications/AgCensus/2012/Online_Resources/Farm_and_Ranch_Irrigation)

Farmers have multiple ways to decide when to irrigate the crop; the dominated method is the condition of the crop(1st), scheduled by delivery organization(2nd) and soil moisture sensing device(3rd). Limited by DSSAT irrigation management setting, the 3rd popular method is chosen. The irrigation management settings ranged from ‘rain-fed’, ‘.2’, ‘.3’, ‘.4’ up to ‘.7’ stands for the soil moistures threshold that triggers irrigation application respectively.

3.3.1 WEATHER DATA

MarkSim[23] is used to generate future weather data that enable DSSAT to simulate future yields holding crop variety, soil condition, crop management such as fertilizer and pesticide sufficient each year.

MarkSim is designed to use along with DSSAT. The future weather simulation includes 17 global circulation climate models from the range of Coupled Model Intercomparison Project Phase 5(CMIP5) that were considered in the latest IPCC reports, based on 4 Representative Concentration Pathways.

It divides the world into 720 climate clusters that are distinct from one another by a down-scaling method based on thin plate spline spatial interpolation of anomalies (deltas method)

of original GCM outputs[43]. The results were grouped according to climate cluster, and regression equations for each of the Markov parameters were calculated using the monthly average rainfall and temperature figures for each station within the cluster.

I simulated daily weather for study regions using global five minutes downscaling climate data from 2013 to 2099 with 99 replications at Maksim's maximum². The simulation of rainfall follows a stochastic process and sensitive subject to model specification. Variations of daily rain along with cumulative solar radiation were huge. In order to get better estimates, following Peter's suggestion, all 17 GCMs were incorporated.

By replicate 100 different possible weather outcomes, the variance within the research station further reduced.

The procedure for generating random 100 replications of whether outcome for each RCPs is listed below:

- Generate 100 three capital letter random strings for 100 replicates of climate outcomes, S, L, M, H, stands for representative pathways from the lowest concentration of GHG to the highest.
- Number of MarkSim output folders: $81 \times 4(324)$, 81 years and four representative pathways.
- Structure of MarkSim Output Folder: *station_year_rcps 99 replications* \RXXXYY01.WTG, where XXX three numbers stand for latitude and longitude for research stations, YY are two numbers stands for the index of replications ranges from 01 – 99. Each WTG files includes daily weather inputs including max/min temperature and cumulative solar radiation in Julian Day of Year Format.
- Random Matrix(*100 by 4 matrix.*)

²MarkSim simulation restricted to 99 replication per year for each RCP

$$\begin{pmatrix} 1 & 7 & 90 & 22 \\ \vdots & \dots & \dots & \vdots \\ 94 & 84 & 43 & 75 \end{pmatrix}$$

The row of the matrix stands for the random index for the program to select from 1-99 indexed climate files for the RCPs, column stands for RCPs. For example, the program will extract $rm[i, j]$ means under RCPsi, random index j, index[rm] WTG files under each output folder.

- Under each output folder, extract $rm[i, j]$'s WTG file, name the selected WTG files as XXXS/L/M/HYY01.WTG, XXX means one replicate of climate outcome, YY is year ranges from 18 to 99, 01 means the weather file includes only one year of daily weather inputs(365 records, leap year is neglected in the generation). In total, 82 years with 100 replications of possible climate outcome each year were generated.

3.4 PROFIT MAXIMIZING AND OPTIMAL IRRIGATION STRATEGY

3.4.1 THEORETICAL FRAMEWORK

Assume farmers are rational and maximize profit subject to sets of inputs and outputs prices. The profit function is a function of crop yield, crop price, weathers, farmers characteristics, total fertilizer, pesticide and weed control cost.

$$\pi_{i,f,c,t,tr,j} = p_c * q(w_{i,f,c,t,tr,j}, \bar{x}, T_{f,t,j}, R_{f,t,j}) - c_{t,c} * c(w_{i,f,c,t,tr,j}, \bar{x})^1$$

The cost function can be simplified according to the experiment settings

$$C(w_{i,f,c,t,tr,j}, \bar{x}) = c_{t,c} * c((w_{i,f,c,t,tr,j})) + F_f$$

Furthermore, the DSSAT only takes weather, varieties, planting method and crop management into account, in reality farmers may have preferences about crop varieties, planting

¹tr = 1,...,7, seven different

method and crop management. But my dissertation focus on the impact of climate change on crop yield and crop water demand. The effect of farmers preferences are neglected. The profit function can be further simplified as:

$$\pi_{f,c,t,tr,j} = p_c * q(w_{f,c,t,tr,j}, \bar{x}, T_{f,t,j}, R_{f,t,j}) - c_{t,c} * c(w_{f,c,t,tr,j}) - F_f^2$$

- \bar{x} other inputs(fertilizer, pesticide) that held constant.
- $tr = 1, \dots, 7$, seven different soil moisture threshold, from rain-fed(not irrigated), 0.2 Soil Moisture Threshold(irrigate the crop when soil water content falls below 20%), up to 0.7 Soil Moisture Threshold.
- $t = 1, \dots, 82$, DSSAT simulation includes historical and future yield for all available weather input(1990 - 2099).
- $f = 1, \dots, 16$, research stations selected in *Station Selection*.
- $c = 1, \dots, 5$, crops: corn, peanut, soybean, cotton and wheat
- $j = 1, \dots, 400$, the 400 possible simulated daily weather from MarkSim.³

Assume perfect competition in water market and output market, the profit function is concave function with Hessian matrix negative semidefinite . The mean profit maximizing water prices of the 100 simulation are equivalent to profit maximizing prices of mean yield under one strategy. The input demand function can be simplified as

$$w *_{c,k,t} (c_{t,c}, p_{c,k,t,tr,..}, R, T)$$

Farmers facing profit maximizing function $\pi_{f,c,t,tr,..}$ subject to a set of input and output The problem farmer facing is:

$$max : \pi_{f,c,t,tr,..} = p_c * q(w_{f,c,t,tr,..}, \bar{x}, T_{f,t,j}, R_{f,t,..}) - c_{t,c} * c(w_{f,c,t,tr,..}) - F_f$$

²all other costs, treated as fixed cost

³100 per RCP

. By taking derivative with respect to water application, the water demand function(input) is

$$w^*_{c,k,t} (c_{t,c}, p_{c,k,t}, R, T)$$

. By shepard's lemma, the profit maximizing water demand function is equivalent to cost minimization function.

$$w^*_{c,k,t} (c_{t,c}, p_{c,k,t}, R, T) = \frac{c(w_{f,c,t,tr,j})}{w}$$

For each simulated corn price p_c , the F.O.C is:

$$MP_w = \frac{P_w}{P_c}$$

,the marginal production is a function of irrigation strategy.

Ideally, a farmer can apply any amount of water he desires, so, w^* would be a continuous function, but DSSAT simulate water usage by thresholds, therefore, w^*_{tr} is a discrete function with seven levels, the problem farmers facing is to choose the optimal thresholds that maximize his profit by crop, water price and weather variables.

If farmers get access to irrigation water for free or a lump sum cost (installation fee, furrow irrigation), $MP_w = 0$ which implies the profit maximization irrigation strategy is equivalent to yield maximization strategy. However, when the water price is high, $MP_w > 0$, the profit maximization irrigation strategies are different from yield maximization strategy.

This dissertation aims to finding the P_w that makes profit maximization and yield maximization different.

In most cases. Cost of irrigation depends on water usage. It is correlated with temperature, crop, and precipitation. In reality, irrigation cost (inch/acre) varies by systems, energy used (gasoline, diesel), and the well depth. Farmer has to balance between irrigation efficiency and cost.

3.4.2 EMPIRICAL FRAMEWORK

3.5 UTILITY MAXIMIZING AND OPTIMAL IRRIGATION STRATEGY

3.5.1 THEORETICAL FRAMEWORK

Assume utility function of individual farmer is a function of profit $U_i(\pi_{ictj})$, where i represents the individual farmer, f represents the field that crop grown, c is the crop the farmer grow, t is the harvest year and j is the 100 possible weather outcome in a given county $c \in \{'corn', 'cotton', 'peanut', 'soybean', 'wheat'\}$, $t = 2018, \dots, 2099$ and $j = 1, \dots, 100$.

Since DSSAT assumes homogeneous output within field level, farmers' characteristics and preferences have no effect, soil, crop variety, and crop management. So the farmers' utility function can be simplified to $U_f(\pi_{fctj})$, meanwhile, his decision is in depending on his characteristics.

By expected utility theory, a farmer with utility function $U_f(\pi_{fctj})$. The expected utility $E(U_f(\pi_{fct})) = \frac{\sum_{j=1}^{100} p_j * U_f(\pi_{fctj})}{100}$, where p_j is the associate probability of possible weather outcome for a given county, because the 100 weather outcomes are from random draw, the probability of each outcome is equivalent, $p_{j1} = p_{j2} = \dots = p_{j100} = \frac{1}{100}$.

Following the experiment design in chapter 1, farmers profit has the following form

$$\pi_{f,c,t,tr,j} = p_c * q(w_{f,c,t,tr,j}, \bar{x}, T_{f,t,j}, R_{f,t,j}) - c_{t,c} * c(w_{f,c,t,tr,j}, \bar{x})^1$$

Farmers may have different risk preferences, which implied by the concavity of the utility function. More concave the utility function is, more risk averse the farmer is.

Following the definition of ..[39], $U(\cdot)$ is a von Neumann - Morgen-stern utility function representing farmers risk preferences under climate risk.

In this dissertation, farmers individual preferences have no effect on risk, the utility function has constant Arrow-Pratt:

$$r_a = -\frac{U''}{U'} = \alpha$$

¹tr = 1, ..., 7, seven different

The objective of a farmer in field f that grows the crop c is to maximize the expected utility:

$$MAX : E(U_f(\pi_{fct})) = \frac{1}{100} \sum_{j=1}^{100} \int U_f(\pi_{fctj}) dG(\epsilon)$$

The only source of risk is climate, captured by ϵ , the distribution $G(\epsilon)$ is independent of farmer's behavior.

The optimal level of irrigation application comes from the f.o.c:

$$E(MU_\pi * MP_w * p_c) = E(p_w * MC_w) + \frac{cov[MU_\pi, MP_w]}{E[MU]}$$

Farmers' irrigation strategies depend on the U , q and G .

Likewise, when the cost of irrigation is low, or a lump sum cost, $p_w \rightarrow 0$, the utility and yield maximization strategy is consistent, when p_w is high, farmer's utility maximizing irrigation strategy is different from yield maximization strategy.

This dissertations look at the p_w where $E(U_{yield_{max_{tr}}}) = E(U_{tr})$.

3.5.2 EMPIRICAL FRAMEWORK

For each crop c at field f , DSSAT will give yield and water use level by irrigation strategies tr .

Farmer's profit function depends on p_c , p_w , $q_{c,f,tr,t,j}$ and $w(w_{tr})$. The climate risk is captured by simulated yield and water use from DSSAT.

$$\pi_{c,f,tr,t,j} = p_c * q(w_{tr}, \bar{x}, \epsilon) - p_w * w_{c,f,tr,t,j} - F_f$$

, where

- p_c is a vector of simulated crop prices based on 30 years national average crop price that different by crop level.¹

¹See Appendix

- p_w is simulated water price $\in \{.1, \dots, 200\}$ increase by .1
- $q_{c,f,tr,t,j}$ is the crop yield by crop, weather, irrigation strategies and research stations.
- $w_{c,f,tr,t,j}$ is the water use by crop, weather, irrigation strategies and research stations.

The utility function under each weather

$$U(\pi) = e^{\alpha\pi}$$

subject to crop, weather, research station and irrigation strategies. The $r_a(\alpha) \in \{1.5, 2, 4\}$. Larger the r_a is, more risk averse farmers are.

The expected utility for t, c, f, tr is the average of the 100 different random weathers in one research station. For a certain crop in a research station, each strategy, each year $\frac{1}{100} * e^{\alpha * \pi_{yield_{max}}} = \frac{1}{100} * e^{\alpha * \pi_{tr}}$, rational farmers choose the irrigation strategy that maximize his expected utility over the 100 possible weather scenarios. The dissertation looks at the price above which farmer's yield and profit maximizing irrigation strategy diverge and the water price above which farmer switches from irrigated to rain-fed production. The water prices are presented for selected years across different RCPs and research stations.

CHAPTER 4

RESULTS AND CONCLUSIONS

4.1 INTRODUCTION

4.1.1 INTRODUCTION OF THE CONTENTS

This chapter will show the result of simulated yield, water use of representative counties in peanut, cotton, soybean, corn, and wheat by irrigation strategies at each research station at simulated weather, simulated yield and water use by irrigation strategies and maximum yield section.

Meanwhile, the economic parameters that makes farmers yield maximization non-optimal are presented for selected years by four representative pathways and by two different economics objective functions. ¹.

The maximum water price that makes an irrigation strategy optimal for neutral(profit maximizing) and risk-averse farmers at all simulated output price are shown through the 3D surface plot at the year 2018, 2045, 2072 and 2099. The steepness of these plots indicates the sensitivity of each crop to output price and water price.

Along with the 3D surface plot, exact divergent water price of 2018, 2045, 2072 and 2099 at different irrigation strategy at observed 30 years historical low, median, and high crop price are shown for each research station and each crop.

Within each objective function, there is a comparison between divergent water prices of 2018 and 2099; meanwhile, holding irrigation strategies constant, the comparison between risk-averse and risk-neutral farmers can be found in the result chapter as well.

¹Risk netural and risk aversion

DICTIONARY

- TR - Irrigation Strategies
- MTR - Yield Maximizing Irrigation Strategy
- DWP - Divergent water price for risk neutral farmers.
- DWP(1.5) - Divergent water price for risk averse farmers with (Arrow-Pratt coefficient) $\alpha = 1.5$.
- DWP(2) - Divergent water price for risk averse farmers with (Arrow-Pratt coefficient) $\alpha = 2$.
- DWP(4) - Divergent water price for risk averse farmers with (Arrow-Pratt coefficient) $\alpha = 4$.
- OP - Output Price
- DW - Water savings by switching from yield maximizing strategies to other strategies.
- Diff - Difference between 2099 and 2018
- y-p water price - the simulated water price above which farmer's yield and profit maximization strategy diverge less fixed irrigation cost.
- irr-rf water price - the simulated water price drives farmer switch from irrigated production to rainfed production less fixed irrigation cost.

4.2 SIMULATED PEANUT YIELD, WATER USE AND DIVERGENT OUTPUT PRICE BY RCPS AND YEAR

Table 4.1 show the observed GA peanuts in the year 2013. The rain-fed and irrigated peanut production were 4215 LB/Acre and 4576 LB/Acre respectively, the simulated corn yield from DSSAT in the year 2018 was lower than the observed average rain-fed yield. The

primary driver of the difference was the rain-fed cotton yield in Texas, considering in 2013, the cumulative rainfall 3 inches more than 2018.

The simulated maximum yield level from DSSAT was significantly higher than the observed average yield from the 2013 census. The research station for peanut located in Seminole and Decatur county, table 4.2 shows the county level peanut yield from 2014 - 2017. The simulated yield was close to the county level observed yield data.

Peanut production under RCP 8.5, reduced by half at the end of the century, even with 5 inches more water applied, the simulated yield is way below-observed peanut yield.

The changes of temperature and precipitation are not significant for RCP 2.6, yet for RCP 8.5, the year 2099 has $5C^{\circ}$ increase in temperature along with $4Inch$ decrease in precipitation.

Table 4.1: Peanuts, yield 2013 Census

State	Rain-fed Yield(LB/Acre)	Irrigated Yield (LB/Acre)
GEORGIA	2500	4576

Source: <https://quickstats.nass.usda.gov/results/44E170CE-42E7-3FE9-BCB1-37114B06E766>

Table 4.2: Peanuts, peanut average yield by county and year

Year	County	Average Yield(LB/Acre)
2017	DECATUR	5190
2017	SEMINOLE	5175
2016	DECATUR	4896
2016	SEMINOLE	4673
2015	DECATUR	5284
2014	DECATUR	5473
2014	SEMINOLE	5491

Table 4.3 shows the average level of simulated cotton yield weighted by harvest acreage(rain-fed/yield max), temperature and rainfall over the corn growing season. For all RCPs, the simulated rain-fed yield of all research stations decrease. Especially for RCP 8.5, both rain-yield and the maximum yield reduced by 50% even if crop water demand increases by 5 inch/acre. The increasing temperature is the primary driver of the yield loss.

Table 4.3: Mean peanut rain-fed yield, minimum/maximum temperature and precipitation over the growing season

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	2784	6063	19	32	22	16
2045	2813	5902	20	32	22	16
2072	2744	5916	20	32	22	16
2099	2716	5902	20	32	22	16

RCP 2.6 Low Emission Scenario

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	2770	6004	19	32	22	16
2045	2512	5742	20	32	22	16
2072	2352	5552	21	34	22	17
2099	2348	5542	21	34	22	18

RCP 4.5 Medium Low Emission Scenario

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	2751	5976	19	32	22	16
2045	2568	5810	20	32	22	17
2072	2272	5469	21	34	22	18
2099	2052	5110	22	34	22	18

RCP 6.0 Medium Emission Scenario

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	2695	6020	19	32	22	16
2045	2357	5656	21	33	22	17
2072	1818	4864	22	35	22	18
2099	1086	3639	24	37	20	22

RCP 8.5 High Emission Scenario

Peanut production fixed and variable cost in Georiga is listed below.

Table 4.4: Cost of Peanut Planting, Georgia

Variable Cost	Cost per Acre
Land Rent	\$0.00
Crop Insurance (Excluding STAX)	\$8.00
Seed (Including Tech Fees and Seed Treatments)	\$100.19
Lime- Custom Spread	\$14.19
Fertilizers	
Nitrogen	\$39.60
Phosphate (P2O5)	\$26.60
Potash (K2O)	\$20.30
Chicken Litter- Custom Spread	\$0.00
Boron, Sulfur, and Others	\$5.00
Weed Control	
Pre-Plant Broadcast or PPI	\$0.00
At Planting or PRE	\$7.35
POST	\$37.36
Layby	\$13.54
Hand Weeding	\$10.00
Insect Control	
Scouting	\$10.00
In-Furrow (If no seed treatment used)	\$0.00
Spray- Caterpillar Pests	\$0.00
Spray- Stink Bugs, Other Pests	\$11.00
Nematicide (If no seed treatment used)	\$0.00
Fungicide (If no seed treatment used)	\$0.00
PGR	\$1.84
Defoliant and Boll Opener	\$12.33
Irrigation	
Machinery and Equipment	
Fuel and Lube	\$29.15
Repairs and Maintenance	\$28.58
Custom Spray Applications	\$0.00
Custom Picking	\$0.00
Labor	\$25.85
Interest on Operating	\$14.16
Ginning and Warehousing	
Ginning	\$96.00
Other (Hauling, Etc.)	\$0.00
Storage and Warehousing	\$25.40
Promotions, Boards, Classing	\$14.66
Cottonseed Credit	-\$93.75
BWEF	\$1.81
Fixed Cost	
Tractors and Sprayer	47.57
Equipment/Implements	16.71
Irrigation	130.00
Picker/BB/MB	72.06
Owned Land Charge	0.00
Misc Overhead	26.52
Management	26.52
Total	\$778.55

<http://agecon.uga.edu/extension/budgets.html>

4.2.1 DECATUR, GA

Georgia ranked first in producing peanuts in the U.S.A. Decatur, Mitchell, Miller, Worth and Seminole Counties producing the most peanuts with in GA. It is located in southwestern corner along the Flint river basin. According to USDA survey in 2017 Decatur produced 177,500,000 lbs of peanut with 29,800 planting acres.

SIMULATED WEATHER

Figure 4.1, 4.2, 4.3 is the average temperature, precipitation simulated from MarkSim. Both maximum and the minimum temperature from the simulation raised along with decrease in cumulative rainfall over the peanut growing season, expect for RCP 2.6. The mean temperature during crop season in Decatur county raises about 4°C. The historical averages were monthly normal from NOAA[48] Table A.1 shows summary statistics temperature, precipitation of peanut season in Decatur, GA.

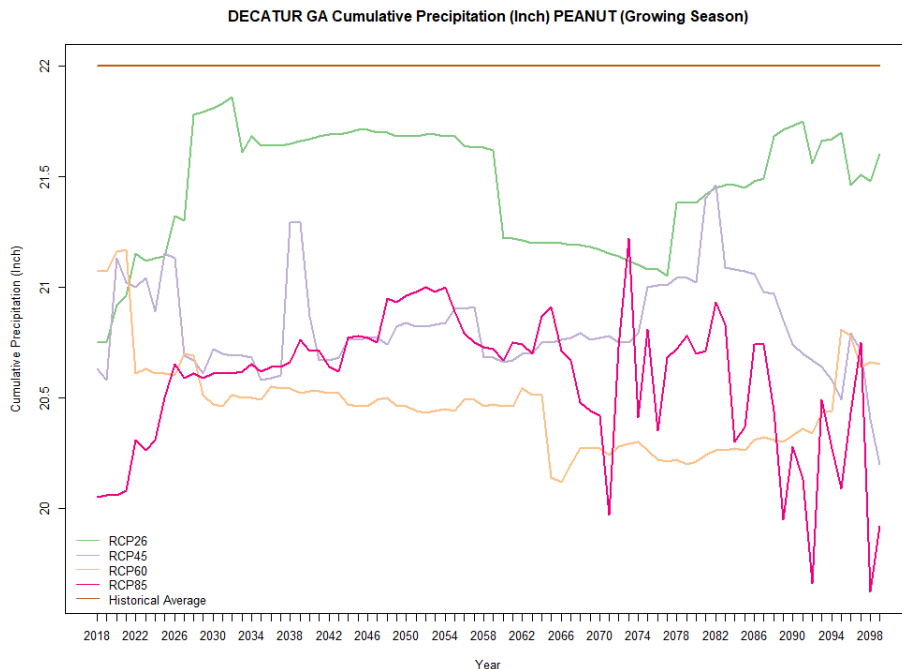


Figure 4.1: Cumulative Rainfall over Peanut Season, Decatur, GA

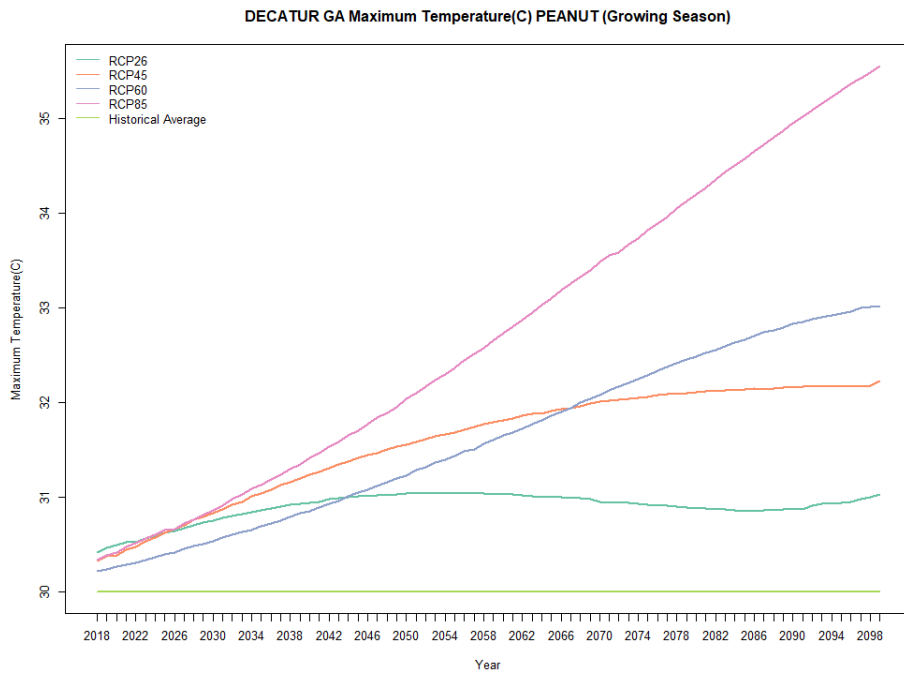


Figure 4.2: Average Maximum Temperature over Peanut Season, Decatur, GA

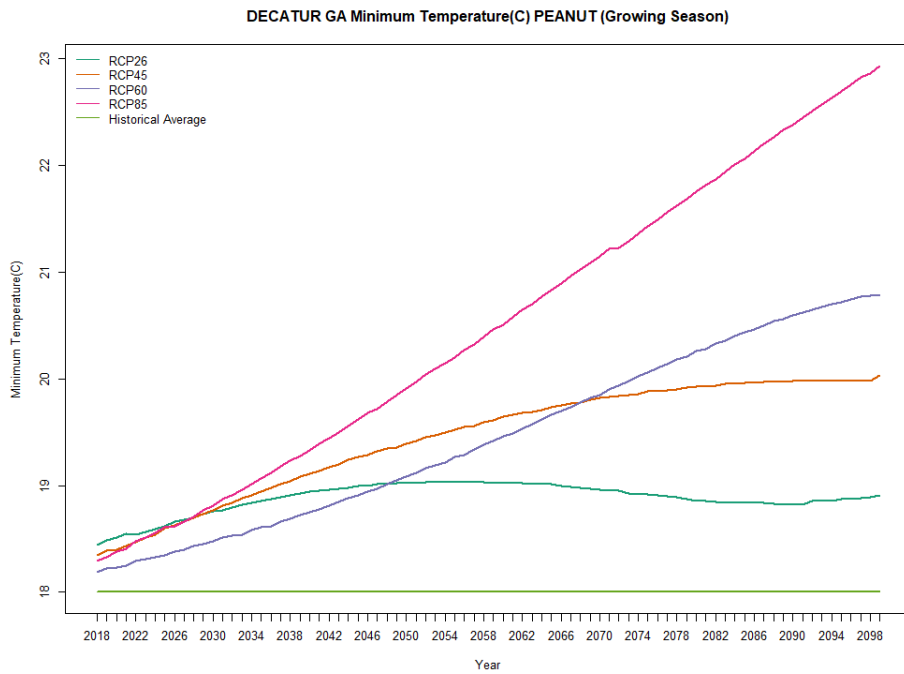
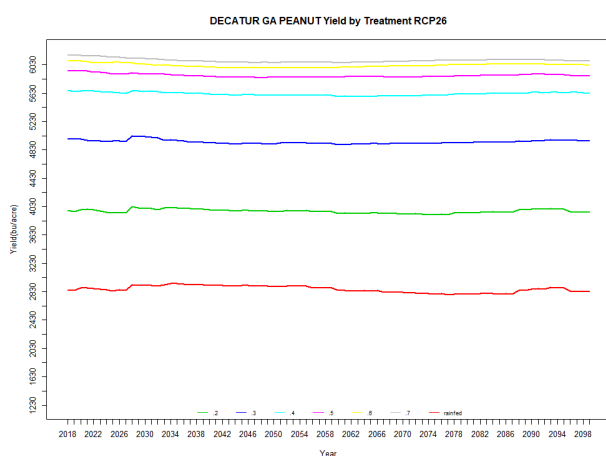


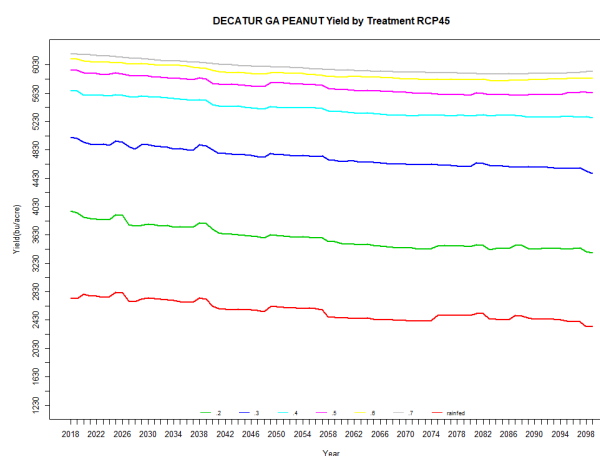
Figure 4.3: Average Minimum Temperature over Peanut Season, Decatur, GA

SIMULATED YIELD AND WATER USE BY IRRIGATION STRATEGIES

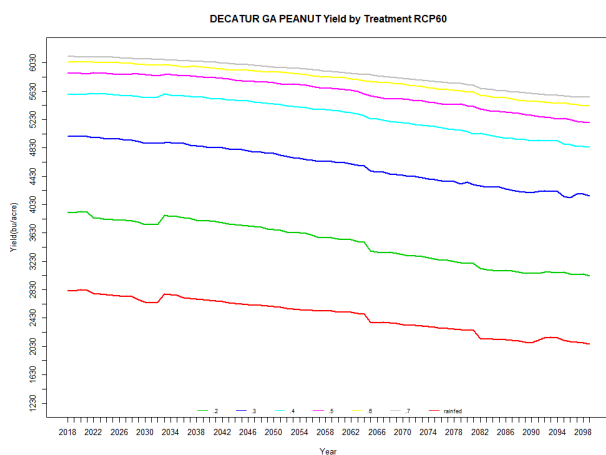
As figure 4.4 shows, the slope of yield loss increases with emission concentrations. The simulated rain-fed yield difference between 2018 and 2099 are 18 LB/ACRE, 407 LB/ACRE, 761 LB/ACRE and 1294 LB/ACRE respectively. Figure 4.82 and ??shows importance of irrigation to peanut production, simulated yield increases with higher application strategies. With around 3 inches of water use, the average simulated yield across rcps and years increases by 1053 LB/ACRE.



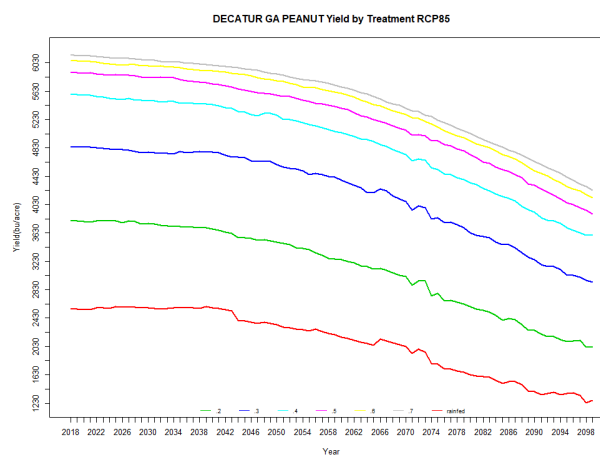
(a) Simulated Peanut Yield-RCP 2.6



(b) Simulated Peanut Yield-RCP 4.5

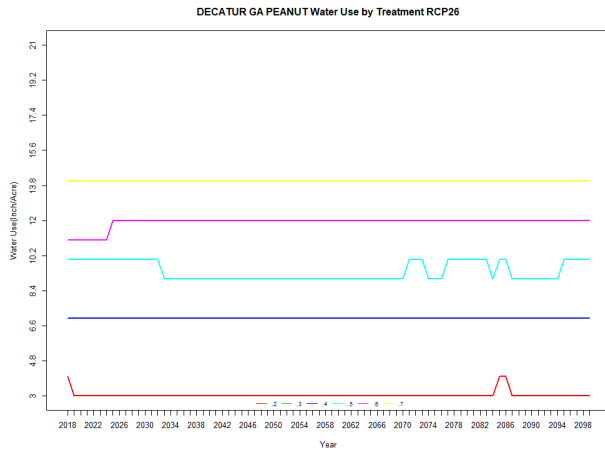


(c) Simulated Peanutrn Yield-RCP 6.0

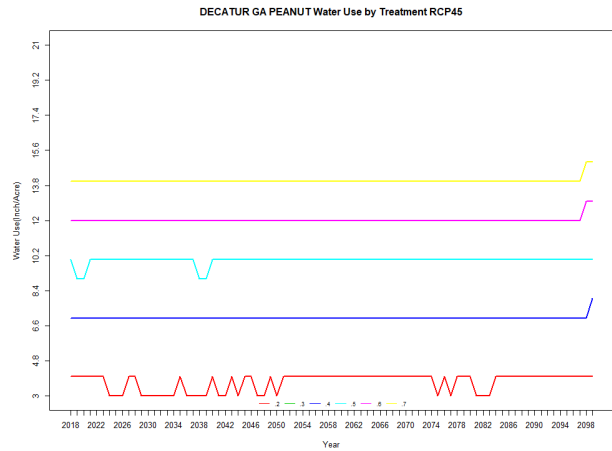


(d) Simulated Peanut Yield-RCP 8.5

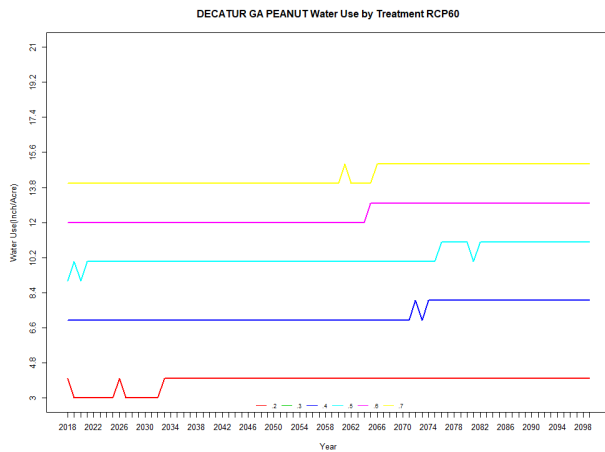
Figure 4.4: Average Simulated Yield by Treatment, Decatur, GA, Peanut



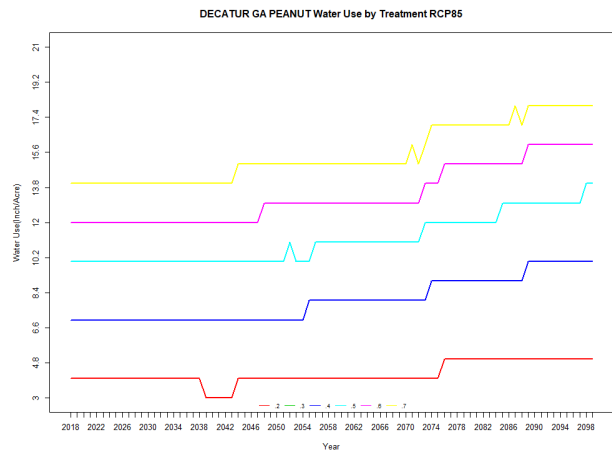
(a) Simulated Water Use Yield-RCP 2.6



(b) Simulated Water Use-RCP 4.5



(c) Simulated Water Use-RCP 6.0



(d) Simulated Water Use-RCP 8.5

Figure 4.5: Average Simulated Water Use by Treatment, Decatur, GA, Peanut

MAXIMUM YIELD IRRIGATION STRATEGIES

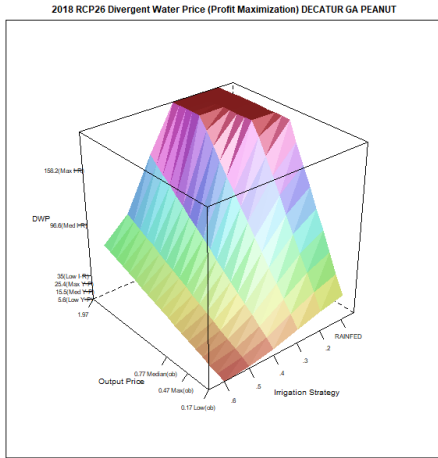
Table 4.5 shows Decatur,GA peanut farmer' yield maximization irrigation strategy for different emission scenarios. For all years and climate projections, the yield maximization strategy is 0.7 across emission scenarios and years. For RCP 2.6 and 4.5, peanut water demand stay the same while for RCP 6.0 and 8.5, peanut water demand increased more than 4 inches.

Table 4.5: Yield Maximization Treatment, Decatur, GA, Peanut

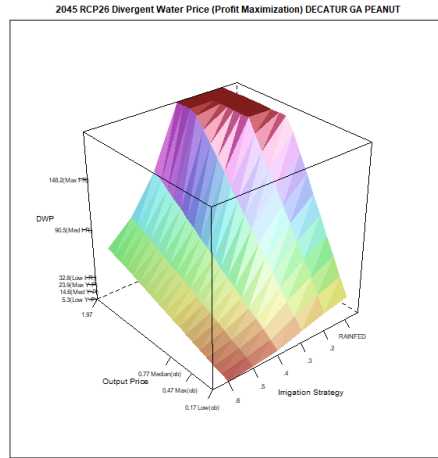
Climate	Year	Irrigation Strategy	Yield(LB/ACRE)	Water Use(INCH/ACRE)
RCP 2.6	2018	.7	6173.15	16.15
	2045	.7	6064.45	16.36
	2072	.7	6084.22	16.40
	2099	.7	6082.74	16.22
RCP 4.5	2018	.7	6192.26	16.20
	2045	.7	6015.57	16.25
	2072	.7	5925.04	16.49
	2099	.7	5936.21	16.80
RCP 6.0	2018	.7	6145.39	16.26
	2045	.7	5947.18	16.92
	2072	.7	5344.41	17.92
	2099	.7	4234.99	20.86
RCP 8.5	2018	.7	6145.39	16.26
	2045	.7	5947.18	16.92
	2072	.7	5344.41	17.92
	2099	.7	4234.99	20.86

DIVERGENT WATER PRICE FOR RISK NEUTRAL FARMERS

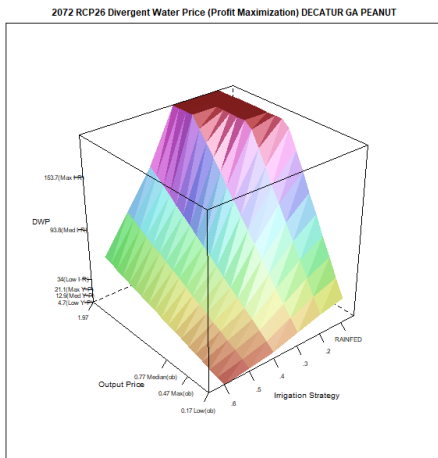
Figure 4.6, 4.7, 4.8 and 4.9 shows the divergent water price for risk neutral farmers by irrigation strategies. The low(ob), medium(ob) and max(ob) in the y-axis are low, medium and maximum observed 30 years historical peanut price from USDA survey.



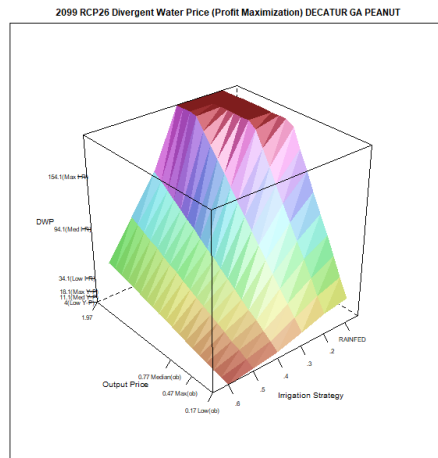
(a) 2018



(b) 2045

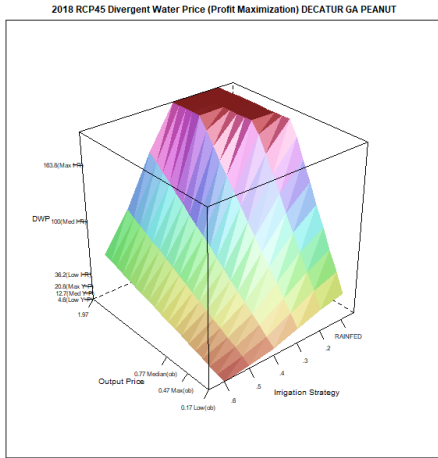


(c) 2072

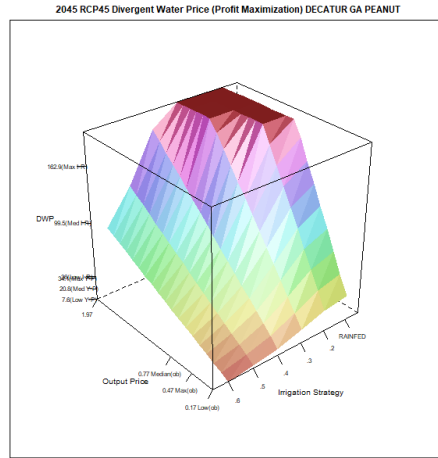


(d) 2099

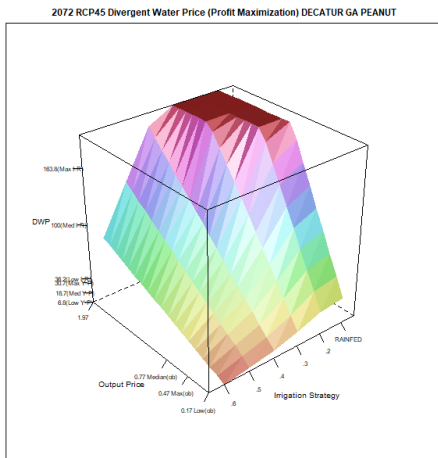
Figure 4.6: Divergent Water Price of profit maximizing farmers by irrigation strategies, Decatur, GA, Peanut, RCP 2.6



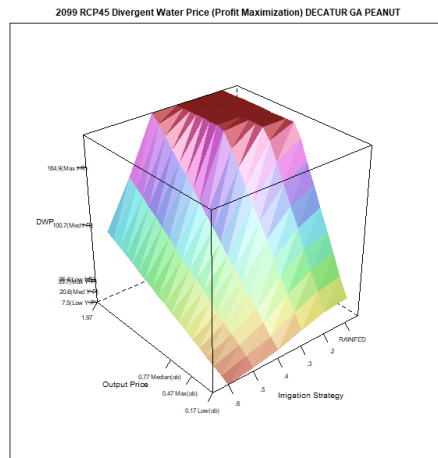
(a) 2018



(b) 2045

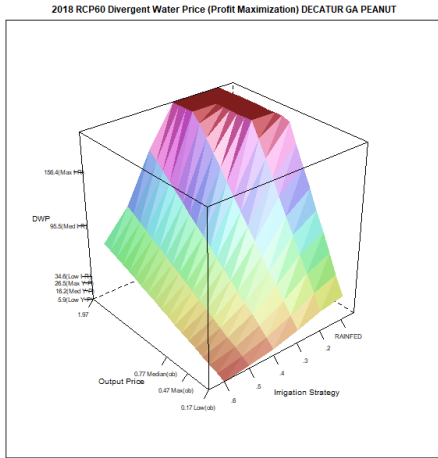


(c) 2072

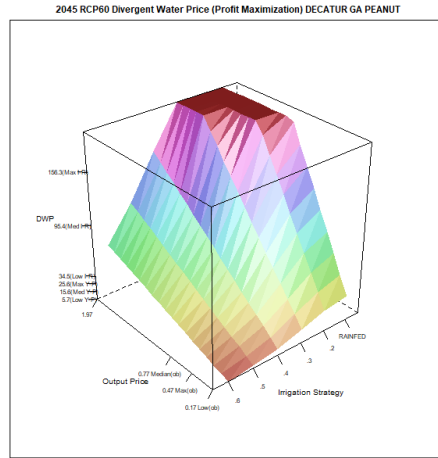


(d) 2099

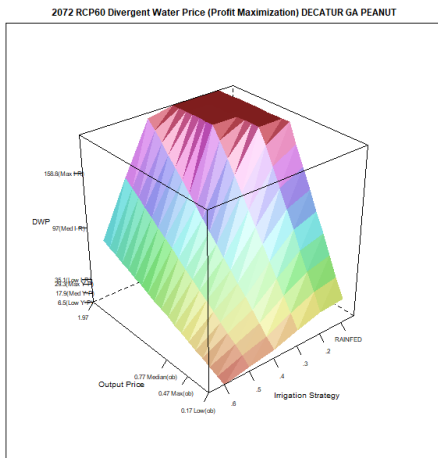
Figure 4.7: Divergent Water Price of profit maximizing farmers by irrigation strategies, Decatur, GA, Peanut, RCP 4.5



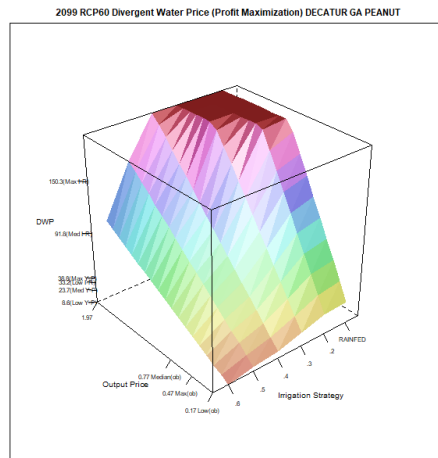
(a) 2018



(b) 2045

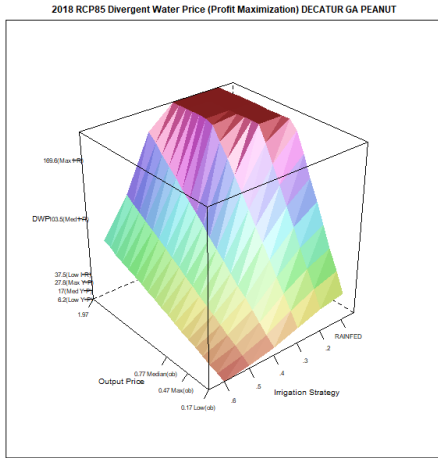


(c) 2072

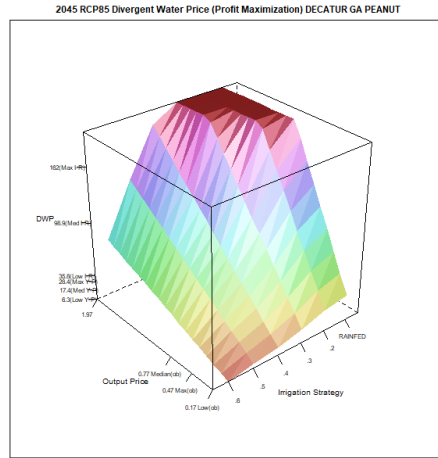


(d) 2099

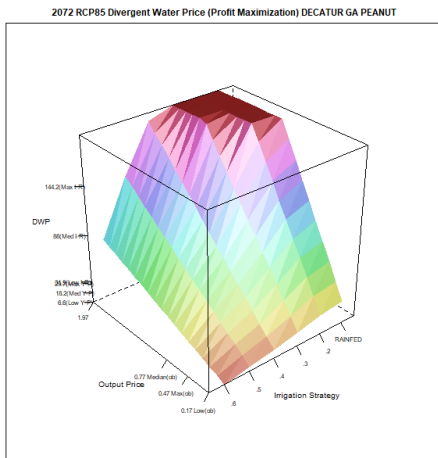
Figure 4.8: Divergent Water Price of profit maximizing farmers by irrigation strategies, Decatur, GA, Peanut, RCP 6.0



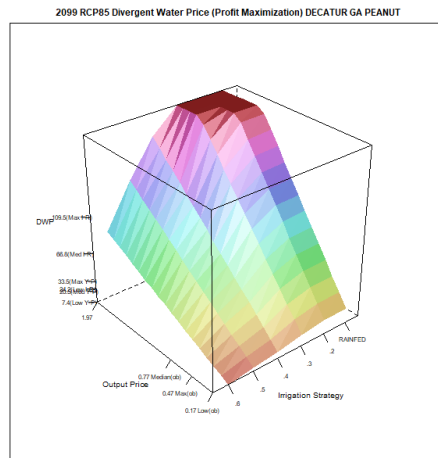
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.9: Divergent Water Price of profit maximizing farmers by irrigation strategies, Decatur, GA, Peanut, RCP 8.5

Table 4.6 shows the y-p and irr-rf water price of Decatur, GA, peanut farmers, both y-p and irr-rf water price strictly increases with output prices. At the same peanut price level, the trend of y-p water price at each emission scenarios is different, for RCP 8.5, the y-p water price is decreasing with time.

Irr-rf water prices follows downward trend across emission scenarios.

Table 4.6: Divergent Water Price of Risk Netural Farmers(Y-P and I-R)

Year	Climate	Form	0.17	0.47	0.77
2018	RCP26	Yield - Profit	5.60	15.50	25.40
2045	RCP26	Yield - Profit	5.30	14.60	23.90
2072	RCP26	Yield - Profit	4.70	12.90	21.10
2099	RCP26	Yield - Profit	4.00	11.10	18.10
2018	RCP45	Yield - Profit	4.60	12.70	20.80
2045	RCP45	Yield - Profit	7.60	20.80	34.10
2072	RCP45	Yield - Profit	6.80	18.70	30.70
2099	RCP45	Yield - Profit	7.50	20.60	33.70
2018	RCP60	Yield - Profit	5.90	16.20	26.50
2045	RCP60	Yield - Profit	5.70	15.60	25.60
2072	RCP60	Yield - Profit	6.50	17.90	29.30
2099	RCP60	Yield - Profit	8.60	23.70	38.80
2018	RCP85	Yield - Profit	6.20	17.00	27.80
2045	RCP85	Yield - Profit	6.30	17.40	28.40
2072	RCP85	Yield - Profit	6.60	18.20	29.70
2099	RCP85	Yield - Profit	7.40	20.50	33.50
2018	RCP26	Irrigated - Rainfed	35.00	96.60	158.20
2045	RCP26	Irrigated - Rainfed	32.80	90.50	148.20
2072	RCP26	Irrigated - Rainfed	34.00	93.80	153.70
2099	RCP26	Irrigated - Rainfed	34.10	94.10	154.10

2018	RCP45	Irrigated - Rainfed	36.20	100.00	163.80
2045	RCP45	Irrigated - Rainfed	36.00	99.50	162.90
2072	RCP45	Irrigated - Rainfed	36.20	100.00	163.80
2099	RCP45	Irrigated - Rainfed	36.40	100.70	164.90
2018	RCP60	Irrigated - Rainfed	34.60	95.50	156.40
2045	RCP60	Irrigated - Rainfed	34.50	95.40	156.30
2072	RCP60	Irrigated - Rainfed	35.10	97.00	158.80
2099	RCP60	Irrigated - Rainfed	33.20	91.80	150.30
2018	RCP85	Irrigated - Rainfed	37.50	103.50	169.60
2045	RCP85	Irrigated - Rainfed	35.80	98.90	162.00
2072	RCP85	Irrigated - Rainfed	31.90	88.00	144.20
2099	RCP85	Irrigated - Rainfed	24.20	66.80	109.50

The table B.1, B.2, B.3 and B.4 in the appendix shows the divergent water price for risk neutral farms, for low emission scenario, the y-p diverge decreases with time, while for other emission scenarios, it is increasing with time. The change water price makes farmer switch from irrigated production to rain-fed production for rcp 2.6, 4.5 and 6.0 is small, while for high emission scenario, it dropped 35% at 2099 compared to 2018.

Table 4.7 shows the y-p water price and irr-rf water price at 2018 and 2099.

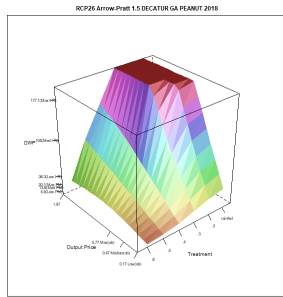
Except for RCP 4.5, the y-p and irr-rf water prices at 2099 are lower than 2018 and the irr-rf water price for RCP 6.0;

Table 4.7: Difference between divergent water price for risk neutral farmer ,DECATUR, GA, PEANUT

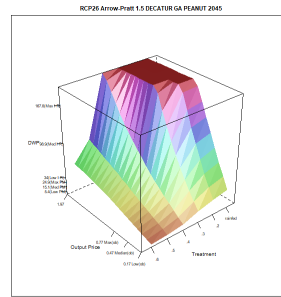
Climate	TR2018	TR2099	Output Price	2018DWP	2099DWP	Diff
rcp26	.6	.6	0.17	5.60	4.00	-1.60
rcp26	.6	.6	0.47	15.50	11.10	-4.40
rcp26	.6	.6	0.77	25.40	18.10	-7.30
rcp26	RAINFED	RAINFED	0.17	35.00	34.10	-0.90
rcp26	RAINFED	RAINFED	0.47	96.60	94.10	-2.50
rcp26	RAINFED	RAINFED	0.77	158.20	154.10	-4.10
rcp45	.6	.6	0.17	4.60	7.50	2.90
rcp45	.6	.6	0.47	12.70	20.60	7.90
rcp45	.6	.6	0.77	20.80	33.70	12.90
rcp45	RAINFED	RAINFED	0.17	36.20	36.40	0.20
rcp45	RAINFED	RAINFED	0.47	100.00	100.70	0.70
rcp45	RAINFED	RAINFED	0.77	163.80	164.90	1.10
rcp60	.6	.6	0.17	5.90	8.60	2.70
rcp60	.6	.6	0.47	16.20	23.70	7.50
rcp60	.6	.6	0.77	26.50	38.80	12.30
rcp60	RAINFED	RAINFED	0.17	34.60	33.20	-1.40
rcp60	RAINFED	RAINFED	0.47	95.50	91.80	-3.70
rcp60	RAINFED	RAINFED	0.77	156.40	150.30	-6.10
rcp85	.6	.6	0.17	6.20	7.40	1.20
rcp85	.6	.6	0.47	17.00	20.50	3.50
rcp85	.6	.6	0.77	27.80	33.50	5.70
rcp85	RAINFED	RAINFED	0.17	37.50	24.20	-13.30
rcp85	RAINFED	RAINFED	0.47	103.50	66.80	-36.70
rcp85	RAINFED	RAINFED	0.77	169.60	109.50	-60.10

DIVERGENT WATER PRICE FOR RISK AVERSE FARMERS

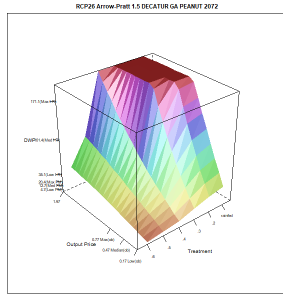
Figure 4.10, 4.11, 4.12 and 4.13 showed the divergent water price of risk averse farmers under $r_a = 1.5$. On average, the divergent water price for switching to rain-fed production increases with output price and decreases with years.



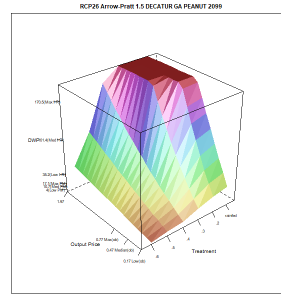
(a) 2018



(b) 2045

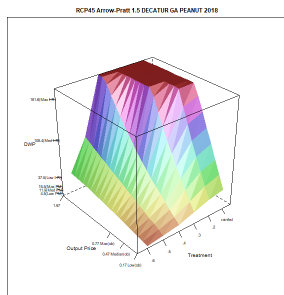


(c) 2072

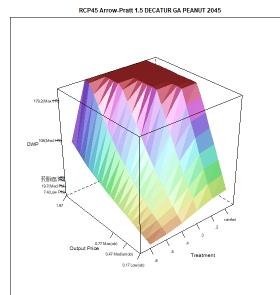


(d) 2099

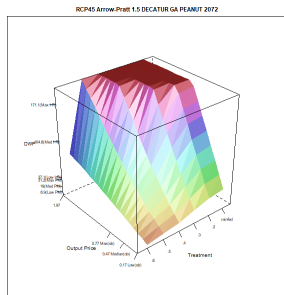
Figure 4.10: Divergent Water Price of Utility Maximization Farmers, Decatur, GA, Peanut $r_a = 1.5$, RCP 2.6



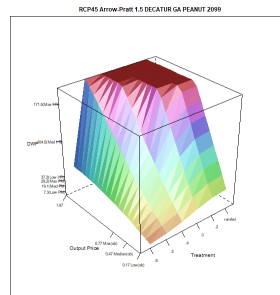
(a) 2018



(b) 2045

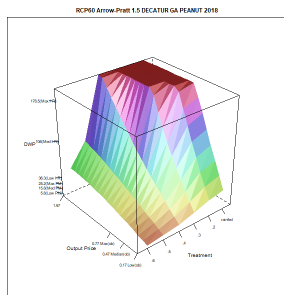


(c) 2072

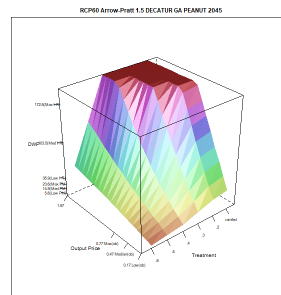


(d) 2099

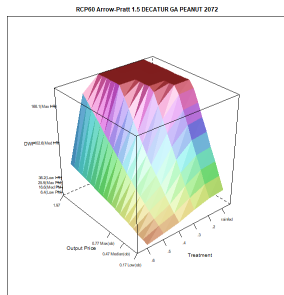
Figure 4.11: Divergent Water Price of Utility Maximization Farmers, Decatur, GA, Peanut $r_a = 1.5$, RCP 4.5



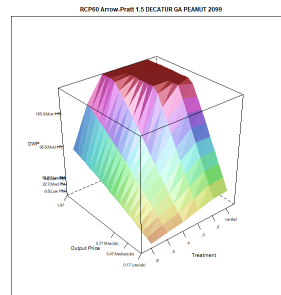
(a) 2018



(b) 2045

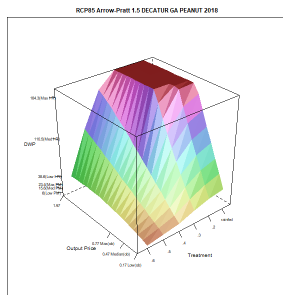


(c) 2072

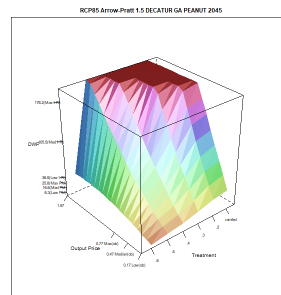


(d) 2099

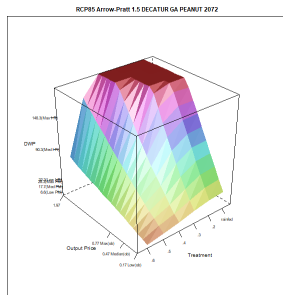
Figure 4.12: Divergent Water Price of Utility Maximization Farmers, Decatur, GA, Peanut $r_a = 1.5$, RCP 6.0



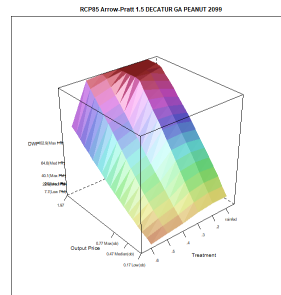
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.13: Divergent Water Price of Utility Maximization Farmers, Decatur, GA, Peanut $r_a = 1.5$, RCP 8.5

Table 4.8 focus on the y-p and irr-rf water price of peanut farmers in Decatur, GA. At same price level, for low emission scenario, the y-p and irr-rf water prices decrease with time; for mid-low and mid emission scenarios, the y-p and irr-rf water price is not strictly increase or decrease with time; for high emission scenarios, y-p water prices increase with time while irr-rf water decreases with time.

Table 4.8: Divergent Water Price of Risk Averse Farmers (Y-P and I-R) ,DECATUR ,GA ,PEANUT

Year	Climate	Form	0.17	0.47	0.77
2018	RCP26	Yield - Profit	5.50	13.80	20.10
2045	RCP26	Yield - Profit	5.40	15.10	24.90
2072	RCP26	Yield - Profit	4.70	12.70	20.40
2099	RCP26	Yield - Profit	4.00	10.70	17.10
2018	RCP45	Yield - Profit	4.50	11.90	18.50
2045	RCP45	Yield - Profit	7.40	19.70	31.80
2072	RCP45	Yield - Profit	6.90	19.00	31.20
2099	RCP45	Yield - Profit	7.30	19.10	29.20
2018	RCP60	Yield - Profit	5.80	15.80	25.20
2045	RCP60	Yield - Profit	5.60	14.90	23.60
2072	RCP60	Yield - Profit	6.40	16.60	25.90
2099	RCP60	Yield - Profit	8.50	22.70	36.20
2018	RCP85	Yield - Profit	6.00	15.60	23.40
2045	RCP85	Yield - Profit	6.30	16.60	25.80
2072	RCP85	Yield - Profit	6.60	17.70	28.30
2099	RCP85	Yield - Profit	7.70	22.90	40.10
2018	RCP26	Irrigated - Rainfed	36.30	105.00	177.10
2045	RCP26	Irrigated - Rainfed	34.00	98.90	167.80
2072	RCP26	Irrigated - Rainfed	35.10	101.40	171.10

2099	RCP26	Irrigated - Rainfed	35.20	101.40	170.50
2018	RCP45	Irrigated - Rainfed	37.50	108.40	181.60
2045	RCP45	Irrigated - Rainfed	37.50	108.00	179.20
2072	RCP45	Irrigated - Rainfed	37.10	104.60	171.10
2099	RCP45	Irrigated - Rainfed	37.20	104.50	171.50
2018	RCP60	Irrigated - Rainfed	36.30	106.00	178.50
2045	RCP60	Irrigated - Rainfed	35.90	103.50	172.80
2072	RCP60	Irrigated - Rainfed	36.20	102.60	168.10
2099	RCP60	Irrigated - Rainfed	34.00	95.50	155.30
2018	RCP85	Irrigated - Rainfed	38.60	110.50	184.30
2045	RCP85	Irrigated - Rainfed	36.80	105.50	176.20
2072	RCP85	Irrigated - Rainfed	32.30	90.30	148.30
2099	RCP85	Irrigated - Rainfed	24.00	64.80	102.90

Table C.1, C.2, C.3 and C.4 in the appendix shows the optimum maximum expected utility irrigation strategies of risk averse farmers in Decatur, GA. For all emission scenarios, there are no difference between $\alpha \in \{1.5, 2, 4\}$.

Table 4.9 shows the y-p and irr-rf water prices at Decatur, GA. Both y-p and irr-rf water prices for risk averse farmers decreases with time.

Table 4.9: Difference between divergent water price of risk averse farmers ,DECATUR ,GA ,PEANUT

Climate	TR2018	TR2099	OP	2018DWP	2099DWP	Diff
rcp26	.6	.6	0.17	5.50	2.52	-2.98
rcp26	.6	.6	0.47	13.80	2.52	-11.28
rcp26	.6	.6	0.77	20.10	2.52	-17.58
rcp26	rainfed	rainfed	0.17	36.30	35.20	-1.10
rcp26	rainfed	rainfed	0.47	105.00	101.40	-3.60
rcp26	rainfed	rainfed	0.77	177.10	170.50	-6.60
rcp45	.6	.6	0.17	4.50	2.60	-1.90
rcp45	.6	.6	0.47	11.90	2.60	-9.30
rcp45	.6	.6	0.77	18.50	2.60	-15.90
rcp45	rainfed	rainfed	0.17	37.50	37.20	-0.30
rcp45	rainfed	rainfed	0.47	108.40	104.50	-3.90
rcp45	rainfed	rainfed	0.77	181.60	171.50	-10.10
rcp60	.6	.6	0.17	5.80	2.27	-3.53
rcp60	.6	.6	0.47	15.80	2.27	-13.53
rcp60	.6	.6	0.77	25.20	2.27	-22.93
rcp60	rainfed	rainfed	0.17	36.30	34.00	-2.30
rcp60	rainfed	rainfed	0.47	106.00	95.50	-10.50
rcp60	rainfed	rainfed	0.77	178.50	155.30	-23.20
rcp85	.6	.6	0.17	6.00	2.33	-3.67
rcp85	.6	.6	0.47	15.60	2.33	-13.27
rcp85	.6	.6	0.77	23.40	2.33	-21.07
rcp85	rainfed	rainfed	0.17	38.60	24.00	-14.60
rcp85	rainfed	rainfed	0.47	110.50	64.80	-45.70
rcp85	rainfed	rainfed	0.77	184.30	102.90	-81.40

RISK NEUTRAL v.s. RISK AVERSE FARMERS

Table D.1, D.2, D.3, D.4 in the appendix compares the full divergent water prices between risk averse and risk neutral farmers.

Table 4.10, 4.11, ??, 4.13 only shows the y-p and irr-rf water prices. For y-p water prices, at low peanut price, risk neutral farmers are more willing to stay at yield maximum level, at high peanut price risk averse farmers are more willing to choose yield maximum irrigation strategy. For irr-rf water prices, risk averse farmers pay more, they are more willing to stay at irrigated production.

Table 4.10: Divergent water price for risk neutral v.s. averse farmers ,DECATUR ,GA ,PEANUT ,RCP26

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	5.60	-10.95	5.50	-9.59	0.17
2045	.6	5.30	-25.68	5.40	-27.06	0.17
2018	.6	15.50	1681.25	13.80	1704.42	0.47
2045	.6	14.60	1641.48	15.10	1634.59	0.47
2072	.6	12.90	1678.17	12.70	1680.96	0.47
2099	.6	11.10	1709.02	10.70	1714.54	0.47
2018	.6	25.40	3373.44	20.10	3445.68	0.77
2045	.6	23.90	3308.65	24.90	3294.86	0.77
2072	.6	21.10	3368.97	20.40	3378.71	0.77
2099	.6	18.10	3420.21	17.10	3434.00	0.77
2018	rainfed	35.00	-484.32	36.30	-484.32	0.17
2045	rainfed	32.80	-474.21	34.00	-474.21	0.17
2072	rainfed	34.00	-491.82	35.10	-491.82	0.17
2099	rainfed	34.10	-487.50	35.20	-487.50	0.17
2018	rainfed	96.60	372.76	105.00	372.76	0.47
2045	rainfed	90.50	400.72	98.90	400.72	0.47
2072	rainfed	93.80	352.02	101.40	352.02	0.47
2099	rainfed	94.10	363.97	101.40	363.97	0.47
2018	rainfed	158.20	1229.84	177.10	1229.84	0.77

2045	rainfed	148.20	1275.64	167.80	1275.64	0.77
2072	rainfed	153.70	1195.86	171.10	1195.86	0.77
2099	rainfed	154.10	1215.44	170.50	1215.44	0.77

Table 4.11: Divergent water price for risk neutral v.s. averse farmers ,DECATUR ,GA ,PEANUT ,RCP45

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	4.60	8.17	4.50	9.53	0.17
2045	.6	7.60	-70.71	7.40	-67.89	0.17
2072	.6	6.80	-74.78	6.90	-76.19	0.17
2099	.6	7.50	-86.69	7.30	-83.78	0.17
2018	.6	12.70	1734.60	11.90	1745.48	0.47
2045	.6	20.80	1519.26	19.70	1534.73	0.47
2072	.6	18.70	1506.44	19.00	1502.20	0.47
2099	.6	20.60	1474.06	19.10	1495.86	0.47
2018	.6	20.80	3461.02	18.50	3492.30	0.77
2045	.6	34.10	3107.82	31.80	3140.16	0.77
2072	.6	30.70	3086.24	31.20	3079.18	0.77
2099	.6	33.70	3034.81	29.20	3100.20	0.77
2018	rainfed	36.20	-503.09	37.50	-503.09	0.17
2045	rainfed	36.00	-531.67	37.50	-531.67	0.17
2072	rainfed	36.20	-558.98	37.10	-558.98	0.17
2099	rainfed	36.40	-572.28	37.20	-572.28	0.17
2018	rainfed	100.00	320.86	108.40	320.86	0.47
2045	rainfed	99.50	241.85	108.00	241.85	0.47
2072	rainfed	100.00	166.36	104.60	166.36	0.47
2099	rainfed	100.70	129.57	104.50	129.57	0.47
2018	rainfed	163.80	1144.82	181.60	1144.82	0.77
2045	rainfed	162.90	1015.37	179.20	1015.37	0.77
2072	rainfed	163.80	891.69	171.10	891.69	0.77

2099	rainfed	164.90	831.42	171.50	831.42	0.77
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Table 4.12: Divergent water price for risk neutral v.s. averse farmers ,DECATUR ,GA ,PEANUT ,RCP60

Year	TR	DWP(Natural)	Profit(Natural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	5.90	-25.15	5.80	-23.75	0.17
2045	.6	5.70	-43.44	5.60	-42.01	0.17
2072	.6	6.50	-94.56	6.40	-93.11	0.17
2099	.6	8.60	-180.37	8.50	-178.83	0.17
2018	.6	16.20	1643.80	15.80	1649.39	0.47
2045	.6	15.60	1593.95	14.90	1603.98	0.47
2072	.6	17.90	1451.35	16.60	1470.24	0.47
2099	.6	23.70	1214.27	22.70	1229.70	0.47
2018	.6	26.50	3312.74	25.20	3330.93	0.77
2045	.6	25.60	3229.90	23.60	3258.56	0.77
2072	.6	29.30	2997.27	25.90	3046.67	0.77
2099	.6	38.80	2608.91	36.20	2649.03	0.77
2018	rainfed	34.60	-490.58	36.30	-490.58	0.17
2045	rainfed	34.50	-523.07	35.90	-523.07	0.17
2072	rainfed	35.10	-574.50	36.20	-574.50	0.17
2099	rainfed	33.20	-619.91	34.00	-619.91	0.17
2018	rainfed	95.50	355.44	106.00	355.44	0.47
2045	rainfed	95.40	265.63	103.50	265.63	0.47
2072	rainfed	97.00	123.44	102.60	123.44	0.47
2099	rainfed	91.80	-2.11	95.50	-2.11	0.47
2018	rainfed	156.40	1201.47	178.50	1201.47	0.77
2045	rainfed	156.30	1054.34	172.80	1054.34	0.77
2072	rainfed	158.80	821.37	168.10	821.37	0.77

2099	rainfed	150.30	615.69	155.30	615.69	0.77
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Table 4.13: Divergent water price for risk neutral v.s. averse farmers ,DECATUR ,GA ,PEANUT ,RCP85

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	6.20	-25.94	6.00	-23.15	0.17
2099	.6	7.40	-404.37	7.70	-409.86	0.17
2018	.6	17.00	1642.02	15.60	1661.53	0.47
2045	.6	17.40	1531.08	16.60	1542.79	0.47
2072	.6	18.20	1216.01	17.70	1223.72	0.47
2099	.6	20.50	593.06	22.90	549.11	0.47
2018	.6	27.80	3309.99	23.40	3371.28	0.77
2045	.6	28.40	3129.07	25.80	3167.13	0.77
2072	.6	29.70	2613.14	28.30	2634.74	0.77
2099	.6	33.50	1592.31	40.10	1471.46	0.77
2018	rainfed	37.50	-533.97	38.60	-533.97	0.17
2045	rainfed	35.80	-563.66	36.80	-563.66	0.17
2072	rainfed	31.90	-631.71	32.30	-631.71	0.17
2099	rainfed	24.20	-753.92	24.00	-753.92	0.17
2018	rainfed	103.50	235.51	110.50	235.51	0.47
2045	rainfed	98.90	153.42	105.50	153.42	0.47
2072	rainfed	88.00	-34.72	90.30	-34.72	0.47
2099	rainfed	66.80	-372.62	64.80	-372.62	0.47
2018	rainfed	169.60	1004.98	184.30	1004.98	0.77
2045	rainfed	162.00	870.50	176.20	870.50	0.77
2072	rainfed	144.20	562.27	148.30	562.27	0.77
2099	rainfed	109.50	8.69	102.90	8.69	0.77

4.2.2 SEMINOLE, GA

Seminole County located about Decatur, it is one of the top 5 counties in Georgia peanut producing.

SIMULATED WEATHER

Figure 4.14, ??, 4.16 is the average temperature, precipitation simulated from MarkSim. Both maximum and the minimum temperature from the simulation raised along with decrease in cumulative rainfall over the peanut growing season, expect for RCP 2.6. The mean temperature during crop season in Seminole county raises about 4°C. Changes of simulated cumulative rainfall over peanut growing season are within two inch by emission scenarios. The historical averages come from monthly normal ?? Table ?? shows summary statistics temperature, precipitation of peanut season in Seminole, GA.

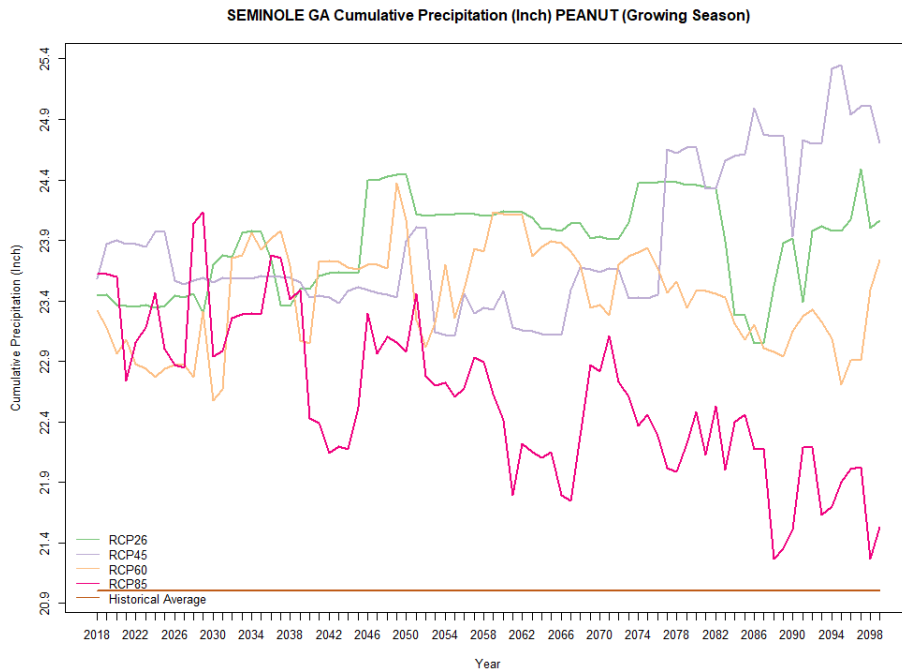


Figure 4.14: Cumulative Rainfall over Peanut Season, Decatur, GA

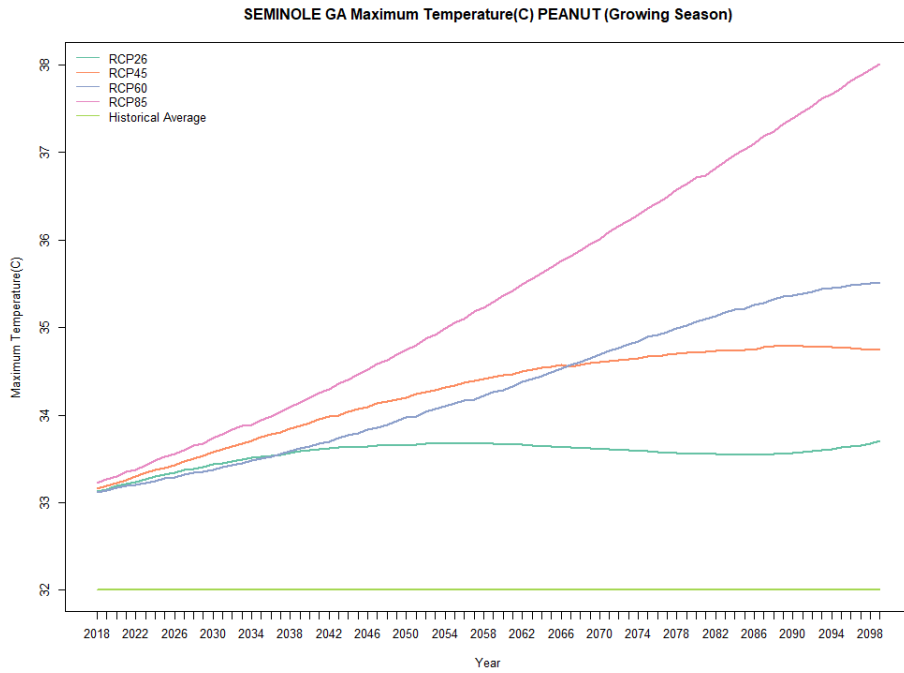


Figure 4.15: Average Maximum Temperature over Peanut Season, Decatur, GA

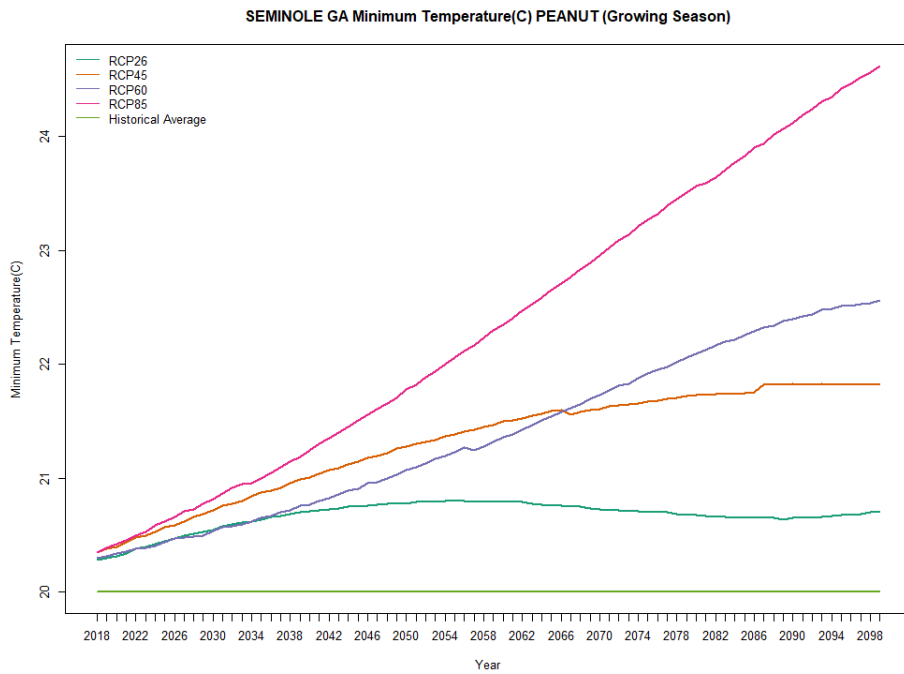
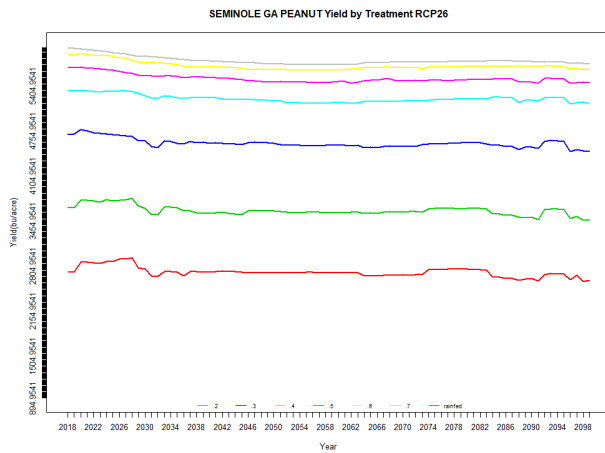


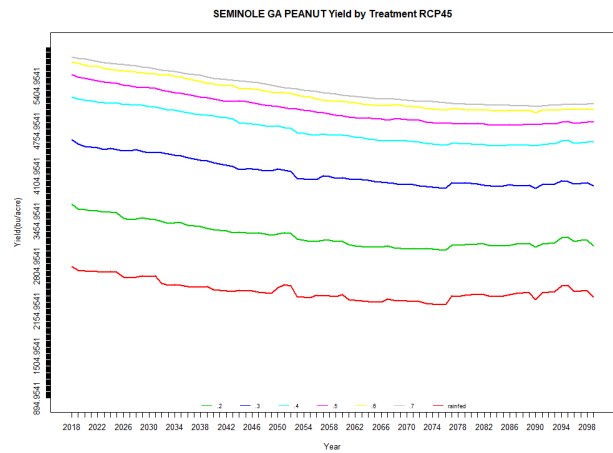
Figure 4.16: Average Minimum Temperature over Peanut Season, Decatur, GA

SIMULATED YIELD AND WATER USE BY IRRIGATION STRATEGIES

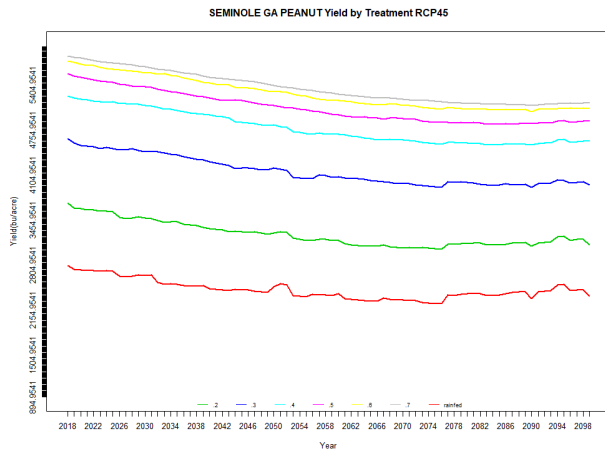
As figure 4.17 shows, the slope of yield loss increases with emission concentrations. The simulated rain-fed yield difference between 2018 and 2099 are 117 LB/ACRE (-4%), 435 LB/ACRE (-15%), 637 LB/ACRE (-24%) and 1924 LB/ACRE (-68%) respectively. Figure 4.17 and ??shows importance of irrigation to peanut production, simulated yield increases with higher application strategies. With around 4 inches of water use, the average simulated yield across rcps and years increases by 1053 LB/ACRE.



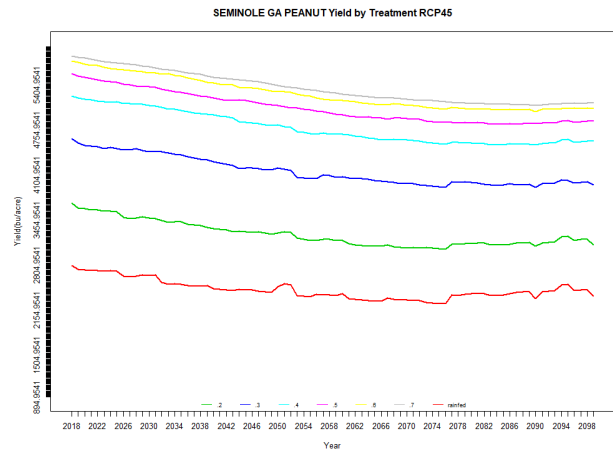
(a) Simulated Peanut Yield-RCP 2.6



(b) Simulated Peanut Yield-RCP 4.5

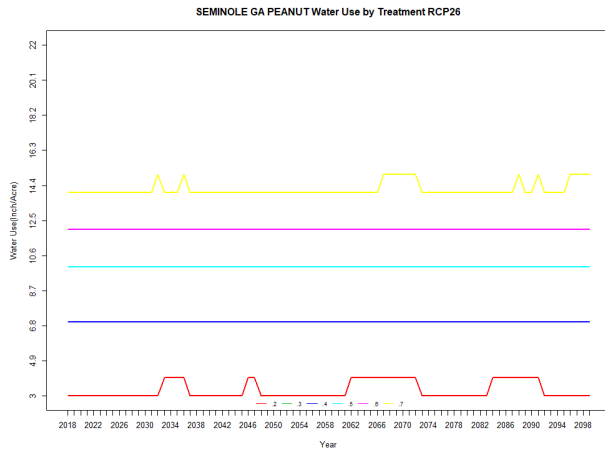


(c) Simulated Peanut Yield-RCP 6.0

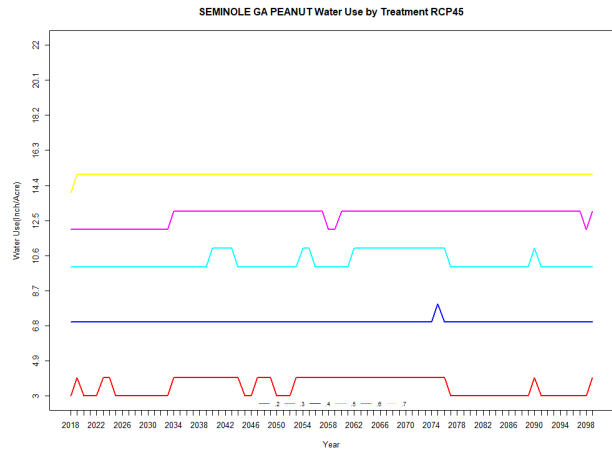


(d) Simulated Peanut Yield-RCP 8.5

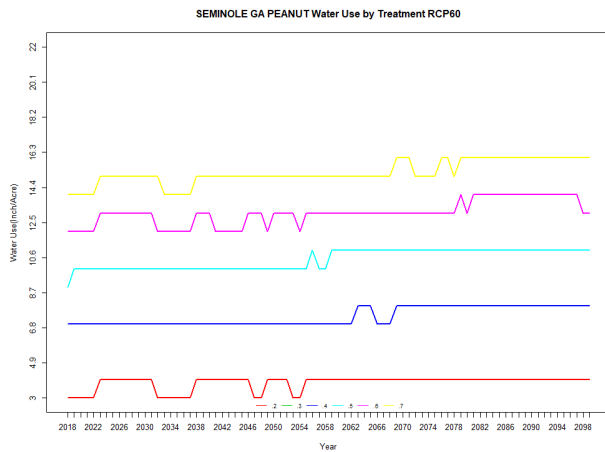
Figure 4.17: Average Simulated Yield by Treatment, Seminole, GA Peanut



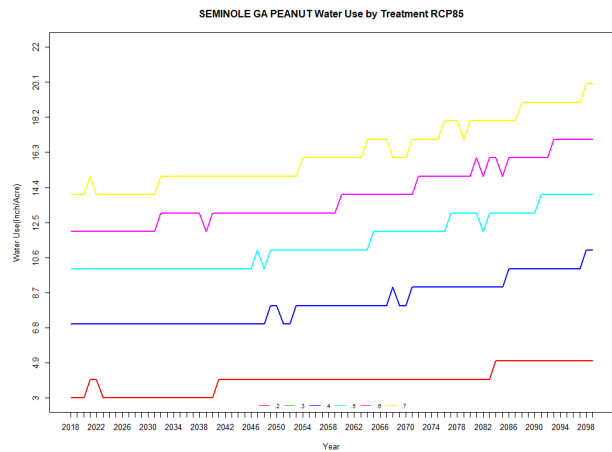
(a) Simulated Water Use Yield-RCP 2.6



(b) Simulated Water Use-RCP 4.5



(c) Simulated Water Use-RCP 6.0



(d) Simulated Water Use-RCP 8.5

Figure 4.18: Average Simulated Water Use by Treatment, Decatur, GA peanut

MAXIMUM YIELD IRRIGATION STRATEGIES

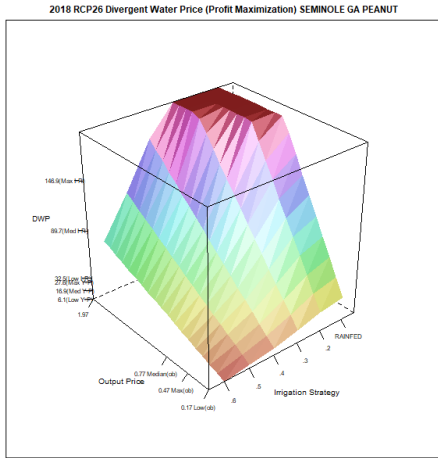
Table 4.14 shows Seminole,GA peanut farmer' yield maximization irrigation strategy for different emission scenarios. For all years and climate projections, the yield maximization strategy is 0.7 across emission scenarios and years. For RCP 2.6 and 4.5, peanut water demand stay the same while for RCP 6.0 water demand increased by 2 inches, for RCP 8.5, peanut water demand increased more than 5 inches.

Table 4.14: Yield Maximization Treatment, Seminole,GA, Peanut

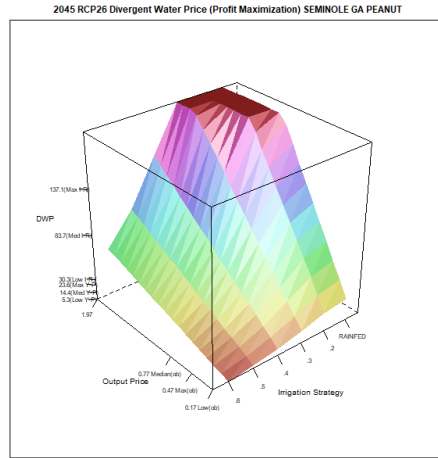
Climate	Year	Irrigation Strategy	Yield(LB/ACRE)	Water Use(INCH/ACRE)
RCP 2.6	2018	.7	5952.92	16.99
	2045	.7	5739.49	17.01
	2072	.7	5747.58	17.25
	2099	.7	5720.72	16.92
RCP 4.5	2018	.7	5816.00	16.94
	2045	.7	5468.51	17.41
	2072	.7	5179.49	17.97
	2099	.7	5146.70	17.54
RCP 6.0	2018	.7	5831.49	16.52
	2045	.7	5612.17	17.25
	2072	.7	5146.36	17.94
	2099	.7	4671.25	18.28
RCP 8.5	2018	.7	5894.00	17.27
	2045	.7	5364.41	17.46
	2072	.7	4385.37	19.44
	2099	.7	3043.43	22.49

DIVERGENT WATER PRICE FOR RISK NEUTRAL FARMERS

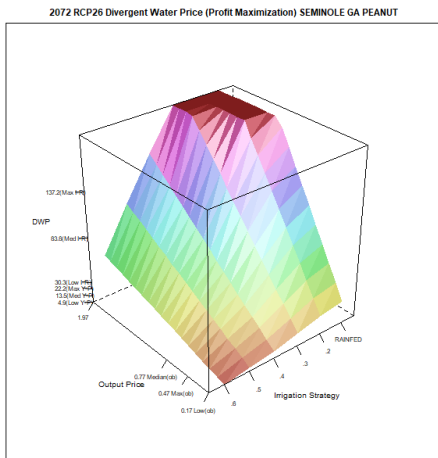
Figure 4.6, 4.7, 4.8 and 4.9 shows the divergent water price for risk neutral farmers by irrigation strategies. The low(ob), medium(ob) and max(ob) in the y-axis are low, medium and maximum observed 30 years historical peanut price from USDA survey.



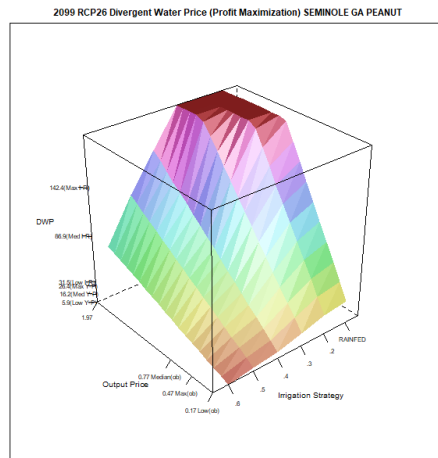
(a) 2018



(b) 2045

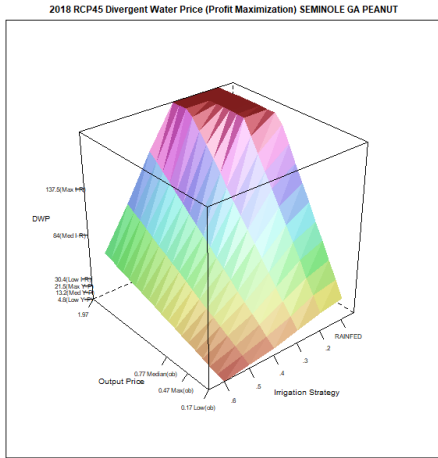


(c) 2072

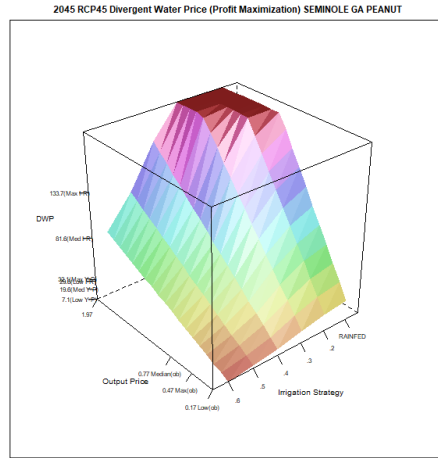


(d) 2099

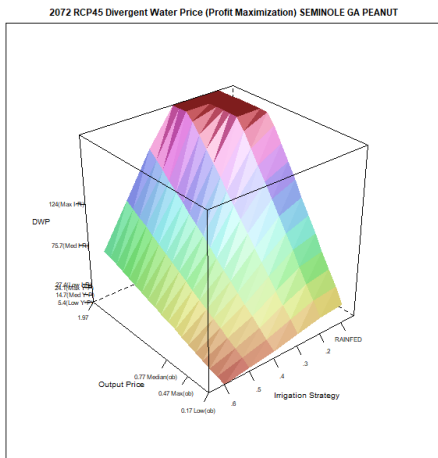
Figure 4.19: Water Use of profit maximizing farmers by irrigation strategies, Decatur, GA, Peanut, RCP 2.6



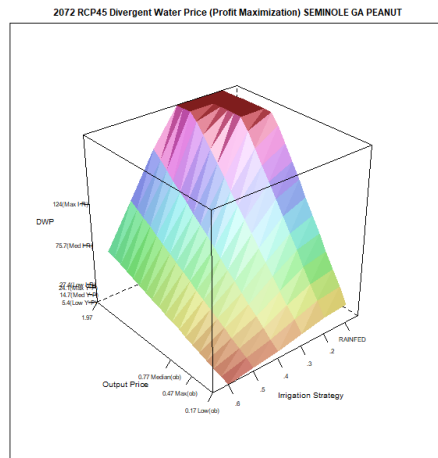
(a) 2018



(b) 2045

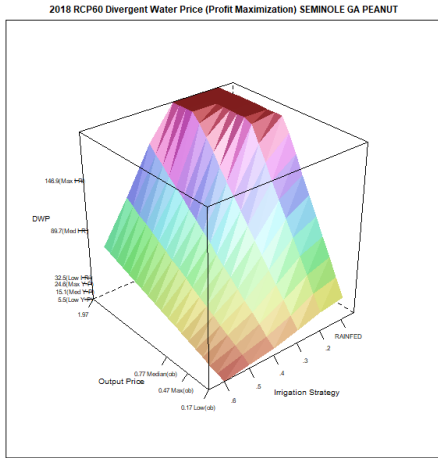


(c) 2072

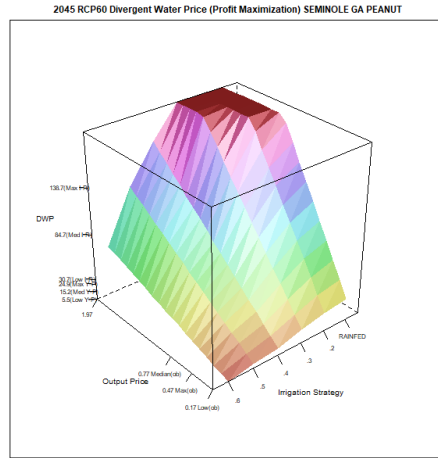


(d) 2099

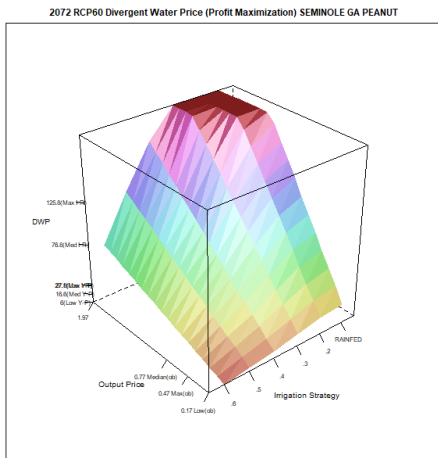
Figure 4.20: Water Use of profit maximizing farmers by irrigation strategies, Decatur, GA, Peanut, RCP 4.5



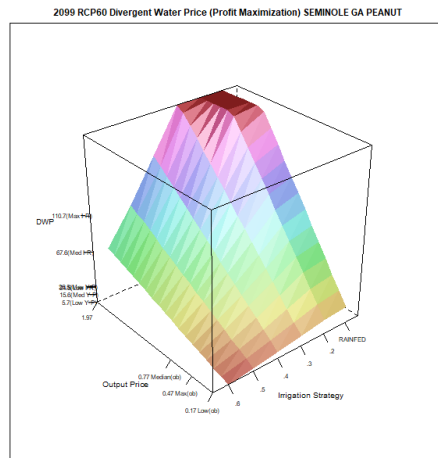
(a) 2018



(b) 2045

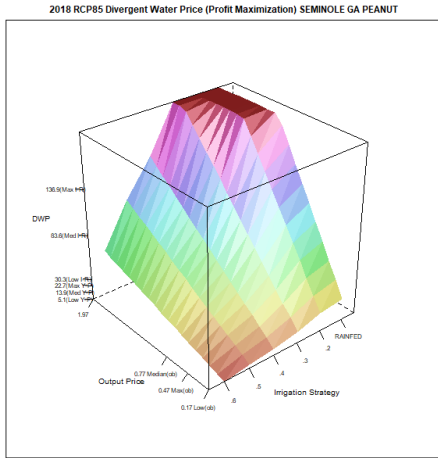


(c) 2072

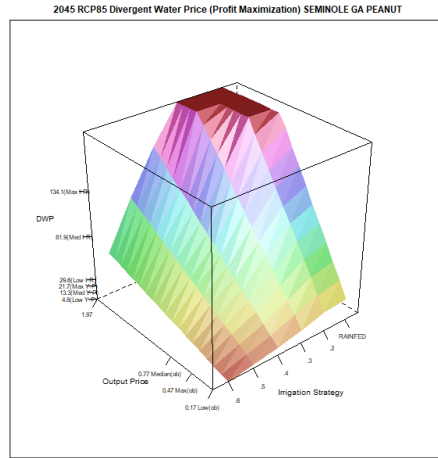


(d) 2099

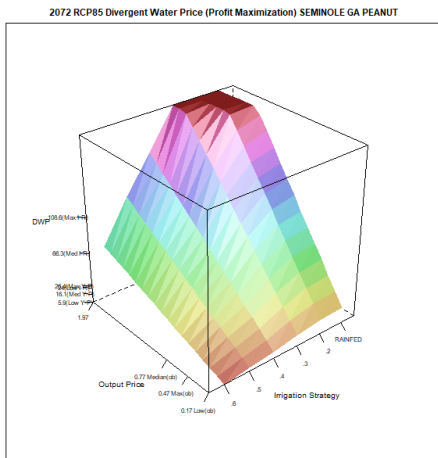
Figure 4.21: Water Use of profit maximizing farmers by irrigation strategies, Decatur, GA, Peanut, RCP 6.0



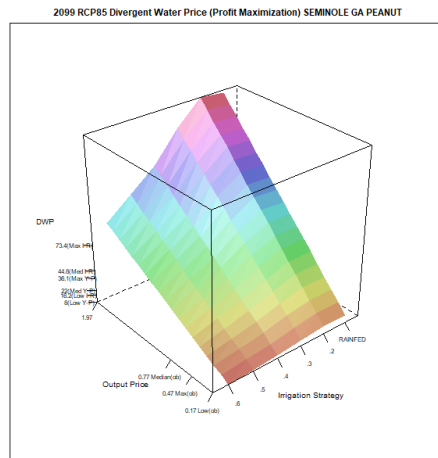
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.22: Water Use of profit maximizing farmers by irrigation strategies, Decatur, GA, Peanut, RCP 8.5

Table 4.15 summarizes the y-p and irr-rf water prices at difference peanut prices and RCPs. For RCP 4.5, 6.0 and 8.5, both irr-rf and y-p prices decrease with time .

Table 4.15: Divergent Water Price of Risk Netural Farmers(Y-P and I-R), Seminole, GA, Peanut

Year	Climate	Form	0.17	0.47	0.77
2018	RCP26	Yield - Profit	6.10	16.90	27.60
2045	RCP26	Yield - Profit	5.30	14.40	23.60
2072	RCP26	Yield - Profit	4.90	13.50	22.20
2099	RCP26	Yield - Profit	5.90	16.20	26.40
2018	RCP45	Yield - Profit	4.80	13.20	21.50
2045	RCP45	Yield - Profit	7.10	19.60	32.10
2072	RCP45	Yield - Profit	5.40	14.70	24.10
2099	RCP45	Yield - Profit	6.00	16.60	27.20
2018	RCP60	Yield - Profit	5.50	15.10	24.60
2045	RCP60	Yield - Profit	5.50	15.20	24.90
2072	RCP60	Yield - Profit	6.00	16.60	27.10
2099	RCP60	Yield - Profit	5.70	15.60	25.50
2018	RCP85	Yield - Profit	5.10	13.90	22.70
2045	RCP85	Yield - Profit	4.80	13.30	21.70
2072	RCP85	Yield - Profit	5.90	16.10	26.40
2099	RCP85	Yield - Profit	8.00	22.00	36.10
2018	RCP26	Irrigated - Rainfed	32.50	89.70	146.90
2045	RCP26	Irrigated - Rainfed	30.30	83.70	137.10
2072	RCP26	Irrigated - Rainfed	30.30	83.80	137.20
2099	RCP26	Irrigated - Rainfed	31.50	86.90	142.40
2018	RCP45	Irrigated - Rainfed	30.40	84.00	137.50
2045	RCP45	Irrigated - Rainfed	29.60	81.60	133.70

2072	RCP45	Irrigated - Rainfed	27.40	75.70	124.00
2099	RCP45	Irrigated - Rainfed	27.10	74.80	122.50
2018	RCP60	Irrigated - Rainfed	32.50	89.70	146.90
2045	RCP60	Irrigated - Rainfed	30.70	84.70	138.70
2072	RCP60	Irrigated - Rainfed	27.80	76.80	125.80
2099	RCP60	Irrigated - Rainfed	24.50	67.60	110.70
2018	RCP85	Irrigated - Rainfed	30.30	83.60	136.90
2045	RCP85	Irrigated - Rainfed	29.60	81.90	134.10
2072	RCP85	Irrigated - Rainfed	24.00	66.30	108.60
2099	RCP85	Irrigated - Rainfed	16.20	44.80	73.40

The table B.5, B.6, B.7 and B.8 in the appendix shows the divergent water price for risk neutral farms.

The divergent water price for yield to profit maximizing strategy decrease over time at RCP 2.6 and RCP 8.5, increased over time for RCP 4.5 and RCP 6.0. The water price drives Seminole peanut farmer switch from irrigated to rain-fed production decrease over time for all emission scenarios.

Table 4.16 shows the difference between water price at which farmer's profit and yield maximizing irrigation strategy diverge and water price at which farmer switch from irrigated to rain-fed production.

For RCP 2.6, at the same price level, divergent water price for risk neutral farmers dropped 4%, while for RCP 4.5 the water price increased 25% for yield and profit maximizing behavior diverge. However, the irrigated to rain-fed water price dropped 11% at low price level, for high price level, the irrigated to rain-fed water price remain the same. For RCP 6.0, the water price drives risk neutral farmers' profit and yield maximization strategy diverge at low price level increased 4%, yet the water price makes farmers switch from irrigated to rain-

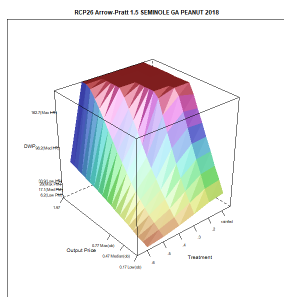
fed production dropped 25% at low price scenario. For RCP 8.5, the water price drives risk neutral farmers' profit and yield maximization strategy diverge at low price level increased 57%, yet the water price makes farmers switch from irrigated to rain-fed production dropped 47% at low price scenario, even at high price scenario it also dropped 6%.

Table 4.16: Difference between divergent water price for risk neutral farmer, SEMINOLE, GA, PEANUT

Climate	TR2018	TR2099	Output Price	2018DWP	2099DWP	Diff
rcp26	.6	.6	0.17	6.10	5.90	-0.20
rcp26	.6	.6	0.47	16.90	16.20	-0.70
rcp26	.6	.6	0.77	27.60	26.40	-1.20
rcp26	RAINFED	RAINFED	0.17	32.50	31.50	-1.00
rcp26	RAINFED	RAINFED	0.47	89.70	86.90	-2.80
rcp26	RAINFED	RAINFED	0.77	146.90	142.40	-4.50
rcp45	.6	.6	0.17	4.80	6.00	1.20
rcp45	.6	.6	0.47	13.20	16.60	3.40
rcp45	.6	.6	0.77	21.50	27.20	5.70
rcp45	RAINFED	RAINFED	0.17	30.40	27.10	-3.30
rcp45	RAINFED	RAINFED	0.47	84.00	74.80	-9.20
rcp45	RAINFED	RAINFED	0.77	137.50	122.50	-15.00
rcp60	.6	.6	0.17	5.50	5.70	0.20
rcp60	.6	.6	0.47	15.10	15.60	0.50
rcp60	.6	.6	0.77	24.60	25.50	0.90
rcp60	RAINFED	RAINFED	0.17	32.50	24.50	-8.00
rcp60	RAINFED	RAINFED	0.47	89.70	67.60	-22.10
rcp60	RAINFED	RAINFED	0.77	146.90	110.70	-36.20
rcp85	.6	.6	0.17	5.10	8.00	2.90
rcp85	.6	.6	0.47	13.90	22.00	8.10
rcp85	.6	.6	0.77	22.70	36.10	13.40
rcp85	RAINFED	RAINFED	0.17	30.30	16.20	-14.10
rcp85	RAINFED	RAINFED	0.47	83.60	44.80	-38.80
rcp85	RAINFED	RAINFED	0.77	136.90	73.40	-63.50

DIVERGENT WATER PRICE FOR RISK AVERSE FARMERS

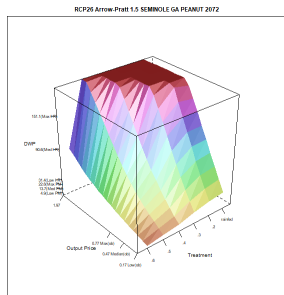
Figure 4.10, 4.11, 4.12 and 4.13 showed the divergent water price of risk averse farmers under $r_a = 1.5$. On average, the divergent water price for switching to rain-fed production increases with output price and decreases with years.



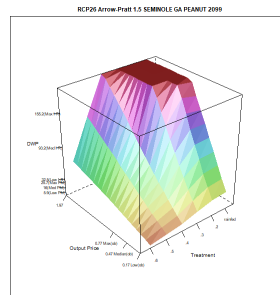
(a) 2018



(b) 2045

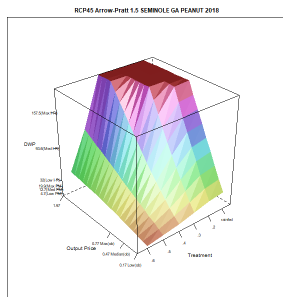


(c) 2072

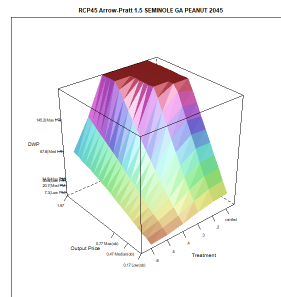


(d) 2099

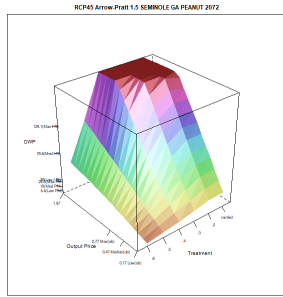
Figure 4.23: Divergent Water Price of Utility Maximization Farmers, Seminole, GA, Peanut $r_a = 1.5$, RCP 2.6



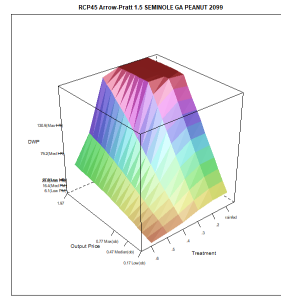
(a) 2018



(b) 2045

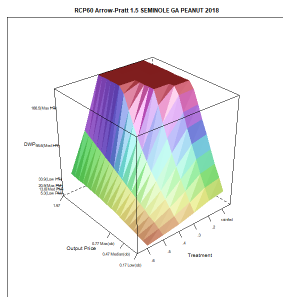


(c) 2072

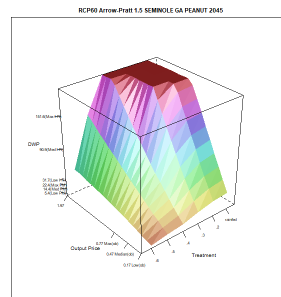


(d) 2099

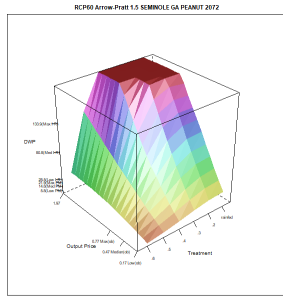
Figure 4.24: Divergent Water Price of Utility Maximization Farmers, Seminole, GA, Peanut $r_a = 1.5$, RCP 4.5



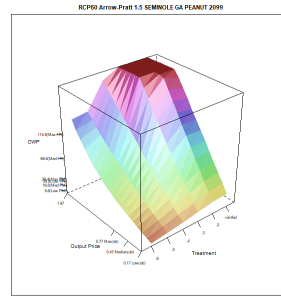
(a) 2018



(b) 2045

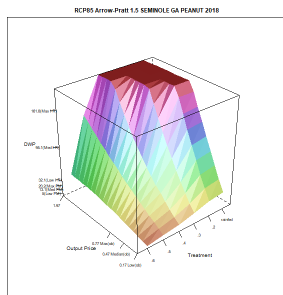


(c) 2072

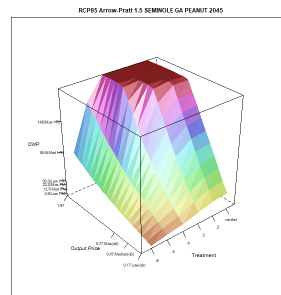


(d) 2099

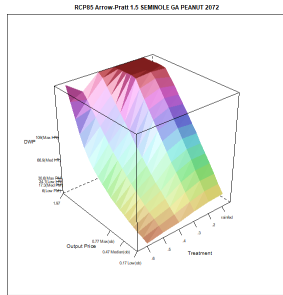
Figure 4.25: Divergent Water Price of Utility Maximization Farmers, Seminole, GA, Peanut $r_a = 1.5$, RCP 6.0



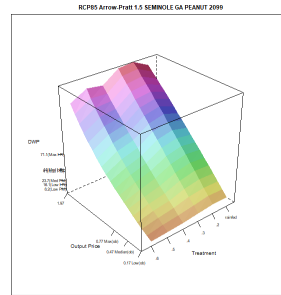
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.26: Divergent Water Price of Utility Maximization Farmers, Seminole, GA, Peanut $r_a = 1.5$, RCP 8.5

Table 4.17 summarizes the y-p and irr-rf water prices for Seminole, GA, risk averse peanuts farmers. The y-p water prices for RCP 4.5, 6.0 and 8.5 increases with time. The irr-rf water prices decreases with time for RCP 6.0 and 8.5.

Table 4.17: Divergent Water Price of Risk Averse Farmers (Y-P and I-R) ,SEMINOLE ,GA ,PEANUT

Year	Climate	Form	0.17	0.47	0.77
2018	RCP26	Yield - Profit	6.20	17.10	28.00
2045	RCP26	Yield - Profit	5.10	13.30	20.00
2072	RCP26	Yield - Profit	4.90	13.70	22.80
2099	RCP26	Yield - Profit	5.90	16.00	25.70
2018	RCP45	Yield - Profit	4.70	12.70	19.90
2045	RCP45	Yield - Profit	7.30	20.70	34.50
2072	RCP45	Yield - Profit	5.40	15.00	24.50
2099	RCP45	Yield - Profit	6.10	16.40	25.80
2018	RCP60	Yield - Profit	5.30	13.80	20.90
2045	RCP60	Yield - Profit	5.40	14.40	22.40
2072	RCP60	Yield - Profit	5.80	14.80	21.90
2099	RCP60	Yield - Profit	5.80	16.80	29.40
2018	RCP85	Yield - Profit	5.00	13.10	20.20
2045	RCP85	Yield - Profit	4.90	13.70	23.20
2072	RCP85	Yield - Profit	6.00	17.30	30.60
2099	RCP85	Yield - Profit	8.20	23.70	41.00
2018	RCP26	Irrigated - Rainfed	33.90	98.20	162.70
2045	RCP26	Irrigated - Rainfed	31.40	91.00	152.40
2072	RCP26	Irrigated - Rainfed	31.40	90.60	151.10
2099	RCP26	Irrigated - Rainfed	32.50	93.20	155.20
2018	RCP45	Irrigated - Rainfed	32.00	93.60	157.50

2045	RCP45	Irrigated - Rainfed	30.60	87.60	145.20
2072	RCP45	Irrigated - Rainfed	28.00	78.80	129.10
2099	RCP45	Irrigated - Rainfed	27.90	79.20	130.90
2018	RCP60	Irrigated - Rainfed	33.90	98.60	166.50
2045	RCP60	Irrigated - Rainfed	31.70	90.90	151.60
2072	RCP60	Irrigated - Rainfed	28.50	80.80	133.90
2099	RCP60	Irrigated - Rainfed	24.80	69.50	114.90
2018	RCP85	Irrigated - Rainfed	32.10	95.10	161.80
2045	RCP85	Irrigated - Rainfed	30.30	85.90	142.00
2072	RCP85	Irrigated - Rainfed	24.10	66.90	109.00
2099	RCP85	Irrigated - Rainfed	16.10	44.00	71.10

Table C.5, C.6, C.7 and C.8 in the appendix shows the optimum maximum expected utility irrigation strategies of risk averse farmers in Decatur, GA. For all emission scenarios, the difference between $\alpha \in \{1.5, 2, 4\}$ is small. The divergent water price that makes yield and profit maximization irrigation strategies different increases with time at same price level for RCP 4.5 and 6.0, decreases with time for RCP 2.6 and 8.5. The divergent water price that makes farmers switch from irrigated to rain-fed production decreases with time for all emission scenarios.

RISK NEUTRAL V.S. RISK AVERSE FARMERS

Table D.5, D.6, D.7 and D.8 in the appendix listed the full comparison divergent water prices between risk neutral and risk averse farmers,

Table 4.18, 4.19, 4.20 and 4.21 listed below only cares about y-p and irr-rf water prices.

Table 4.18: Divergent water price for risk neutral v.s. averse farmers ,SEMINOLE ,GA ,PEANUT ,RCP26

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	6.10	-61.62	6.20	-63.07	0.17
2045	.6	5.30	-84.21	5.10	-81.34	0.17
2018	.6	16.90	1540.90	17.10	1538.00	0.47
2045	.6	14.40	1482.57	13.30	1498.39	0.47
2072	.6	13.50	1498.48	13.70	1495.57	0.47
2099	.6	16.20	1444.87	16.00	1447.77	0.47
2018	.6	27.60	3144.86	28.00	3139.07	0.77
2045	.6	23.60	3047.92	20.00	3099.69	0.77
2072	.6	22.20	3072.90	22.80	3064.15	0.77
2099	.6	26.40	2988.31	25.70	2998.47	0.77
2018	rainfed	32.50	-508.97	33.90	-508.97	0.17
2045	rainfed	30.30	-509.23	31.40	-509.23	0.17
2072	rainfed	30.30	-515.29	31.40	-515.29	0.17
2099	rainfed	31.50	-528.93	32.50	-528.93	0.17
2018	rainfed	89.70	304.61	98.20	304.61	0.47
2045	rainfed	83.70	303.90	91.00	303.90	0.47
2072	rainfed	83.80	287.15	90.60	287.15	0.47
2099	rainfed	86.90	249.43	93.20	249.43	0.47
2018	rainfed	146.90	1118.19	162.70	1118.19	0.77
2045	rainfed	137.10	1117.03	152.40	1117.03	0.77
2072	rainfed	137.20	1089.59	151.10	1089.59	0.77
2099	rainfed	142.40	1027.80	155.20	1027.80	0.77

Table 4.19: Divergent water price for risk neutral v.s. averse farmers ,SEMINOLE ,GA ,PEANUT ,RCP45

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	4.80	-62.42	4.70	-60.97	0.17
2045	.6	7.10	-163.88	7.30	-166.82	0.17
2099	.6	6.00	-200.31	6.10	-201.81	0.17
2018	.6	13.20	1540.22	12.70	1547.42	0.47
2045	.6	19.60	1259.11	20.70	1242.94	0.47
2072	.6	14.70	1200.31	15.00	1195.74	0.47
2099	.6	16.60	1157.79	16.40	1160.80	0.47
2018	.6	21.50	3144.30	19.90	3167.35	0.77
2045	.6	32.10	2682.10	34.50	2646.82	0.77
2072	.6	24.10	2585.36	24.50	2579.26	0.77
2099	.6	27.20	2515.89	25.80	2536.93	0.77
2018	rainfed	30.40	-495.37	32.00	-495.37	0.17
2045	rainfed	29.60	-554.21	30.60	-554.21	0.17
2072	rainfed	27.40	-581.34	28.00	-581.34	0.17
2099	rainfed	27.10	-569.36	27.90	-569.36	0.17
2018	rainfed	84.00	342.22	93.60	342.22	0.47
2045	rainfed	81.60	179.54	87.60	179.54	0.47
2072	rainfed	75.70	104.53	78.80	104.53	0.47
2099	rainfed	74.80	137.64	79.20	137.64	0.47
2018	rainfed	137.50	1179.81	157.50	1179.81	0.77
2045	rainfed	133.70	913.29	145.20	913.29	0.77
2072	rainfed	124.00	790.40	129.10	790.40	0.77
2099	rainfed	122.50	844.64	130.90	844.64	0.77



Table 4.20: Divergent water price for risk neutral v.s. averse farmers ,SEMINOLE ,GA ,PEANUT ,RCP60

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	5.50	-69.31	5.30	-66.51	0.17
2045	.6	5.50	-110.70	5.40	-109.24	0.17
2072	.6	6.00	-202.71	5.80	-199.65	0.17
2099	.6	5.70	-279.93	5.80	-281.50	0.17
2018	.6	15.10	1521.62	13.80	1539.83	0.47
2045	.6	15.20	1405.79	14.40	1417.48	0.47
2072	.6	16.60	1151.15	14.80	1178.73	0.47
2099	.6	15.60	940.35	16.80	921.47	0.47
2018	.6	24.60	3113.96	20.90	3165.79	0.77
2045	.6	24.90	2922.28	22.40	2958.83	0.77
2072	.6	27.10	2506.55	21.90	2586.21	0.77
2099	.6	25.50	2160.62	29.40	2099.27	0.77
2018	rainfed	32.50	-514.04	33.90	-514.04	0.17
2045	rainfed	30.70	-544.02	31.70	-544.02	0.17
2072	rainfed	27.80	-593.00	28.50	-593.00	0.17
2099	rainfed	24.50	-622.47	24.80	-622.47	0.17
2018	rainfed	89.70	290.58	98.60	290.58	0.47
2045	rainfed	84.70	207.70	90.90	207.70	0.47
2072	rainfed	76.80	72.30	80.80	72.30	0.47
2099	rainfed	67.60	-9.19	69.50	-9.19	0.47
2018	rainfed	146.90	1095.21	166.50	1095.21	0.77
2045	rainfed	138.70	959.43	151.60	959.43	0.77
2072	rainfed	125.80	737.61	133.90	737.61	0.77

2099	rainfed	110.70	604.09	114.90	604.09	0.77
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Table 4.21: Divergent water price for risk neutral v.s. averse farmers ,SEMINOLE ,GA ,PEANUT ,RCP85

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	5.10	-55.84	5.00	-54.39	0.17
2045	.6	4.80	-141.79	4.90	-143.29	0.17
2072	.6	5.90	-338.98	6.00	-340.69	0.17
2099	.6	8.00	-632.44	8.20	-636.36	0.17
2018	.6	13.90	1560.28	13.10	1571.85	0.47
2045	.6	13.30	1319.31	13.70	1313.30	0.47
2072	.6	16.10	778.20	17.30	757.68	0.47
2099	.6	22.00	-34.45	23.70	-67.72	0.47
2018	.6	22.70	3176.41	20.20	3212.56	0.77
2045	.6	21.70	2781.91	23.20	2759.38	0.77
2072	.6	26.40	1893.66	30.60	1821.84	0.77
2099	.6	36.10	561.58	41.00	465.69	0.77
2018	rainfed	30.30	-489.73	32.10	-489.73	0.17
2045	rainfed	29.60	-574.85	30.30	-574.85	0.17
2072	rainfed	24.00	-690.30	24.10	-690.30	0.17
2099	rainfed	16.20	-816.96	16.10	-816.96	0.17
2018	rainfed	83.60	357.82	95.10	357.82	0.47
2045	rainfed	81.90	122.47	85.90	122.47	0.47
2072	rainfed	66.30	-196.70	66.90	-196.70	0.47
2099	rainfed	44.80	-546.90	44.00	-546.90	0.47
2018	rainfed	136.90	1205.36	161.80	1205.36	0.77
2045	rainfed	134.10	819.80	142.00	819.80	0.77
2072	rainfed	108.60	296.90	109.00	296.90	0.77

2099	rainfed	73.40	-276.84	71.10	-276.84	0.77
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4.3 SIMULATED SOYBEAN YIELD, WATER USE AND DIVERGENT OUTPUT PRICE BY RCPS AND YEARS

Table 4.22 show the observed cotton yield in selected research stations in 2013, the weighed average ¹ were 517 LB/Acre and 1055 LB/Acre for rain-fed and irrigated upland cotton respectively, the simulated corn yield from DSSAT in year 2018 was lower to the observed average rain-fed yield. The main driver of the difference was the rain-fed cotton yield in Texas, considering in 2013, the cumulative rainfall was only 8 inch in total. The outcome was self-explanatory.

Again simulated DSSAT maximum yield level from DSSAT were 300 Bu/Acre(30%) higher than yield in 2018. For ECP 2.6, the simulated maximum yields were always higher than observed yield. For other RCPs, after mid 21 century, the corn yield became lower than the baseline observed yield.

The changes of temperature and precipitation are not significant for RCP 2.6, yet for RCP 8.5, year 2099 has 5C° increase in temperature along with 4(*Ibch*) decrease in precipitation.

Table 4.22: Soybean Yield 2013 Census

State	Rain-fed Yield(Bu/Acre)	Irrigated Yield
Illinois	49	57
Iowa	49	56

(Source: <https://quickstats.nass.usda.gov/results/44E170CE-42E7-3FE9-BCB1-37114B06E766>)

Table 4.23 shows the average level of simulated cotton yield(rain-fed/yield max), temperature and rainfall over the soybean growing season. For all RCPs, the average rain-fed yield of all research stations follows decrease trend. Especially for RCP 8.5, the rain-yield reduced by 37% while the maximum yield remains stable across RCPs.

¹The mean yield, temperature and precipitation are weighted by 20 years state level harvest acreage

Table 4.23: Mean cotton rain-fed yield, minimum/maximum temperature and precipitation over the growing season

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	59	97	17	30	15	9
2045	56	98	18	31	14	9
2072	59	98	18	31	15	8
2099	54	99	17	31	15	9

RCP 2.6 Low Emission Scenario

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	60	97	17	30	16	9
2045	56	98	18	31	15	9
2072	56	99	18	32	15	9
2099	56	100	19	32	15	9

RCP 4.5 Medium Low Emission Scenario

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	58	97	17	30	15	8
2045	58	98	17	30	15	9
2072	54	100	19	32	14	10
2099	52	100	19	33	14	9

RCP 6.0 Medium Emission Scenario

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	58	97	17	30	16	8
2045	55	99	18	32	15	9
2072	49	101	20	34	14	11
2099	36	100	22	36	13	13

RCP 8.5 High Emission Scenario

The cost of soybean producing in Iowa and Illinois are listed in the following table 4.24, 4.25.

Table 4.24: Cost of soybean producing in Iowa: <https://www.extension.iastate.edu/>

Item	Cost per acre
Seed, Chemicals, etc.	
Seed	\$59.40
cost per unit	
number of units	
Phosphate	\$15.60
price per pound	
pounds per acre	
Potash	\$20.25
price per pound	
pounds per acre	
Lime (annual cost)	\$4.90
Herbicide	\$43.30
Crop insurance	\$8.90
Miscellaneous	\$10.00
Interest on preharvest variable costs	\$6.73
length of period (months)	
interest rate	
Total	\$169.09
Harvest machinery	
Combine	\$12.70
Grain Cart	\$9.40
Haul	\$4.17
Fixed- price per bushel	
Variable- price per bushel	
Handling	\$1.91
Fixed- price per bushel	
Variable- price per bushel	
Custom hire	\$0.00
Total per acre	\$28.17
Total all acres	\$2,817
Operator	\$23.80
Total	\$23.80
Cash rent equivalent	\$219.00
Total Fixed, Variable and All Costs	
Per acre	\$465.36

Table 4.25: Cost of soybean producing in Illinois: <https://web.extension.illinois.edu/state/news.cfm>

Variable Cost	Soybean
ARC/PLC	\$0
Crop insurance proceeds	\$0
Gross revenue	\$713
Fertilizers	\$139
Pesticides	\$71
Seed	\$117
Drying	\$10
Storage	\$10
Crop insurance	\$21
Total direct costs	\$368
Machine hire/lease	\$12
Utilities	\$5
Machine repair	\$20
Fuel and oil	\$14
Light vehicle	\$1
Mach. depreciation	\$62
Total power costs	\$114
Hired labor	\$17
Building repair and rent	\$4
Building depreciation	\$12
Insurance	\$11
Misc	\$8
Interest (non-land)	\$15
Total overhead costs	\$67
Total non-land costs	\$549

4.3.1 SIOUX, IA

Soybean yields were highest in the northern two-thirds of the state Iowa .Sioux located at the northwest corner in Iowa, it ranked the fourth in terms of soybean production. Led by Kossuth Count (13.0 million bushels), Plymouth (11.5 million), Pottawatomie (11.0 million)and followed by Woodbury (9.88 million)[?].

SIMULATED WEATHER

Figure 4.27, 4.28, 4.29 is the average temperature, precipitation simulated from MarkSim. Both maximum and the minimum temperature from the simulation raised along with decrease in cumulative rainfall over the soybean growing season, expect for RCP 2.6. The mean temperature during cotton season in Sioux county raises about 6°C whereas the cumulative precipitation dropped 3 inches for high emission scenario. Table A.6 shows the summary statistics of temperature and precipitation by RCPs. The historical average are from NCDC monthly normals[48].

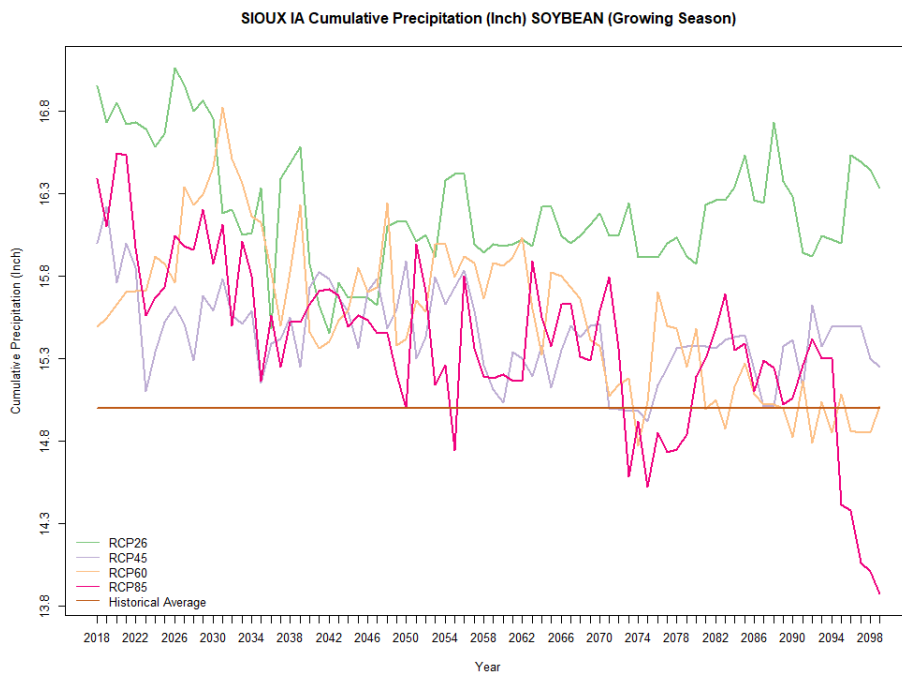


Figure 4.27: Cumulative Rainfall over Soybean Season, Sioux, IA

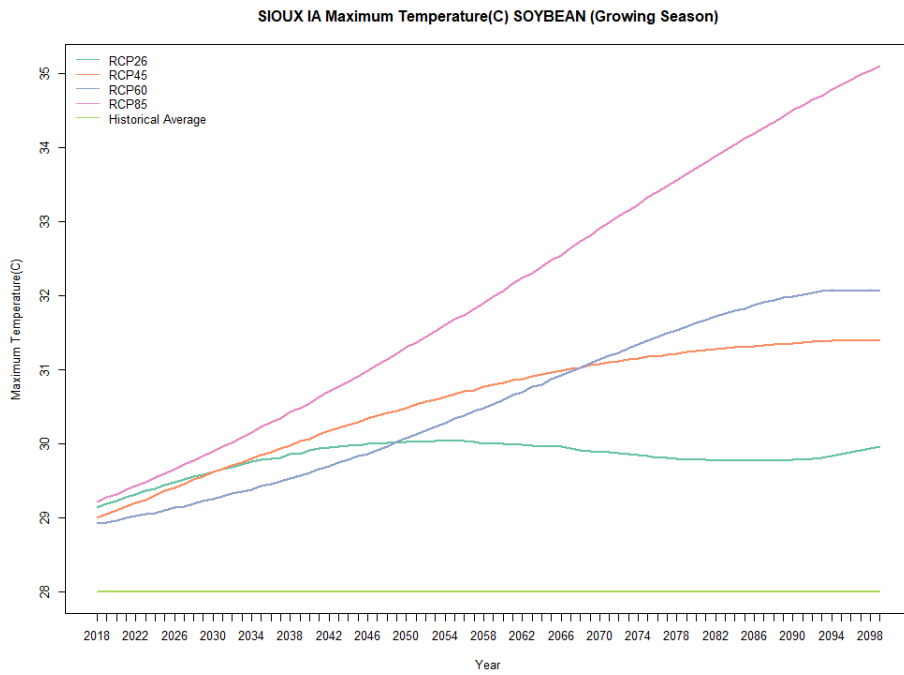


Figure 4.28: Average Maximum Temperature over Soybean Season, Sioux, IA

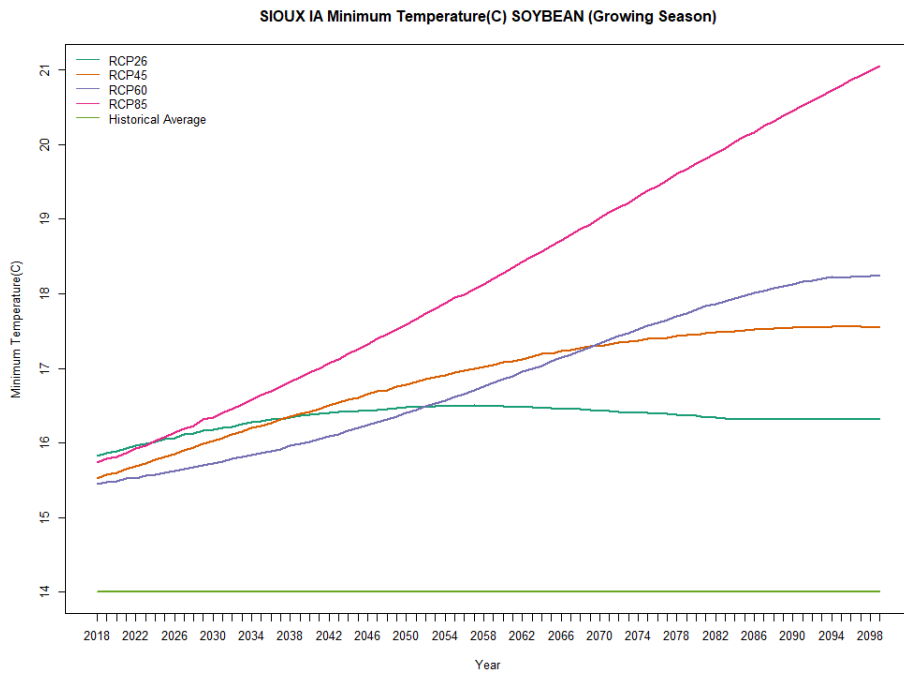
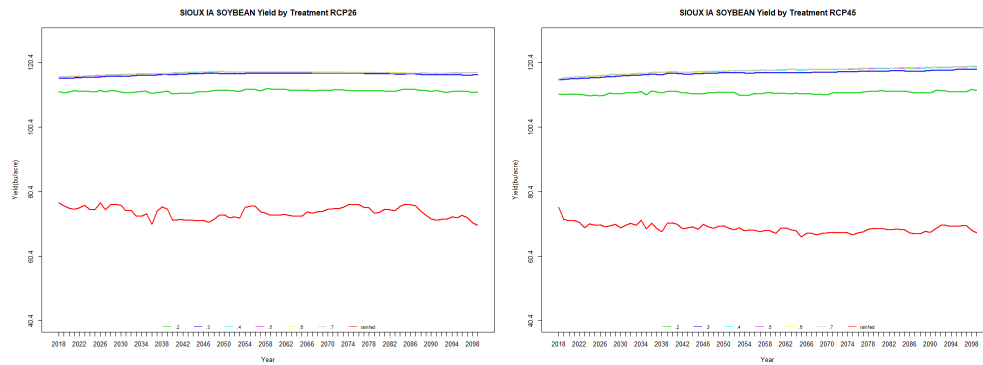


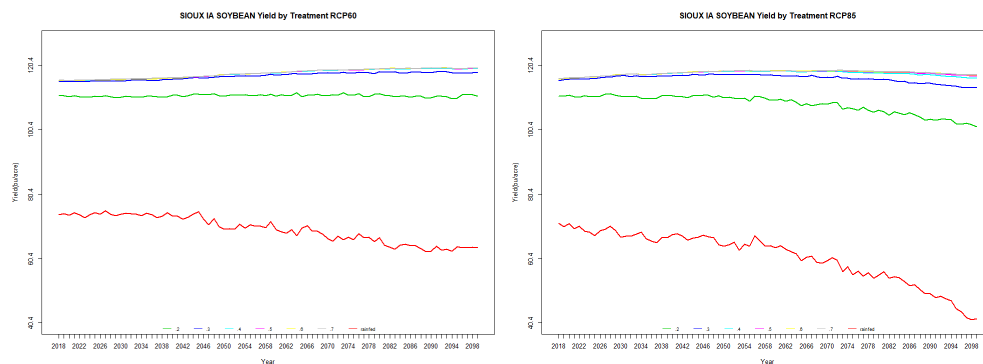
Figure 4.29: Average Minimum Temperature over Soybean Season, Sioux, IA

SIMULATED YIELD AND WATER USE BY IRRIGATION STRATEGIES

As figure 4.30 and 4.31 shows, for Siouxatur county with 6.1 inches of water application the cotton yield increase 42 BU/ACRE on average. The simulated rain-fed yield at 2099 increases 7 BU/ACRE (9%) for RCP 2.6, decreases 7 BU/ACRE (10%), 10 BU/ACRE (13%), 30 BU/ACREE (42%) for RCP 4.5, 6.0 and 8.5 respectively.

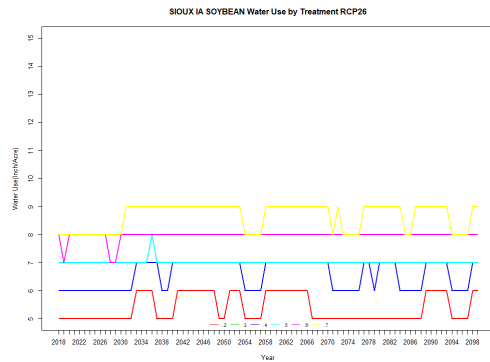


(a) Simulated Soybean Yield-RCP 2.6 (b) Simulated Soybean Yield-RCP 4.5

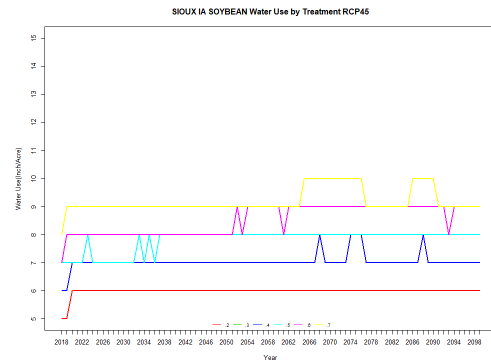


(c) Simulated Soybean Yield-RCP 6.0 (d) Simulated Soybean Yield-RCP 8.5

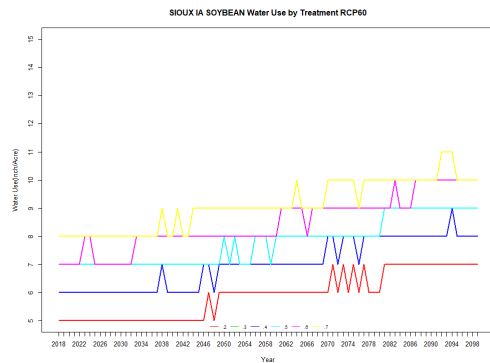
Figure 4.30: Average Simulated Yield by Treatment, Sioux, IA, Soybean



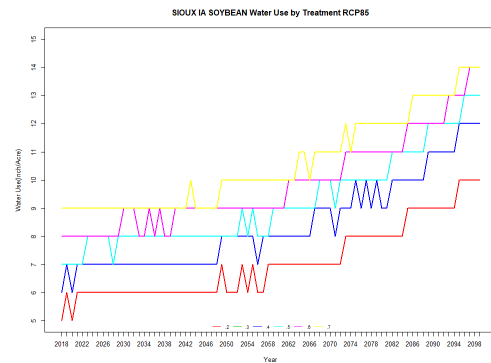
(a) Simulated Soybean Water Use-RCP Yield-RCP 2.6



(b) Simulated Soybean Water Use-RCP 4.5



(c) Simulated Soybean Water Use-RCP 6.0



(d) Simulated Soybean Water Use-RCP 8.5

Figure 4.31: Average Simulated Water Use by Treatment, Sioux, IA, Soybean

MAXIMUM YIELD IRRIGATION STRATEGIES

Table 4.26 shows yield maximization irrigation strategy for Sioux, Iowa soybean farmers. The lowest irrigation strategy level is at 2072, low emission scenario, for RCP 2.6 , 4.5 and 6.0, the irrigation strategy level is lower at the end of 21 century than 2018. For RCP 8.5, the yield maximization scenario remains at 0.7.

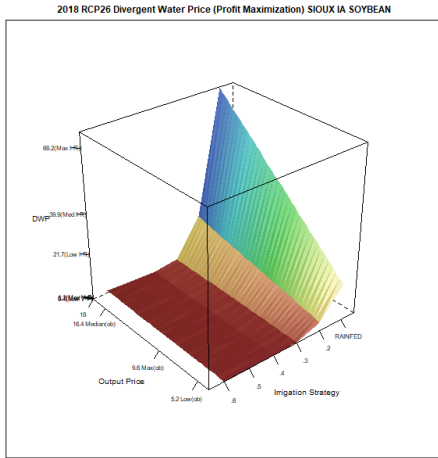
Table 4.26: Yield Maximization Treatment, Sioux,IA, Soybean

Climate	Year	Irrigation Strategy	Yield(LB/ACRE)	Water Use(INCH/ACRE)
RCP 2.6	2018	.7	115.88	9.35
	2045	.6	117.44	8.68
	2072	.5	117.46	7.79
	2099	.6	117.27	8.60
RCP 4.5	2018	.7	115.28	9.09
	2045	.7	117.53	10.08
	2072	.6	118.33	9.54
	2099	.6	119.30	9.45
RCP 6.0	2018	.7	115.81	9.45
	2045	.7	116.88	9.50
	2072	.7	119.01	10.76
	2099	.6	119.50	10.29
RCP 8.5	2018	.7	116.31	9.48
	2045	.7	118.42	10.09
	2072	.7	118.97	11.90
	2099	.7	117.45	15.22

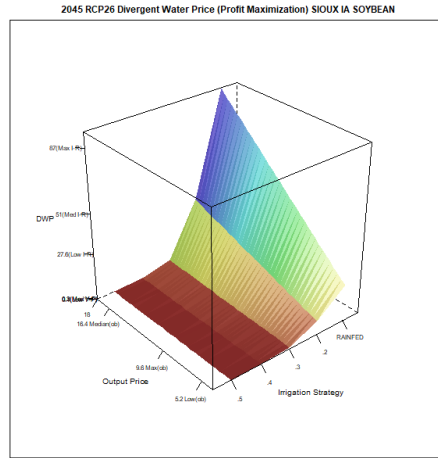
DIVERGENT WATER PRICE OF RISK NEUTRAL FARMERS

Figure 4.32, 4.33, 4.34 and 4.35 shows the divergent water price for risk neutral farmers by irrigation strategies. The low(ob), medium(ob) in the y-axis are low, medium observed 30 years historical soybean price from USDA survey. The divergent water price increases with output prices.

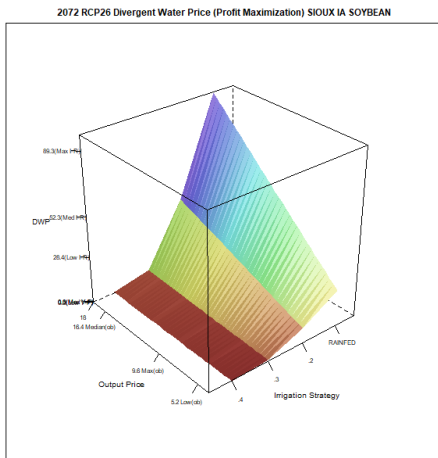
The table 4.27 shows the water price above which farmers' yield and profit maximizing strategy diverge and the water price above which farmer' switch from irrigated - rain-fed production. The divergent water price from yield - profit maximizing are low, for all years,



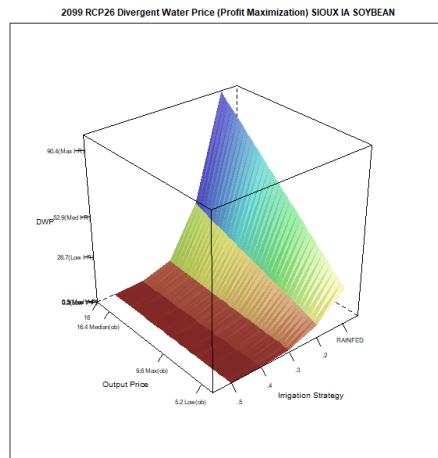
(a) 2018



(b) 2045

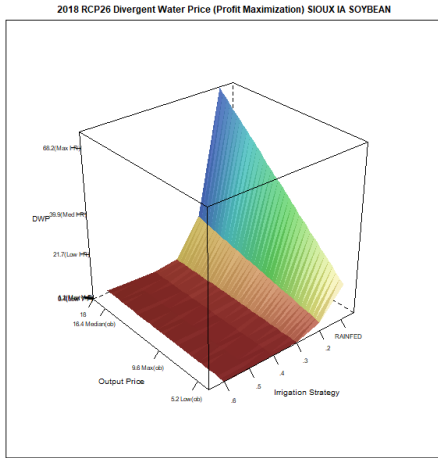


(c) 2072

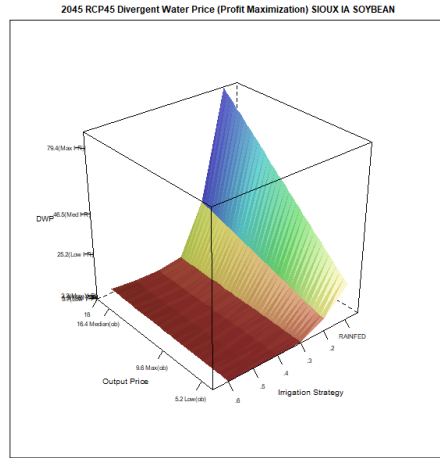


(d) 2099

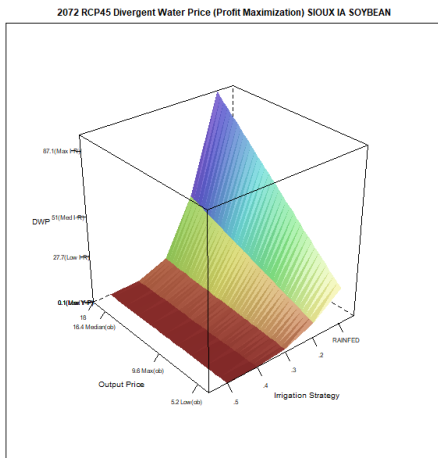
Figure 4.32: Divergent water price of profit maximizing farmers by irrigation strategies, Sioux, IA, Soybean, RCP 2.6



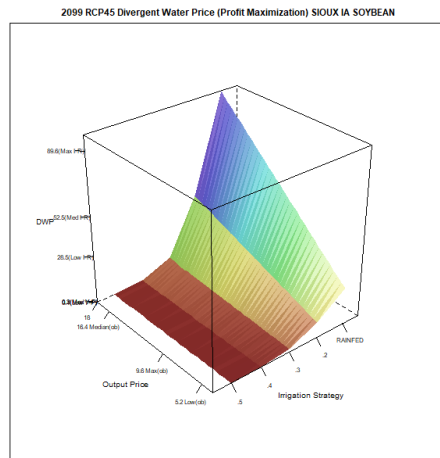
(a) 2018



(b) 2045

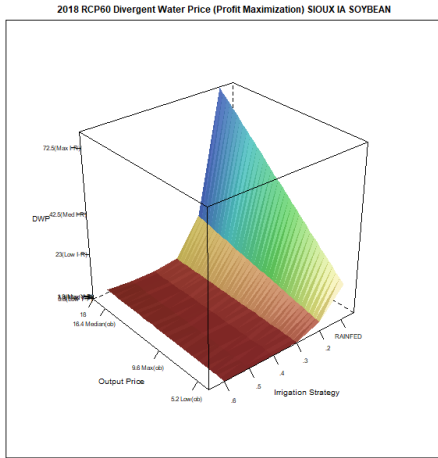


(c) 2072

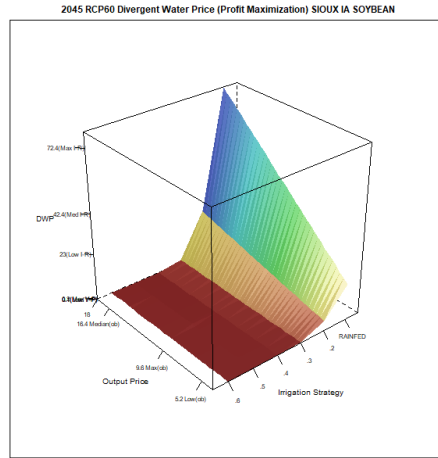


(d) 2099

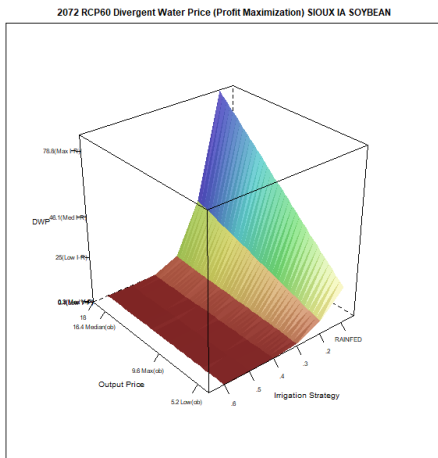
Figure 4.33: Divergent water price of profit maximizing farmers by irrigation strategies, Sioux, IA, Soybean, RCP 4.5



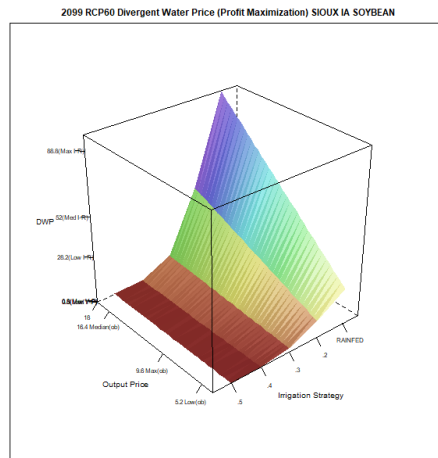
(a) 2018



(b) 2045

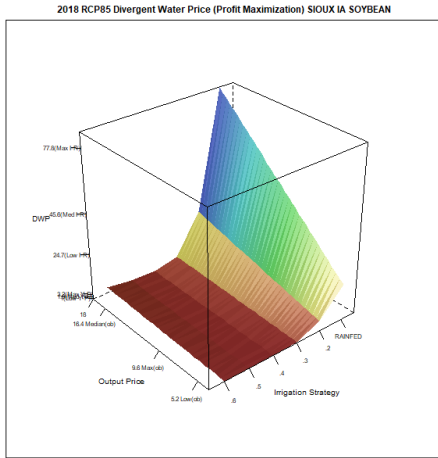


(c) 2072

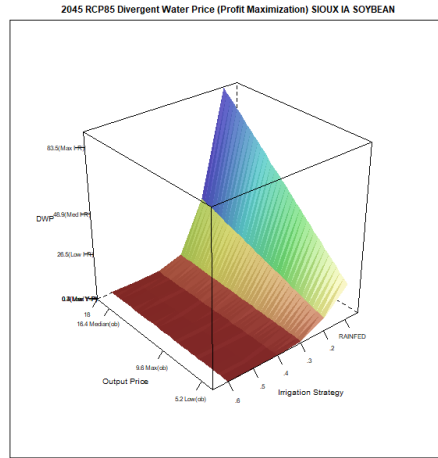


(d) 2099

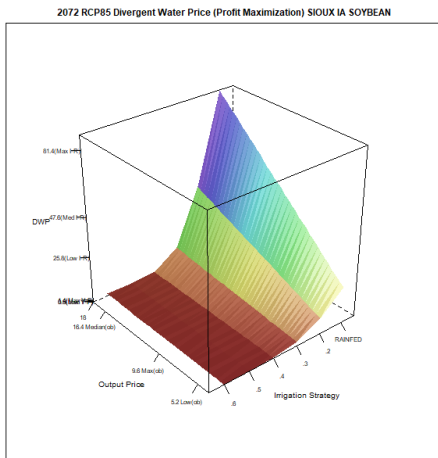
Figure 4.34: Divergent water price of profit maximizing farmers by irrigation strategies, Sioux, IA, Soybean, RCP 6.0



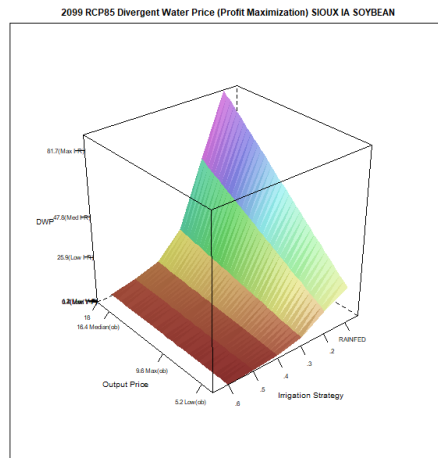
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.35: Divergent water price of profit maximizing farmers by irrigation strategies, Sioux, IA, Soybean, RCP 8.5

prices and emission scenarios, they are below \$2. The irrigated to rain-fed production for Iowa soybean farmers is strictly increasing with output price at the same year and emission

Table 4.27: Divergent Water Price of Risk Netural Farmers(Y-P and I-R), Sioux, IA, Soybean

Year	Climate	Form	5.2	9.6	16.4
2018	RCP26	Yield - Profit	0.40	0.70	1.10
2045	RCP26	Yield - Profit	0.10	0.20	0.30
2072	RCP26	Yield - Profit	0.20	0.30	0.60
2099	RCP26	Yield - Profit	0.20	0.30	0.50
2018	RCP45	Yield - Profit	0.20	0.30	0.50
2045	RCP45	Yield - Profit	0.70	1.30	2.20
2072	RCP45	Yield - Profit	0.10	0.10	0.10
2099	RCP45	Yield - Profit	0.10	0.20	0.30
2018	RCP60	Yield - Profit	0.60	1.10	1.80
2045	RCP60	Yield - Profit	0.10	0.10	0.20
2072	RCP60	Yield - Profit	0.10	0.20	0.30
2099	RCP60	Yield - Profit	0.30	0.50	0.80
2018	RCP85	Yield - Profit	1.00	1.90	3.20
2045	RCP85	Yield - Profit	0.30	0.40	0.70
2072	RCP85	Yield - Profit	0.50	0.90	1.40
2099	RCP85	Yield - Profit	0.40	0.70	1.20
2018	RCP26	Irrigated - Rainfed	21.70	39.90	68.20
2045	RCP26	Irrigated - Rainfed	27.60	51.00	87.00
2072	RCP26	Irrigated - Rainfed	28.40	52.30	89.30
2099	RCP26	Irrigated - Rainfed	28.70	52.90	90.40
2018	RCP45	Irrigated - Rainfed	22.70	41.90	71.60
2045	RCP45	Irrigated - Rainfed	25.20	46.50	79.40
2072	RCP45	Irrigated - Rainfed	27.70	51.00	87.10

2099	RCP45	Irrigated - Rainfed	28.50	52.50	89.60
2018	RCP60	Irrigated - Rainfed	23.00	42.50	72.50
2045	RCP60	Irrigated - Rainfed	23.00	42.40	72.40
2072	RCP60	Irrigated - Rainfed	25.00	46.10	78.80
2099	RCP60	Irrigated - Rainfed	28.20	52.00	88.80
2018	RCP85	Irrigated - Rainfed	24.70	45.60	77.80
2045	RCP85	Irrigated - Rainfed	26.50	48.90	83.50
2072	RCP85	Irrigated - Rainfed	25.80	47.60	81.40
2099	RCP85	Irrigated - Rainfed	25.90	47.80	81.70

The table B.9, B.10, B.11 and B.12 in the appendix shows the divergent water price for risk neutral farms, the water price makes farmer's profit maximizing and yield maximizing diverge decreases for all emission scenarios, but the difference at across all price levels are within \$2.5. The change water price makes farmer switch from irrigated production to rain-fed increases for all emission scenarios. The TR, MRR, DWP, DW and OP stands for irrigation strategies, maximum yield strategy, divergent water price and water saving compared to yield maximum strategy and output price.

Table 4.28 shows the divergent water prices at 2018 and 2088. The p-m water price at 2099 is less than 2018, but the changes are less than \$2. The irr-rf water price increases at 2088, but the amount of difference at high emission scenarios is less than low emission scenarios, induced by yield reduction and soybean water demand increment.

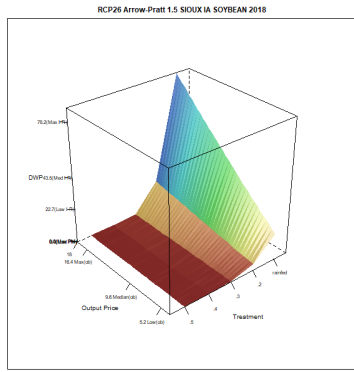
DIVERGENT WATER PRICE OF RISK AVERSE FARMERS

Figure 4.36, 4.37, 4.38 and 4.39 shows the divergent water price for risk averse farmers by irrigation strategies. The low(ob), medium(ob) and max(ob) in the y-axis are low, medium and maximum observed 30 years historical soybean price from USDA survey. The low, median

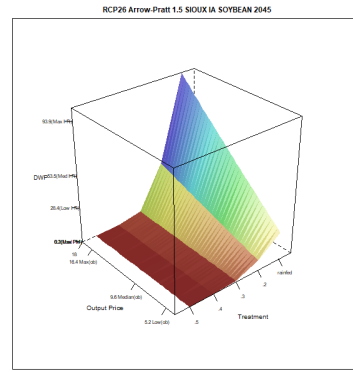
Table 4.28: Difference between divergent water price for risk neutral farmer,SIOUX,IA,SOYBEAN

Climate	TR2018	TR2099	Output Price	2018DWP	2099DWP	Diff
rcp26	.6	.5	5.20	0.40	0.20	-0.20
rcp26	.6	.5	9.60	0.70	0.30	-0.40
rcp26	.6	.5	16.40	1.10	0.50	-0.60
rcp26	RAINFED	RAINFED	5.20	21.70	28.70	7.00
rcp26	RAINFED	RAINFED	9.60	39.90	52.90	13.00
rcp26	RAINFED	RAINFED	16.40	68.20	90.40	22.20
rcp45	.6	.5	5.20	0.20	0.10	-0.10
rcp45	.6	.5	9.60	0.30	0.20	-0.10
rcp45	.6	.5	16.40	0.50	0.30	-0.20
rcp45	RAINFED	RAINFED	5.20	22.70	28.50	5.80
rcp45	RAINFED	RAINFED	9.60	41.90	52.50	10.60
rcp45	RAINFED	RAINFED	16.40	71.60	89.60	18.00
rcp60	.6	.5	5.20	0.60	0.30	-0.30
rcp60	.6	.5	9.60	1.10	0.50	-0.60
rcp60	.6	.5	16.40	1.80	0.80	-1.00
rcp60	RAINFED	RAINFED	5.20	23.00	28.20	5.20
rcp60	RAINFED	RAINFED	9.60	42.50	52.00	9.50
rcp60	RAINFED	RAINFED	16.40	72.50	88.80	16.30
rcp85	.6	.6	5.20	1.00	0.40	-0.60
rcp85	.6	.6	9.60	1.90	0.70	-1.20
rcp85	.6	.6	16.40	3.20	1.20	-2.00
rcp85	RAINFED	RAINFED	5.20	24.70	25.90	1.20
rcp85	RAINFED	RAINFED	9.60	45.60	47.80	2.20
rcp85	RAINFED	RAINFED	16.40	77.80	81.70	3.90

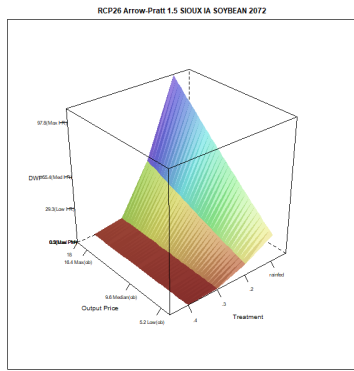
and max on the z axis are the divergent water price ($y-p$, irr-rf) associate with each observed low, median and high output price.



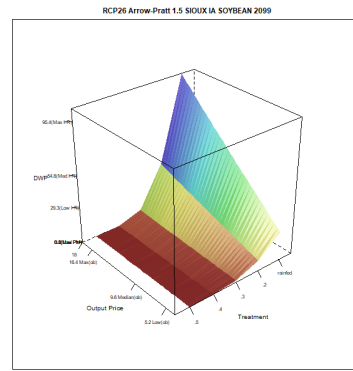
(a) 2018



(b) 2045

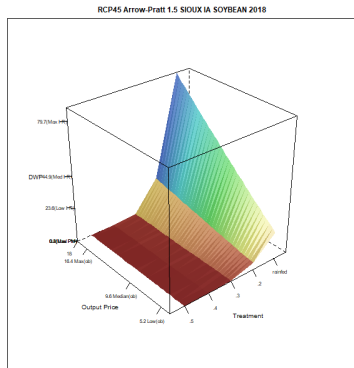


(c) 2072

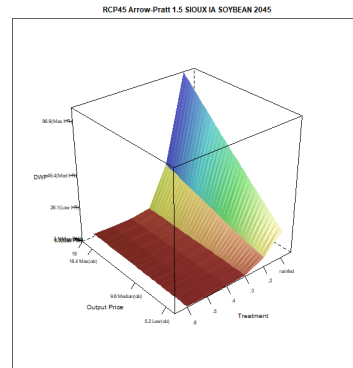


(d) 2099

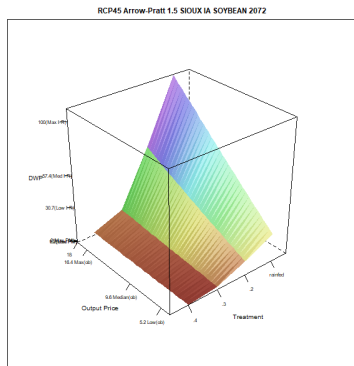
Figure 4.36: Divergent water price for utility maximizing farmers by irrigation strategies, Sioux, IA, Soybean, RCP 2.6



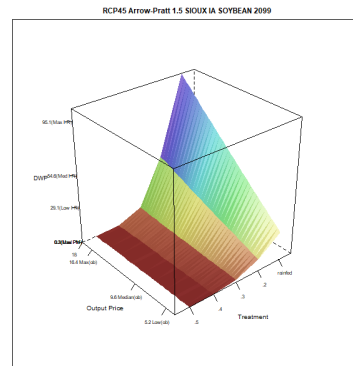
(a) 2018



(b) 2045

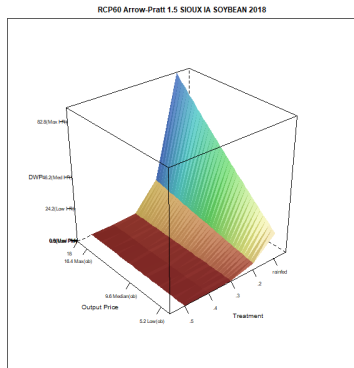


(c) 2072

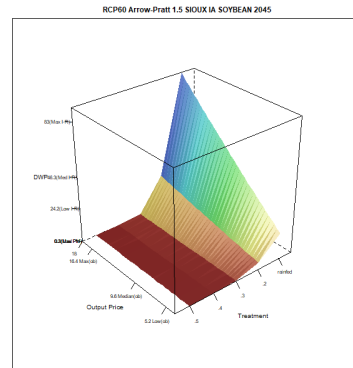


(d) 2099

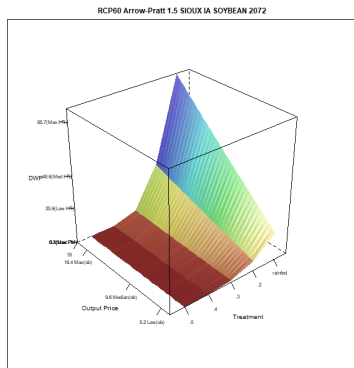
Figure 4.37: Divergent water price for utility maximizing farmers by irrigation strategies, Sioux, IA, Soybean, RCP 4.5



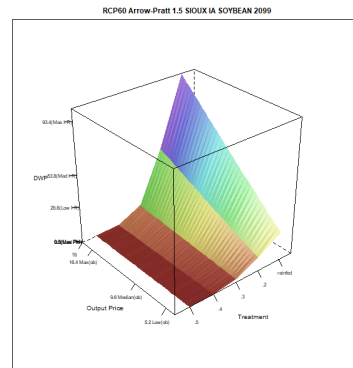
(a) 2018



(b) 2045

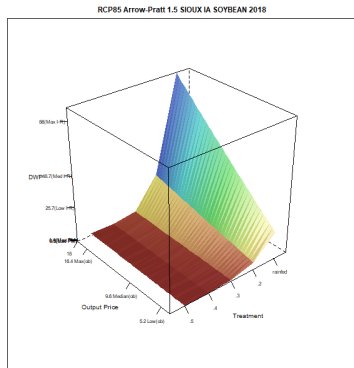


(c) 2072

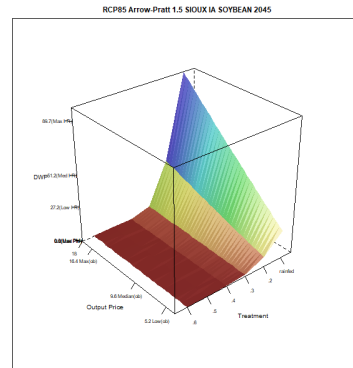


(d) 2099

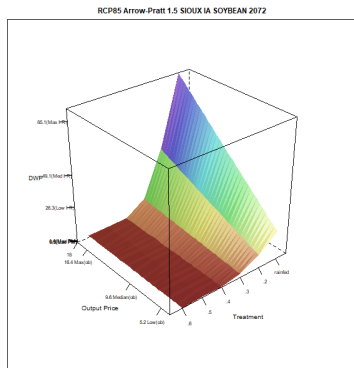
Figure 4.38: Divergent Water price for utility maximizing farmers by irrigation strategies, Sioux, IA, Soybean, RCP 6.0



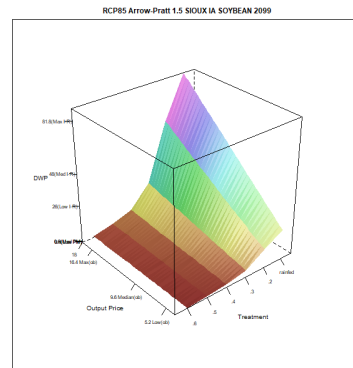
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.39: Divergent water price for utility maximizing farmers by irrigation strategies, Sioux, IA, Soybean, RCP 8.5

Table 4.29 only the y-p and irr-rf water price for risk averse farmers in Sioux, IA. The y-p water price are lower than \$2 across all emission scenarios and output price. The irr-rf water prices are more sensitive to soybean prices, at high soybean price level, the irr-rf are above \$70 all the time.

Table 4.29: Divergent Water Price of Risk Averse Farmers(Y-P and I-R) ,SIOUX ,IA ,SOY-BEAN

Year	Climate	Form	5.2	9.6	16.4
2018	RCP26	Yield - Profit	0.40	0.60	0.80
2045	RCP26	Yield - Profit	0.10	0.20	0.20
2072	RCP26	Yield - Profit	0.20	0.30	0.50
2099	RCP26	Yield - Profit	0.20	0.30	0.40
2018	RCP45	Yield - Profit	0.20	0.30	0.60
2045	RCP45	Yield - Profit	0.70	1.30	2.10
2072	RCP45	Yield - Profit	0.70	1.20	2.00
2099	RCP45	Yield - Profit	0.10	0.20	0.30
2018	RCP60	Yield - Profit	0.60	1.00	1.60
2045	RCP60	Yield - Profit	0.10	0.10	0.30
2072	RCP60	Yield - Profit	0.10	0.20	0.30
2099	RCP60	Yield - Profit	0.30	0.50	0.80
2018	RCP85	Yield - Profit	1.00	1.80	2.80
2045	RCP85	Yield - Profit	0.20	0.40	0.60
2072	RCP85	Yield - Profit	0.50	0.90	1.40
2099	RCP85	Yield - Profit	0.40	0.60	0.90
2018	RCP26	Irrigated - Rainfed	22.70	43.50	78.20
2045	RCP26	Irrigated - Rainfed	28.40	53.50	93.90
2072	RCP26	Irrigated - Rainfed	29.30	55.40	97.80
2099	RCP26	Irrigated - Rainfed	29.30	54.80	95.40

2018	RCP45	Irrigated - Rainfed	23.60	44.90	79.70
2045	RCP45	Irrigated - Rainfed	26.10	49.40	86.90
2072	RCP45	Irrigated - Rainfed	30.70	57.40	100.00
2099	RCP45	Irrigated - Rainfed	29.10	54.60	95.10
2018	RCP60	Irrigated - Rainfed	24.20	46.20	82.80
2045	RCP60	Irrigated - Rainfed	24.20	46.30	83.00
2072	RCP60	Irrigated - Rainfed	25.90	48.90	85.70
2099	RCP60	Irrigated - Rainfed	28.80	53.80	93.40
2018	RCP85	Irrigated - Rainfed	25.70	48.70	86.00
2045	RCP85	Irrigated - Rainfed	27.20	51.20	89.70
2072	RCP85	Irrigated - Rainfed	26.30	49.10	85.10
2099	RCP85	Irrigated - Rainfed	26.00	48.00	81.80

Table C.9, C.10, C.11, C.12 in the appendix shows the divergent water price at each level of irrigation strategies. The DWP are the same across different level of risk aversion.

RISK NETURAL V.S RISK AVERSE FARMERS

Table D.9, D.10, D.11, D.12 in the appendix compared the difference of divergent water prices between soybean farmers in Iowa at holding irrigation strategies the same. The y-m and irr-rf water price is very close between risk averse and risk neutral farmer. For y-m water price, the sign of difference is not consistent across emission scenarios and years. Yet irr-rf water price risk averse farmer are always higher across emission scenarios and years.

Table 4.30, 4.31, 4.32, 4.33 listed below only focus on y-p and irr-rf water prices.

Table 4.30: Divergent water price for risk neutral v.s. averse farmers ,SIOUX ,IA ,SOYBEAN ,RCP26

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	0.70	590.95	0.60	591.77	9.60
2018	.6	1.10	1375.11	0.80	1377.57	16.40
2045	.5	0.30	1408.42	0.20	1409.23	16.40
2099	.5	0.50	1403.95	0.40	1404.74	16.40
2018	rainfed	21.70	-114.55	22.70	-114.55	5.20
2045	rainfed	27.60	-143.67	28.40	-143.67	5.20
2072	rainfed	28.40	-124.74	29.30	-124.74	5.20
2099	rainfed	28.70	-151.52	29.30	-151.52	5.20
2018	rainfed	39.90	224.30	43.50	224.30	9.60
2045	rainfed	51.00	170.54	53.50	170.54	9.60
2072	rainfed	52.30	205.48	55.40	205.48	9.60
2099	rainfed	52.90	156.04	54.80	156.04	9.60
2018	rainfed	68.20	747.96	78.20	747.96	16.40
2045	rainfed	87.00	656.12	93.90	656.12	16.40
2072	rainfed	89.30	715.82	97.80	715.82	16.40
2099	rainfed	90.40	631.36	95.40	631.36	16.40

Table 4.31: Divergent water price for risk neutral v.s. averse farmers ,SIOUX ,IA ,SOYBEAN ,RCP45

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	0.50	1371.27	0.60	1370.48	16.40
2045	.6	2.20	1390.27	2.10	1391.19	16.40
2045	.5	0.80	605.43	0.70	606.27	9.60
2018	.4	0.10	83.58	0.20	82.91	5.20
2072	.4	0.40	96.62	0.70	94.21	5.20
2018	.4	0.20	589.97	0.30	589.30	9.60
2072	.4	0.60	615.27	1.20	610.43	9.60
2018	rainfed	22.70	-121.78	23.60	-121.78	5.20
2045	rainfed	25.20	-157.66	26.10	-157.66	5.20
2072	rainfed	27.70	-162.91	30.70	-162.91	5.20
2099	rainfed	28.50	-163.06	29.10	-163.06	5.20
2018	rainfed	41.90	210.95	44.90	210.95	9.60
2045	rainfed	46.50	144.71	49.40	144.71	9.60
2072	rainfed	51.00	135.02	57.40	135.02	9.60
2099	rainfed	52.50	134.73	54.60	134.73	9.60
2018	rainfed	71.60	725.17	79.70	725.17	16.40
2045	rainfed	79.40	612.01	86.90	612.01	16.40
2072	rainfed	87.10	595.44	100.00	595.44	16.40
2099	rainfed	89.60	594.95	95.10	594.95	16.40

Table 4.32: Divergent water price for risk neutral v.s. averse farmers ,SIOUX ,IA ,SOYBEAN ,RCP60

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	1.10	586.50	1.00	587.34	9.60
2018	.6	1.80	1367.40	1.60	1369.07	16.40
2045	.6	0.20	1399.96	0.30	1399.11	16.40
2099	.3	9.60	1346.25	9.50	1347.07	16.40
2018	rainfed	23.00	-129.99	24.20	-129.99	5.20
2045	rainfed	23.00	-125.21	24.20	-125.21	5.20
2072	rainfed	25.00	-164.94	25.90	-164.94	5.20
2099	rainfed	28.20	-183.14	28.80	-183.14	5.20
2018	rainfed	42.50	195.78	46.20	195.78	9.60
2045	rainfed	42.40	204.62	46.30	204.62	9.60
2072	rainfed	46.10	131.27	48.90	131.27	9.60
2099	rainfed	52.00	97.67	53.80	97.67	9.60
2018	rainfed	72.50	699.26	82.80	699.26	16.40
2045	rainfed	72.40	714.34	83.00	714.34	16.40
2072	rainfed	78.80	589.05	85.70	589.05	16.40
2099	rainfed	88.80	531.65	93.40	531.65	16.40

Table 4.33: Divergent water price for risk neutral v.s. averse farmers ,SIOUX ,IA ,SOYBEAN ,RCP85

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2045	.6	0.30	97.81	0.20	98.73	5.20
2018	.6	1.90	583.53	1.80	584.40	9.60
2099	.6	0.70	601.95	0.60	603.38	9.60
2018	.6	3.20	1362.05	2.80	1365.53	16.40
2045	.6	0.70	1419.98	0.60	1420.91	16.40
2099	.6	1.20	1393.06	0.90	1397.34	16.40
2018	rainfed	24.70	-143.98	25.70	-143.98	5.20
2045	rainfed	26.50	-166.13	27.20	-166.13	5.20
2072	rainfed	25.80	-203.31	26.30	-203.31	5.20
2099	rainfed	25.90	-298.16	26.00	-298.16	5.20
2018	rainfed	45.60	169.96	48.70	169.96	9.60
2045	rainfed	48.90	129.06	51.20	129.06	9.60
2072	rainfed	47.60	60.42	49.10	60.42	9.60
2099	rainfed	47.80	-114.68	48.00	-114.68	9.60
2018	rainfed	77.80	655.14	86.00	655.14	16.40
2045	rainfed	83.50	585.28	89.70	585.28	16.40
2072	rainfed	81.40	468.02	85.10	468.02	16.40
2099	rainfed	81.70	168.88	81.80	168.88	16.40

4.3.2 PIATT, IL

Figure 4.40, 4.41, 4.42 is the average temperature, precipitation simulated from MarkSim. Both maximum and the minimum temperature from the simulation raised along

with decrease in cumulative rainfall over the soybean growing season, expect for RCP 2.6. The mean temperature during cotton season in Piatt county raises about 5°C whereas the cumulative precipitation dropped 2 inches for high emission scenario. Table A.7 shows the summary statistics of temperature and precipitation by RCPs. The historical average are from NCDC monthly normals[48].

SIMULATED WEATHER

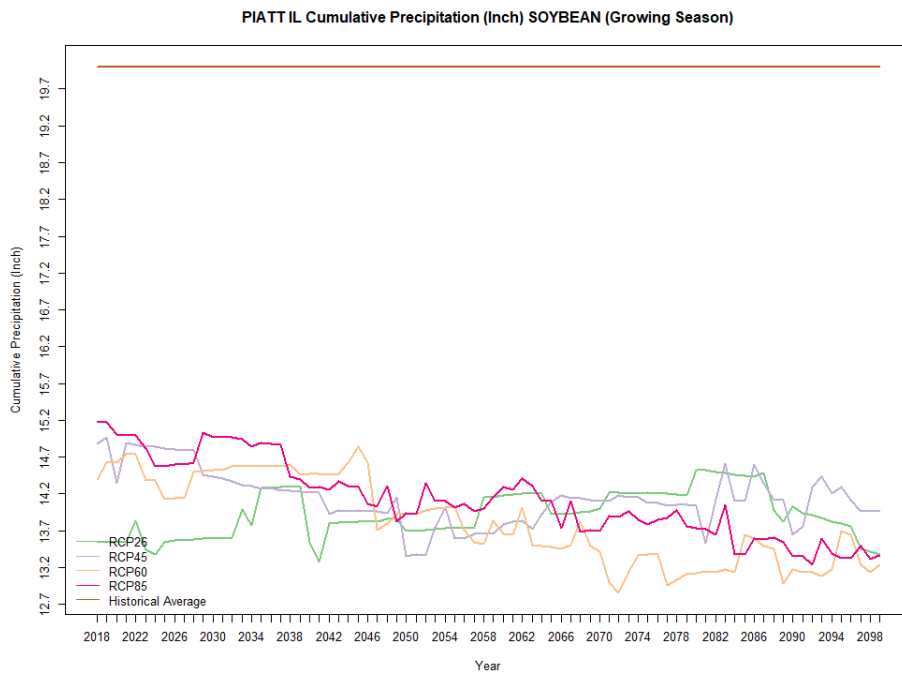


Figure 4.40: Cumulative Rainfall over Soybean Season, Piatt, IL

SIMULATED YIELD AND WATER USE BY IRRIGATION STRATEGIES

As figure 4.43 and 4.44 shows, for Piatt county, there are no significant differences between higher level of irrigation strategies(.4-.7), with 2.8 inches of water application the cotton yield increase 17 BU/ACRE on average. The simulated rain-fed yield at 2099 increases 3 BU/ACRE (7%) for RCP 2.6, decreases 0.5 BU/ACRE (1%),3 BU/ACRE (6%), 15 BU/ACREE (31%) for RCP 4.5, 6.0 and 8.5 respectively.

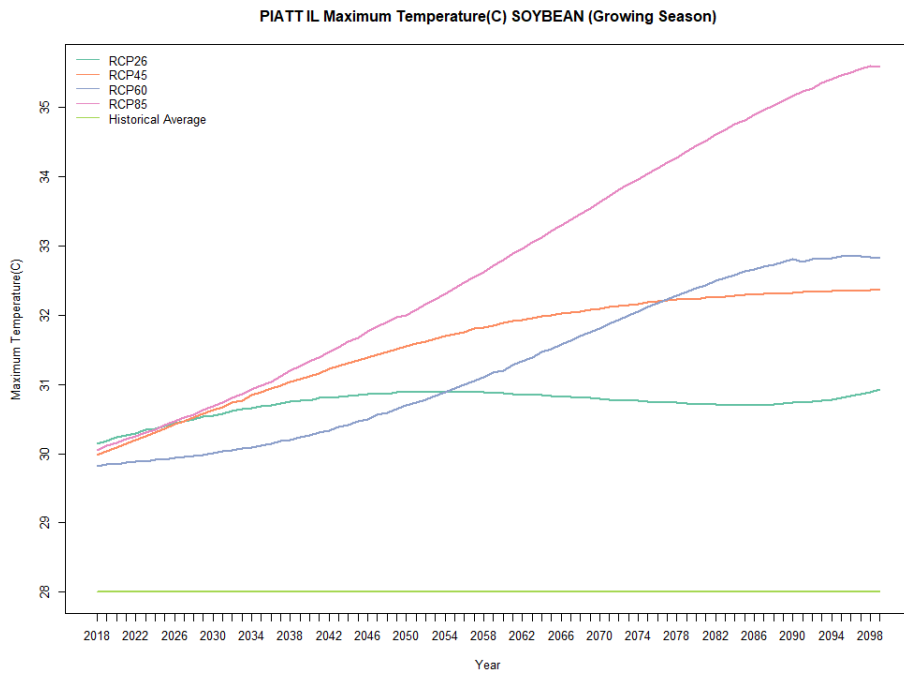


Figure 4.41: Average Maximum Temperature over Soybean Season, Piatt, IL

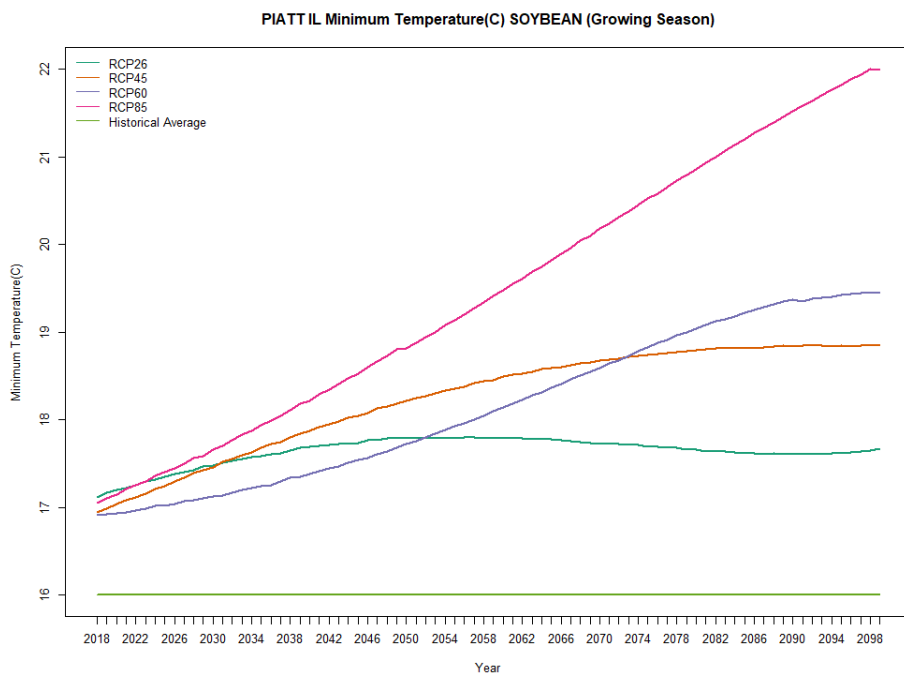
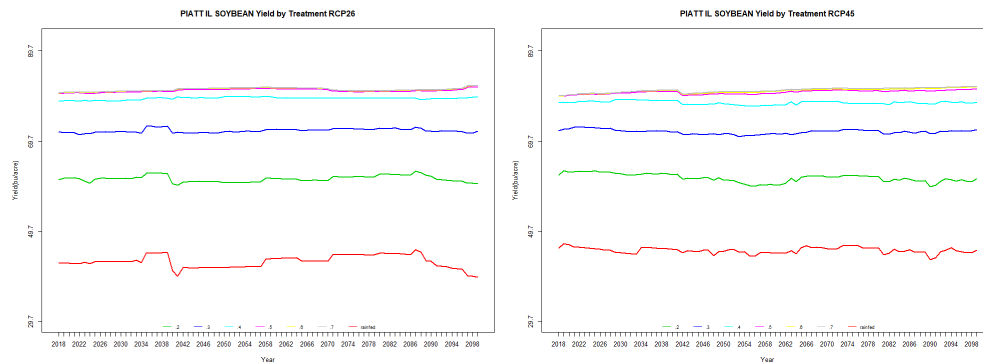
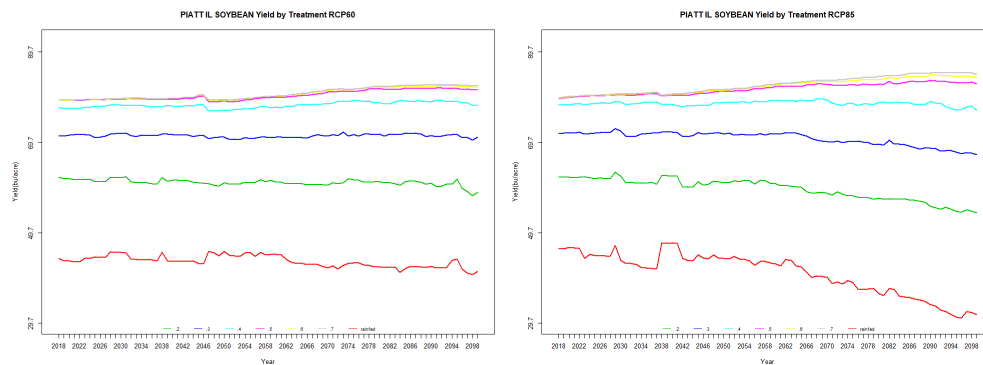


Figure 4.42: Average Minimum Temperature over Soybean Season, Piatt, IL

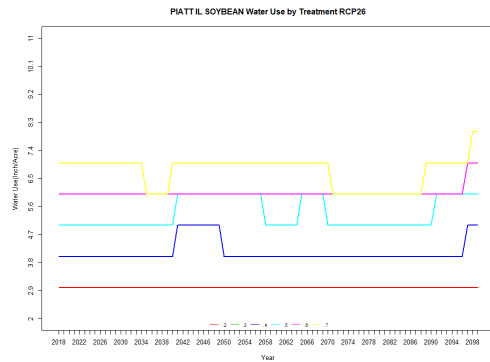


(a) Simulated Soybean Yield-RCP 2.6 (b) Simulated Soybean Yield-RCP 4.5

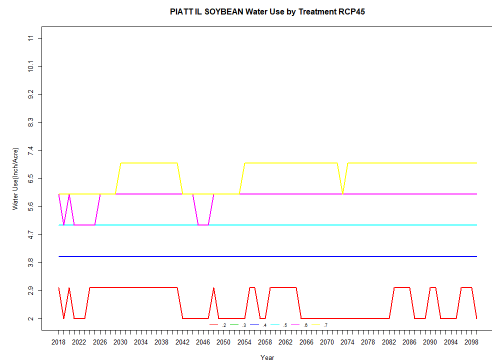


(c) Simulated Soybean Yield-RCP 6.0 (d) Simulated Soybean Yield-RCP 8.5

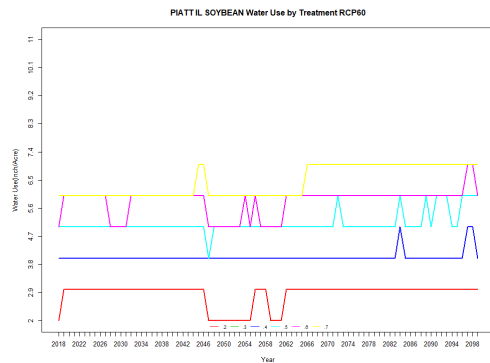
Figure 4.43: Average Simulated Yield by Treatment, Sioux, IA, Soybean



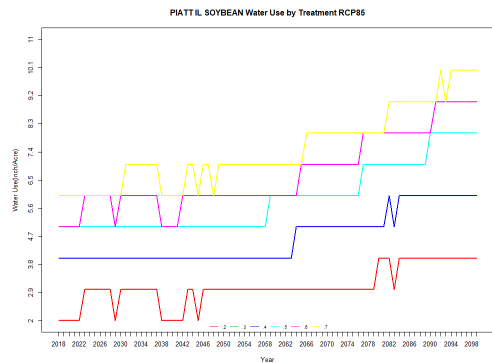
(a) Simulated Soybean Water Use-Yield-RCP 4.6



(b) Simulated Soybean Water Use-RCP 4.5



(c) Simulated Soybean Water Use-RCP 6.0



(d) Simulated Soybean Water Use-RCP 8.5

Figure 4.44: Average Simulated Water Use by Treatment, Sioux, IA, Soybean

MAXIMUM YIELD IRRIGATION STRATEGIES

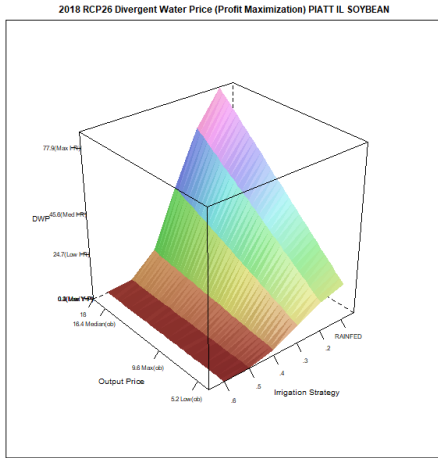
Table 4.34 shows yield maximization irrigation strategy for Piatt, Illinois soybean farmers. The yield maximizing irrigation strategy is always .7 across emission scenarios and years.

Table 4.34: Yield Maximization Treatment, Piatt,IL, Soybean

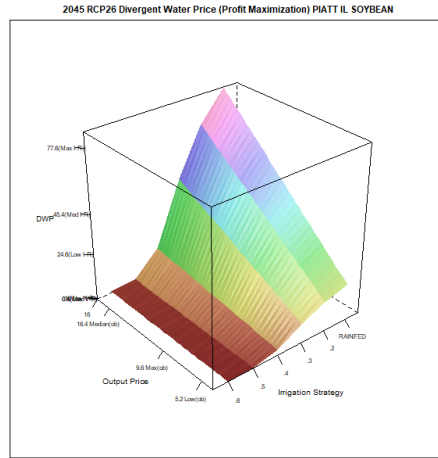
Climate	Year	Irrigation Strategy	Yield(LB/ACRE)	Water Use(INCH/ACRE)
RCP 2.6	2018	.7	80.38	7.95
	2045	.7	81.37	8.43
	2072	.7	80.96	7.62
	2099	.7	82.09	8.84
RCP 4.5	2018	.7	79.76	7.71
	2045	.7	80.31	7.53
	2072	.7	81.41	7.75
	2099	.7	81.72	7.68
RCP 6.0	2018	.7	79.11	7.40
	2045	.7	80.18	8.00
	2072	.7	81.50	8.10
	2099	.7	82.17	8.46
RCP 8.5	2018	.7	79.55	7.37
	2045	.7	80.95	7.56
	2072	.7	83.57	9.02
	2099	.7	84.75	10.95

DIVERGENT WATER PRICE OF RISK NEUTRAL FARMERS

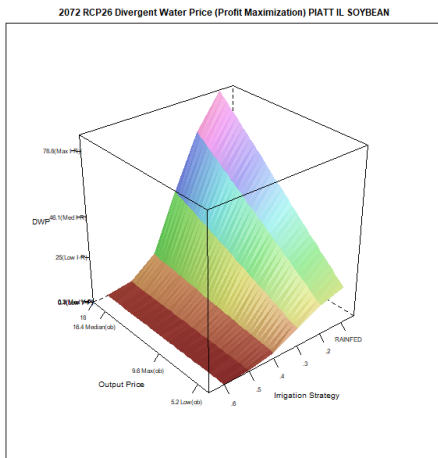
Figure 4.45, 4.46, 4.47 and 4.48 shows the divergent water price for risk neutral farmers by irrigation strategies. The low(ob), medium(ob) in the y-axis are low, medium observed 30 years historical soybean price from USDA survey. The divergent water price increases with output prices.



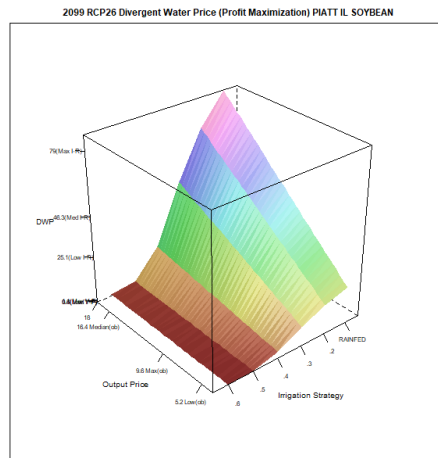
(a) 2018



(b) 2045

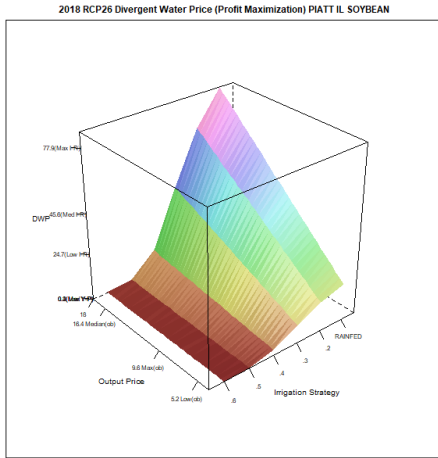


(c) 2072

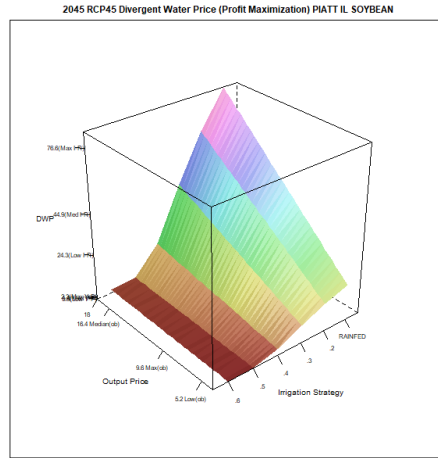


(d) 2099

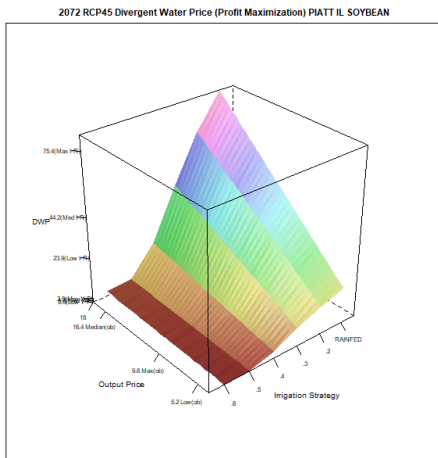
Figure 4.45: Water Use of profit maximizing farmers by irrigation strategies, Piatt, IL, Soybean, RCP 2.6



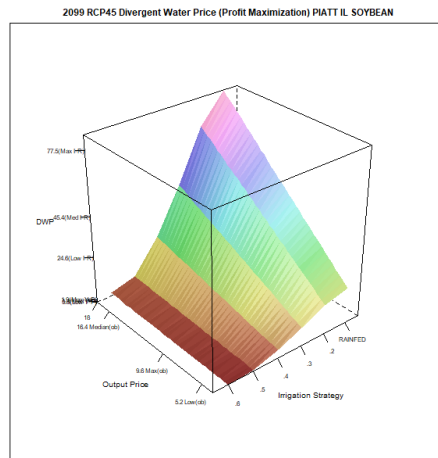
(a) 2018



(b) 2045

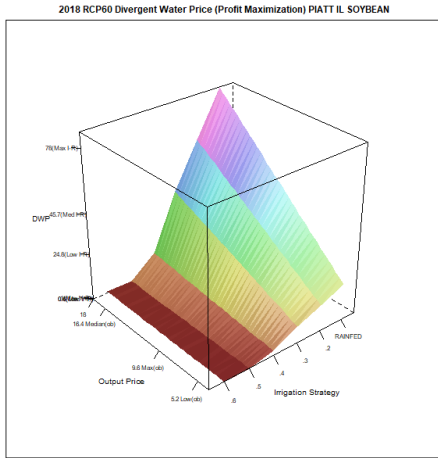


(c) 2072

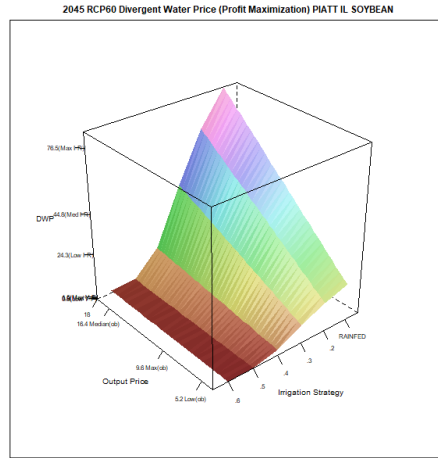


(d) 2099

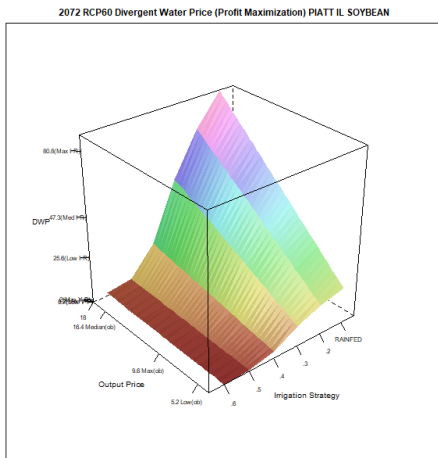
Figure 4.46: Water Use of profit maximizing farmers by irrigation strategies, Piatt, IL, Soybean, RCP 4.5



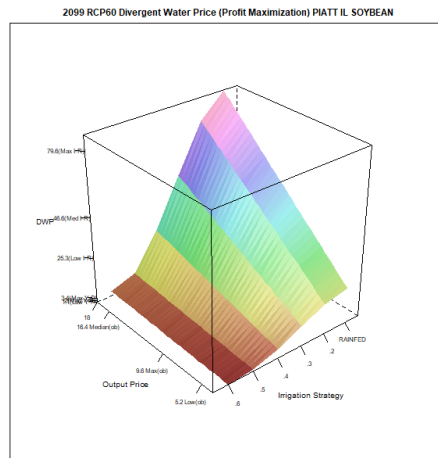
(a) 2018



(b) 2045

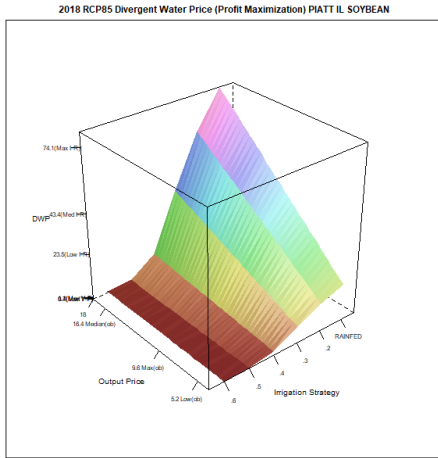


(c) 2072

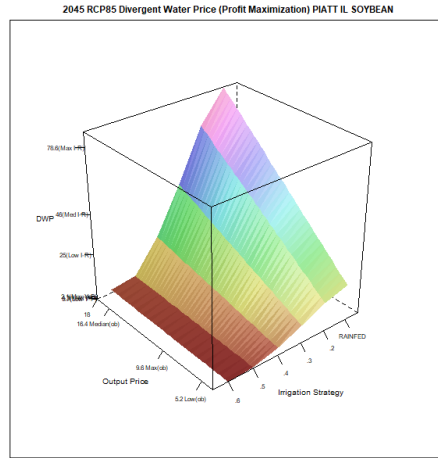


(d) 2099

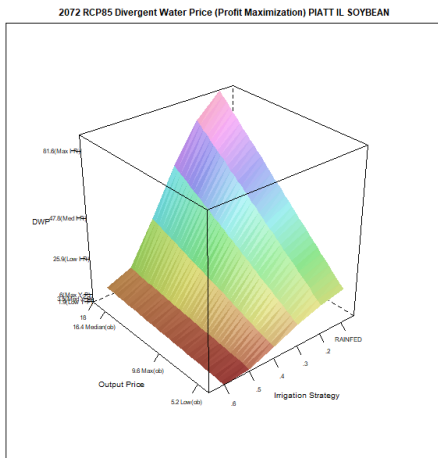
Figure 4.47: Water Use of profit maximizing farmers by irrigation strategies, Piatt, IL, Soybean, RCP 6.0



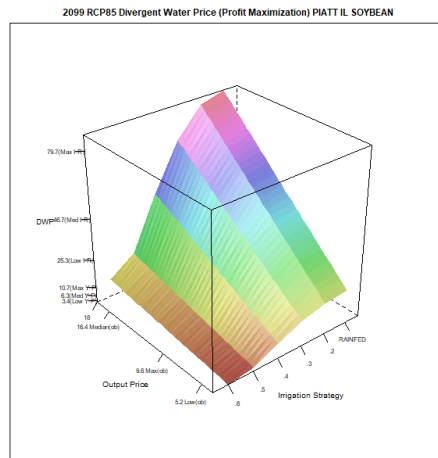
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.48: Water Use of profit maximizing farmers by irrigation strategies, Piatt, IL, Soybean, RCP 8.5

Table 4.35 shows the y-p and irr-rf water price for Piatt Soybean farmers, the y-p water price increases with time except for RCP 2.6. They are lower than \$5 except for high emission scenarios at the end of 21 century, the divergent water price at high soybean price are above \$10. The irr-rf water price increases with year, at high output price level, soybean farmers are willing to pay more than \$75 to stay on irrigation production on average.

Table 4.35: Divergent Water Price of Risk Netural Farmers(Y-P and I-R), Piatt, IL, Soybean

Year	Climate	Form	5.2	9.6	16.4
2018	RCP26	Yield - Profit	0.20	0.30	0.40
2045	RCP26	Yield - Profit	0.40	0.60	1.00
2072	RCP26	Yield - Profit	0.10	0.20	0.30
2099	RCP26	Yield - Profit	0.40	0.60	1.10
2018	RCP45	Yield - Profit	0.40	0.70	1.10
2045	RCP45	Yield - Profit	0.80	1.40	2.30
2072	RCP45	Yield - Profit	0.90	1.70	2.80
2099	RCP45	Yield - Profit	0.60	1.10	1.90
2018	RCP60	Yield - Profit	0.40	0.60	1.00
2045	RCP60	Yield - Profit	0.50	0.90	1.50
2072	RCP60	Yield - Profit	0.70	1.20	2.00
2099	RCP60	Yield - Profit	1.10	2.00	3.40
2018	RCP85	Yield - Profit	0.40	0.70	1.10
2045	RCP85	Yield - Profit	0.70	1.30	2.10
2072	RCP85	Yield - Profit	1.90	3.50	6.00
2099	RCP85	Yield - Profit	3.40	6.30	10.70
2018	RCP26	Irrigated - Rainfed	24.70	45.60	77.90
2045	RCP26	Irrigated - Rainfed	24.60	45.40	77.60
2072	RCP26	Irrigated - Rainfed	25.00	46.10	78.80
2099	RCP26	Irrigated - Rainfed	25.10	46.30	79.00

2018	RCP45	Irrigated - Rainfed	22.90	42.20	72.00
2045	RCP45	Irrigated - Rainfed	24.30	44.90	76.60
2072	RCP45	Irrigated - Rainfed	23.90	44.20	75.40
2099	RCP45	Irrigated - Rainfed	24.60	45.40	77.50
2018	RCP60	Irrigated - Rainfed	24.80	45.70	78.00
2045	RCP60	Irrigated - Rainfed	24.30	44.80	76.50
2072	RCP60	Irrigated - Rainfed	25.60	47.30	80.80
2099	RCP60	Irrigated - Rainfed	25.30	46.60	79.60
2018	RCP85	Irrigated - Rainfed	23.50	43.40	74.10
2045	RCP85	Irrigated - Rainfed	25.00	46.00	78.60
2072	RCP85	Irrigated - Rainfed	25.90	47.80	81.60
2099	RCP85	Irrigated - Rainfed	25.30	46.70	79.70

The table B.13, B.14, B.15 and B.16 listed in appendix shows the divergent water price for risk neutral farms, the water price makes farmer's profit maximizing and yield maximizing diverge decreases for all emission scenarios, but the difference at across all price levels are within \$2.5. The change water price makes farmer switch from irrigated production to rain-fed increases for all emission scenarios. The TR, MRR, DWP, DW and OP stands for irrigation strategies, maximum yield strategy, divergent water price and water saving compared to yield maximum strategy and output price.

Table 4.36, shows the y-p and irr-if water price at 2018 and 2099. Compared to 2018, both water price are higher at 2099, for y-m and irr-rf water price, most of the increment are lower than \$6 for low-high emission scenarios. All increments are low \$10.

Table 4.36: Difference between divergent water price for risk neutral farmer,PIATT,IL,SOYBEAN

Climate	TR2018	TR2099	Output Price	2018DWP	2099DWP	Diff
rcp26	.6	.6	5.20	0.20	0.40	0.20
rcp26	.6	.6	9.60	0.30	0.60	0.30
rcp26	.6	.6	16.40	0.40	1.10	0.70
rcp26	RAINFED	RAINFED	5.20	24.70	25.10	0.40
rcp26	RAINFED	RAINFED	9.60	45.60	46.30	0.70
rcp26	RAINFED	RAINFED	16.40	77.90	79.00	1.10
rcp45	.6	.6	5.20	0.40	0.60	0.20
rcp45	.6	.6	9.60	0.70	1.10	0.40
rcp45	.6	.6	16.40	1.10	1.90	0.80
rcp45	RAINFED	RAINFED	5.20	22.90	24.60	1.70
rcp45	RAINFED	RAINFED	9.60	42.20	45.40	3.20
rcp45	RAINFED	RAINFED	16.40	72.00	77.50	5.50
rcp60	.6	.6	5.20	0.40	1.10	0.70
rcp60	.6	.6	9.60	0.60	2.00	1.40
rcp60	.6	.6	16.40	1.00	3.40	2.40
rcp60	RAINFED	RAINFED	5.20	24.80	25.30	0.50
rcp60	RAINFED	RAINFED	9.60	45.70	46.60	0.90
rcp60	RAINFED	RAINFED	16.40	78.00	79.60	1.60
rcp85	.6	.6	5.20	0.40	3.40	3.00
rcp85	.6	.6	9.60	0.70	6.30	5.60
rcp85	.6	.6	16.40	1.10	10.70	9.60
rcp85	RAINFED	RAINFED	5.20	23.50	25.30	1.80
rcp85	RAINFED	RAINFED	9.60	43.40	46.70	3.30
rcp85	RAINFED	RAINFED	16.40	74.10	79.70	5.60

DIVERGENT WATER PRICE OF RISK AVERSE FARMERS

Figure ??, 4.50, 4.51 and 4.52 shows the divergent water price for risk averse farmers by irrigation strategies. The low(ob), medium(ob) and max(ob) in the y-axis are low, medium and maximum observed 30 years historical soybean price from USDA survey. The low, median and max on the z axis are the divergent water price(y-p, irr-rf) associate with each observed low, median and high output price.

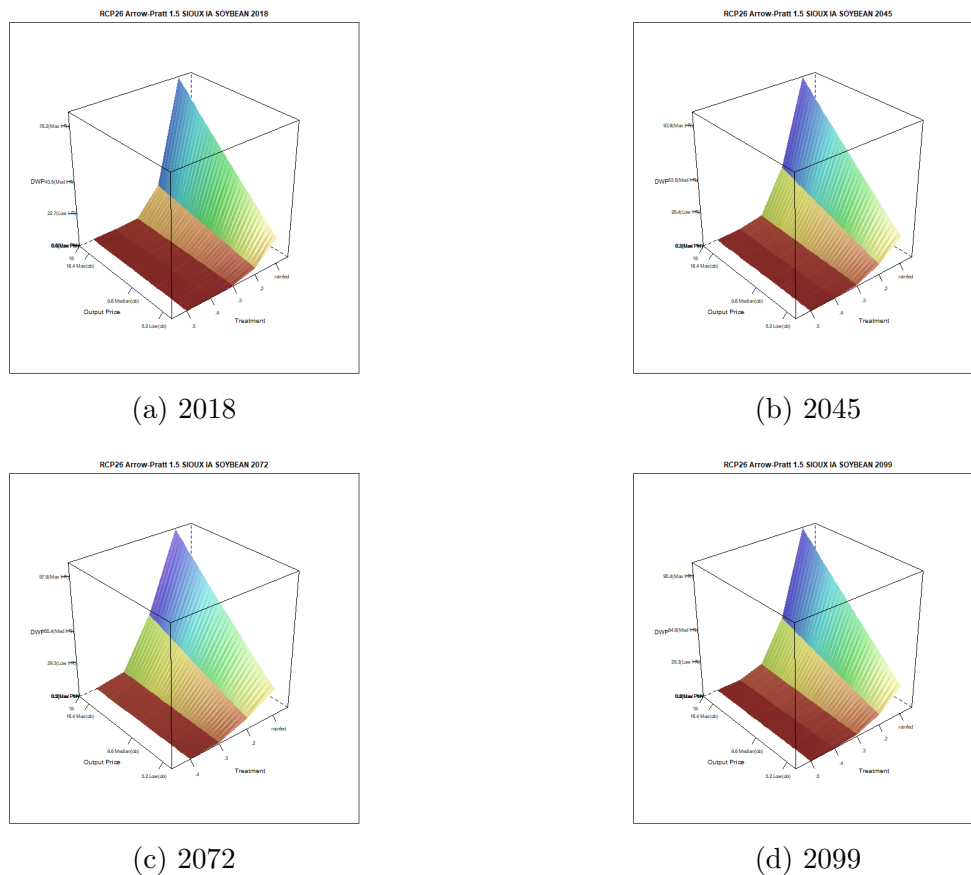
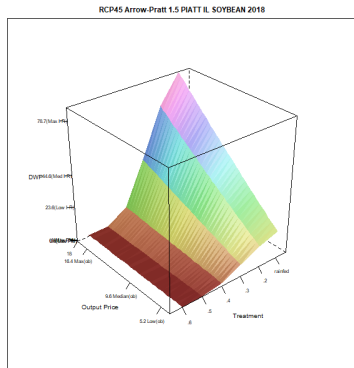
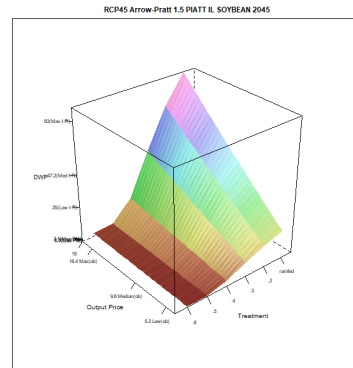


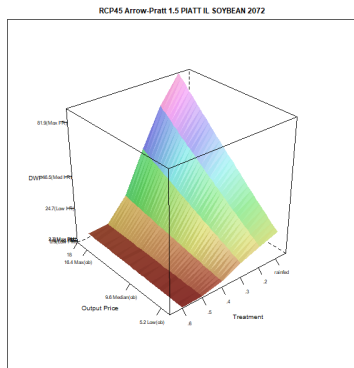
Figure 4.49: Divergent water price for utility maximizing farmers by irrigation strategies, Piatt, IL, Soybean, RCP 2.6



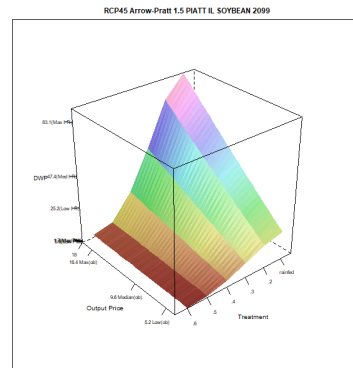
(a) 2018



(b) 2045

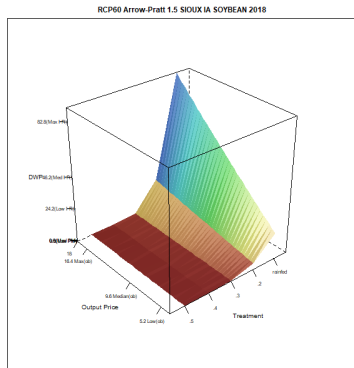


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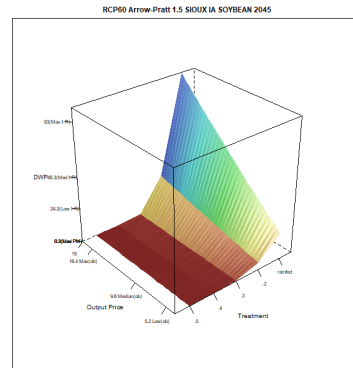


(d) 2099

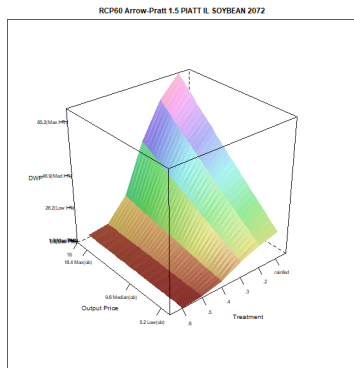
Figure 4.50: Divergent water price for utility maximizing farmers by irrigation strategies, Piatt, IL, Soybean, RCP 4.5



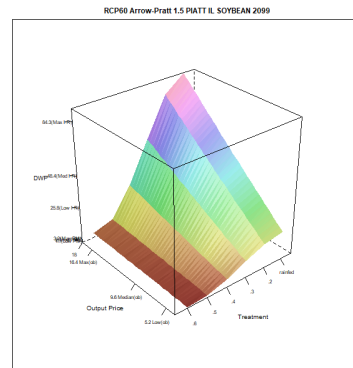
(a) 2018



(b) 2045

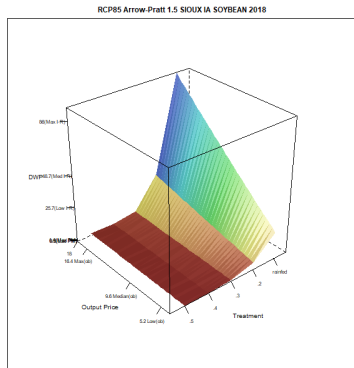


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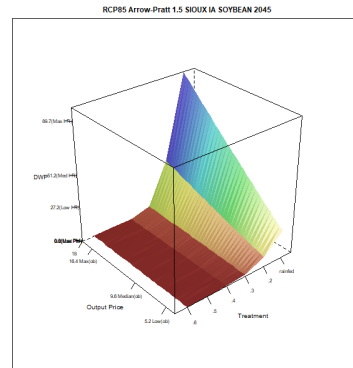


(d) 2099

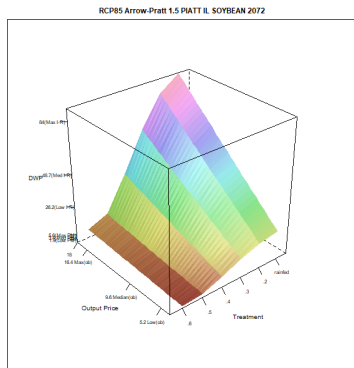
Figure 4.51: Divergent Water price for utility maximizing farmers by irrigation strategies, Piatt, IL, Soybean, RCP 6.0



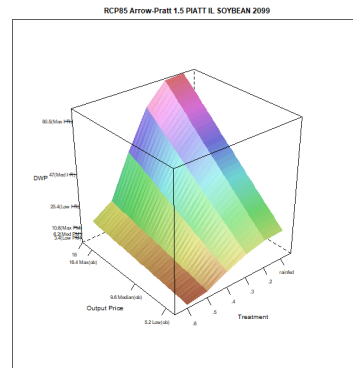
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.52: Divergent water price for utility maximizing farmers by irrigation strategies, Piatt, IL, Soybean, RCP 8.5

Table 4.37 focus on the y-p and irr-rf water price, except for RCP 2.6, the y-m water price is strictly increasing with time. The highest y-m water price is at the end of 21 century, but still below \$4 at low soybean output price level. If the price of crop is high, at 2099, the y-m water price can increased to \$10.6. Compared to Sioux, Piatt soybean farmers are more sensitive to soybean price in terms of y-p.

Table 4.37: Divergent Water Price of Risk Averse Farmers(Y-P and I-R) ,PIATT ,IL ,SOY-BEAN

Year	Climate	Form	5.2	9.6	16.4
2018	RCP26	Yield - Profit	0.20	0.30	0.40
2045	RCP26	Yield - Profit	0.40	0.60	1.00
2072	RCP26	Yield - Profit	0.10	0.20	0.30
2099	RCP26	Yield - Profit	0.40	0.60	1.00
2018	RCP45	Yield - Profit	0.40	0.60	1.00
2045	RCP45	Yield - Profit	0.70	1.30	2.10
2072	RCP45	Yield - Profit	0.90	1.60	2.70
2099	RCP45	Yield - Profit	0.60	1.10	1.70
2018	RCP60	Yield - Profit	0.30	0.60	0.90
2045	RCP60	Yield - Profit	0.50	0.90	1.50
2072	RCP60	Yield - Profit	0.60	1.10	1.80
2099	RCP60	Yield - Profit	1.10	2.00	3.20
2018	RCP85	Yield - Profit	0.40	0.70	1.10
2045	RCP85	Yield - Profit	0.70	1.20	2.00
2072	RCP85	Yield - Profit	1.90	3.40	5.60
2099	RCP85	Yield - Profit	3.40	6.20	10.60
2018	RCP26	Irrigated - Rainfed	25.20	47.00	81.60
2045	RCP26	Irrigated - Rainfed	25.10	47.00	81.90
2072	RCP26	Irrigated - Rainfed	25.50	47.90	83.60

2099	RCP26	Irrigated - Rainfed	25.50	47.60	82.50
2018	RCP45	Irrigated - Rainfed	23.60	44.60	78.70
2045	RCP45	Irrigated - Rainfed	25.00	47.20	83.00
2072	RCP45	Irrigated - Rainfed	24.70	46.50	81.90
2099	RCP45	Irrigated - Rainfed	25.20	47.40	83.10
2018	RCP60	Irrigated - Rainfed	25.40	47.60	83.30
2045	RCP60	Irrigated - Rainfed	24.80	46.40	80.90
2072	RCP60	Irrigated - Rainfed	26.20	48.90	85.20
2099	RCP60	Irrigated - Rainfed	25.80	48.40	84.30
2018	RCP85	Irrigated - Rainfed	24.10	45.40	79.90
2045	RCP85	Irrigated - Rainfed	25.50	48.00	83.90
2072	RCP85	Irrigated - Rainfed	26.20	48.70	84.00
2099	RCP85	Irrigated - Rainfed	25.40	47.00	80.50

Table C.13, C.14, C.15 and C.16 in the appendix shows the full divergent water prices across irrigation strategies for Piatt, soybean risk averse farmers.

RISK NETURAL V.S RISK AVERSE FARMERS

Table D.13, D.14, D.15, D.16 in the appendix compared the difference of divergent water prices between soybean farmers in Illinois at holding irrigation strategies the same.

Table 4.39, 4.40, 4.41, 4.42 only compares the y-m and irr-rf water price is very close between risk averse and risk neutral farmer. For y-m water price, the sign of difference is not consistent across emission scenarios and years. Yet irr-rf water price risk averse farmer are always higher across emission scenarios and years.

Table 4.38: Difference between divergent water price of risk averse farmers ,PIATT ,IL ,SOY-BEAN

Climate	TR2018	TR2099	OP	2018DWP	2099DWP	Diff
rcp26	.6	2099	5.20	0.20	1.17	5.00
rcp26	.6	2099	9.60	0.30	1.17	4.90
rcp26	.6	2099	16.40	0.40	1.17	4.80
rcp26	rainfed	2099	5.20	25.20	25.50	0.30
rcp26	rainfed	2099	9.60	47.00	47.60	0.60
rcp26	rainfed	2099	16.40	81.60	82.50	0.60
rcp45	.6	2099	5.20	0.40	1.34	5.00
rcp45	.6	2099	9.60	0.60	1.34	5.00
rcp45	.6	2099	16.40	1.00	1.34	5.00
rcp45	rainfed	2099	5.20	23.60	25.20	0.00
rcp45	rainfed	2099	9.60	44.60	47.40	0.00
rcp45	rainfed	2099	16.40	78.70	83.10	0.00
rcp60	.6	2099	5.20	0.30	1.17	5.00
rcp60	.6	2099	9.60	0.60	1.17	5.00
rcp60	.6	2099	16.40	0.90	1.17	5.00
rcp60	rainfed	2099	5.20	25.40	25.80	0.00
rcp60	rainfed	2099	9.60	47.60	48.40	0.00
rcp60	rainfed	2099	16.40	83.30	84.30	0.00
rcp85	.6	2099	5.20	0.40	1.24	5.00
rcp85	.6	2099	9.60	0.70	1.24	5.00
rcp85	.6	2099	16.40	1.10	1.24	5.00
rcp85	rainfed	2099	5.20	24.10	25.40	0.00
rcp85	rainfed	2099	9.60	45.40	47.00	0.00
rcp85	rainfed	2099	16.40	79.90	80.50	0.00

Table 4.39: Divergent water price for risk neutral v.s. averse farmers ,PIATT ,IL ,SOYBEAN ,RCP26

Year	TR	DWP(Neutral)	Profit(Neutral)	DWP (Averse)	Profit(Averse)	OP
2099	.6	1.10	821.63	1.00	822.38	16.40
2045	.5	1.30	255.30	1.20	255.95	9.60
2045	.5	2.20	801.07	2.10	801.72	16.40
2018	.4	11.90	708.84	12.00	708.30	16.40
2018	.3	22.60	77.33	23.20	74.78	9.60
2072	.3	22.50	90.81	23.40	87.24	9.60
2099	.3	25.40	48.84	26.20	44.88	9.60
2018	rainfed	24.70	-293.32	25.20	-293.32	5.20
2045	rainfed	24.60	-299.10	25.10	-299.10	5.20
2072	rainfed	25.00	-284.17	25.50	-284.17	5.20
2099	rainfed	25.10	-309.65	25.50	-309.65	5.20
2018	rainfed	45.60	-105.75	47.00	-105.75	9.60
2045	rainfed	45.40	-116.41	47.00	-116.41	9.60
2072	rainfed	46.10	-88.86	47.90	-88.86	9.60
2099	rainfed	46.30	-135.90	47.60	-135.90	9.60
2018	rainfed	77.90	184.13	81.60	184.13	16.40
2045	rainfed	77.60	165.93	81.90	165.93	16.40
2072	rainfed	78.80	213.00	83.60	213.00	16.40
2099	rainfed	79.00	132.64	82.50	132.64	16.40

Table 4.40: Divergent water price for risk neutral v.s. averse farmers ,PIATT ,IL ,SOYBEAN ,RCP45

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2045	.6	0.80	-103.33	0.70	-102.70	5.20
2018	.6	0.70	245.37	0.60	246.01	9.60
2045	.6	1.40	245.50	1.30	246.13	9.60
2072	.6	1.70	253.45	1.60	254.10	9.60
2018	rainfed	22.90	-276.22	23.60	-276.22	5.20
2045	rainfed	24.30	-280.27	25.00	-280.27	5.20
2072	rainfed	23.90	-276.94	24.70	-276.94	5.20
2099	rainfed	24.60	-278.66	25.20	-278.66	5.20
2018	rainfed	42.20	-74.17	44.60	-74.17	9.60
2045	rainfed	44.90	-81.66	47.20	-81.66	9.60
2072	rainfed	44.20	-75.51	46.50	-75.51	9.60
2099	rainfed	45.40	-78.68	47.40	-78.68	9.60
2018	rainfed	72.00	238.09	78.70	238.09	16.40
2045	rainfed	76.60	225.30	83.00	225.30	16.40
2072	rainfed	75.40	235.79	81.90	235.79	16.40
2099	rainfed	77.50	230.38	83.10	230.38	16.40

Table 4.41: Divergent water price for risk neutral v.s. averse farmers ,PIATT ,IL ,SOYBEAN ,RCP60

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	0.40	-106.48	0.30	-105.86	5.20
2072	.6	0.70	-96.76	0.60	-96.05	5.20
2072	.6	1.20	257.79	1.10	258.49	9.60
2018	.6	1.00	775.03	0.90	775.65	16.40
2072	.6	2.00	805.53	1.80	806.94	16.40
2099	.6	3.40	803.88	3.20	805.31	16.40
2018	rainfed	24.80	-286.56	25.40	-286.56	5.20
2045	rainfed	24.30	-291.92	24.80	-291.92	5.20
2072	rainfed	25.60	-298.63	26.20	-298.63	5.20
2099	rainfed	25.30	-301.18	25.80	-301.18	5.20
2018	rainfed	45.70	-93.27	47.60	-93.27	9.60
2045	rainfed	44.80	-103.16	46.40	-103.16	9.60
2072	rainfed	47.30	-115.54	48.90	-115.54	9.60
2099	rainfed	46.60	-120.25	48.40	-120.25	9.60
2018	rainfed	78.00	205.45	83.30	205.45	16.40
2045	rainfed	76.50	188.56	80.90	188.56	16.40
2072	rainfed	80.80	167.40	85.20	167.40	16.40
2099	rainfed	79.60	159.37	84.30	159.37	16.40

Table 4.42: Divergent water price for risk neutral v.s. averse farmers ,PIATT ,IL ,SOYBEAN ,RCP85

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2045	.6	1.30	252.39	1.20	253.02	9.60
2072	.6	3.50	255.75	3.40	256.54	9.60
2099	.6	6.30	229.68	6.20	230.67	9.60
2045	.6	2.10	796.72	2.00	797.36	16.40
2072	.6	6.00	801.53	5.60	804.69	16.40
2099	.6	10.70	757.77	10.60	758.77	16.40
2018	rainfed	23.50	-274.50	24.10	-274.50	5.20
2045	rainfed	25.00	-282.30	25.50	-282.30	5.20
2072	rainfed	25.90	-313.60	26.20	-313.60	5.20
2099	rainfed	25.30	-350.84	25.40	-350.84	5.20
2018	rainfed	43.40	-71.00	45.40	-71.00	9.60
2045	rainfed	46.00	-85.40	48.00	-85.40	9.60
2072	rainfed	47.80	-143.19	48.70	-143.19	9.60
2099	rainfed	46.70	-211.93	47.00	-211.93	9.60
2018	rainfed	74.10	243.50	79.90	243.50	16.40
2045	rainfed	78.60	218.90	83.90	218.90	16.40
2072	rainfed	81.60	120.17	84.00	120.17	16.40
2099	rainfed	79.70	2.75	80.50	2.75	16.40

4.4 SIMULATED COTTON YIELD, MAXIMUM TEMPERATURE, MINIMUM TEMPERATURE AND PRECIPITATION

Table 4.43 show the observed cotton yield in selected research stations in 2013, the weighed average ¹ were 517 LB/Acre and 1055 LB/Acre for rain-fed and irrigated upland cotton respectively, the simulated corn yield from DSSAT in year 2018 was lower to the observed average rain-fed yield. The main driver of the difference was the rain-fed cotton yield in Texas, considering in 2013, the cumulative rainfall was only 8 inch in total. The outcome was self-explanatory.

Again simulated DSSAT maximum yield level from DSSAT were 300 Bu/Acre(30%) higher than yield in 2018. For ECP 2.6, the simulated maximum yields were always higher than observed yield. For other RCPs, after mid 21 century, the corn yield became lower than the baseline observed yield.

The changes of temperature and precipitation are not significant for RCP 2.6, yet for RCP 8.5, year 2099 has 5C° increase in temperature along with 4(*Ibch*) decrease in precipitation.

Table 4.43: Upland Cotton, yield 2013 Census

State	Rain-fed Yield(Lb/Acre)	Irrigated Yield
GEORG4IA	811	1026
LOUISIANA	1262	1361
TEXAS	368	1037

(Source: <https://quickstats.nass.usda.gov/results/44E170CE-42E7-3FE9-BCB1-37114B06E766>)

Table 4.44 shows the average level of simulated cotton yield(rain-fed/yield max), temperature and rainfall over the corn growing season. For all RCPs, the average rainfed yield of all research stations follows decrease trend. Especially for RCP 8.5, the rain-yield reduced by 63% and the maximum yield reduced by 30% with irrigation application increases by 3 inch/acre.

¹The mean yield, temperature and precipitation are weighted by 20 years state level harvest acreage

Table 4.44: Mean cotton rain-fed yield, minimum/maximum temperature and precipitation over the growing season

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	696	1324	17	31	17	12
2045	673	1316	18	32	17	14
2072	664	1324	18	32	17	13
2099	660	1314	18	32	17	13

RCP 2.6 Low Emission Scenario

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	708	1317	17	31	17	14
2045	664	1306	18	33	16	13
2072	611	1279	19	34	16	14
2099	620	1269	19	34	17	13

RCP 4.5 Medium Low Emission Scenario

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	716	1315	17	31	17	12
2045	683	1307	18	32	17	14
2072	610	1275	19	34	16	14
2099	548	1220	20	35	16	15

RCP 6.0 Medium Emission Scenario

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	701	1307	17	31	17	13
2045	617	1280	19	33	16	14
2072	483	1141	21	35	16	14
2099	260	875	23	38	14	17

RCP 8.5 High Emission Scenario

The cost of cotton production in Georgia and Texas are listed in table 4.45 and 4.46.

4.4.1 DECATUR, GA

Decatur is one of top cotton producing county in GA. It is located in southwestern corner along the Flint river basin. According to USDA survey in 2017 Decatur produced 60,400 bales of cotton with 29,600 Acre.

SIMULATED WEATHER

Figure 4.53, 4.54, 4.55 is the average temperature, precipitation simulated from MarkSim. Both maximum and the minimum temperature from the simulation raised along with decrease in cumulative rainfall over the cotton growing season, expect for RCP 2.6. The mean temperature during cotton season in Decatur county raises about 4°C whereas the cumulative precipitation dropped 2 inches for high emission secnario. Table A.3 shows the summary statistics of temperature and precipitation by RCPs. The historical average come from monthly normal [48].

SIMULATED YIELD AND WATER USE BY IRRIGATION STRATEGIES

As figure 4.56 and 4.57 shows, for Decatur county, there are no significant differences between irrigation strategies, with 6.8 inches of water application the cotton yield increase 367 LB/ACRE on average. The simulated rain-fed yield at 2099 increases 24 LB/ACRE (3%) for RCP 2.6, decreases 107 LB/ACRE (11%), 77 LB/ACRE (8%), 389 LB/ACRE (43%) for RCP 4.5, 6.0 and 8.5 respectively.

Table 4.45: Cotton production cost in GA: <http://agecon.uga.edu/extension/budgets.html>

Variable Cost	Cost per Acre
Custom	
Strip and Module - Cotton	
Ginning - Cotton	\$129.46
Fertilizer Application - Liquid High	\$4.75
Scouting	\$9.00
Fertilizer	
Fertilizer (P) - Liquid	\$28.68
Fertilizer (N) - Liquid	\$48.83
Herbicide	
Herbicide - Cotton Preplant	\$9.50
Herbicide - Cotton At Plant	\$4.50
Herbicide - Cotton Postplant	\$25.00
Spot Spray and Chemical	\$3.00
Insecticide	
Insecticide and Apply Cotton	\$12.00
Boll Weevil Assessment Irrigated	\$2.50
Miscellaneous	
Crop Insurance Cotton - Irrigated	\$40.00
Seed	
Seed - Cotton Irrigated	\$71.55
Other Chemicals	
Harvest Aid Apply Cotton Irrigated	\$25.00
Other Labor	
Hoeing	\$3.00
Irrigation	
Energy Cost	
Irrigation Labor	
Machinery Labor	
Tractors/Self-Propelled	\$8.88
Other Labor	\$10.32
Diesel Fuel	
Tractors/Self-Propelled	\$9.20
Gasoline	
Pickup/General Use Equipment	\$6.00
Repairs & Maintenance	
Pickup/General Use Equipment	\$0.50
Irrigation Equipment	\$21.00
Tractors/Self-Propelled	\$6.00
Implements	\$3.00
Interest on Credit Line	\$15.62
Total Variable Costs	
Fixed Cost	
Pickup/General Use Equipment	\$1.25
Irrigation Equipment	\$55.00
Tractors/Self-Propelled	\$12.00
Implements	\$10.00
Management Fee, Owner/Operator Labor	\$25.00
Cash Rent - Cotton Irrigated	\$100.00
Whole Farm Insurance	\$2.00
	\$702.54

Table 4.46: Cotton production cost in TX: <https://agriflifeextension.tamu.edu/>

Variable Cost	Cost per Acre
Custom	
Strip and Module - Cotton	
Ginning - Cotton	\$129.46
Fertilizer Application - Liquid High	\$4.75
Scouting	\$9.00
Fertilizer	
Fertilizer (P) - Liquid	\$28.68
Fertilizer (N) - Liquid	\$48.83
Herbicide	
Herbicide - Cotton Preplant	\$9.50
Herbicide - Cotton At Plant	\$4.50
Herbicide - Cotton Postplant	\$25.00
Spot Spray and Chemical	\$3.00
Insecticide	
Insecticide and Apply Cotton	\$12.00
Boll Weevil Assessment Irrigated	\$2.50
Miscellaneous	
Crop Insurance Cotton - Irrigated	\$40.00
Seed	
Seed - Cotton Irrigated	\$71.55
Other Chemicals	
Harvest Aid Apply Cotton Irrigated	\$25.00
Other Labor	
Hoeing	\$3.00
Irrigation	
Energy Cost	
Irrigation Labor	
Machinery Labor	
Tractors/Self-Propelled	\$8.88
Other Labor	\$10.32
Diesel Fuel	
Tractors/Self-Propelled	\$9.20
Gasoline	
Pickup/General Use Equipment	\$6.00
Repairs & Maintenance	
Pickup/General Use Equipment	\$0.50
Irrigation Equipment	\$21.00
Tractors/Self-Propelled	\$6.00
Implements	\$3.00
Interest on Credit Line	\$15.62
Total Variable Costs	
Fixed Cost	
Pickup/General Use Equipment	\$1.25
Irrigation Equipment	\$55.00
Tractors/Self-Propelled	\$12.00
Implements	\$10.00
Management Fee, Owner/Operator Labor	\$25.00
Cash Rent - Cotton Irrigated	\$100.00
Whole Farm Insurance	\$2.00
	\$702.54

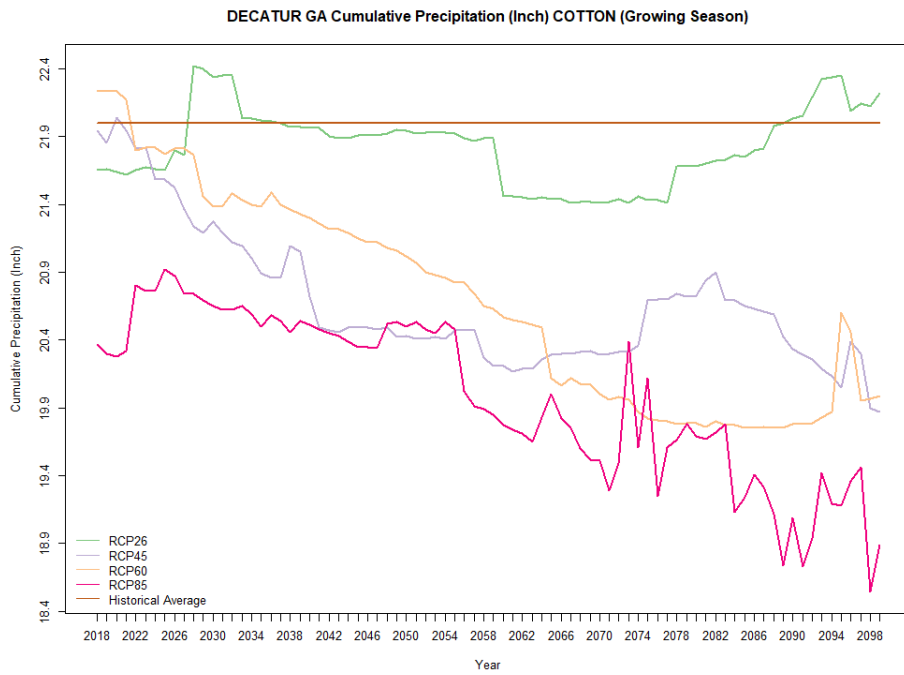


Figure 4.53: Cumulative Rainfall over Cotton Season, Decatur, GA

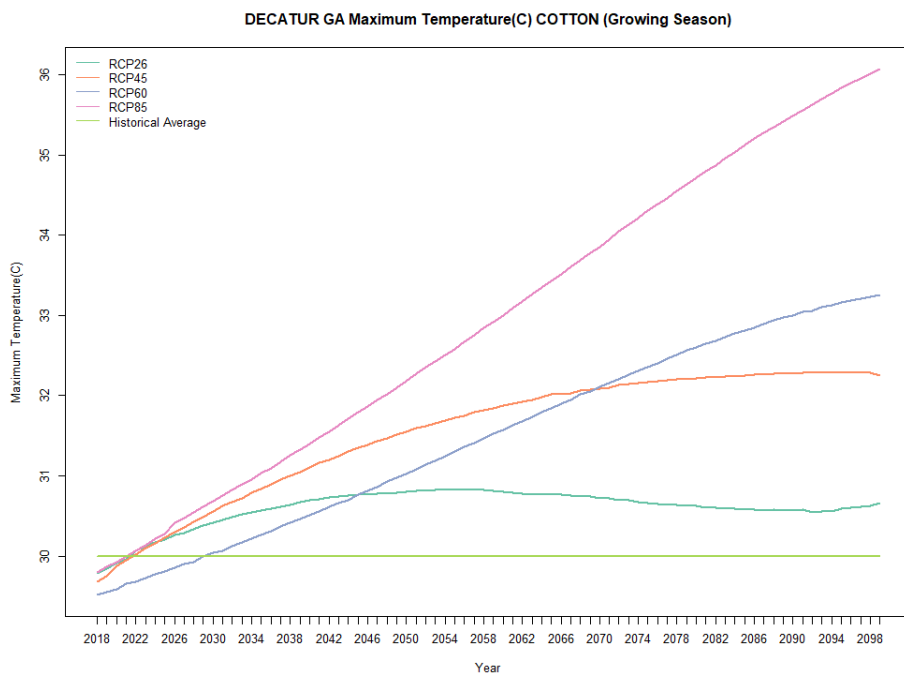


Figure 4.54: Average Maximum Temperature over Cotton Season, Decatur, GA

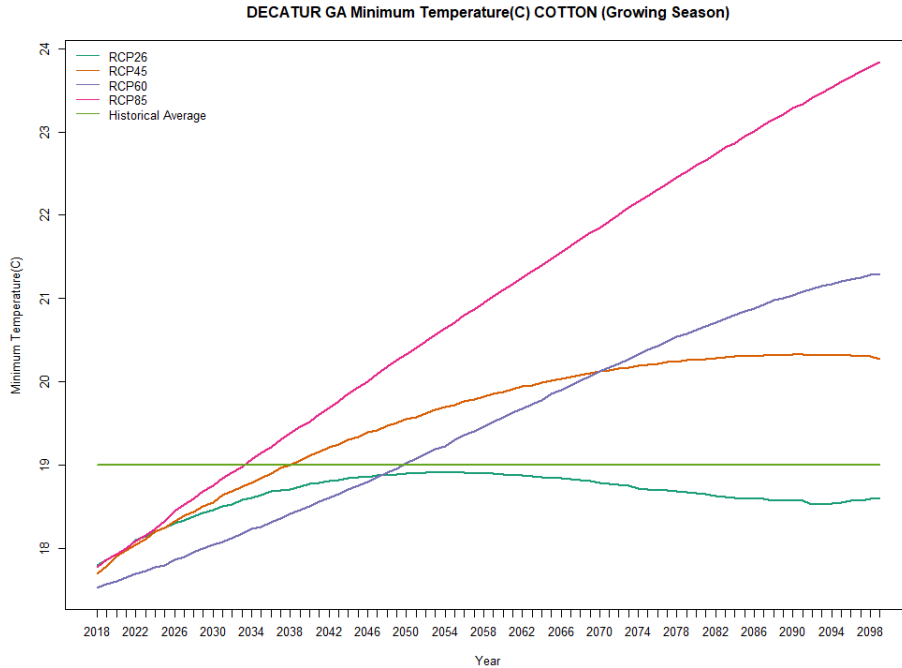


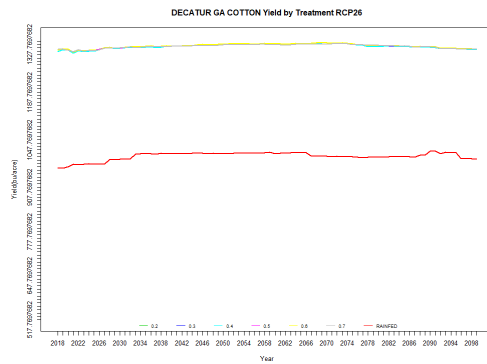
Figure 4.55: Average Minimum Temperature over Cotton Season, Decatur, GA

MAXIMUM YIELD IRRIGATION STRATEGIES

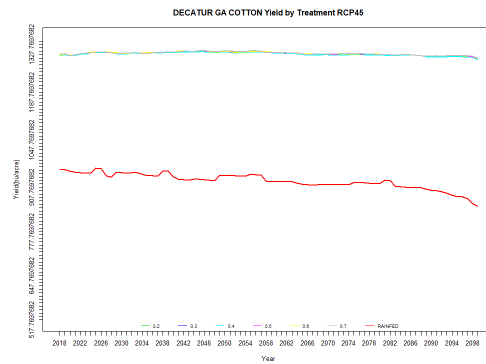
Table 4.47 shows the yield maximization strategies for Decatur, GA, cotton farmers. For low emission scenarios (RCP 2.6), except for 2045, the yield maximization strategies are 0.7. For mid-low emission scenarios (RCP 4.5) the yield maximization strategies are 0.7 always. For mid emission scenarios (RCP 6.0) the yield maximization strategies are 0.7, except for 2099. For high emission scenarios (RCP 8.5), at 2018 the yield maximization strategy is 0.7, then it becomes 0.6 at until 2072, at 2099, the yield maximization strategy is 0.5.

DIVERGENT WATER PRICE FOR RISK NEUTRAL FARMERS

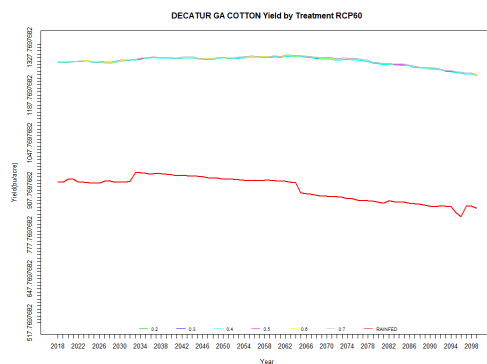
Figure 4.58, 4.59, 4.60 and 4.61 shows the divergent water price for risk neutral farmers by irrigation strategies. The low(ob), medium(ob) and max(ob) in the y-axis are low, medium



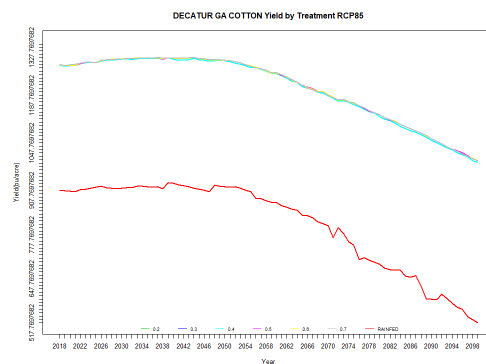
(a) Simulated Cotton Yield-RCP 2.6



(b) Simulated Cotton Yield-RCP 4.5



(c) Simulated Cotton Yield-RCP 6.0

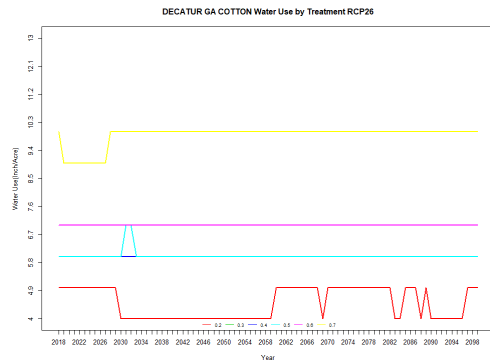


(d) Simulated Cotton Yield-RCP 8.5

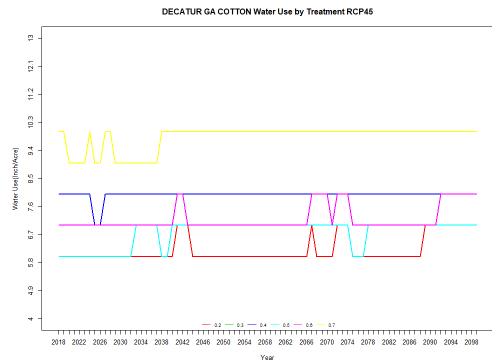
Figure 4.56: Average Simulated Yield by Treatment, Decatur, GA, Cotton

Table 4.47: Yield Maximization Treatment, Decatur,GA, Cotton

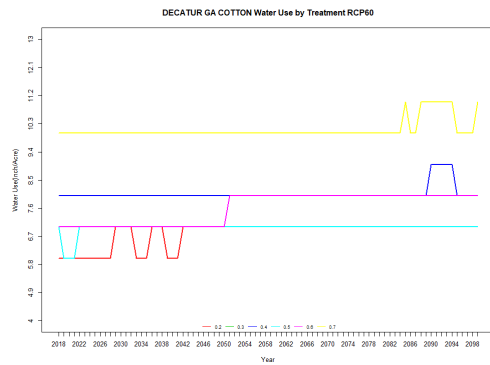
Climate	Year	Irrigation Strategy	Yield(LB/ACRE)	Water Use(INCH/ACRE)
RCP 2.6	2018	0.7	1312.90	9.56
	2045	0.6	1327.20	9.675
	2072	0.6	1331.49	9.68
	2099	0.7	1313.31	9.80
RCP 4.5	2018	0.7	1298.44	9.60
	2045	0.7	1309.73	9.89
	2072	0.7	1299.87	9.77
	2099	0.7	1286.89	10.20
RCP 6.0	2018	0.7	1285.04	9.57
	2045	0.7	1296.11	9.99
	2072	0.7	1293.92	10.00
	2099	0.5	1248.06	8.05
RCP 8.5	2018	0.7	1278.98	9.92
	2045	0.6	1294.47	9.79
	2072	0.6	1294.47	9.79
	2099	0.5	995.11	10.27



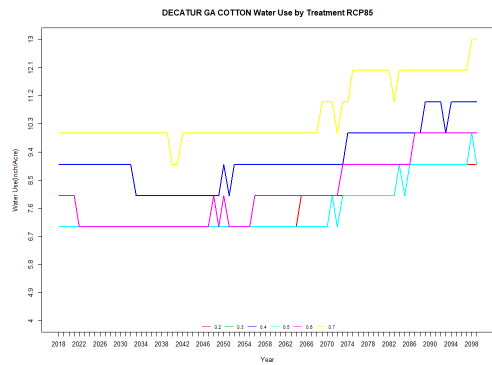
(a) Simulated Water Use Yield-RCP 2.6



(b) Simulated Water Use-RCP 4.5



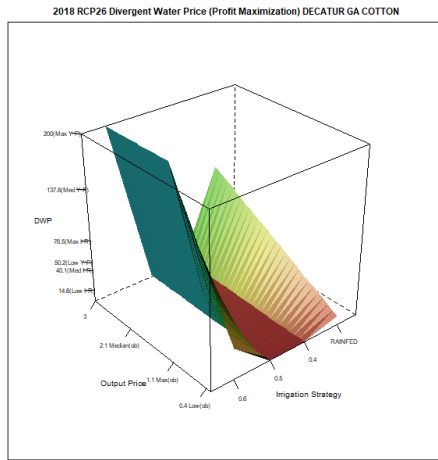
(c) Simulated Water Use-RCP 6.0



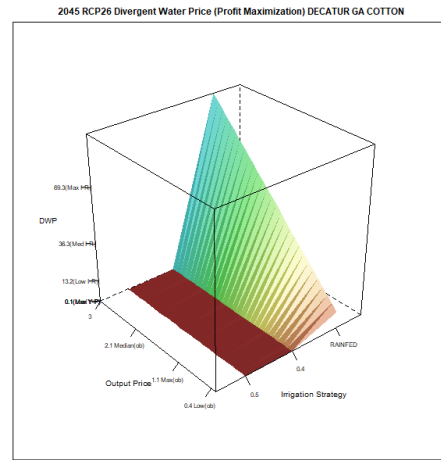
(d) Simulated Water Use-RCP 8.5

Figure 4.57: Average Simulated Water Use by Treatment, Decatur, GA, Cotton

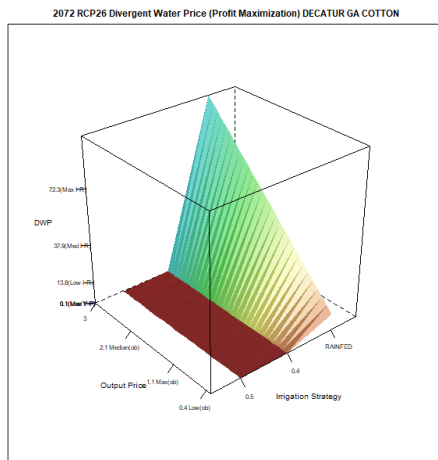
and maximum observed 30 years historical cotton price from USDA survey. The divergent water price increases with output prices.



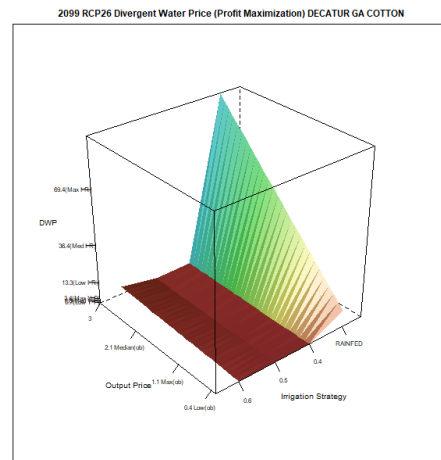
(a) 2018



(b) 2045

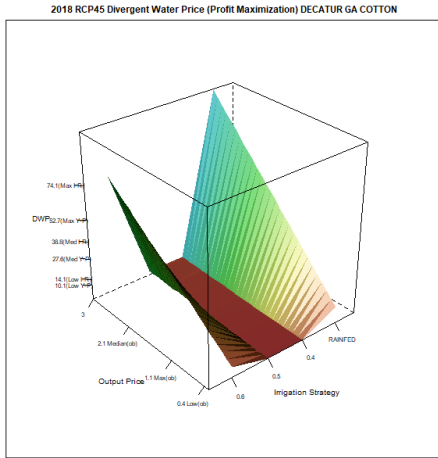


(c) 2072

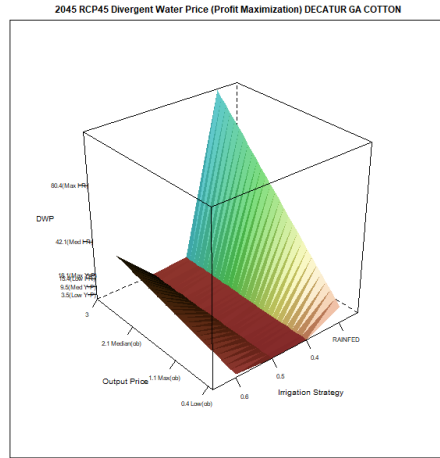


(d) 2099

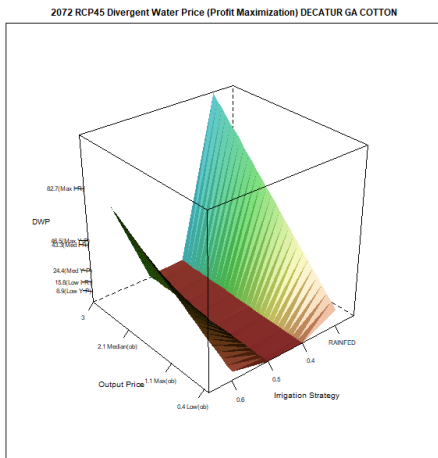
Figure 4.58: Water Use of profit maximizing farmers by irrigation strategies, Decatur, GA, Cotton, RCP 2.6



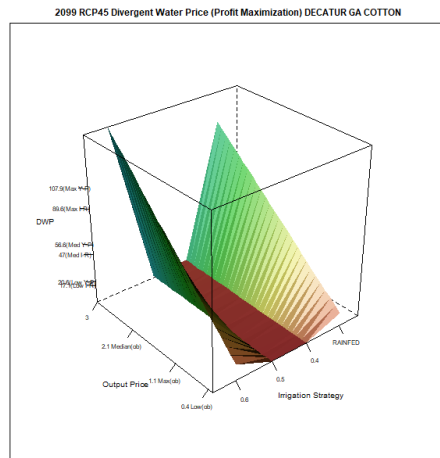
(a) 2018



(b) 2045

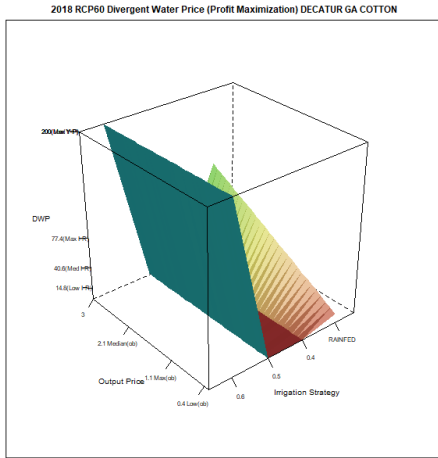


(c) 2072

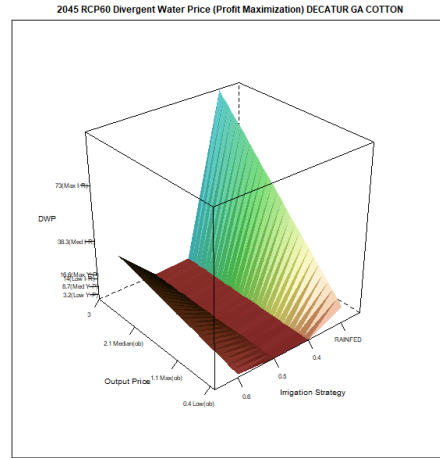


(d) 2099

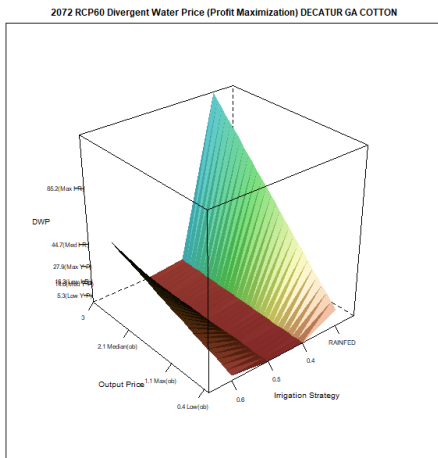
Figure 4.59: Water Use of profit maximizing farmers by irrigation strategies, Decatur, GA, Cotton, RCP 4.5



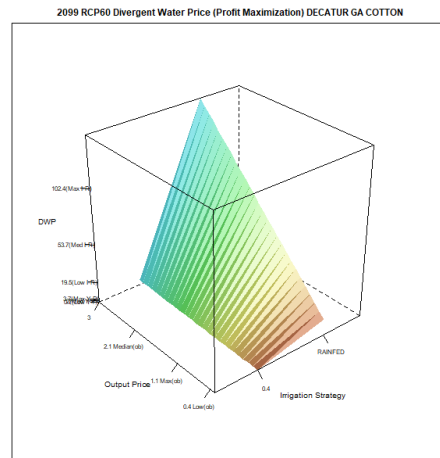
(a) 2018



(b) 2045

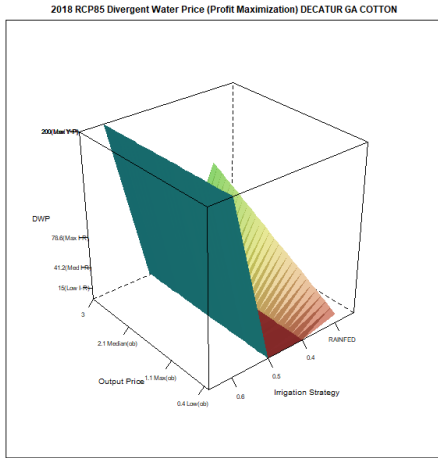


(c) 2072

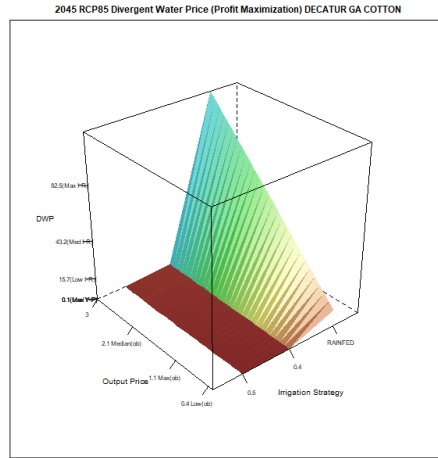


(d) 2099

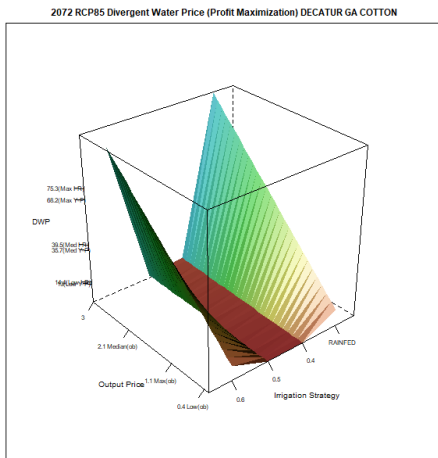
Figure 4.60: Water Use of profit maximizing farmers by irrigation strategies, Decatur, GA, Cotton, RCP 6.0



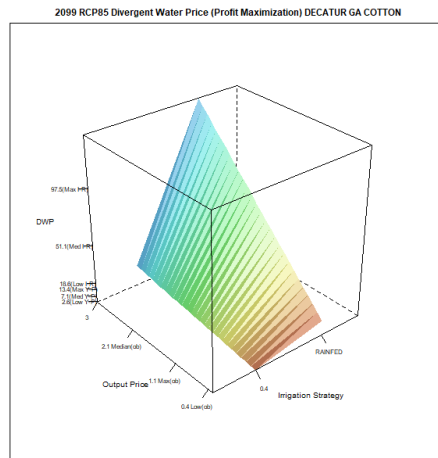
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.61: Water Use of profit maximizing farmers by irrigation strategies, Decatur, GA, Cotton, RCP 8.5

The table 4.48 shows the irr-rf water prices for Decatur, GA cotton farmers, across RCPs and selected years. Expect for RCP 2.6, the irr-rf water prices of risk neutral farmers are strictly increasing with years.

Table 4.48: Divergent Water Price of Risk Netural Farmers(Y-P and I-R), Decatur, GA, Cotton

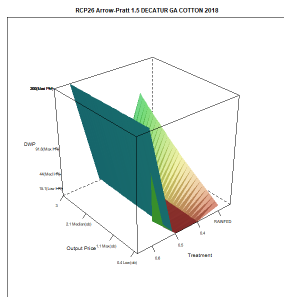
Year	Climate	Form	0.4	1.1	2.1
2018	RCP26	Irrigated - Rainfed	14.60	40.10	76.50
2045	RCP26	Irrigated - Rainfed	13.20	36.30	69.30
2072	RCP26	Irrigated - Rainfed	13.80	37.90	72.30
2099	RCP26	Irrigated - Rainfed	13.30	36.40	69.40
2018	RCP45	Irrigated - Rainfed	14.10	38.80	74.10
2045	RCP45	Irrigated - Rainfed	15.40	42.10	80.40
2072	RCP45	Irrigated - Rainfed	15.80	43.30	82.70
2099	RCP45	Irrigated - Rainfed	17.10	47.00	89.60
2018	RCP60	Irrigated - Rainfed	14.80	40.60	77.40
2045	RCP60	Irrigated - Rainfed	14.00	38.30	73.00
2072	RCP60	Irrigated - Rainfed	16.30	44.70	85.20
2099	RCP60	Irrigated - Rainfed	19.50	53.70	102.40
2018	RCP85	Irrigated - Rainfed	15.00	41.20	78.60
2045	RCP85	Irrigated - Rainfed	15.70	43.20	82.50
2072	RCP85	Irrigated - Rainfed	14.40	39.50	75.30
2099	RCP85	Irrigated - Rainfed	18.60	51.10	97.50

Table 4.49: Divergent Water Price for Risk Neutral Farmers, DECATUR, GA, COTTON, RCP26

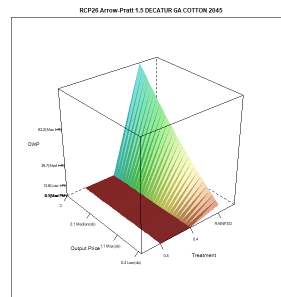
Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	RAINFED	.5	964.91	0.00	14.60	9.56	0.40
2045	RAINFED	.6	1008.11	0.00	13.20	9.67	0.40
2072	RAINFED	.6	998.54	0.00	13.80	9.68	0.40
2099	RAINFED	.7	989.77	0.00	13.30	9.80	0.40
2018	RAINFED	.5	964.91	0.00	40.10	9.56	1.10
2045	RAINFED	.6	1008.11	0.00	36.30	9.67	1.10
2072	RAINFED	.6	998.54	0.00	37.90	9.68	1.10
2099	RAINFED	.7	989.77	0.00	36.40	9.80	1.10
2018	RAINFED	.5	964.91	0.00	76.50	9.56	2.10
2045	RAINFED	.6	1008.11	0.00	69.30	9.67	2.10
2072	RAINFED	.6	998.54	0.00	72.30	9.68	2.10
2099	RAINFED	.7	989.77	0.00	69.40	9.80	2.10

DIVERGENT WATER PRICE FOR RISK AVERSE FARMERS

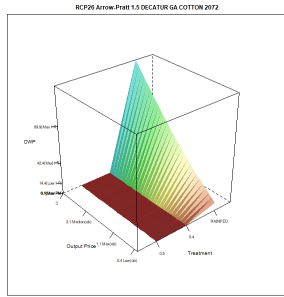
Figure 4.10, 4.11, 4.12 and 4.13 showed the divergent water price of risk averse farmers under $r_a = 1.5$. On average, the divergent water price for switching to rain-fed production increases with output price and decreases with years.



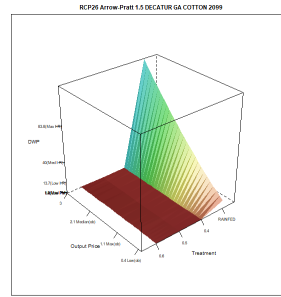
(a) 2018



(b) 2045

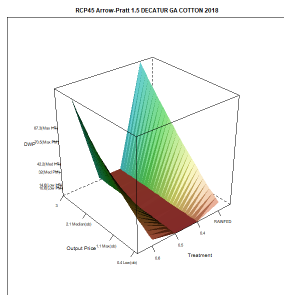


(c) 2072

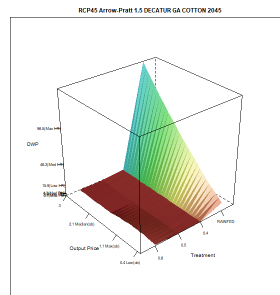


(d) 2099

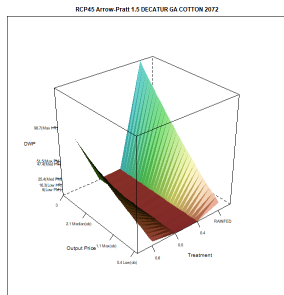
Figure 4.62: Divergent Water Price of Utility Maximization Farmers, Decatur, GA, Cotton $r_a = 1.5$, RCP 2.6



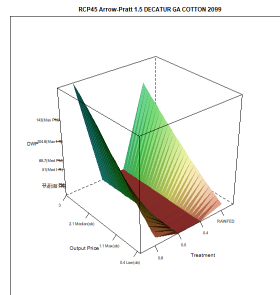
(a) 2018



(b) 2045

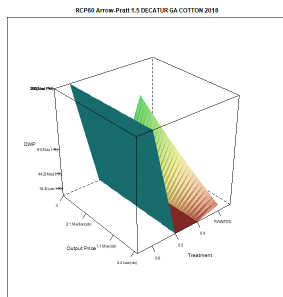


(c) 2072

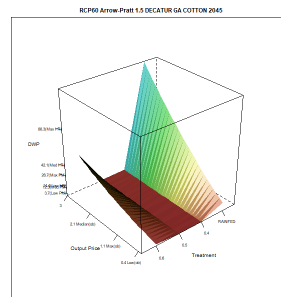


(d) 2099

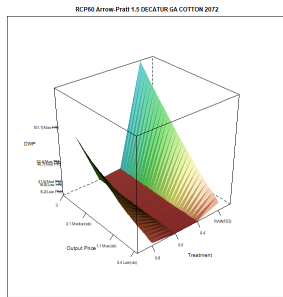
Figure 4.63: Divergent Water Price of Utility Maximization Farmers, Decatur, GA, Cotton $r_a = 1.5$, RCP 4.5



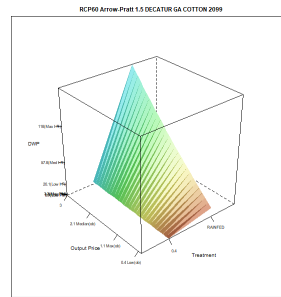
(a) 2018



(b) 2045

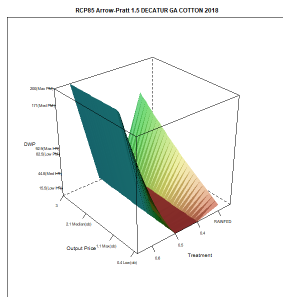


(c) 2072

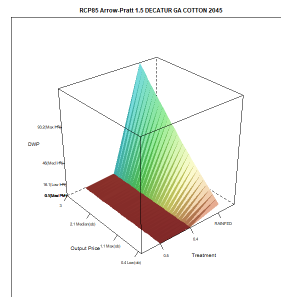


(d) 2099

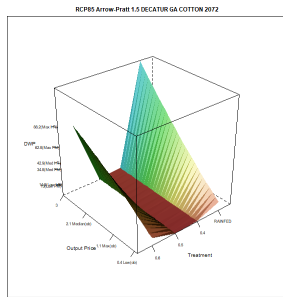
Figure 4.64: Divergent Water Price of Utility Maximization Farmers, Decatur, GA, Cotton $r_a = 1.5$, RCP 6.0



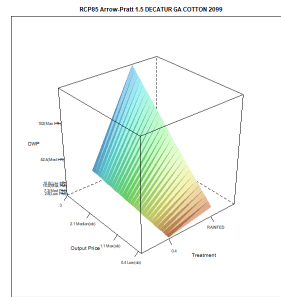
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.65: Divergent Water Price of Utility Maximization Farmers, Seminole, GA, Peanut $r_a = 1.5$, RCP 8.5

Table 4.50 shows the irr-rf water prices across emission scenarios and cotton prices, if cotton prices are at \$2.1 LB, the irr-rf prices are above \$83, it can be as high as \$118. If the cotton price is at \$0.4, if the water price (less fixed irrigation cost) is above \$20.1, farmers will do rain-fed production.

Table 4.50: Divergent Water Price of Risk Averse Farmers (Y-P and I-R) ,DECATUR ,GA ,COTTON

Year	Climate	Form	0.4	1.1	2.1
2018	RCP26	Irrigated - Rainfed	15.10	44.00	91.80
2045	RCP26	Irrigated - Rainfed	13.60	39.70	83.20
2072	RCP26	Irrigated - Rainfed	14.40	42.40	89.90
2099	RCP26	Irrigated - Rainfed	13.70	40.00	83.80
2018	RCP45	Irrigated - Rainfed	14.60	42.20	87.30
2045	RCP45	Irrigated - Rainfed	15.90	46.20	96.50
2072	RCP45	Irrigated - Rainfed	16.30	47.40	98.70
2099	RCP45	Irrigated - Rainfed	17.60	51.00	104.60
2018	RCP60	Irrigated - Rainfed	15.30	44.20	91.00
2045	RCP60	Irrigated - Rainfed	14.40	42.10	88.30
2072	RCP60	Irrigated - Rainfed	16.80	48.70	101.10
2099	RCP60	Irrigated - Rainfed	20.10	57.80	118.00
2018	RCP85	Irrigated - Rainfed	15.50	44.80	92.90
2045	RCP85	Irrigated - Rainfed	16.10	46.00	93.20
2072	RCP85	Irrigated - Rainfed	14.80	42.90	88.20
2099	RCP85	Irrigated - Rainfed	18.80	52.50	102.00

RISK NETURAL V.S RISK AVERSE FARMERS

Table 4.51, 4.52, 4.53, 4.54 compared the divergent water price between risk averse and neutral farmers. On average, the divergent water price of risk neutral farmers are lower than risk averse.

For all emission scenarios, the divergent water price at 0.5 to 0.4 irrigation strategy of risk averse are lower than risk neutral farmers.

For divergent water price drive farmer switch from irrigated to rain-fed production of risk averse farmers are always higher than risk neutral farmers.

Table 4.51: Divergent water price for risk neutral v.s. averse farmers ,DECATUR ,GA ,COTTON ,RCP26

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2099	0.6	0.70	-259.33	0.60	-258.36	0.40
2099	0.6	1.80	649.20	1.20	655.05	1.10
2099	0.6	3.40	1946.83	1.40	1966.33	2.10
2018	0.5	1.20	655.14	1.30	654.43	1.10
2018	0.5	2.20	1958.46	2.80	1954.21	2.10
2018	0.4	2.40	643.57	2.60	642.29	1.10
2018	0.4	4.60	1935.60	5.30	1931.14	2.10
2045	0.4	0.50	2004.59	0.40	2005.23	2.10
2099	0.4	0.90	1971.65	0.80	1972.30	2.10
2018	RAINFED	14.60	-391.84	15.10	-391.84	0.40
2045	RAINFED	13.20	-374.56	13.60	-374.56	0.40
2072	RAINFED	13.80	-378.38	14.40	-378.38	0.40
2099	RAINFED	13.30	-381.89	13.70	-381.89	0.40
2018	RAINFED	40.10	283.60	44.00	283.60	1.10
2045	RAINFED	36.30	331.12	39.70	331.12	1.10
2072	RAINFED	37.90	320.59	42.40	320.59	1.10
2099	RAINFED	36.40	310.95	40.00	310.95	1.10

2018	RAINFED	76.50	1248.51	91.80	1248.51	2.10
2045	RAINFED	69.30	1339.23	83.20	1339.23	2.10
2072	RAINFED	72.30	1319.13	89.90	1319.13	2.10
2099	RAINFED	69.40	1300.72	83.80	1300.72	2.10

Table 4.52: Divergent water price for risk neutral v.s. averse farmers ,DECATUR ,GA ,COTTON ,RCP45

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	RAINFED	14.10	-393.84	14.60	-393.84	0.40
2045	RAINFED	15.40	-405.26	15.90	-405.26	0.40
2072	RAINFED	15.80	-411.61	16.30	-411.61	0.40
2099	RAINFED	17.10	-437.04	17.60	-437.04	0.40
2018	RAINFED	38.80	278.08	42.20	278.08	1.10
2045	RAINFED	42.10	246.69	46.20	246.69	1.10
2072	RAINFED	43.30	229.22	47.40	229.22	1.10
2099	RAINFED	47.00	159.28	51.00	159.28	1.10
2018	RAINFED	74.10	1237.97	87.30	1237.97	2.10
2045	RAINFED	80.40	1178.04	96.50	1178.04	2.10
2072	RAINFED	82.70	1144.69	98.70	1144.69	2.10
2099	RAINFED	89.60	1011.17	104.60	1011.17	2.10

Table 4.53: Divergent water price for risk neutral v.s. averse farmers ,DECATUR ,GA ,COTTON ,RCP60

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	RAINFED	14.80	-404.79	15.30	-404.79	0.40
2045	RAINFED	14.00	-398.30	14.40	-398.30	0.40
2072	RAINFED	16.30	-422.53	16.80	-422.53	0.40
2099	RAINFED	19.50	-435.62	20.10	-435.62	0.40
2018	RAINFED	40.60	247.98	44.20	247.98	1.10
2045	RAINFED	38.30	265.82	42.10	265.82	1.10
2072	RAINFED	44.70	199.19	48.70	199.19	1.10
2099	RAINFED	53.70	163.19	57.80	163.19	1.10
2018	RAINFED	77.40	1180.51	91.00	1180.51	2.10
2045	RAINFED	73.00	1214.58	88.30	1214.58	2.10
2072	RAINFED	85.20	1087.36	101.10	1087.36	2.10
2099	RAINFED	102.40	1018.64	118.00	1018.64	2.10

Table 4.54: Divergent water price for risk neutral v.s. averse farmers ,DECATUR ,GA ,COTTON ,RCP85

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	RAINFED	15.00	-414.59	15.50	-414.59	0.40
2045	RAINFED	15.70	-413.67	16.10	-413.67	0.40
2072	RAINFED	14.40	-458.59	14.80	-458.59	0.40
2099	RAINFED	18.60	-570.29	18.80	-570.29	0.40
2018	RAINFED	41.20	221.03	44.80	221.03	1.10
2045	RAINFED	43.20	223.55	46.00	223.55	1.10
2072	RAINFED	39.50	100.03	42.90	100.03	1.10
2099	RAINFED	51.10	-207.15	52.50	-207.15	1.10
2018	RAINFED	78.60	1129.06	92.90	1129.06	2.10
2045	RAINFED	82.50	1133.87	93.20	1133.87	2.10
2072	RAINFED	75.30	898.06	88.20	898.06	2.10
2099	RAINFED	97.50	311.62	102.00	311.62	2.10

4.4.2 SEMINOLE, GA

Figure 4.66, 4.67, 4.68 is the average temperature, precipitation simulated from MarkSim. Both maximum and the minimum temperature from the simulation raised along with decrease in cumulative rainfall over the cotton growing season, expect for RCP 2.6. The mean temperature during cotton season in Decatur county raises about 4°C whereas the cumulative precipitation dropped 2 inches for high emission secnario. Table A.3 shows the summary statistics of temperature and precipitation by RCPs. The historical average come from monthly normal ??.

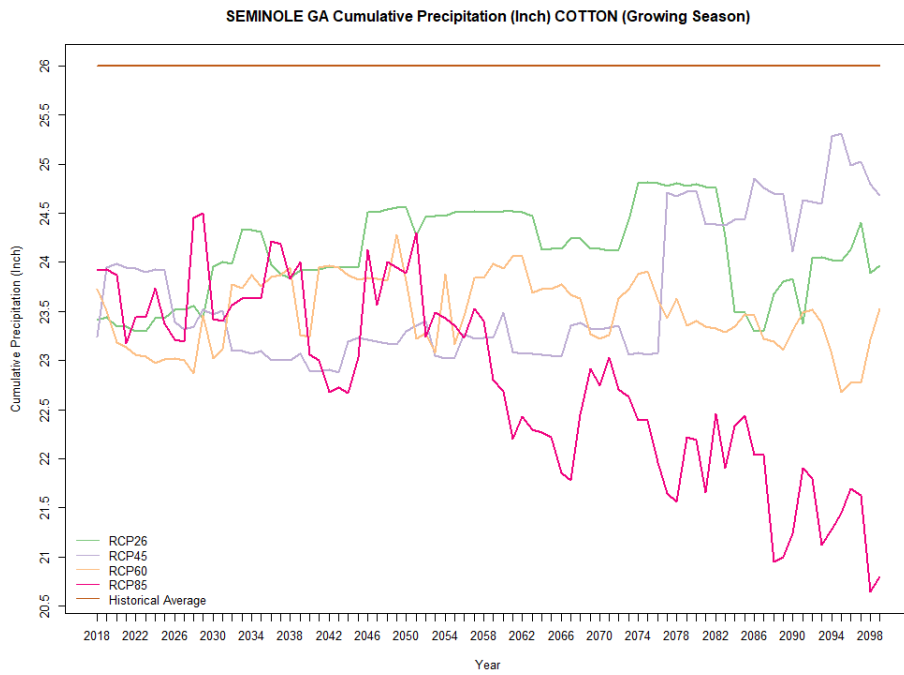


Figure 4.66: Cumulative Rainfall over Cotton Season, Decatur, GA

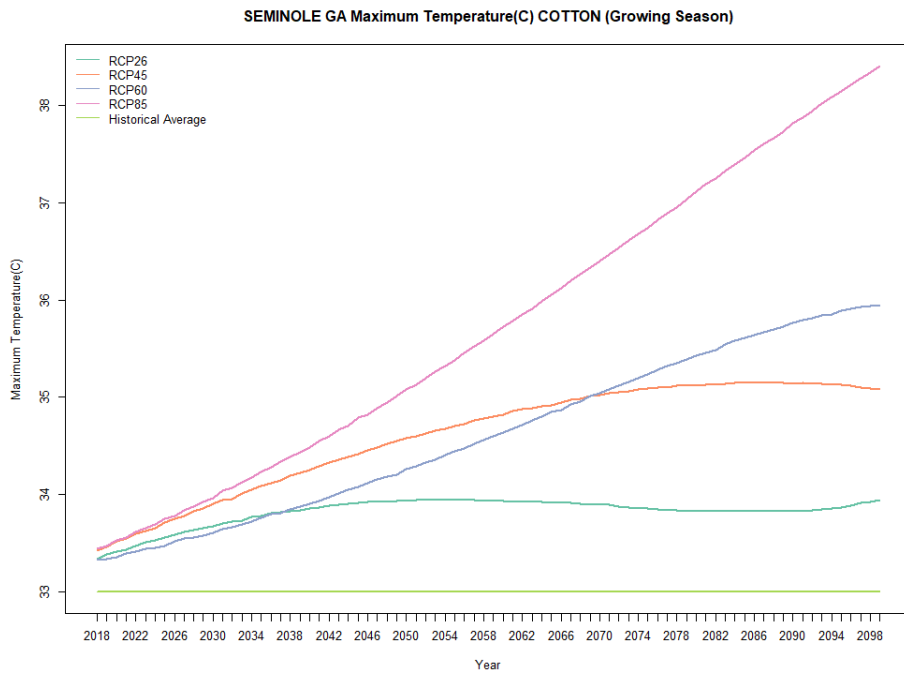


Figure 4.67: Average Maximum Temperature over Cotton Season, Decatur, GA

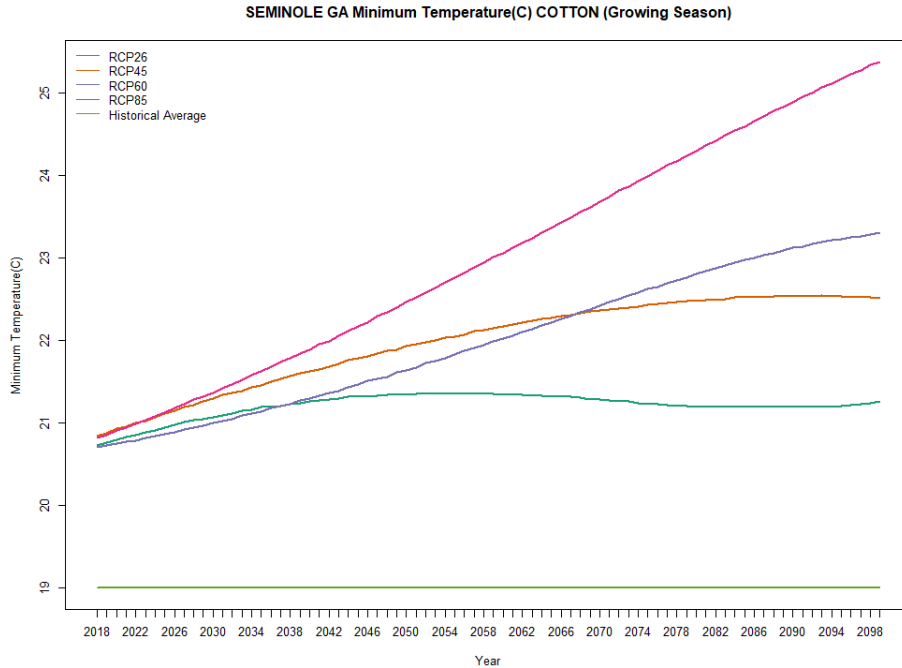
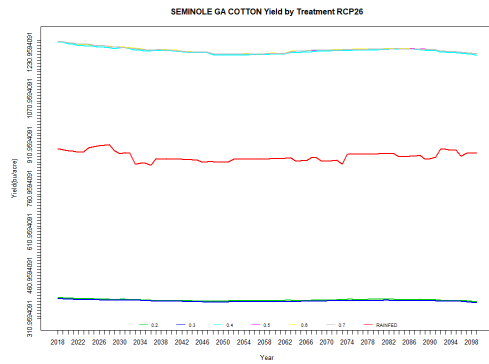


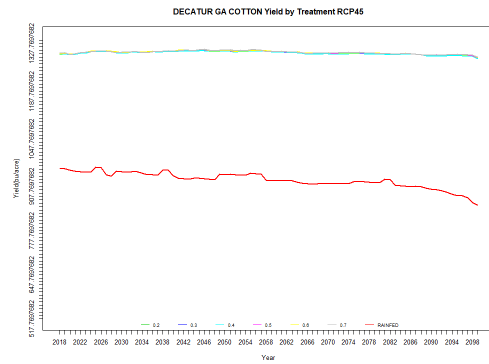
Figure 4.68: Average Minimum Temperature over Cotton Season, Decatur, GA

SIMULATED YIELD AND WATER USE BY IRRIGATION STRATEGIES

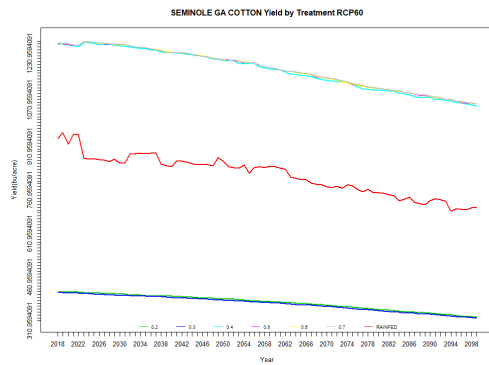
As figure 4.69 and 4.70 shows, for Seminole county, there are no significant differences between irrigation strategies, with 6.8 inches of water application the cotton yield increase 367 LB/ACRE on average. The simulated rain-fed yield at 2099 increases 24 LB/ACRE (3%) for RCP 2.6, decreases 107 LB/ACRE (11%), 77 LB/ACRE (8%), 389 LB/ACRE (43%) for RCP 4.5, 6.0 and 8.5 respectively.



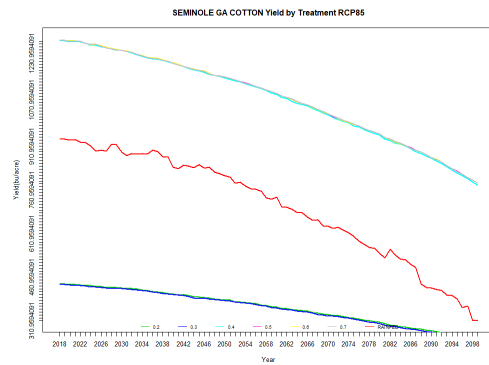
(a) Simulated Cotton Yield-RCP 2.6



(b) Simulated Cotton Yield-RCP 4.5

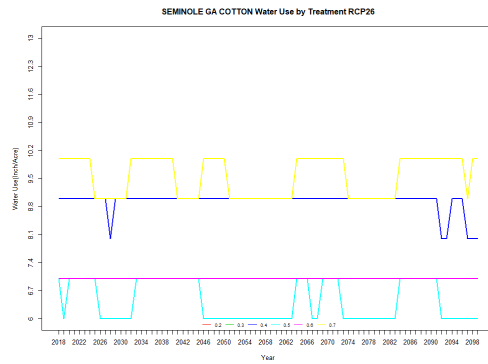


(c) Simulated Cotton Yield-RCP 6.0

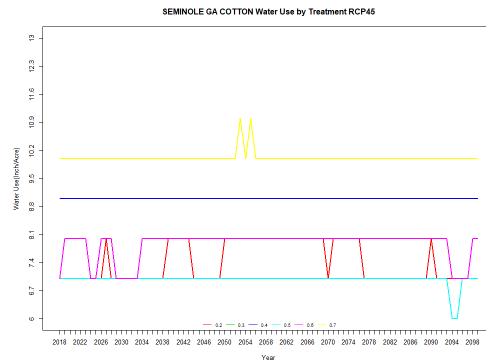


(d) Simulated Cotton Yield-RCP 8.5

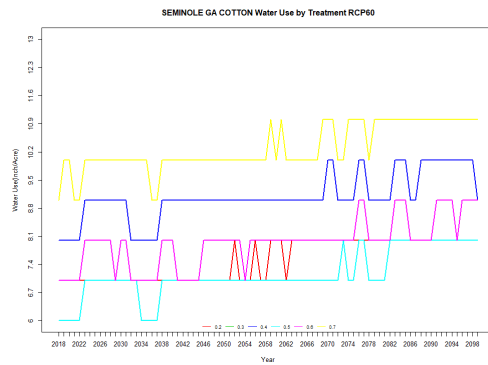
Figure 4.69: Average Simulated Yield by Treatment, Seminole, GA, Cotton



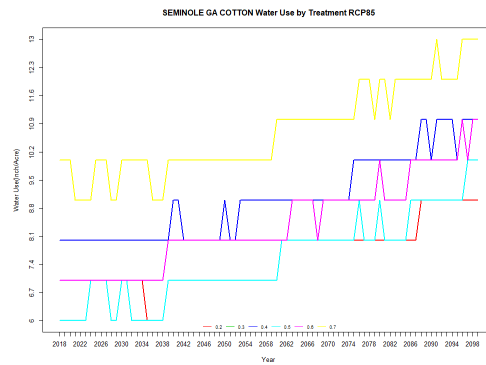
(a) Simulated Water Use Yield-RCP 2.6



(b) Simulated Water Use-RCP 4.5



(c) Simulated Water Use-RCP 6.0



(d) Simulated Water Use-RCP 8.5

Figure 4.70: Average Simulated Water Use by Treatment, Seminole, GA, Cotton

MAXIMUM YIELD IRRIGATION STRATEGIES

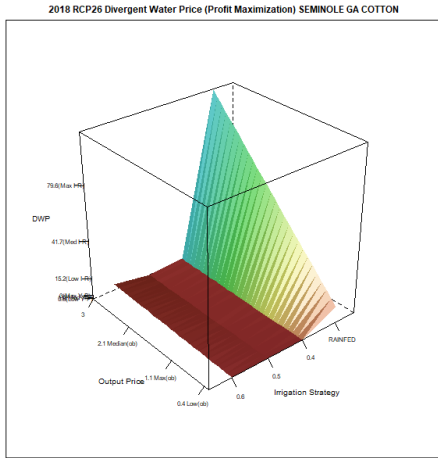
Table 4.55 shows the yield maximization strategies for Decatur, GA, cotton farmers. For low emission scenarios (RCP 2.6), except for 2045, the yield maximization strategies are 0.7. For mid-low emission scenarios (RCP 4.5) the yield maximization strategies are 0.7 always. For mid emission scenarios (RCP 6.0) the yield maximization strategies are 0.7, except for 2099. For high emission scenarios (RCP 8.5), at 2018 the yield maximization strategy is 0.7, then it becomes 0.6 at until 2072, at 2099, the yield maximization strategy is 0.5.

Table 4.55: Yield Maximization Treatment, Seminole ,GA, Cotton

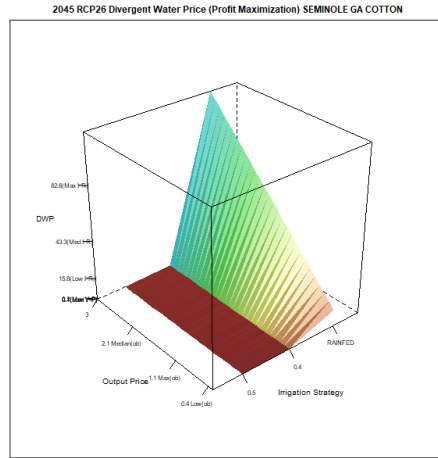
Climate	Year	Irrigation Strategy	Yield(LB/ACRE)	Water Use(INCH/ACRE)
RCP 2.6	2018	0.7	1267.22	9.78
	2045	0.6	1229.51	9.45
	2072	0.6	1237.98	9.67
	2099	0.6	1224.09	9.57
RCP 4.5	2018	0.5	1262.61	7.35
	2045	0.7	1185.20	10.10
	2072	0.5	1137.67	7.96
	2099	0.6	1126.39	9.99
RCP 6.0	2018	0.6	1264.25	9.48
	2045	0.6	1223.06	9.65
	2072	0.7	1139.28	10.45
	2099	0.7	1055.58	10.78
RCP 8.5	2018	0.6	1275.72	9.53
	2045	0.6	1170.73	10.02
	2072	0.7	1006.44	11.12
	2099	0.5	782.72	11.01

DIVERGENT WATER PRICE FOR RISK NEUTRAL FARMERS

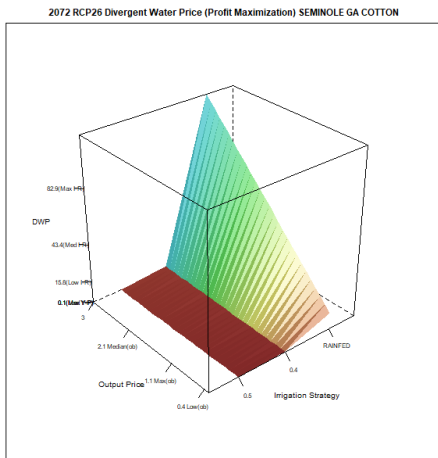
Figure 4.58, 4.59, 4.60 and 4.61 shows the divergent water price for risk neutral farmers by irrigation strategies. The low(ob), medium(ob) and max(ob) in the y-axis are low, medium and maximum observed 30 years historical cotton price from USDA survey. The divergent water price increases with output prices.



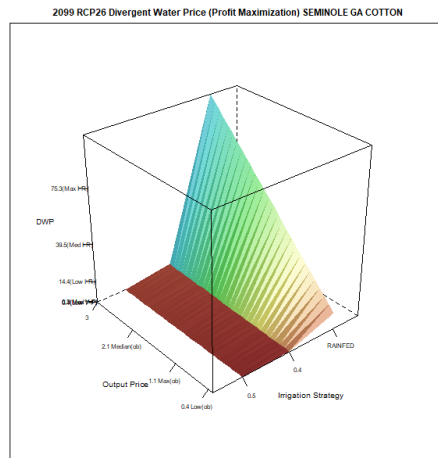
(a) 2018



(b) 2045

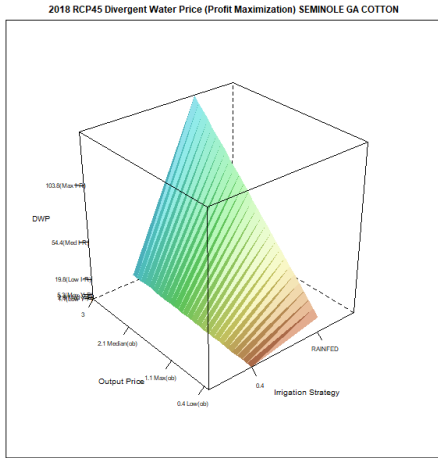


(c) 2072

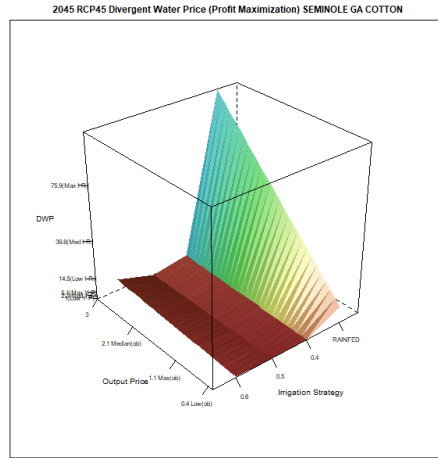


(d) 2099

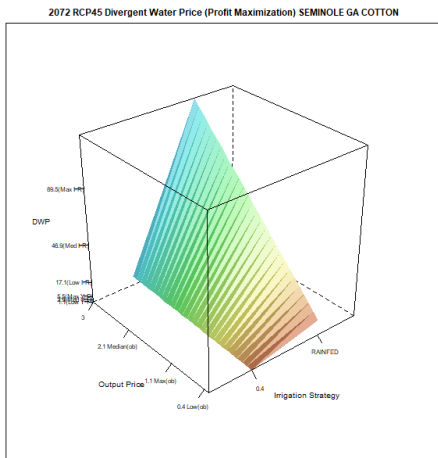
Figure 4.71: Water Use of profit maximizing farmers by irrigation strategies, Seminole, GA, Cotton, RCP 2.6



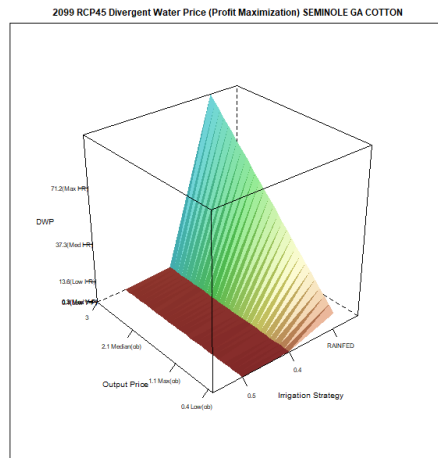
(a) 2018



(b) 2045

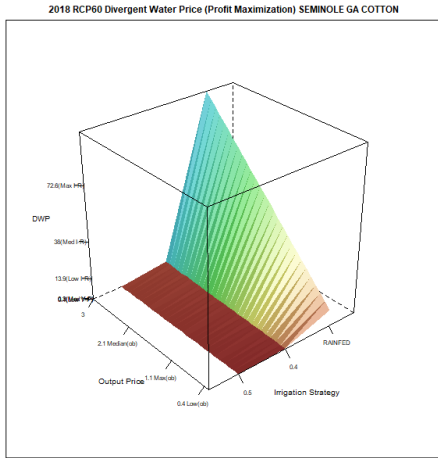


(c) 2072

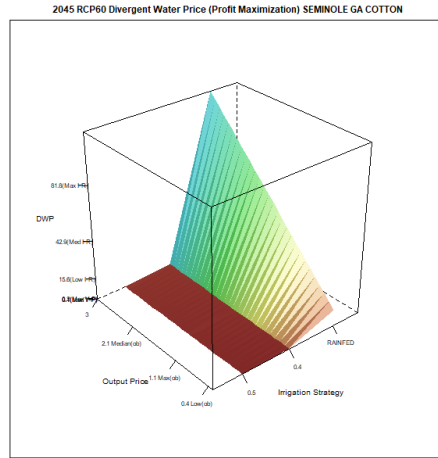


(d) 2099

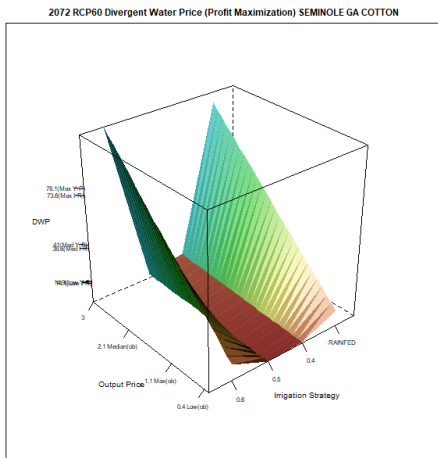
Figure 4.72: Water Use of profit maximizing farmers by irrigation strategies, Seminole, GA, Cotton, RCP 4.5



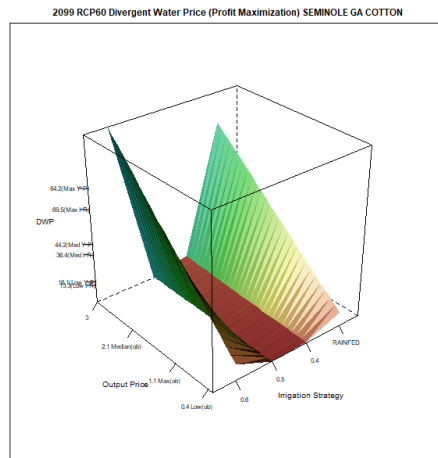
(a) 2018



(b) 2045

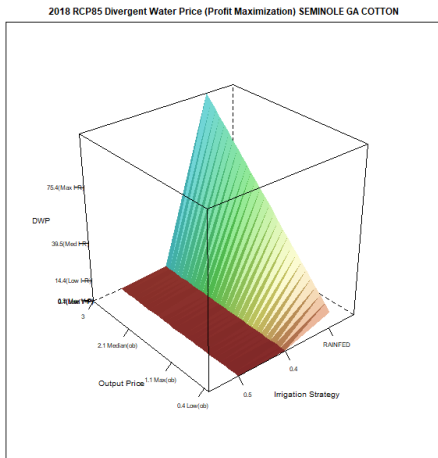


(c) 2072

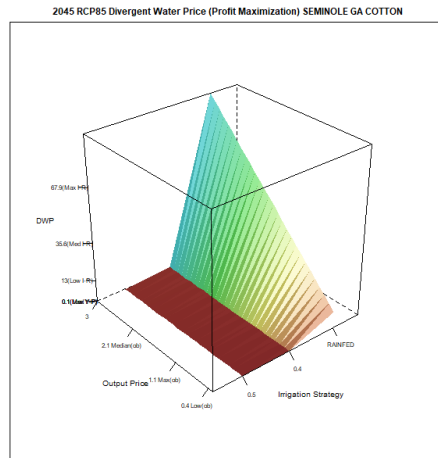


(d) 2099

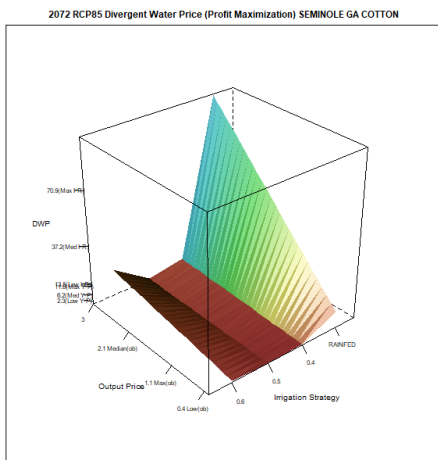
Figure 4.73: Water Use of profit maximizing farmers by irrigation strategies, Seminole, GA, Cotton, RCP 6.0



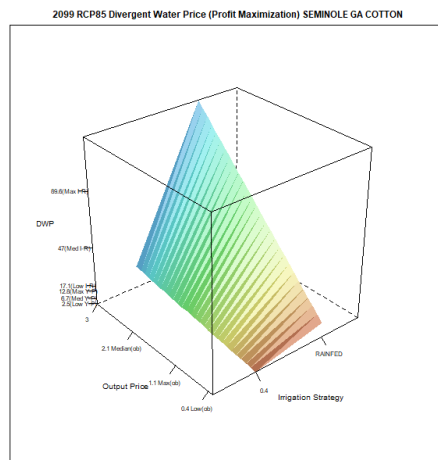
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.74: Water Use of profit maximizing farmers by irrigation strategies, Seminole, GA, Cotton, RCP 8.5

The table 4.56 shows the irr-rf water prices for Seminole, GA cotton farmers, across RCPs and selected years. Except for RCP 2.6 and RCP 4.5, the irr-rf water prices of risk neutral farmers are strictly increasing with years.

Table 4.56: Divergent Water Price of Risk Neutral Farmers(Y-P and I-R), Seminole, GA, Cotton

Year	Climate	Form	0.4	1.1	2.1
2018	RCP26	Irrigated - Rainfed	15.20	41.70	79.60
2045	RCP26	Irrigated - Rainfed	15.80	43.30	82.60
2072	RCP26	Irrigated - Rainfed	15.80	43.40	82.90
2099	RCP26	Irrigated - Rainfed	14.40	39.50	75.30
2018	RCP45	Irrigated - Rainfed	19.80	54.40	103.80
2045	RCP45	Irrigated - Rainfed	14.50	39.80	75.90
2072	RCP45	Irrigated - Rainfed	17.10	46.90	89.50
2099	RCP45	Irrigated - Rainfed	13.60	37.30	71.20
2018	RCP60	Irrigated - Rainfed	13.90	38.00	72.60
2045	RCP60	Irrigated - Rainfed	15.60	42.90	81.80
2072	RCP60	Irrigated - Rainfed	14.10	38.60	73.60
2099	RCP60	Irrigated - Rainfed	13.30	36.40	69.50
2018	RCP85	Irrigated - Rainfed	14.40	39.50	75.40
2045	RCP85	Irrigated - Rainfed	13.00	35.60	67.90
2072	RCP85	Irrigated - Rainfed	13.50	37.20	70.90
2099	RCP85	Irrigated - Rainfed	17.10	47.00	89.60

Table 4.57 is the irr-rf water price for Seminole cotton farmers at 2018 and 2099 across cotton prices.

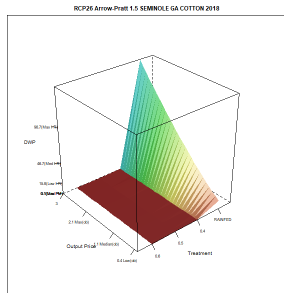
Expect for RCP 8.5, the irr-rf water price of 2099 is lower than 2018, at \$0.4 LB cotton price, the biggest change is at RCP 4.5, at 2099, farmers pay \$6 less to stay at irrigated production(\$13.6).

Table 4.57: Difference between divergent water price for risk neutral farmer, SEMINOLE, GA, COTTON

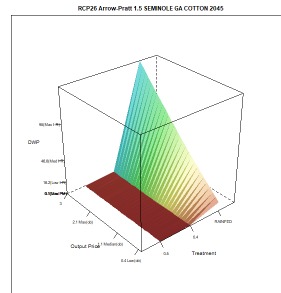
Climate	TR2018	TR2099	Output Price	2018DWP	2099DWP	Diff
rcp26	RAINFED	RAINFED	0.40	15.20	14.40	-0.80
rcp26	RAINFED	RAINFED	1.10	41.70	39.50	-2.20
rcp26	RAINFED	RAINFED	2.10	79.60	75.30	-4.30
rcp45	RAINFED	RAINFED	0.40	19.80	13.60	-6.20
rcp45	RAINFED	RAINFED	1.10	54.40	37.30	-17.10
rcp45	RAINFED	RAINFED	2.10	103.80	71.20	-32.60
rcp60	RAINFED	RAINFED	0.40	13.90	13.30	-0.60
rcp60	RAINFED	RAINFED	1.10	38.00	36.40	-1.60
rcp60	RAINFED	RAINFED	2.10	72.60	69.50	-3.10
rcp85	RAINFED	RAINFED	0.40	14.40	17.10	2.70
rcp85	RAINFED	RAINFED	1.10	39.50	47.00	7.50
rcp85	RAINFED	RAINFED	2.10	75.40	89.60	14.20

DIVERGENT WATER PRICE FOR RISK AVERSE FARMERS

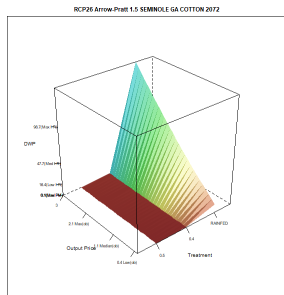
Figure 4.10, 4.11, 4.12 and 4.13 showed the divergent water price of risk averse farmers under $r_a = 1.5$. On average, the divergent water price for switching to rain-fed production increases with output price and decreases with years.



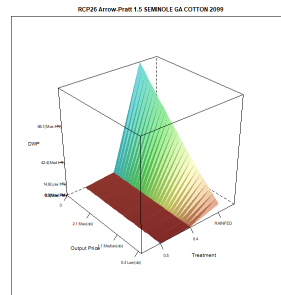
(a) 2018



(b) 2045

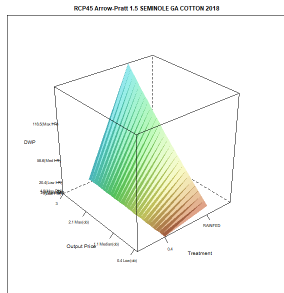


(c) 2072

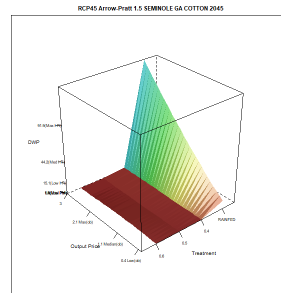


(d) 2099

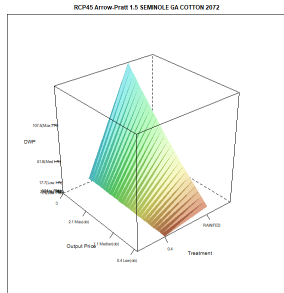
Figure 4.75: Divergent Water Price of Utility Maximization Farmers, Seminole, GA, Cotton $r_a = 1.5$, RCP 2.6



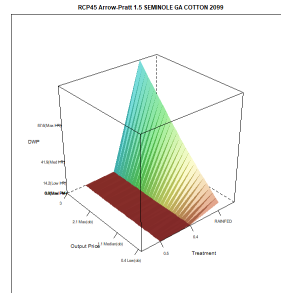
(a) 2018



(b) 2045

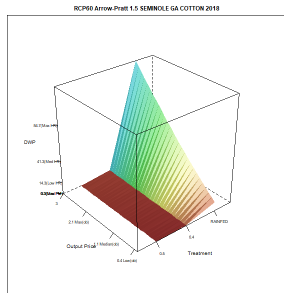


(c) 2072

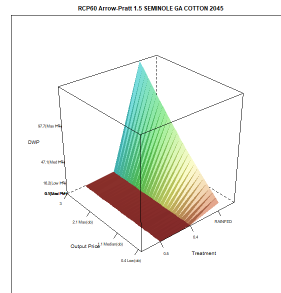


(d) 2099

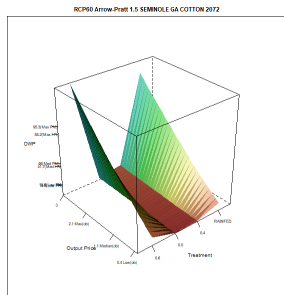
Figure 4.76: Divergent Water Price of Utility Maximization Farmers, Seminole, GA, Cotton $r_a = 1.5$, RCP 4.5



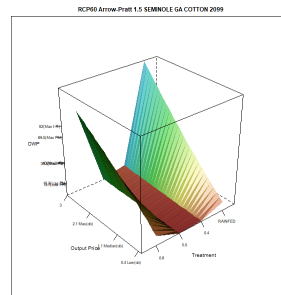
(a) 2018



(b) 2045

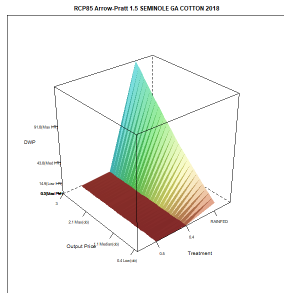


(c) 2072

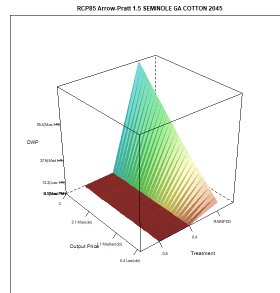


(d) 2099

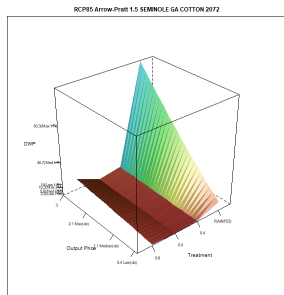
Figure 4.77: Divergent Water Price of Utility Maximization Farmers, Seminole, GA, Cotton $r_a = 1.5$, RCP 6.0



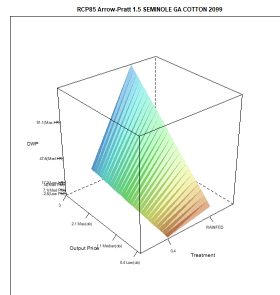
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.78: Divergent Water Price of Utility Maximization Farmers, Seminole, GA, Peanut $r_a = 1.5$, RCP 8.5

Table 4.58 shows the irr-rf water prices across emission scenarios and cotton prices, if cotton prices are at \$2.1 LB, the irr-rf prices are above \$83, it can be as high as \$118. If the cotton price is at \$0.4, if the water price (less fixed irrigation cost) is above \$20.1, farmers will do rain-fed production.

Table 4.58: Divergent Water Price of Risk Averse Farmers (Y-P and I-R) ,SEMINOLE ,GA ,COTTON

Year	Climate	Form	0.4	1.1	2.1
2018	RCP26	Irrigated - Rainfed	15.80	46.70	98.70
2045	RCP26	Irrigated - Rainfed	16.20	46.80	95.00
2072	RCP26	Irrigated - Rainfed	16.40	47.70	98.70
2099	RCP26	Irrigated - Rainfed	14.80	42.40	86.10
2018	RCP45	Irrigated - Rainfed	20.40	58.60	118.50
2045	RCP45	Irrigated - Rainfed	15.10	44.20	91.90
2072	RCP45	Irrigated - Rainfed	17.70	51.80	107.50
2099	RCP45	Irrigated - Rainfed	14.20	41.90	87.60
2018	RCP60	Irrigated - Rainfed	14.30	41.30	84.70
2045	RCP60	Irrigated - Rainfed	16.20	47.10	97.70
2072	RCP60	Irrigated - Rainfed	14.50	41.70	85.20
2099	RCP60	Irrigated - Rainfed	13.70	40.00	82.00
2018	RCP85	Irrigated - Rainfed	14.90	43.80	91.80
2045	RCP85	Irrigated - Rainfed	13.30	37.90	76.40
2072	RCP85	Irrigated - Rainfed	14.00	40.70	83.30
2099	RCP85	Irrigated - Rainfed	17.20	47.60	91.10

Table 4.59 to 4.62 shows similar information as table 4.58, in addition it shows water savings and irr-rf water price at difference risk aversion level.

According to the four tables, there differences between $\alpha \in \{1, 5, 2, 4\}$ are small.

Table 4.59: Divergent Water Price for Risk Averse Farmers, SEMINOLE, GA, COTTON

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	RAINFED	0.7	896.57	0.00	15.80	15.80	15.80	9.74	0.40
2045	RAINFED	0.6	858.01	0.00	16.20	16.20	16.20	7.18	0.40
2072	RAINFED	0.6	856.56	0.00	16.40	16.40	16.40	7.24	0.40
2099	RAINFED	0.6	881.24	0.00	14.80	14.80	14.80	7.14	0.40
2018	RAINFED	0.7	896.57	0.00	46.70	46.70	46.70	9.74	1.10
2045	RAINFED	0.6	858.01	0.00	46.80	46.80	46.80	7.18	1.10
2072	RAINFED	0.6	856.56	0.00	47.70	47.70	47.70	7.24	1.10
2099	RAINFED	0.6	881.24	0.00	42.40	42.40	42.40	7.14	1.10
2018	RAINFED	0.7	896.57	0.00	98.70	98.70	98.70	9.74	2.10
2045	RAINFED	0.6	858.01	0.00	95.00	95.00	95.00	7.18	2.10
2072	RAINFED	0.6	856.56	0.00	98.70	98.70	98.70	7.24	2.10
2099	RAINFED	0.6	881.24	0.00	86.10	86.10	86.10	7.14	2.10

Table 4.60: Divergent Water Price for Risk Averse Farmers, SEMINOLE, GA, COTTON

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	RAINFED	0.5	899.34	0.00	20.40	20.40	20.40	6.60	0.40
2045	RAINFED	0.7	820.34	0.00	15.10	15.10	15.10	10.00	0.40
2072	RAINFED	0.5	798.61	0.00	17.70	17.70	17.70	7.09	0.40
2099	RAINFED	0.6	787.94	0.00	14.20	14.20	14.20	7.62	0.40
2018	RAINFED	0.5	899.34	0.00	58.60	58.60	58.60	6.60	1.10
2045	RAINFED	0.7	820.34	0.00	44.20	44.20	44.20	10.00	1.10
2072	RAINFED	0.5	798.61	0.00	51.80	51.80	51.80	7.09	1.10
2099	RAINFED	0.6	787.94	0.00	41.90	41.90	41.90	7.62	1.10
2018	RAINFED	0.5	899.34	0.00	118.50	118.50	118.50	6.60	2.10
2045	RAINFED	0.7	820.34	0.00	91.90	91.90	91.90	10.00	2.10
2072	RAINFED	0.5	798.61	0.00	107.50	107.50	107.50	7.09	2.10
2099	RAINFED	0.6	787.94	0.00	87.60	87.60	87.60	7.62	2.10

Table 4.61: Divergent Water Price for Risk Averse Farmers, SEMINOLE, GA, COTTON

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	RAINFED	0.6	936.85	0.00	14.30	14.30	14.30	7.02	0.40
2045	RAINFED	0.6	847.21	0.00	16.20	16.20	16.20	7.46	0.40
2072	RAINFED	0.7	773.16	0.00	14.50	14.50	14.50	10.40	0.40
2099	RAINFED	0.7	699.17	0.00	13.70	13.70	13.70	8.56	0.40
2018	RAINFED	0.6	936.85	0.00	41.30	41.30	41.30	7.02	1.10
2045	RAINFED	0.6	847.21	0.00	47.10	47.10	47.10	7.46	1.10
2072	RAINFED	0.7	773.16	0.00	41.70	41.70	41.70	10.40	1.10
2099	RAINFED	0.7	699.17	0.00	40.00	40.00	40.00	8.56	1.10
2018	RAINFED	0.6	936.85	0.00	84.70	84.70	84.70	7.02	2.10
2045	RAINFED	0.6	847.21	0.00	97.70	97.70	97.70	7.46	2.10
2072	RAINFED	0.7	773.16	0.00	85.20	85.20	85.20	10.40	2.10
2099	RAINFED	0.7	699.17	0.00	82.00	82.00	82.00	8.56	2.10

Table 4.62: Divergent Water Price for Risk Averse Farmers, SEMINOLE, GA, COTTON

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	RAINFED	0.6	933.85	0.00	14.90	15.10	15.90	7.26	0.40
2045	RAINFED	0.6	846.94	0.00	13.30	13.40	13.80	7.70	0.40
2072	RAINFED	0.7	631.33	0.00	14.00	14.20	14.80	8.81	0.40
2099	RAINFED	0.5	313.17	0.00	17.20	17.20	17.30	9.97	0.40
2018	RAINFED	0.6	933.85	0.00	43.80	45.40	51.70	7.26	1.10
2045	RAINFED	0.6	846.94	0.00	37.90	38.70	41.80	7.70	1.10
2072	RAINFED	0.7	631.33	0.00	40.70	41.90	45.70	8.81	1.10
2099	RAINFED	0.5	313.17	0.00	47.60	47.70	47.70	9.97	1.10
2018	RAINFED	0.6	933.85	0.00	91.80	97.60	115.70	7.26	2.10
2045	RAINFED	0.6	846.94	0.00	76.40	79.30	89.60	7.70	2.10
2072	RAINFED	0.7	631.33	0.00	83.30	86.60	94.40	8.81	2.10
2099	RAINFED	0.5	313.17	0.00	91.10	91.00	89.30	9.97	2.10

Table 4.63: Difference between divergent water price of risk averse farmers, SEMINOLE, GA, COTTON

Climate	TR2018	TR2099	OP	2018DWP	2099DWP	Diff
rcp26	rainfed	rainfed	0.40	15.80	0.00	-15.80
rcp26	rainfed	rainfed	1.10	46.70	0.00	-46.70
rcp26	rainfed	rainfed	2.10	98.70	0.00	-98.70
rcp45	rainfed	rainfed	0.40	20.40	0.00	-20.40
rcp45	rainfed	rainfed	1.10	58.60	0.00	-58.60
rcp45	rainfed	rainfed	2.10	118.50	0.00	-118.50
rcp60	rainfed	rainfed	0.40	14.30	0.00	-14.30
rcp60	rainfed	rainfed	1.10	41.30	0.00	-41.30
rcp60	rainfed	rainfed	2.10	84.70	0.00	-84.70
rcp85	rainfed	rainfed	0.40	14.90	0.00	-14.90
rcp85	rainfed	rainfed	1.10	43.80	0.00	-43.80
rcp85	rainfed	rainfed	2.10	91.80	0.00	-91.80

RISK NETURAL V.S RISK AVERSE FARMERS

Table 4.64, 4.64, 4.66, 4.67 compared the divergent water price between risk averse and neutral farmers. On average, the divergent water price of risk neutral farmers are lower than risk averse.

For divergent water price drive farmer switch from irrigated to rain-fed production of risk averse farmers are always higher than risk neutral farmers.

Table 4.64: Divergent water price for risk neutral v.s. averse farmers ,SEMINOLE ,GA
,COTTON ,RCP26

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	RAINFED	15.20	-419.17	15.80	-419.17	0.40
2045	RAINFED	15.80	-434.60	16.20	-434.60	0.40
2072	RAINFED	15.80	-435.18	16.40	-435.18	0.40
2099	RAINFED	14.40	-425.30	14.80	-425.30	0.40
2018	RAINFED	41.70	208.43	46.70	208.43	1.10
2045	RAINFED	43.30	166.01	46.80	166.01	1.10
2072	RAINFED	43.40	164.42	47.70	164.42	1.10
2099	RAINFED	39.50	191.56	42.40	191.56	1.10
2018	RAINFED	79.60	1105.00	98.70	1105.00	2.10
2045	RAINFED	82.60	1024.02	95.00	1024.02	2.10
2072	RAINFED	82.90	1020.98	98.70	1020.98	2.10
2099	RAINFED	75.30	1072.80	86.10	1072.80	2.10

Table 4.65: Divergent water price for risk neutral v.s. averse farmers ,SEMINOLE ,GA
,COTTON ,RCP45

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	RAINFED	19.80	-418.06	20.40	-418.06	0.40
2045	RAINFED	14.50	-449.66	15.10	-449.66	0.40
2072	RAINFED	17.10	-458.36	17.70	-458.36	0.40
2099	RAINFED	13.60	-462.62	14.20	-462.62	0.40
2018	RAINFED	54.40	211.47	58.60	211.47	1.10
2045	RAINFED	39.80	124.57	44.20	124.57	1.10
2072	RAINFED	46.90	100.67	51.80	100.67	1.10
2099	RAINFED	37.30	88.93	41.90	88.93	1.10
2018	RAINFED	103.80	1110.81	118.50	1110.81	2.10
2045	RAINFED	75.90	944.91	91.90	944.91	2.10
2072	RAINFED	89.50	899.28	107.50	899.28	2.10
2099	RAINFED	71.20	876.87	87.60	876.87	2.10

Table 4.66: Divergent water price for risk neutral v.s. averse farmers ,SEMINOLE ,GA
,COTTON ,RCP60

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	RAINFED	13.90	-403.06	14.30	-403.06	0.40
2045	RAINFED	15.60	-438.92	16.20	-438.92	0.40
2072	RAINFED	14.10	-468.54	14.50	-468.54	0.40
2099	RAINFED	13.30	-498.13	13.70	-498.13	0.40
2018	RAINFED	38.00	252.74	41.30	252.74	1.10
2045	RAINFED	42.90	154.13	47.10	154.13	1.10
2072	RAINFED	38.60	72.68	41.70	72.68	1.10
2099	RAINFED	36.40	-8.71	40.00	-8.71	1.10
2018	RAINFED	72.60	1189.59	84.70	1189.59	2.10
2045	RAINFED	81.80	1001.34	97.70	1001.34	2.10
2072	RAINFED	73.60	845.84	85.20	845.84	2.10
2099	RAINFED	69.50	690.46	82.00	690.46	2.10

Table 4.67: Divergent water price for risk neutral v.s. averse farmers ,SEMINOLE ,GA ,COTTON ,RCP85

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	RAINFED	14.40	-404.26	14.90	-404.26	0.40
2045	RAINFED	13.00	-439.02	13.30	-439.02	0.40
2072	RAINFED	13.50	-525.27	14.00	-525.27	0.40
2099	RAINFED	17.10	-652.53	17.20	-652.53	0.40
2018	RAINFED	39.50	249.44	43.80	249.44	1.10
2045	RAINFED	35.60	153.83	37.90	153.83	1.10
2072	RAINFED	37.20	-83.34	40.70	-83.34	1.10
2099	RAINFED	47.00	-433.31	47.60	-433.31	1.10
2018	RAINFED	75.40	1183.29	91.80	1183.29	2.10
2045	RAINFED	67.90	1000.77	76.40	1000.77	2.10
2072	RAINFED	70.90	547.99	83.30	547.99	2.10
2099	RAINFED	89.60	-120.14	91.10	-120.14	2.10

4.4.3 CARSON, TEXAS

Texas is the top 1 area in producing and planting cotton in the U.S.A. Decatur is one of top cotton producing county in GA. It is located in southwestern corner along the Flint river basin. According to USDA survey in 2017 Decatur produced 60,400 bales of cotton with 29,600 Acre.

SIMULATED WEATHER

Figure 4.79, 4.80 and 4.81 show the average temperature, precipitation simulated from MarkSim. Both maximum and the minimum temperature from the simulation raised along

with decrease in cumulative rainfall over the corn growing season, expect for RCP 2.6. The mean temperature during corn season in Carson county raises about 4°C. The cumulative rainfall over growing season follows downward trend except for RCP 2.6. At RCP 8.5, at the end of 21 century, the cumulative rainfall of cotton season dropped almost 4 inches. Table A.5 shows the min, max and standard deviation across random draws of MarkSim weather simulation.

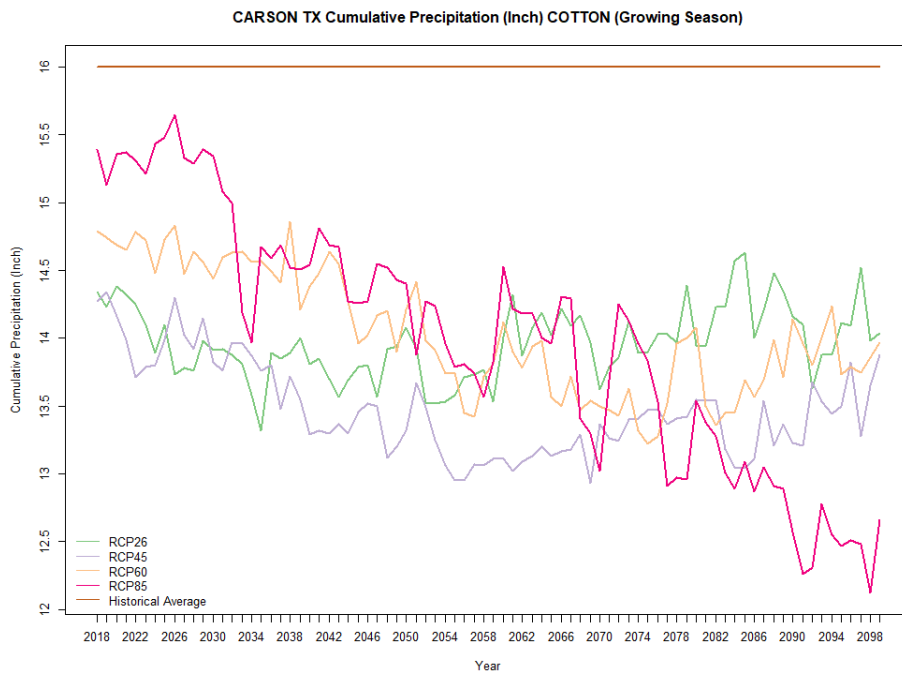


Figure 4.79: Cumulative Rainfall over Cotton Season, Carson, TX

SIMULATED YIELD AND WATER USE

As figure 4.56 shows, for RCP 8.5, the average yield behave as expected,for all irrigation strategies, yield reduced by 483 lb/Acre . Since we are more likely to meet RCP 6.0 and RCP 8.5, switching to irrigation agricultural will keep the cotton yield above 900 lb/acre.

Similar to Decatur county, there are no significant yield differences between irrigation strategies, with around 13 Inch/Acre of water use, cotton yield is expected to increase 772 LB/Acre across different years and levels of emissions.

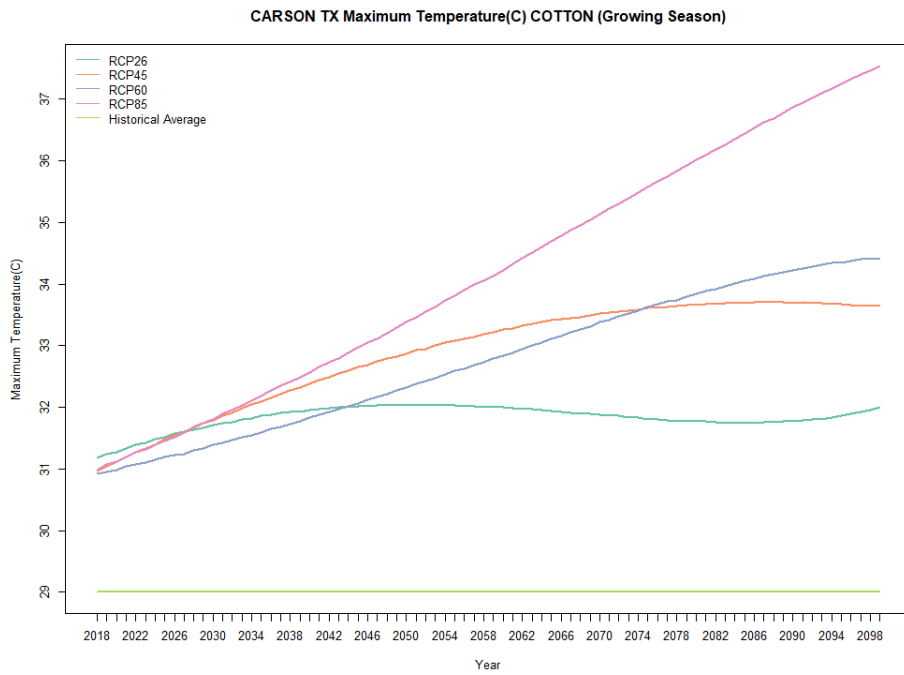


Figure 4.80: Average Maximum Temperature over Cotton Season, Carson, TX

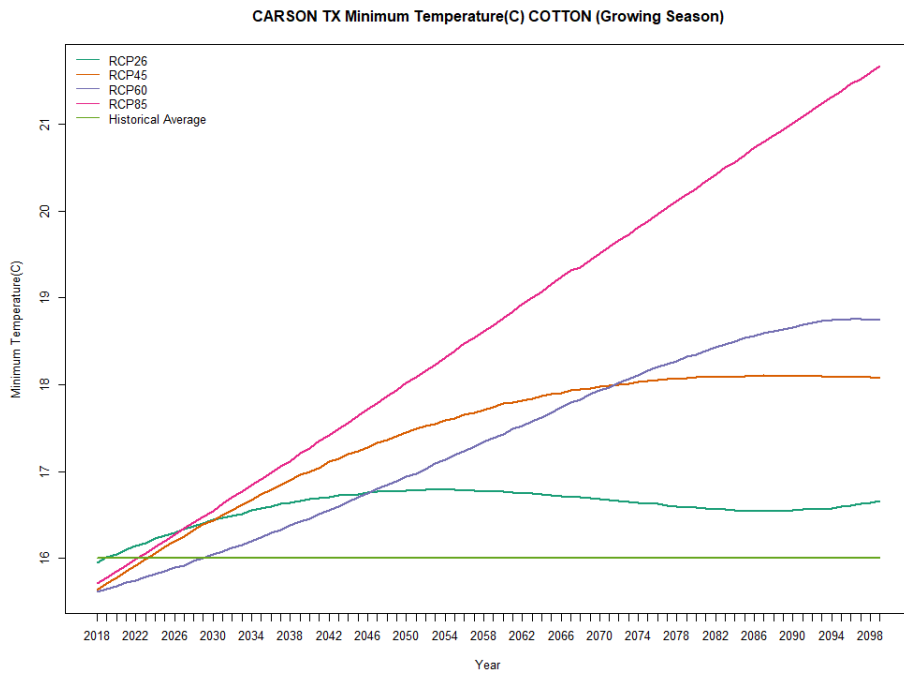
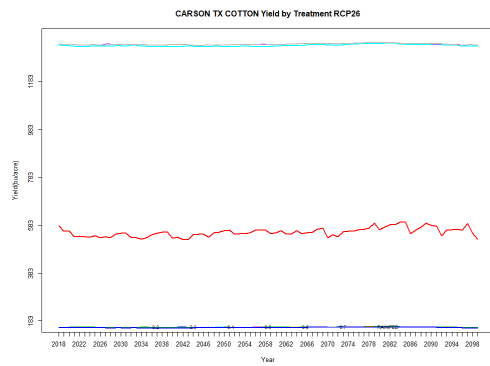
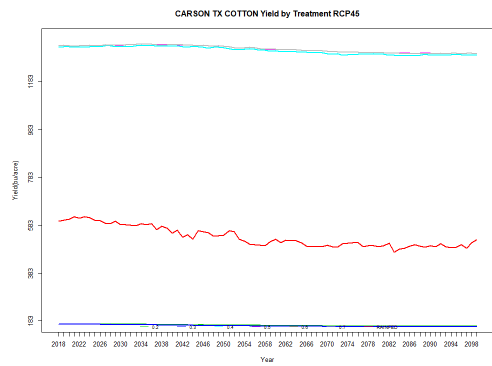


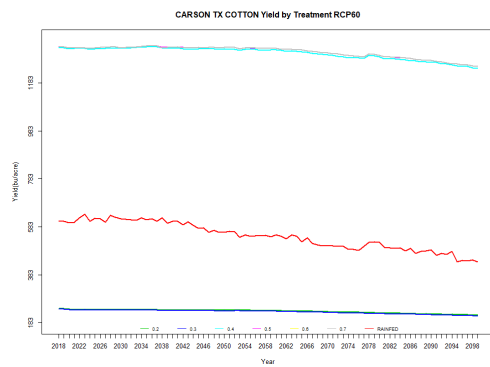
Figure 4.81: Average Minimum Temperature over Cotton Season, Carson, TX



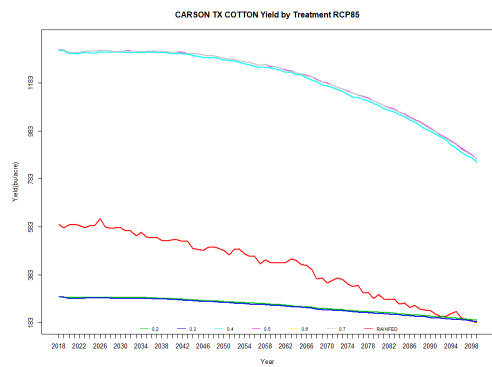
(a) Simulated Cotton Yield-RCP 2.6



(b) Simulated Cotton Yield-RCP 4.5

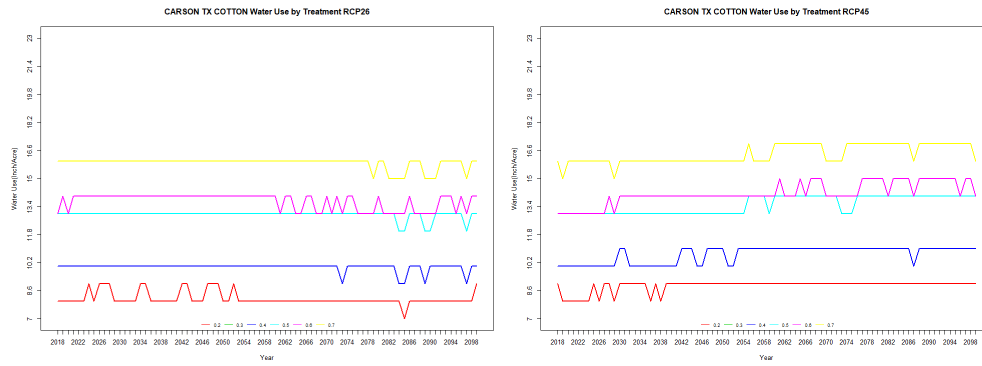


(c) Simulated Cotton Yield-RCP 6.0

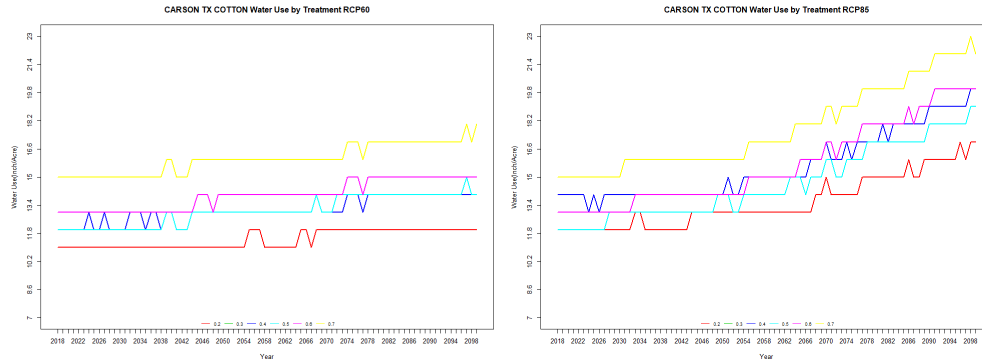


(d) Simulated Cotton Yield-RCP 8.5

Figure 4.82: Average Simulated Yield by Treatment, Carson, TX cotton



(a) Simulated Water Use Yield-RCP 2.6 (b) Simulated Water Use-RCP 4.5



(c) Simulated Water Use-RCP 6.0 (d) Simulated Water Use-RCP 8.5

Figure 4.83: Average Simulated Water Use by Treatment, Carson, TX cotton

From figure 4.82, simulated yield increases a lot between irrigated and rain-fed strategy. Between irrigated strategies, the yield variations are minor.

MAXIMUM YIELD IRRIGATION STRATEGIES

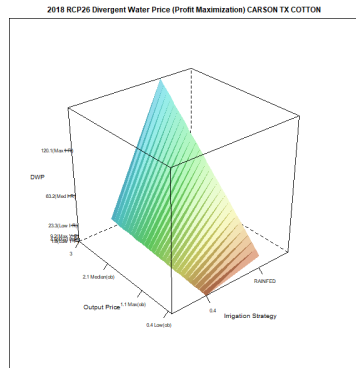
Table 4.68 shows yield maximization irrigation strategy for Carson, Texas, cotton farmers. For all years and climate projections, the yield maximization strategies are 0.5 or 0.7, depends on cumulative rainfall and temperature.

Table 4.68: Yield Maximization Treatment, Carson, Cotton

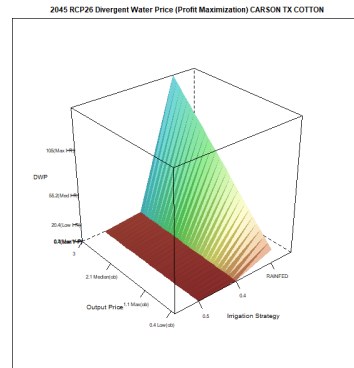
Climate	Year	Irrigation Strategy	Yield(LB/ACRE)	Water Use(INCH/ACRE)
RCP 2.6	2018	0.5	1341.31	13.35
	2045	0.7	1334.24	15.85
	2072	0.5	1342.67	13.56
	2099	0.5	1336.54	13.93
RCP 4.5	2018	0.7	1334.68	15.60
	2045	0.5	1334.22	13.96
	2072	0.7	1308.92	16.49
	2099	0.5	1300.11	14.50
RCP 6.0	2018	0.5	1334.95	12.95
	2045	0.7	1331.38	15.65
	2072	0.7	1304.27	16.41
	2099	0.7	1252.59	17.50
RCP 8.5	2018	0.7	1322.49	15.22
	2045	0.7	1303.82	16.14
	2072	0.5	1167.01	16.30
	2099	0.5	868.32	20.25

DIVERGENT WATER PRICE OF RISK NEUTRAL FARMERS

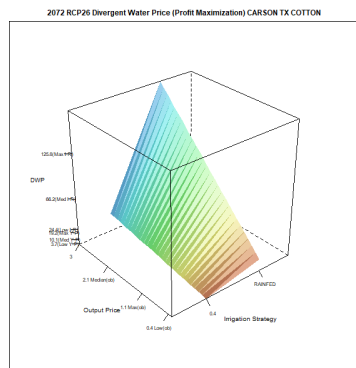
Figure 4.84, 4.85, 4.86 and 4.87 shows the divergent water price for risk neutral farmers by treatment. Overall, the divergent water price increases with output price and decreases with time. For all emission scenarios(projections), the divergent water price for rain-fed decrease with time.



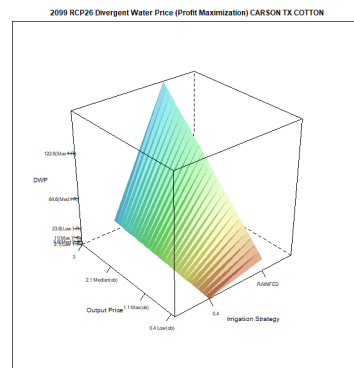
(a) 2018



(b) 2045

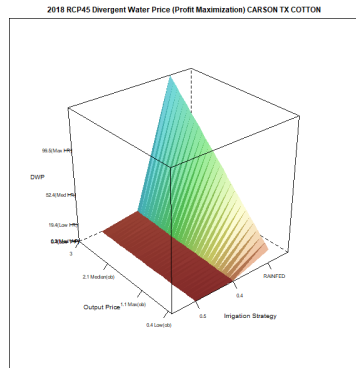


(c) 2072

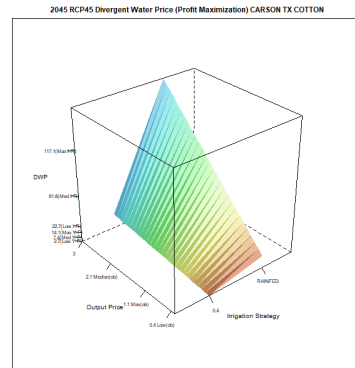


(d) 2099

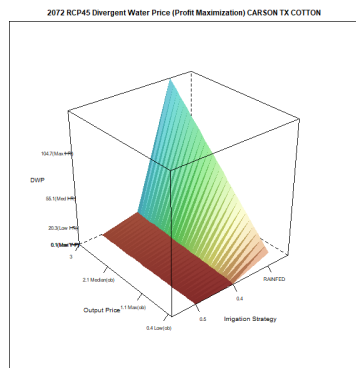
Figure 4.84: Water Use of profit maximizing farmers by irrigation strategies, Carson, TX, Cotton, RCP 2.6



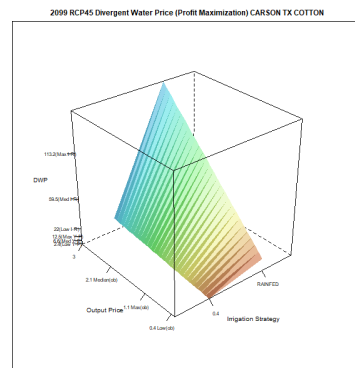
(a) 2018



(b) 2045

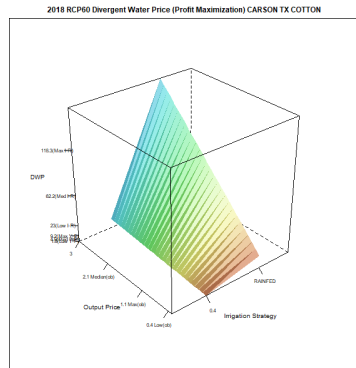


(c) 2072

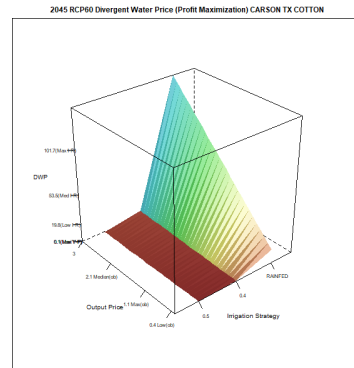


(d) 2099

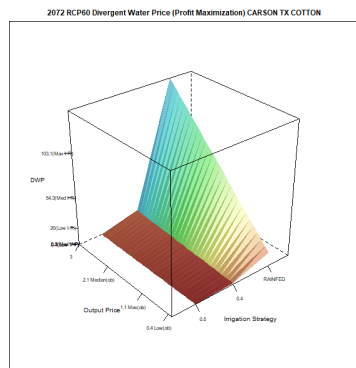
Figure 4.85: Water Use of profit maximizing farmers by irrigation strategies, Carson, TX, Cotton, RCP 4.5



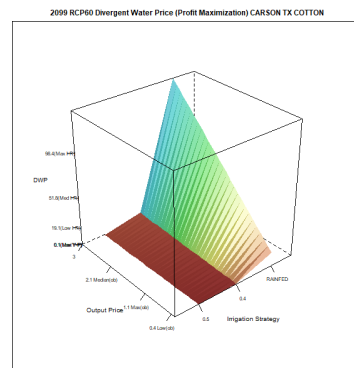
(a) 2018



(b) 2045

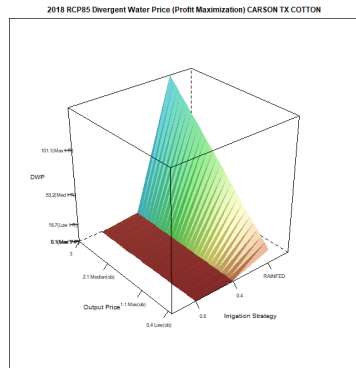


(c) 2072

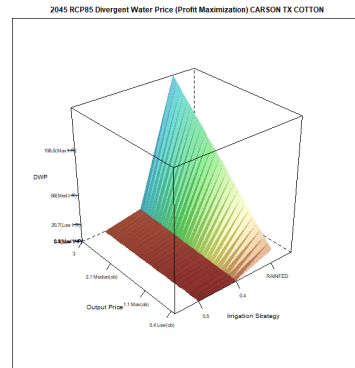


(d) 2099

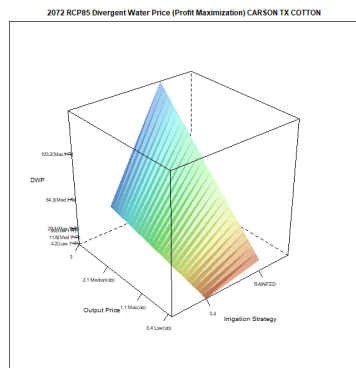
Figure 4.86: Water Use of profit maximizing farmers by irrigation strategies, Carson, TX, Cotton, RCP 6.0



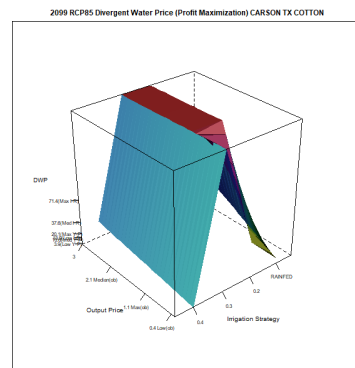
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.87: Water Use of profit maximizing farmers by irrigation strategies, Carson, TX, Cotton, RCP 8.5

The table 4.69, listed below shows the divergent water price for risk neutral farms, for all emission scenarios at the same price level.

For RCP 2.6: divergent water price for switching from yield to profit maximizing irrigation strategies peaked in 2072(simulated dry year) at the same cotton price level; divergent water price for switching from irrigated production to rain-fed increases in later 21 century.

For RCP 4.5: at the same output price level, divergent water price for switching from yield to profit maximizing irrigation strategies peaked in 2045(simulated dry year), 3 times compared to 2018; at the end of 21 century, the price makes farmers' yield and profit maximization decision diverge is twice as much as 2018. Divergent water price for switching from irrigated production to rain-fed increases by 14% in later 21 century

For RCP 6.0: at the same output price level: divergent water price for switching from yield to profit maximizing irrigation decreases at the end of 21 century; divergent water price for switching from irrigated production to rain-fed decreased by 18% in later 21 century.

For RCP 8.5: at the same output price level, divergent water price for switching from yield to profit maximizing irrigation strategies peaked in 2072(simulated dry year), 6 times compared to 2018. At the end of 21 century, the price makes farmers' yield and profit maximization decision diverge is 5 times as much as 2018. Divergent water price for switching from irrigated production to rain-fed decreases by 30% in later 21 century

Table 4.69: Divergent Water Price of Risk Netural Farmers(Y-P and I-R), Carson, TX, Cotton

Year	Climate	Form	0.4	1.1	2.1
2018	RCP26	Irrigated - Rainfed	23.30	63.20	120.10
2045	RCP26	Irrigated - Rainfed	20.40	55.20	105.00
2072	RCP26	Irrigated - Rainfed	24.40	66.20	125.80
2099	RCP26	Irrigated - Rainfed	23.80	64.60	122.80
2018	RCP45	Irrigated - Rainfed	19.40	52.40	99.50
2045	RCP45	Irrigated - Rainfed	22.70	61.60	117.10

2072	RCP45	Irrigated - Rainfed	20.30	55.10	104.70
2099	RCP45	Irrigated - Rainfed	22.00	59.50	113.20
2018	RCP60	Irrigated - Rainfed	23.00	62.20	118.30
2045	RCP60	Irrigated - Rainfed	19.80	53.50	101.70
2072	RCP60	Irrigated - Rainfed	20.00	54.30	103.10
2099	RCP60	Irrigated - Rainfed	19.10	51.80	98.40
2018	RCP85	Irrigated - Rainfed	19.70	53.20	101.10
2045	RCP85	Irrigated - Rainfed	20.70	56.00	106.50
2072	RCP85	Irrigated - Rainfed	20.00	54.30	103.20
2099	RCP85	Irrigated - Rainfed	13.90	37.60	71.40

Table 4.70, shows the change of irr-rf water price for risk averse farmers, for low and mid low emission scenario, irr-rf water prices at 2099 is higher than 2018; while for RCP 6.0 and 8.5, they are lower.

Table 4.70: Difference between divergent water price for risk neutral farmer, CARSON, TX, COTTON

Climate	TR2018	TR2099	Output Price	2018DWP	2099DWP	Diff
rcp26	RAINFED	RAINFED	0.40	23.30	23.80	0.50
rcp26	RAINFED	RAINFED	1.10	63.20	64.60	1.40
rcp26	RAINFED	RAINFED	2.10	120.10	122.80	2.70
rcp45	RAINFED	RAINFED	0.40	19.40	22.00	2.60
rcp45	RAINFED	RAINFED	1.10	52.40	59.50	7.10
rcp45	RAINFED	RAINFED	2.10	99.50	113.20	13.70
rcp60	RAINFED	RAINFED	0.40	23.00	19.10	-3.90
rcp60	RAINFED	RAINFED	1.10	62.20	51.80	-10.40
rcp60	RAINFED	RAINFED	2.10	118.30	98.40	-19.90
rcp85	RAINFED	RAINFED	0.40	19.70	13.90	-5.80
rcp85	RAINFED	RAINFED	1.10	53.20	37.60	-15.60
rcp85	RAINFED	RAINFED	2.10	101.10	71.40	-29.70

DIVERGENT WATER PRICE OF RISK AVERSE FARMERS

Figure 4.88, 4.89, 4.90 and 4.91 showed the divergent water price of risk averse farmers under $r_a = 1.5$. On average, the divergent water price for switching to rain-fed production increases with output price and decreases with years.

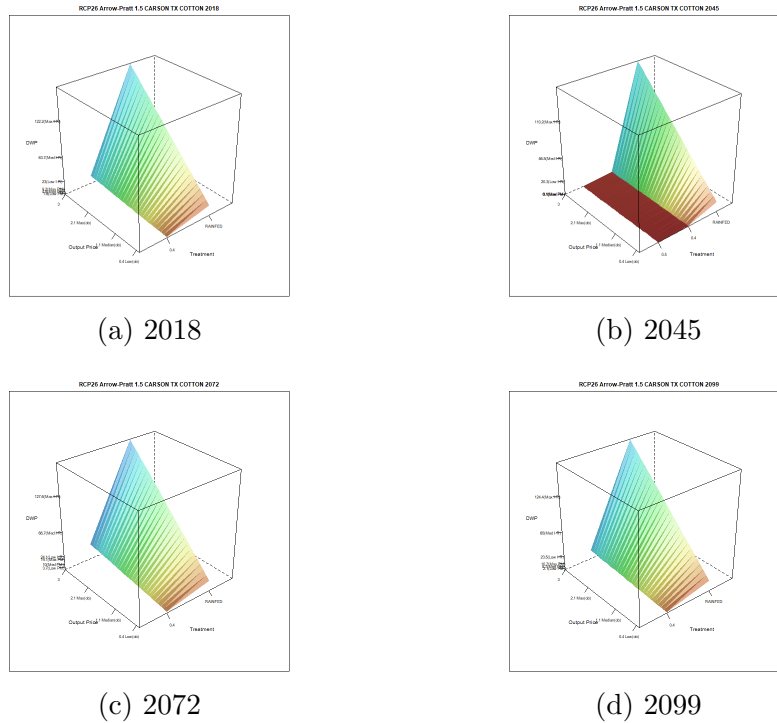


Figure 4.88: Divergent Water Price of Utility Maximization Farmers, Carson, TX, Cotton $r_a = 1.5$, RCP 2.6

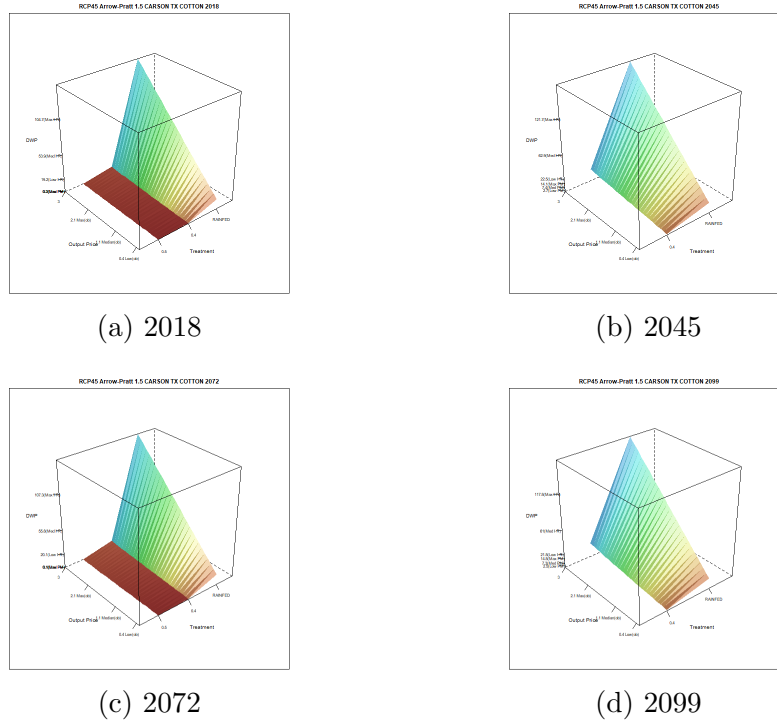


Figure 4.89: Divergent Water Price of Utility Maximization Farmers, Carson, TX, Cotton $r_a = 1.5$, RCP 4.5

Table 4.71 focus on the irr-rf water prices across different years and output prices, table 4.72 to table 4.75 shows similar information, in addition it shows water savings and irr-rf water price at difference risk aversion level.

According to the four tables, the differences between $\alpha \in \{1, 5, 2, 4\}$ is within \$3 dollars.

Table 4.71: Divergent Water Price of Risk Averse Farmers (Y-P and I-R) ,CARSON ,TX ,COTTON

Year	Climate	Form	0.4	1.1	2.1
2018	RCP26	Irrigated - Rainfed	23.00	63.70	122.20
2045	RCP26	Irrigated - Rainfed	20.30	56.80	110.20
2072	RCP26	Irrigated - Rainfed	24.10	66.70	127.60

2099	RCP26	Irrigated - Rainfed	23.50	65.00	124.40
2018	RCP45	Irrigated - Rainfed	19.20	53.90	104.70
2045	RCP45	Irrigated - Rainfed	22.50	62.90	121.70
2072	RCP45	Irrigated - Rainfed	20.10	55.80	107.30
2099	RCP45	Irrigated - Rainfed	21.80	61.00	117.80
2018	RCP60	Irrigated - Rainfed	22.90	64.20	124.10
2045	RCP60	Irrigated - Rainfed	19.60	55.20	107.60
2072	RCP60	Irrigated - Rainfed	19.80	54.80	105.30
2099	RCP60	Irrigated - Rainfed	21.20	58.30	110.60
2018	RCP85	Irrigated - Rainfed	19.40	54.00	103.90
2045	RCP85	Irrigated - Rainfed	20.50	57.00	109.90
2072	RCP85	Irrigated - Rainfed	19.70	54.10	102.70
2099	RCP85	Irrigated - Rainfed	13.40	35.70	65.30

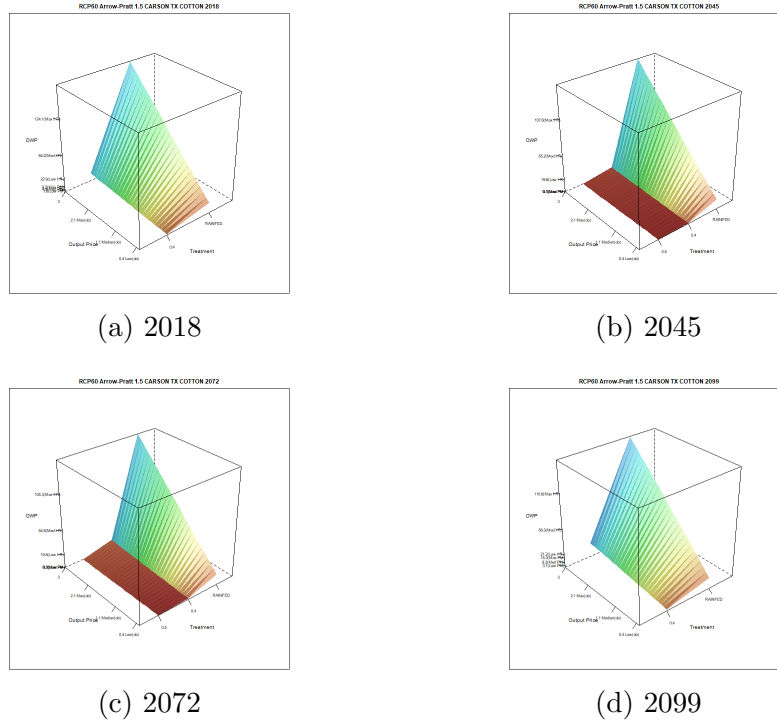


Figure 4.90: Divergent Water Price of Utility Maximization Farmers, Carson, TX, Cotton $r_a = 1.5$, RCP 6.0

Table 4.72: Divergent Water Price for Risk Averse Farmers ,CARSON ,TX ,COTTON

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	RAINFED	0.5	609.18	0.00	22.90	23.00	23.40	12.22	0.40
2045	RAINFED	0.6	577.11	0.00	19.60	19.70	20.10	13.56	0.40
2072	RAINFED	0.6	502.10	0.00	19.80	19.80	20.00	14.35	0.40
2099	RAINFED	0.5	436.29	0.00	21.20	21.30	21.20	14.42	0.40
2018	RAINFED	0.5	609.18	0.00	64.20	64.60	65.20	12.22	1.10
2045	RAINFED	0.6	577.11	0.00	55.20	55.70	57.00	13.56	1.10
2072	RAINFED	0.6	502.10	0.00	54.80	55.00	55.20	14.35	1.10
2099	RAINFED	0.5	436.29	0.00	58.30	58.20	57.50	14.42	1.10

2018	RAINFED	0.5	609.18	0.00	124.10	124.40	122.50	12.22	2.10
2045	RAINFED	0.6	577.11	0.00	107.60	108.60	109.30	13.56	2.10
2072	RAINFED	0.6	502.10	0.00	105.30	105.40	103.90	14.35	2.10
2099	RAINFED	0.5	436.29	0.00	110.60	109.80	105.40	14.42	2.10

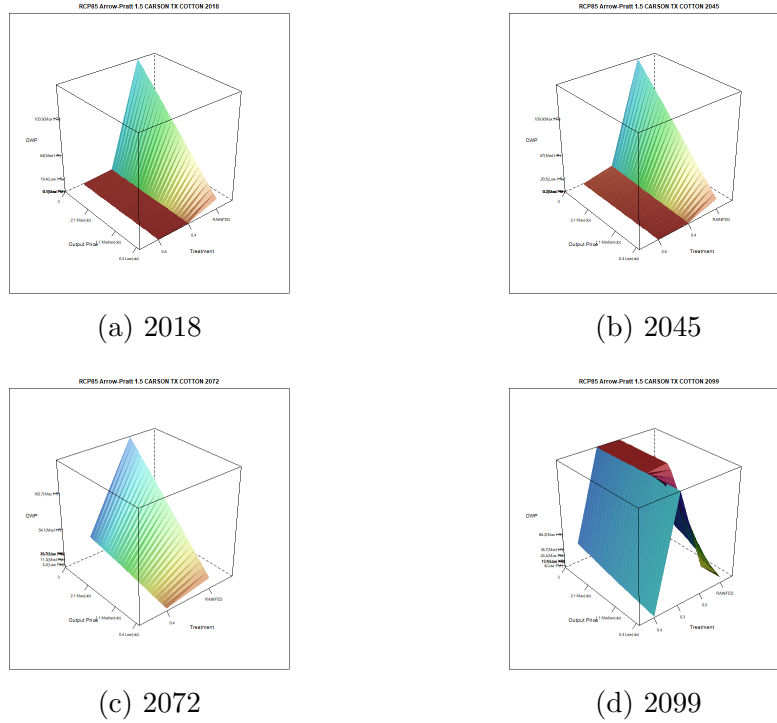


Figure 4.91: Divergent Water Price of Utility Maximization Farmers, Carson, TX, Cotton $r_a = 1.5$, RCP 8.5

Table 4.73: Divergent Water Price for Risk Averse Farmers ,CARSON ,TX ,COTTON

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	RAINFED	0.6	598.99	0.00	19.20	19.30	19.60	13.37	0.40
2045	RAINFED	0.5	559.61	0.00	22.50	22.60	22.90	13.15	0.40
2072	RAINFED	0.6	490.49	0.00	20.10	20.10	20.30	14.47	0.40
2099	RAINFED	0.5	522.27	0.00	21.80	21.90	22.20	13.67	0.40
2018	RAINFED	0.6	598.99	0.00	53.90	54.40	55.20	13.37	1.10
2045	RAINFED	0.5	559.61	0.00	62.90	63.30	64.10	13.15	1.10
2072	RAINFED	0.6	490.49	0.00	55.80	56.00	56.40	14.47	1.10
2099	RAINFED	0.5	522.27	0.00	61.00	61.40	61.80	13.67	1.10

2018	RAINFED	0.6	598.99	0.00	104.70	105.30	104.80	13.37	2.10
2045	RAINFED	0.5	559.61	0.00	121.70	122.30	122.60	13.15	2.10
2072	RAINFED	0.6	490.49	0.00	107.30	107.60	107.00	14.47	2.10
2099	RAINFED	0.5	522.27	0.00	117.80	118.00	117.00	13.67	2.10

Table 4.74: Divergent Water Price for Risk Averse Farmers ,CARSON ,TX ,COTTON

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	RAINFED	0.5	609.18	0.00	22.90	23.00	23.40	12.22	0.40
2045	RAINFED	0.6	577.11	0.00	19.60	19.70	20.10	13.56	0.40
2072	RAINFED	0.6	502.10	0.00	19.80	19.80	20.00	14.35	0.40
2099	RAINFED	0.5	436.29	0.00	21.20	21.30	21.20	14.42	0.40
2018	RAINFED	0.5	609.18	0.00	64.20	64.60	65.20	12.22	1.10
2045	RAINFED	0.6	577.11	0.00	55.20	55.70	57.00	13.56	1.10
2072	RAINFED	0.6	502.10	0.00	54.80	55.00	55.20	14.35	1.10
2099	RAINFED	0.5	436.29	0.00	58.30	58.20	57.50	14.42	1.10
2018	RAINFED	0.5	609.18	0.00	124.10	124.40	122.50	12.22	2.10
2045	RAINFED	0.6	577.11	0.00	107.60	108.60	109.30	13.56	2.10
2072	RAINFED	0.6	502.10	0.00	105.30	105.40	103.90	14.35	2.10
2099	RAINFED	0.5	436.29	0.00	110.60	109.80	105.40	14.42	2.10

Table 4.75: Divergent Water Price for Risk Averse Farmers ,CARSON ,TX ,COTTON

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	RAINFED	0.6	593.50	0.00	19.40	19.50	19.60	13.07	0.40
2045	RAINFED	0.6	489.27	0.00	20.50	20.50	20.70	14.06	0.40
2072	RAINFED	0.5	369.92	0.00	19.70	19.70	19.70	15.22	0.40
2099	RAINFED	0.5	183.75	0.00	13.40	13.30	13.00	18.74	0.40
2018	RAINFED	0.6	593.50	0.00	54.00	54.20	54.50	13.07	1.10
2045	RAINFED	0.6	489.27	0.00	57.00	57.30	57.80	14.06	1.10
2072	RAINFED	0.5	369.92	0.00	54.10	54.00	53.40	15.22	1.10
2099	RAINFED	0.5	183.75	0.00	35.70	35.20	32.90	18.74	1.10
2018	RAINFED	0.6	593.50	0.00	103.90	104.00	102.30	13.07	2.10
2045	RAINFED	0.6	489.27	0.00	109.90	110.20	109.50	14.06	2.10
2072	RAINFED	0.5	369.92	0.00	102.70	102.00	98.60	15.22	2.10
2099	RAINFED	0.5	183.75	0.00	65.30	63.10	54.60	18.74	2.10

Table 4.76 compares the difference of irr-rf water price at 2018 and 2099. The irr-rf water price for risk averse farmers increases with RCP 2.6 and 4.5 only. At \$2.1 LB cotton price, if RCP 8.5 is expected, risk averse farmers pay \$38.6 less at 2099 than 2018.

RISK NETURAL FARMERS VS RISK AVERSE FARMERS - COTTON

Table 4.77 to 4.80 compares the different risk preferences, at expected loss, risk averse farmers pays less than risk neutral farmers to stay at irrigated production, at expected gain, they pay more to stay at irrigated production.

Table 4.77: Divergent water price for risk neutral v.s. averse farmers ,CARSON ,TX ,COTTON ,RCP26

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	RAINFED	23.30	-376.46	23.00	-376.46	0.40
2045	RAINFED	20.40	-390.86	20.30	-390.86	0.40
2072	RAINFED	24.40	-395.38	24.10	-395.38	0.40
2099	RAINFED	23.80	-398.83	23.50	-398.83	0.40
2018	RAINFED	63.20	30.50	63.70	30.50	1.10
2045	RAINFED	55.20	-9.11	56.80	-9.11	1.10
2072	RAINFED	66.20	-21.53	66.70	-21.53	1.10
2099	RAINFED	64.60	-31.03	65.00	-31.03	1.10
2018	RAINFED	120.10	611.86	122.20	611.86	2.10
2045	RAINFED	105.00	536.24	110.20	536.24	2.10
2072	RAINFED	125.80	512.53	127.60	512.53	2.10
2099	RAINFED	122.80	494.40	124.40	494.40	2.10

Table 4.76: Difference between divergent water price of risk averse farmers, CARSON, TX, COTTON

Climate	TR2018	TR2099	OP	2018DWP	2099DWP	Diff
rcp26	rainfed	rainfed	0.40	23.00	23.50	0.50
rcp26	rainfed	rainfed	1.10	63.70	65.00	1.30
rcp26	rainfed	rainfed	2.10	122.20	124.40	2.20
rcp45	rainfed	rainfed	0.40	19.20	21.80	2.60
rcp45	rainfed	rainfed	1.10	53.90	61.00	7.10
rcp45	rainfed	rainfed	2.10	104.70	117.80	13.10
rcp60	rainfed	rainfed	0.40	22.90	21.20	-1.70
rcp60	rainfed	rainfed	1.10	64.20	58.30	-5.90
rcp60	rainfed	rainfed	2.10	124.10	110.60	-13.50
rcp85	rainfed	rainfed	0.40	19.40	13.40	-6.00
rcp85	rainfed	rainfed	1.10	54.00	35.70	-18.30
rcp85	rainfed	rainfed	2.10	103.90	65.30	-38.60

Table 4.78: Divergent water price for risk neutral v.s. averse farmers ,CARSON ,TX ,COTTON ,RCP45

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	RAINFED	19.40	-369.40	19.20	-369.40	0.40
2045	RAINFED	22.70	-385.16	22.50	-385.16	0.40
2072	RAINFED	20.30	-412.80	20.10	-412.80	0.40
2099	RAINFED	22.00	-400.09	21.80	-400.09	0.40
2018	RAINFED	52.40	49.89	53.90	49.89	1.10
2045	RAINFED	61.60	6.57	62.90	6.57	1.10
2072	RAINFED	55.10	-69.46	55.80	-69.46	1.10
2099	RAINFED	59.50	-34.50	61.00	-34.50	1.10
2018	RAINFED	99.50	648.88	104.70	648.88	2.10
2045	RAINFED	117.10	566.18	121.70	566.18	2.10
2072	RAINFED	104.70	421.03	107.30	421.03	2.10

2099	RAINFED	113.20	487.77	117.80	487.77	2.10
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Table 4.79: Divergent water price for risk neutral v.s. averse farmers ,CARSON ,TX
,COTTON ,RCP60

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	RAINFED	23.00	-365.33	22.90	-365.33	0.40
2045	RAINFED	19.80	-378.16	19.60	-378.16	0.40
2072	RAINFED	20.00	-408.16	19.80	-408.16	0.40
2099	RAINFED	19.10	-434.48	21.20	-434.48	0.40
2018	RAINFED	62.20	61.10	64.20	61.10	1.10
2045	RAINFED	53.50	25.82	55.20	25.82	1.10
2072	RAINFED	54.30	-56.69	54.80	-56.69	1.10
2099	RAINFED	51.80	-129.08	58.30	-129.08	1.10
2018	RAINFED	118.30	670.28	124.10	670.28	2.10
2045	RAINFED	101.70	602.93	107.60	602.93	2.10
2072	RAINFED	103.10	445.41	105.30	445.41	2.10
2099	RAINFED	98.40	307.21	110.60	307.21	2.10

Table 4.80: Divergent water price for risk neutral v.s. averse farmers ,CARSON ,TX ,COTTON ,RCP85

Year	TR	DWP(Natural)	Profit(Natural)	DWP (Averse)	Profit(Averse)	OP
2018	RAINFED	19.70	-371.60	19.40	-371.60	0.40
2045	RAINFED	20.70	-413.29	20.50	-413.29	0.40
2072	RAINFED	20.00	-461.03	19.70	-461.03	0.40
2099	RAINFED	13.90	-535.50	13.40	-535.50	0.40
2018	RAINFED	53.20	43.85	54.00	43.85	1.10
2045	RAINFED	56.00	-70.80	57.00	-70.80	1.10
2072	RAINFED	54.30	-202.09	54.10	-202.09	1.10
2099	RAINFED	37.60	-406.88	35.70	-406.88	1.10
2018	RAINFED	101.10	637.35	103.90	637.35	2.10
2045	RAINFED	106.50	418.47	109.90	418.47	2.10
2072	RAINFED	103.20	167.83	102.70	167.83	2.10
2099	RAINFED	71.40	-223.12	65.30	-223.12	2.10

4.5 SIMULATED CORN AVERAGE YIELD BY IRRIGATION STRATEGY, EMISSION SCENARIO AND RESEARCH STATIONS

Table 4.81 show corn yield in selected research stations according to 2013 census. the weighed average ¹ were 158 Bu/Acre and 201 Bu/Acre for rain-fed and irrigated corn for grain respectively, the simulated corn yield from DSSAT in year 2018 was close to the observed average rain-fed yield. However, the simulated DSSAT highest yield level from DSSAT were 20 Bu/Acre(10%) higher than yield in 2018. For ECP 2.6, the simulated maximum yields

¹The mean yield, temperature and precipitation are weighted by 20 years state level harvest acreage

were always higher than observed yield. For other RCPs, after mid 21 century, the corn yield became lower than the baseline observed yield.

The changes of temperature and precipitation are not significant for RCP 2.6, yet for RCP 8.5, year 2099 has $5C^{\circ}$ increase in temperature along with 4(*Ibch*) decrease in precipitation.

Table 4.81: Corn for grain, yield 2013 Census

State	Rain-fed Yield(Bu/Acre)	Irrigated Yield(Bu/Acre)
ILLINOIS	173	196
IOWA	171	206

Source: <https://quickstats.nass.usda.gov/results/44E170CE-42E7-3FE9-BCB1-37114B06E766>

Table ?? shows the average level of simulated corn yield(rain-fed/yield max), temperature and rainfall over the corn growing season. For all RCPs, the average rainfed yield of all research stations follows decrease trend. Especially for RCP 8.5, the yield almost reduced by half. The maximum yield follows the same trend as rain-fed. For RCP 8.5, the average maximum yield also decrease by half even with 10 acre inch of water applied.

The cost of corn producing in research stations are listed in table 4.83 and 4.84

Year	Rainfed Yield(Bu/Acre)	Max Yield(Bu/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	217	290	15	28	18	6
2045	215	278	15	28	17	6
2072	216	278	15	28	18	6
2099	208	278	15	28	17	6

RCP 2.6 Low Emission Scenario

Year	Rainfed Yield(Bu/Acre)	Max Yield(Bu/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	227	296	15	27	18	6
2045	206	271	16	29	17	6
2072	194	255	16	29	17	7
2099	189	251	17	29	16	6

RCP 4.5 Medium Low Emission Scenario

Year	Rainfed Yield(Bu/Acre)	Max Yield(Bu/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	215	290	15	28	18	6
2045	201	272	16	28	16	6
2072	185	249	17	30	15	7
2099	177	237	17	30	15	7

RCP 6.0 Medium Emission Scenario

Year	Rainfed Yield(Bu/Acre)	Max Yield(Bu/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2018	213	286	15	28	17	6
2045	195	257	16	29	16	6
2072	164	220	18	31	14	7
2099	130	173	19	32	13	8

Table 4.82: RCP 8.5 High Emission Scenario

Mean Corn rain-fed yield, minimum/maximum temperature and precipitation over the growing season

Table 4.83: Cost of Corn production in Illinois

Variable Cost	Corn- after- Corn
ARC/PLC	\$0
Crop insurance proceeds	\$0
Gross revenue	\$713
Fertilizers	\$139
Pesticides	\$71
Seed	\$117
Drying	\$10
Storage	\$10
Crop insurance	\$21
Total direct costs	\$368
Machine hire/lease	\$12
Utilities	\$5
Machine repair	\$20
Fuel and oil	\$14
Light vehicle	\$1
Mach. depreciation	\$62
Total power costs	\$114
Hired labor	\$17
Building repair and rent	\$4
Building depreciation	\$12
Insurance	\$11
Misc	\$8
Interest (non-land)	\$15
Total overhead costs	\$67
Total non-land costs	\$549

Table 4.84: Cost of Corn production in Iowa

Item	Cost per Acre
Seed	\$97.90
cost per 1000 kernels	
kernels per acre	
Nitrogen	\$55.80
price per pound	
pounds per acre	
Phosphate	\$24.18
price per pound	
pounds per acre	
Potash	\$13.50
price per pound	
pounds per acre	
Lime (annual cost)	\$4.90
Herbicide	\$28.00
Insecticide	\$23.30
Crop insurance	\$11.00
Miscellaneous	\$10.00
Interest on preharvest variable costs	\$11.22
length of period (months)	
interest rate	
Total	\$279.80
Harvest machinery	
Combine	\$20.20
Grain Cart	\$9.40
Haul	\$13.75
Fixed- price per bushel	
Variable- price per bushel	
Drying	\$37.95
Fixed- price per bushel	
Variable- price per bushel	
Handling	\$6.29
Fixed- price per bushel	
Variable- price per bushel	
Custom hire	\$0.00
Total per acre	\$87.59
Total all acres	\$8,759
Labor	
Operator	\$39.20
Hours	
Rate per hour	
Hired	\$0.00
Hours	
Rate per hour	
Total	\$39.20
Land	
Cash rent equivalent	\$219.00
Total fixed, variable and all costs	
Per acre	\$670.79

4.5.1 DEKALB, ILLINOIS

Dekalb county is one of the top counties corn producing county in State Illinois. Corn is the number one ag commodity grown in the county. Farmers grow corn on nearly two-thirds of the farmland amounting to 211,500 acres with an annual value of \$144 million.

SIMULATED WEATHER

Figure 4.92, 4.93, 4.94 is the average temperature, precipitation simulated from MarkSim. Both maximum and the minimum temperature from the simulation raised along with decrease in cumulative rainfall over the cotton growing season, expect for RCP 2.6. The mean temperature during cotton season in Decatur county raises about 3°C whereas the cumulative precipitation dropped 3 inches for high emission scenario. Table A.10 shows the summary statistics of temperature and precipitation by RCPs.

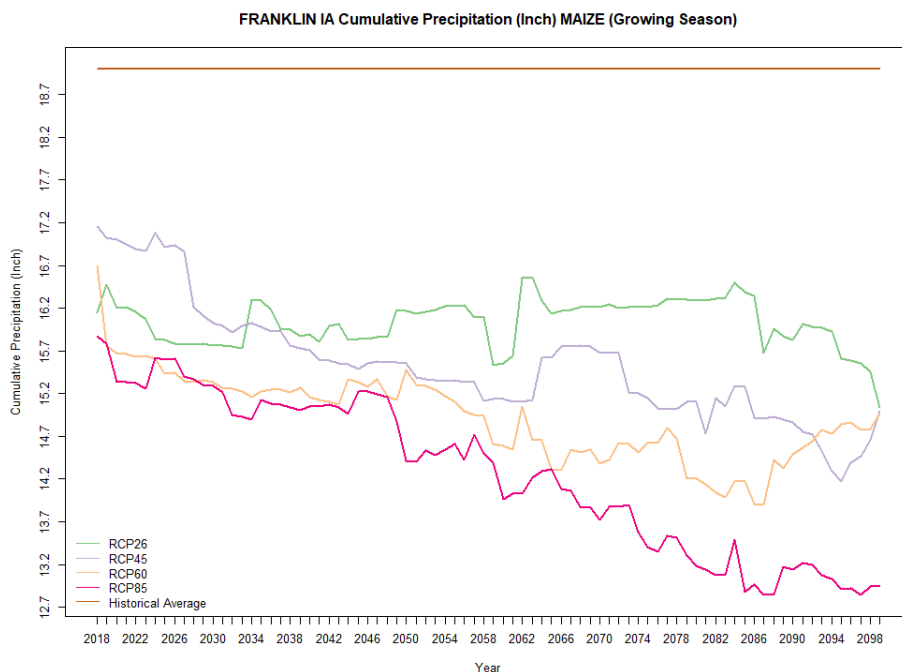


Figure 4.92: Cumulative Rainfall over Corn Season, Franklin, IA

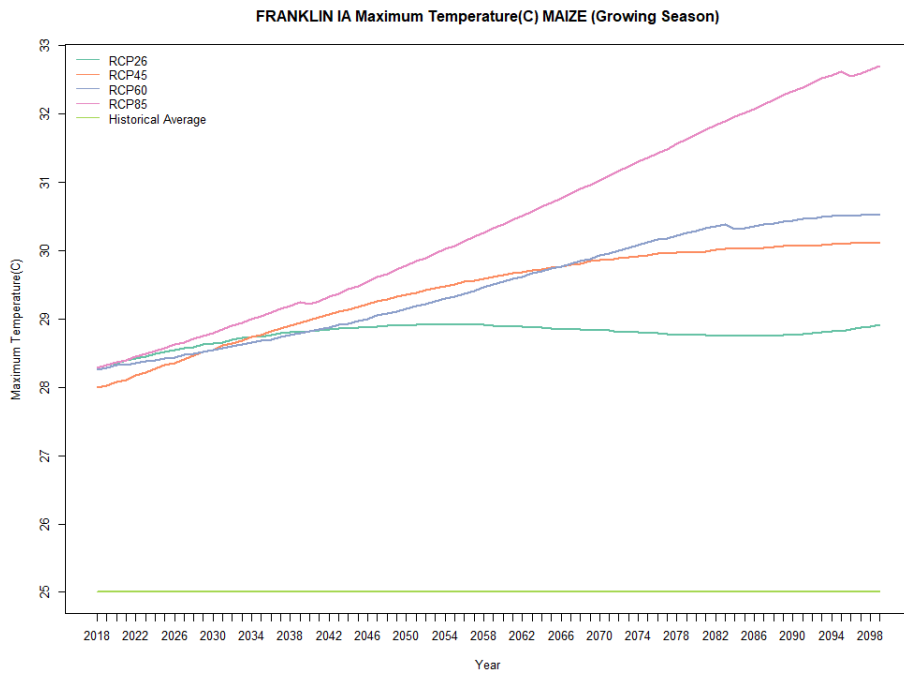


Figure 4.93: Average Maximum Temperature over Corn Season, Franklin, IA

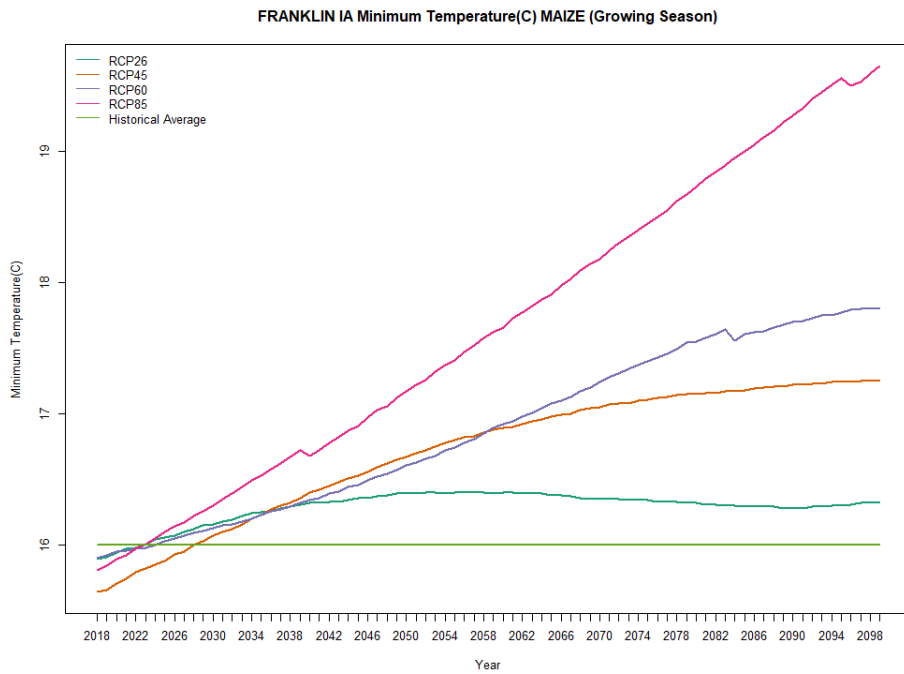


Figure 4.94: Average Minimum Temperature over Corn Season, Franklin, IA

SIMULATED YIELD AND WATER USE BY IRRIGATION STRATEGIES

As figure 4.95 shows, the average yield behaves as expected. Especially for RCP 8.5, if farmers take no action and stick to current rain-fed production, yield is expected to reduce by 75%. Since we are more likely to meet RCP 6.0 and RCP 8.5, switching to irrigation agricultural will keep the corn yield above 100 bu/acre.

For Dekalb county, there are no significant differences between irrigation strategies, with around 6 Inch/Acre of water use, corn yield is expected to increase 40 -60 Bu/Acre across different years and levels of emissions.

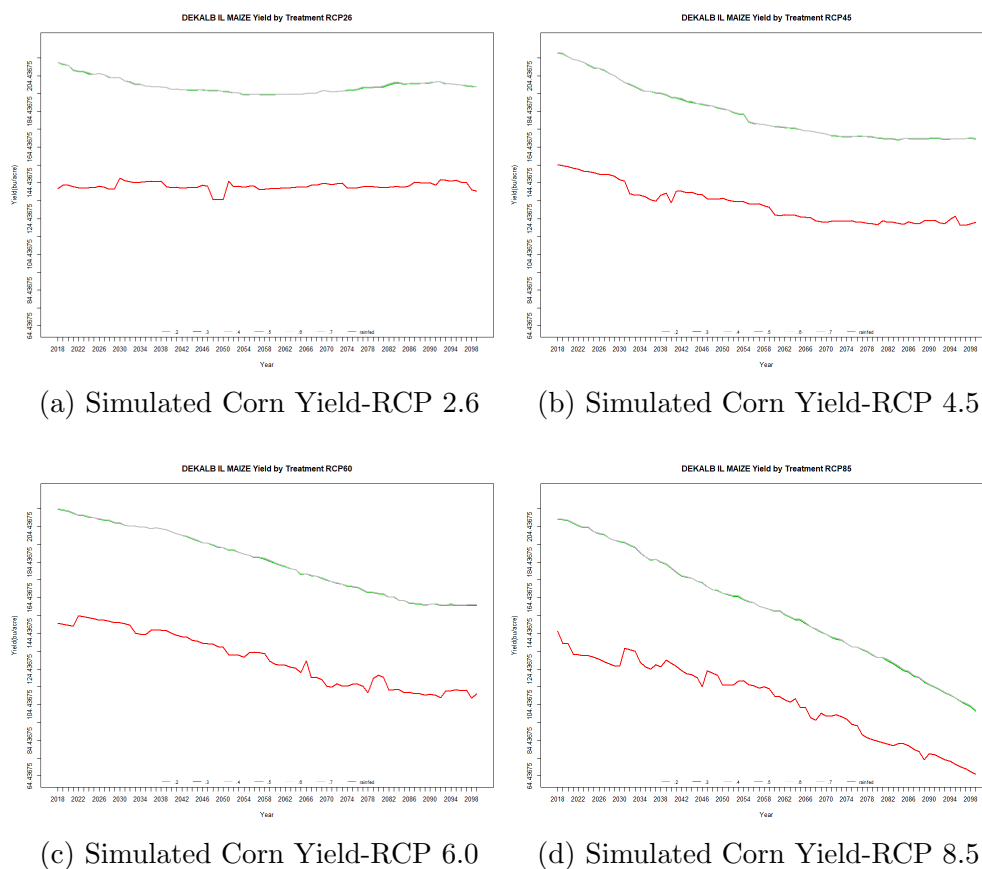
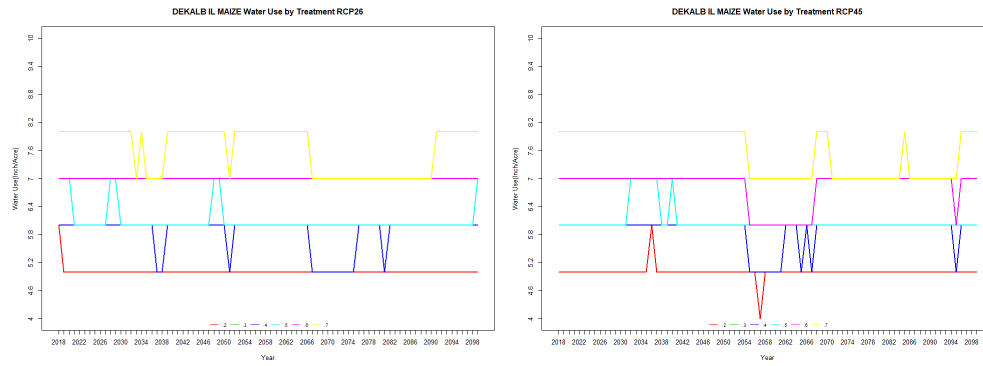
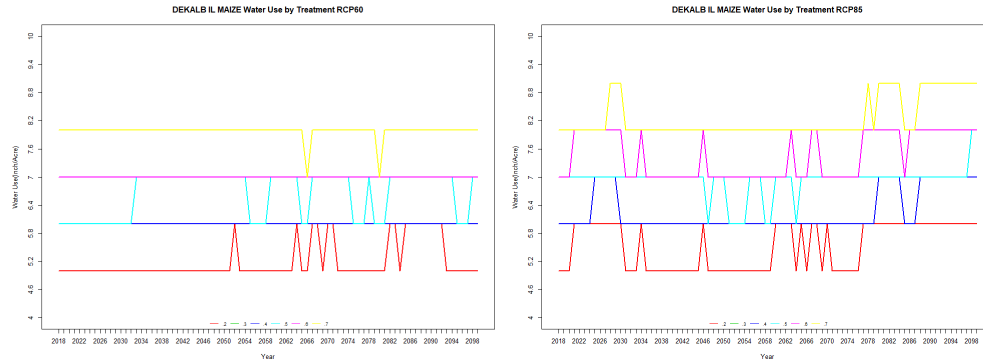


Figure 4.95: Average Simulated Yield by Treatment



(a) Simulated Water Use Yield-RCP 2.6 (b) Simulated Water Use-RCP 4.5



(c) Simulated Water Use-RCP 6.0 (d) Simulated Water Use-RCP 8.5

Figure 4.96: Average Simulated Water Use by Treatment

From figure 4.95, simulated yield increases are not significant between irrigation strategy (treatment 0.2 - 0.7), yet water use increase more than 1 inches with irrigation threshold. Profit maximizing farmers would prefer irrigation at treatment .2 most times.

MAXIMUM YIELD IRRIGATION STRATEGIES

Table 4.85 shows yield maximization irrigation strategy for Dekalb, Illinois farmers. For all years and climate projections, the yield maximization strategy is 0.3.

Table 4.85: Yield Maximization Treatment

Climate	Year	Irrigation Strategy	Yield
RCP 2.6	2018	.3	212.00
	2038	.2	198.20
	2058	.3	193.87
	2079	.3	198.17
	2099	.3	198.19
RCP 4.5	2018	.3	217.40
	2038	.3	194.72
	2058	.3	177.15
	2079	.3	170.37
	2099	.3	169.18
RCP 6.0	2018	.3	214.53
	2038	.2	203.12
	2058	.3	186.50
	2079	.3	167.66
	2099	.3	160.89
RCP 8.5	2018	.3	208.68
	2038	.3	184.55
	2058	.3	158.92
	2079	.3	132.47
	2099	.3	101.41

DIVERGENT WATER PRICE OF RISK NEUTRAL FARMERS

Figure 4.97, 4.98, 4.99 and 4.100 showed the divergent water price of risk averse farmers under $r_a = 1.5$. On average, the divergent water price for switching to rain-fed production increases with output price and decreases with years.

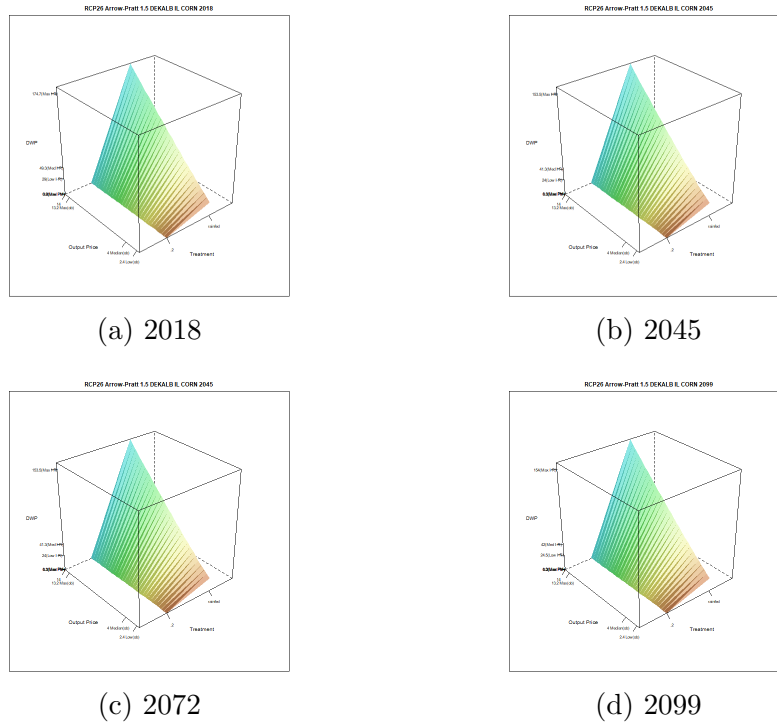


Figure 4.97: Divergent Water Price of Utility Maximization Farmers, Dekalb, IL, Corn $r_a = 1.5$, RCP 2.6

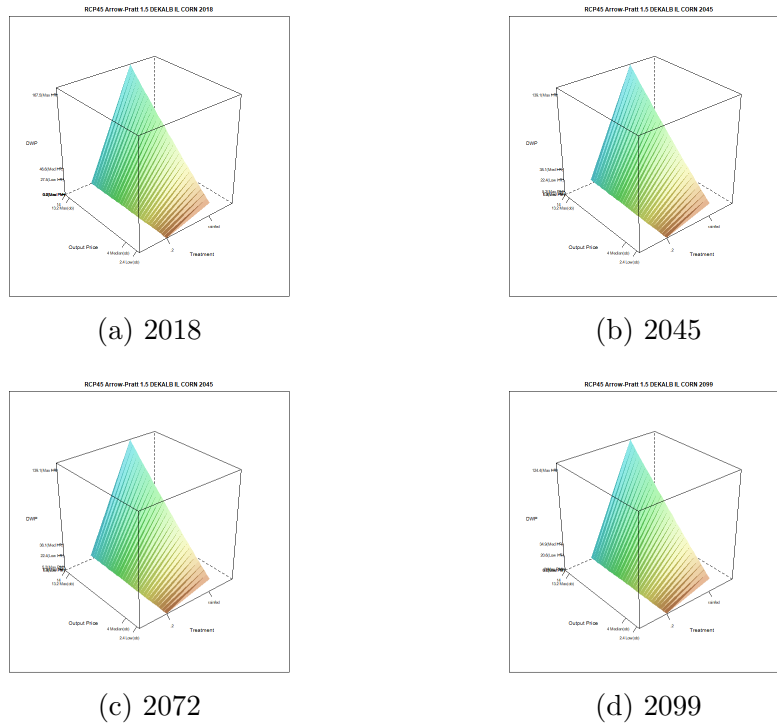


Figure 4.98: Divergent Water Price of Utility Maximization Farmers, Dekalb, IL, Corn $r_a = 1.5$, RCP 2.6

Table 4.86 shows the y-p and irr-rf water prices for risk neutral farmers at De Kalb, IL.

Table 4.86: Divergent Water Price of Risk Netural Farmers(Y-P and I-R), De Kalb, IL, Corn

Year	Climate	Form	2.4	4	13.2
2018	RCP26	Yield - Profit	0.10	0.20	0.60
2045	RCP26	Yield - Profit	0.20	0.30	1.00
2072	RCP26	Yield - Profit	0.20	0.30	1.00
2099	RCP26	Yield - Profit	0.20	0.20	0.70
2018	RCP45	Yield - Profit	0.30	0.40	1.30
2045	RCP45	Yield - Profit	0.70	1.20	3.90
2072	RCP45	Yield - Profit	0.30	0.50	1.40

2099	RCP45	Yield - Profit	0.50	0.80	2.50
2018	RCP60	Yield - Profit	1.00	1.60	5.10
2045	RCP60	Yield - Profit	0.40	0.70	2.20
2072	RCP60	Yield - Profit	0.60	1.00	3.20
2099	RCP60	Yield - Profit	1.80	2.90	9.50
2018	RCP85	Yield - Profit	0.80	1.30	4.20
2045	RCP85	Yield - Profit	0.60	1.00	3.10
2072	RCP85	Yield - Profit	2.40	3.90	12.80
2099	RCP85	Yield - Profit	1.80	3.00	9.70
2018	RCP26	Irrigated - Rainfed	27.90	46.40	153.10
2045	RCP26	Irrigated - Rainfed	22.70	37.90	124.80
2072	RCP26	Irrigated - Rainfed	22.70	37.80	124.70
2099	RCP26	Irrigated - Rainfed	23.30	38.80	127.80
2018	RCP45	Irrigated - Rainfed	26.70	44.40	146.50
2045	RCP45	Irrigated - Rainfed	21.60	35.90	118.30
2072	RCP45	Irrigated - Rainfed	20.20	33.70	110.90
2099	RCP45	Irrigated - Rainfed	19.90	33.20	109.40
2018	RCP60	Irrigated - Rainfed	26.00	43.40	143.00
2045	RCP60	Irrigated - Rainfed	22.60	37.60	123.90
2072	RCP60	Irrigated - Rainfed	22.60	37.60	123.80
2099	RCP60	Irrigated - Rainfed	19.90	33.20	109.40
2018	RCP85	Irrigated - Rainfed	25.80	43.00	141.90
2045	RCP85	Irrigated - Rainfed	21.10	35.10	115.80
2072	RCP85	Irrigated - Rainfed	17.30	28.80	95.00
2099	RCP85	Irrigated - Rainfed	12.30	20.50	67.70

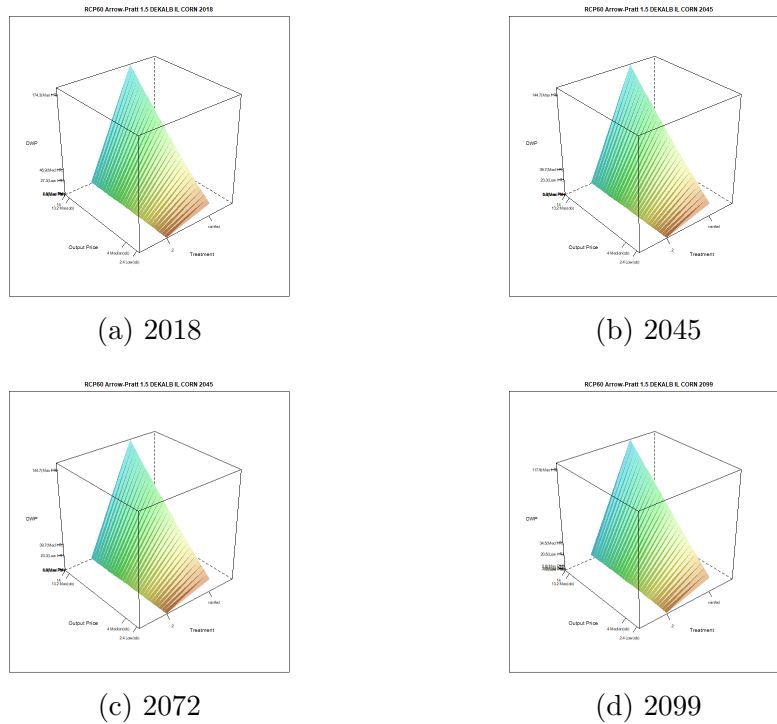
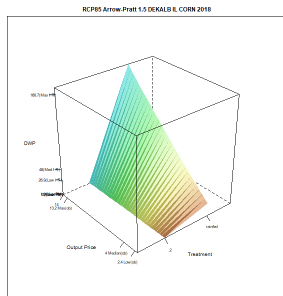


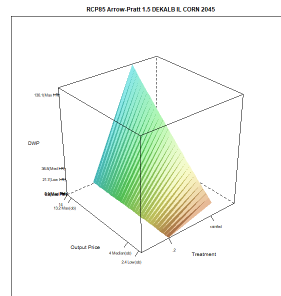
Figure 4.99: Divergent Water Price of Utility Maximization Farmers, Dekalb, IL, Corn $r_a = 1.5$, RCP 2.6

Table B.17, B.18, B.19 and B.20 in the appendix shows the optimum risk neutral irrigation strategies of in Dekalb, IL. For all emission scenarios, farmers are more willing to pay to maintain yield maximization production level. For low emission and mid low scenarios, farmers prefer irrigation production. Yet for mid and high emission scenarios, after 2045, farmers divergent water price follow a downward trend. Especially for rcp 8.5, if water price is higher than \$10, farmer will choose rain fed as optimal irrigation strategy, 50% less than rcp 2.6.

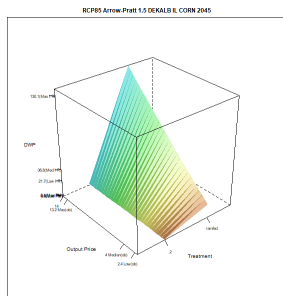
Table 4.87 shows the y-p and irr-rf water prices for De Kalb, IL corn farmers, the y-p water prices increase with time, if RCP 6.0 or 8.5 is expected, the y-p price were lower than \$2 at \$2.4 output price. The irr-rf water prices decrease for any corn prices, if RCP 8.5 is



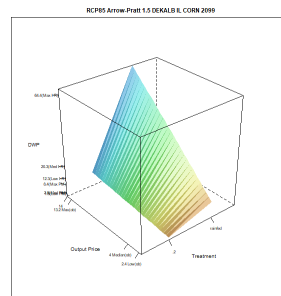
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.100: Divergent Water Price of Utility Maximization Farmers, Dekalb, IL, Corn $r_a = 1.5$, RCP 2.6

expected, at the end of 21 century, risk neutral farmers pay 50% less than 2018 to stay at irrigated production.

DIVERGENT WATER PRICE FOR RISK AVERSE FARMERS

The table C.17, C.17, C.17 and C.17, shows the full divergent water prices across irrigation strategies for risk averse farmers in Dekalb, IL. As table 4.88 shows, the water price that makes yield and profit maximization diverge: for low emission scenario: risk averse farmers pay more to stay at higher yield level; for mid low emission scenario: risk averse farmers pay more to stay at higher yield level until 2072; for mid and high emission scenarios, risk neutral farmer pay more to stay at higher yield level.

Table 4.87: Difference between divergent water price for risk neutral farmer, DEKALB, IL, CORN

Climate	TR2018	TR2099	Output Price	2018DWP	2099DWP	Diff
rcp26	.2	.2	2.40	0.10	0.20	0.10
rcp26	.2	.2	4.00	0.20	0.20	0.00
rcp26	.2	.2	13.20	0.60	0.70	0.10
rcp26	RAINFED	RAINFED	2.40	27.90	23.30	-4.60
rcp26	RAINFED	RAINFED	4.00	46.40	38.80	-7.60
rcp26	RAINFED	RAINFED	13.20	153.10	127.80	-25.30
rcp45	.2	.2	2.40	0.30	0.50	0.20
rcp45	.2	.2	4.00	0.40	0.80	0.40
rcp45	.2	.2	13.20	1.30	2.50	1.20
rcp45	RAINFED	RAINFED	2.40	26.70	19.90	-6.80
rcp45	RAINFED	RAINFED	4.00	44.40	33.20	-11.20
rcp45	RAINFED	RAINFED	13.20	146.50	109.40	-37.10
rcp60	.2	.2	2.40	1.00	1.80	0.80
rcp60	.2	.2	4.00	1.60	2.90	1.30
rcp60	.2	.2	13.20	5.10	9.50	4.40
rcp60	RAINFED	RAINFED	2.40	26.00	19.90	-6.10
rcp60	RAINFED	RAINFED	4.00	43.40	33.20	-10.20
rcp60	RAINFED	RAINFED	13.20	143.00	109.40	-33.60
rcp85	.2	.2	2.40	0.80	1.80	1.00
rcp85	.2	.2	4.00	1.30	3.00	1.70
rcp85	.2	.2	13.20	4.20	9.70	5.50
rcp85	RAINFED	RAINFED	2.40	25.80	12.30	-13.50
rcp85	RAINFED	RAINFED	4.00	43.00	20.50	-22.50
rcp85	RAINFED	RAINFED	13.20	141.90	67.70	-74.20

Table 4.88: Divergent Water Price of Risk Averse Farmers (Y-P and I-R) ,DEKALB ,IL ,CORN

Year	Climate	Form	2.4	4	13.2
2018	RCP26	Yield - Profit	0.20	0.20	0.80
2045	RCP26	Yield - Profit	0.20	0.30	1.10
2072	RCP26	Yield - Profit	0.20	0.30	1.10
2099	RCP26	Yield - Profit	0.20	0.30	1.30
2018	RCP45	Yield - Profit	0.20	0.40	0.70
2045	RCP45	Yield - Profit	0.80	1.30	5.20
2072	RCP45	Yield - Profit	0.30	0.50	1.70
2099	RCP45	Yield - Profit	0.50	0.70	2.00
2018	RCP60	Yield - Profit	0.90	1.30	2.50
2045	RCP60	Yield - Profit	0.40	0.60	1.30
2072	RCP60	Yield - Profit	0.60	1.00	2.70
2099	RCP60	Yield - Profit	1.70	2.60	5.60
2018	RCP85	Yield - Profit	0.70	1.00	1.90
2045	RCP85	Yield - Profit	0.60	0.90	2.10
2072	RCP85	Yield - Profit	2.20	3.40	7.80
2099	RCP85	Yield - Profit	1.80	2.80	8.40
2018	RCP26	Irrigated - Rainfed	29.00	49.30	174.70
2045	RCP26	Irrigated - Rainfed	24.00	41.30	153.50
2072	RCP26	Irrigated - Rainfed	24.10	41.70	158.30
2099	RCP26	Irrigated - Rainfed	24.50	42.00	154.00
2018	RCP45	Irrigated - Rainfed	27.50	46.60	167.50
2045	RCP45	Irrigated - Rainfed	22.40	38.10	139.10
2072	RCP45	Irrigated - Rainfed	21.00	35.90	130.20

2099	RCP45	Irrigated - Rainfed	20.60	34.90	124.40
2018	RCP60	Irrigated - Rainfed	27.30	46.90	174.30
2045	RCP60	Irrigated - Rainfed	23.30	39.70	144.70
2072	RCP60	Irrigated - Rainfed	23.00	38.60	131.80
2099	RCP60	Irrigated - Rainfed	20.50	34.50	117.90
2018	RCP85	Irrigated - Rainfed	26.90	46.00	168.70
2045	RCP85	Irrigated - Rainfed	21.70	36.80	130.10
2072	RCP85	Irrigated - Rainfed	17.80	30.20	106.50
2099	RCP85	Irrigated - Rainfed	12.30	20.30	64.40

Table 4.89, shows the change of divergent water price between yield/profit and irrigated/rain-fed production. The yield-profit divergent water price increases for all emission scenarios, the irrigated to rain-fed decrease for all emission scenarios. The magnitude of divergent water prices increases with GHG concentrations.

Table 4.89: Difference between divergent water price of risk averse farmers, DEKALB, IL, CORN

Climate	TR2018	TR2099	OP	2018DWP	2099DWP	Diff
rcp26	.2	.2	2.40	0.20	0.20	0.00
rcp26	.2	.2	4.00	0.20	0.30	0.10
rcp26	.2	.2	13.20	0.80	1.30	0.50
rcp26	rainfed	rainfed	2.40	29.00	24.50	-4.50
rcp26	rainfed	rainfed	4.00	49.30	42.00	-7.30
rcp26	rainfed	rainfed	13.20	174.70	154.00	-20.70
rcp45	.2	.2	2.40	0.20	0.50	0.30
rcp45	.2	.2	4.00	0.40	0.70	0.30
rcp45	.2	.2	13.20	0.70	2.00	1.30
rcp45	rainfed	rainfed	2.40	27.50	20.60	-6.90
rcp45	rainfed	rainfed	4.00	46.60	34.90	-11.70
rcp45	rainfed	rainfed	13.20	167.50	124.40	-43.10
rcp60	.2	.2	2.40	0.90	1.70	0.80
rcp60	.2	.2	4.00	1.30	2.60	1.30
rcp60	.2	.2	13.20	2.50	5.60	3.10
rcp60	rainfed	rainfed	2.40	27.30	20.50	-6.80
rcp60	rainfed	rainfed	4.00	46.90	34.50	-12.40
rcp60	rainfed	rainfed	13.20	174.30	117.90	-56.40
rcp85	.2	.2	2.40	0.70	1.80	1.10
rcp85	.2	.2	4.00	1.00	2.80	1.80
rcp85	.2	.2	13.20	1.90	8.40	6.50
rcp85	rainfed	rainfed	2.40	26.90	12.30	-14.60
rcp85	rainfed	rainfed	4.00	46.00	20.30	-25.70
rcp85	rainfed	rainfed	13.20	168.70	64.40	-104.30

RISK NETURAL V.S RISK AVERSE FARMERS

Table 4.90, 4.91, 4.92, 4.93 compared the divergent water price between risk averse and neutral farmers at De Kalb, IL . The water price above which farmer's profit and yield maximization irrigation strategy diverge of risk averse is higher than risk neutral farmers at

low and mid-low emission scenarios; it becomes lower than risk neutral farmers at mid and high emission scenarios.

The water price drives corn farmer at De Kalb, IL switch from irrigated to rain-fed production is always higher across all emission scenarios and year, except for 2099(high emission). It indicates risk averse farmers at De Kalb, IL are more willing to use irrigation as risk management tool.

Table 4.90: Divergent water price for risk neutral v.s. averse farmers ,DEKALB ,IL ,CORN ,RCP26

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.2	0.10	-100.83	0.20	-101.38	2.40
2099	.2	0.20	182.55	0.30	182.00	4.00
2018	.2	0.60	2185.68	0.80	2184.57	13.20
2045	.2	1.00	1978.81	1.10	1978.29	13.20
2072	.2	1.00	1967.04	1.10	1966.56	13.20
2099	.2	0.70	2002.90	1.30	1999.63	13.20
2018	rainfed	27.90	-270.31	29.00	-270.31	2.40
2045	rainfed	22.70	-268.15	24.00	-268.15	2.40
2072	rainfed	22.70	-263.38	24.10	-263.38	2.40
2099	rainfed	23.30	-273.36	24.50	-273.36	2.40
2018	rainfed	46.40	-44.52	49.30	-44.52	4.00
2045	rainfed	37.90	-40.92	41.30	-40.92	4.00
2072	rainfed	37.80	-32.96	41.70	-32.96	4.00
2099	rainfed	38.80	-49.60	42.00	-49.60	4.00
2018	rainfed	153.10	1253.78	174.70	1253.78	13.20
2045	rainfed	124.80	1265.66	153.50	1265.66	13.20
2072	rainfed	124.70	1291.93	158.30	1291.93	13.20

2099	rainfed	127.80	1237.02	154.00	1237.02	13.20
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Table 4.91: Divergent water price for risk neutral v.s. averse farmers ,DEKALB ,IL ,CORN ,RCP45

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.2	0.30	-88.87	0.20	-88.37	2.40
2045	.2	0.70	-159.53	0.80	-160.03	2.40
2045	.2	1.20	139.96	1.30	139.45	4.00
2099	.2	0.80	63.26	0.70	63.77	4.00
2018	.2	1.30	2253.47	0.70	2256.49	13.20
2045	.2	3.90	1862.86	5.20	1856.27	13.20
2072	.2	1.40	1637.94	1.70	1636.45	13.20
2099	.2	2.50	1610.17	2.00	1612.68	13.20
2018	rainfed	26.70	-238.06	27.50	-238.06	2.40
2045	rainfed	21.60	-277.80	22.40	-277.80	2.40
2072	rainfed	20.20	-313.68	21.00	-313.68	2.40
2099	rainfed	19.90	-315.07	20.60	-315.07	2.40
2018	rainfed	44.40	9.24	46.60	9.24	4.00
2045	rainfed	35.90	-57.00	38.10	-57.00	4.00
2072	rainfed	33.70	-116.80	35.90	-116.80	4.00
2099	rainfed	33.20	-119.12	34.90	-119.12	4.00
2018	rainfed	146.50	1431.19	167.50	1431.19	13.20
2045	rainfed	118.30	1212.60	139.10	1212.60	13.20
2072	rainfed	110.90	1015.26	130.20	1015.26	13.20
2099	rainfed	109.40	1007.60	124.40	1007.60	13.20

Table 4.92: Divergent water price for risk neutral v.s. averse farmers ,DEKALB ,IL ,CORN ,RCP60

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.2	1.00	-100.02	0.90	-99.49	2.40
2099	.2	1.80	-233.71	1.70	-233.17	2.40
2018	.2	1.60	239.66	1.30	241.23	4.00
2045	.2	0.70	173.44	0.60	173.97	4.00
2099	.2	2.90	17.02	2.60	18.62	4.00
2018	.2	5.10	2192.51	2.50	2206.13	13.20
2045	.2	2.20	1973.62	1.30	1978.41	13.20
2072	.2	3.20	1652.20	2.70	1654.85	13.20
2099	.2	9.50	1457.25	5.60	1478.04	13.20
2018	rainfed	26.00	-248.76	27.30	-248.76	2.40
2045	rainfed	22.60	-272.93	23.30	-272.93	2.40
2072	rainfed	22.60	-329.98	23.00	-329.98	2.40
2099	rainfed	19.90	-343.42	20.50	-343.42	2.40
2018	rainfed	43.40	-8.60	46.90	-8.60	4.00
2045	rainfed	37.60	-48.88	39.70	-48.88	4.00
2072	rainfed	37.60	-143.96	38.60	-143.96	4.00
2099	rainfed	33.20	-166.36	34.50	-166.36	4.00
2018	rainfed	143.00	1372.32	174.30	1372.32	13.20
2045	rainfed	123.90	1239.40	144.70	1239.40	13.20
2072	rainfed	123.80	925.63	131.80	925.63	13.20
2099	rainfed	109.40	851.71	117.90	851.71	13.20

Table 4.93: Divergent water price for risk neutral v.s. averse farmers ,DEKALB ,IL ,CORN ,RCP85

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.2	0.80	-112.82	0.70	-112.29	2.40
2072	.2	2.40	-283.10	2.20	-282.02	2.40
2018	.2	1.30	218.14	1.00	219.73	4.00
2045	.2	1.00	79.85	0.90	80.40	4.00
2072	.2	3.90	-65.30	3.40	-62.60	4.00
2099	.2	3.00	-224.39	2.80	-223.13	4.00
2018	.2	4.20	2121.03	1.90	2133.24	13.20
2045	.2	3.10	1665.30	2.10	1670.77	13.20
2072	.2	12.80	1185.59	7.80	1212.59	13.20
2099	.2	9.70	661.47	8.40	669.65	13.20
2018	rainfed	25.80	-259.54	26.90	-259.54	2.40
2045	rainfed	21.10	-322.13	21.70	-322.13	2.40
2072	rainfed	17.30	-371.98	17.80	-371.98	2.40
2018	rainfed	43.00	-26.56	46.00	-26.56	4.00
2045	rainfed	35.10	-130.88	36.80	-130.88	4.00
2072	rainfed	28.80	-213.96	30.20	-213.96	4.00
2099	rainfed	20.50	-347.24	20.30	-347.24	4.00
2018	rainfed	141.90	1313.05	168.70	1313.05	13.20
2045	rainfed	115.80	968.80	130.10	968.80	13.20
2072	rainfed	95.00	694.63	106.50	694.63	13.20
2099	rainfed	67.70	254.81	64.40	254.81	13.20

4.5.2 FRANKLIN, IA

Franklin county, Iowa is located on the U.S Corn Belt. It produced of more than 40 million bushels of corn in 2017.

SIMULATED WEATHER

Figure 4.101, 4.102, 4.103 is the average temperature, precipitation simulated from MarkSim. Both maximum and the minimum temperature from the simulation raised along with decrease in cumulative rainfall over the cotton growing season, expect for RCP 2.6. The mean temperature during cotton season in Decatur county raises about 3°C whereas the cumulative precipitation dropped 3 inches for high emission scenario. Table A.10 shows the summary statistics of temperature and precipitation by RCPs.

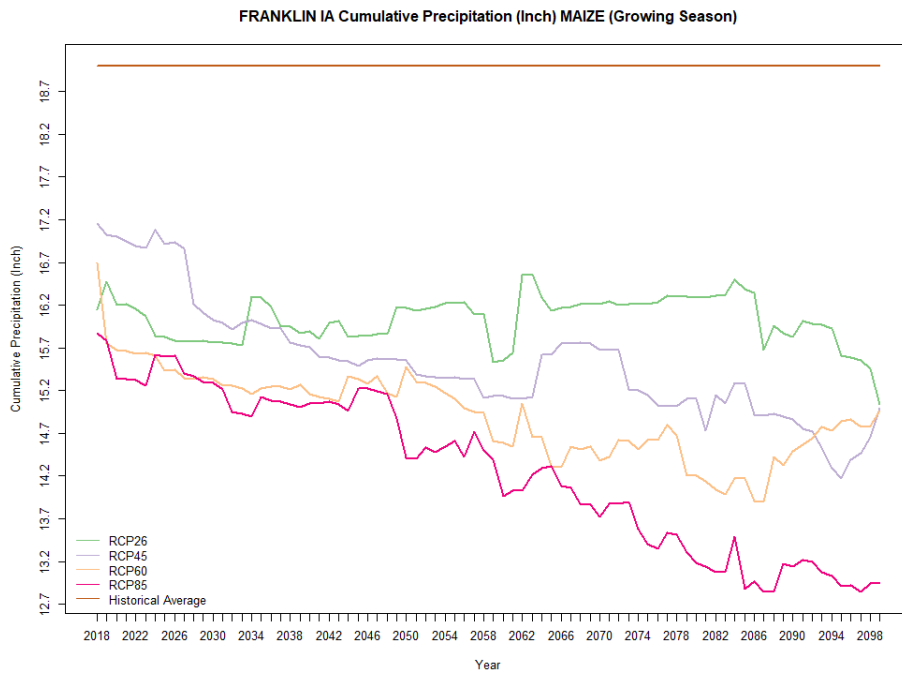


Figure 4.101: Cumulative Rainfall over Corn Season, Franklin, IA

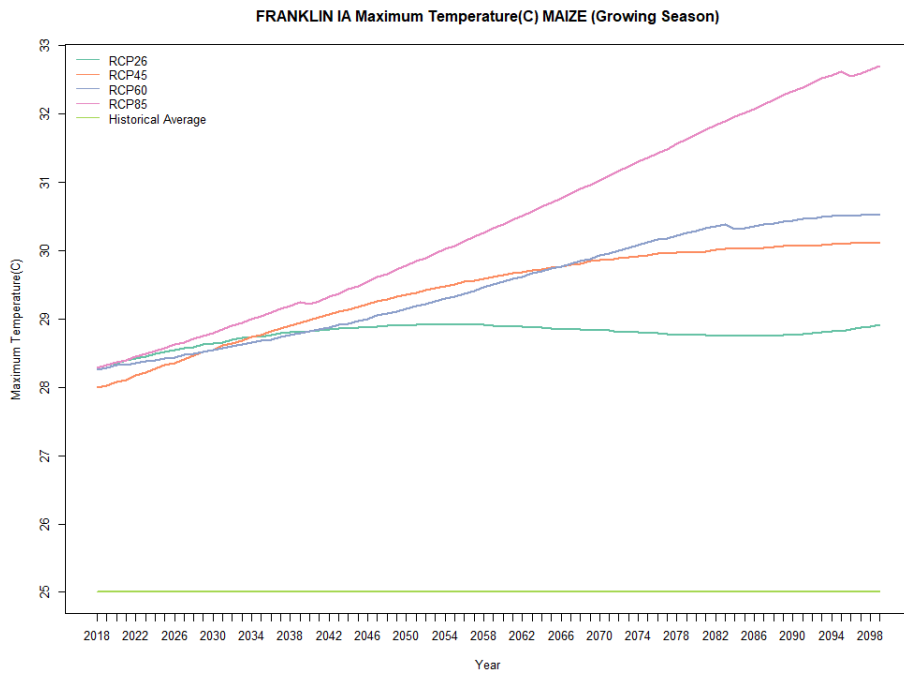


Figure 4.102: Average Maximum Temperature over Corn Season, Franklin, IA

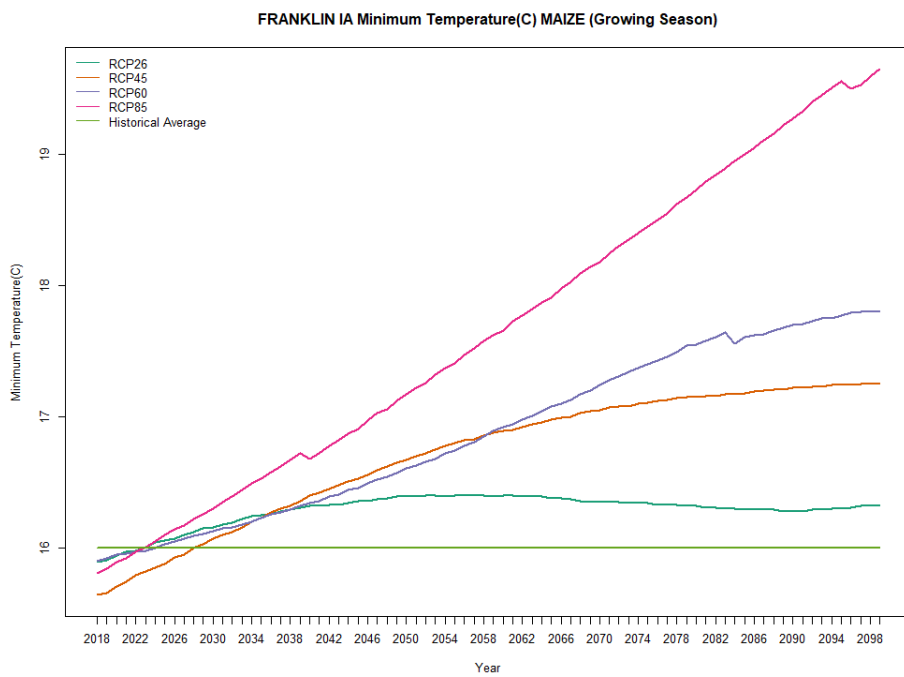


Figure 4.103: Average Minimum Temperature over Corn Season, Franklin, IA

SIMULATED YIELD AND WATER USE BY IRRIGATION STRATEGIES

As figure 4.104 shows, the rain-fed yield decrease 11 Bu/Acre (10%), 34 Bu/Acre (28%), 31 Bu/Acre (29%) and 72 Bu/Acre (66%) for RCP 2.6, RCP 4.5, RCP 6.0 and RCP 8.5 respectively. For Franklin county, there are no significant differences between irrigation strategies, with around 6 Inch/Acre of water use, corn yield is expected to increase 41 Bu/Acre across different years and levels of emissions.

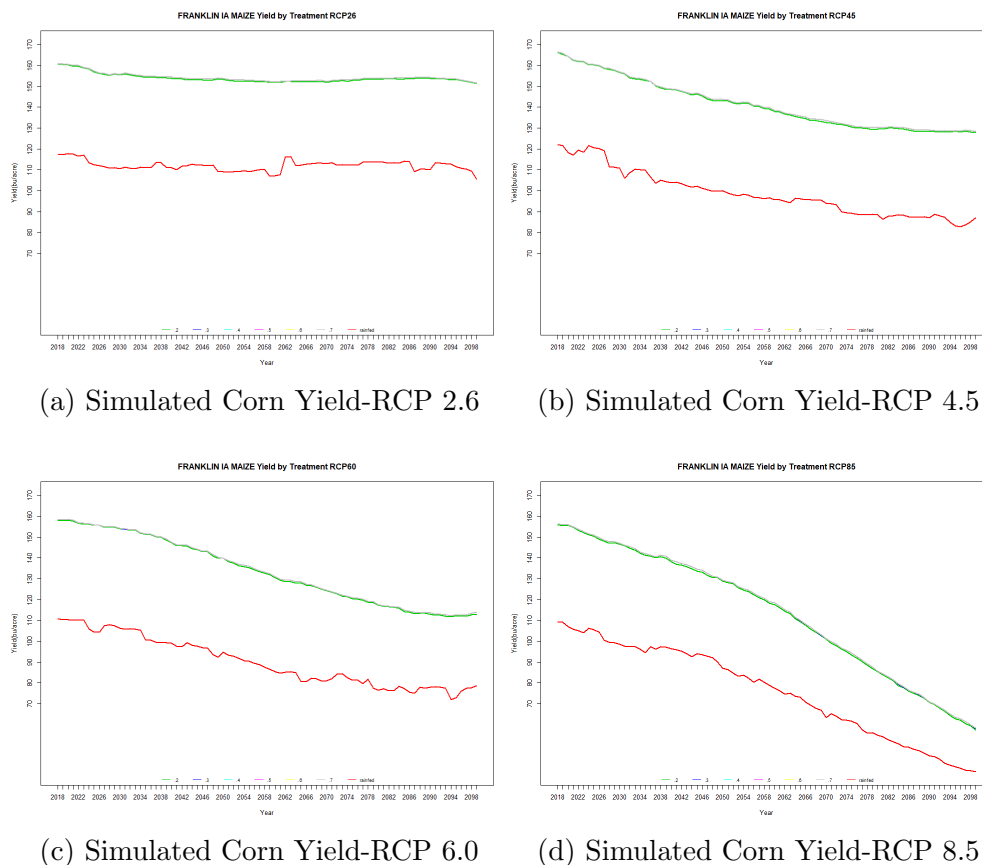
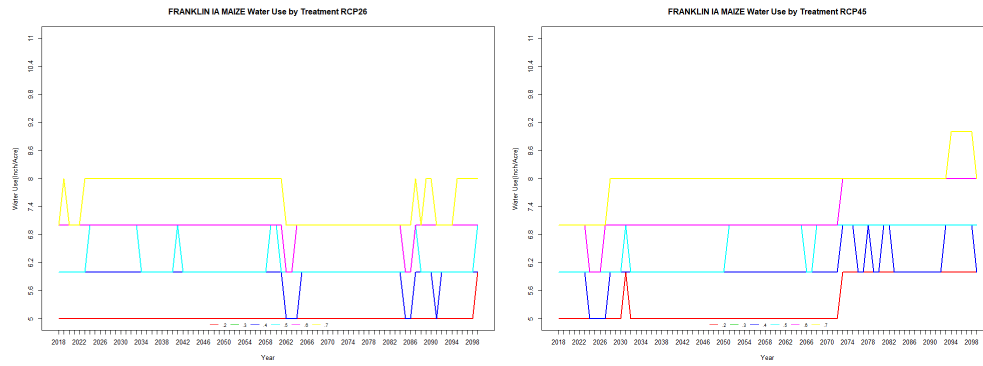
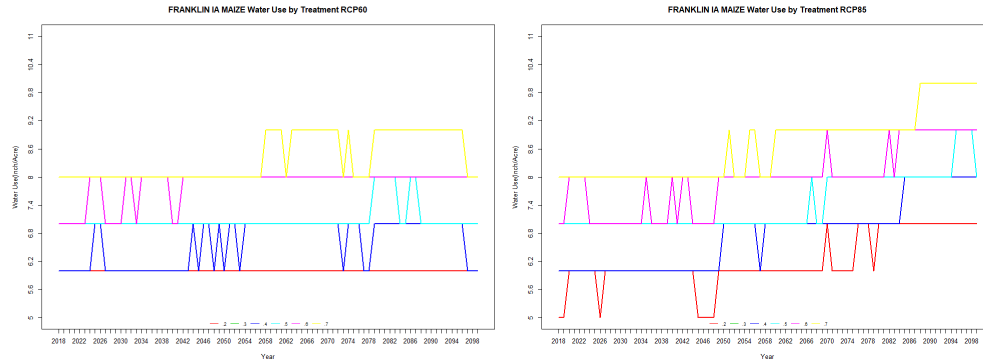


Figure 4.104: Average Simulated Yield by Treatment, Franklin, IA, Corn



(a) Simulated Water Use Yield-RCP 2.6 (b) Simulated Water Use-RCP 4.5



(c) Simulated Water Use-RCP 6.0 (d) Simulated Water Use-RCP 8.5

Figure 4.105: Average Simulated Water Use by Treatment, Franklin, IA, Corn

From figure 4.95, simulated yield increases are not significant between irrigation strategy(treatment 0.2 - 0.7).

MAXIMUM YIELD IRRIGATION STRATEGIES

Table 4.94 shows yield maximization irrigation strategy for Franklin, Iowa corn soybean farmers. The yield maximizing irrigation strategy either .3 or .4 across years and emission scenarios.

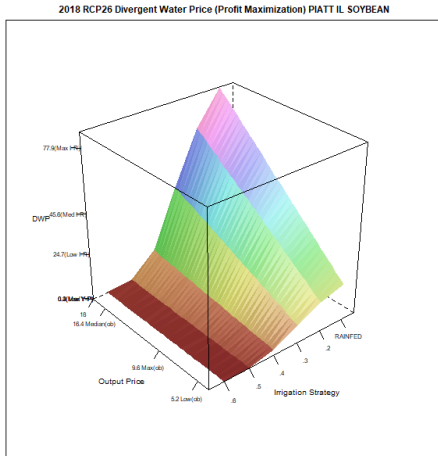
Table 4.94: Yield Maximization Treatment, Franklin ,IA, Corn

Climate	Year	Irrigation Strategy	Yield(LB/ACRE)	Water Use(INCH/ACRE)
RCP 2.6	2018	.3	161.07	5.72
	2045	.3	153.60	5.66
	2072	.4	152.88	6.15
	2099	.3	151.71	6.24
RCP 4.5	2018	.4	166.42	6.19
	2045	.4	146.78	6.36
	2072	.4	132.66	6.71
	2099	.3	128.39	6.49
RCP 6.0	2018	.3	158.44	6.19
	2045	.3	144.20	6.49
	2072	.4	123.02	7.30
	2099	.4	113.80	6.96
RCP 8.5	2018	.3	156.32	6.07
	2045	.3	134.63	6.07
	2072	.4	98.42	7.56
	2099	.4	58.08	8.45

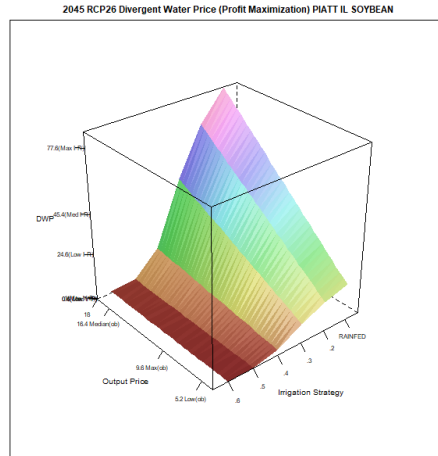
DIVERGENT WATER PRICE OF RISK NEUTRAL FARMERS

Figure 4.106, ??, ?? and ?? shows the divergent water price for risk neutral farmers by irrigation strategies. The low(ob), medium(ob) in the y-axis are low, medium observed 30 years historical soybean price from USDA survey. The divergent water price increases with output prices. The water price is strictly increasing with output price.

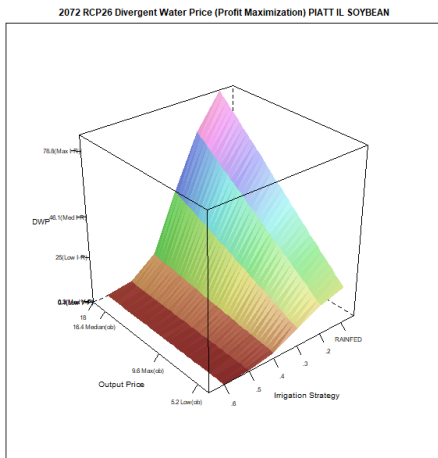
Table 4.95 shows the y-p and irr-rf water price at Franklin, Iowa. At \$2.4 Bu/Acre price, the highest y-p price is \$8.1 at 2045 RCP 8.5, the y-p price is bounces around across emission scenarios and years. As well as the irr-rf water price. The lowest irr-rf water price is \$ 14.20 at RCP 8.5, 2099.



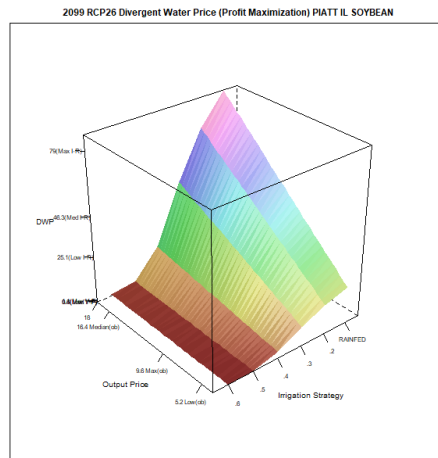
(a) 2018



(b) 2045

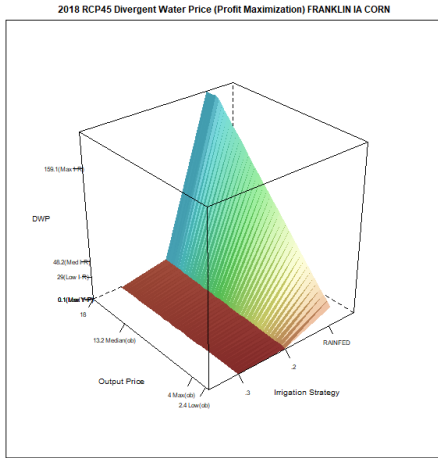


(c) 2072

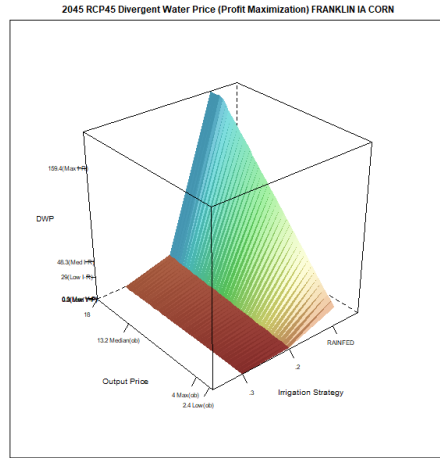


(d) 2099

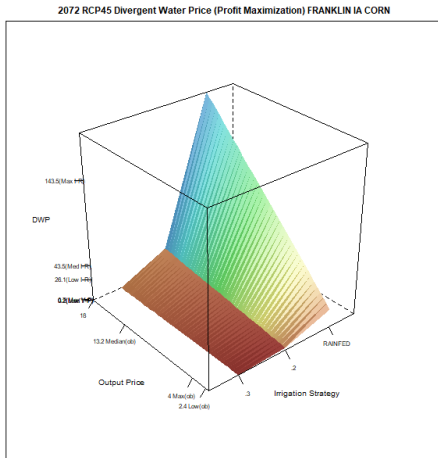
Figure 4.106: Water Use of profit maximizing farmers by irrigation strategies, Franklin, IA, Corn, RCP 2.6



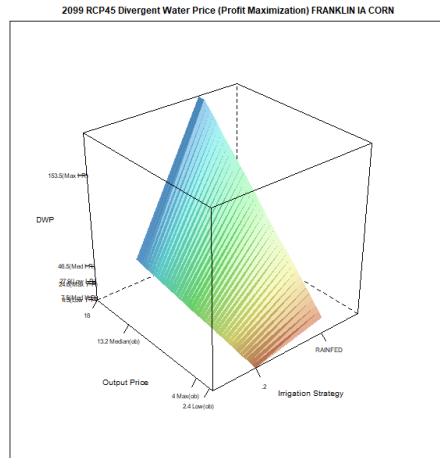
(a) 2018



(b) 2045

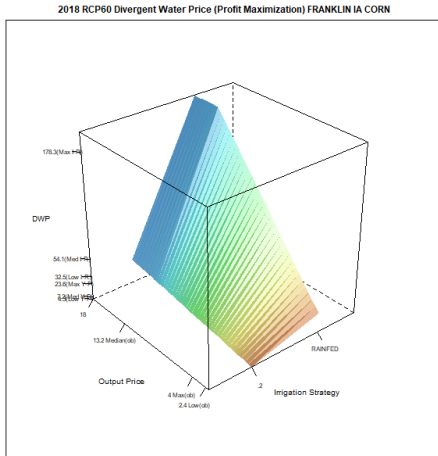


(c) 2072

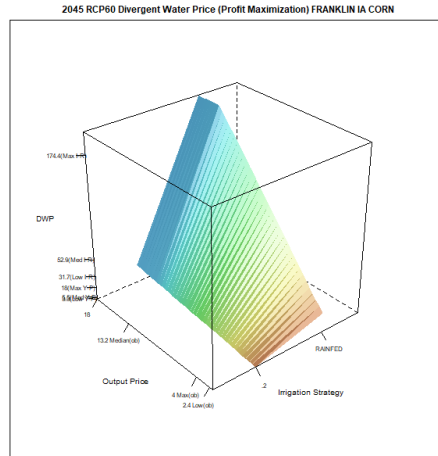


(d) 2099

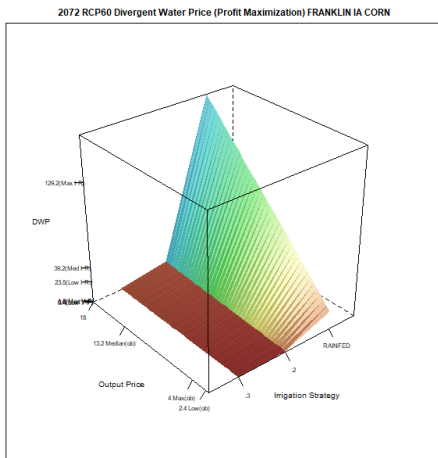
Figure 4.107: Water Use of profit maximizing farmers by irrigation strategies, Franklin, IA, Corn, RCP 4.5



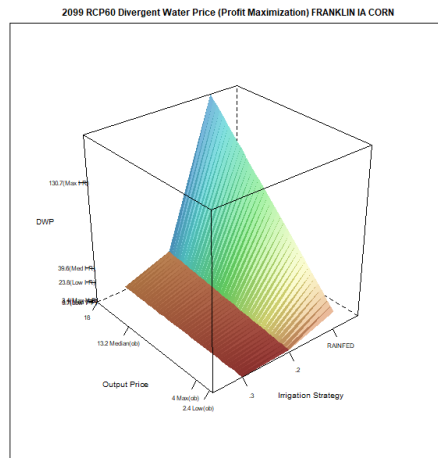
(a) 2018



(b) 2045

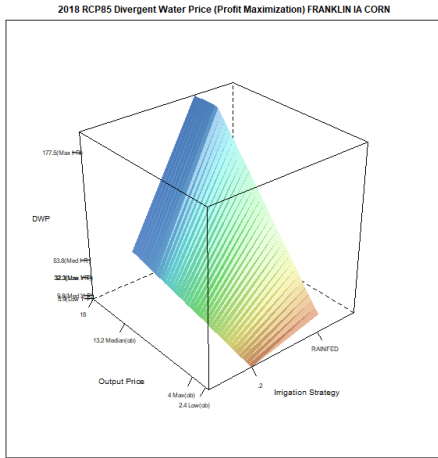


(c) 2072

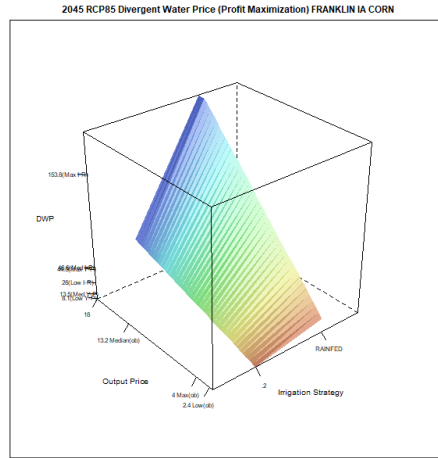


(d) 2099

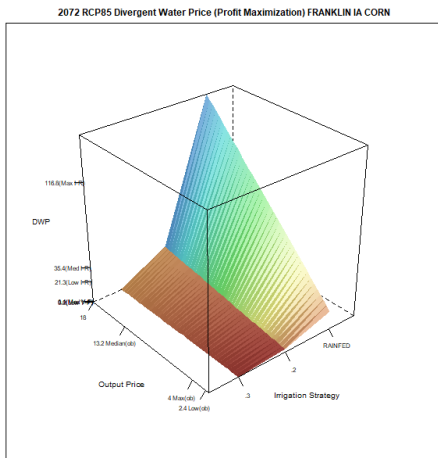
Figure 4.108: Water Use of profit maximizing farmers by irrigation strategies, Franklin, IA, Corn, RCP 6.0



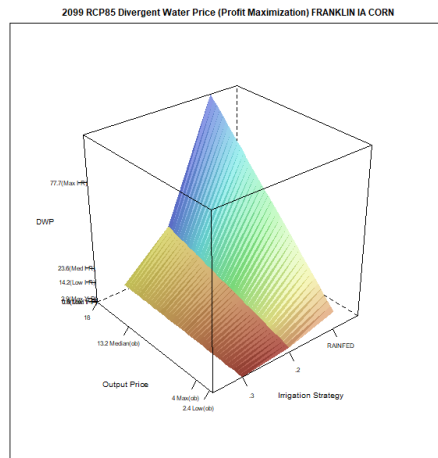
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.109: Water Use of profit maximizing farmers by irrigation strategies, Franklin, IA, Corn, RCP 8.5

Table 4.95: Divergent Water Price of Risk Netural Farmers(Y-P and I-R), Franklin, IA

Year	Climate	Form	2.4	4	13.2
2018	RCP26	Yield - Profit	2.00	3.30	10.90
2045	RCP26	Yield - Profit	6.20	10.30	33.90
2072	RCP26	Yield - Profit	2.90	4.70	15.50
2099	RCP26	Yield - Profit	5.00	8.20	27.10
2018	RCP45	Yield - Profit	1.60	2.60	8.60
2045	RCP45	Yield - Profit	2.40	3.90	12.90
2072	RCP45	Yield - Profit	3.60	6.00	19.80
2099	RCP45	Yield - Profit	4.50	7.50	24.60
2018	RCP60	Yield - Profit	4.30	7.20	23.60
2045	RCP60	Yield - Profit	3.30	5.50	18.00
2072	RCP60	Yield - Profit	1.60	2.60	8.40
2099	RCP60	Yield - Profit	3.20	5.30	17.30
2018	RCP85	Yield - Profit	5.90	9.80	32.30
2045	RCP85	Yield - Profit	8.10	13.50	44.30
2072	RCP85	Yield - Profit	3.50	5.80	18.90
2099	RCP85	Yield - Profit	4.20	7.00	23.10
2018	RCP26	Irrigated - Rainfed	31.40	52.30	172.50
2045	RCP26	Irrigated - Rainfed	30.80	51.30	169.10
2072	RCP26	Irrigated - Rainfed	28.00	46.70	153.90
2099	RCP26	Irrigated - Rainfed	31.40	52.40	172.60
2018	RCP45	Irrigated - Rainfed	29.00	48.20	159.10
2045	RCP45	Irrigated - Rainfed	29.00	48.30	159.40
2072	RCP45	Irrigated - Rainfed	26.10	43.50	143.50
2099	RCP45	Irrigated - Rainfed	27.90	46.50	153.50

2018	RCP60	Irrigated - Rainfed	32.50	54.10	178.30
2045	RCP60	Irrigated - Rainfed	31.70	52.90	174.40
2072	RCP60	Irrigated - Rainfed	23.50	39.20	129.20
2099	RCP60	Irrigated - Rainfed	23.80	39.60	130.70
2018	RCP85	Irrigated - Rainfed	32.30	53.80	177.50
2045	RCP85	Irrigated - Rainfed	28.00	46.60	153.80
2072	RCP85	Irrigated - Rainfed	21.30	35.40	116.80
2099	RCP85	Irrigated - Rainfed	14.20	23.60	77.70

Table B.21, B.22, B.23 and B.24 in the appendix shows the divergent water prices at different level of irrigation strategies.

Table 4.96 shows the y-p and irr-rf water prices for risk neutral farmers at 2018 and 2099. The y-p water price and irr - rf water price at 2099 are higher than 2018 for low emission scenarios. For mid-low emission scenario, the y-p price at 2099 is higher than 2018. For all other irr-rf and y-p water prices, 2018 prices are higher than 2099 prices.

Table 4.96: Difference between divergent water price for risk neutral farmer,FRANKLIN,IA,MAIZE

Climate	TR2018	TR2099	Output Price	2018DWP	2099DWP	Diff
rcp26	.2	.2	2.40	2.00	5.00	3
rcp26	.2	.2	4.00	3.30	8.20	4.9
rcp26	.2	.2	13.20	10.90	27.10	16.2
rcp26	RAINFED	RAINFED	2.40	31.40	31.40	0
rcp26	RAINFED	RAINFED	4.00	52.30	52.40	0.1
rcp26	RAINFED	RAINFED	13.20	172.50	172.60	0.09
rcp45	.2	.2	2.40	1.60	4.50	2.9
rcp45	.2	.2	4.00	2.60	7.50	4.9
rcp45	.2	.2	13.20	8.60	24.60	16
rcp45	RAINFED	RAINFED	2.40	29.00	27.90	-1.1
rcp45	RAINFED	RAINFED	4.00	48.20	46.50	-1.7
rcp45	RAINFED	RAINFED	13.20	159.10	153.50	-5.59
rcp60	.2	.2	2.40	4.30	3.20	-1.1
rcp60	.2	.2	4.00	7.20	5.30	-1.9
rcp60	.2	.2	13.20	23.60	17.30	-6.3
rcp60	RAINFED	RAINFED	2.40	32.50	23.80	-8.7
rcp60	RAINFED	RAINFED	4.00	54.10	39.60	-14.5
rcp60	RAINFED	RAINFED	13.20	178.30	130.70	-47.6
rcp85	.2	.2	2.40	5.90	4.20	-1.7
rcp85	.2	.2	4.00	9.80	7.00	-2.8
rcp85	.2	.2	13.20	32.30	23.10	-9.2
rcp85	RAINFED	RAINFED	2.40	32.30	14.20	-18.1
rcp85	RAINFED	RAINFED	4.00	53.80	23.60	-30.2
rcp85	RAINFED	RAINFED	13.20	177.50	77.70	-99.8

DIVERGENT WATER PRICE FOR RISK AVERSE FARMERS

Figure ??, 4.111, 4.112 and 4.113 showed the divergent water price of risk averse farmers under $r_a = 1.5$. On average, the divergent water price for switching to rain-fed production increases with output price and decreases with years.

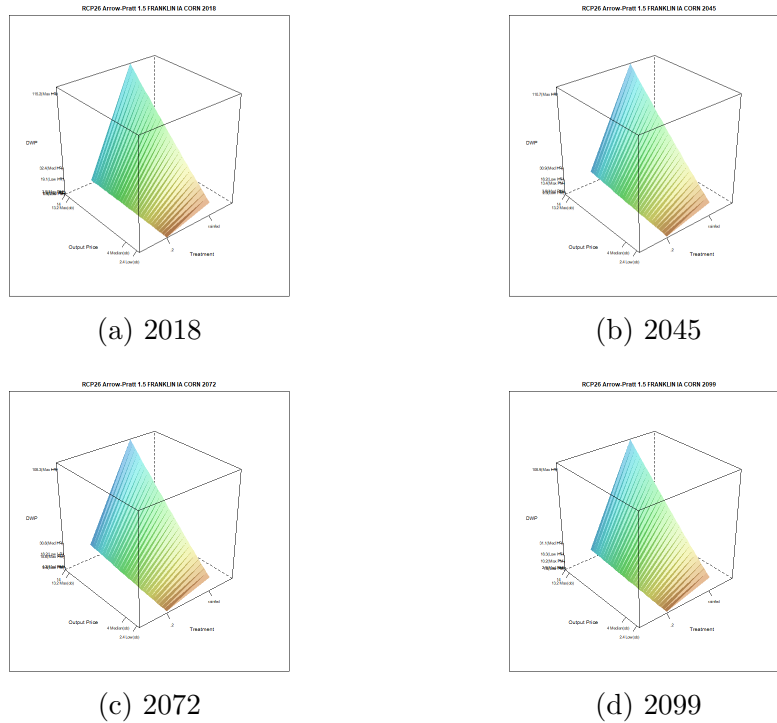


Figure 4.110: Divergent Water Price of Utility Maximization Farmers, Franklin, IA, Corn $r_a = 1.5$, RCP 2.6

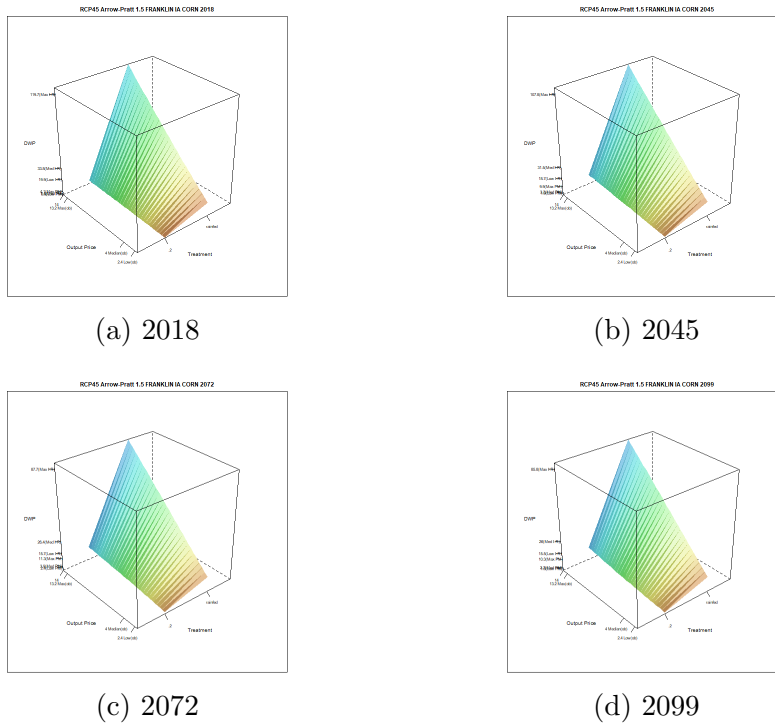


Figure 4.111: Divergent Water Price of Utility Maximization Farmers, Franklin, IA, Corn $r_a = 1.5$, RCP 4.5

Table 4.97 shows the y-p and irr-rf water prices of risk averse corn farmers in Franklin, Iowa, at \$2.4 Bu/Acre price, the y-p price are lower than \$4 across emission scenarios and years. If RCP 6.0 or RCP 8.5 is expected, at the end of 21 century the y-p water prices at any output price are lower than 5 dimes.

At low corn return, the irr-rf water prices are above \$10 expect RCP 8.5, 2099. At high corn return, the irr-rf water price could be as high as \$119, even at RCP 8.5 2099, the irr-rf water price are as high as \$31.

Table 4.97: Divergent Water Price of Risk Averse Farmers (Y-P and I-R) ,FRANKLIN ,IA ,MAIZE

Year	Climate	Form	2.4	4	13.2
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2018	RCP26	Yield - Profit	0.90	1.40	3.80
2045	RCP26	Yield - Profit	2.30	3.80	13.40
2072	RCP26	Yield - Profit	2.50	4.20	15.60
2099	RCP26	Yield - Profit	1.80	2.90	10.20
2018	RCP45	Yield - Profit	0.90	1.40	4.10
2045	RCP45	Yield - Profit	1.90	3.20	9.90
2072	RCP45	Yield - Profit	2.40	3.90	11.30
2099	RCP45	Yield - Profit	1.60	2.70	10.30
2018	RCP60	Yield - Profit	1.70	2.90	10.30
2045	RCP60	Yield - Profit	1.30	2.10	6.60
2072	RCP60	Yield - Profit	0.80	1.40	4.00
2099	RCP60	Yield - Profit	0.10	0.10	0.20
2018	RCP85	Yield - Profit	1.50	2.60	8.50
2045	RCP85	Yield - Profit	3.80	6.40	23.30
2072	RCP85	Yield - Profit	1.80	2.80	6.40
2099	RCP85	Yield - Profit	0.10	0.20	0.40
2018	RCP26	Irrigated - Rainfed	19.10	32.40	115.20
2045	RCP26	Irrigated - Rainfed	18.20	30.90	110.70
2072	RCP26	Irrigated - Rainfed	18.20	30.80	108.30
2099	RCP26	Irrigated - Rainfed	18.30	31.10	108.90
2018	RCP45	Irrigated - Rainfed	19.90	33.80	119.70
2045	RCP45	Irrigated - Rainfed	18.70	31.50	107.80
2072	RCP45	Irrigated - Rainfed	15.70	26.40	87.70
2099	RCP45	Irrigated - Rainfed	15.50	26.00	85.80
2018	RCP60	Irrigated - Rainfed	18.90	31.70	108.40
2045	RCP60	Irrigated - Rainfed	17.40	29.10	93.20

2072	RCP60	Irrigated - Rainfed	13.90	23.20	76.80
2099	RCP60	Irrigated - Rainfed	12.40	20.80	69.90
2018	RCP85	Irrigated - Rainfed	19.00	31.90	110.40
2045	RCP85	Irrigated - Rainfed	16.40	27.50	92.50
2072	RCP85	Irrigated - Rainfed	11.80	19.60	64.00
2099	RCP85	Irrigated - Rainfed	5.90	9.80	31.00

Table 4.98 shows the irr-rf price and y-p price at 2018 and 2099 risk averse farmers. For any corn price, the y-p and irr-rf water prices at 2099 are less than 2018.

Table C.21 to table C.24 in the appendix shows the difference induced by risk averse levels and water savings of franklin corn farmers.

Table 4.98 shows the differences of y-p and irr-rf water prices at 2018 and 2099. For RCP 2.6 and 4.5 the y-p water prices increases with time; for RCP 6.0 and 8.5, divergent water prices of 2099 are less than 2018. Especially for RCP 8.5, at 2099, farmers pay 70% less than 2018 to stay at irrigation production.

RISK NETURAL V.S RISK AVERSE FARMERS

Table 4.99, 4.100, 4.101, 4.102 compared the divergent water price between risk averse and neutral farmers at Franklin, IA. The water price above which farmer's profit and yield maximization irrigation strategy diverge of risk averse is higher than risk neutral farmers at low and mid-low emission scenarios; it becomes lower than risk neutral farmers at mid and high emission scenarios.

Table 4.99: Divergent water price for risk neutral v.s. averse farmers, FRANKLIN, IA, CORN, RCP26

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.2	2.00	-233.07	0.90	-227.53	2.40

2045	.2	6.20	-273.15	2.30	-253.34	2.40
2072	.2	2.90	-257.87	2.50	-255.88	2.40
2099	.2	5.00	-274.03	1.80	-256.04	2.40
2018	.2	3.30	17.72	1.40	27.28	4.00
2045	.2	10.30	-49.08	3.80	-16.06	4.00
2072	.2	4.70	-23.12	4.20	-20.63	4.00
2099	.2	8.20	-49.96	2.90	-20.18	4.00
2018	.2	10.90	1459.13	3.80	1494.84	13.20
2045	.2	33.90	1239.18	13.40	1343.32	13.20
2072	.2	15.50	1324.46	15.60	1323.96	13.20
2099	.2	27.10	1235.59	10.20	1330.57	13.20
2018	rainfed	31.40	-327.41	19.10	-327.41	2.40
2045	rainfed	30.80	-339.43	18.20	-339.43	2.40
2072	rainfed	28.00	-339.79	18.20	-339.79	2.40
2099	rainfed	31.40	-355.75	18.30	-355.75	2.40
2018	rainfed	52.30	-139.68	32.40	-139.68	4.00
2045	rainfed	51.30	-159.72	30.90	-159.72	4.00
2072	rainfed	46.70	-160.32	30.80	-160.32	4.00
2099	rainfed	52.40	-186.92	31.10	-186.92	4.00
2018	rainfed	172.50	939.76	115.20	939.76	13.20
2045	rainfed	169.10	873.62	110.70	873.62	13.20
2072	rainfed	153.90	871.64	108.30	871.64	13.20
2099	rainfed	172.60	783.86	108.90	783.86	13.20

Table 4.98: Difference between divergent water price of risk averse farmers, FRANKLIN, IA, CORN

Climate	TR2018	TR2099	OP	2018DWP	2099DWP	Diff
rcp26	.2	.2	2.40	0.90	1.80	0.90
rcp26	.2	.2	4.00	1.40	2.90	1.50
rcp26	.2	.2	13.20	3.80	10.20	6.40
rcp26	rainfed	rainfed	2.40	19.10	18.30	-0.80
rcp26	rainfed	rainfed	4.00	32.40	31.10	-1.30
rcp26	rainfed	rainfed	13.20	115.20	108.90	-6.30
rcp45	.2	.2	2.40	0.90	1.60	0.70
rcp45	.2	.2	4.00	1.40	2.70	1.30
rcp45	.2	.2	13.20	4.10	10.30	6.20
rcp45	rainfed	rainfed	2.40	19.90	15.50	-4.40
rcp45	rainfed	rainfed	4.00	33.80	26.00	-7.80
rcp45	rainfed	rainfed	13.20	119.70	85.80	-33.90
rcp60	.2	.3	2.40	1.70	0.10	-1.60
rcp60	.2	.3	4.00	2.90	0.10	-2.80
rcp60	.2	.3	13.20	10.30	0.20	-10.10
rcp60	rainfed	rainfed	2.40	18.90	12.40	-6.50
rcp60	rainfed	rainfed	4.00	31.70	20.80	-10.90
rcp60	rainfed	rainfed	13.20	108.40	69.90	-38.50
rcp85	.2	.3	2.40	1.50	0.10	-1.40
rcp85	.2	.3	4.00	2.60	0.20	-2.40
rcp85	.2	.3	13.20	8.50	0.40	-8.10
rcp85	rainfed	rainfed	2.40	19.00	5.90	-13.10
rcp85	rainfed	rainfed	4.00	31.90	9.80	-22.10
rcp85	rainfed	rainfed	13.20	110.40	31.00	-79.40

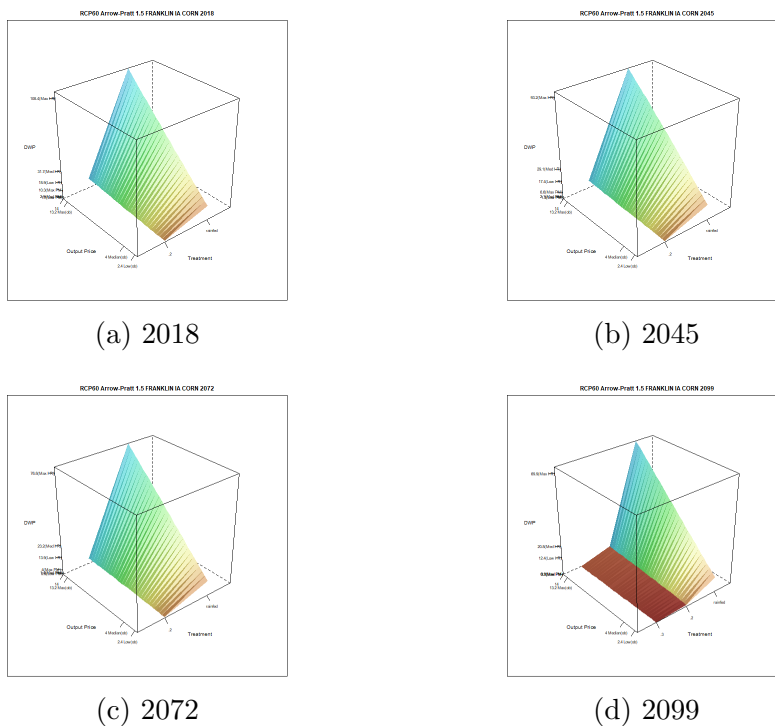


Figure 4.112: Divergent Water Price of Utility Maximization Farmers, Franklin, IA, Corn $r_a = 1.5$, RCP 6.0

Table 4.100: Divergent water price for risk neutral v.s. averse farmers ,FRANKLIN ,IA ,CORN ,RCP45

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.2	1.60	-217.94	0.90	-214.50	2.40
2045	.2	2.40	-270.46	1.90	-267.85	2.40
2072	.2	3.60	-311.83	2.40	-305.28	2.40
2099	.2	4.50	-327.69	1.60	-311.16	2.40
2018	.2	2.60	43.09	1.40	48.99	4.00
2045	.2	3.90	-44.24	3.20	-40.58	4.00
2072	.2	6.00	-113.72	3.90	-102.25	4.00

2099	.2	7.50	-140.15	2.70	-112.79	4.00
2018	.2	8.60	1542.79	4.10	1564.93	13.20
2045	.2	12.90	1254.56	9.90	1270.22	13.20
2072	.2	19.80	1025.42	11.30	1071.83	13.20
2099	.2	24.60	939.06	10.30	1020.57	13.20
2018	rainfed	29.00	-315.94	19.90	-315.94	2.40
2045	rainfed	29.00	-363.67	18.70	-363.67	2.40
2072	rainfed	26.10	-385.15	15.70	-385.15	2.40
2099	rainfed	27.90	-399.96	15.50	-399.96	2.40
2018	rainfed	48.20	-120.56	33.80	-120.56	4.00
2045	rainfed	48.30	-200.12	31.50	-200.12	4.00
2072	rainfed	43.50	-235.92	26.40	-235.92	4.00
2099	rainfed	46.50	-260.60	26.00	-260.60	4.00
2018	rainfed	159.10	1002.85	119.70	1002.85	13.20
2045	rainfed	159.40	740.30	107.80	740.30	13.20
2072	rainfed	143.50	622.16	87.70	622.16	13.20
2099	rainfed	153.50	540.72	85.80	540.72	13.20

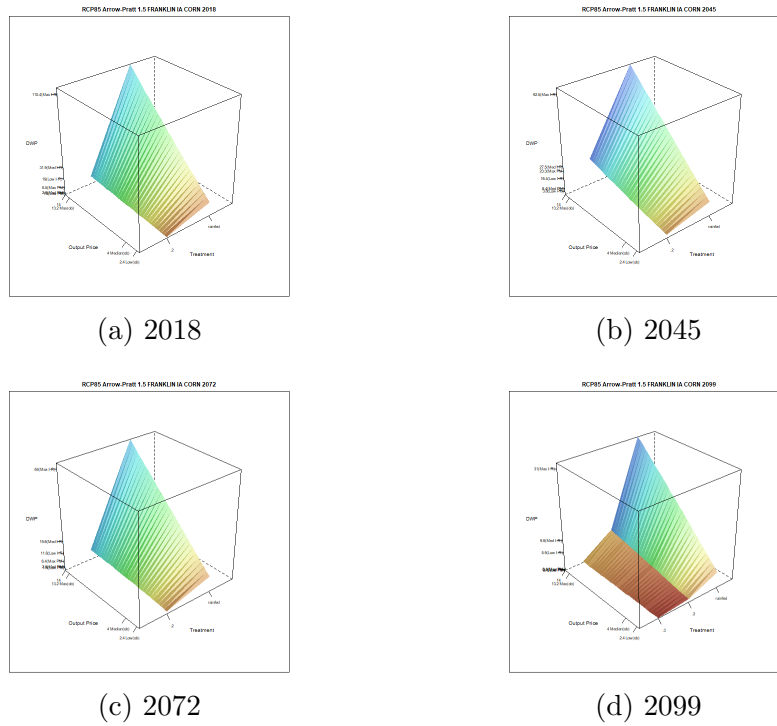


Figure 4.113: Divergent Water Price of Utility Maximization Farmers, Franklin, IA, Corn $r_a = 1.5$, RCP 8.5

Table 4.101: Divergent water price for risk neutral v.s. averse farmers ,FRANKLIN ,IA ,CORN ,RCP60

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2099	.3	0.70	-340.37	0.10	-336.54	2.40
2099	.3	1.10	-160.86	0.10	-154.48	4.00
2099	.3	3.40	871.34	0.20	891.75	13.20
2018	.2	4.30	-253.65	1.70	-239.24	2.40
2045	.2	3.30	-282.77	1.30	-271.29	2.40
2072	.2	1.60	-324.06	0.80	-319.23	2.40
2099	.2	3.20	-355.89	1.40	-345.70	2.40

2018	.2	7.20	-16.93	2.90	6.89	4.00
2045	.2	5.50	-65.29	2.10	-45.77	4.00
2072	.2	2.60	-133.70	1.40	-126.46	4.00
2099	.2	5.30	-186.96	2.30	-169.98	4.00
2018	.2	23.60	1345.72	10.30	1419.41	13.20
2045	.2	18.00	1186.10	6.60	1251.54	13.20
2072	.2	8.40	960.56	4.00	987.14	13.20
2099	.2	17.30	784.81	5.90	849.34	13.20
2018	rainfed	32.50	-343.08	18.90	-343.08	2.40
2045	rainfed	31.70	-374.62	17.40	-374.62	2.40
2072	rainfed	23.50	-406.92	13.90	-406.92	2.40
2099	rainfed	23.80	-420.48	12.40	-420.48	2.40
2018	rainfed	54.10	-165.80	31.70	-165.80	4.00
2045	rainfed	52.90	-218.36	29.10	-218.36	4.00
2072	rainfed	39.20	-272.20	23.20	-272.20	4.00
2099	rainfed	39.60	-294.80	20.80	-294.80	4.00
2018	rainfed	178.30	853.56	108.40	853.56	13.20
2045	rainfed	174.40	680.11	93.20	680.11	13.20
2072	rainfed	129.20	502.44	76.80	502.44	13.20
2099	rainfed	130.70	427.86	69.90	427.86	13.20

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2099	.3	0.60	-474.35	0.10	-470.44	2.40
2099	.3	0.90	-383.80	0.20	-378.32	4.00
2099	.3	2.90	134.71	0.40	154.26	13.20
2018	.2	5.90	-266.99	1.50	-242.93	2.40
2045	.2	8.10	-332.28	3.80	-308.89	2.40
2072	.2	3.50	-396.42	1.80	-385.61	2.40
2099	.2	4.20	-500.67	1.30	-480.51	2.40
2018	.2	9.80	-38.81	2.60	0.58	4.00
2045	.2	13.50	-147.80	6.40	-109.18	4.00
2072	.2	5.80	-254.49	2.80	-235.41	4.00
2099	.2	7.00	-428.45	2.10	-394.39	4.00
2018	.2	32.30	1272.86	8.50	1403.05	13.20
2045	.2	44.30	914.32	23.30	1028.56	13.20
2072	.2	18.90	562.42	6.40	641.92	13.20
2099	.2	23.10	-13.19	6.50	102.19	13.20
2018	rainfed	32.30	-346.44	19.00	-346.44	2.40
2045	rainfed	28.00	-383.47	16.40	-383.47	2.40
2072	rainfed	21.30	-455.40	11.80	-455.40	2.40
2099	rainfed	14.20	-519.67	5.90	-519.67	2.40
2018	rainfed	53.80	-171.40	31.90	-171.40	4.00
2045	rainfed	46.60	-233.12	27.50	-233.12	4.00
2072	rainfed	35.40	-353.00	19.60	-353.00	4.00
2099	rainfed	23.60	-460.12	9.80	-460.12	4.00
2018	rainfed	177.50	835.08	110.40	835.08	13.20
2045	rainfed	153.80	631.40	92.50	631.40	13.20

2072	rained	116.80	235.80	64.00	235.80	13.20
2099	rained	77.70	-117.70	31.00	-117.70	13.20

Table 4.102: Divergent water price for risk neutral v.s. averse farmers ,FRANKLIN ,IA ,CORN ,RCP85

4.6 SIMULATED WHEAT YIELD, MAXIMUM TEMPERATURE, MINIMUM TEMPERATURE AND PRECIPITATION

Table 4.103 show the observed cotton yield in selected research stations in 2013, the weighed average ¹ were 517 LB/Acre and 1055 LB/Acre for rain-fed and irrigated upland cotton respectively, the simulated corn yield from DSSAT in year 2018 was lower to the observed average rain-fed yield. The main driver of the difference was the rain-fed cotton yield in Texas, considering in 2013, the cumulative rainfall was only 8 inch in total. The outcome was self-explanatory.

Again simulated DSSAT maximum yield level from DSSAT were 300 Bu/Acre(30%) higher than yield in 2018. For ECP 2.6, the simulated maximum yields were always higher than observed yield. For other RCPs, after mid 21 century, the corn yield became lower than the baseline observed yield.

The changes of temperature and precipitation are not significant for RCP 2.6, yet for RCP 8.5, year 2099 has 5C° increase in temperature along with 4(Ibch) decrease in precipitation.

Table 4.105 shows the average level of simulated cotton yield(rain-fed/yield max), temperature and rainfall over the soybean growing season. For all RCPs, the average rain-fed yield of all research stations follows decrease trend. Especially for RCP 8.5, the rain-yield reduced by 37% while the maximum yield remains stable across RCPs.

¹The mean yield, temperature and precipitation are weighted by 20 years state level harvest acreage

State	Rain-fed Yield(Bu/Acre)	Irrigated Yield
Illinois	66	71
Kansas	37	45

Table 4.103: Upland Cotton, yield 2013 Census

Source: <https://quickstats.nass.usda.gov/results/44E170CE-42E7-3FE9-BCB1-37114B06E766>

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2019	79	126	1	17	12	9
2046	80	133	1	18	11	9
2072	83	134	1	18	11	9
2099	82	132	1	18	12	9

RCP 2.6 Low Emission Scenario

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2019	74	130	0	17	11	10
2046	75	138	1	18	10	11
2072	77	143	1	18	9	11
2099	81	143	2	18	10	11

RCP 4.5 Medium Low Emission Scenario

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2019	80	127	1	17	11	9
2046	82	135	1	18	11	10
2072	87	143	2	18	11	9
2099	83	147	2	19	10	11

Table 4.104: RCP 6.0 Medium Emission Scenario

Year	Rainfed Yield(LB/Acre)	Max Yield(LB/Acre)	TMAX C°	TMIN C°	Precipitation(Inch)	Water Use(Inch)
2019	70	129	1	17	11	10
2046	74	142	1	18	10	11
2072	78	151	2	19	9	12
2099	83	153	3	20	9	12

RCP 8.5 High Emission Scenario

Table 4.105: Mean wheat rain-fed yield, minimum/maximum temperature and precipitation over the growing season

The cost of wheat production in Illinois and Kansas are listed in table 4.106 and 4.107.

Variable Cost	Wheat
ARC/PLC	0
Crop insurance proceeds	0
Gross revenue	\$353
Fertilizers	\$76
Pesticides	27
Seed	50
Drying	1
Storage	1
Crop insurance	9
Total direct costs	\$164
Machine hire/lease	\$18
Utilities	7
Machine repair	33
Fuel and oil	20
Light vehicle	2
Mach. depreciation	49
Total power costs	\$129
Hired labor	\$15
Building repair and rent	3
Building depreciation	8
Insurance	5
Misc	9
Interest (non-land)	14
Total overhead costs	\$54
Total non-land costs	\$347

Table 4.106: Cost of wheat production in Illinois

Item	Cost per Acre
1. Seed	\$19.20
2. Herbicide	2.75
3. Insecticide / Fungicide	11.80
4. Fertilizer and Lime	103.52
5. Crop Consulting	6.00
6. Crop Insurance	0.00
7. Drying	0.00
8. Miscellaneous	10.00
9. Custom Hire / Machinery Expense	113.00
10. Non-machinery Labor	12.77
11. Irrigation	
a. Labor	6.50
b. Fuel and Oil	36.00
c. Repairs and Maintenance	3.96
d. Depreciation on Equipment / Well	55.00
e. Interest on Equipment and Well	43.09
12. Land Charge / Rent	182.40
G. SUB TOTAL	\$605.99
13. Interest on 1/2 Nonland Costs	10.58
H. TOTAL COSTS	\$616.57

Table 4.107: Cost of wheat production in Kansas

4.6.1 DE KALB, IL

SIMULATED WEATHER

Figure 4.114, 4.115, 4.116 is the average temperature, precipitation simulated from MarkSim. Both maximum and the minimum temperature from the simulation raised along with decrease in cumulative rainfall over the soybean growing season, expect for RCP 2.6. The mean temperature during cotton season in Sioux county raises about 3°C whereas the cumulative precipitation dropped 3 inches for high emission scenario. Table A.6 shows the summary statistics of temperature and precipitation by RCPs. The historical average are from NCDC monthly normals[48].

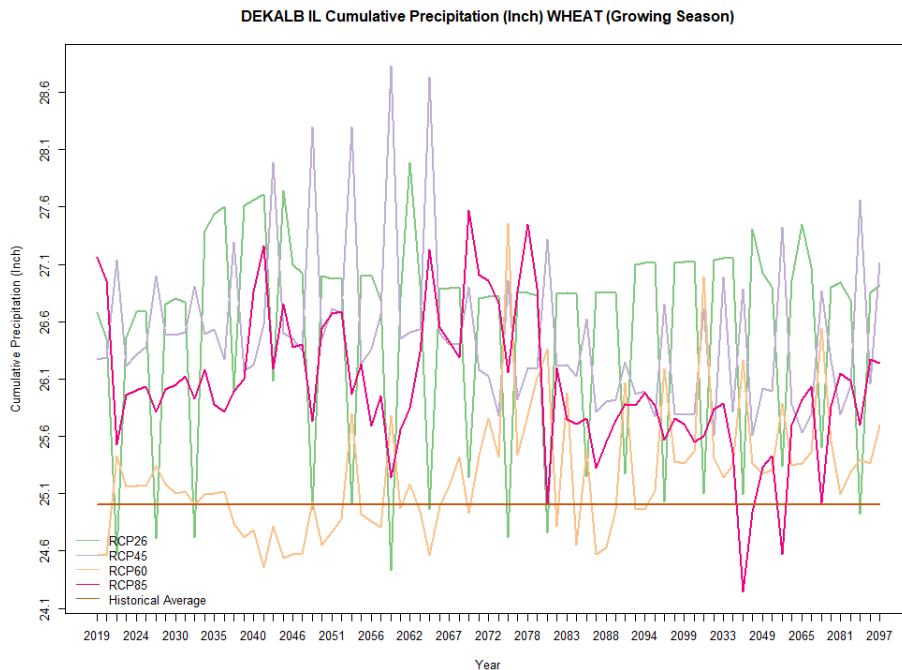


Figure 4.114: Cumulative Rainfall over Winter Wheat Season, De Kalb, IL

SIMULATED YIELD AND WATER USE BY IRRIGATION STRATEGIES

As figure 4.117 and 4.118 shows, for De Kalb county with 1 inches of water application the wheat yield increase 0.14 BU/ACRE on average. The simulated rain-fed yield at 2099

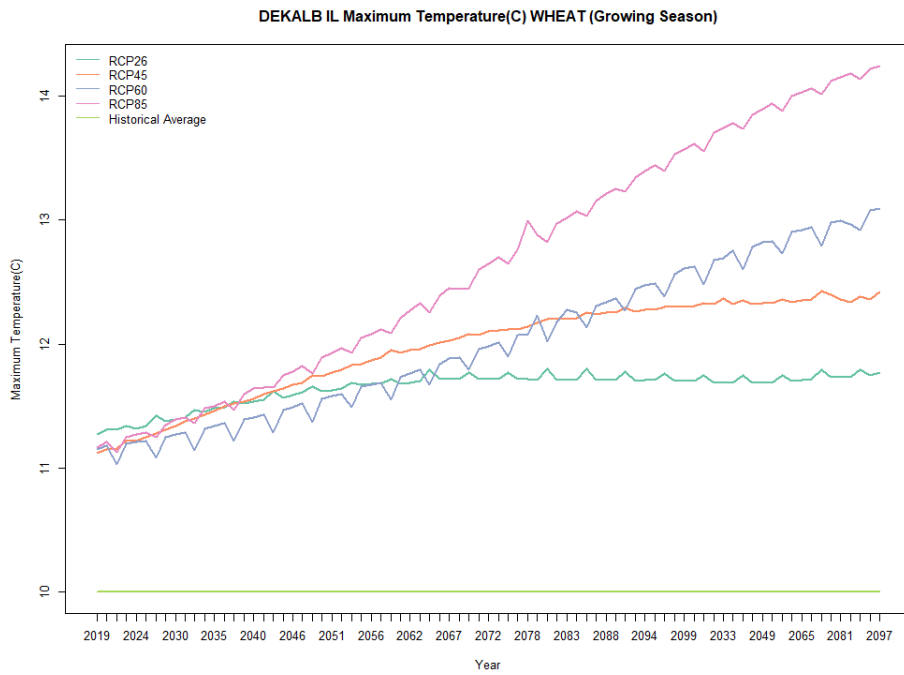


Figure 4.115: Average Maximum Temperature over Winter Wheat Season, De Kalb, IL

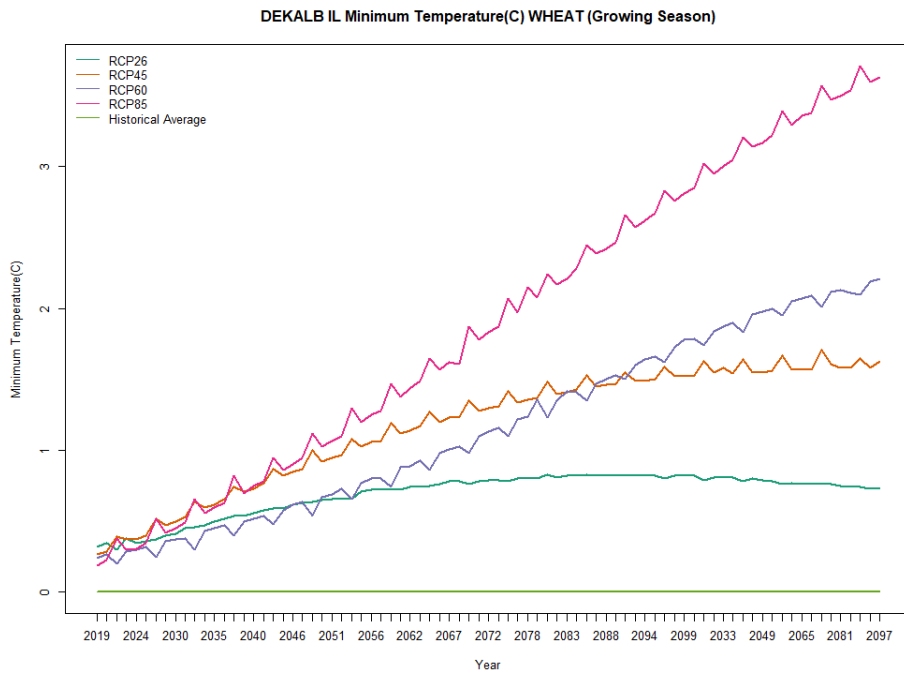
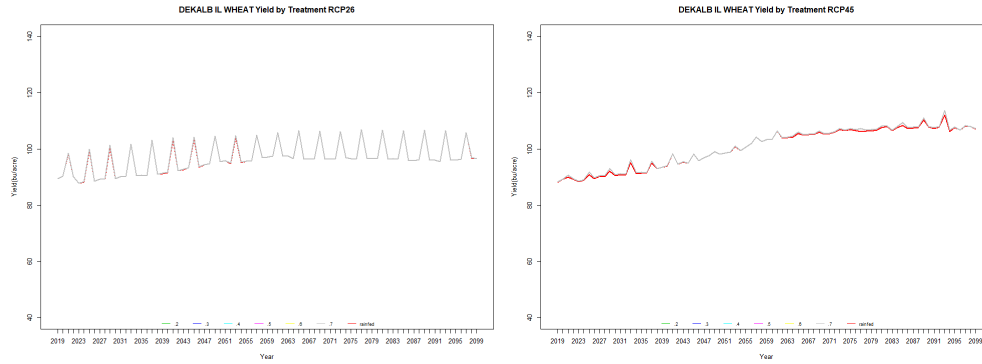
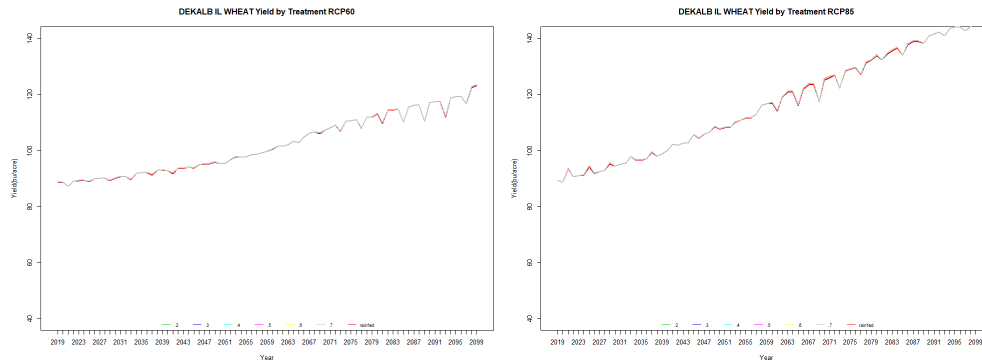


Figure 4.116: Average Minimum Temperature over Winter Wheat Season, De Kalb, IL

increases 7 BU/ACRE (7%) for RCP 2.6, increases 19 BU/ACRE (21%), 34 BU/ACRE (38%), 55 BU/ACRE (62%) for RCP 4.5, 6.0 and 8.5 respectively.

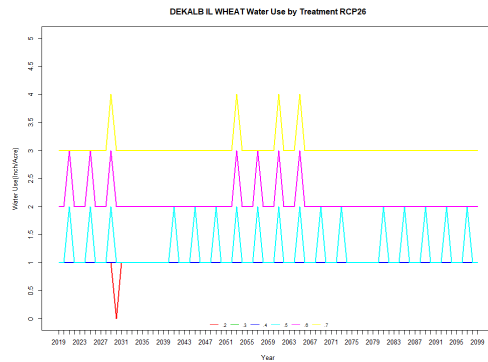


(a) Simulated Wheat Yield-RCP 2.6 (b) Simulated Wheat Yield-RCP 4.5

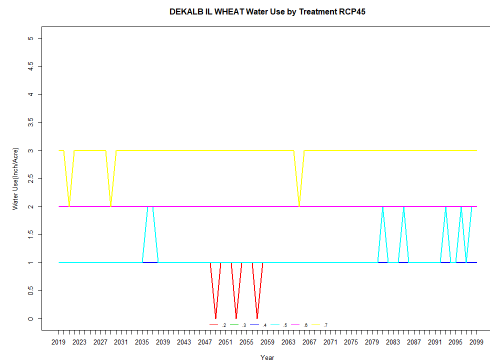


(c) Simulated Wheat Yield-RCP 6.0 (d) Simulated Wheat Yield-RCP 8.5

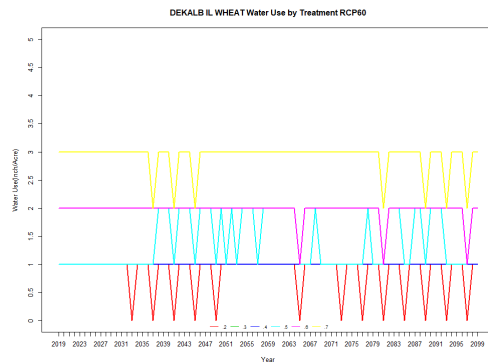
Figure 4.117: Average Simulated Yield by Treatment, De Kalb, IL, Wheat



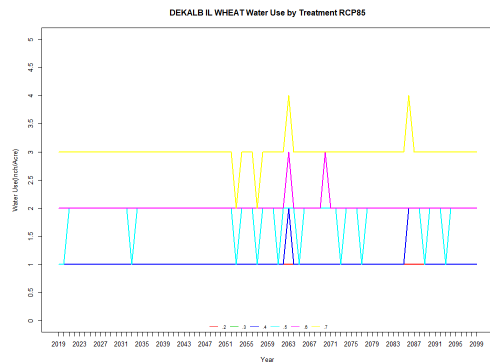
(a) Simulated Wheat Water Use Yield-RCP 2.6



(b) Simulated Wheat Water Use-RCP 4.5



(c) Simulated Wheat Water Use-RCP 6.0



(d) Simulated Wheat Water Use-RCP 8.5

Figure 4.118: Average Simulated Water Use by Treatment, De Kalb, IL, Wheat

MAXIMUM YIELD IRRIGATION STRATEGIES

Table 4.108 shows yield maximization irrigation strategy for De Kakb, IL wheat farmers, the yield maximizing strategy is always at .2 treatment, wheat farmers benefit from climate change due top increasing temperature.

Table 4.108: Yield Maximization Treatment, Sioux,IA, Soybean

Climate	Year	Irrigation Strategy	Yield(LB/ACRE)	Water Use(INCH/ACRE)
RCP 2.6	2018	.2	93.67	0.64
	2045	.2	117.44	8.68
	2072	.2	96.43	0.61
	2099	.2	96.55	0.64
RCP 4.5	2018	.2	88.27	0.64
	2045	.2	95.80	0.59
	2072	.2	106.20	0.72
	2099	.2	107.16	0.80
RCP 6.0	2018	.2	88.62	0.66
	2045	.2	95.00	0.71
	2072	.2	109.07	0.76
	2099	.2	123.39	0.93
RCP 8.5	2018	.2	89.45	0.69
	2045	.2	104.53	0.94
	2072	.2	127.06	1.11
	2099	.2	144.90	0.98

DIVERGENT WATER PRICE OF RISK NEUTRAL FARMERS

Table 4.109 shows the irr-rf water price in De Kalb, IL. The irr-rf water price is strictly increasing with output price and decreasing with year. Note the yield maximizing strategy is 0.2, y-p water price is the same as irr-rf water price and there is no other divergent water prices between other irrigation strategies.

Table 4.109: Divergent Water Price of Risk Netural Farmers(Y-P and I-R), Dekalb IL, Wheat

Year	Climate	Form	3.2	6	8.8
2018	RCP26	Irrigated - Rainfed	0.3	0.6	0.7
2045	RCP26	Irrigated - Rainfed	2.3	4.2	5.8
2072	RCP26	Irrigated - Rainfed	0.1	0.1	0.1
2099	RCP26	Irrigated - Rainfed	0.4	0.7	1.0
2018	RCP45	Irrigated - Rainfed	0.4	0.8	1.1
2045	RCP45	Irrigated - Rainfed	0.1	0.1	0.1
2072	RCP45	Irrigated - Rainfed	1.2	2.1	2.9
2099	RCP45	Irrigated - Rainfed	0.7	0.4	0.5
2018	RCP60	Irrigated - Rainfed	1.5	2.7	3.7
2045	RCP60	Irrigated - Rainfed	0.2	0.3	0.4
2072	RCP60	Irrigated - Rainfed	1.2	2.2	3.0
2099	RCP60	Irrigated - Rainfed	0.1	0.1	0.1
2018	RCP85	Irrigated - Rainfed	0.1	0.1	0.1
2045	RCP85	Irrigated - Rainfed	0.7	1.2	1.6
2072	RCP85	Irrigated - Rainfed	0.7	1.2	1.6
2099	RCP85	Irrigated - Rainfed	0.1	0.1	0.1

DIVERGENT WATER PRICE FOR RISK AVERSE FARMERS

Table 4.110 shows the changes between irr-rf water price of risk averse farmer, it is strictly increasing with output price and decreasing with years.

Table 4.110: Divergent Water Price of Risk Averse Farmers (I-R) ,DEKALB ,IL ,WHEAT

Year	Climate	Form	3.2	6	8.8
2018	RCP26	Irrigated - Rainfed	0.3	0.6	0.8

2045	RCP26	Irrigated - Rainfed	2.2	3.7	4.9
2072	RCP26	Irrigated - Rainfed	0.1	0.1	0.1
2099	RCP26	Irrigated - Rainfed	0.3	0.5	0.6
2018	RCP45	Irrigated - Rainfed	0.4	0.5	0.6
2045	RCP45	Irrigated - Rainfed	0.1	0.1	0.1
2072	RCP45	Irrigated - Rainfed	1.0	1.6	2.0
2099	RCP45	Irrigated - Rainfed	0.2	0.3	0.4
2018	RCP60	Irrigated - Rainfed	0.1	0.1	0.2
2045	RCP60	Irrigated - Rainfed	1.3	1.6	2.7
2072	RCP60	Irrigated - Rainfed	0.2	0.2	0.3
2099	RCP60	Irrigated - Rainfed	1.1	1.4	2.4
2018	RCP85	Irrigated - Rainfed	0.1	0.1	0.1
2045	RCP85	Irrigated - Rainfed	0.6	0.7	1.2
2072	RCP85	Irrigated - Rainfed	0.7	0.8	1.5
2099	RCP85	Irrigated - Rainfed	0.1	0.1	0.1

Table 4.111 to table 4.114 focus on the difference between risk aversion coefficient.

Table 4.111: Divergent Water Price for Risk Averse Farmers ,DEKALB ,IL ,WHEAT

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2019	rainfed	0.2	89.43	0	0.30	0.30	0.30	0.69	3.40
2046	rainfed	0.2	93.57	0	0.50	0.50	0.40	0.64	3.40
2099	rainfed	0.2	96.48	0	0.40	0.30	0.30	0.64	3.40
2019	rainfed	0.2	89.43	0	0.60	0.60	0.60	0.69	6.20
2046	rainfed	0.2	93.57	0	0.80	0.70	0.50	0.64	6.20
2099	rainfed	0.2	96.48	0	0.60	0.50	0.30	0.64	6.20
2019	rainfed	0.2	89.43	0	0.80	0.80	1.00	0.69	8.60

2046	rainfed	0.2	93.57	0	1.00	0.90	0.50	0.64	8.60
2099	rainfed	0.2	96.48	0	0.70	0.60	0.30	0.64	8.60

Table 4.112: Divergent Water Price for Risk Averse Farmers ,DEKALB ,IL ,WHEAT

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2019	rainfed	0.2	88.19	0	0.40	0.30	0.30	0.64	3.40
2072	rainfed	0.2	105.97	0	1.00	1.00	0.80	0.72	3.40
2099	rainfed	0.2	107.12	0	0.20	0.20	0.20	0.80	3.40
2019	rainfed	0.2	88.19	0	0.50	0.40	0.30	0.64	6.20
2072	rainfed	0.2	105.97	0	1.60	1.40	1.00	0.72	6.20
2099	rainfed	0.2	107.12	0	0.30	0.30	0.20	0.80	6.20
2019	rainfed	0.2	88.19	0	0.60	0.50	0.20	0.64	8.60
2072	rainfed	0.2	105.97	0	2.00	1.70	1.00	0.72	8.60
2099	rainfed	0.2	107.12	0	0.40	0.30	0.20	0.80	8.60

Table 4.113: Divergent Water Price for Risk Averse Farmers ,DEKALB ,IL ,WHEAT

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2019	rainfed	0.2	88.60	0	0.10	0.10	0.10	0.66	3.40
2046	rainfed	0.2	94.95	0	0.30	0.30	0.20	0.71	3.40
2072	rainfed	0.2	109.03	0	0.20	0.20	0.20	0.76	3.40
2099	rainfed	0.2	123.07	0	1.10	1.10	1.00	0.93	3.40
2019	rainfed	0.2	88.60	0	0.20	0.20	0.10	0.66	6.20
2046	rainfed	0.2	94.95	0	0.40	0.40	0.30	0.71	6.20
2072	rainfed	0.2	109.03	0	0.30	0.20	0.20	0.76	6.20
2099	rainfed	0.2	123.07	0	1.90	1.70	1.30	0.93	6.20
2019	rainfed	0.2	88.60	0	0.20	0.20	0.10	0.66	8.60
2046	rainfed	0.2	94.95	0	0.50	0.40	0.30	0.71	8.60
2072	rainfed	0.2	109.03	0	0.30	0.30	0.20	0.76	8.60
2099	rainfed	0.2	123.07	0	2.40	2.20	1.40	0.93	8.60

Table 4.114: Divergent Water Price for Risk Averse Farmers ,DEKALB ,IL ,WHEAT

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2019	rainfed	0.2	89.44	0	0.10	0.10	0.10	0.69	3.40
2065	rainfed	0.2	115.93	0	1.30	1.20	1.00	0.85	3.40
2088	rainfed	0.2	138.70	0	1.20	1.20	1.10	1.15	3.40
2019	rainfed	0.2	89.44	0	0.10	0.10	0.10	0.69	6.20
2065	rainfed	0.2	115.93	0	2.00	1.80	1.20	0.85	6.20
2088	rainfed	0.2	138.70	0	2.00	1.90	1.60	1.15	6.20
2019	rainfed	0.2	89.44	0	0.10	0.10	0.10	0.69	8.60
2065	rainfed	0.2	115.93	0	2.50	2.20	1.10	0.85	8.60
2088	rainfed	0.2	138.70	0	2.60	2.50	1.70	1.15	8.60

4.6.2 MORTON, KS

SIMULATED WEATHER

Figure 4.119, 4.120, 4.121 is the average temperature, precipitation simulated from MarkSim. Both maximum and the minimum temperature from the simulation raised along with decrease in cumulative rainfall over the wheat growing season, expect for RCP 2.6. The mean temperature during cotton season in Sioux county raises about 3°C whereas the cumulative precipitation dropped 3 inches for high emission secnario. Table ?? shows the summary statistics of temperature and precipitation by RCPs. The historical average are from NCDC monthly normals[48].

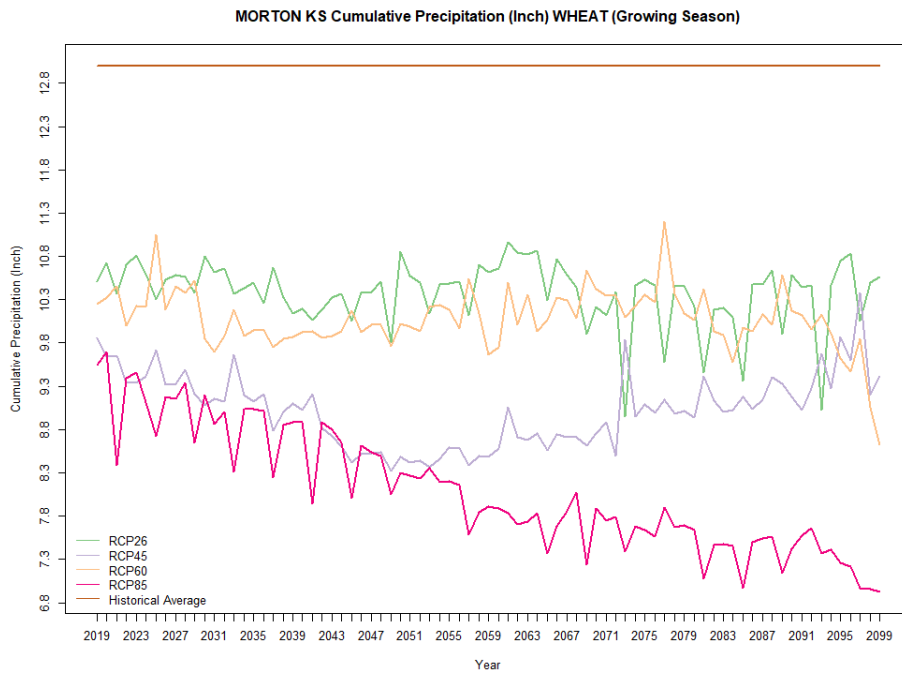


Figure 4.119: Cumulative Rainfall over Winter Wheat Season, Morton, KS

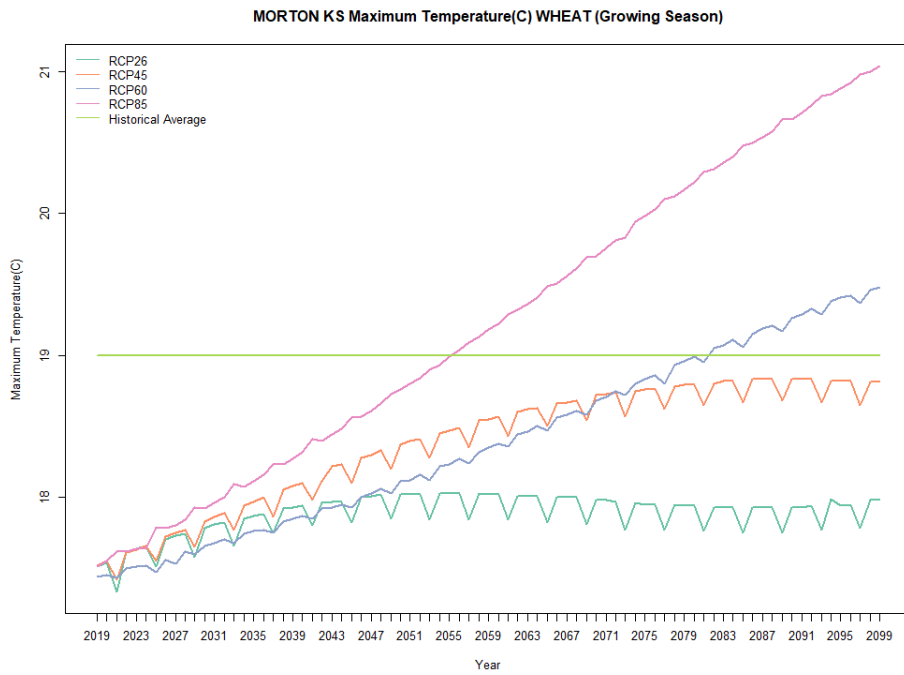


Figure 4.120: Average Maximum Temperature over Winter Wheat Season, Morton, KS

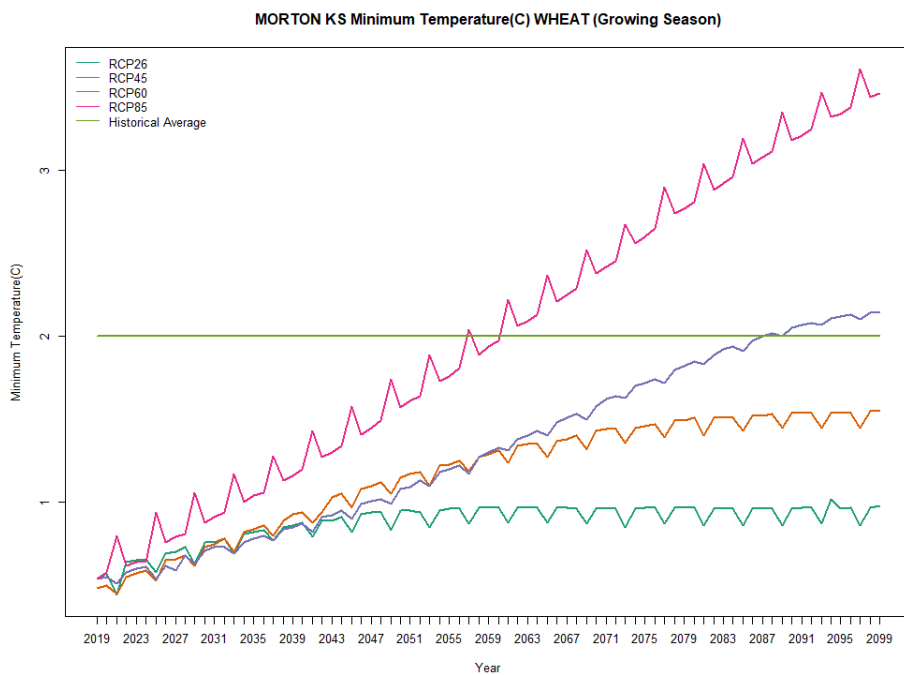
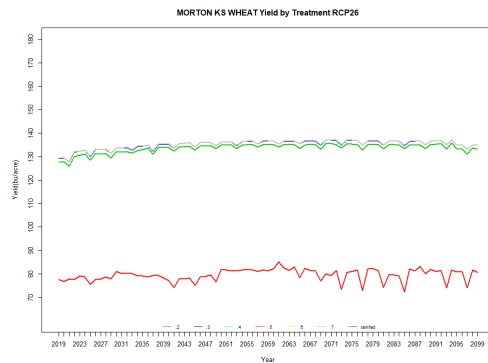


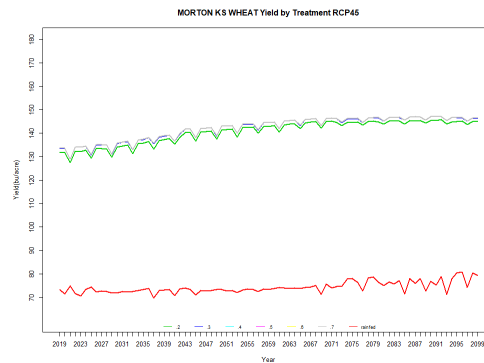
Figure 4.121: Average Minimum Temperature over Winter Wheat Season, Morton, KS

SIMULATED YIELD AND WATER USE BY IRRIGATION STRATEGIES

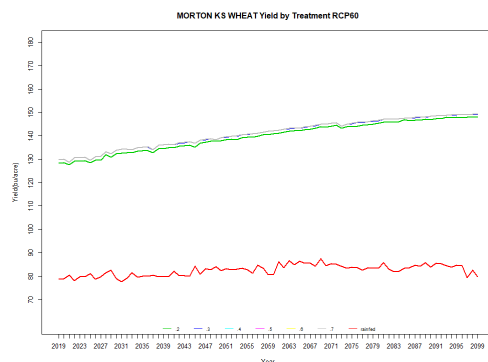
As figure 4.122 and 4.123 shows, for Morton county with 9.5 inches of water application the wheat yield increase 62 BU/ACRE on average. The simulated rain-fed yield at 2099 increases 3 BU/ACRE (3%) for RCP 2.6, increases 6 BU/ACRE (8%), for RCP 4.5, 2 BU/ACRE (2%) for RCP 6.0 and 10.13 BU/ACRE(14%) for RCP 8.5 respectively.



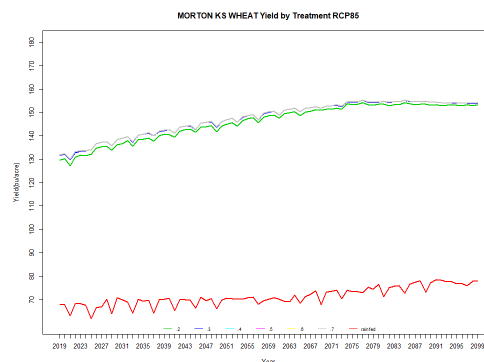
(a) Simulated Wheat Yield-RCP 2.6



(b) Simulated Wheat Yield-RCP 4.5

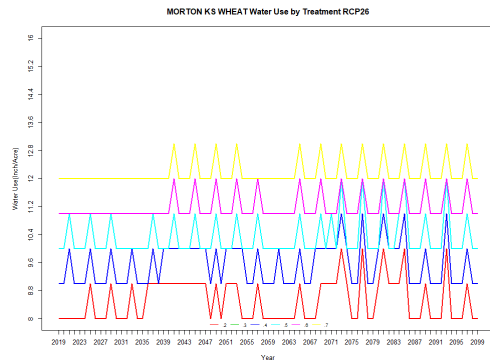


(c) Simulated Wheat Yield-RCP 6.0

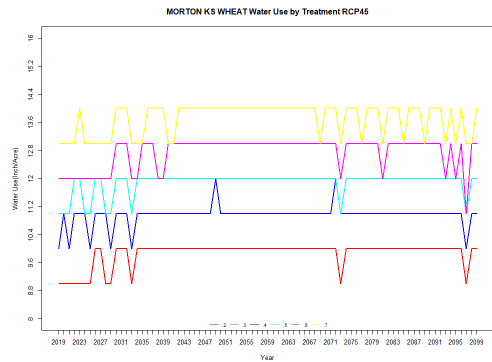


(d) Simulated Wheat Yield-RCP 8.5

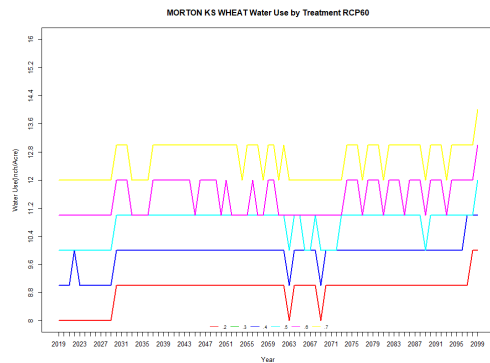
Figure 4.122: Average Simulated Yield by Treatment, , Morton, KS Wheat



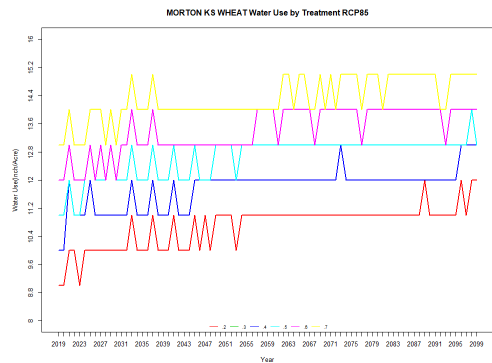
(a) Simulated Wheat Water Use Yield-RCP 2.6



(b) Simulated Wheat Water Use-RCP 4.5



(c) Simulated Wheat Water Use-RCP 6.0



(d) Simulated Wheat Water Use-RCP 8.5

Figure 4.123: Average Simulated Water Use by Treatment, Morton, KS, Wheat

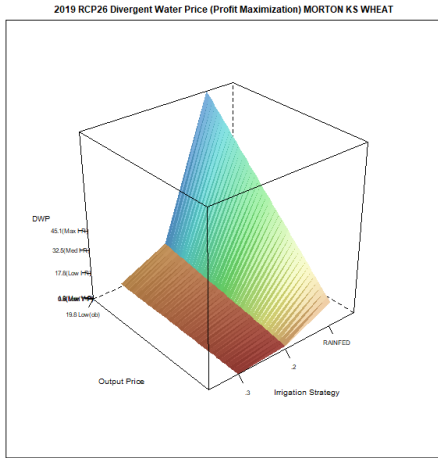
MAXIMUM YIELD IRRIGATION STRATEGIES

Table 4.115 shows yield maximization irrigation strategy for De Kakk, IL wheat farmers, the yield maximizing strategy is always at .4 treatment, wheat farmers benefit from climate change due to increasing temperature.

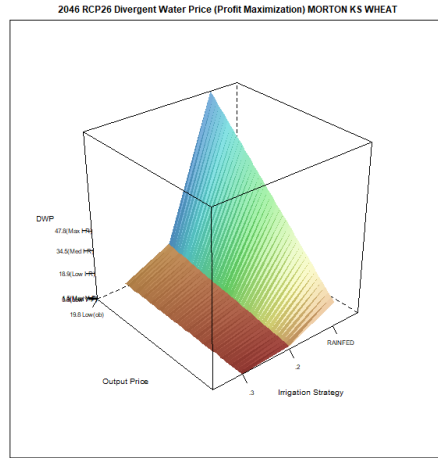
Table 4.115: Yield Maximization Treatment, Morton, KS, Wheat

Climate	Year	Irrigation Strategy	Yield(LB/ACRE)	Water Use(INCH/ACRE)
RCP 2.6	2018	.4	129.28	9.87
	2045	.4	136.05	10.33
	2072	.4	136.93	10.29
	2099	.4	134.91	9.95
RCP 4.5	201	.4	133.75	11.23
	2045	.4	141.99	12.20
	2072	.4	146.26	12.38
	2099	.4	146.35	11.81
RCP 6.0	2018	.4	129.77	10.03
	2045	.4	138.15	10.84
	2072	.4	145.59	10.35
	2099	.4	149.15	11.88
RCP 8.5	2018	.4	131.84	11.32
	2045	.4	145.39	12.34
	2072	.4	153.17	12.98
	2099	.4	154.06	13.46

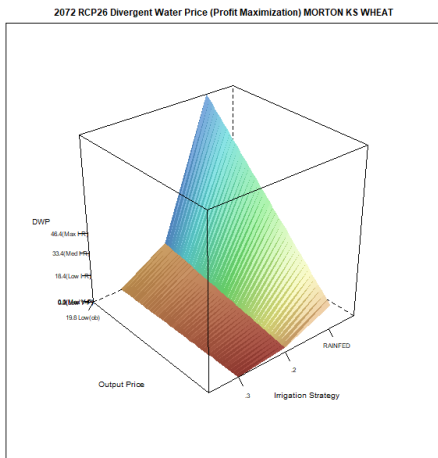
DIVERGENT WATER PRICE OF RISK NEUTRAL FARMERS



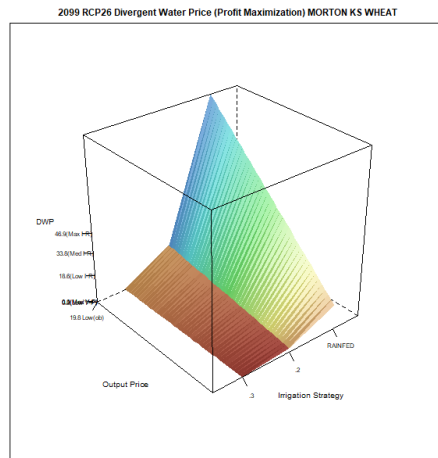
(a) 2019



(b) 2046

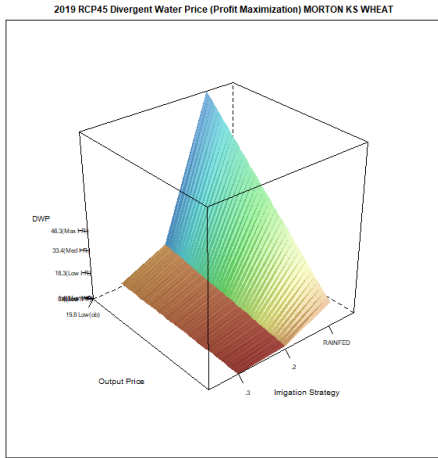


(c) 2072

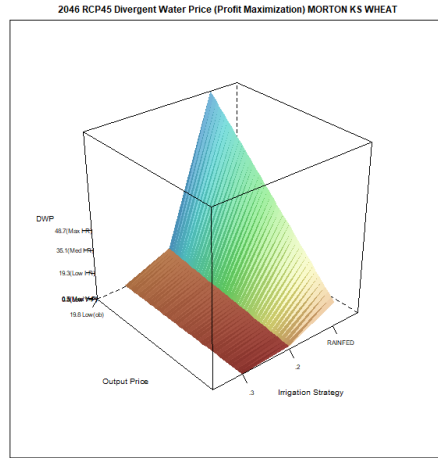


(d) 2099

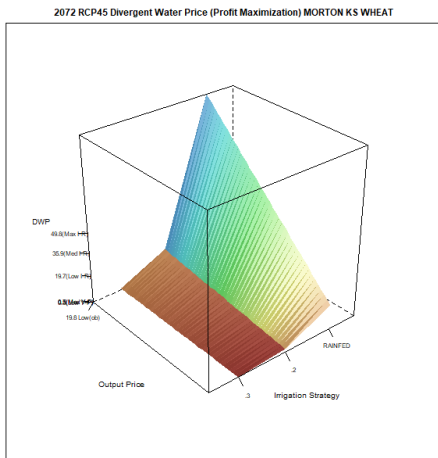
Figure 4.124: Divergent water price of profit maximizing farmers by irrigation strategies, Morton, KS, Wheat, RCP 2.6



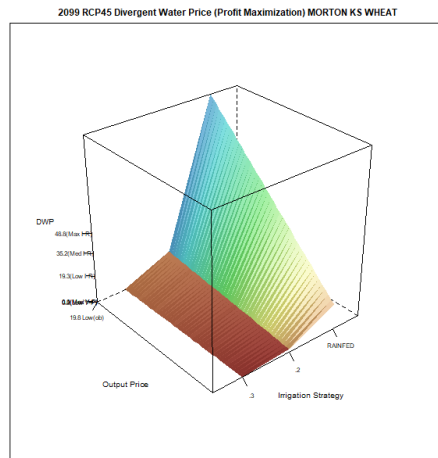
(a) 2019



(b) 2046

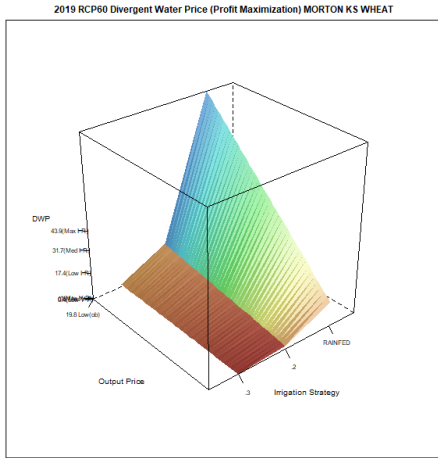


(c) 2072

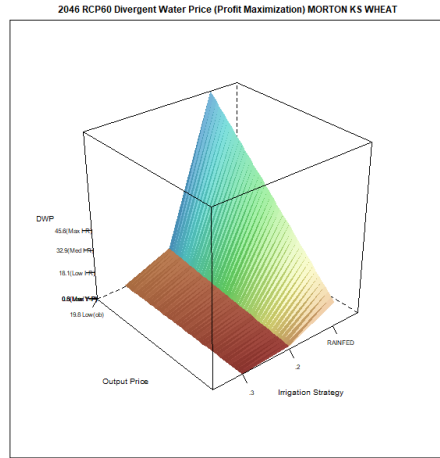


(d) 2099

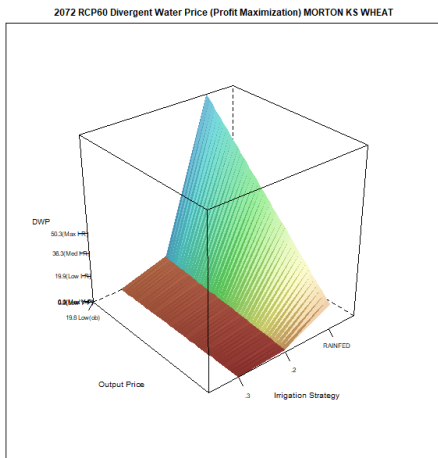
Figure 4.125: Divergent water price profit maximizing farmers by irrigation strategies, Morton, KS, Wheat, RCP 4.5



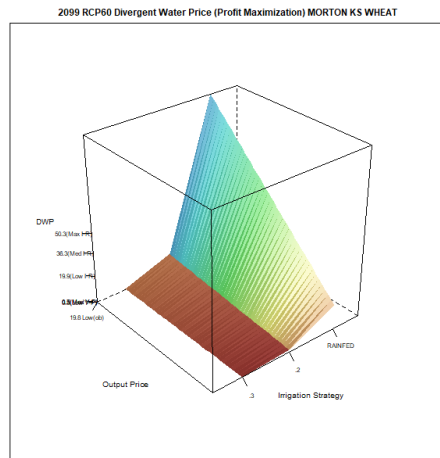
(a) 2019



(b) 2046

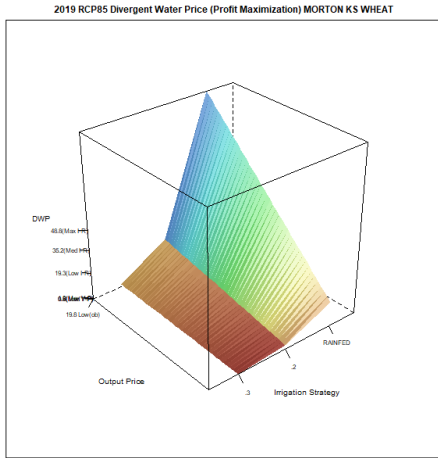


(c) 2072

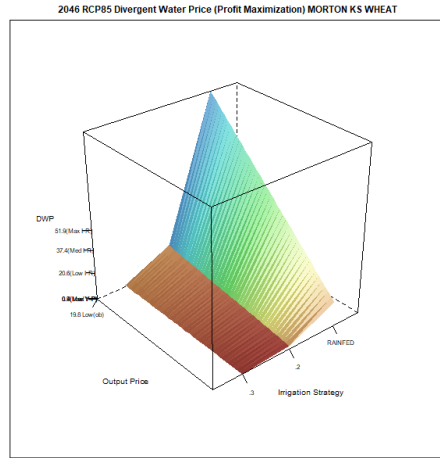


(d) 2099

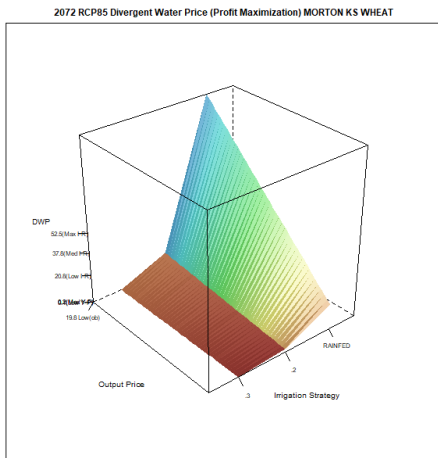
Figure 4.126: Divergent water price of profit maximizing farmers by irrigation strategies, Morton, KS, Wheat, RCP 6.0



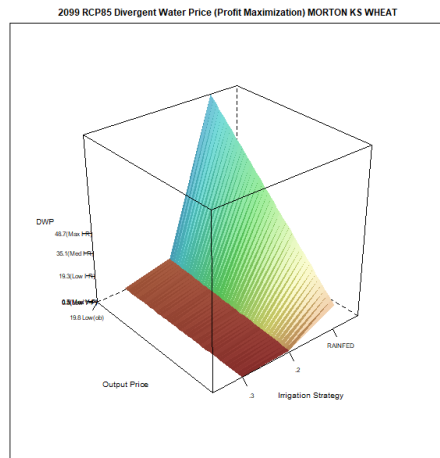
(a) 2019



(b) 2046



(c) 2072



(d) 2099

Figure 4.127: Divergent water price of profit maximizing farmers by irrigation strategies, Morton, KS, Wheat, RCP 8.5

Table 4.116 shows the y-p and irr-rf water price for Morton, KS wheat, all y-p water price are below \$1.5, for low and mid-low emission scenarios, y-p price is decreasing with time. For mid and high emission scenarios, the y-p water price is lowest at 2072(wet year). The yield increase is small between .2 - .4 strategy, but the yield increase a lot between rainfed to .2 and all y-p divergent water prices are below \$1.5. so the section focus on irr-rf water price.

Table 4.116: Divergent Water Price of Risk Netural Farmers(Y-P and I-R), Morton,KS, Wheat

Year	Climate	Form	3.4	6.2	8.6
2019	RCP26	Yield - Profit	0.50	0.90	1.20
2046	RCP26	Yield - Profit	0.60	1.10	1.50
2072	RCP26	Yield - Profit	0.20	0.30	0.40
2099	RCP26	Yield - Profit	0.20	0.30	0.40
2019	RCP45	Yield - Profit	0.60	1.00	1.40
2046	RCP45	Yield - Profit	0.30	0.50	0.70
2072	RCP45	Yield - Profit	0.30	0.50	0.70
2099	RCP45	Yield - Profit	0.20	0.30	0.40
2019	RCP60	Yield - Profit	0.40	0.80	1.00
2046	RCP60	Yield - Profit	0.30	0.50	0.60
2072	RCP60	Yield - Profit	0.20	0.30	0.40
2099	RCP60	Yield - Profit	0.30	0.50	0.70
2019	RCP85	Yield - Profit	0.50	0.90	1.20
2046	RCP85	Yield - Profit	0.40	0.70	0.90
2072	RCP85	Yield - Profit	0.10	0.20	0.20
2099	RCP85	Yield - Profit	0.30	0.50	0.70
2019	RCP26	Irrigated - Rainfed	17.80	32.50	45.10
2046	RCP26	Irrigated - Rainfed	18.90	34.50	47.80

2072	RCP26	Irrigated - Rainfed	18.40	33.40	46.40
2099	RCP26	Irrigated - Rainfed	18.60	33.80	46.90
2019	RCP45	Irrigated - Rainfed	18.30	33.40	46.30
2046	RCP45	Irrigated - Rainfed	19.30	35.10	48.70
2072	RCP45	Irrigated - Rainfed	19.70	35.90	49.80
2099	RCP45	Irrigated - Rainfed	19.30	35.20	48.80
2019	RCP60	Irrigated - Rainfed	17.40	31.70	43.90
2046	RCP60	Irrigated - Rainfed	18.10	32.90	45.60
2072	RCP60	Irrigated - Rainfed	19.90	36.30	50.30
2099	RCP60	Irrigated - Rainfed	19.90	36.30	50.30
2019	RCP85	Irrigated - Rainfed	19.30	35.20	48.80
2046	RCP85	Irrigated - Rainfed	20.60	37.40	51.90
2072	RCP85	Irrigated - Rainfed	20.80	37.80	52.50
2099	RCP85	Irrigated - Rainfed	19.30	35.10	48.70

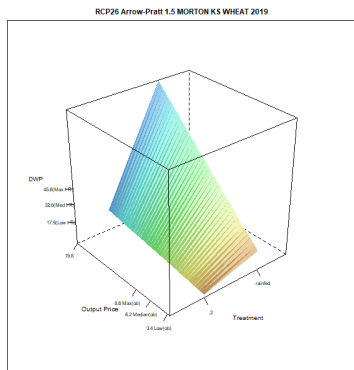
Table 4.117 shows the divergent water price of irr-rf water price, for most emission scenario, the irr-rf water prices are higher at 2099. The change between water prices are below \$5.

DIVERGENT WATER PRICE FOR RISK AVERSE FARMERS

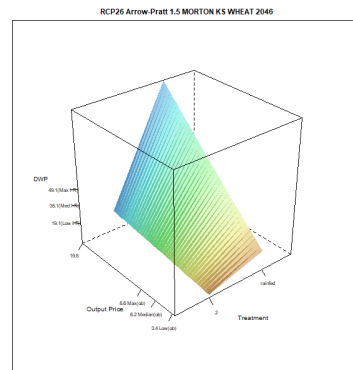
Figure 4.128, 4.129, 4.130 and 4.131 shows the divergent water price for risk averse farmers by irrigation strategies. The low(ob), medium(ob) and max(ob) in the y-axis are low, medium and maximum observed 30 years historical wheat price from USDA survey. The low, median and max on the z axis are the divergent water price(y-p, irr-rf) associate with each observed low, median and high output price.

Table 4.117: Difference between divergent water price for risk neutral farmer, MORTON, KS, WHEAT

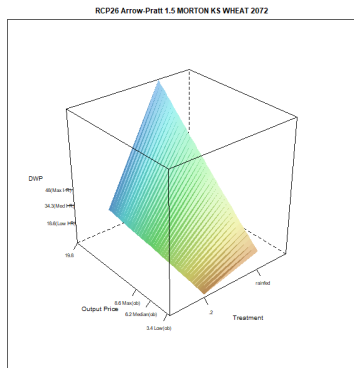
Climate	TR2018	TR2099	Output Price	2018DWP	2099DWP	Diff
rcp26	RAINFED	RAINFED	3.40	17.80	18.60	0.80
rcp26	RAINFED	RAINFED	6.20	32.50	33.80	1.3
rcp26	RAINFED	RAINFED	8.60	45.10	46.90	1.8
rcp45	RAINFED	RAINFED	3.40	18.30	19.30	1
rcp45	RAINFED	RAINFED	6.20	33.40	35.20	1.8
rcp45	RAINFED	RAINFED	8.60	46.30	48.80	2.5
rcp60	RAINFED	RAINFED	3.40	17.40	19.90	2.5
rcp60	RAINFED	RAINFED	6.20	31.70	36.30	4.6
rcp60	RAINFED	RAINFED	8.60	43.90	50.30	6.4
rcp85	RAINFED	RAINFED	3.40	19.30	19.30	0
rcp85	RAINFED	RAINFED	6.20	35.20	35.10	-0.1
rcp85	RAINFED	RAINFED	8.60	48.80	48.70	-0.10



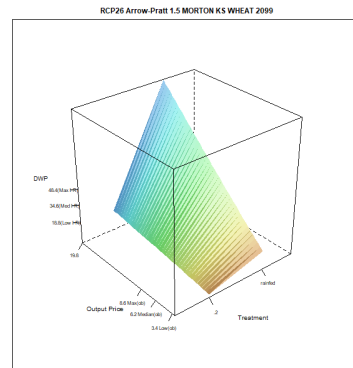
(a) 2018



(b) 2045

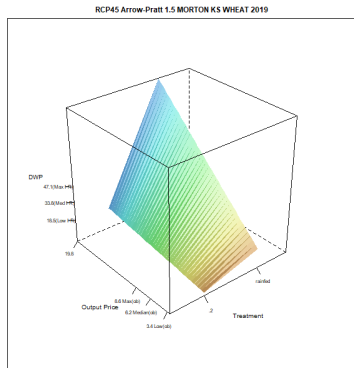


(c) 2072

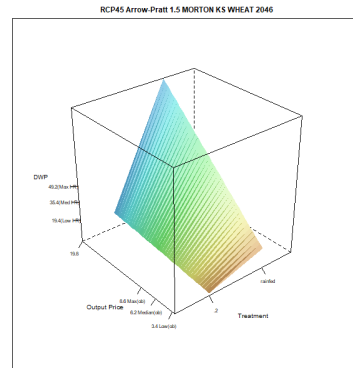


(d) 2099

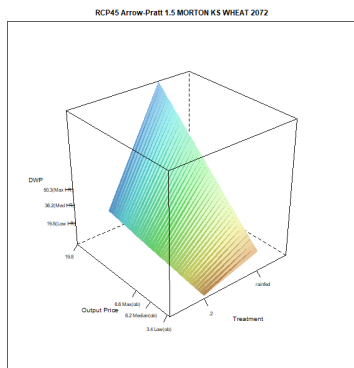
Figure 4.128: Divergent water price for utility maximizing farmers by irrigation strategies, De Kalb, IL, Wheat, RCP 2.6



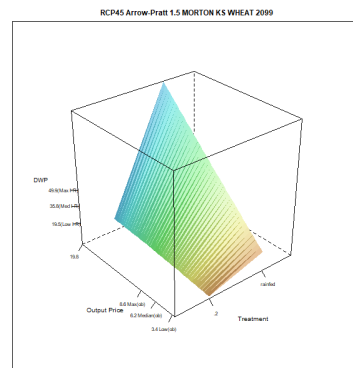
(a) 2018



(b) 2045

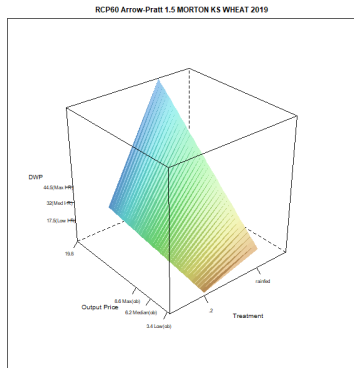


(c) 2072

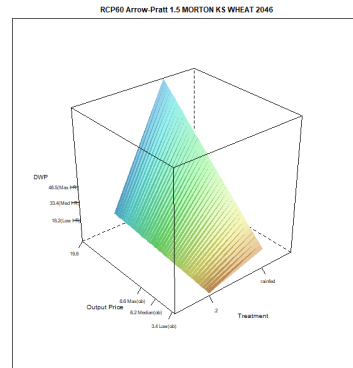


(d) 2099

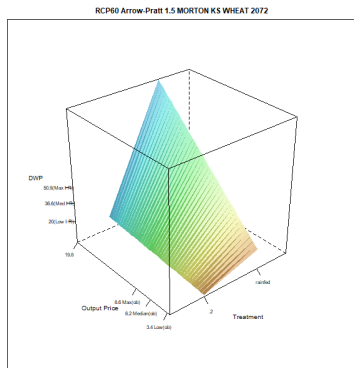
Figure 4.129: Divergent water price for utility maximizing farmers by irrigation strategies, De Kalb, IL, Wheat, RCP 4.5



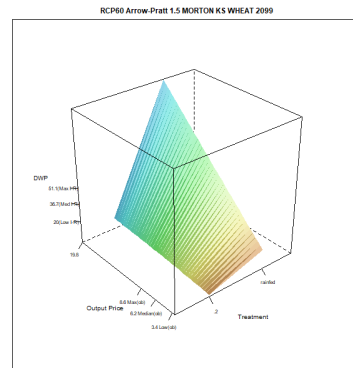
(a) 2018



(b) 2045

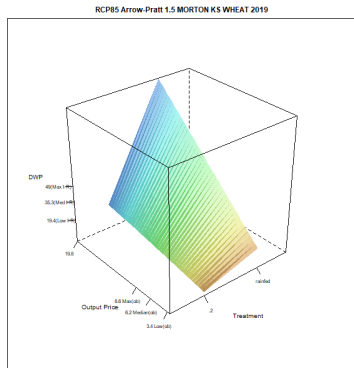


(c) 2072

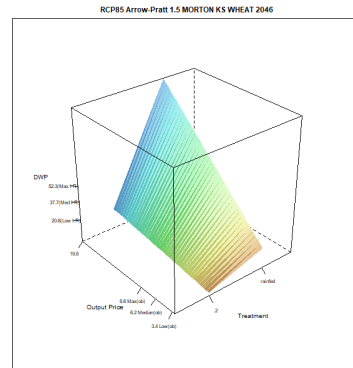


(d) 2099

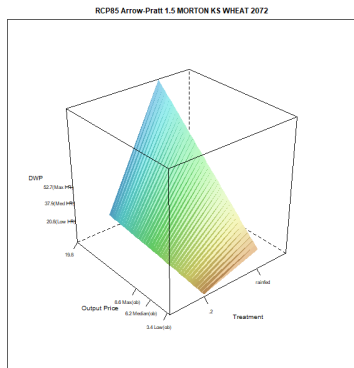
Figure 4.130: Divergent Water price for utility maximizing farmers by irrigation strategies, De Kalb, IL, Wheat, RCP 6.0



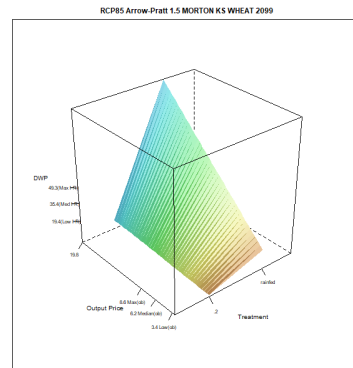
(a) 2018



(b) 2045



(c) 2072



(d) 2099

Figure 4.131: Divergent water price for utility maximizing farmers by irrigation strategies, De Kalb, IL, Wheat, RCP 8.5

Table 4.118 shows the y=p and irr-rf water price of risk averse farmers, again, the water price of y-p are low \$2 and the yield difference between .2-.4 irrigation strategies is very small.

Table 4.118: Divergent Water Price of Risk Averse Farmers (Y-P and I-R) ,MORTON ,KS ,WHEAT

Year	Climate	Form	3.4	6.2	8.6
2019	RCP26	Yield - Profit	0.50	0.90	1.20
2046	RCP26	Yield - Profit	0.60	1.10	1.60
2072	RCP26	Yield - Profit	0.20	0.30	0.40
2099	RCP26	Yield - Profit	0.20	0.30	0.40
2019	RCP45	Yield - Profit	0.60	1.10	1.60
2046	RCP45	Yield - Profit	0.30	0.50	0.70
2072	RCP45	Yield - Profit	0.30	0.50	0.70
2099	RCP45	Yield - Profit	0.20	0.30	0.30
2019	RCP60	Yield - Profit	0.40	0.70	1.00
2046	RCP60	Yield - Profit	0.30	0.50	0.60
2072	RCP60	Yield - Profit	0.20	0.30	0.40
2099	RCP60	Yield - Profit	0.30	0.60	0.80
2019	RCP85	Yield - Profit	0.50	1.00	1.30
2046	RCP85	Yield - Profit	0.40	0.70	1.10
2072	RCP85	Yield - Profit	0.10	0.20	0.20
2099	RCP85	Yield - Profit	0.30	0.50	0.70
2019	RCP26	Irrigated - Rainfed	17.90	32.80	45.60
2046	RCP26	Irrigated - Rainfed	19.10	35.10	49.10
2072	RCP26	Irrigated - Rainfed	18.60	34.30	48.00
2099	RCP26	Irrigated - Rainfed	18.80	34.60	48.40
2019	RCP45	Irrigated - Rainfed	18.50	33.80	47.10

2046	RCP45	Irrigated - Rainfed	19.40	35.40	49.20
2072	RCP45	Irrigated - Rainfed	19.80	36.20	50.30
2099	RCP45	Irrigated - Rainfed	19.50	35.80	49.90
2019	RCP60	Irrigated - Rainfed	17.50	32.00	44.50
2046	RCP60	Irrigated - Rainfed	18.20	33.40	46.50
2072	RCP60	Irrigated - Rainfed	20.00	36.60	50.90
2099	RCP60	Irrigated - Rainfed	20.00	36.70	51.10
2019	RCP85	Irrigated - Rainfed	19.40	35.30	49.00
2046	RCP85	Irrigated - Rainfed	20.60	37.70	52.30
2072	RCP85	Irrigated - Rainfed	20.80	37.90	52.70
2099	RCP85	Irrigated - Rainfed	19.40	35.40	49.30

Table 4.119 shows the irr-rf water price at 2018 and 2099. The differences are less than \$6 per acre inch.

Table 4.119: Difference between divergent water price of risk averse farmers ,MORTON ,KS ,WHEAT

Climate	TR2018	TR2099	OP	2018DWP	2099DWP	Diff
rcp26	rainfed	rainfed	3.40	17.90	18.80	0.90
rcp26	rainfed	rainfed	6.20	32.80	34.60	1.80
rcp26	rainfed	rainfed	8.60	45.60	48.40	2.80
rcp45	rainfed	rainfed	3.40	18.50	19.50	1.00
rcp45	rainfed	rainfed	6.20	33.80	35.80	2.00
rcp45	rainfed	rainfed	8.60	47.10	49.90	2.80
rcp60	rainfed	rainfed	3.40	17.50	20.00	2.50
rcp60	rainfed	rainfed	6.20	32.00	36.70	4.70
rcp60	rainfed	rainfed	8.60	44.50	51.10	6.60
rcp85	rainfed	rainfed	3.40	19.40	19.40	0.00
rcp85	rainfed	rainfed	6.20	35.30	35.40	0.10
rcp85	rainfed	rainfed	8.60	49.00	49.30	0.30

Table 4.120, 4.122, 4.124, 4.126 shows similar information as table 4.119, in addition with difference in water use and difference between risk aversion levels.

Table 4.120: Divergent Water Price for Risk Averse Farmers ,MORTON ,KS ,WHEAT

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2019	rainfed	0.4	77.64	0.00	17.90	18.00	18.10	9.87	3.40
2046	rainfed	0.4	78.72	0.00	19.10	19.20	19.50	10.33	3.40
2072	rainfed	0.4	81.54	0.00	18.60	18.70	19.00	10.29	3.40
2099	rainfed	0.4	80.69	0.00	18.80	18.90	19.20	9.95	3.40
2019	rainfed	0.4	77.64	0.00	32.80	32.90	33.20	9.87	6.20
2046	rainfed	0.4	78.72	0.00	35.10	35.40	36.10	10.33	6.20
2072	rainfed	0.4	81.54	0.00	34.30	34.60	35.50	10.29	6.20
2099	rainfed	0.4	80.69	0.00	34.60	34.90	35.80	9.95	6.20
2019	rainfed	0.4	77.64	0.00	45.60	45.80	46.30	9.87	8.60
2046	rainfed	0.4	78.72	0.00	49.10	49.40	50.70	10.33	8.60
2072	rainfed	0.4	81.54	0.00	48.00	48.50	50.10	10.29	8.60
2099	rainfed	0.4	80.69	0.00	48.40	48.90	50.40	9.95	8.60

RISK NETURAL V.S RISK AVERSE FARMERS

Table 4.121, 4.123, 4.125, 4.127 compared the difference of divergent water prices between wheat farmers in De Kalb at holding irrigation strategies the same. The irr-rf water price of risk averse farmers are always higher than risk neutral farmers, but the differences within \$1.

Table 4.121: Divergent water price for risk neutral v.s. averse farmers ,MORTON ,KS ,WHEAT ,RCP26

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2019	rainfed	17.80	-227.02	17.90	-227.02	3.40
2046	rainfed	18.90	-223.35	19.10	-223.35	3.40
2072	rainfed	18.40	-213.76	18.60	-213.76	3.40
2099	rainfed	18.60	-216.65	18.80	-216.65	3.40
2019	rainfed	32.50	-9.63	32.80	-9.63	6.20
2046	rainfed	34.50	-2.94	35.10	-2.94	6.20
2072	rainfed	33.40	14.55	34.30	14.55	6.20
2099	rainfed	33.80	9.28	34.60	9.28	6.20
2019	rainfed	45.10	176.70	45.60	176.70	8.60
2046	rainfed	47.80	185.99	49.10	185.99	8.60
2072	rainfed	46.40	210.24	48.00	210.24	8.60
2099	rainfed	46.90	202.93	48.40	202.93	8.60

Table 4.122: Divergent Water Price for Risk Averse Farmers ,MORTON ,KS ,WHEAT

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2019	rainfed	0.4	73.42	0.00	18.50	18.50	18.70	11.23	3.40
2046	rainfed	0.4	72.94	0.00	19.40	19.40	19.50	12.20	3.40
2072	rainfed	0.4	74.70	0.00	19.80	19.80	19.90	12.38	3.40
2099	rainfed	0.4	79.40	0.00	19.50	19.60	19.80	11.81	3.40
2019	rainfed	0.4	73.42	0.00	33.80	33.90	34.20	11.23	6.20
2046	rainfed	0.4	72.94	0.00	35.40	35.50	35.60	12.20	6.20
2072	rainfed	0.4	74.70	0.00	36.20	36.30	36.40	12.38	6.20
2099	rainfed	0.4	79.40	0.00	35.80	36.00	36.50	11.81	6.20
2019	rainfed	0.4	73.42	0.00	47.10	47.20	47.50	11.23	8.60

2046	rainfed	0.4	72.94	0.00	49.20	49.30	49.20	12.20	8.60
2072	rainfed	0.4	74.70	0.00	50.30	50.40	50.30	12.38	8.60
2099	rainfed	0.4	79.40	0.00	49.90	50.20	51.10	11.81	8.60

Table 4.123: Divergent water price for risk neutral v.s. averse farmers ,MORTON ,KS ,WHEAT ,RCP45

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2019	rainfed	18.30	-241.37	18.50	-241.37	3.40
2046	rainfed	19.30	-243.00	19.40	-243.00	3.40
2072	rainfed	19.70	-237.02	19.80	-237.02	3.40
2099	rainfed	19.30	-221.04	19.50	-221.04	3.40
2019	rainfed	33.40	-35.80	33.80	-35.80	6.20
2046	rainfed	35.10	-38.77	35.40	-38.77	6.20
2072	rainfed	35.90	-27.86	36.20	-27.86	6.20
2099	rainfed	35.20	1.28	35.80	1.28	6.20
2019	rainfed	46.30	140.41	47.10	140.41	8.60
2046	rainfed	48.70	136.28	49.20	136.28	8.60
2072	rainfed	49.80	151.42	50.30	151.42	8.60
2099	rainfed	48.80	191.84	49.90	191.84	8.60

Table 4.124: Divergent Water Price for Risk Averse Farmers ,MORTON ,KS ,WHEAT

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2019	rainfed	0.4	78.61	0.00	17.50	17.50	17.70	10.03	3.40
2046	rainfed	0.4	80.74	0.00	18.20	18.20	18.40	10.84	3.40
2072	rainfed	0.4	85.06	0.00	20.00	20.10	20.20	10.35	3.40
2099	rainfed	0.4	79.80	0.00	20.00	20.10	20.20	11.88	3.40
2019	rainfed	0.4	78.61	0.00	32.00	32.10	32.40	10.03	6.20
2046	rainfed	0.4	80.74	0.00	33.40	33.50	33.90	10.84	6.20
2072	rainfed	0.4	85.06	0.00	36.60	36.70	36.90	10.35	6.20
2099	rainfed	0.4	79.80	0.00	36.70	36.80	37.30	11.88	6.20
2019	rainfed	0.4	78.61	0.00	44.50	44.70	45.10	10.03	8.60
2046	rainfed	0.4	80.74	0.00	46.50	46.70	47.10	10.84	8.60
2072	rainfed	0.4	85.06	0.00	50.90	51.00	51.20	10.35	8.60
2099	rainfed	0.4	79.80	0.00	51.10	51.30	52.00	11.88	8.60

Table 4.125: Divergent water price for risk neutral v.s. averse farmers ,MORTON ,KS
,WHEAT ,RCP60

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2019	rainfed	17.40	-223.73	17.50	-223.73	3.40
2046	rainfed	18.10	-216.48	18.20	-216.48	3.40
2072	rainfed	19.90	-201.80	20.00	-201.80	3.40
2099	rainfed	19.90	-219.68	20.00	-219.68	3.40
2019	rainfed	31.70	-3.62	32.00	-3.62	6.20
2046	rainfed	32.90	9.59	33.40	9.59	6.20
2072	rainfed	36.30	36.37	36.60	36.37	6.20
2099	rainfed	36.30	3.76	36.70	3.76	6.20
2019	rainfed	43.90	185.05	44.50	185.05	8.60
2046	rainfed	45.60	203.36	46.50	203.36	8.60
2072	rainfed	50.30	240.52	50.90	240.52	8.60
2099	rainfed	50.30	195.28	51.10	195.28	8.60

Table 4.126: Divergent Water Price for Risk Averse Farmers ,MORTON ,KS ,WHEAT

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2019	rainfed	0.4	67.72	0.00	19.40	19.40	19.40	11.32	3.40
2046	rainfed	0.4	70.96	0.00	20.60	20.70	20.70	12.34	3.40
2072	rainfed	0.4	74.09	0.00	20.80	20.80	20.80	12.98	3.40
2099	rainfed	0.4	77.85	0.00	19.40	19.40	19.50	13.46	3.40
2019	rainfed	0.4	67.72	0.00	35.30	35.30	35.40	11.32	6.20
2046	rainfed	0.4	70.96	0.00	37.70	37.70	37.70	12.34	6.20
2072	rainfed	0.4	74.09	0.00	37.90	38.00	38.00	12.98	6.20
2099	rainfed	0.4	77.85	0.00	35.40	35.50	35.80	13.46	6.20
2019	rainfed	0.4	67.72	0.00	49.00	49.00	48.90	11.32	8.60
2046	rainfed	0.4	70.96	0.00	52.30	52.30	52.00	12.34	8.60
2072	rainfed	0.4	74.09	0.00	52.70	52.70	52.50	12.98	8.60
2099	rainfed	0.4	77.85	0.00	49.30	49.40	49.90	13.46	8.60

Table 4.127: Divergent water price for risk neutral v.s. averse farmers ,MORTON ,KS ,WHEAT ,RCP85

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2019	rainfed	19.30	-260.75	19.40	-260.75	3.40
2099	rainfed	19.30	-226.31	19.40	-226.31	3.40
2019	rainfed	35.20	-71.14	35.30	-71.14	6.20
2046	rainfed	37.40	-51.05	37.70	-51.05	6.20
2072	rainfed	37.80	-31.64	37.90	-31.64	6.20
2099	rainfed	35.10	-8.33	35.40	-8.33	6.20
2019	rainfed	48.80	91.39	49.00	91.39	8.60
2046	rainfed	51.90	119.26	52.30	119.26	8.60
2072	rainfed	52.50	146.17	52.70	146.17	8.60
2099	rainfed	48.70	178.51	49.30	178.51	8.60

4.7 CONCLUSION

Atmospheric concentrations of GHGs are unlikely to decline if we continue to use non-renewable energy sources. The continued exploitation of these energy resources increases the likelihood that we will experience futures that are modeled in RCP 6.0 or 8.5.

The United States is expecting increased temperatures, greater uncertainty around the timing and spatial distribution of precipitation, and more extreme events. These changes will have profound effects on the agricultural output and input markets through supply shocks (e.g., crop yields, water supply system).

The simulation of five crops from 2018 to 2099 has revealed that holding current planting methods and dates constant, crop yield and water demand are going to change in the near term.

Baseline irrigated yields are from 2017 county-level USDA survey data. Simulated irrigated maximum peanut, corn, and cotton yields behave similarly to rain-fed production, with a smaller magnitude of yield losses (less than 30%). In contrast to simulated rain-fed soybean yield, the expected irrigated soybean yield in 2099 slightly increases compared to expected irrigated yield in 2018. ².

Unlike the other crops, both the rain-fed and irrigated wheat yield follow strictly increasing trends. By the end of the century the rain-fed and irrigated wheat increased 20% over baseline yields.

Regardless of the different trends in simulated crop yields, all five crops are expected to demand more water in the second half of 21 century across all research stations.

Facing climate change and high emission concentrations, farmer's economic objective functions become even more dependent on optimizing yield and water planning. This is due to the fact that irrigation decisions vary not only with precipitation, temperature, and location but also with agricultural prices in output and input markets, as well as risk preferences.

If researchers ignore these economic factors and only consider the maximization of yield, they may overestimate crop water consumption significantly. Even if there is no supply shock in the irrigation water supply market, equilibrium water prices under different crop price scenarios have shown that solely focusing on yield maximization in projecting crop yield and water consumption is misleading.

Currently, the majority of planters in Georgia irrigate their peanuts at a rate of 9.6 in/acre. At the historically low peanut price scenario (0.17 \$/lb), under RCP 6.0 a risk-neutral farmer in Decatur, GA would save 6.8 in/acre of water in 2018 and 4.6 in/acre of water in 2099 by irrigating at lower soil moisture thresholds instead of yield-maximizing levels. Under RCP 8.5, he can save 4.2 in/acre and 4.9 in/acre in 2018 and 2099, respectively.

²Iowa does not have records of irrigated soybean yields.

At the average median historical peanut price of \$0.47/lb, yield maximization has the same result the same as profit maximizing for risk-neutral farmers, regardless of which RCP they face.

As opposed to peanuts, cotton is less sensitive to irrigation. Most of the farmers in South Plain Texas pumping groundwater to irrigate cotton at a cost of \$22 in/acre. At the historically low cotton price of \$0.4/lb, risk neutral farmers should irrigate in 2018, but they would better off not irrigating in 2099, which save 17 in/acre of water. Under the median historical cotton price they should always irrigate. If the future climate follows projections under RCP 8.5 then in 57 of the 82 simulated years cotton farmers should not irrigate, which saves them 17 in/acre of water on average at \$0.4/lb. At \$1.1/lb they should always irrigate.

There is no irrigation system available for soybeans and corn currently in Illinois or Iowa. In the future, if the irrigation system is built to mitigate the negative impact of climate change that adds no cost to farmers. Using Illinois corn farmers as an example: if the price is higher than \$40 per in/acre and facing RCP 6.0 after 2070, farmers should not irrigate corn, which saves 5.6 in/acre of water on average over irrigating at the yield-maximizing threshold. Projecting the future climate at higher concentrations of GHGs would cause corn farmers in Illinois to switch to rain-fed production after 2060 and result in 6.4 in/acre less water consumption compared to yield-maximizing production.

Farmers risk preferences play a role in irrigation decision making. Greater risk aversion increases the use of irrigation as a risk management tool. However, the impact of risk aversion is limited to \$3 per in/acre more than risk-neutral farmers across all simulated years and climate projections.

In conclusion, climate change is expected to have a significant impact on agricultural production in the United States based on current trends in non-renewable energy consumption. Most of the major crops will experience significant yield losses, holding current planting methods constant. Farmers should consider the use of irrigation to adapt to expected changes.

Meanwhile, researchers must consider all aspects of a farmer's economics objective function in order to avoid overestimating crop water consumption in the future.

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APPENDIX A

FUTURE WEATHER PROJECTION

A.1 STATISTICS OF SIMULATED WEATHER

A.1.1 DECATUR, GA, PEANUTS

Table A.1: Summary Statistics of Peanut Season, Decatur, GA

Year	TMAX(max)	TMAX(min)	TMAX(sd)	TMIN(max)	TMIN(min)	TMIN(sd)	Rainfall(max)	Rainfall(min)	Rainfall(sd)	Climate
2018	31.90	29.00	0.55	20.10	17.50	0.45	36.82	11.58	5.31	rep26
2045	32.40	29.70	0.53	20.60	18.10	0.43	36.23	9.05	5.82	rep26
2072	32.30	29.60	0.53	20.50	18.00	0.44	35.76	9.36	5.68	rep26
2099	32.40	29.60	0.54	20.50	17.90	0.44	33.66	8.23	5.50	rep26
2018	31.80	28.90	0.57	20.10	17.20	0.53	36.08	10.22	5.43	rep45
2045	32.90	30.20	0.53	20.90	18.10	0.49	33.85	9.52	6.08	rep45
2072	33.40	30.80	0.51	21.40	18.70	0.47	33.70	11.89	5.30	rep45
2099	33.60	31.00	0.51	21.60	18.90	0.47	35.92	11.23	5.15	rep45
2018	31.60	28.70	0.55	19.90	17.00	0.51	40.25	9.98	6.22	rep60
2045	32.40	29.70	0.52	20.50	17.70	0.48	35.26	8.97	6.12	rep60
2072	33.50	30.90	0.50	21.50	18.80	0.45	33.31	10.06	5.94	rep60
2099	34.30	31.80	0.50	22.20	19.70	0.45	35.45	9.05	6.35	rep60
2018	31.30	28.80	0.54	19.50	16.70	0.53	31.12	11.58	4.85	rep85
2045	32.60	30.20	0.53	20.70	18.20	0.48	35.61	10.65	4.57	rep85
2072	34.50	32.10	0.50	22.30	19.70	0.48	36.19	10.22	5.82	rep85
2099	36.40	34.10	0.47	23.90	21.50	0.45	30.93	8.74	4.62	rep85

A.1.2 SEMINOLE, GA, PEANUTS

Year	TMAX(max)	TMAX(min)	TMAX(sd)	TMIN(max)	TMIN(min)	TMIN(sd)	Rainfall(max)	Rainfall(min)	Rainfall(sd)	Climate
2018	31.90	26.50	0.96	20.10	15.00	0.95	39.04	10.88	6.15	rcp26
2045	32.50	28.40	0.81	20.70	16.80	0.80	36.93	8.31	5.56	rcp26
2072	32.50	28.40	0.81	20.70	16.70	0.80	36.43	8.74	5.19	rcp26
2099	32.50	28.20	0.84	20.60	16.50	0.83	37.36	8.78	5.72	rcp26
2018	31.90	26.40	0.93	20.10	15.00	0.97	36.23	7.49	5.98	rcp45
2045	33.10	29.30	0.71	21.20	17.70	0.70	35.41	9.55	6.14	rcp45
2072	33.70	30.40	0.67	21.80	18.70	0.65	36.11	9.83	5.22	rcp45
2099	33.90	30.60	0.67	21.90	18.70	0.65	35.84	8.54	5.19	rcp45
2018	31.60	27.40	0.90	19.90	15.40	0.95	43.02	7.80	6.35	rcp60
2045	32.50	28.80	0.79	20.70	16.70	0.83	36.00	8.19	5.69	rcp60
2072	33.80	30.60	0.67	21.90	18.80	0.66	35.80	8.58	5.68	rcp60
2099	34.90	31.80	0.62	22.90	20.10	0.59	37.28	7.64	6.22	rcp60
2018	31.60	28.00	0.75	19.70	16.00	0.81	31.51	9.16	4.88	rcp85
2045	33.10	30.20	0.61	21.40	18.70	0.62	32.84	10.34	4.55	rcp85
2072	35.20	32.80	0.53	23.10	20.60	0.51	29.45	9.28	5.05	rcp85
2099	37.10	34.90	0.50	24.90	22.60	0.45	29.68	10.18	4.84	rcp85

Table A.2: Summary Statistics of Cotton Season, Seminole, GA

A.1.3 DECATUR, GA, COTTON

Table A.3: Summary Statistics of Cotton Season, Decatur, GA

Year	TMAX(max)	TMAX(min)	TMAX(sd)	TMIN(max)	TMIN(min)	TMIN(sd)	Rainfall(max)	Rainfall(min)	Rainfall(sd)	Climate
2018.00	34.90	31.80	0.62	22.40	19.50	0.60	40.76	10.37	6.91	rcp26
2045.00	35.50	32.40	0.60	22.90	20.10	0.55	41.81	10.88	6.96	rcp26
2072.00	35.50	32.40	0.59	22.80	20.10	0.56	41.81	9.16	7.42	rcp26
2099.00	35.40	32.40	0.60	22.70	20.10	0.56	39.31	11.58	6.78	rcp26
2018.00	34.90	31.80	0.58	22.30	19.50	0.57	53.04	11.35	7.94	rcp45
2045.00	35.90	32.80	0.57	23.20	20.40	0.53	49.30	10.72	7.38	rcp45
2072.00	36.50	33.40	0.55	23.70	21.00	0.49	42.43	11.00	6.27	rcp45
2099.00	36.50	33.50	0.55	23.80	21.10	0.50	63.22	9.71	8.43	rcp45
2018.00	34.90	31.80	0.60	22.30	19.40	0.57	40.91	10.84	6.23	rcp60
2045.00	35.50	32.70	0.59	22.90	20.10	0.55	49.96	10.53	6.89	rcp60
2072.00	36.50	33.90	0.55	23.80	21.10	0.51	48.48	11.39	6.00	rcp60
2099.00	37.20	34.60	0.53	24.50	21.90	0.48	34.67	12.40	5.33	rcp60
2018.00	34.80	31.80	0.61	22.20	19.50	0.59	52.88	10.65	7.23	rcp85
2045.00	36.20	33.20	0.59	23.60	21.00	0.54	42.94	10.72	6.30	rcp85
2072.00	37.80	35.10	0.54	25.00	22.80	0.46	58.89	11.04	6.61	rcp85
2099.00	39.60	37.00	0.50	26.50	24.40	0.42	37.44	10.49	4.85	rcp85

A.1.4 SEMINOLE, GA, COTTON

Table A.4: Summary Statistics of Cotton Season, Seminole, GA

Year	TMAX(max)	TMAX(min)	TMAX(sd)	TMIN(max)	TMIN(min)	TMIN(sd)	Rainfall(max)	Rainfall(min)	Rainfall(sd)	Climate
2018.00	34.90	31.80	0.62	22.40	19.50	0.60	40.76	10.37	6.91	rcp26
2045.00	35.50	32.40	0.60	22.90	20.10	0.55	41.81	10.88	6.96	rcp26
2072.00	35.50	32.40	0.59	22.80	20.10	0.56	41.81	9.16	7.42	rcp26
2099.00	35.40	32.40	0.60	22.70	20.10	0.56	39.31	11.58	6.78	rcp26
2018.00	34.90	31.80	0.58	22.30	19.50	0.57	53.04	11.35	7.94	rcp45
2045.00	35.90	32.80	0.57	23.20	20.40	0.53	49.30	10.72	7.38	rcp45
2072.00	36.50	33.40	0.55	23.70	21.00	0.49	42.43	11.00	6.27	rcp45
2099.00	36.50	33.50	0.55	23.80	21.10	0.50	63.22	9.71	8.43	rcp45
2018.00	34.90	31.80	0.60	22.30	19.40	0.57	40.91	10.84	6.23	rcp60
2045.00	35.50	32.70	0.59	22.90	20.10	0.55	49.96	10.53	6.89	rcp60
2072.00	36.50	33.90	0.55	23.80	21.10	0.51	48.48	11.39	6.00	rcp60
2099.00	37.20	34.60	0.53	24.50	21.90	0.48	34.67	12.40	5.33	rcp60
2018.00	34.80	31.80	0.61	22.20	19.50	0.59	52.88	10.65	7.23	rcp85
2045.00	36.20	33.20	0.59	23.60	21.00	0.54	42.94	10.72	6.30	rcp85
2072.00	37.80	35.10	0.54	25.00	22.80	0.46	58.89	11.04	6.61	rcp85
2099.00	39.60	37.00	0.50	26.50	24.40	0.42	37.44	10.49	4.85	rcp85

A.1.5 CARSON, TX, COTTON

Table A.5: Summary Statistics of Cotton Season, Carson, TX

Year	TMAX(max)	TMAX(min)	TMAX(sd)	TMIN(max)	TMIN(min)	TMIN(sd)	Rainfall(max)	Rainfall(min)	Rainfall(sd)	Climate
2018	32.70	29.60	0.69	17.40	14.70	0.67	24.34	6.01	3.85	rcp26
2045	33.40	30.60	0.66	18.00	15.60	0.58	24.18	3.94	4.24	rcp26
2072	33.30	30.50	0.65	17.90	15.60	0.57	22.74	7.02	3.77	rcp26
2099	33.50	30.60	0.65	18.00	15.50	0.59	24.69	4.95	3.88	rcp26
2018	32.50	28.70	0.79	17.20	12.90	0.78	27.22	5.15	4.35	rcp45
2045	33.90	31.20	0.62	18.50	15.20	0.60	26.09	6.36	3.95	rcp45
2072	34.70	32.20	0.58	19.10	16.20	0.54	22.74	6.36	4.07	rcp45
2099	34.90	32.30	0.59	19.30	16.30	0.55	27.46	4.64	5.01	rcp45
2018	32.90	28.70	0.80	18.20	12.90	0.83	27.07	5.69	4.29	rcp60
2045	33.70	30.50	0.71	18.80	14.40	0.71	23.91	5.38	4.05	rcp60
2072	35.00	32.20	0.63	19.90	16.20	0.59	22.93	3.98	3.95	rcp60
2099	35.80	33.30	0.60	20.60	17.10	0.54	25.82	4.88	4.90	rcp60
2018	33.00	29.10	0.84	18.30	13.30	0.88	28.78	3.51	5.25	rcp85
2045	34.60	31.60	0.66	19.70	15.80	0.71	23.63	4.91	4.23	rcp85
2072	36.60	34.10	0.62	21.40	18.00	0.61	24.69	4.45	4.78	rcp85
2099	38.70	36.40	0.55	23.10	20.10	0.56	25.00	3.39	4.15	rcp85

A.1.6 SIOUX, IA, SOYBEAN

Table A.6: Summary Statistics of Cotton Season, Carson, TX

Year	TMAX(max)	TMAX(min)	TMAX(sd)	TMIN(max)	TMIN(min)	TMIN(sd)	Rainfall(max)	Rainfall(min)	Rainfall(sd)	Climate
2018	30.80	27.70	0.73	17.70	14.10	0.71	32.37	5.77	5.49	rep26
2045	31.60	28.50	0.70	18.30	14.50	0.68	29.99	6.40	4.89	rep26
2072	31.50	28.50	0.73	18.30	14.60	0.69	40.05	6.47	5.51	rep26
2099	31.70	28.50	0.71	18.20	14.40	0.70	29.56	7.76	4.82	rep26
2018	30.80	27.30	0.78	17.30	13.70	0.75	27.50	7.64	5.00	rep45
2045	32.00	28.50	0.74	18.50	14.90	0.70	28.43	6.43	5.06	rep45
2072	32.60	29.30	0.71	19.10	15.60	0.66	26.44	6.24	4.91	rep45
2099	33.00	29.70	0.71	19.30	15.80	0.64	26.05	6.67	4.85	rep45
2018	30.60	27.30	0.74	17.60	13.80	0.74	27.53	6.01	4.66	rep60
2045	31.60	28.20	0.71	18.20	14.60	0.71	25.35	6.98	4.37	rep60
2072	32.90	29.50	0.70	19.30	16.00	0.67	26.36	5.11	4.83	rep60
2099	33.70	30.40	0.66	20.10	16.90	0.63	23.59	5.89	4.03	rep60
2018	31.00	27.40	0.77	17.60	14.00	0.76	32.10	7.84	5.43	rep85
2045	32.50	29.10	0.73	19.00	15.40	0.71	29.29	7.10	4.57	rep85
2072	34.60	31.30	0.68	20.70	17.20	0.63	25.12	6.08	4.54	rep85
2099	36.60	33.40	0.62	22.50	19.30	0.56	25.35	6.08	3.98	rep85

A.1.7 PIATT, IL, SOYBEAN

Table A.7: Summary Statistics of Soybean Season, Piatt, IL

Year	TMAX(max)	TMAX(min)	TMAX(sd)	TMIN(max)	TMIN(min)	TMIN(sd)	Rainfall(max)	Rainfall(min)	Rainfall(sd)	Climate
2018	31.40	28.10	0.65	18.90	14.80	0.65	26.01	5.11	4.39	rcp26
2045	32.00	28.80	0.63	19.40	15.40	0.66	27.30	5.11	4.89	rcp26
2072	32.00	28.70	0.65	19.30	15.40	0.65	27.85	4.49	4.70	rcp26
2099	32.20	28.80	0.64	19.30	15.30	0.66	24.73	4.25	4.52	rcp26
2018	31.50	27.90	0.73	18.70	14.60	0.73	27.18	4.95	5.12	rcp45
2045	32.80	29.20	0.70	19.70	15.80	0.71	25.47	4.80	4.40	rcp45
2072	33.50	30.00	0.68	20.30	16.50	0.68	23.79	6.08	4.43	rcp45
2099	33.70	30.30	0.68	20.50	16.70	0.68	26.79	6.08	4.35	rcp45
2018	31.20	27.80	0.71	18.30	14.60	0.66	25.78	4.02	5.49	rcp60
2045	31.80	28.40	0.68	18.90	15.30	0.63	24.69	5.07	4.77	rcp60
2072	33.30	29.90	0.68	20.10	16.50	0.63	26.91	6.12	3.92	rcp60
2099	34.20	30.90	0.65	20.80	17.40	0.60	23.79	5.30	4.23	rcp60
2018	31.60	28.00	0.67	18.80	15.30	0.64	26.21	4.41	5.81	rcp85
2045	33.20	29.60	0.65	20.20	17.00	0.63	27.34	5.42	5.43	rcp85
2072	35.20	31.90	0.62	21.80	19.00	0.57	26.05	5.38	4.89	rcp85
2099	37.00	33.90	0.58	23.40	20.70	0.52	25.08	4.45	4.55	rcp85

A.1.8 DE KALB, IL, WHEAT

Table A.8: Summary Statistics of Winter Wheat Season, De Kalb, IL

Year	TMAX(max)	TMAX(min)	TMAX(sd)	TMIN(max)	TMIN(min)	TMIN(sd)	Rainfall(max)	Rainfall(min)	Rainfall(sd)	Climate
2019	12.60	9.60	0.60	1.80	-1.60	0.62	41.61	12.13	6.82	rep26
2045	12.90	10.10	0.78	1.90	-0.50	0.69	37.32	13.22	8.19	rep26
2071	13.00	10.20	0.63	2.30	-0.90	0.64	43.02	13.61	6.55	rep26
2097	12.90	10.20	0.75	1.90	-0.40	0.69	42.90	9.63	8.16	rep26
2019	12.20	9.70	0.52	1.70	-1.50	0.71	40.64	13.77	6.49	rep45
2045	12.80	10.40	0.54	2.00	-0.10	0.49	38.26	18.02	5.84	rep45
2071	13.30	10.90	0.54	2.80	-0.30	0.70	36.00	13.22	5.81	rep45
2097	13.30	10.90	0.55	2.50	0.50	0.49	36.93	18.33	6.00	rep45
2019	12.40	9.50	0.57	1.90	-1.00	0.63	41.22	11.82	6.01	rep60
2045	12.50	10.10	0.56	1.60	-0.40	0.52	40.05	14.59	7.07	rep60
2071	13.60	10.80	0.56	3.10	0.30	0.61	40.52	14.39	5.85	rep60
2097	13.90	11.60	0.53	3.00	1.10	0.50	33.62	17.82	3.87	rep60
2019	12.60	9.70	0.58	1.50	-1.10	0.69	43.68	12.29	6.73	rep85
2045	13.30	10.60	0.69	2.40	0.20	0.65	39.08	14.43	5.95	rep85
2071	14.60	11.90	0.57	3.70	1.20	0.67	40.01	11.82	6.02	rep85
2097	15.30	12.90	0.63	4.70	2.70	0.64	44.15	16.73	6.65	rep85

A.1.9 MORTON, KS, WHEAT

Table A.9: Summary Statistics of Wheat Season, Morton, KS

Year	TMAX(max)	TMAX(min)	TMAX(sd)	TMIN(max)	TMIN(min)	TMIN(sd)	Rainfall(max)	Rainfall(min)	Rainfall(sd)	Climate
2019	18.90	16.20	0.53	1.70	-1.30	0.74	17.00	2.77	3.20	rep26
2046	19.40	16.60	0.53	2.10	-0.80	0.72	18.80	4.72	2.98	rep26
2072	19.40	16.60	0.52	2.20	-0.70	0.73	17.94	4.76	3.14	rep26
2099	19.40	16.60	0.52	2.20	-0.70	0.72	20.55	3.63	3.29	rep26
2019	18.80	16.10	0.52	2.00	-0.80	0.61	17.71	3.70	3.72	rep45
2045	18.90	16.80	0.57	1.80	0.10	0.51	14.66	4.21	3.03	rep45
2071	20.00	17.30	0.50	3.00	0.00	0.60	19.97	2.77	3.71	rep45
2097	19.30	17.30	0.51	2.30	0.50	0.51	17.39	5.07	2.86	rep45
2019	18.80	16.00	0.51	1.90	-0.90	0.71	16.34	3.70	3.35	rep60
2045	19.30	16.50	0.58	2.10	-0.10	0.58	21.88	3.78	4.39	rep60
2071	20.10	17.30	0.49	3.00	0.10	0.71	18.29	3.43	3.68	rep60
2097	20.80	17.90	0.59	3.30	1.00	0.58	15.80	1.36	3.94	rep60
2019	18.90	16.10	0.58	2.00	-1.30	0.70	21.96	3.74	3.51	rep85
2045	19.80	17.00	0.76	2.60	0.30	0.62	13.92	3.43	3.31	rep85
2071	21.10	18.30	0.57	3.90	0.70	0.69	18.45	1.48	3.16	rep85
2097	22.30	19.50	0.73	4.70	2.30	0.62	11.74	1.52	2.61	rep85

A.1.10 FRANKLIN, IA, CORN

Table A.10: Summary Statistics of Corn Season, Franklin, IA

Year	TMAX(max)	TMAX(min)	TMAX(sd)	TMIN(max)	TMIN(min)	TMIN(sd)	Rainfall(max)	Rainfall(min)	Rainfall(sd)	Climate
2018	29.90	26.20	0.59	17.40	13.70	0.63	27.81	5.19	5.20	rep26
2045	30.60	26.80	0.60	17.90	14.20	0.62	26.29	6.47	5.24	rep26
2072	30.50	26.70	0.59	17.90	14.20	0.62	28.55	7.57	5.39	rep26
2099	30.60	26.80	0.60	17.90	14.20	0.63	26.44	4.99	5.30	rep26
2018	29.80	26.10	0.76	17.20	13.60	0.73	29.56	7.53	4.49	rep45
2045	31.10	27.40	0.72	18.20	14.70	0.67	27.89	5.89	4.80	rep45
2072	31.80	28.10	0.71	18.70	15.20	0.66	25.70	4.37	4.70	rep45
2099	32.00	28.20	0.73	18.90	15.40	0.66	23.56	5.97	4.46	rep45
2018	29.90	26.90	0.53	17.30	14.60	0.53	32.99	8.70	4.90	rep60
2045	30.60	27.50	0.53	17.90	15.20	0.52	27.07	4.88	4.72	rep60
2072	31.70	28.60	0.54	18.70	16.10	0.50	25.31	3.78	4.50	rep60
2099	32.20	29.10	0.53	19.20	16.50	0.50	24.65	3.82	4.58	rep60
2018	30.00	26.30	0.65	17.30	13.60	0.61	29.84	7.61	4.89	rep85
2045	31.30	27.60	0.65	18.40	15.00	0.55	25.58	5.07	4.79	rep85
2072	32.90	29.30	0.64	19.70	16.50	0.56	25.43	4.17	4.96	rep85
2099	34.20	31.00	0.60	20.80	18.10	0.53	25.47	3.20	4.58	rep85

Table A.11: Projected Temperature Changes by RCPs

Scenarios	2046-2065	2081-2100
RCP2.6	1.0 (0.4 to 1.6)	1.0 (0.3 to 1.7)
RCP4.5	1.4 (0.9 to 2.0)	1.8 (1.1 to 2.6)
RCP6.0	1.3 (0.8 to 1.8)	2.2 (1.4 to 3.1)
RCP8.5	2.0 (1.4 to 2.6)	3.7 (2.6 to 4.8)

A.1.11 DE KALB, IL, WHEAT

Table A.12: Summary Statistics of Corn Season, De Kalb, IL

Year	TMAX(max)	TMAX(min)	TMAX(sd)	TMIN(max)	TMIN(min)	TMIN(sd)	Rainfall(max)	Rainfall(min)	Rainfall(sd)	Climate
2018	28.00	25.00	0.66	15.10	12.10	0.72	33.38	7.25	6.37	rep26
2045	28.70	25.70	0.62	15.70	12.50	0.69	32.80	8.46	5.71	rep26
2072	28.70	25.60	0.64	15.70	12.50	0.70	30.89	6.86	5.87	rep26
2099	28.70	25.70	0.62	15.60	12.50	0.70	32.29	5.46	5.85	rep26
2018	27.40	24.90	0.54	15.00	12.00	0.57	35.30	8.62	5.77	rep45
2045	28.60	25.90	0.50	16.00	12.80	0.55	32.14	9.13	5.68	rep45
2072	29.30	26.50	0.49	16.40	13.30	0.53	27.50	5.93	5.09	rep45
2099	29.40	26.70	0.50	16.60	13.40	0.54	31.63	5.46	5.46	rep45
2018	28.40	25.30	0.63	15.50	12.40	0.67	33.42	8.15	6.06	rep60
2045	29.00	26.00	0.60	16.10	13.20	0.63	29.33	7.72	5.06	rep60
2072	30.20	27.50	0.56	17.00	14.30	0.58	28.39	8.11	5.26	rep60
2099	31.00	28.20	0.56	17.60	14.90	0.56	25.35	5.23	4.84	rep60
2018	28.60	24.80	0.65	15.60	11.80	0.68	35.88	7.33	6.05	rep85
2045	29.90	26.30	0.64	16.80	13.50	0.63	30.89	6.36	5.40	rep85
2072	31.70	28.30	0.60	18.20	15.30	0.58	26.60	5.42	4.99	rep85
2099	33.20	30.00	0.59	19.40	16.80	0.58	23.59	4.52	4.03	rep85

APPENDIX B

SIMULATED DIVERGENT WATER PRICES OF RISK NEUTRAL FARMERS

B.1 PEANUTS

B.1.1 DECATUR, GA

Table B.1: Divergent Water Price for Risk Neutral Farmers ,DECATUR ,GA ,PEANUT,
RCP 2.6

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	6090.45	13.63	5.60	2.51	0.17
2045	.6	.7	5984.72	13.79	5.30	2.57	0.17
2072	.6	.7	6016.20	13.91	4.70	2.49	0.17
2099	.6	.7	6025.73	13.79	4.00	2.44	0.17
2018	.6	.7	6090.45	13.63	15.50	2.51	0.47
2045	.6	.7	5984.72	13.79	14.60	2.57	0.47
2072	.6	.7	6016.20	13.91	12.90	2.49	0.47
2099	.6	.7	6025.73	13.79	11.10	2.44	0.47
2018	.6	.7	6090.45	13.63	25.40	2.51	0.77
2045	.6	.7	5984.72	13.79	23.90	2.57	0.77
2072	.6	.7	6016.20	13.91	21.10	2.49	0.77
2099	.6	.7	6025.73	13.79	18.10	2.44	0.77
2018	.5	.7	5955.65	11.46	7.90	4.69	0.17
2045	.5	.7	5858.83	11.74	7.60	4.62	0.17
2072	.5	.7	5859.46	11.80	8.40	4.60	0.17

2099	.5	.7	5878.94	11.76	7.80	4.46	0.17
2018	.5	.7	5955.65	11.46	21.90	4.69	0.47
2045	.5	.7	5858.83	11.74	21.00	4.62	0.47
2072	.5	.7	5859.46	11.80	23.00	4.60	0.47
2099	.5	.7	5878.94	11.76	21.50	4.46	0.47
2018	.5	.7	5955.65	11.46	35.80	4.69	0.77
2045	.5	.7	5858.83	11.74	34.30	4.62	0.77
2072	.5	.7	5859.46	11.80	37.70	4.60	0.77
2099	.5	.7	5878.94	11.76	35.20	4.46	0.77
2018	.4	.7	5669.02	9.54	13.00	6.61	0.17
2045	.4	.7	5605.29	9.46	11.40	6.90	0.17
2072	.4	.7	5594.87	9.52	12.10	6.88	0.17
2099	.4	.7	5628.27	9.51	11.60	6.72	0.17
2018	.4	.7	5669.02	9.54	35.90	6.61	0.47
2045	.4	.7	5605.29	9.46	31.30	6.90	0.47
2072	.4	.7	5594.87	9.52	33.50	6.88	0.47
2099	.4	.7	5628.27	9.51	31.90	6.72	0.47
2018	.4	.7	5669.02	9.54	58.80	6.61	0.77
2045	.4	.7	5605.29	9.46	51.30	6.90	0.77
2072	.4	.7	5594.87	9.52	54.80	6.88	0.77
2099	.4	.7	5628.27	9.51	52.20	6.72	0.77
2018	.3	.7	4995.29	6.87	21.70	9.27	0.17
2045	.3	.7	4917.96	6.59	20.00	9.77	0.17
2072	.3	.7	4922.10	6.72	20.50	9.68	0.17
2099	.3	.7	4962.60	6.78	20.20	9.44	0.17
2018	.3	.7	4995.29	6.87	59.80	9.27	0.47
2045	.3	.7	4917.96	6.59	55.20	9.77	0.47

2072	.3	.7	4922.10	6.72	56.50	9.68	0.47
2099	.3	.7	4962.60	6.78	55.80	9.44	0.47
2018	.3	.7	4995.29	6.87	97.90	9.27	0.77
2045	.3	.7	4917.96	6.59	90.40	9.77	0.77
2072	.3	.7	4922.10	6.72	92.50	9.68	0.77
2099	.3	.7	4962.60	6.78	91.40	9.44	0.77
2018	.2	.7	3975.47	3.51	29.60	12.63	0.17
2045	.2	.7	3979.90	3.25	27.10	13.11	0.17
2072	.2	.7	3931.54	3.39	28.20	13.01	0.17
2099	.2	.7	3962.22	3.40	28.20	12.82	0.17
2018	.2	.7	3975.47	3.51	81.80	12.63	0.47
2045	.2	.7	3979.90	3.25	74.80	13.11	0.47
2072	.2	.7	3931.54	3.39	77.80	13.01	0.47
2099	.2	.7	3962.22	3.40	77.80	12.82	0.47
2018	.2	.7	3975.47	3.51	134.00	12.63	0.77
2045	.2	.7	3979.90	3.25	122.50	13.11	0.77
2072	.2	.7	3931.54	3.39	127.50	13.01	0.77
2099	.2	.7	3962.22	3.40	127.40	12.82	0.77
2018	RAINFED	.7	2856.94	0.00	35.00	16.15	0.17
2045	RAINFED	.7	2916.42	0.00	32.80	16.36	0.17
2072	RAINFED	.7	2812.81	0.00	34.00	16.40	0.17
2099	RAINFED	.7	2838.23	0.00	34.10	16.22	0.17
2018	RAINFED	.7	2856.94	0.00	96.60	16.15	0.47
2045	RAINFED	.7	2916.42	0.00	90.50	16.36	0.47
2072	RAINFED	.7	2812.81	0.00	93.80	16.40	0.47
2099	RAINFED	.7	2838.23	0.00	94.10	16.22	0.47
2018	RAINFED	.7	2856.94	0.00	158.20	16.15	0.77

2045	RAINFED	.7	2916.42	0.00	148.20	16.36	0.77
2072	RAINFED	.7	2812.81	0.00	153.70	16.40	0.77
2099	RAINFED	.7	2838.23	0.00	154.10	16.22	0.77

Table B.2: Divergent Water Price for Risk Neutral Farmers ,DECATUR ,GA ,PEANUT ,RCP45

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	6121.95	13.60	4.60	2.60	0.17
2045	.6	.7	5918.53	14.06	7.60	2.19	0.17
2072	.6	.7	5831.21	14.13	6.80	2.36	0.17
2099	.6	.7	5836.98	14.53	7.50	2.27	0.17
2018	.6	.7	6121.95	13.60	12.70	2.60	0.47
2045	.6	.7	5918.53	14.06	20.80	2.19	0.47
2072	.6	.7	5831.21	14.13	18.70	2.36	0.47
2099	.6	.7	5836.98	14.53	20.60	2.27	0.47
2018	.6	.7	6121.95	13.60	20.80	2.60	0.77
2045	.6	.7	5918.53	14.06	34.10	2.19	0.77
2072	.6	.7	5831.21	14.13	30.70	2.36	0.77
2099	.6	.7	5836.98	14.53	33.70	2.27	0.77
2018	.5	.7	5966.36	11.56	8.30	4.64	0.17
2045	.5	.7	5744.07	11.96	10.80	4.29	0.17
2072	.5	.7	5630.74	12.13	11.50	4.36	0.17
2099	.5	.7	5637.20	12.55	12.00	4.25	0.17
2018	.5	.7	5966.36	11.56	22.90	4.64	0.47
2045	.5	.7	5744.07	11.96	29.80	4.29	0.47
2072	.5	.7	5630.74	12.13	31.80	4.36	0.47
2099	.5	.7	5637.20	12.55	33.10	4.25	0.47
2018	.5	.7	5966.36	11.56	37.50	4.64	0.77
2045	.5	.7	5744.07	11.96	48.80	4.29	0.77
2072	.5	.7	5630.74	12.13	52.00	4.36	0.77

2099	.5	.7	5637.20	12.55	54.20	4.25	0.77
2018	.4	.7	5673.42	9.53	13.30	6.68	0.17
2045	.4	.7	5430.68	9.79	15.40	6.46	0.17
2072	.4	.7	5317.72	10.03	16.00	6.45	0.17
2099	.4	.7	5281.99	10.41	17.50	6.38	0.17
2018	.4	.7	5673.42	9.53	36.60	6.68	0.47
2045	.4	.7	5430.68	9.79	42.60	6.46	0.47
2072	.4	.7	5317.72	10.03	44.30	6.45	0.47
2099	.4	.7	5281.99	10.41	48.20	6.38	0.47
2018	.4	.7	5673.42	9.53	59.90	6.68	0.77
2045	.4	.7	5430.68	9.79	69.70	6.46	0.77
2072	.4	.7	5317.72	10.03	72.50	6.45	0.77
2099	.4	.7	5281.99	10.41	79.00	6.38	0.77
2018	.3	.7	5006.15	6.87	21.70	9.33	0.17
2045	.3	.7	4758.44	7.12	23.40	9.13	0.17
2072	.3	.7	4618.01	7.20	24.00	9.29	0.17
2099	.3	.7	4498.57	7.54	26.40	9.26	0.17
2018	.3	.7	5006.15	6.87	59.80	9.33	0.47
2045	.3	.7	4758.44	7.12	64.70	9.13	0.47
2072	.3	.7	4618.01	7.20	66.20	9.29	0.47
2099	.3	.7	4498.57	7.54	73.00	9.26	0.47
2018	.3	.7	5006.15	6.87	97.90	9.33	0.77
2045	.3	.7	4758.44	7.12	106.00	9.13	0.77
2072	.3	.7	4618.01	7.20	108.40	9.29	0.77
2099	.3	.7	4498.57	7.54	119.60	9.26	0.77
2018	.2	.7	3971.43	3.61	30.00	12.60	0.17
2045	.2	.7	3625.84	3.51	31.90	12.74	0.17

2072	.2	.7	3432.96	3.61	32.90	12.88	0.17
2099	.2	.7	3379.41	3.69	33.20	13.11	0.17
2018	.2	.7	3971.43	3.61	82.90	12.60	0.47
2045	.2	.7	3625.84	3.51	88.20	12.74	0.47
2072	.2	.7	3432.96	3.61	91.00	12.88	0.47
2099	.2	.7	3379.41	3.69	91.70	13.11	0.47
2018	.2	.7	3971.43	3.61	135.80	12.60	0.77
2045	.2	.7	3625.84	3.51	144.50	12.74	0.77
2072	.2	.7	3432.96	3.61	149.00	12.88	0.77
2099	.2	.7	3379.41	3.69	150.20	13.11	0.77
2018	RAINFED	.7	2746.52	0.00	36.20	16.20	0.17
2045	RAINFED	.7	2578.40	0.00	36.00	16.25	0.17
2072	RAINFED	.7	2417.78	0.00	36.20	16.49	0.17
2099	RAINFED	.7	2339.51	0.00	36.40	16.80	0.17
2018	RAINFED	.7	2746.52	0.00	100.00	16.20	0.47
2045	RAINFED	.7	2578.40	0.00	99.50	16.25	0.47
2072	RAINFED	.7	2417.78	0.00	100.00	16.49	0.47
2099	RAINFED	.7	2339.51	0.00	100.70	16.80	0.47
2018	RAINFED	.7	2746.52	0.00	163.80	16.20	0.77
2045	RAINFED	.7	2578.40	0.00	162.90	16.25	0.77
2072	RAINFED	.7	2417.78	0.00	163.80	16.49	0.77
2099	RAINFED	.7	2339.51	0.00	164.90	16.80	0.77

Table B.3: Divergent Water Price for Risk Neutral Farmers ,DECATUR ,GA ,PEANUT ,RCP60

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	6043.48	13.99	5.90	2.27	0.17
2045	.6	.7	5930.84	14.33	5.70	2.32	0.17
2072	.6	.7	5705.19	14.53	6.50	2.28	0.17
2099	.6	.7	5425.45	15.43	8.60	2.45	0.17
2018	.6	.7	6043.48	13.99	16.20	2.27	0.47
2045	.6	.7	5930.84	14.33	15.60	2.32	0.47
2072	.6	.7	5705.19	14.53	17.90	2.28	0.47
2099	.6	.7	5425.45	15.43	23.70	2.45	0.47
2018	.6	.7	6043.48	13.99	26.50	2.27	0.77
2045	.6	.7	5930.84	14.33	25.60	2.32	0.77
2072	.6	.7	5705.19	14.53	29.30	2.28	0.77
2099	.6	.7	5425.45	15.43	38.80	2.45	0.77
2018	.5	.7	5889.63	11.74	8.80	4.52	0.17
2045	.5	.7	5775.54	12.26	9.00	4.40	0.17
2072	.5	.7	5498.62	12.60	11.90	4.21	0.17
2099	.5	.7	5183.73	13.29	13.60	4.59	0.17
2018	.5	.7	5889.63	11.74	24.10	4.52	0.47
2045	.5	.7	5775.54	12.26	24.90	4.40	0.47
2072	.5	.7	5498.62	12.60	32.80	4.21	0.47
2099	.5	.7	5183.73	13.29	37.40	4.59	0.47
2018	.5	.7	5889.63	11.74	39.50	4.52	0.77
2045	.5	.7	5775.54	12.26	40.70	4.40	0.77
2072	.5	.7	5498.62	12.60	53.70	4.21	0.77

2099	.5	.7	5183.73	13.29	61.30	4.59	0.77
2018	.4	.7	5587.47	9.49	13.40	6.77	0.17
2045	.4	.7	5493.44	10.05	13.30	6.60	0.17
2072	.4	.7	5159.48	10.39	16.80	6.41	0.17
2099	.4	.7	4841.31	10.95	17.40	6.93	0.17
2018	.4	.7	5587.47	9.49	37.10	6.77	0.47
2045	.4	.7	5493.44	10.05	36.70	6.60	0.47
2072	.4	.7	5159.48	10.39	46.40	6.41	0.47
2099	.4	.7	4841.31	10.95	48.00	6.93	0.47
2018	.4	.7	5587.47	9.49	60.70	6.77	0.77
2045	.4	.7	5493.44	10.05	60.10	6.60	0.77
2072	.4	.7	5159.48	10.39	76.00	6.41	0.77
2099	.4	.7	4841.31	10.95	78.60	6.93	0.77
2018	.3	.7	4995.68	6.99	20.70	9.27	0.17
2045	.3	.7	4810.41	7.22	21.60	9.44	0.17
2072	.3	.7	4424.54	7.51	25.00	9.30	0.17
2099	.3	.7	4155.40	8.06	24.20	9.82	0.17
2018	.3	.7	4995.68	6.99	57.10	9.27	0.47
2045	.3	.7	4810.41	7.22	59.70	9.44	0.47
2072	.3	.7	4424.54	7.51	69.20	9.30	0.47
2099	.3	.7	4155.40	8.06	66.80	9.82	0.47
2018	.3	.7	4995.68	6.99	93.60	9.27	0.77
2045	.3	.7	4810.41	7.22	97.80	9.44	0.77
2072	.3	.7	4424.54	7.51	113.30	9.30	0.77
2099	.3	.7	4155.40	8.06	109.30	9.82	0.77
2018	.2	.7	3926.10	3.50	29.30	12.76	0.17
2045	.2	.7	3738.25	3.72	29.90	12.94	0.17

2072	.2	.7	3306.83	3.72	32.30	13.09	0.17
2099	.2	.7	3021.27	4.17	31.40	13.71	0.17
2018	.2	.7	3926.10	3.50	80.90	12.76	0.47
2045	.2	.7	3738.25	3.72	82.50	12.94	0.47
2072	.2	.7	3306.83	3.72	89.30	13.09	0.47
2099	.2	.7	3021.27	4.17	86.70	13.71	0.47
2018	.2	.7	3926.10	3.50	132.50	12.76	0.77
2045	.2	.7	3738.25	3.72	135.10	12.94	0.77
2072	.2	.7	3306.83	3.72	146.20	13.09	0.77
2099	.2	.7	3021.27	4.17	142.00	13.71	0.77
2018	RAINFED	.7	2820.09	0.00	34.60	16.26	0.17
2045	RAINFED	.7	2629.01	0.00	34.50	16.65	0.17
2072	RAINFED	.7	2326.46	0.00	35.10	16.81	0.17
2099	RAINFED	.7	2059.34	0.00	33.20	17.88	0.17
2018	RAINFED	.7	2820.09	0.00	95.50	16.26	0.47
2045	RAINFED	.7	2629.01	0.00	95.40	16.65	0.47
2072	RAINFED	.7	2326.46	0.00	97.00	16.81	0.47
2099	RAINFED	.7	2059.34	0.00	91.80	17.88	0.47
2018	RAINFED	.7	2820.09	0.00	156.40	16.26	0.77
2045	RAINFED	.7	2629.01	0.00	156.30	16.65	0.77
2072	RAINFED	.7	2326.46	0.00	158.80	16.81	0.77
2099	RAINFED	.7	2059.34	0.00	150.30	17.88	0.77

Table B.4: Divergent Water Price for Risk Neutral Farmers ,DECATUR ,GA ,PEANUT ,RCP85

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	6061.35	13.93	6.20	2.33	0.17
2045	.6	.7	5863.43	14.64	6.30	2.27	0.17
2072	.6	.7	5248.58	15.43	6.60	2.49	0.17
2099	.6	.7	4124.28	18.31	7.40	2.55	0.17
2018	.6	.7	6061.35	13.93	17.00	2.33	0.47
2045	.6	.7	5863.43	14.64	17.40	2.27	0.47
2072	.6	.7	5248.58	15.43	18.20	2.49	0.47
2099	.6	.7	4124.28	18.31	20.50	2.55	0.47
2018	.6	.7	6061.35	13.93	27.80	2.33	0.77
2045	.6	.7	5863.43	14.64	28.40	2.27	0.77
2072	.6	.7	5248.58	15.43	29.70	2.49	0.77
2099	.6	.7	4124.28	18.31	33.50	2.55	0.77
2018	.5	.7	5902.17	12.07	9.90	4.19	0.17
2045	.5	.7	5641.94	12.36	11.40	4.55	0.17
2072	.5	.7	5014.99	13.24	12.00	4.68	0.17
2099	.5	.7	3900.74	15.98	11.70	4.88	0.17
2018	.5	.7	5902.17	12.07	27.30	4.19	0.47
2045	.5	.7	5641.94	12.36	31.60	4.55	0.47
2072	.5	.7	5014.99	13.24	33.10	4.68	0.47
2099	.5	.7	3900.74	15.98	32.30	4.88	0.47
2018	.5	.7	5902.17	12.07	44.70	4.19	0.77
2045	.5	.7	5641.94	12.36	51.70	4.55	0.77
2072	.5	.7	5014.99	13.24	54.20	4.68	0.77

2099	.5	.7	3900.74	15.98	52.80	4.88	0.77
2018	.4	.7	5594.22	10.09	15.20	6.17	0.17
2045	.4	.7	5334.00	10.34	15.90	6.58	0.17
2072	.4	.7	4671.17	10.99	16.60	6.93	0.17
2099	.4	.7	3596.61	13.63	15.10	7.23	0.17
2018	.4	.7	5594.22	10.09	42.00	6.17	0.47
2045	.4	.7	5334.00	10.34	43.90	6.58	0.47
2072	.4	.7	4671.17	10.99	45.70	6.93	0.47
2099	.4	.7	3596.61	13.63	41.60	7.23	0.47
2018	.4	.7	5594.22	10.09	68.80	6.17	0.77
2045	.4	.7	5334.00	10.34	71.80	6.58	0.77
2072	.4	.7	4671.17	10.99	74.80	6.93	0.77
2099	.4	.7	3596.61	13.63	68.10	7.23	0.77
2018	.3	.7	4849.32	7.25	24.50	9.01	0.17
2045	.3	.7	4688.71	7.47	22.70	9.44	0.17
2072	.3	.7	4012.11	8.00	22.90	9.92	0.17
2099	.3	.7	2933.38	10.27	20.90	10.59	0.17
2018	.3	.7	4849.32	7.25	67.70	9.01	0.47
2045	.3	.7	4688.71	7.47	62.70	9.44	0.47
2072	.3	.7	4012.11	8.00	63.20	9.92	0.47
2099	.3	.7	2933.38	10.27	57.80	10.59	0.47
2018	.3	.7	4849.32	7.25	110.80	9.01	0.77
2045	.3	.7	4688.71	7.47	102.70	9.44	0.77
2072	.3	.7	4012.11	8.00	103.40	9.92	0.77
2099	.3	.7	2933.38	10.27	94.70	10.59	0.77
2018	.2	.7	3809.45	3.89	32.20	12.37	0.17
2045	.2	.7	3563.98	3.79	30.90	13.12	0.17

2072	.2	.7	2954.36	4.02	29.30	13.90	0.17
2099	.2	.7	2032.58	5.25	24.00	15.61	0.17
2018	.2	.7	3809.45	3.89	88.80	12.37	0.47
2045	.2	.7	3563.98	3.79	85.40	13.12	0.47
2072	.2	.7	2954.36	4.02	80.90	13.90	0.47
2099	.2	.7	2032.58	5.25	66.40	15.61	0.47
2018	.2	.7	3809.45	3.89	145.40	12.37	0.77
2045	.2	.7	3563.98	3.79	139.90	13.12	0.77
2072	.2	.7	2954.36	4.02	132.40	13.90	0.77
2099	.2	.7	2032.58	5.25	108.70	15.61	0.77
2018	RAINFED	.7	2564.91	0.00	37.50	16.26	0.17
2045	RAINFED	.7	2390.26	0.00	35.80	16.92	0.17
2072	RAINFED	.7	1989.96	0.00	31.90	17.92	0.17
2099	RAINFED	.7	1271.03	0.00	24.20	20.86	0.17
2018	RAINFED	.7	2564.91	0.00	103.50	16.26	0.47
2045	RAINFED	.7	2390.26	0.00	98.90	16.92	0.47
2072	RAINFED	.7	1989.96	0.00	88.00	17.92	0.47
2099	RAINFED	.7	1271.03	0.00	66.80	20.86	0.47
2018	RAINFED	.7	2564.91	0.00	169.60	16.26	0.77
2045	RAINFED	.7	2390.26	0.00	162.00	16.92	0.77
2072	RAINFED	.7	1989.96	0.00	144.20	17.92	0.77
2099	RAINFED	.7	1271.03	0.00	109.50	20.86	0.77

B.1.2 SEMINOLE, GA

Table B.5: Divergent Water Price for Risk Neutral Farmers ,SEMINOLE ,GA ,PEANUT ,RCP26

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	5862.64	14.47	6.10	2.53	0.17
2045	.6	.7	5658.82	14.38	5.30	2.63	0.17
2072	.6	.7	5670.88	14.58	4.90	2.67	0.17
2099	.6	.7	5638.15	14.51	5.90	2.41	0.17
2018	.6	.7	5862.64	14.47	16.90	2.53	0.47
2045	.6	.7	5658.82	14.38	14.40	2.63	0.47
2072	.6	.7	5670.88	14.58	13.50	2.67	0.47
2099	.6	.7	5638.15	14.51	16.20	2.41	0.47
2018	.6	.7	5862.64	14.47	27.60	2.53	0.77
2045	.6	.7	5658.82	14.38	23.60	2.63	0.77
2072	.6	.7	5670.88	14.58	22.20	2.67	0.77
2099	.6	.7	5638.15	14.51	26.40	2.41	0.77
2018	.5	.7	5666.16	12.14	10.10	4.86	0.17
2045	.5	.7	5497.34	12.10	8.40	4.91	0.17
2072	.5	.7	5482.00	12.32	9.20	4.92	0.17
2099	.5	.7	5446.50	12.31	10.20	4.60	0.17
2018	.5	.7	5666.16	12.14	27.80	4.86	0.47
2045	.5	.7	5497.34	12.10	23.20	4.91	0.47
2072	.5	.7	5482.00	12.32	25.40	4.92	0.47
2099	.5	.7	5446.50	12.31	28.10	4.60	0.47
2018	.5	.7	5666.16	12.14	45.50	4.86	0.77
2045	.5	.7	5497.34	12.10	38.00	4.91	0.77

2072	.5	.7	5482.00	12.32	41.60	4.92	0.77
2099	.5	.7	5446.50	12.31	45.90	4.60	0.77
2018	.4	.7	5335.41	9.75	14.50	7.24	0.17
2045	.4	.7	5207.35	9.98	12.90	7.03	0.17
2072	.4	.7	5187.23	10.08	13.30	7.17	0.17
2099	.4	.7	5149.52	9.82	13.70	7.10	0.17
2018	.4	.7	5335.41	9.75	40.10	7.24	0.47
2045	.4	.7	5207.35	9.98	35.60	7.03	0.47
2072	.4	.7	5187.23	10.08	36.80	7.17	0.47
2099	.4	.7	5149.52	9.82	37.90	7.10	0.47
2018	.4	.7	5335.41	9.75	65.70	7.24	0.77
2045	.4	.7	5207.35	9.98	58.30	7.03	0.77
2072	.4	.7	5187.23	10.08	60.30	7.17	0.77
2099	.4	.7	5149.52	9.82	62.00	7.10	0.77
2018	.3	.7	4698.49	6.94	21.30	10.05	0.17
2045	.3	.7	4551.45	6.89	20.00	10.12	0.17
2072	.3	.7	4531.21	7.00	20.20	10.25	0.17
2099	.3	.7	4454.46	6.80	21.30	10.12	0.17
2018	.3	.7	4698.49	6.94	58.70	10.05	0.47
2045	.3	.7	4551.45	6.89	55.20	10.12	0.47
2072	.3	.7	4531.21	7.00	55.80	10.25	0.47
2099	.3	.7	4454.46	6.80	58.90	10.12	0.47
2018	.3	.7	4698.49	6.94	96.20	10.05	0.77
2045	.3	.7	4551.45	6.89	90.50	10.12	0.77
2072	.3	.7	4531.21	7.00	91.50	10.25	0.77
2099	.3	.7	4454.46	6.80	96.40	10.12	0.77
2018	.2	.7	3648.66	3.39	28.90	13.60	0.17

2045	.2	.7	3548.01	3.37	27.40	13.64	0.17
2072	.2	.7	3586.07	3.54	26.90	13.71	0.17
2099	.2	.7	3461.85	3.31	28.30	13.61	0.17
2018	.2	.7	3648.66	3.39	79.70	13.60	0.47
2045	.2	.7	3548.01	3.37	75.60	13.64	0.47
2072	.2	.7	3586.07	3.54	74.20	13.71	0.47
2099	.2	.7	3461.85	3.31	78.10	13.61	0.47
2018	.2	.7	3648.66	3.39	130.50	13.60	0.77
2045	.2	.7	3548.01	3.37	123.80	13.64	0.77
2072	.2	.7	3586.07	3.54	121.50	13.71	0.77
2099	.2	.7	3461.85	3.31	127.80	13.61	0.77
2018	RAINFED	.7	2711.94	0.00	32.50	16.99	0.17
2045	RAINFED	.7	2710.43	0.00	30.30	17.01	0.17
2072	RAINFED	.7	2674.79	0.00	30.30	17.25	0.17
2099	RAINFED	.7	2594.54	0.00	31.50	16.92	0.17
2018	RAINFED	.7	2711.94	0.00	89.70	16.99	0.47
2045	RAINFED	.7	2710.43	0.00	83.70	17.01	0.47
2072	RAINFED	.7	2674.79	0.00	83.80	17.25	0.47
2099	RAINFED	.7	2594.54	0.00	86.90	16.92	0.47
2018	RAINFED	.7	2711.94	0.00	146.90	16.99	0.77
2045	RAINFED	.7	2710.43	0.00	137.10	17.01	0.77
2072	RAINFED	.7	2674.79	0.00	137.20	17.25	0.77
2099	RAINFED	.7	2594.54	0.00	142.40	16.92	0.77

Table B.6: Divergent Water Price for Risk Neutral Farmers ,SEMINOLE ,GA ,PEANUT ,RCP45

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	5745.60	14.41	4.80	2.53	0.17
2045	.6	.7	5355.81	14.70	7.10	2.71	0.17
2072	.6	.7	5094.65	15.25	5.40	2.72	0.17
2099	.6	.7	5058.06	15.03	6.00	2.51	0.17
2018	.6	.7	5745.60	14.41	13.20	2.53	0.47
2045	.6	.7	5355.81	14.70	19.60	2.71	0.47
2072	.6	.7	5094.65	15.25	14.70	2.72	0.47
2099	.6	.7	5058.06	15.03	16.60	2.51	0.47
2018	.6	.7	5745.60	14.41	21.50	2.53	0.77
2045	.6	.7	5355.81	14.70	32.10	2.71	0.77
2072	.6	.7	5094.65	15.25	24.10	2.72	0.77
2099	.6	.7	5058.06	15.03	27.20	2.51	0.77
2018	.5	.7	5568.36	12.19	8.90	4.75	0.17
2045	.5	.7	5176.20	12.54	10.20	4.87	0.17
2072	.5	.7	4905.55	13.08	9.60	4.88	0.17
2099	.5	.7	4885.68	12.84	9.50	4.70	0.17
2018	.5	.7	5568.36	12.19	24.60	4.75	0.47
2045	.5	.7	5176.20	12.54	28.20	4.87	0.47
2072	.5	.7	4905.55	13.08	26.40	4.88	0.47
2099	.5	.7	4885.68	12.84	26.20	4.70	0.47
2018	.5	.7	5568.36	12.19	40.20	4.75	0.77
2045	.5	.7	5176.20	12.54	46.20	4.87	0.77
2072	.5	.7	4905.55	13.08	43.20	4.88	0.77

2099	.5	.7	4885.68	12.84	42.80	4.70	0.77
2018	.4	.7	5242.48	9.59	13.30	7.34	0.17
2045	.4	.7	4859.59	10.16	14.30	7.25	0.17
2072	.4	.7	4590.72	10.72	13.80	7.25	0.17
2099	.4	.7	4587.86	10.34	13.20	7.20	0.17
2018	.4	.7	5242.48	9.59	36.80	7.34	0.47
2045	.4	.7	4859.59	10.16	39.50	7.25	0.47
2072	.4	.7	4590.72	10.72	38.20	7.25	0.47
2099	.4	.7	4587.86	10.34	36.50	7.20	0.47
2018	.4	.7	5242.48	9.59	60.20	7.34	0.77
2045	.4	.7	4859.59	10.16	64.70	7.25	0.77
2072	.4	.7	4590.72	10.72	62.60	7.25	0.77
2099	.4	.7	4587.86	10.34	59.80	7.20	0.77
2018	.3	.7	4629.53	6.75	19.90	10.19	0.17
2045	.3	.7	4203.84	7.34	21.40	10.07	0.17
2072	.3	.7	3962.71	7.43	19.70	10.54	0.17
2099	.3	.7	3958.65	7.33	19.80	10.21	0.17
2018	.3	.7	4629.53	6.75	54.80	10.19	0.47
2045	.3	.7	4203.84	7.34	59.10	10.07	0.47
2072	.3	.7	3962.71	7.43	54.30	10.54	0.47
2099	.3	.7	3958.65	7.33	54.80	10.21	0.47
2018	.3	.7	4629.53	6.75	89.70	10.19	0.77
2045	.3	.7	4203.84	7.34	96.80	10.07	0.77
2072	.3	.7	3962.71	7.43	89.00	10.54	0.77
2099	.3	.7	3958.65	7.33	89.70	10.21	0.77
2018	.2	.7	3694.82	3.38	26.70	13.55	0.17
2045	.2	.7	3281.64	3.49	26.80	13.92	0.17

2072	.2	.7	3043.48	3.54	25.20	14.43	0.17
2099	.2	.7	3089.96	3.57	25.10	13.97	0.17
2018	.2	.7	3694.82	3.38	73.60	13.55	0.47
2045	.2	.7	3281.64	3.49	73.90	13.92	0.47
2072	.2	.7	3043.48	3.54	69.60	14.43	0.47
2099	.2	.7	3089.96	3.57	69.20	13.97	0.47
2018	.2	.7	3694.82	3.38	120.60	13.55	0.77
2045	.2	.7	3281.64	3.49	121.00	13.92	0.77
2072	.2	.7	3043.48	3.54	114.00	14.43	0.77
2099	.2	.7	3089.96	3.57	113.40	13.97	0.77
2018	RAINFED	.7	2791.96	0.00	30.40	16.94	0.17
2045	RAINFED	.7	2445.83	0.00	29.60	17.41	0.17
2072	RAINFED	.7	2286.24	0.00	27.40	17.97	0.17
2099	RAINFED	.7	2356.68	0.00	27.10	17.54	0.17
2018	RAINFED	.7	2791.96	0.00	84.00	16.94	0.47
2045	RAINFED	.7	2445.83	0.00	81.60	17.41	0.47
2072	RAINFED	.7	2286.24	0.00	75.70	17.97	0.47
2099	RAINFED	.7	2356.68	0.00	74.80	17.54	0.47
2018	RAINFED	.7	2791.96	0.00	137.50	16.94	0.77
2045	RAINFED	.7	2445.83	0.00	133.70	17.41	0.77
2072	RAINFED	.7	2286.24	0.00	124.00	17.97	0.77
2099	RAINFED	.7	2356.68	0.00	122.50	17.54	0.77

Table B.7: Divergent Water Price for Risk Neutral Farmers ,SEMINOLE, GA, PEANUT,
RCP60

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	5751.43	14.01	5.50	2.51	0.17
2045	.6	.7	5527.68	14.62	5.50	2.62	0.17
2072	.6	.7	5054.18	15.32	6.00	2.62	0.17
2099	.6	.7	4586.67	15.73	5.70	2.56	0.17
2018	.6	.7	5751.43	14.01	15.10	2.51	0.47
2045	.6	.7	5527.68	14.62	15.20	2.62	0.47
2072	.6	.7	5054.18	15.32	16.60	2.62	0.47
2099	.6	.7	4586.67	15.73	15.60	2.56	0.47
2018	.6	.7	5751.43	14.01	24.60	2.51	0.77
2045	.6	.7	5527.68	14.62	24.90	2.62	0.77
2072	.6	.7	5054.18	15.32	27.10	2.62	0.77
2099	.6	.7	4586.67	15.73	25.50	2.56	0.77
2018	.5	.7	5566.08	11.77	9.60	4.75	0.17
2045	.5	.7	5313.39	12.46	10.70	4.79	0.17
2072	.5	.7	4851.03	13.11	10.50	4.83	0.17
2099	.5	.7	4406.25	13.32	9.10	4.96	0.17
2018	.5	.7	5566.08	11.77	26.30	4.75	0.47
2045	.5	.7	5313.39	12.46	29.40	4.79	0.47
2072	.5	.7	4851.03	13.11	28.80	4.83	0.47
2099	.5	.7	4406.25	13.32	25.10	4.96	0.47
2018	.5	.7	5566.08	11.77	43.10	4.75	0.77
2045	.5	.7	5313.39	12.46	48.10	4.79	0.77
2072	.5	.7	4851.03	13.11	47.20	4.83	0.77

2099	.5	.7	4406.25	13.32	41.20	4.96	0.77
2018	.4	.7	5250.79	9.48	14.10	7.04	0.17
2045	.4	.7	5007.90	10.04	14.30	7.20	0.17
2072	.4	.7	4524.76	10.70	14.60	7.24	0.17
2099	.4	.7	4100.75	10.89	13.20	7.39	0.17
2018	.4	.7	5250.79	9.48	38.80	7.04	0.47
2045	.4	.7	5007.90	10.04	39.50	7.20	0.47
2072	.4	.7	4524.76	10.70	40.40	7.24	0.47
2099	.4	.7	4100.75	10.89	36.30	7.39	0.47
2018	.4	.7	5250.79	9.48	63.60	7.04	0.77
2045	.4	.7	5007.90	10.04	64.60	7.20	0.77
2072	.4	.7	4524.76	10.70	66.10	7.24	0.77
2099	.4	.7	4100.75	10.89	59.50	7.39	0.77
2018	.3	.7	4626.26	6.63	20.80	9.89	0.17
2045	.3	.7	4342.92	7.20	21.50	10.05	0.17
2072	.3	.7	3906.75	7.52	20.30	10.42	0.17
2099	.3	.7	3590.87	7.93	17.80	10.35	0.17
2018	.3	.7	4626.26	6.63	57.40	9.89	0.47
2045	.3	.7	4342.92	7.20	59.40	10.05	0.47
2072	.3	.7	3906.75	7.52	56.00	10.42	0.47
2099	.3	.7	3590.87	7.93	49.10	10.35	0.47
2018	.3	.7	4626.26	6.63	93.90	9.89	0.77
2045	.3	.7	4342.92	7.20	97.30	10.05	0.77
2072	.3	.7	3906.75	7.52	91.60	10.42	0.77
2099	.3	.7	3590.87	7.93	80.40	10.35	0.77
2018	.2	.7	3630.96	3.36	28.50	13.16	0.17
2045	.2	.7	3410.41	3.57	27.40	13.68	0.17

2072	.2	.7	3015.85	3.67	25.40	14.27	0.17
2099	.2	.7	2728.82	3.75	22.80	14.53	0.17
2018	.2	.7	3630.96	3.36	78.60	13.16	0.47
2045	.2	.7	3410.41	3.57	75.70	13.68	0.47
2072	.2	.7	3015.85	3.67	70.20	14.27	0.47
2099	.2	.7	2728.82	3.75	62.90	14.53	0.47
2018	.2	.7	3630.96	3.36	128.80	13.16	0.77
2045	.2	.7	3410.41	3.57	124.00	13.68	0.77
2072	.2	.7	3015.85	3.67	115.00	14.27	0.77
2099	.2	.7	2728.82	3.75	103.00	14.53	0.77
2018	RAINFED	.7	2682.09	0.00	32.50	16.52	0.17
2045	RAINFED	.7	2505.75	0.00	30.70	17.25	0.17
2072	RAINFED	.7	2217.67	0.00	27.80	17.94	0.17
2099	RAINFED	.7	2044.27	0.00	24.50	18.28	0.17
2018	RAINFED	.7	2682.09	0.00	89.70	16.52	0.47
2045	RAINFED	.7	2505.75	0.00	84.70	17.25	0.47
2072	RAINFED	.7	2217.67	0.00	76.80	17.94	0.47
2099	RAINFED	.7	2044.27	0.00	67.60	18.28	0.47
2018	RAINFED	.7	2682.09	0.00	146.90	16.52	0.77
2045	RAINFED	.7	2505.75	0.00	138.70	17.25	0.77
2072	RAINFED	.7	2217.67	0.00	125.80	17.94	0.77
2099	RAINFED	.7	2044.27	0.00	110.70	18.28	0.77

Table B.8: Divergent Water Price for Risk Neutral Farmers ,SEMINOLE ,GA ,PEANUT ,RCP85

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	5811.23	14.46	5.10	2.81	0.17
2045	.6	.7	5295.90	15.02	4.80	2.44	0.17
2072	.6	.7	4305.33	17.10	5.90	2.34	0.17
2099	.6	.7	2906.57	19.57	8.00	2.92	0.17
2018	.6	.7	5811.23	14.46	13.90	2.81	0.47
2045	.6	.7	5295.90	15.02	13.30	2.44	0.47
2072	.6	.7	4305.33	17.10	16.10	2.34	0.47
2099	.6	.7	2906.57	19.57	22.00	2.92	0.47
2018	.6	.7	5811.23	14.46	22.70	2.81	0.77
2045	.6	.7	5295.90	15.02	21.70	2.44	0.77
2072	.6	.7	4305.33	17.10	26.40	2.34	0.77
2099	.6	.7	2906.57	19.57	36.10	2.92	0.77
2018	.5	.7	5621.60	12.28	9.30	4.98	0.17
2045	.5	.7	5096.34	12.66	9.50	4.80	0.17
2072	.5	.7	4096.37	14.51	10.00	4.93	0.17
2099	.5	.7	2749.14	17.36	9.80	5.13	0.17
2018	.5	.7	5621.60	12.28	25.80	4.98	0.47
2045	.5	.7	5096.34	12.66	26.30	4.80	0.47
2072	.5	.7	4096.37	14.51	27.60	4.93	0.47
2099	.5	.7	2749.14	17.36	27.00	5.13	0.47
2018	.5	.7	5621.60	12.28	42.20	4.98	0.77
2045	.5	.7	5096.34	12.66	43.10	4.80	0.77
2072	.5	.7	4096.37	14.51	45.10	4.93	0.77

2099	.5	.7	2749.14	17.36	44.20	5.13	0.77
2018	.4	.7	5347.08	9.99	12.80	7.28	0.17
2045	.4	.7	4781.52	10.24	13.80	7.22	0.17
2072	.4	.7	3786.81	11.88	13.50	7.57	0.17
2099	.4	.7	2488.73	14.36	11.60	8.13	0.17
2018	.4	.7	5347.08	9.99	35.40	7.28	0.47
2045	.4	.7	4781.52	10.24	38.00	7.22	0.47
2072	.4	.7	3786.81	11.88	37.20	7.57	0.47
2099	.4	.7	2488.73	14.36	32.10	8.13	0.47
2018	.4	.7	5347.08	9.99	57.90	7.28	0.77
2045	.4	.7	4781.52	10.24	62.20	7.22	0.77
2072	.4	.7	3786.81	11.88	61.00	7.57	0.77
2099	.4	.7	2488.73	14.36	52.60	8.13	0.77
2018	.3	.7	4743.40	6.90	18.90	10.36	0.17
2045	.3	.7	4136.80	7.26	20.50	10.20	0.17
2072	.3	.7	3176.45	8.62	19.00	10.82	0.17
2099	.3	.7	2055.33	10.76	14.40	11.73	0.17
2018	.3	.7	4743.40	6.90	52.20	10.36	0.47
2045	.3	.7	4136.80	7.26	56.60	10.20	0.47
2072	.3	.7	3176.45	8.62	52.60	10.82	0.47
2099	.3	.7	2055.33	10.76	39.60	11.73	0.47
2018	.3	.7	4743.40	6.90	85.50	10.36	0.77
2045	.3	.7	4136.80	7.26	92.70	10.20	0.77
2072	.3	.7	3176.45	8.62	86.10	10.82	0.77
2099	.3	.7	2055.33	10.76	64.90	11.73	0.77
2018	.2	.7	3725.04	3.38	26.60	13.88	0.17
2045	.2	.7	3158.93	3.54	27.00	13.92	0.17

2072	.2	.7	2304.02	4.03	23.00	15.42	0.17
2099	.2	.7	1392.10	5.38	16.50	17.11	0.17
2018	.2	.7	3725.04	3.38	73.50	13.88	0.47
2045	.2	.7	3158.93	3.54	74.50	13.92	0.47
2072	.2	.7	2304.02	4.03	63.50	15.42	0.47
2099	.2	.7	1392.10	5.38	45.40	17.11	0.47
2018	.2	.7	3725.04	3.38	120.40	13.88	0.77
2045	.2	.7	3158.93	3.54	122.00	13.92	0.77
2072	.2	.7	2304.02	4.03	104.00	15.42	0.77
2099	.2	.7	1392.10	5.38	74.40	17.11	0.77
2018	RAINFED	.7	2825.14	0.00	30.30	17.27	0.17
2045	RAINFED	.7	2324.41	0.00	29.60	17.46	0.17
2072	RAINFED	.7	1645.32	0.00	24.00	19.44	0.17
2099	RAINFED	.7	900.21	0.00	16.20	22.49	0.17
2018	RAINFED	.7	2825.14	0.00	83.60	17.27	0.47
2045	RAINFED	.7	2324.41	0.00	81.90	17.46	0.47
2072	RAINFED	.7	1645.32	0.00	66.30	19.44	0.47
2099	RAINFED	.7	900.21	0.00	44.80	22.49	0.47
2018	RAINFED	.7	2825.14	0.00	136.90	17.27	0.77
2045	RAINFED	.7	2324.41	0.00	134.10	17.46	0.77
2072	RAINFED	.7	1645.32	0.00	108.60	19.44	0.77
2099	RAINFED	.7	900.21	0.00	73.40	22.49	0.77

B.2 SOYBEAN

B.2.1 SIOUX, IA

Table B.9: Divergent Water Price for Risk Neutral Farmers ,SIOUX ,IA ,SOYBEAN

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	115.80	8.19	0.40	1.16	5.20
2018	.6	.7	115.80	8.19	0.70	1.16	9.60
2018	.6	.7	115.80	8.19	1.10	1.16	16.40
2018	.5	.7	115.80	7.57	0.30	1.78	5.20
2045	.5	.6	117.43	8.09	0.10	0.58	5.20
2099	.5	.6	117.25	7.89	0.20	0.71	5.20
2018	.5	.7	115.80	7.57	0.50	1.78	9.60
2045	.5	.6	117.43	8.09	0.20	0.58	9.60
2099	.5	.6	117.25	7.89	0.30	0.71	9.60
2018	.5	.7	115.80	7.57	0.70	1.78	16.40
2045	.5	.6	117.43	8.09	0.30	0.58	16.40
2099	.5	.6	117.25	7.89	0.50	0.71	16.40
2018	.4	.7	115.78	6.73	0.20	2.62	5.20
2045	.4	.6	117.36	7.31	0.30	1.36	5.20
2072	.4	.5	117.43	7.02	0.20	0.77	5.20
2099	.4	.6	117.21	7.26	0.30	1.33	5.20
2018	.4	.7	115.78	6.73	0.40	2.62	9.60
2045	.4	.6	117.36	7.31	0.60	1.36	9.60
2072	.4	.5	117.43	7.02	0.30	0.77	9.60
2099	.4	.6	117.21	7.26	0.50	1.33	9.60
2018	.4	.7	115.78	6.73	0.70	2.62	16.40
2045	.4	.6	117.36	7.31	1.00	1.36	16.40

2072	.4	.5	117.43	7.02	0.60	0.77	16.40
2099	.4	.6	117.21	7.26	0.80	1.33	16.40
2018	.3	.7	115.50	5.92	0.60	3.43	5.20
2045	.3	.6	116.92	6.79	1.50	1.89	5.20
2072	.3	.5	117.09	6.47	1.50	1.32	5.20
2099	.3	.6	116.56	6.64	1.90	1.96	5.20
2018	.3	.7	115.50	5.92	1.10	3.43	9.60
2045	.3	.6	116.92	6.79	2.70	1.89	9.60
2072	.3	.5	117.09	6.47	2.70	1.32	9.60
2099	.3	.6	116.56	6.64	3.50	1.96	9.60
2018	.3	.7	115.50	5.92	1.90	3.43	16.40
2045	.3	.6	116.92	6.79	4.50	1.89	16.40
2072	.3	.5	117.09	6.47	4.60	1.32	16.40
2099	.3	.6	116.56	6.64	6.00	1.96	16.40
2018	.2	.7	111.44	5.11	5.50	4.24	5.20
2045	.2	.6	111.38	5.67	10.50	3.01	5.20
2072	.2	.5	111.95	5.40	12.00	2.39	5.20
2099	.2	.6	111.10	5.61	10.80	2.99	5.20
2018	.2	.7	111.44	5.11	10.10	4.24	9.60
2045	.2	.6	111.38	5.67	19.30	3.01	9.60
2072	.2	.5	111.95	5.40	22.20	2.39	9.60
2099	.2	.6	111.10	5.61	19.80	2.99	9.60
2018	.2	.7	111.44	5.11	17.20	4.24	16.40
2045	.2	.6	111.38	5.67	33.00	3.01	16.40
2072	.2	.5	111.95	5.40	37.90	2.39	16.40
2099	.2	.6	111.10	5.61	33.80	2.99	16.40
2018	RAINFED	.7	77.01	0.00	21.70	9.35	5.20

2045	RAINFED	.6	71.41	0.00	27.60	8.68	5.20
2072	RAINFED	.5	75.05	0.00	28.40	7.79	5.20
2099	RAINFED	.6	69.90	0.00	28.70	8.60	5.20
2018	RAINFED	.7	77.01	0.00	39.90	9.35	9.60
2045	RAINFED	.6	71.41	0.00	51.00	8.68	9.60
2072	RAINFED	.5	75.05	0.00	52.30	7.79	9.60
2099	RAINFED	.6	69.90	0.00	52.90	8.60	9.60
2018	RAINFED	.7	77.01	0.00	68.20	9.35	16.40
2045	RAINFED	.6	71.41	0.00	87.00	8.68	16.40
2072	RAINFED	.5	75.05	0.00	89.30	7.79	16.40
2099	RAINFED	.6	69.90	0.00	90.40	8.60	16.40

Table B.10: Divergent Water Price for Risk Neutral Farmers ,SIOUX ,IA ,SOYBEAN

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	115.26	7.98	0.20	1.11	5.20
2045	.6	.7	117.40	9.13	0.70	0.96	5.20
2018	.6	.7	115.26	7.98	0.30	1.11	9.60
2045	.6	.7	117.40	9.13	1.30	0.96	9.60
2018	.6	.7	115.26	7.98	0.50	1.11	16.40
2045	.6	.7	117.40	9.13	2.20	0.96	16.40
2018	.5	.7	115.26	7.28	0.10	1.81	5.20
2045	.5	.7	117.41	8.38	0.40	1.71	5.20
2072	.5	.6	118.33	8.79	0.10	0.75	5.20
2099	.5	.6	119.29	8.71	0.10	0.74	5.20
2018	.5	.7	115.26	7.28	0.20	1.81	9.60
2045	.5	.7	117.41	8.38	0.80	1.71	9.60
2072	.5	.6	118.33	8.79	0.10	0.75	9.60
2099	.5	.6	119.29	8.71	0.20	0.74	9.60
2018	.5	.7	115.26	7.28	0.30	1.81	16.40
2045	.5	.7	117.41	8.38	1.30	1.71	16.40
2072	.5	.6	118.33	8.79	0.10	0.75	16.40
2099	.5	.6	119.29	8.71	0.30	0.74	16.40
2018	.4	.7	115.24	6.69	0.10	2.41	5.20
2045	.4	.7	117.34	7.73	0.50	2.35	5.20
2072	.4	.6	118.24	8.06	0.40	1.47	5.20
2099	.4	.6	119.20	7.97	0.40	1.48	5.20
2018	.4	.7	115.24	6.69	0.20	2.41	9.60
2045	.4	.7	117.34	7.73	0.80	2.35	9.60

2072	.4	.6	118.24	8.06	0.60	1.47	9.60
2099	.4	.6	119.20	7.97	0.70	1.48	9.60
2018	.4	.7	115.24	6.69	0.40	2.41	16.40
2045	.4	.7	117.34	7.73	1.40	2.35	16.40
2072	.4	.6	118.24	8.06	1.10	1.47	16.40
2099	.4	.6	119.20	7.97	1.20	1.48	16.40
2018	.3	.7	114.99	5.98	0.50	3.12	5.20
2045	.3	.7	116.93	7.04	1.10	3.04	5.20
2072	.3	.6	117.46	7.50	2.30	2.04	5.20
2099	.3	.6	118.33	7.37	2.50	2.08	5.20
2018	.3	.7	114.99	5.98	1.00	3.12	9.60
2045	.3	.7	116.93	7.04	2.00	3.04	9.60
2072	.3	.6	117.46	7.50	4.20	2.04	9.60
2099	.3	.6	118.33	7.37	4.50	2.08	9.60
2018	.3	.7	114.99	5.98	1.60	3.12	16.40
2045	.3	.7	116.93	7.04	3.30	3.04	16.40
2072	.3	.6	117.46	7.50	7.10	2.04	16.40
2099	.3	.6	118.33	7.37	7.70	2.08	16.40
2018	.2	.7	110.73	5.12	6.00	3.98	5.20
2045	.2	.7	110.59	5.96	8.80	4.12	5.20
2072	.2	.6	111.10	6.28	11.60	3.26	5.20
2099	.2	.6	111.83	6.19	12.00	3.26	5.20
2018	.2	.7	110.73	5.12	11.00	3.98	9.60
2045	.2	.7	110.59	5.96	16.20	4.12	9.60
2072	.2	.6	111.10	6.28	21.40	3.26	9.60
2099	.2	.6	111.83	6.19	22.10	3.26	9.60
2018	.2	.7	110.73	5.12	18.80	3.98	16.40

2045	.2	.7	110.59	5.96	27.60	4.12	16.40
2072	.2	.6	111.10	6.28	36.40	3.26	16.40
2099	.2	.6	111.83	6.19	37.70	3.26	16.40
2018	RAINFED	.7	75.62	0.00	22.70	9.09	5.20
2045	RAINFED	.7	68.72	0.00	25.20	10.08	5.20
2072	RAINFED	.6	67.71	0.00	27.70	9.54	5.20
2099	RAINFED	.6	67.68	0.00	28.50	9.45	5.20
2018	RAINFED	.7	75.62	0.00	41.90	9.09	9.60
2045	RAINFED	.7	68.72	0.00	46.50	10.08	9.60
2072	RAINFED	.6	67.71	0.00	51.00	9.54	9.60
2099	RAINFED	.6	67.68	0.00	52.50	9.45	9.60
2018	RAINFED	.7	75.62	0.00	71.60	9.09	16.40
2045	RAINFED	.7	68.72	0.00	79.40	10.08	16.40
2072	RAINFED	.6	67.71	0.00	87.10	9.54	16.40
2099	RAINFED	.6	67.68	0.00	89.60	9.45	16.40

Table B.11: Divergent Water Price for Risk Neutral Farmers ,SIOUX ,IA ,SOYBEAN

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	115.70	8.38	0.60	1.07	5.20
2045	.6	.7	116.87	8.53	0.10	0.97	5.20
2072	.6	.7	118.99	9.59	0.10	1.17	5.20
2018	.6	.7	115.70	8.38	1.10	1.07	9.60
2045	.6	.7	116.87	8.53	0.10	0.97	9.60
2072	.6	.7	118.99	9.59	0.20	1.17	9.60
2018	.6	.7	115.70	8.38	1.80	1.07	16.40
2045	.6	.7	116.87	8.53	0.20	0.97	16.40
2072	.6	.7	118.99	9.59	0.30	1.17	16.40
2018	.5	.7	115.70	7.50	0.30	1.95	5.20
2045	.5	.7	116.86	7.73	0.10	1.76	5.20
2072	.5	.7	118.99	8.91	0.10	1.85	5.20
2099	.5	.6	119.48	9.66	0.30	0.62	5.20
2018	.5	.7	115.70	7.50	0.60	1.95	9.60
2045	.5	.7	116.86	7.73	0.10	1.76	9.60
2072	.5	.7	118.99	8.91	0.10	1.85	9.60
2099	.5	.6	119.48	9.66	0.50	0.62	9.60
2018	.5	.7	115.70	7.50	1.00	1.95	16.40
2045	.5	.7	116.86	7.73	0.20	1.76	16.40
2072	.5	.7	118.99	8.91	0.20	1.85	16.40
2099	.5	.6	119.48	9.66	0.80	0.62	16.40
2018	.4	.7	115.69	6.78	0.30	2.67	5.20
2045	.4	.7	116.87	6.94	0.10	2.55	5.20
2072	.4	.7	118.93	8.23	0.20	2.54	5.20

2099	.4	.6	119.40	8.89	0.40	1.39	5.20
2018	.4	.7	115.69	6.78	0.50	2.67	9.60
2045	.4	.7	116.87	6.94	0.10	2.55	9.60
2072	.4	.7	118.93	8.23	0.30	2.54	9.60
2099	.4	.6	119.40	8.89	0.80	1.39	9.60
2018	.4	.7	115.69	6.78	0.80	2.67	16.40
2045	.4	.7	116.87	6.94	0.10	2.55	16.40
2072	.4	.7	118.93	8.23	0.50	2.54	16.40
2099	.4	.6	119.40	8.89	1.30	1.39	16.40
2018	.3	.7	115.37	6.14	0.70	3.30	5.20
2045	.3	.7	116.58	6.26	0.50	3.24	5.20
2072	.3	.7	117.96	7.41	1.70	3.35	5.20
2099	.3	.6	118.32	8.25	3.10	2.04	5.20
2018	.3	.7	115.37	6.14	1.30	3.30	9.60
2045	.3	.7	116.58	6.26	0.90	3.24	9.60
2072	.3	.7	117.96	7.41	3.10	3.35	9.60
2099	.3	.6	118.32	8.25	5.60	2.04	9.60
2018	.3	.7	115.37	6.14	2.20	3.30	16.40
2045	.3	.7	116.58	6.26	1.60	3.24	16.40
2072	.3	.7	117.96	7.41	5.20	3.35	16.40
2099	.3	.6	118.32	8.25	9.60	2.04	16.40
2018	.2	.7	111.00	5.20	5.90	4.25	5.20
2045	.2	.7	111.40	5.15	6.60	4.35	5.20
2072	.2	.7	111.06	6.32	9.30	4.45	5.20
2099	.2	.6	110.90	6.91	13.30	3.37	5.20
2018	.2	.7	111.00	5.20	10.90	4.25	9.60
2045	.2	.7	111.40	5.15	12.10	4.35	9.60

2072	.2	.7	111.06	6.32	17.20	4.45	9.60
2099	.2	.6	110.90	6.91	24.50	3.37	9.60
2018	.2	.7	111.00	5.20	18.60	4.25	16.40
2045	.2	.7	111.40	5.15	20.70	4.35	16.40
2072	.2	.7	111.06	6.32	29.40	4.45	16.40
2099	.2	.6	110.90	6.91	41.90	3.37	16.40
2018	RAINFED	.7	74.04	0.00	23.00	9.45	5.20
2045	RAINFED	.7	74.96	0.00	23.00	9.50	5.20
2072	RAINFED	.7	67.32	0.00	25.00	10.76	5.20
2099	RAINFED	.6	63.82	0.00	28.20	10.29	5.20
2018	RAINFED	.7	74.04	0.00	42.50	9.45	9.60
2045	RAINFED	.7	74.96	0.00	42.40	9.50	9.60
2072	RAINFED	.7	67.32	0.00	46.10	10.76	9.60
2099	RAINFED	.6	63.82	0.00	52.00	10.29	9.60
2018	RAINFED	.7	74.04	0.00	72.50	9.45	16.40
2045	RAINFED	.7	74.96	0.00	72.40	9.50	16.40
2072	RAINFED	.7	67.32	0.00	78.80	10.76	16.40
2099	RAINFED	.6	63.82	0.00	88.80	10.29	16.40

Table B.12: Divergent Water Price for Risk Neutral Farmers ,SIOUX ,IA ,SOYBEAN

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	116.15	8.69	1.00	0.79	5.20
2045	.6	.7	118.38	9.21	0.30	0.88	5.20
2072	.6	.7	118.89	11.04	0.50	0.87	5.20
2099	.6	.7	117.39	14.28	0.40	0.94	5.20
2018	.6	.7	116.15	8.69	1.90	0.79	9.60
2045	.6	.7	118.38	9.21	0.40	0.88	9.60
2072	.6	.7	118.89	11.04	0.90	0.87	9.60
2099	.6	.7	117.39	14.28	0.70	0.94	9.60
2018	.6	.7	116.15	8.69	3.20	0.79	16.40
2045	.6	.7	118.38	9.21	0.70	0.88	16.40
2072	.6	.7	118.89	11.04	1.40	0.87	16.40
2099	.6	.7	117.39	14.28	1.20	0.94	16.40
2018	.5	.7	116.15	7.83	0.60	1.65	5.20
2045	.5	.7	118.35	8.58	0.30	1.51	5.20
2072	.5	.7	118.80	10.28	0.60	1.63	5.20
2099	.5	.7	117.07	13.64	1.30	1.58	5.20
2018	.5	.7	116.15	7.83	1.00	1.65	9.60
2045	.5	.7	118.35	8.58	0.40	1.51	9.60
2072	.5	.7	118.80	10.28	1.00	1.63	9.60
2099	.5	.7	117.07	13.64	2.40	1.58	9.60
2018	.5	.7	116.15	7.83	1.60	1.65	16.40
2045	.5	.7	118.35	8.58	0.70	1.51	16.40
2072	.5	.7	118.80	10.28	1.70	1.63	16.40
2099	.5	.7	117.07	13.64	4.10	1.58	16.40

2018	.4	.7	116.12	7.10	0.50	2.38	5.20
2045	.4	.7	118.29	7.88	0.30	2.21	5.20
2072	.4	.7	118.65	9.68	0.80	2.22	5.20
2099	.4	.7	116.36	12.91	2.50	2.31	5.20
2018	.4	.7	116.12	7.10	0.80	2.38	9.60
2045	.4	.7	118.29	7.88	0.60	2.21	9.60
2072	.4	.7	118.65	9.68	1.40	2.22	9.60
2099	.4	.7	116.36	12.91	4.60	2.31	9.60
2018	.4	.7	116.12	7.10	1.30	2.38	16.40
2045	.4	.7	118.29	7.88	0.90	2.21	16.40
2072	.4	.7	118.65	9.68	2.40	2.22	16.40
2099	.4	.7	116.36	12.91	7.80	2.31	16.40
2018	.3	.7	115.64	6.46	1.20	3.02	5.20
2045	.3	.7	117.57	7.22	1.60	2.88	5.20
2072	.3	.7	117.01	8.79	3.30	3.11	5.20
2099	.3	.7	113.53	12.02	6.40	3.20	5.20
2018	.3	.7	115.64	6.46	2.20	3.02	9.60
2045	.3	.7	117.57	7.22	2.90	2.88	9.60
2072	.3	.7	117.01	8.79	6.10	3.11	9.60
2099	.3	.7	113.53	12.02	11.80	3.20	9.60
2018	.3	.7	115.64	6.46	3.60	3.02	16.40
2045	.3	.7	117.57	7.22	4.90	2.88	16.40
2072	.3	.7	117.01	8.79	10.30	3.11	16.40
2099	.3	.7	113.53	12.02	20.20	3.20	16.40
2018	.2	.7	110.83	5.44	7.10	4.04	5.20
2045	.2	.7	111.01	6.12	9.80	3.97	5.20
2072	.2	.7	108.77	7.46	12.00	4.44	5.20

2099	.2	.7	101.35	10.15	16.60	5.07	5.20
2018	.2	.7	110.83	5.44	13.10	4.04	9.60
2045	.2	.7	111.01	6.12	18.00	3.97	9.60
2072	.2	.7	108.77	7.46	22.10	4.44	9.60
2099	.2	.7	101.35	10.15	30.60	5.07	9.60
2018	.2	.7	110.83	5.44	22.30	4.04	16.40
2045	.2	.7	111.01	6.12	30.60	3.97	16.40
2072	.2	.7	108.77	7.46	37.70	4.44	16.40
2099	.2	.7	101.35	10.15	52.20	5.07	16.40
2018	RAINFED	.7	71.35	0.00	24.70	9.48	5.20
2045	RAINFED	.7	67.09	0.00	26.50	10.09	5.20
2072	RAINFED	.7	59.94	0.00	25.80	11.90	5.20
2099	RAINFED	.7	41.70	0.00	25.90	15.22	5.20
2018	RAINFED	.7	71.35	0.00	45.60	9.48	9.60
2045	RAINFED	.7	67.09	0.00	48.90	10.09	9.60
2072	RAINFED	.7	59.94	0.00	47.60	11.90	9.60
2099	RAINFED	.7	41.70	0.00	47.80	15.22	9.60
2018	RAINFED	.7	71.35	0.00	77.80	9.48	16.40
2045	RAINFED	.7	67.09	0.00	83.50	10.09	16.40
2072	RAINFED	.7	59.94	0.00	81.40	11.90	16.40
2099	RAINFED	.7	41.70	0.00	81.70	15.22	16.40

B.2.2 PIATT, IL

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	80.35	6.78	0.20	1.17	5.20

2045	.6	.7	81.30	7.30	0.40	1.13	5.20
2072	.6	.7	80.94	6.36	0.10	1.26	5.20
2099	.6	.7	82.01	7.58	0.40	1.27	5.20
2018	.6	.7	80.35	6.78	0.30	1.17	9.60
2045	.6	.7	81.30	7.30	0.60	1.13	9.60
2072	.6	.7	80.94	6.36	0.20	1.26	9.60
2099	.6	.7	82.01	7.58	0.60	1.27	9.60
2018	.6	.7	80.35	6.78	0.40	1.17	16.40
2045	.6	.7	81.30	7.30	1.00	1.13	16.40
2072	.6	.7	80.94	6.36	0.30	1.26	16.40
2099	.6	.7	82.01	7.58	1.10	1.27	16.40
2018	.5	.7	80.19	6.11	0.60	1.84	5.20
2045	.5	.7	81.12	6.50	0.70	1.93	5.20
2072	.5	.7	80.72	5.85	0.70	1.77	5.20
2099	.5	.7	81.78	6.80	0.80	2.05	5.20
2018	.5	.7	80.19	6.11	1.00	1.84	9.60
2045	.5	.7	81.12	6.50	1.30	1.93	9.60
2072	.5	.7	80.72	5.85	1.30	1.77	9.60
2099	.5	.7	81.78	6.80	1.50	2.05	9.60
2018	.5	.7	80.19	6.11	1.70	1.84	16.40
2045	.5	.7	81.12	6.50	2.20	1.93	16.40
2072	.5	.7	80.72	5.85	2.20	1.77	16.40
2099	.5	.7	81.78	6.80	2.50	2.05	16.40
2018	.4	.7	78.55	5.41	3.80	2.54	5.20
2045	.4	.7	79.35	5.85	4.10	2.57	5.20
2072	.4	.7	79.21	5.13	3.70	2.49	5.20
2099	.4	.7	79.50	6.11	5.00	2.74	5.20

2018	.4	.7	78.55	5.41	7.00	2.54	9.60
2045	.4	.7	79.35	5.85	7.50	2.57	9.60
2072	.4	.7	79.21	5.13	6.80	2.49	9.60
2099	.4	.7	79.50	6.11	9.10	2.74	9.60
2018	.4	.7	78.55	5.41	11.90	2.54	16.40
2045	.4	.7	79.35	5.85	12.90	2.57	16.40
2072	.4	.7	79.21	5.13	11.60	2.49	16.40
2099	.4	.7	79.50	6.11	15.50	2.74	16.40
2018	.3	.7	71.73	4.26	12.30	3.69	5.20
2045	.3	.7	71.54	4.62	13.50	3.80	5.20
2072	.3	.7	72.41	3.97	12.20	3.65	5.20
2099	.3	.7	71.83	4.95	13.80	3.89	5.20
2018	.3	.7	71.73	4.26	22.60	3.69	9.60
2045	.3	.7	71.54	4.62	24.80	3.80	9.60
2072	.3	.7	72.41	3.97	22.50	3.65	9.60
2099	.3	.7	71.83	4.95	25.40	3.89	9.60
2018	.3	.7	71.73	4.26	38.50	3.69	16.40
2045	.3	.7	71.54	4.62	42.40	3.80	16.40
2072	.3	.7	72.41	3.97	38.50	3.65	16.40
2099	.3	.7	71.83	4.95	43.30	3.89	16.40
2018	.2	.7	61.05	2.87	19.90	5.07	5.20
2045	.2	.7	60.73	3.15	20.40	5.28	5.20
2072	.2	.7	61.81	2.63	20.00	4.98	5.20
2099	.2	.7	60.22	3.33	20.60	5.52	5.20
2018	.2	.7	61.05	2.87	36.60	5.07	9.60
2045	.2	.7	60.73	3.15	37.60	5.28	9.60
2072	.2	.7	61.81	2.63	36.90	4.98	9.60

2099		.2	.7	60.22	3.33	38.10	5.52	9.60
2018		.2	.7	61.05	2.87	62.50	5.07	16.40
2045		.2	.7	60.73	3.15	64.20	5.28	16.40
2072		.2	.7	61.81	2.63	63.00	4.98	16.40
2099		.2	.7	60.22	3.33	65.00	5.52	16.40
2018	RAINFED		.7	42.63	0.00	24.70	7.95	5.20
2045	RAINFED		.7	41.52	0.00	24.60	8.43	5.20
2072	RAINFED		.7	44.39	0.00	25.00	7.62	5.20
2099	RAINFED		.7	39.49	0.00	25.10	8.84	5.20
2018	RAINFED		.7	42.63	0.00	45.60	7.95	9.60
2045	RAINFED		.7	41.52	0.00	45.40	8.43	9.60
2072	RAINFED		.7	44.39	0.00	46.10	7.62	9.60
2099	RAINFED		.7	39.49	0.00	46.30	8.84	9.60
2018	RAINFED		.7	42.63	0.00	77.90	7.95	16.40
2045	RAINFED		.7	41.52	0.00	77.60	8.43	16.40
2072	RAINFED		.7	44.39	0.00	78.80	7.62	16.40
2099	RAINFED		.7	39.49	0.00	79.00	8.84	16.40

Table B.13: Divergent Water Price for Risk Neutral Farmers ,PIATT ,IL ,SOYBEAN, RCP26

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	79.67	6.37	0.40	1.35	5.20
2045	.6	.7	80.14	6.32	0.80	1.21	5.20
2072	.6	.7	81.21	6.57	0.90	1.18	5.20
2099	.6	.7	81.60	6.58	0.60	1.10	5.20
2018	.6	.7	79.67	6.37	0.70	1.35	9.60
2045	.6	.7	80.14	6.32	1.40	1.21	9.60
2072	.6	.7	81.21	6.57	1.70	1.18	9.60
2099	.6	.7	81.60	6.58	1.10	1.10	9.60
2018	.6	.7	79.67	6.37	1.10	1.35	16.40
2045	.6	.7	80.14	6.32	2.30	1.21	16.40
2072	.6	.7	81.21	6.57	2.80	1.18	16.40
2099	.6	.7	81.60	6.58	1.90	1.10	16.40
2018	.5	.7	79.59	5.51	0.40	2.20	5.20
2045	.5	.7	79.89	5.50	1.10	2.03	5.20
2072	.5	.7	80.94	5.78	1.30	1.97	5.20
2099	.5	.7	81.14	5.82	1.70	1.86	5.20
2018	.5	.7	79.59	5.51	0.80	2.20	9.60
2045	.5	.7	79.89	5.50	2.00	2.03	9.60
2072	.5	.7	80.94	5.78	2.40	1.97	9.60
2099	.5	.7	81.14	5.82	3.00	1.86	9.60
2018	.5	.7	79.59	5.51	1.30	2.20	16.40
2045	.5	.7	79.89	5.50	3.40	2.03	16.40
2072	.5	.7	80.94	5.78	4.00	1.97	16.40
2099	.5	.7	81.14	5.82	5.10	1.86	16.40
2018	.4	.7	78.17	4.78	2.90	2.94	5.20

2045	.4	.7	77.76	4.78	4.90	2.75	5.20
2072	.4	.7	78.50	4.93	5.40	2.82	5.20
2099	.4	.7	78.36	4.96	6.40	2.73	5.20
2018	.4	.7	78.17	4.78	5.30	2.94	9.60
2045	.4	.7	77.76	4.78	8.90	2.75	9.60
2072	.4	.7	78.50	4.93	10.00	2.82	9.60
2099	.4	.7	78.36	4.96	11.90	2.73	9.60
2018	.4	.7	78.17	4.78	8.90	2.94	16.40
2045	.4	.7	77.76	4.78	15.20	2.75	16.40
2072	.4	.7	78.50	4.93	17.00	2.82	16.40
2099	.4	.7	78.36	4.96	20.20	2.73	16.40
2018	.3	.7	72.01	3.74	10.20	3.97	5.20
2045	.3	.7	71.19	3.73	12.50	3.80	5.20
2072	.3	.7	71.83	3.81	12.70	3.94	5.20
2099	.3	.7	72.23	3.90	13.10	3.78	5.20
2018	.3	.7	72.01	3.74	18.80	3.97	9.60
2045	.3	.7	71.19	3.73	23.10	3.80	9.60
2072	.3	.7	71.83	3.81	23.40	3.94	9.60
2099	.3	.7	72.23	3.90	24.10	3.78	9.60
2018	.3	.7	72.01	3.74	32.10	3.97	16.40
2045	.3	.7	71.19	3.73	39.30	3.80	16.40
2072	.3	.7	71.83	3.81	39.90	3.94	16.40
2099	.3	.7	72.23	3.90	41.20	3.78	16.40
2018	.2	.7	62.05	2.55	17.90	5.16	5.20
2045	.2	.7	61.32	2.36	19.20	5.17	5.20
2072	.2	.7	61.62	2.37	19.20	5.38	5.20
2099	.2	.7	61.29	2.50	20.50	5.19	5.20

2018	.2	.7	62.05	2.55	33.00	5.16	9.60
2045	.2	.7	61.32	2.36	35.30	5.17	9.60
2072	.2	.7	61.62	2.37	35.30	5.38	9.60
2099	.2	.7	61.29	2.50	37.90	5.19	9.60
2018	.2	.7	62.05	2.55	56.30	5.16	16.40
2045	.2	.7	61.32	2.36	60.30	5.17	16.40
2072	.2	.7	61.62	2.37	60.30	5.38	16.40
2099	.2	.7	61.29	2.50	64.60	5.19	16.40
2018	RAINFED	.7	45.92	0.00	22.90	7.71	5.20
2045	RAINFED	.7	45.14	0.00	24.30	7.53	5.20
2072	RAINFED	.7	45.78	0.00	23.90	7.75	5.20
2099	RAINFED	.7	45.45	0.00	24.60	7.68	5.20
2018	RAINFED	.7	45.92	0.00	42.20	7.71	9.60
2045	RAINFED	.7	45.14	0.00	44.90	7.53	9.60
2072	RAINFED	.7	45.78	0.00	44.20	7.75	9.60
2099	RAINFED	.7	45.45	0.00	45.40	7.68	9.60
2018	RAINFED	.7	45.92	0.00	72.00	7.71	16.40
2045	RAINFED	.7	45.14	0.00	76.60	7.53	16.40
2072	RAINFED	.7	45.78	0.00	75.40	7.75	16.40
2099	RAINFED	.7	45.45	0.00	77.50	7.68	16.40

Table B.14: Divergent Water Price for Risk Neutral Farmers ,PIATT ,IL ,SOYBEAN, RCP45

Table B.15: Divergent Water Price for Risk Neutral Farmers ,PIATT ,IL ,SOYBEAN, RCP60

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	79.04	6.23	0.40	1.17	5.20
2045	.6	.7	80.07	6.69	0.50	1.31	5.20
2072	.6	.7	81.38	7.05	0.70	1.05	5.20
2099	.6	.7	81.90	7.14	1.10	1.33	5.20
2018	.6	.7	79.04	6.23	0.60	1.17	9.60
2045	.6	.7	80.07	6.69	0.90	1.31	9.60
2072	.6	.7	81.38	7.05	1.20	1.05	9.60
2099	.6	.7	81.90	7.14	2.00	1.33	9.60
2018	.6	.7	79.04	6.23	1.00	1.17	16.40
2045	.6	.7	80.07	6.69	1.50	1.31	16.40
2072	.6	.7	81.38	7.05	2.00	1.05	16.40
2099	.6	.7	81.90	7.14	3.40	1.33	16.40
2018	.5	.7	78.97	5.48	0.40	1.92	5.20
2045	.5	.7	79.91	5.86	0.70	2.14	5.20
2072	.5	.7	80.99	6.10	1.40	2.00	5.20
2099	.5	.7	81.30	6.48	2.30	1.99	5.20
2018	.5	.7	78.97	5.48	0.70	1.92	9.60
2045	.5	.7	79.91	5.86	1.30	2.14	9.60
2072	.5	.7	80.99	6.10	2.50	2.00	9.60
2099	.5	.7	81.30	6.48	4.30	1.99	9.60
2018	.5	.7	78.97	5.48	1.20	1.92	16.40
2045	.5	.7	79.91	5.86	2.20	2.14	16.40
2072	.5	.7	80.99	6.10	4.20	2.00	16.40
2099	.5	.7	81.30	6.48	7.30	1.99	16.40

2018	.4	.7	77.39	4.71	3.40	2.69	5.20
2045	.4	.7	78.09	5.31	4.10	2.68	5.20
2072	.4	.7	78.78	5.55	5.60	2.56	5.20
2099	.4	.7	78.01	5.63	7.70	2.84	5.20
2018	.4	.7	77.39	4.71	6.20	2.69	9.60
2045	.4	.7	78.09	5.31	7.60	2.68	9.60
2072	.4	.7	78.78	5.55	10.30	2.56	9.60
2099	.4	.7	78.01	5.63	14.10	2.84	9.60
2018	.4	.7	77.39	4.71	10.50	2.69	16.40
2045	.4	.7	78.09	5.31	12.90	2.68	16.40
2072	.4	.7	78.78	5.55	17.50	2.56	16.40
2099	.4	.7	78.01	5.63	24.10	2.84	16.40
2018	.3	.7	71.24	3.86	11.60	3.54	5.20
2045	.3	.7	71.23	4.23	12.40	3.76	5.20
2072	.3	.7	71.17	4.39	14.50	3.72	5.20
2099	.3	.7	70.85	4.49	14.90	3.98	5.20
2018	.3	.7	71.24	3.86	21.40	3.54	9.60
2045	.3	.7	71.23	4.23	22.90	3.76	9.60
2072	.3	.7	71.17	4.39	26.70	3.72	9.60
2099	.3	.7	70.85	4.49	27.40	3.98	9.60
2018	.3	.7	71.24	3.86	36.50	3.54	16.40
2045	.3	.7	71.23	4.23	39.10	3.76	16.40
2072	.3	.7	71.17	4.39	45.60	3.72	16.40
2099	.3	.7	70.85	4.49	46.70	3.98	16.40
2018	.2	.7	61.93	2.48	18.20	4.92	5.20
2045	.2	.7	60.79	2.80	19.40	5.20	5.20
2072	.2	.7	60.53	2.90	21.00	5.21	5.20

2099	.2	.7	58.60	2.86	21.90	5.61	5.20
2018	.2	.7	61.93	2.48	33.50	4.92	9.60
2045	.2	.7	60.79	2.80	35.90	5.20	9.60
2072	.2	.7	60.53	2.90	38.70	5.21	9.60
2099	.2	.7	58.60	2.86	40.40	5.61	9.60
2018	.2	.7	61.93	2.48	57.30	4.92	16.40
2045	.2	.7	60.79	2.80	61.20	5.20	16.40
2072	.2	.7	60.53	2.90	66.10	5.21	16.40
2099	.2	.7	58.60	2.86	69.00	5.61	16.40
2018	RAINFED	.7	43.93	0.00	24.80	7.40	5.20
2045	RAINFED	.7	42.90	0.00	24.30	8.00	5.20
2072	RAINFED	.7	41.61	0.00	25.60	8.10	5.20
2099	RAINFED	.7	41.12	0.00	25.30	8.46	5.20
2018	RAINFED	.7	43.93	0.00	45.70	7.40	9.60
2045	RAINFED	.7	42.90	0.00	44.80	8.00	9.60
2072	RAINFED	.7	41.61	0.00	47.30	8.10	9.60
2099	RAINFED	.7	41.12	0.00	46.60	8.46	9.60
2018	RAINFED	.7	43.93	0.00	78.00	7.40	16.40
2045	RAINFED	.7	42.90	0.00	76.50	8.00	16.40
2072	RAINFED	.7	41.61	0.00	80.80	8.10	16.40
2099	RAINFED	.7	41.12	0.00	79.60	8.46	16.40

Table B.16: Divergent Water Price for Risk Neutral Farmers ,PIATT ,IL ,SOYBEAN, RCP85

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.6	.7	79.47	6.13	0.40	1.24	5.20
2045	.6	.7	80.80	6.38	0.70	1.18	5.20
2072	.6	.7	83.17	7.91	1.90	1.11	5.20
2099	.6	.7	84.10	9.95	3.40	1.00	5.20
2018	.6	.7	79.47	6.13	0.70	1.24	9.60
2045	.6	.7	80.80	6.38	1.30	1.18	9.60
2072	.6	.7	83.17	7.91	3.50	1.11	9.60
2099	.6	.7	84.10	9.95	6.30	1.00	9.60
2018	.6	.7	79.47	6.13	1.10	1.24	16.40
2045	.6	.7	80.80	6.38	2.10	1.18	16.40
2072	.6	.7	83.17	7.91	6.00	1.11	16.40
2099	.6	.7	84.10	9.95	10.70	1.00	16.40
2018	.5	.7	79.36	5.45	0.60	1.92	5.20
2045	.5	.7	80.49	5.74	1.40	1.81	5.20
2072	.5	.7	82.27	7.07	3.50	1.95	5.20
2099	.5	.7	82.69	9.14	6.00	1.81	5.20
2018	.5	.7	79.36	5.45	1.00	1.92	9.60
2045	.5	.7	80.49	5.74	2.50	1.81	9.60
2072	.5	.7	82.27	7.07	6.40	1.95	9.60
2099	.5	.7	82.69	9.14	11.00	1.81	9.60
2018	.5	.7	79.36	5.45	1.60	1.92	16.40
2045	.5	.7	80.49	5.74	4.20	1.81	16.40
2072	.5	.7	82.27	7.07	11.00	1.95	16.40
2099	.5	.7	82.69	9.14	18.80	1.81	16.40

2018	.4	.7	77.97	4.64	3.00	2.73	5.20
2045	.4	.7	78.01	5.03	6.10	2.53	5.20
2072	.4	.7	78.12	6.16	10.00	2.86	5.20
2099	.4	.7	76.73	7.89	13.70	3.06	5.20
2018	.4	.7	77.97	4.64	5.60	2.73	9.60
2045	.4	.7	78.01	5.03	11.20	2.53	9.60
2072	.4	.7	78.12	6.16	18.40	2.86	9.60
2099	.4	.7	76.73	7.89	25.20	3.06	9.60
2018	.4	.7	77.97	4.64	9.50	2.73	16.40
2045	.4	.7	78.01	5.03	19.10	2.53	16.40
2072	.4	.7	78.12	6.16	31.30	2.86	16.40
2099	.4	.7	76.73	7.89	43.00	3.06	16.40
2018	.3	.7	71.68	3.70	11.20	3.68	5.20
2045	.3	.7	71.83	3.85	12.80	3.71	5.20
2072	.3	.7	70.02	4.83	16.80	4.19	5.20
2099	.3	.7	66.99	6.40	20.30	4.55	5.20
2018	.3	.7	71.68	3.70	20.60	3.68	9.60
2045	.3	.7	71.83	3.85	23.70	3.71	9.60
2072	.3	.7	70.02	4.83	31.10	4.19	9.60
2099	.3	.7	66.99	6.40	37.50	4.55	9.60
2018	.3	.7	71.68	3.70	35.10	3.68	16.40
2045	.3	.7	71.83	3.85	40.40	3.71	16.40
2072	.3	.7	70.02	4.83	53.00	4.19	16.40
2099	.3	.7	66.99	6.40	64.10	4.55	16.40
2018	.2	.7	62.08	2.44	18.50	4.93	5.20
2045	.2	.7	60.95	2.46	20.40	5.10	5.20
2072	.2	.7	58.77	3.30	22.60	5.72	5.20

2099	.2	.7	54.08	4.39	24.40	6.56	5.20
2018	.2	.7	62.08	2.44	34.00	4.93	9.60
2045	.2	.7	60.95	2.46	37.70	5.10	9.60
2072	.2	.7	58.77	3.30	41.60	5.72	9.60
2099	.2	.7	54.08	4.39	44.90	6.56	9.60
2018	.2	.7	62.08	2.44	58.10	4.93	16.40
2045	.2	.7	60.95	2.46	64.30	5.10	16.40
2072	.2	.7	58.77	3.30	71.10	5.72	16.40
2099	.2	.7	54.08	4.39	76.70	6.56	16.40
2018	RAINFED	.7	46.25	0.00	23.50	7.37	5.20
2045	RAINFED	.7	44.75	0.00	25.00	7.56	5.20
2072	RAINFED	.7	38.73	0.00	25.90	9.02	5.20
2099	RAINFED	.7	31.57	0.00	25.30	10.95	5.20
2018	RAINFED	.7	46.25	0.00	43.40	7.37	9.60
2045	RAINFED	.7	44.75	0.00	46.00	7.56	9.60
2072	RAINFED	.7	38.73	0.00	47.80	9.02	9.60
2099	RAINFED	.7	31.57	0.00	46.70	10.95	9.60
2018	RAINFED	.7	46.25	0.00	74.10	7.37	16.40
2045	RAINFED	.7	44.75	0.00	78.60	7.56	16.40
2072	RAINFED	.7	38.73	0.00	81.60	9.02	16.40
2099	RAINFED	.7	31.57	0.00	79.70	10.95	16.40

B.3 CORN

B.3.1 DEKALB, IL

Table B.17: Divergent Water Price for Risk Neutral Farmers, DEKALB, IL, CORN, RCP26

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.2	.3	211.97	5.54	0.10	1.15	2.40
2045	.2	.3	196.44	5.20	0.20	1.09	2.40
2072	.2	.3	195.52	4.82	0.20	1.14	2.40
2099	.2	.5	198.16	5.45	0.20	1.06	2.40
2018	.2	.6	211.97	5.54	0.20	1.15	4.00
2045	.2	.2	196.44	5.20	0.30	1.09	4.00
2072	.2	.3	195.52	4.82	0.30	1.14	4.00
2099	.2	.5	198.16	5.45	0.20	1.06	4.00
2018	.2	.6	211.97	5.54	0.60	1.15	13.20
2045	.2	.2	196.44	5.20	1.00	1.09	13.20
2072	.2	.3	195.52	4.82	1.00	1.14	13.20
2099	.2	.5	198.16	5.45	0.70	1.06	13.20
2018	RAINFED	.6	141.12	0.00	27.90	6.69	2.40
2045	RAINFED	.2	142.02	0.00	22.70	6.29	2.40
2072	RAINFED	.9	144.01	0.00	22.70	5.96	2.40
2099	RAINFED	.5	139.85	0.00	23.30	6.51	2.40
2018	RAINFED	.6	141.12	0.00	46.40	6.69	4.00
2045	RAINFED	.2	142.02	0.00	37.90	6.29	4.00
2072	RAINFED	.9	144.01	0.00	37.80	5.96	4.00
2099	RAINFED	.5	139.85	0.00	38.80	6.51	4.00
2018	RAINFED	.6	141.12	0.00	153.10	6.69	13.20
2045	RAINFED	.2	142.02	0.00	124.80	6.29	13.20

2072	RAINFED	.9	144.01	0.00	124.70	5.96	13.20
2099	RAINFED	.5	139.85	0.00	127.80	6.51	13.20

Table B.18: Divergent Water Price for Risk Neutral Farmers, DEKALB, IL, CORN, RCP45

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.2	.2	217.35	5.04	0.30	1.19	2.40
2045	.2	.3	188.76	5.07	0.70	1.32	2.40
2072	.2	.3	170.75	4.97	0.30	1.11	2.40
2099	.2	.2	169.07	5.02	0.50	1.20	2.40
2018	.2	.2	217.35	5.04	0.40	1.19	4.00
2045	.2	.3	188.76	5.07	1.20	1.32	4.00
2072	.2	.3	170.75	4.97	0.50	1.11	4.00
2099	.2	.2	169.07	5.02	0.80	1.20	4.00
2018	.2	.2	217.35	5.04	1.30	1.19	13.20
2045	.2	.3	188.76	5.07	3.90	1.32	13.20
2072	.2	.2	170.75	4.97	1.40	1.11	13.20
2099	.2	.2	169.07	5.02	2.50	1.20	13.20
2018	RAINFED	.2	154.56	0.00	26.70	6.23	2.40
2045	RAINFED	.3	138.00	0.00	21.60	6.39	2.40
2072	RAINFED	.3	123.05	0.00	20.20	6.09	2.40
2099	RAINFED	.2	122.47	0.00	19.90	6.22	2.40
2018	RAINFED	.2	154.56	0.00	44.40	6.23	4.00
2045	RAINFED	.3	138.00	0.00	35.90	6.39	4.00
2072	RAINFED	.3	123.05	0.00	33.70	6.09	4.00
2099	RAINFED	.2	122.47	0.00	33.20	6.22	4.00
2018	RAINFED	.2	154.56	0.00	146.50	6.23	13.20
2045	RAINFED	.3	138.00	0.00	118.30	6.39	13.20
2072	RAINFED	.2	123.05	0.00	110.90	6.09	13.20
2099	RAINFED	.2	122.47	0.00	109.40	6.22	13.20



Table B.19: Divergent Water Price for Risk Neutral Farmers, DEKALB, IL, CORN, RCP60

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.2	.4	214.26	5.24	1.00	1.21	2.40
2045	.2	.5	196.54	5.32	0.40	1.28	2.40
2072	.2	.5	172.59	5.31	0.60	1.24	2.40
2099	.2	.5	160.37	5.33	1.80	1.25	2.40
2018	.2	.4	214.26	5.24	1.60	1.21	4.00
2045	.2	.5	196.54	5.32	0.70	1.28	4.00
2072	.2	.5	172.59	5.31	1.00	1.24	4.00
2099	.2	.5	160.37	5.33	2.90	1.25	4.00
2018	.2	.4	214.26	5.24	5.10	1.21	13.20
2045	.2	.5	196.54	5.32	2.20	1.28	13.20
2072	.2	.5	172.59	5.31	3.20	1.24	13.20
2099	.2	.5	160.37	5.33	9.50	1.25	13.20
2018	RAINFED	.4	150.10	0.00	26.00	6.45	2.40
2045	RAINFED	.5	140.03	0.00	22.60	6.59	2.40
2072	RAINFED	.5	116.26	0.00	22.60	6.54	2.40
2099	RAINFED	.5	110.66	0.00	19.90	6.58	2.40
2018	RAINFED	.4	150.10	0.00	43.40	6.45	4.00
2045	RAINFED	.5	140.03	0.00	37.60	6.59	4.00
2072	RAINFED	.5	116.26	0.00	37.60	6.54	4.00
2099	RAINFED	.5	110.66	0.00	33.20	6.58	4.00
2018	RAINFED	.4	150.10	0.00	143.00	6.45	13.20
2045	RAINFED	.5	140.03	0.00	123.90	6.59	13.20
2072	RAINFED	.5	116.26	0.00	123.80	6.54	13.20
2099	RAINFED	.5	110.66	0.00	109.40	6.58	13.20



Table B.20: Divergent Water Price for Risk Neutral Farmers, DEKALB, IL, CORN, RCP85

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.2	.5	208.51	5.32	0.80	1.20	2.40
2045	.2	.6	173.58	5.47	0.60	1.19	2.40
2072	.2	.6	141.19	5.40	2.40	1.22	2.40
2099	.2	.5	100.87	6.29	1.80	1.31	2.40
2018	.2	.5	208.51	5.32	1.30	1.20	4.00
2045	.2	.6	173.58	5.47	1.00	1.19	4.00
2072	.2	.6	141.19	5.40	3.90	1.22	4.00
2099	.2	.5	100.87	6.29	3.00	1.31	4.00
2018	.2	.5	208.51	5.32	4.20	1.20	13.20
2045	.2	.6	173.58	5.47	3.10	1.19	13.20
2072	.2	.6	141.19	5.40	12.80	1.22	13.20
2099	.2	.5	100.87	6.29	9.70	1.31	13.20
2018	RAINFED	.5	145.61	0.00	25.80	6.51	2.40
2045	RAINFED	.6	119.53	0.00	21.10	6.66	2.40
2072	RAINFED	.6	98.76	0.00	17.30	6.62	2.40
2099	RAINFED	.5	65.44	0.00	12.30	7.60	2.40
2018	RAINFED	.5	145.61	0.00	43.00	6.51	4.00
2045	RAINFED	.6	119.53	0.00	35.10	6.66	4.00
2072	RAINFED	.6	98.76	0.00	28.80	6.62	4.00
2099	RAINFED	.5	65.44	0.00	20.50	7.60	4.00
2018	RAINFED	.5	145.61	0.00	141.90	6.51	13.20
2045	RAINFED	.6	119.53	0.00	115.80	6.66	13.20
2072	RAINFED	.6	98.76	0.00	95.00	6.62	13.20
2099	RAINFED	.5	65.44	0.00	67.70	7.60	13.20



B.3.2 FRANKLIN, IA

Table B.21: Divergent Water Price for Risk Neutral Farmers ,FRANKLIN ,IA ,MAIZE ,RCP26

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2072	.3	.5	352.16	5.55	0.20	1.20	2.40
2072	.3	.5	352.16	5.55	0.20	1.20	4.00
2072	.3	.5	352.16	5.55	0.70	1.20	13.20
2018	.2	.4	359.35	5.03	2.00	0.99	2.40
2045	.2	.4	350.51	5.08	6.20	1.15	2.40
2072	.2	.5	350.81	4.97	2.90	1.77	2.40
2099	.2	.4	348.84	5.62	5.00	1.25	2.40
2018	.2	.4	359.35	5.03	3.30	0.99	4.00
2045	.2	.4	350.51	5.08	10.30	1.15	4.00
2072	.2	.5	350.81	4.97	4.70	1.77	4.00
2099	.2	.4	348.84	5.62	8.20	1.25	4.00
2018	.2	.4	359.35	5.03	10.90	0.99	13.20
2045	.2	.4	350.51	5.08	33.90	1.15	13.20
2072	.2	.5	350.81	4.97	15.50	1.77	13.20
2099	.2	.4	348.84	5.62	27.10	1.25	13.20
2018	RAINFED	.4	285.12	0.00	31.40	6.03	2.40
2045	RAINFED	.4	279.53	0.00	30.80	6.23	2.40
2072	RAINFED	.5	280.48	0.00	28.00	6.75	2.40
2099	RAINFED	.4	268.52	0.00	31.40	6.87	2.40
2018	RAINFED	.4	285.12	0.00	52.30	6.03	4.00
2045	RAINFED	.4	279.53	0.00	51.30	6.23	4.00
2072	RAINFED	.5	280.48	0.00	46.70	6.75	4.00

2099	RAINFED	.4	268.52	0.00	52.40	6.87	4.00
2018	RAINFED	.4	285.12	0.00	172.50	6.03	13.20
2045	RAINFED	.4	279.53	0.00	169.10	6.23	13.20
2072	RAINFED	.5	280.48	0.00	153.90	6.75	13.20
2099	RAINFED	.4	268.52	0.00	172.60	6.87	13.20

Table B.22: Divergent Water Price for Risk Neutral Farmers ,FRANKLIN ,IA ,MAIZE ,RCP45

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2018	.3	.5	366.16	5.51	0.10	1.21	2.40
2045	.3	.5	344.05	5.83	0.20	1.10	2.40
2072	.3	.5	330.15	6.11	0.20	1.25	2.40
2018	.3	.5	366.16	5.51	0.10	1.21	4.00
2045	.3	.5	344.05	5.83	0.30	1.10	4.00
2072	.3	.5	330.15	6.11	0.20	1.25	4.00
2018	.3	.5	366.16	5.51	0.10	1.21	13.20
2045	.3	.5	344.05	5.83	0.80	1.10	13.20
2072	.3	.5	330.15	6.11	0.70	1.25	13.20
2018	.2	.5	365.35	4.92	1.60	1.79	2.40
2045	.2	.5	342.97	5.22	2.40	1.72	2.40
2072	.2	.5	328.31	5.46	3.60	1.90	2.40
2099	.2	.4	323.25	5.70	4.50	1.33	2.40
2018	.2	.5	365.35	4.92	2.60	1.79	4.00
2045	.2	.5	342.97	5.22	3.90	1.72	4.00
2072	.2	.5	328.31	5.46	6.00	1.90	4.00
2099	.2	.4	323.25	5.70	7.50	1.33	4.00
2018	.2	.5	365.35	4.92	8.60	1.79	13.20
2045	.2	.5	342.97	5.22	12.90	1.72	13.20
2072	.2	.5	328.31	5.46	19.80	1.90	13.20
2099	.2	.4	323.25	5.70	24.60	1.33	13.20
2018	RAINFED	.5	291.56	0.00	29.00	6.72	2.40
2045	RAINFED	.5	267.32	0.00	29.00	6.93	2.40

2072	RAINFED	.5	257.27	0.00	26.10	7.36	2.40
2099	RAINFED	.4	249.33	0.00	27.90	7.02	2.40
2018	RAINFED	.5	291.56	0.00	48.20	6.72	4.00
2045	RAINFED	.5	267.32	0.00	48.30	6.93	4.00
2072	RAINFED	.5	257.27	0.00	43.50	7.36	4.00
2099	RAINFED	.4	249.33	0.00	46.50	7.02	4.00
2018	RAINFED	.5	291.56	0.00	159.10	6.72	13.20
2045	RAINFED	.5	267.32	0.00	159.40	6.93	13.20
2072	RAINFED	.5	257.27	0.00	143.50	7.36	13.20
2099	RAINFED	.4	249.33	0.00	153.50	7.02	13.20

Table B.23: Divergent Water Price for Risk Neutral Farmers ,FRANKLIN ,IA ,MAIZE
,RCP60

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2072	.3	.5	317.69	6.82	0.40	1.06	2.40
2099	.3	.5	305.45	6.38	0.70	1.23	2.40
2072	.3	.5	317.69	6.82	0.60	1.06	4.00
2099	.3	.5	305.45	6.38	1.10	1.23	4.00
2072	.3	.5	317.69	6.82	1.80	1.06	13.20
2099	.3	.5	305.45	6.38	3.40	1.23	13.20
2018	.2	.4	355.70	5.54	4.30	1.25	2.40
2045	.2	.4	339.38	5.74	3.30	1.32	2.40
2072	.2	.5	316.94	6.04	1.60	1.84	2.40
2099	.2	.5	303.89	5.66	3.20	1.95	2.40
2018	.2	.4	355.70	5.54	7.20	1.25	4.00
2045	.2	.4	339.38	5.74	5.50	1.32	4.00
2072	.2	.5	316.94	6.04	2.60	1.84	4.00
2099	.2	.5	303.89	5.66	5.30	1.95	4.00
2018	.2	.4	355.70	5.54	23.60	1.25	13.20
2045	.2	.4	339.38	5.74	18.00	1.32	13.20
2072	.2	.5	316.94	6.04	8.40	1.84	13.20
2099	.2	.5	303.89	5.66	17.30	1.95	13.20
2018	RAINFED	.4	273.23	0.00	32.50	6.79	2.40
2045	RAINFED	.4	254.75	0.00	31.70	7.06	2.40
2072	RAINFED	.5	246.31	0.00	23.50	7.88	2.40
2099	RAINFED	.5	236.68	0.00	23.80	7.61	2.40
2018	RAINFED	.4	273.23	0.00	54.10	6.79	4.00

2045	RAINFED	.4	254.75	0.00	52.90	7.06	4.00
2072	RAINFED	.5	246.31	0.00	39.20	7.88	4.00
2099	RAINFED	.5	236.68	0.00	39.60	7.61	4.00
2018	RAINFED	.4	273.23	0.00	178.30	6.79	13.20
2045	RAINFED	.4	254.75	0.00	174.40	7.06	13.20
2072	RAINFED	.5	246.31	0.00	129.20	7.88	13.20
2099	RAINFED	.5	236.68	0.00	130.70	7.61	13.20

Table B.24: Divergent Water Price for Risk Neutral Farmers ,FRANKLIN ,IA ,MAIZE ,RCP85

Year	TR	MTR	Yield	Water Use	DWP	DW	OP
2072	.3	.5	289.65	7.04	0.20	1.23	2.40
2099	.3	.5	238.14	7.82	0.60	1.30	2.40
2072	.3	.5	289.65	7.04	0.40	1.23	4.00
2099	.3	.5	238.14	7.82	0.90	1.30	4.00
2072	.3	.5	289.65	7.04	1.10	1.23	13.20
2099	.3	.5	238.14	7.82	2.90	1.30	13.20
2018	.2	.4	353.22	5.47	5.90	1.15	2.40
2045	.2	.4	330.11	5.44	8.10	1.21	2.40
2072	.2	.5	287.98	6.36	3.50	1.91	2.40
2099	.2	.5	235.66	6.95	4.20	2.17	2.40
2018	.2	.4	353.22	5.47	9.80	1.15	4.00
2045	.2	.4	330.11	5.44	13.50	1.21	4.00
2072	.2	.5	287.98	6.36	5.80	1.91	4.00
2099	.2	.5	235.66	6.95	7.00	2.17	4.00
2018	.2	.4	353.22	5.47	32.30	1.15	13.20
2045	.2	.4	330.11	5.44	44.30	1.21	13.20
2072	.2	.5	287.98	6.36	18.90	1.91	13.20
2099	.2	.5	235.66	6.95	23.10	2.17	13.20
2018	RAINFED	.4	273.14	0.00	32.30	6.62	2.40
2045	RAINFED	.4	261.55	0.00	28.00	6.65	2.40
2072	RAINFED	.5	222.83	0.00	21.30	8.27	2.40
2099	RAINFED	.5	188.58	0.00	14.20	9.12	2.40
2018	RAINFED	.4	273.14	0.00	53.80	6.62	4.00

2045	RAINFED	.4	261.55	0.00	46.60	6.65	4.00
2072	RAINFED	.5	222.83	0.00	35.40	8.27	4.00
2099	RAINFED	.5	188.58	0.00	23.60	9.12	4.00
2018	RAINFED	.4	273.14	0.00	177.50	6.62	13.20
2045	RAINFED	.4	261.55	0.00	153.80	6.65	13.20
2072	RAINFED	.5	222.83	0.00	116.80	8.27	13.20
2099	RAINFED	.5	188.58	0.00	77.70	9.12	13.20

APPENDIX C

DIVERGENT WATER PRICE FOR RISK AVERSE FARMERS

C.1 PEANUTS

C.1.1 DECATUR, GA

Table C.1: Divergent Water Price for Risk Averse Farmers, DECATUR, GA, PEANUT, RCP 2.6

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.6	0.7	6090.45	13.63	5.50	5.40	5.10	0.00	0.17
2045	.6	0.7	5984.72	13.79	5.40	5.40	5.50	0.00	0.17
2072	.6	0.7	6016.20	13.91	4.70	4.70	4.60	0.00	0.17
2099	.6	0.7	6025.73	13.79	4.00	4.00	3.90	0.00	0.17
2018	.6	0.7	6090.45	13.63	13.80	13.10	9.20	0.00	0.47
2045	.6	0.7	5984.72	13.79	15.10	15.20	14.80	0.00	0.47
2072	.6	0.7	6016.20	13.91	12.70	12.60	11.70	0.00	0.47
2099	.6	0.7	6025.73	13.79	10.70	10.60	10.30	0.00	0.47
2018	.6	0.7	6090.45	13.63	20.10	17.50	7.10	0.00	0.77
2045	.6	0.7	5984.72	13.79	24.90	24.70	20.40	0.00	0.77
2072	.6	0.7	6016.20	13.91	20.40	19.80	15.90	0.00	0.77
2099	.6	0.7	6025.73	13.79	17.10	16.90	17.00	0.00	0.77
2018	.5	0.7	5955.65	11.46	8.00	8.00	7.90	2.17	0.17
2045	.5	0.7	5858.83	11.74	7.70	7.70	7.70	2.05	0.17
2072	.5	0.7	5859.46	11.80	8.40	8.40	8.40	2.11	0.17

2099	.5	0.7	5878.94	11.76	7.90	7.90	8.00	2.03	0.17
2018	.5	0.7	5955.65	11.46	21.90	21.80	21.50	2.17	0.47
2045	.5	0.7	5858.83	11.74	21.30	21.40	21.60	2.05	0.47
2072	.5	0.7	5859.46	11.80	23.10	23.10	22.80	2.11	0.47
2099	.5	0.7	5878.94	11.76	21.90	22.10	22.80	2.03	0.47
2018	.5	0.7	5955.65	11.46	35.60	35.40	34.80	2.17	0.77
2045	.5	0.7	5858.83	11.74	35.10	35.30	34.50	2.05	0.77
2072	.5	0.7	5859.46	11.80	37.70	37.60	34.80	2.11	0.77
2099	.5	0.7	5878.94	11.76	36.40	36.90	38.60	2.03	0.77
2018	.4	0.7	5669.02	9.54	13.30	13.30	13.60	4.09	0.17
2045	.4	0.7	5605.29	9.46	11.60	11.70	12.10	4.33	0.17
2072	.4	0.7	5594.87	9.52	12.40	12.50	12.90	4.39	0.17
2099	.4	0.7	5628.27	9.51	11.70	11.80	12.10	4.28	0.17
2018	.4	0.7	5669.02	9.54	37.50	37.90	37.90	4.09	0.47
2045	.4	0.7	5605.29	9.46	33.30	34.20	39.20	4.33	0.47
2072	.4	0.7	5594.87	9.52	35.60	36.40	40.70	4.39	0.47
2099	.4	0.7	5628.27	9.51	33.50	34.10	37.40	4.28	0.47
2018	.4	0.7	5669.02	9.54	62.40	62.60	55.90	4.09	0.77
2045	.4	0.7	5605.29	9.46	57.50	60.70	84.00	4.33	0.77
2072	.4	0.7	5594.87	9.52	61.00	63.80	79.20	4.39	0.77
2099	.4	0.7	5628.27	9.51	56.90	59.00	70.50	4.28	0.77
2018	.3	0.7	4995.29	6.87	22.70	23.10	24.70	6.76	0.17
2045	.3	0.7	4917.96	6.59	21.00	21.30	23.10	7.20	0.17
2072	.3	0.7	4922.10	6.72	21.40	21.80	23.60	7.19	0.17
2099	.3	0.7	4962.60	6.78	21.00	21.30	22.60	7.01	0.17
2018	.3	0.7	4995.29	6.87	68.50	71.70	85.00	6.76	0.47
2045	.3	0.7	4917.96	6.59	64.10	68.40	90.00	7.20	0.47

2072	.3	0.7	4922.10	6.72	65.50	69.80	91.30	7.19	0.47
2099	.3	0.7	4962.60	6.78	62.60	65.60	80.40	7.01	0.47
2018	.3	0.7	4995.29	6.87	122.60	131.60	158.40	6.76	0.77
2045	.3	0.7	4917.96	6.59	119.30	134.20	177.00	7.20	0.77
2072	.3	0.7	4922.10	6.72	121.80	136.70	177.40	7.19	0.77
2099	.3	0.7	4962.60	6.78	112.40	122.40	154.00	7.01	0.77
2018	.2	0.7	3975.47	3.51	31.30	31.90	34.20	10.12	0.17
2045	.2	0.7	3979.90	3.25	28.80	29.50	32.20	10.54	0.17
2072	.2	0.7	3931.54	3.39	29.80	30.40	32.90	10.52	0.17
2099	.2	0.7	3962.22	3.40	29.80	30.40	32.80	10.39	0.17
2018	.2	0.7	3975.47	3.51	95.00	99.10	110.90	10.12	0.47
2045	.2	0.7	3979.90	3.25	89.50	94.90	111.20	10.54	0.47
2072	.2	0.7	3931.54	3.39	91.40	96.30	112.00	10.52	0.47
2099	.2	0.7	3962.22	3.40	91.20	96.20	113.10	10.39	0.47
2018	.2	0.7	3975.47	3.51	167.90	176.20	192.50	10.12	0.77
2045	.2	0.7	3979.90	3.25	163.00	174.60	194.70	10.54	0.77
2072	.2	0.7	3931.54	3.39	164.90	176.00	195.90	10.52	0.77
2099	.2	0.7	3962.22	3.40	165.10	177.10	198.30	10.39	0.77
2018	rainfed	0.7	2856.94	0.00	36.30	36.60	37.90	13.63	0.17
2045	rainfed	0.7	2916.42	0.00	34.00	34.40	35.70	13.79	0.17
2072	rainfed	0.7	2812.81	0.00	35.10	35.50	36.70	13.91	0.17
2099	rainfed	0.7	2838.23	0.00	35.20	35.50	36.60	13.79	0.17
2018	rainfed	0.7	2856.94	0.00	105.00	106.80	110.90	13.63	0.47
2045	rainfed	0.7	2916.42	0.00	98.90	100.90	105.60	13.79	0.47
2072	rainfed	0.7	2812.81	0.00	101.40	103.20	106.90	13.91	0.47
2099	rainfed	0.7	2838.23	0.00	101.40	103.00	106.10	13.79	0.47
2018	rainfed	0.7	2856.94	0.00	177.10	180.00	183.90	13.63	0.77

2045	rainfed	0.7	2916.42	0.00	167.80	171.00	175.40	13.79	0.77
2072	rainfed	0.7	2812.81	0.00	171.10	173.70	177.10	13.91	0.77
2099	rainfed	0.7	2838.23	0.00	170.50	172.70	174.10	13.79	0.77

Table C.2: Divergent Water Price for Risk Averse Farmers, DECATUR, GA, PEANUT,
RCP 4.5

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.6	0.7	6121.95	13.60	4.50	4.50	4.30	0.00	0.17
2045	.6	0.7	5918.53	14.06	7.40	7.30	7.20	0.00	0.17
2072	.6	0.7	5831.21	14.13	6.90	6.90	6.90	0.00	0.17
2099	.6	0.7	5836.98	14.53	7.30	7.20	7.00	0.00	0.17
2018	.6	0.7	6121.95	13.60	11.90	11.60	10.40	0.00	0.47
2045	.6	0.7	5918.53	14.06	19.70	19.50	19.80	0.00	0.47
2072	.6	0.7	5831.21	14.13	19.00	19.00	18.80	0.00	0.47
2099	.6	0.7	5836.98	14.53	19.10	18.50	15.60	0.00	0.47
2018	.6	0.7	6121.95	13.60	18.50	17.70	14.50	0.00	0.77
2045	.6	0.7	5918.53	14.06	31.80	31.90	39.90	0.00	0.77
2072	.6	0.7	5831.21	14.13	31.20	31.00	29.10	0.00	0.77
2099	.6	0.7	5836.98	14.53	29.20	27.30	19.30	0.00	0.77
2018	.5	0.7	5966.36	11.56	8.30	8.30	8.30	2.04	0.17
2045	.5	0.7	5744.07	11.96	11.00	11.10	11.50	2.10	0.17
2072	.5	0.7	5630.74	12.13	11.90	12.00	12.60	2.00	0.17
2099	.5	0.7	5637.20	12.55	12.50	12.60	13.30	1.98	0.17
2018	.5	0.7	5966.36	11.56	22.80	22.80	22.90	2.04	0.47
2045	.5	0.7	5744.07	11.96	31.90	33.00	40.20	2.10	0.47
2072	.5	0.7	5630.74	12.13	34.80	36.10	42.10	2.00	0.47
2099	.5	0.7	5637.20	12.55	36.90	38.40	44.70	1.98	0.47
2018	.5	0.7	5966.36	11.56	37.40	37.40	37.70	2.04	0.77
2045	.5	0.7	5744.07	11.96	56.10	60.70	85.70	2.10	0.77
2072	.5	0.7	5630.74	12.13	61.10	65.20	78.40	2.00	0.77

2099	.5	0.7	5637.20	12.55	65.40	69.70	79.30	1.98	0.77
2018	.4	0.7	5673.42	9.53	13.50	13.60	14.00	4.07	0.17
2045	.4	0.7	5430.68	9.79	16.10	16.30	17.30	4.27	0.17
2072	.4	0.7	5317.72	10.03	16.70	17.00	18.00	4.10	0.17
2099	.4	0.7	5281.99	10.41	18.10	18.30	19.20	4.12	0.17
2018	.4	0.7	5673.42	9.53	38.70	39.50	44.10	4.07	0.47
2045	.4	0.7	5430.68	9.79	48.10	50.20	59.10	4.27	0.47
2072	.4	0.7	5317.72	10.03	49.90	52.10	61.10	4.10	0.47
2099	.4	0.7	5281.99	10.41	53.20	55.10	61.80	4.12	0.47
2018	.4	0.7	5673.42	9.53	66.10	69.00	91.40	4.07	0.77
2045	.4	0.7	5430.68	9.79	85.60	91.80	107.50	4.27	0.77
2072	.4	0.7	5317.72	10.03	88.90	95.20	108.00	4.10	0.77
2099	.4	0.7	5281.99	10.41	93.00	97.80	105.00	4.12	0.77
2018	.3	0.7	5006.15	6.87	22.70	23.10	24.70	6.73	0.17
2045	.3	0.7	4758.44	7.12	24.90	25.50	27.50	6.94	0.17
2072	.3	0.7	4618.01	7.20	25.30	25.70	27.60	6.93	0.17
2099	.3	0.7	4498.57	7.54	27.70	28.10	29.90	6.99	0.17
2018	.3	0.7	5006.15	6.87	68.60	72.00	86.40	6.73	0.47
2045	.3	0.7	4758.44	7.12	76.40	80.00	89.20	6.94	0.47
2072	.3	0.7	4618.01	7.20	76.50	79.80	88.40	6.93	0.47
2099	.3	0.7	4498.57	7.54	83.00	86.20	93.60	6.99	0.47
2018	.3	0.7	5006.15	6.87	123.20	133.00	163.80	6.73	0.77
2045	.3	0.7	4758.44	7.12	135.80	142.40	149.30	6.94	0.77
2072	.3	0.7	4618.01	7.20	135.30	141.50	145.70	6.93	0.77
2099	.3	0.7	4498.57	7.54	145.40	150.80	152.70	6.99	0.77
2018	.2	0.7	3971.43	3.61	31.80	32.40	34.80	9.99	0.17
2045	.2	0.7	3625.84	3.51	34.00	34.60	36.80	10.55	0.17

2072	.2	0.7	3432.96	3.61	34.30	34.70	36.00	10.52	0.17
2099	.2	0.7	3379.41	3.69	34.50	34.80	36.20	10.84	0.17
2018	.2	0.7	3971.43	3.61	96.70	101.10	114.70	9.99	0.47
2045	.2	0.7	3625.84	3.51	102.00	104.90	109.40	10.55	0.47
2072	.2	0.7	3432.96	3.61	99.80	101.30	101.80	10.52	0.47
2099	.2	0.7	3379.41	3.69	100.30	102.20	104.10	10.84	0.47
2018	.2	0.7	3971.43	3.61	171.90	181.40	200.00	9.99	0.77
2045	.2	0.7	3625.84	3.51	174.80	178.00	177.90	10.55	0.77
2072	.2	0.7	3432.96	3.61	167.30	167.70	161.00	10.52	0.77
2099	.2	0.7	3379.41	3.69	169.20	170.70	166.60	10.84	0.77
2018	rainfed	0.7	2746.52	0.00	37.50	37.90	39.20	13.60	0.17
2045	rainfed	0.7	2578.40	0.00	37.50	37.90	39.00	14.06	0.17
2072	rainfed	0.7	2417.78	0.00	37.10	37.30	37.80	14.13	0.17
2099	rainfed	0.7	2339.51	0.00	37.20	37.30	37.80	14.53	0.17
2018	rainfed	0.7	2746.52	0.00	108.40	109.90	111.90	13.60	0.47
2045	rainfed	0.7	2578.40	0.00	108.00	109.00	108.80	14.06	0.47
2072	rainfed	0.7	2417.78	0.00	104.60	104.70	101.70	14.13	0.47
2099	rainfed	0.7	2339.51	0.00	104.50	104.80	102.70	14.53	0.47
2018	rainfed	0.7	2746.52	0.00	181.60	183.10	181.40	13.60	0.77
2045	rainfed	0.7	2578.40	0.00	179.20	179.20	173.20	14.06	0.77
2072	rainfed	0.7	2417.78	0.00	171.10	169.10	157.90	14.13	0.77
2099	rainfed	0.7	2339.51	0.00	171.50	170.10	160.70	14.53	0.77

Table C.3: Divergent Water Price for Risk Averse Farmers, DECATUR, GA, PEANUT,
RCP 6.0

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.6	0.7	6043.48	13.99	5.80	5.80	5.80	0.00	0.17
2045	.6	0.7	5930.84	14.33	5.60	5.60	5.40	0.00	0.17
2072	.6	0.7	5705.19	14.53	6.40	6.30	6.10	0.00	0.17
2099	.6	0.7	5425.45	15.43	8.50	8.40	8.30	0.00	0.17
2018	.6	0.7	6043.48	13.99	15.80	15.60	14.30	0.00	0.47
2045	.6	0.7	5930.84	14.33	14.90	14.60	13.70	0.00	0.47
2072	.6	0.7	5705.19	14.53	16.60	16.20	14.60	0.00	0.47
2099	.6	0.7	5425.45	15.43	22.70	22.40	21.20	0.00	0.47
2018	.6	0.7	6043.48	13.99	25.20	24.30	17.80	0.00	0.77
2045	.6	0.7	5930.84	14.33	23.60	23.00	20.50	0.00	0.77
2072	.6	0.7	5705.19	14.53	25.90	24.70	21.70	0.00	0.77
2099	.6	0.7	5425.45	15.43	36.20	35.40	32.70	0.00	0.77
2018	.5	0.7	5889.63	11.74	8.80	8.80	8.70	2.25	0.17
2045	.5	0.7	5775.54	12.26	9.10	9.10	9.30	2.07	0.17
2072	.5	0.7	5498.62	12.60	12.20	12.20	12.60	1.93	0.17
2099	.5	0.7	5183.73	13.29	13.80	13.90	14.20	2.14	0.17
2018	.5	0.7	5889.63	11.74	24.00	23.90	23.20	2.25	0.47
2045	.5	0.7	5775.54	12.26	25.50	25.90	27.70	2.07	0.47
2072	.5	0.7	5498.62	12.60	34.90	35.70	39.10	1.93	0.47
2099	.5	0.7	5183.73	13.29	39.20	39.60	39.80	2.14	0.47
2018	.5	0.7	5889.63	11.74	39.00	38.50	34.10	2.25	0.77
2045	.5	0.7	5775.54	12.26	42.90	44.10	49.70	2.07	0.77
2072	.5	0.7	5498.62	12.60	59.80	62.10	68.60	1.93	0.77

2099	.5	0.7	5183.73	13.29	65.40	65.60	60.70	2.14	0.77
2018	.4	0.7	5587.47	9.49	13.80	13.90	14.40	4.50	0.17
2045	.4	0.7	5493.44	10.05	13.70	13.90	14.60	4.28	0.17
2072	.4	0.7	5159.48	10.39	17.40	17.60	18.40	4.14	0.17
2099	.4	0.7	4841.31	10.95	18.00	18.20	19.00	4.48	0.17
2018	.4	0.7	5587.47	9.49	39.90	40.80	44.90	4.50	0.47
2045	.4	0.7	5493.44	10.05	40.60	42.40	52.30	4.28	0.47
2072	.4	0.7	5159.48	10.39	51.00	53.00	61.60	4.14	0.47
2099	.4	0.7	4841.31	10.95	52.50	53.80	56.20	4.48	0.47
2018	.4	0.7	5587.47	9.49	68.30	71.00	84.80	4.50	0.77
2045	.4	0.7	5493.44	10.05	72.50	79.10	103.70	4.28	0.77
2072	.4	0.7	5159.48	10.39	90.00	96.00	109.90	4.14	0.77
2099	.4	0.7	4841.31	10.95	89.70	91.60	89.00	4.48	0.77
2018	.3	0.7	4995.68	6.99	21.70	22.10	23.70	7.00	0.17
2045	.3	0.7	4810.41	7.22	22.70	23.00	24.60	7.11	0.17
2072	.3	0.7	4424.54	7.51	26.40	26.80	28.40	7.02	0.17
2099	.3	0.7	4155.40	8.06	25.50	26.00	27.80	7.37	0.17
2018	.3	0.7	4995.68	6.99	65.90	69.60	90.30	7.00	0.47
2045	.3	0.7	4810.41	7.22	68.10	71.20	80.90	7.11	0.47
2072	.3	0.7	4424.54	7.51	78.70	81.20	85.50	7.02	0.47
2099	.3	0.7	4155.40	8.06	77.00	79.80	84.20	7.37	0.47
2018	.3	0.7	4995.68	6.99	120.20	133.80	189.30	7.00	0.77
2045	.3	0.7	4810.41	7.22	120.90	127.80	140.60	7.11	0.77
2072	.3	0.7	4424.54	7.51	136.00	139.10	137.60	7.02	0.77
2099	.3	0.7	4155.40	8.06	134.00	137.30	132.90	7.37	0.77
2018	.2	0.7	3926.10	3.50	31.30	32.00	34.40	10.49	0.17
2045	.2	0.7	3738.25	3.72	31.70	32.30	34.70	10.61	0.17

2072	.2	0.7	3306.83	3.72	33.80	34.20	35.60	10.81	0.17
2099	.2	0.7	3021.27	4.17	32.80	33.20	34.40	11.26	0.17
2018	.2	0.7	3926.10	3.50	95.60	99.70	111.00	10.49	0.47
2045	.2	0.7	3738.25	3.72	96.20	99.80	106.80	10.61	0.47
2072	.2	0.7	3306.83	3.72	98.70	100.20	100.70	10.81	0.47
2099	.2	0.7	3021.27	4.17	95.30	96.60	95.70	11.26	0.47
2018	.2	0.7	3926.10	3.50	168.50	176.40	194.50	10.49	0.77
2045	.2	0.7	3738.25	3.72	167.70	172.70	176.50	10.61	0.77
2072	.2	0.7	3306.83	3.72	165.40	165.80	159.80	10.81	0.77
2099	.2	0.7	3021.27	4.17	159.00	158.50	149.70	11.26	0.77
2018	rainfed	0.7	2820.09	0.00	36.30	36.80	38.30	13.99	0.17
2045	rainfed	0.7	2629.01	0.00	35.90	36.20	37.40	14.33	0.17
2072	rainfed	0.7	2326.46	0.00	36.20	36.50	37.10	14.53	0.17
2099	rainfed	0.7	2059.34	0.00	34.00	34.20	34.60	15.43	0.17
2018	rainfed	0.7	2820.09	0.00	106.00	107.80	110.30	13.99	0.47
2045	rainfed	0.7	2629.01	0.00	103.50	104.80	105.50	14.33	0.47
2072	rainfed	0.7	2326.46	0.00	102.60	102.80	100.00	14.53	0.47
2099	rainfed	0.7	2059.34	0.00	95.50	95.30	91.60	15.43	0.47
2018	rainfed	0.7	2820.09	0.00	178.50	180.30	179.50	13.99	0.77
2045	rainfed	0.7	2629.01	0.00	172.80	173.30	168.90	14.33	0.77
2072	rainfed	0.7	2326.46	0.00	168.10	166.20	155.50	14.53	0.77
2099	rainfed	0.7	2059.34	0.00	155.30	152.80	141.40	15.43	0.77

Table C.4: Divergent Water Price for Risk Averse Farmers, DECATUR, GA, PEANUT,
RCP 8.5

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.6	0.7	6061.35	13.93	6.00	6.00	5.70	0.00	0.17
2045	.6	0.7	5863.43	14.64	6.30	6.20	6.10	0.00	0.17
2072	.6	0.7	5248.58	15.43	6.60	6.50	6.40	0.00	0.17
2099	.6	0.7	4124.28	18.31	7.70	7.90	8.30	0.00	0.17
2018	.6	0.7	6061.35	13.93	15.60	15.00	11.60	0.00	0.47
2045	.6	0.7	5863.43	14.64	16.60	16.20	13.50	0.00	0.47
2072	.6	0.7	5248.58	15.43	17.70	17.50	16.60	0.00	0.47
2099	.6	0.7	4124.28	18.31	22.90	23.70	27.20	0.00	0.47
2018	.6	0.7	6061.35	13.93	23.40	21.20	11.80	0.00	0.77
2045	.6	0.7	5863.43	14.64	25.80	24.00	13.60	0.00	0.77
2072	.6	0.7	5248.58	15.43	28.30	27.70	27.10	0.00	0.77
2099	.6	0.7	4124.28	18.31	40.10	42.40	49.40	0.00	0.77
2018	.5	0.7	5902.17	12.07	9.90	9.90	9.90	1.86	0.17
2045	.5	0.7	5641.94	12.36	11.80	11.90	12.50	2.28	0.17
2072	.5	0.7	5014.99	13.24	12.30	12.40	12.70	2.19	0.17
2099	.5	0.7	3900.74	15.98	12.30	12.50	13.30	2.33	0.17
2018	.5	0.7	5902.17	12.07	27.40	27.40	27.20	1.86	0.47
2045	.5	0.7	5641.94	12.36	34.70	36.00	42.80	2.28	0.47
2072	.5	0.7	5014.99	13.24	35.20	35.80	38.00	2.19	0.47
2099	.5	0.7	3900.74	15.98	36.80	38.40	44.50	2.33	0.47
2018	.5	0.7	5902.17	12.07	44.80	44.70	43.70	1.86	0.77
2045	.5	0.7	5641.94	12.36	61.10	65.70	83.60	2.28	0.77
2072	.5	0.7	5014.99	13.24	59.60	61.00	65.50	2.19	0.77

2099	.5	0.7	3900.74	15.98	65.50	69.70	77.40	2.33	0.77
2018	.4	0.7	5594.22	10.09	15.40	15.50	15.70	3.84	0.17
2045	.4	0.7	5334.00	10.34	16.50	16.70	17.60	4.30	0.17
2072	.4	0.7	4671.17	10.99	17.10	17.30	18.20	4.44	0.17
2099	.4	0.7	3596.61	13.63	15.50	15.70	16.30	4.68	0.17
2018	.4	0.7	5594.22	10.09	43.40	43.70	43.90	3.84	0.47
2045	.4	0.7	5334.00	10.34	48.70	50.60	58.30	4.30	0.47
2072	.4	0.7	4671.17	10.99	50.40	52.10	59.20	4.44	0.47
2099	.4	0.7	3596.61	13.63	45.10	46.00	48.50	4.68	0.47
2018	.4	0.7	5594.22	10.09	71.90	72.20	67.10	3.84	0.77
2045	.4	0.7	5334.00	10.34	85.90	91.10	103.70	4.30	0.77
2072	.4	0.7	4671.17	10.99	88.10	93.00	103.50	4.44	0.77
2099	.4	0.7	3596.61	13.63	76.70	78.40	80.20	4.68	0.77
2018	.3	0.7	4849.32	7.25	25.50	25.90	27.50	6.68	0.17
2045	.3	0.7	4688.71	7.47	23.70	24.10	25.60	7.17	0.17
2072	.3	0.7	4012.11	8.00	23.90	24.30	26.00	7.43	0.17
2099	.3	0.7	2933.38	10.27	21.60	21.80	22.50	8.04	0.17
2018	.3	0.7	4849.32	7.25	76.20	79.60	93.10	6.68	0.47
2045	.3	0.7	4688.71	7.47	71.10	74.40	88.40	7.17	0.47
2072	.3	0.7	4012.11	8.00	72.00	75.40	86.50	7.43	0.47
2099	.3	0.7	2933.38	10.27	62.20	63.20	64.00	8.04	0.47
2018	.3	0.7	4849.32	7.25	135.60	145.00	168.70	6.68	0.77
2045	.3	0.7	4688.71	7.47	127.00	136.60	164.20	7.17	0.77
2072	.3	0.7	4012.11	8.00	128.60	136.60	146.60	7.43	0.77
2099	.3	0.7	2933.38	10.27	104.60	105.30	100.50	8.04	0.77
2018	.2	0.7	3809.45	3.89	33.50	34.00	35.80	10.04	0.17
2045	.2	0.7	3563.98	3.79	32.40	33.00	35.00	10.85	0.17

2072	.2	0.7	2954.36	4.02	30.20	30.50	31.60	11.41	0.17
2099	.2	0.7	2032.58	5.25	24.20	24.20	24.10	13.06	0.17
2018	.2	0.7	3809.45	3.89	99.30	102.50	112.40	10.04	0.47
2045	.2	0.7	3563.98	3.79	97.00	100.50	110.60	10.85	0.47
2072	.2	0.7	2954.36	4.02	87.50	89.10	91.50	11.41	0.47
2099	.2	0.7	2032.58	5.25	66.60	66.10	62.00	13.06	0.47
2018	.2	0.7	3809.45	3.89	172.40	179.30	192.40	10.04	0.77
2045	.2	0.7	3563.98	3.79	169.40	176.50	190.40	10.85	0.77
2072	.2	0.7	2954.36	4.02	147.70	149.50	147.10	11.41	0.77
2099	.2	0.7	2032.58	5.25	107.10	104.30	92.80	13.06	0.77
2018	rainfed	0.7	2564.91	0.00	38.60	39.00	40.00	13.93	0.17
2045	rainfed	0.7	2390.26	0.00	36.80	37.10	38.10	14.64	0.17
2072	rainfed	0.7	1989.96	0.00	32.30	32.40	32.70	15.43	0.17
2099	rainfed	0.7	1271.03	0.00	24.00	23.90	23.50	18.31	0.17
2018	rainfed	0.7	2564.91	0.00	110.50	111.80	113.60	13.93	0.47
2045	rainfed	0.7	2390.26	0.00	105.50	106.80	108.60	14.64	0.47
2072	rainfed	0.7	1989.96	0.00	90.30	90.60	89.20	15.43	0.47
2099	rainfed	0.7	1271.03	0.00	64.80	63.90	58.90	18.31	0.47
2018	rainfed	0.7	2564.91	0.00	184.30	185.60	185.10	13.93	0.77
2045	rainfed	0.7	2390.26	0.00	176.20	177.50	176.50	14.64	0.77
2072	rainfed	0.7	1989.96	0.00	148.30	147.50	139.40	15.43	0.77
2099	rainfed	0.7	1271.03	0.00	102.90	99.60	86.80	18.31	0.77

C.1.2 SEMINOLE, GA

Table C.5: Divergent Water Price for Risk Averse Farmers, SEMINOLE, GA, PEANUT,
RCP 2.6

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.6	0.7	5862.64	14.47	6.20	6.20	6.20	0.00	0.17
2045	.6	0.7	5658.82	14.38	5.10	5.10	4.80	0.00	0.17
2072	.6	0.7	5670.88	14.58	4.90	4.90	5.00	0.00	0.17
2099	.6	0.7	5638.15	14.51	5.90	5.90	5.80	0.00	0.17
2018	.6	0.7	5862.64	14.47	17.10	17.10	16.60	0.00	0.47
2045	.6	0.7	5658.82	14.38	13.30	12.70	10.40	0.00	0.47
2072	.6	0.7	5670.88	14.58	13.70	13.80	15.20	0.00	0.47
2099	.6	0.7	5638.15	14.51	16.00	15.90	15.20	0.00	0.47
2018	.6	0.7	5862.64	14.47	28.00	27.70	25.10	0.00	0.77
2045	.6	0.7	5658.82	14.38	20.00	18.50	12.90	0.00	0.77
2072	.6	0.7	5670.88	14.58	22.80	23.70	34.50	0.00	0.77
2099	.6	0.7	5638.15	14.51	25.70	25.30	23.50	0.00	0.77
2018	.5	0.7	5666.16	12.14	10.50	10.60	11.40	2.33	0.17
2045	.5	0.7	5497.34	12.10	8.60	8.70	9.10	2.28	0.17
2072	.5	0.7	5482.00	12.32	9.60	9.70	10.40	2.26	0.17
2099	.5	0.7	5446.50	12.31	10.40	10.50	10.80	2.20	0.17
2018	.5	0.7	5666.16	12.14	31.60	33.70	46.20	2.33	0.47
2045	.5	0.7	5497.34	12.10	25.30	26.40	34.70	2.28	0.47
2072	.5	0.7	5482.00	12.32	28.90	30.70	41.60	2.26	0.47
2099	.5	0.7	5446.50	12.31	29.90	30.40	32.00	2.20	0.47
2018	.5	0.7	5666.16	12.14	59.00	67.70	85.70	2.33	0.77
2045	.5	0.7	5497.34	12.10	45.20	50.20	89.30	2.28	0.77
2072	.5	0.7	5482.00	12.32	53.40	60.70	83.20	2.26	0.77

2099	.5	0.7	5446.50	12.31	50.60	51.70	52.10	2.20	0.77
2018	.4	0.7	5335.41	9.75	15.30	15.70	17.10	4.72	0.17
2045	.4	0.7	5207.35	9.98	13.40	13.60	14.60	4.40	0.17
2072	.4	0.7	5187.23	10.08	14.00	14.30	15.50	4.50	0.17
2099	.4	0.7	5149.52	9.82	14.30	14.50	15.20	4.69	0.17
2018	.4	0.7	5335.41	9.75	47.50	50.90	63.40	4.72	0.47
2045	.4	0.7	5207.35	9.98	40.30	42.50	54.90	4.40	0.47
2072	.4	0.7	5187.23	10.08	43.10	46.20	59.90	4.50	0.47
2099	.4	0.7	5149.52	9.82	42.20	43.60	47.90	4.69	0.47
2018	.4	0.7	5335.41	9.75	89.00	98.60	101.60	4.72	0.77
2045	.4	0.7	5207.35	9.98	73.40	81.60	110.80	4.40	0.77
2072	.4	0.7	5187.23	10.08	80.80	90.70	105.90	4.50	0.77
2099	.4	0.7	5149.52	9.82	73.40	76.40	80.30	4.69	0.77
2018	.3	0.7	4698.49	6.94	22.90	23.50	26.50	7.53	0.17
2045	.3	0.7	4551.45	6.89	21.40	21.90	24.30	7.49	0.17
2072	.3	0.7	4531.21	7.00	21.90	22.60	25.30	7.58	0.17
2099	.3	0.7	4454.46	6.80	22.70	23.10	25.00	7.71	0.17
2018	.3	0.7	4698.49	6.94	73.80	80.60	96.50	7.53	0.47
2045	.3	0.7	4551.45	6.89	67.60	73.00	90.70	7.49	0.47
2072	.3	0.7	4531.21	7.00	70.50	75.60	83.10	7.58	0.47
2099	.3	0.7	4454.46	6.80	69.40	72.80	83.50	7.71	0.47
2018	.3	0.7	4698.49	6.94	141.90	154.20	152.40	7.53	0.77
2045	.3	0.7	4551.45	6.89	128.00	140.90	158.20	7.49	0.77
2072	.3	0.7	4531.21	7.00	129.80	135.50	126.90	7.58	0.77
2099	.3	0.7	4454.46	6.80	124.10	131.60	146.80	7.71	0.77
2018	.2	0.7	3648.66	3.39	31.10	31.80	34.50	11.08	0.17
2045	.2	0.7	3548.01	3.37	29.00	29.60	31.80	11.01	0.17

2072	.2	0.7	3586.07	3.54	28.50	29.10	31.40	11.04	0.17
2099	.2	0.7	3461.85	3.31	30.10	30.70	32.80	11.20	0.17
2018	.2	0.7	3648.66	3.39	95.90	99.70	102.70	11.08	0.47
2045	.2	0.7	3548.01	3.37	88.30	92.00	97.60	11.01	0.47
2072	.2	0.7	3586.07	3.54	87.30	91.00	94.60	11.04	0.47
2099	.2	0.7	3461.85	3.31	91.00	94.30	102.60	11.20	0.47
2018	.2	0.7	3648.66	3.39	167.20	169.50	158.60	11.08	0.77
2045	.2	0.7	3548.01	3.37	154.80	158.90	156.70	11.01	0.77
2072	.2	0.7	3586.07	3.54	152.90	155.80	146.10	11.04	0.77
2099	.2	0.7	3461.85	3.31	158.70	164.40	175.60	11.20	0.77
2018	rainfed	0.7	2711.94	0.00	33.90	34.30	35.50	14.47	0.17
2045	rainfed	0.7	2710.43	0.00	31.40	31.80	32.90	14.38	0.17
2072	rainfed	0.7	2674.79	0.00	31.40	31.70	32.70	14.58	0.17
2099	rainfed	0.7	2594.54	0.00	32.50	32.80	33.70	14.51	0.17
2018	rainfed	0.7	2711.94	0.00	98.20	99.20	96.20	14.47	0.47
2045	rainfed	0.7	2710.43	0.00	91.00	92.40	92.60	14.38	0.47
2072	rainfed	0.7	2674.79	0.00	90.60	91.80	90.60	14.58	0.47
2099	rainfed	0.7	2594.54	0.00	93.20	94.20	94.90	14.51	0.47
2018	rainfed	0.7	2711.94	0.00	162.70	160.70	145.50	14.47	0.77
2045	rainfed	0.7	2710.43	0.00	152.40	152.70	145.50	14.38	0.77
2072	rainfed	0.7	2674.79	0.00	151.10	150.40	139.50	14.58	0.77
2099	rainfed	0.7	2594.54	0.00	155.20	155.70	152.70	14.51	0.77

Table C.6: Divergent Water Price for Risk Averse Farmers, SEMINOLE, GA, PEANUT,
RCP 4.5

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.6	0.7	5745.60	14.41	4.70	4.70	4.60	0.00	0.17
2045	.6	0.7	5355.81	14.70	7.30	7.30	7.50	0.00	0.17
2072	.6	0.7	5094.65	15.25	5.40	5.40	5.50	0.00	0.17
2099	.6	0.7	5058.06	15.03	6.10	6.00	6.00	0.00	0.17
2018	.6	0.7	5745.60	14.41	12.70	12.40	11.20	0.00	0.47
2045	.6	0.7	5355.81	14.70	20.70	20.90	20.90	0.00	0.47
2072	.6	0.7	5094.65	15.25	15.00	15.10	14.50	0.00	0.47
2099	.6	0.7	5058.06	15.03	16.40	16.10	14.20	0.00	0.47
2018	.6	0.7	5745.60	14.41	19.90	19.10	15.50	0.00	0.77
2045	.6	0.7	5355.81	14.70	34.50	34.50	30.70	0.00	0.77
2072	.6	0.7	5094.65	15.25	24.50	24.20	20.90	0.00	0.77
2099	.6	0.7	5058.06	15.03	25.80	24.50	19.10	0.00	0.77
2018	.5	0.7	5568.36	12.19	9.10	9.10	9.30	2.22	0.17
2045	.5	0.7	5176.20	12.54	10.60	10.70	11.10	2.16	0.17
2072	.5	0.7	4905.55	13.08	9.90	9.90	10.30	2.17	0.17
2099	.5	0.7	4885.68	12.84	9.60	9.60	9.80	2.19	0.17
2018	.5	0.7	5568.36	12.19	25.60	25.80	26.50	2.22	0.47
2045	.5	0.7	5176.20	12.54	30.60	31.30	32.80	2.16	0.47
2072	.5	0.7	4905.55	13.08	28.40	28.90	29.90	2.17	0.47
2099	.5	0.7	4885.68	12.84	26.90	27.10	26.60	2.19	0.47
2018	.5	0.7	5568.36	12.19	42.60	43.10	43.40	2.22	0.77
2045	.5	0.7	5176.20	12.54	52.20	53.30	52.00	2.16	0.77
2072	.5	0.7	4905.55	13.08	48.00	48.70	47.50	2.17	0.77

2099	.5	0.7	4885.68	12.84	44.40	44.20	38.50	2.19	0.77
2018	.4	0.7	5242.48	9.59	14.10	14.40	15.60	4.82	0.17
2045	.4	0.7	4859.59	10.16	15.10	15.30	16.40	4.54	0.17
2072	.4	0.7	4590.72	10.72	14.70	15.00	16.30	4.53	0.17
2099	.4	0.7	4587.86	10.34	13.80	14.00	14.80	4.69	0.17
2018	.4	0.7	5242.48	9.59	43.20	45.50	53.00	4.82	0.47
2045	.4	0.7	4859.59	10.16	45.40	47.40	54.40	4.54	0.47
2072	.4	0.7	4590.72	10.72	45.40	48.20	58.20	4.53	0.47
2099	.4	0.7	4587.86	10.34	41.00	42.60	46.60	4.69	0.47
2018	.4	0.7	5242.48	9.59	77.70	82.90	94.90	4.82	0.77
2045	.4	0.7	4859.59	10.16	80.70	85.50	96.00	4.54	0.77
2072	.4	0.7	4590.72	10.72	83.20	90.30	103.80	4.53	0.77
2099	.4	0.7	4587.86	10.34	71.80	74.80	73.60	4.69	0.77
2018	.3	0.7	4629.53	6.75	21.30	21.90	23.90	7.66	0.17
2045	.3	0.7	4203.84	7.34	22.90	23.50	25.50	7.36	0.17
2072	.3	0.7	3962.71	7.43	20.80	21.20	22.90	7.82	0.17
2099	.3	0.7	3958.65	7.33	21.00	21.40	23.10	7.70	0.17
2018	.3	0.7	4629.53	6.75	66.50	70.40	82.90	7.66	0.47
2045	.3	0.7	4203.84	7.34	70.90	74.40	83.10	7.36	0.47
2072	.3	0.7	3962.71	7.43	63.50	66.40	73.50	7.82	0.47
2099	.3	0.7	3958.65	7.33	64.00	66.90	73.70	7.70	0.47
2018	.3	0.7	4629.53	6.75	120.60	129.20	153.40	7.66	0.77
2045	.3	0.7	4203.84	7.34	126.50	132.60	139.60	7.36	0.77
2072	.3	0.7	3962.71	7.43	112.50	117.50	123.80	7.82	0.77
2099	.3	0.7	3958.65	7.33	113.50	118.40	120.90	7.70	0.77
2018	.2	0.7	3694.82	3.38	28.80	29.40	31.70	11.03	0.17
2045	.2	0.7	3281.64	3.49	28.50	29.00	30.90	11.21	0.17

2072	.2	0.7	3043.48	3.54	26.30	26.70	27.90	11.71	0.17
2099	.2	0.7	3089.96	3.57	26.20	26.60	27.90	11.46	0.17
2018	.2	0.7	3694.82	3.38	88.00	91.30	98.30	11.03	0.47
2045	.2	0.7	3281.64	3.49	85.70	88.40	93.30	11.21	0.47
2072	.2	0.7	3043.48	3.54	77.20	78.70	80.40	11.71	0.47
2099	.2	0.7	3089.96	3.57	77.30	79.10	81.90	11.46	0.47
2018	.2	0.7	3694.82	3.38	153.30	158.10	167.00	11.03	0.77
2045	.2	0.7	3281.64	3.49	147.90	151.40	152.90	11.21	0.77
2072	.2	0.7	3043.48	3.54	130.50	131.70	129.40	11.71	0.77
2099	.2	0.7	3089.96	3.57	131.60	133.60	131.80	11.46	0.77
2018	rainfed	0.7	2791.96	0.00	32.00	32.50	33.80	14.41	0.17
2045	rainfed	0.7	2445.83	0.00	30.60	30.90	31.70	14.70	0.17
2072	rainfed	0.7	2286.24	0.00	28.00	28.10	28.50	15.25	0.17
2099	rainfed	0.7	2356.68	0.00	27.90	28.10	28.70	15.03	0.17
2018	rainfed	0.7	2791.96	0.00	93.60	95.20	97.70	14.41	0.47
2045	rainfed	0.7	2445.83	0.00	87.60	88.30	88.20	14.70	0.47
2072	rainfed	0.7	2286.24	0.00	78.80	78.90	77.30	15.25	0.47
2099	rainfed	0.7	2356.68	0.00	79.20	79.70	79.20	15.03	0.47
2018	rainfed	0.7	2791.96	0.00	157.50	159.20	160.60	14.41	0.77
2045	rainfed	0.7	2445.83	0.00	145.20	145.20	140.80	14.70	0.77
2072	rainfed	0.7	2286.24	0.00	129.10	128.00	121.90	15.25	0.77
2099	rainfed	0.7	2356.68	0.00	130.90	130.60	125.50	15.03	0.77

Table C.7: Divergent Water Price for Risk Averse Farmers, SEMINOLE, GA, PEANUT,
RCP 6.0

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.6	0.7	5751.43	14.01	5.30	5.30	5.00	0.00	0.17
2045	.6	0.7	5527.68	14.62	5.40	5.40	5.30	0.00	0.17
2072	.6	0.7	5054.18	15.32	5.80	5.70	5.40	0.00	0.17
2099	.6	0.7	4586.67	15.73	5.80	5.90	6.10	0.00	0.17
2018	.6	0.7	5751.43	14.01	13.80	13.30	11.10	0.00	0.47
2045	.6	0.7	5527.68	14.62	14.40	14.10	12.50	0.00	0.47
2072	.6	0.7	5054.18	15.32	14.80	14.10	11.10	0.00	0.47
2099	.6	0.7	4586.67	15.73	16.80	17.30	21.30	0.00	0.47
2018	.6	0.7	5751.43	14.01	20.90	19.40	13.80	0.00	0.77
2045	.6	0.7	5527.68	14.62	22.40	21.40	17.40	0.00	0.77
2072	.6	0.7	5054.18	15.32	21.90	19.90	12.70	0.00	0.77
2099	.6	0.7	4586.67	15.73	29.40	31.80	55.30	0.00	0.77
2018	.5	0.7	5566.08	11.77	9.60	9.60	9.70	2.24	0.17
2045	.5	0.7	5313.39	12.46	10.80	10.90	11.10	2.16	0.17
2072	.5	0.7	4851.03	13.11	10.60	10.70	10.90	2.21	0.17
2099	.5	0.7	4406.25	13.32	9.30	9.40	9.60	2.41	0.17
2018	.5	0.7	5566.08	11.77	26.60	26.60	26.50	2.24	0.47
2045	.5	0.7	5313.39	12.46	30.50	30.80	31.70	2.16	0.47
2072	.5	0.7	4851.03	13.11	30.00	30.40	31.90	2.21	0.47
2099	.5	0.7	4406.25	13.32	26.40	26.90	28.90	2.41	0.47
2018	.5	0.7	5566.08	11.77	43.60	43.50	42.60	2.24	0.77
2045	.5	0.7	5313.39	12.46	50.90	51.50	54.20	2.16	0.77
2072	.5	0.7	4851.03	13.11	50.40	51.30	54.60	2.21	0.77

2099	.5	0.7	4406.25	13.32	44.60	45.90	55.30	2.41	0.77
2018	.4	0.7	5250.79	9.48	14.60	14.80	15.70	4.53	0.17
2045	.4	0.7	5007.90	10.04	14.90	15.00	15.80	4.58	0.17
2072	.4	0.7	4524.76	10.70	15.40	15.60	16.70	4.62	0.17
2099	.4	0.7	4100.75	10.89	13.50	13.70	14.10	4.84	0.17
2018	.4	0.7	5250.79	9.48	43.70	45.80	60.70	4.53	0.47
2045	.4	0.7	5007.90	10.04	43.70	45.20	50.80	4.58	0.47
2072	.4	0.7	4524.76	10.70	46.50	48.90	60.60	4.62	0.47
2099	.4	0.7	4100.75	10.89	39.00	39.90	42.60	4.84	0.47
2018	.4	0.7	5250.79	9.48	78.80	88.00	149.40	4.53	0.77
2045	.4	0.7	5007.90	10.04	76.10	79.90	93.20	4.58	0.77
2072	.4	0.7	4524.76	10.70	84.10	92.10	113.60	4.62	0.77
2099	.4	0.7	4100.75	10.89	66.50	68.40	72.40	4.84	0.77
2018	.3	0.7	4626.26	6.63	21.90	22.40	24.40	7.38	0.17
2045	.3	0.7	4342.92	7.20	22.70	23.10	24.90	7.42	0.17
2072	.3	0.7	3906.75	7.52	21.50	21.90	23.70	7.80	0.17
2099	.3	0.7	3590.87	7.93	18.50	18.70	19.70	7.80	0.17
2018	.3	0.7	4626.26	6.63	67.70	72.50	96.70	7.38	0.47
2045	.3	0.7	4342.92	7.20	69.00	72.20	81.80	7.42	0.47
2072	.3	0.7	3906.75	7.52	65.70	69.30	80.60	7.80	0.47
2099	.3	0.7	3590.87	7.93	54.40	56.30	63.10	7.80	0.47
2018	.3	0.7	4626.26	6.63	127.10	143.80	189.90	7.38	0.77
2045	.3	0.7	4342.92	7.20	122.70	129.50	140.90	7.42	0.77
2072	.3	0.7	3906.75	7.52	118.70	126.90	136.00	7.80	0.77
2099	.3	0.7	3590.87	7.93	95.00	99.70	108.90	7.80	0.77
2018	.2	0.7	3630.96	3.36	30.30	30.80	33.10	10.65	0.17
2045	.2	0.7	3410.41	3.57	28.80	29.30	30.90	11.05	0.17

2072	.2	0.7	3015.85	3.67	26.50	26.90	28.20	11.65	0.17
2099	.2	0.7	2728.82	3.75	23.50	23.70	24.60	11.98	0.17
2018	.2	0.7	3630.96	3.36	92.00	96.00	107.90	10.65	0.47
2045	.2	0.7	3410.41	3.57	85.70	88.10	93.10	11.05	0.47
2072	.2	0.7	3015.85	3.67	78.00	79.90	83.50	11.65	0.47
2099	.2	0.7	2728.82	3.75	68.00	69.40	73.00	11.98	0.47
2018	.2	0.7	3630.96	3.36	162.70	171.00	188.00	10.65	0.77
2045	.2	0.7	3410.41	3.57	147.20	150.80	153.70	11.05	0.77
2072	.2	0.7	3015.85	3.67	133.10	135.70	135.10	11.65	0.77
2099	.2	0.7	2728.82	3.75	115.60	118.20	118.80	11.98	0.77
2018	rainfed	0.7	2682.09	0.00	33.90	34.30	35.60	14.01	0.17
2045	rainfed	0.7	2505.75	0.00	31.70	32.00	32.90	14.62	0.17
2072	rainfed	0.7	2217.67	0.00	28.50	28.60	29.20	15.32	0.17
2099	rainfed	0.7	2044.27	0.00	24.80	24.90	25.20	15.73	0.17
2018	rainfed	0.7	2682.09	0.00	98.60	100.40	104.10	14.01	0.47
2045	rainfed	0.7	2505.75	0.00	90.90	91.90	93.00	14.62	0.47
2072	rainfed	0.7	2217.67	0.00	80.80	81.40	81.30	15.32	0.47
2099	rainfed	0.7	2044.27	0.00	69.50	69.90	70.00	15.73	0.47
2018	rainfed	0.7	2682.09	0.00	166.50	169.00	172.60	14.01	0.77
2045	rainfed	0.7	2505.75	0.00	151.60	152.30	149.70	14.62	0.77
2072	rainfed	0.7	2217.67	0.00	133.90	133.90	127.80	15.32	0.77
2099	rainfed	0.7	2044.27	0.00	114.90	115.00	110.80	15.73	0.77

Table C.8: Divergent Water Price for Risk Averse Farmers, SEMINOLE, GA, PEANUT,
RCP 8.5

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.6	0.7	5811.23	14.46	5.00	4.90	4.80	0.00	0.17
2045	.6	0.7	5295.90	15.02	4.90	4.90	5.00	0.00	0.17
2072	.6	0.7	4305.33	17.10	6.00	6.00	6.30	0.00	0.17
2099	.6	0.7	2906.57	19.57	8.20	8.30	8.60	0.00	0.17
2018	.6	0.7	5811.23	14.46	13.10	12.70	10.90	0.00	0.47
2045	.6	0.7	5295.90	15.02	13.70	13.90	15.40	0.00	0.47
2072	.6	0.7	4305.33	17.10	17.30	17.90	23.40	0.00	0.47
2099	.6	0.7	2906.57	19.57	23.70	24.40	28.00	0.00	0.47
2018	.6	0.7	5811.23	14.46	20.20	19.00	13.40	0.00	0.77
2045	.6	0.7	5295.90	15.02	23.20	24.10	31.60	0.00	0.77
2072	.6	0.7	4305.33	17.10	30.60	33.80	80.90	0.00	0.77
2099	.6	0.7	2906.57	19.57	41.00	43.40	61.00	0.00	0.77
2018	.5	0.7	5621.60	12.28	9.50	9.60	9.90	2.18	0.17
2045	.5	0.7	5096.34	12.66	9.70	9.80	10.10	2.36	0.17
2072	.5	0.7	4096.37	14.51	10.20	10.30	10.70	2.59	0.17
2099	.5	0.7	2749.14	17.36	10.00	10.10	10.50	2.21	0.17
2018	.5	0.7	5621.60	12.28	27.30	27.80	29.90	2.18	0.47
2045	.5	0.7	5096.34	12.66	27.90	28.60	32.50	2.36	0.47
2072	.5	0.7	4096.37	14.51	29.60	30.50	35.80	2.59	0.47
2099	.5	0.7	2749.14	17.36	29.00	29.70	33.50	2.21	0.47
2018	.5	0.7	5621.60	12.28	46.30	47.70	54.30	2.18	0.77
2045	.5	0.7	5096.34	12.66	47.90	50.50	64.20	2.36	0.77
2072	.5	0.7	4096.37	14.51	51.50	54.90	69.10	2.59	0.77

2099	.5	0.7	2749.14	17.36	49.90	52.30	65.80	2.21	0.77
2018	.4	0.7	5347.08	9.99	13.30	13.50	14.20	4.47	0.17
2045	.4	0.7	4781.52	10.24	14.30	14.50	15.50	4.78	0.17
2072	.4	0.7	3786.81	11.88	13.80	14.00	14.50	5.22	0.17
2099	.4	0.7	2488.73	14.36	11.90	11.90	12.20	5.21	0.17
2018	.4	0.7	5347.08	9.99	39.40	41.10	50.40	4.47	0.47
2045	.4	0.7	4781.52	10.24	43.00	45.30	58.30	4.78	0.47
2072	.4	0.7	3786.81	11.88	40.10	41.20	45.90	5.22	0.47
2099	.4	0.7	2488.73	14.36	33.70	34.30	36.40	5.21	0.47
2018	.4	0.7	5347.08	9.99	70.10	76.10	111.40	4.47	0.77
2045	.4	0.7	4781.52	10.24	78.30	87.00	118.40	4.78	0.77
2072	.4	0.7	3786.81	11.88	69.20	72.50	79.80	5.22	0.77
2099	.4	0.7	2488.73	14.36	56.90	58.40	63.60	5.21	0.77
2018	.3	0.7	4743.40	6.90	20.10	20.60	22.50	7.56	0.17
2045	.3	0.7	4136.80	7.26	21.50	21.90	23.50	7.76	0.17
2072	.3	0.7	3176.45	8.62	19.60	19.80	20.60	8.48	0.17
2099	.3	0.7	2055.33	10.76	14.60	14.70	14.90	8.81	0.17
2018	.3	0.7	4743.40	6.90	62.40	66.20	80.80	7.56	0.47
2045	.3	0.7	4136.80	7.26	65.40	68.70	80.40	7.76	0.47
2072	.3	0.7	3176.45	8.62	57.10	58.60	62.90	8.48	0.47
2099	.3	0.7	2055.33	10.76	41.30	41.70	42.90	8.81	0.47
2018	.3	0.7	4743.40	6.90	114.30	124.40	150.60	7.56	0.77
2045	.3	0.7	4136.80	7.26	117.70	125.90	140.30	7.76	0.77
2072	.3	0.7	3176.45	8.62	98.10	101.30	103.20	8.48	0.77
2099	.3	0.7	2055.33	10.76	68.90	69.80	70.70	8.81	0.77
2018	.2	0.7	3725.04	3.38	28.90	29.60	32.40	11.08	0.17
2045	.2	0.7	3158.93	3.54	28.00	28.30	29.50	11.48	0.17

2072	.2	0.7	2304.02	4.03	23.40	23.60	24.00	13.07	0.17
2099	.2	0.7	1392.10	5.38	16.50	16.50	16.50	14.19	0.17
2018	.2	0.7	3725.04	3.38	90.00	94.50	104.90	11.08	0.47
2045	.2	0.7	3158.93	3.54	81.70	83.60	87.30	11.48	0.47
2072	.2	0.7	2304.02	4.03	66.40	67.00	66.60	13.07	0.47
2099	.2	0.7	1392.10	5.38	45.60	45.60	45.10	14.19	0.47
2018	.2	0.7	3725.04	3.38	160.20	167.40	179.20	11.08	0.77
2045	.2	0.7	3158.93	3.54	139.10	141.80	142.70	11.48	0.77
2072	.2	0.7	2304.02	4.03	110.30	110.20	101.90	13.07	0.77
2099	.2	0.7	1392.10	5.38	74.50	74.20	71.50	14.19	0.77
2018	rainfed	0.7	2825.14	0.00	32.10	32.60	34.30	14.46	0.17
2045	rainfed	0.7	2324.41	0.00	30.30	30.50	31.10	15.02	0.17
2072	rainfed	0.7	1645.32	0.00	24.10	24.20	24.20	17.10	0.17
2099	rainfed	0.7	900.21	0.00	16.10	16.10	16.00	19.57	0.17
2018	rainfed	0.7	2825.14	0.00	95.10	97.30	101.20	14.46	0.47
2045	rainfed	0.7	2324.41	0.00	85.90	86.40	86.20	15.02	0.47
2072	rainfed	0.7	1645.32	0.00	66.90	66.80	64.70	17.10	0.47
2099	rainfed	0.7	900.21	0.00	44.00	43.70	42.40	19.57	0.47
2018	rainfed	0.7	2825.14	0.00	161.80	164.60	166.60	14.46	0.77
2045	rainfed	0.7	2324.41	0.00	142.00	141.90	136.80	15.02	0.77
2072	rainfed	0.7	1645.32	0.00	109.00	107.70	97.80	17.10	0.77
2099	rainfed	0.7	900.21	0.00	71.10	70.20	66.30	19.57	0.77

C.2 SOYBEAN

C.2.1 SIOUX,IA

Table C.9: Divergent Water Price for Risk Averse Farmers, SIOUX, IA, SOYBEAN, RCP

2.6

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.5	0.7	115.80	7.57	0.30	0.20	0.20	0.00	5.20
2045	.5	0.6	117.43	8.09	0.10	0.10	0.10	0.00	5.20
2099	.5	0.6	117.25	7.89	0.20	0.20	0.20	0.00	5.20
2018	.5	0.7	115.80	7.57	0.40	0.40	0.30	0.00	9.60
2045	.5	0.6	117.43	8.09	0.20	0.20	0.10	0.00	9.60
2099	.5	0.6	117.25	7.89	0.30	0.30	0.20	0.00	9.60
2018	.5	0.7	115.80	7.57	0.60	0.50	0.20	0.00	16.40
2045	.5	0.6	117.43	8.09	0.20	0.20	0.20	0.00	16.40
2099	.5	0.6	117.25	7.89	0.40	0.40	0.20	0.00	16.40
2018	.4	0.7	115.78	6.73	0.20	0.20	0.20	0.84	5.20
2045	.4	0.6	117.36	7.31	0.30	0.30	0.30	0.78	5.20
2072	.4	0.5	117.43	7.02	0.20	0.20	0.20	0.00	5.20
2099	.4	0.6	117.21	7.26	0.30	0.30	0.30	0.63	5.20
2018	.4	0.7	115.78	6.73	0.40	0.40	0.30	0.84	9.60
2045	.4	0.6	117.36	7.31	0.50	0.50	0.50	0.78	9.60
2072	.4	0.5	117.43	7.02	0.30	0.30	0.30	0.00	9.60
2099	.4	0.6	117.21	7.26	0.40	0.40	0.40	0.63	9.60
2018	.4	0.7	115.78	6.73	0.50	0.50	0.30	0.84	16.40
2045	.4	0.6	117.36	7.31	0.80	0.80	0.60	0.78	16.40
2072	.4	0.5	117.43	7.02	0.50	0.40	0.30	0.00	16.40
2099	.4	0.6	117.21	7.26	0.70	0.70	0.50	0.63	16.40
2018	.3	0.7	115.50	5.92	0.60	0.60	0.60	1.65	5.20
2045	.3	0.6	116.92	6.79	1.40	1.40	1.40	1.30	5.20

2072	.3	0.5	117.09	6.47	1.50	1.40	1.40	0.55	5.20
2099	.3	0.6	116.56	6.64	1.90	1.90	1.90	1.25	5.20
2018	.3	0.7	115.50	5.92	1.10	1.00	1.00	1.65	9.60
2045	.3	0.6	116.92	6.79	2.50	2.50	2.30	1.30	9.60
2072	.3	0.5	117.09	6.47	2.60	2.50	2.40	0.55	9.60
2099	.3	0.6	116.56	6.64	3.50	3.40	3.40	1.25	9.60
2018	.3	0.7	115.50	5.92	1.70	1.60	1.40	1.65	16.40
2045	.3	0.6	116.92	6.79	4.10	4.00	3.50	1.30	16.40
2072	.3	0.5	117.09	6.47	4.20	4.10	3.50	0.55	16.40
2099	.3	0.6	116.56	6.64	5.80	5.70	5.50	1.25	16.40
2018	.2	0.7	111.44	5.11	5.50	5.50	5.60	2.46	5.20
2045	.2	0.6	111.38	5.67	10.70	10.70	11.00	2.42	5.20
2072	.2	0.5	111.95	5.40	12.30	12.40	12.90	1.62	5.20
2099	.2	0.6	111.10	5.61	10.90	10.90	11.10	2.28	5.20
2018	.2	0.7	111.44	5.11	10.20	10.30	10.50	2.46	9.60
2045	.2	0.6	111.38	5.67	20.00	20.20	21.20	2.42	9.60
2072	.2	0.5	111.95	5.40	23.20	23.60	25.30	1.62	9.60
2099	.2	0.6	111.10	5.61	20.30	20.50	21.20	2.28	9.60
2018	.2	0.7	111.44	5.11	17.60	17.80	18.60	2.46	16.40
2045	.2	0.6	111.38	5.67	34.90	35.70	39.10	2.42	16.40
2072	.2	0.5	111.95	5.40	41.00	42.20	48.90	1.62	16.40
2099	.2	0.6	111.10	5.61	35.30	35.80	38.20	2.28	16.40
2018	rainfed	0.7	77.01	0.00	22.70	23.10	24.40	7.57	5.20
2045	rainfed	0.6	71.41	0.00	28.40	28.60	29.50	8.09	5.20
2072	rainfed	0.5	75.05	0.00	29.30	29.60	30.70	7.02	5.20
2099	rainfed	0.6	69.90	0.00	29.30	29.40	30.10	7.89	5.20
2018	rainfed	0.7	77.01	0.00	43.50	44.60	48.30	7.57	9.60

2045	rainfed	0.6	71.41	0.00	53.50	54.20	56.70	8.09	9.60
2072	rainfed	0.5	75.05	0.00	55.40	56.30	59.40	7.02	9.60
2099	rainfed	0.6	69.90	0.00	54.80	55.30	57.10	7.89	9.60
2018	rainfed	0.7	77.01	0.00	78.20	80.90	87.90	7.57	16.40
2045	rainfed	0.6	71.41	0.00	93.90	95.70	100.30	8.09	16.40
2072	rainfed	0.5	75.05	0.00	97.80	100.00	106.40	7.02	16.40
2099	rainfed	0.6	69.90	0.00	95.40	96.70	100.20	7.89	16.40

Table C.10: Divergent Water Price for Risk Averse Farmers, SIOUX, IA, SOYBEAN, RCP

4.5

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2045	.6	0.7	117.40	9.13	0.70	0.70	0.70	-0.75	5.20
2045	.6	0.7	117.40	9.13	1.30	1.30	1.20	-0.75	9.60
2045	.6	0.7	117.40	9.13	2.10	2.00	1.70	-0.75	16.40
2018	.5	0.7	115.26	7.28	0.10	0.10	0.20	0.00	5.20
2045	.5	0.7	117.41	8.38	0.40	0.40	0.40	0.00	5.20
2099	.5	0.6	119.29	8.71	0.10	0.10	0.10	0.00	5.20
2018	.5	0.7	115.26	7.28	0.20	0.20	0.30	0.00	9.60
2045	.5	0.7	117.41	8.38	0.70	0.70	0.60	0.00	9.60
2099	.5	0.6	119.29	8.71	0.20	0.20	0.20	0.00	9.60
2018	.5	0.7	115.26	7.28	0.40	0.40	0.60	0.00	16.40
2045	.5	0.7	117.41	8.38	1.10	1.10	0.90	0.00	16.40
2099	.5	0.6	119.29	8.71	0.30	0.30	0.30	0.00	16.40
2018	.4	0.7	115.24	6.69	0.20	0.20	0.20	0.59	5.20
2045	.4	0.7	117.34	7.73	0.50	0.50	0.40	0.65	5.20
2072	.4	0.5	118.24	8.06	0.70	0.70	0.70	0.00	5.20
2099	.4	0.6	119.20	7.97	0.40	0.40	0.40	0.74	5.20
2018	.4	0.7	115.24	6.69	0.30	0.30	0.30	0.59	9.60
2045	.4	0.7	117.34	7.73	0.80	0.80	0.70	0.65	9.60
2072	.4	0.5	118.24	8.06	1.20	1.20	1.20	0.00	9.60
2099	.4	0.6	119.20	7.97	0.70	0.70	0.60	0.74	9.60
2018	.4	0.7	115.24	6.69	0.40	0.40	0.50	0.59	16.40
2045	.4	0.7	117.34	7.73	1.20	1.20	1.00	0.65	16.40
2072	.4	0.5	118.24	8.06	2.00	2.00	1.80	0.00	16.40

2099	.4	0.6	119.20	7.97	1.10	1.00	0.90	0.74	16.40
2018	.3	0.7	114.99	5.98	0.50	0.50	0.50	1.30	5.20
2045	.3	0.7	116.93	7.04	1.10	1.10	1.00	1.34	5.20
2072	.3	0.5	117.46	7.50	3.60	3.60	3.60	0.56	5.20
2099	.3	0.6	118.33	7.37	2.50	2.50	2.50	1.34	5.20
2018	.3	0.7	114.99	5.98	1.00	1.00	1.00	1.30	9.60
2045	.3	0.7	116.93	7.04	1.90	1.90	1.80	1.34	9.60
2072	.3	0.5	117.46	7.50	6.50	6.50	6.50	0.56	9.60
2099	.3	0.6	118.33	7.37	4.50	4.50	4.50	1.34	9.60
2018	.3	0.7	114.99	5.98	1.60	1.60	1.60	1.30	16.40
2045	.3	0.7	116.93	7.04	3.10	3.10	2.80	1.34	16.40
2072	.3	0.5	117.46	7.50	11.10	11.10	11.10	0.56	16.40
2099	.3	0.6	118.33	7.37	7.60	7.60	7.40	1.34	16.40
2018	.2	0.7	110.73	5.12	6.10	6.10	6.20	2.16	5.20
2045	.2	0.7	110.59	5.96	9.00	9.00	9.30	2.42	5.20
2072	.2	0.5	111.10	6.28	15.50	15.70	16.40	1.78	5.20
2099	.2	0.6	111.83	6.19	12.20	12.30	12.70	2.52	5.20
2018	.2	0.7	110.73	5.12	11.30	11.40	11.70	2.16	9.60
2045	.2	0.7	110.59	5.96	16.80	17.00	18.00	2.42	9.60
2072	.2	0.5	111.10	6.28	29.40	30.00	32.50	1.78	9.60
2099	.2	0.6	111.83	6.19	23.00	23.30	24.70	2.52	9.60
2018	.2	0.7	110.73	5.12	19.50	19.80	21.00	2.16	16.40
2045	.2	0.7	110.59	5.96	29.50	30.20	33.30	2.42	16.40
2072	.2	0.5	111.10	6.28	52.30	54.20	62.40	1.78	16.40
2099	.2	0.6	111.83	6.19	40.40	41.40	45.60	2.52	16.40
2018	rainfed	0.7	75.62	0.00	23.60	23.90	25.00	7.28	5.20
2045	rainfed	0.7	68.72	0.00	26.10	26.40	27.30	8.38	5.20

2072	rainfed	0.5	67.71	0.00	30.70	30.90	31.50	8.06	5.20
2099	rainfed	0.6	67.68	0.00	29.10	29.30	30.00	8.71	5.20
2018	rainfed	0.7	75.62	0.00	44.90	45.70	48.70	7.28	9.60
2045	rainfed	0.7	68.72	0.00	49.40	50.10	52.30	8.38	9.60
2072	rainfed	0.5	67.71	0.00	57.40	58.00	59.60	8.06	9.60
2099	rainfed	0.6	67.68	0.00	54.60	55.20	56.60	8.71	9.60
2018	rainfed	0.7	75.62	0.00	79.70	81.80	87.60	7.28	16.40
2045	rainfed	0.7	68.72	0.00	86.90	88.50	91.80	8.38	16.40
2072	rainfed	0.5	67.71	0.00	100.00	101.20	103.70	8.06	16.40
2099	rainfed	0.6	67.68	0.00	95.10	96.20	98.10	8.71	16.40

Table C.11: Divergent Water Price for Risk Averse Farmers, SIOUX, IA, SOYBEAN, RCP

6.0

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.5	0.7	115.70	7.50	0.30	0.30	0.30	0.00	5.20
2045	.5	0.7	116.86	7.73	0.10	0.10	0.10	-0.79	5.20
2072	.5	0.7	118.99	8.91	0.10	0.10	0.10	0.00	5.20
2099	.5	0.6	119.48	9.66	0.30	0.30	0.30	0.00	5.20
2018	.5	0.7	115.70	7.50	0.60	0.50	0.50	0.00	9.60
2045	.5	0.7	116.86	7.73	0.20	0.20	0.20	-0.79	9.60
2072	.5	0.7	118.99	8.91	0.10	0.10	0.10	0.00	9.60
2099	.5	0.6	119.48	9.66	0.50	0.50	0.50	0.00	9.60
2018	.5	0.7	115.70	7.50	0.90	0.80	0.70	0.00	16.40
2045	.5	0.7	116.86	7.73	0.30	0.30	0.40	-0.79	16.40
2072	.5	0.7	118.99	8.91	0.20	0.10	0.10	0.00	16.40
2099	.5	0.6	119.48	9.66	0.80	0.80	0.90	0.00	16.40
2018	.4	0.7	115.69	6.78	0.30	0.30	0.30	0.72	5.20
2045	.4	0.7	116.87	6.94	0.10	0.10	0.10	0.00	5.20
2072	.4	0.7	118.93	8.23	0.20	0.20	0.20	0.68	5.20
2099	.4	0.6	119.40	8.89	0.40	0.40	0.40	0.77	5.20
2018	.4	0.7	115.69	6.78	0.50	0.40	0.40	0.72	9.60
2045	.4	0.7	116.87	6.94	0.10	0.10	0.10	0.00	9.60
2072	.4	0.7	118.93	8.23	0.30	0.30	0.30	0.68	9.60
2099	.4	0.6	119.40	8.89	0.80	0.80	0.70	0.77	9.60
2018	.4	0.7	115.69	6.78	0.70	0.70	0.60	0.72	16.40
2045	.4	0.7	116.87	6.94	0.20	0.20	0.20	0.00	16.40
2072	.4	0.7	118.93	8.23	0.50	0.50	0.40	0.68	16.40

2099	.4	0.6	119.40	8.89	1.30	1.20	1.20	0.77	16.40
2018	.3	0.7	115.37	6.14	0.70	0.70	0.70	1.36	5.20
2045	.3	0.7	116.58	6.26	0.50	0.50	0.50	0.68	5.20
2072	.3	0.7	117.96	7.41	1.70	1.70	1.60	1.50	5.20
2099	.3	0.6	118.32	8.25	3.10	3.10	3.10	1.41	5.20
2018	.3	0.7	115.37	6.14	1.20	1.20	1.10	1.36	9.60
2045	.3	0.7	116.58	6.26	0.90	0.90	0.90	0.68	9.60
2072	.3	0.7	117.96	7.41	3.00	3.00	2.90	1.50	9.60
2099	.3	0.6	118.32	8.25	5.60	5.60	5.60	1.41	9.60
2018	.3	0.7	115.37	6.14	2.00	1.90	1.70	1.36	16.40
2045	.3	0.7	116.58	6.26	1.50	1.50	1.40	0.68	16.40
2072	.3	0.7	117.96	7.41	5.00	5.00	4.70	1.50	16.40
2099	.3	0.6	118.32	8.25	9.50	9.50	9.50	1.41	16.40
2018	.2	0.7	111.00	5.20	6.00	6.00	6.10	2.30	5.20
2045	.2	0.7	111.40	5.15	6.70	6.80	7.00	1.79	5.20
2072	.2	0.7	111.06	6.32	9.50	9.60	9.90	2.59	5.20
2099	.2	0.6	110.90	6.91	13.70	13.80	14.30	2.75	5.20
2018	.2	0.7	111.00	5.20	11.10	11.20	11.50	2.30	9.60
2045	.2	0.7	111.40	5.15	12.60	12.80	13.50	1.79	9.60
2072	.2	0.7	111.06	6.32	17.90	18.10	19.00	2.59	9.60
2099	.2	0.6	110.90	6.91	25.80	26.20	28.10	2.75	9.60
2018	.2	0.7	111.00	5.20	19.20	19.40	20.40	2.30	16.40
2045	.2	0.7	111.40	5.15	22.10	22.60	25.30	1.79	16.40
2072	.2	0.7	111.06	6.32	31.30	32.00	34.70	2.59	16.40
2099	.2	0.6	110.90	6.91	45.60	46.90	53.00	2.75	16.40
2018	rainfed	0.7	74.04	0.00	24.20	24.50	25.90	7.50	5.20
2045	rainfed	0.7	74.96	0.00	24.20	24.60	25.90	6.94	5.20

2072	rainfed	0.7	67.32	0.00	25.90	26.10	27.00	8.91	5.20
2099	rainfed	0.6	63.82	0.00	28.80	28.90	29.50	9.66	5.20
2018	rainfed	0.7	74.04	0.00	46.20	47.40	50.90	7.50	9.60
2045	rainfed	0.7	74.96	0.00	46.30	47.50	51.10	6.94	9.60
2072	rainfed	0.7	67.32	0.00	48.90	49.50	51.40	8.91	9.60
2099	rainfed	0.6	63.82	0.00	53.80	54.30	55.50	9.66	9.60
2018	rainfed	0.7	74.04	0.00	82.80	85.40	91.80	7.50	16.40
2045	rainfed	0.7	74.96	0.00	83.00	85.70	92.30	6.94	16.40
2072	rainfed	0.7	67.32	0.00	85.70	87.10	89.90	8.91	16.40
2099	rainfed	0.6	63.82	0.00	93.40	94.30	95.60	9.66	16.40

Table C.12: Divergent Water Price for Risk Averse Farmers, SIOUX, IA, SOYBEAN, RCP

8.5

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2045	.6	0.7	118.38	9.21	0.20	0.20	0.20	0.00	5.20
2072	.6	0.7	118.89	11.04	0.50	0.50	0.50	0.00	5.20
2099	.6	0.7	117.39	14.28	0.40	0.40	0.30	0.00	5.20
2045	.6	0.7	118.38	9.21	0.40	0.40	0.30	0.00	9.60
2072	.6	0.7	118.89	11.04	0.90	0.90	0.90	0.00	9.60
2099	.6	0.7	117.39	14.28	0.60	0.60	0.50	0.00	9.60
2045	.6	0.7	118.38	9.21	0.60	0.50	0.20	0.00	16.40
2072	.6	0.7	118.89	11.04	1.40	1.40	1.40	0.00	16.40
2099	.6	0.7	117.39	14.28	0.90	0.90	0.40	0.00	16.40
2018	.5	0.7	116.15	7.83	0.50	0.50	0.50	0.00	5.20
2045	.5	0.7	118.35	8.58	0.30	0.30	0.20	0.63	5.20
2072	.5	0.7	118.80	10.28	0.60	0.60	0.60	0.76	5.20
2099	.5	0.7	117.07	13.64	1.30	1.30	1.30	0.64	5.20
2018	.5	0.7	116.15	7.83	0.90	0.90	0.80	0.00	9.60
2045	.5	0.7	118.35	8.58	0.40	0.40	0.40	0.63	9.60
2072	.5	0.7	118.80	10.28	1.00	1.00	1.00	0.76	9.60
2099	.5	0.7	117.07	13.64	2.40	2.30	2.30	0.64	9.60
2018	.5	0.7	116.15	7.83	1.40	1.40	1.10	0.00	16.40
2045	.5	0.7	118.35	8.58	0.70	0.60	0.50	0.63	16.40
2072	.5	0.7	118.80	10.28	1.70	1.70	1.60	0.76	16.40
2099	.5	0.7	117.07	13.64	3.90	3.90	3.70	0.64	16.40
2018	.4	0.7	116.12	7.10	0.40	0.40	0.40	0.73	5.20
2045	.4	0.7	118.29	7.88	0.30	0.30	0.30	1.33	5.20

2072	.4	0.7	118.65	9.68	0.80	0.80	0.80	1.36	5.20
2099	.4	0.7	116.36	12.91	2.50	2.50	2.50	1.37	5.20
2018	.4	0.7	116.12	7.10	0.70	0.70	0.70	0.73	9.60
2045	.4	0.7	118.29	7.88	0.60	0.50	0.50	1.33	9.60
2072	.4	0.7	118.65	9.68	1.40	1.40	1.30	1.36	9.60
2099	.4	0.7	116.36	12.91	4.60	4.60	4.60	1.37	9.60
2018	.4	0.7	116.12	7.10	1.20	1.10	0.90	0.73	16.40
2045	.4	0.7	118.29	7.88	0.90	0.80	0.70	1.33	16.40
2072	.4	0.7	118.65	9.68	2.30	2.20	2.10	1.36	16.40
2099	.4	0.7	116.36	12.91	7.90	7.90	7.90	1.37	16.40
2018	.3	0.7	115.64	6.46	1.20	1.20	1.10	1.37	5.20
2045	.3	0.7	117.57	7.22	1.60	1.60	1.50	1.99	5.20
2072	.3	0.7	117.01	8.79	3.30	3.30	3.30	2.25	5.20
2099	.3	0.7	113.53	12.02	6.50	6.50	6.60	2.26	5.20
2018	.3	0.7	115.64	6.46	2.10	2.10	2.00	1.37	9.60
2045	.3	0.7	117.57	7.22	2.80	2.80	2.70	1.99	9.60
2072	.3	0.7	117.01	8.79	6.10	6.10	6.20	2.25	9.60
2099	.3	0.7	113.53	12.02	12.10	12.10	12.40	2.26	9.60
2018	.3	0.7	115.64	6.46	3.50	3.40	3.10	1.37	16.40
2045	.3	0.7	117.57	7.22	4.70	4.60	4.30	1.99	16.40
2072	.3	0.7	117.01	8.79	10.40	10.50	10.60	2.25	16.40
2099	.3	0.7	113.53	12.02	20.80	21.10	22.00	2.26	16.40
2018	.2	0.7	110.83	5.44	7.20	7.30	7.40	2.39	5.20
2045	.2	0.7	111.01	6.12	10.00	10.00	10.40	3.09	5.20
2072	.2	0.7	108.77	7.46	12.20	12.30	12.60	3.58	5.20
2099	.2	0.7	101.35	10.15	17.00	17.10	17.60	4.13	5.20
2018	.2	0.7	110.83	5.44	13.50	13.60	14.30	2.39	9.60

2045	.2	0.7	111.01	6.12	18.70	19.00	20.20	3.09	9.60
2072	.2	0.7	108.77	7.46	22.90	23.10	24.20	3.58	9.60
2099	.2	0.7	101.35	10.15	31.80	32.30	33.80	4.13	9.60
2018	.2	0.7	110.83	5.44	23.50	24.00	26.20	2.39	16.40
2045	.2	0.7	111.01	6.12	33.00	33.80	38.00	3.09	16.40
2072	.2	0.7	108.77	7.46	40.00	40.80	44.20	3.58	16.40
2099	.2	0.7	101.35	10.15	55.80	57.00	61.10	4.13	16.40
2018	rainfed	0.7	71.35	0.00	25.70	26.00	27.00	7.83	5.20
2045	rainfed	0.7	67.09	0.00	27.20	27.40	28.20	9.21	5.20
2072	rainfed	0.7	59.94	0.00	26.30	26.40	26.90	11.04	5.20
2099	rainfed	0.7	41.70	0.00	26.00	26.00	26.00	14.28	5.20
2018	rainfed	0.7	71.35	0.00	48.70	49.50	52.10	7.83	9.60
2045	rainfed	0.7	67.09	0.00	51.20	51.90	53.90	9.21	9.60
2072	rainfed	0.7	59.94	0.00	49.10	49.50	50.50	11.04	9.60
2099	rainfed	0.7	41.70	0.00	48.00	47.90	47.70	14.28	9.60
2018	rainfed	0.7	71.35	0.00	86.00	87.90	92.00	7.83	16.40
2045	rainfed	0.7	67.09	0.00	89.70	91.20	94.80	9.21	16.40
2072	rainfed	0.7	59.94	0.00	85.10	85.80	87.50	11.04	16.40
2099	rainfed	0.7	41.70	0.00	81.80	81.60	80.40	14.28	16.40

C.2.2 PIATT,IL

Table C.13: Divergent Water Price for Risk Averse Farmers, PIATT, IL, SOYBEAN, RCP
2.6

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.6	0.7	80.35	6.78	0.10	0.10	0.10	0.00	4.00

2045	.6	0.7	81.30	7.30	0.30	0.30	0.30	0.00	4.00
2072	.6	0.7	80.94	6.36	0.10	0.10	0.10	0.00	4.00
2099	.6	0.7	82.01	7.58	0.30	0.30	0.30	0.00	4.00
2018	.6	0.7	80.35	6.78	0.30	0.30	0.30	0.00	10.00
2045	.6	0.7	81.30	7.30	0.60	0.60	0.60	0.00	10.00
2072	.6	0.7	80.94	6.36	0.20	0.20	0.20	0.00	10.00
2099	.6	0.7	82.01	7.58	0.60	0.60	0.60	0.00	10.00
2018	.6	0.7	80.35	6.78	0.40	0.40	0.40	0.00	17.60
2045	.6	0.7	81.30	7.30	1.10	1.10	1.10	0.00	17.60
2072	.6	0.7	80.94	6.36	0.30	0.30	0.30	0.00	17.60
2099	.6	0.7	82.01	7.58	1.10	1.10	1.10	0.00	17.60
2018	.5	0.7	80.19	6.10	0.50	0.50	0.50	0.68	4.00
2045	.5	0.7	81.12	6.50	0.60	0.60	0.60	0.80	4.00
2072	.5	0.7	80.72	5.85	0.60	0.60	0.60	0.51	4.00
2099	.5	0.7	81.78	6.80	0.60	0.60	0.60	0.78	4.00
2018	.5	0.7	80.19	6.10	1.10	1.10	1.10	0.68	10.00
2045	.5	0.7	81.12	6.50	1.30	1.30	1.30	0.80	10.00
2072	.5	0.7	80.72	5.85	1.40	1.40	1.40	0.51	10.00
2099	.5	0.7	81.78	6.80	1.50	1.50	1.50	0.78	10.00
2018	.5	0.7	80.19	6.10	1.90	1.90	1.90	0.68	17.60
2045	.5	0.7	81.12	6.50	2.20	2.20	2.20	0.80	17.60
2072	.5	0.7	80.72	5.85	2.40	2.40	2.40	0.51	17.60
2099	.5	0.7	81.78	6.80	2.60	2.60	2.60	0.78	17.60
2018	.4	0.7	78.55	5.41	2.90	2.90	2.90	1.37	4.00
2045	.4	0.7	79.35	5.85	3.20	3.20	3.20	1.45	4.00
2072	.4	0.7	79.21	5.13	2.90	2.90	2.90	1.23	4.00
2099	.4	0.7	79.50	6.11	3.80	3.80	3.80	1.47	4.00

2018	.4	0.7	78.55	5.41	7.30	7.30	7.30	1.37	10.00
2045	.4	0.7	79.35	5.85	7.90	7.90	7.90	1.45	10.00
2072	.4	0.7	79.21	5.13	7.10	7.10	7.10	1.23	10.00
2099	.4	0.7	79.50	6.11	9.60	9.60	9.60	1.47	10.00
2018	.4	0.7	78.55	5.41	12.80	12.80	12.80	1.37	17.60
2045	.4	0.7	79.35	5.85	13.80	13.80	13.80	1.45	17.60
2072	.4	0.7	79.21	5.13	12.40	12.40	12.40	1.23	17.60
2099	.4	0.7	79.50	6.11	16.90	16.90	16.90	1.47	17.60
2018	.3	0.7	71.73	4.26	9.60	9.60	9.60	2.52	4.00
2045	.3	0.7	71.54	4.62	10.50	10.50	10.50	2.68	4.00
2072	.3	0.7	72.41	3.97	9.60	9.60	9.60	2.39	4.00
2099	.3	0.7	71.83	4.95	10.70	10.70	10.70	2.63	4.00
2018	.3	0.7	71.73	4.26	24.20	24.20	24.20	2.52	10.00
2045	.3	0.7	71.54	4.62	26.90	26.90	26.90	2.68	10.00
2072	.3	0.7	72.41	3.97	24.50	24.50	24.50	2.39	10.00
2099	.3	0.7	71.83	4.95	27.40	27.40	27.40	2.63	10.00
2018	.3	0.7	71.73	4.26	43.60	43.60	43.60	2.52	17.60
2045	.3	0.7	71.54	4.62	48.90	48.90	48.90	2.68	17.60
2072	.3	0.7	72.41	3.97	44.40	44.40	44.40	2.39	17.60
2099	.3	0.7	71.83	4.95	49.40	49.40	49.40	2.63	17.60
2018	.2	0.7	61.05	2.87	15.50	15.50	15.50	3.91	4.00
2045	.2	0.7	60.73	3.15	16.00	16.00	16.00	4.15	4.00
2072	.2	0.7	61.81	2.63	15.70	15.70	15.70	3.73	4.00
2099	.2	0.7	60.22	3.32	16.10	16.10	16.10	4.26	4.00
2018	.2	0.7	61.05	2.87	39.50	39.50	39.50	3.91	10.00
2045	.2	0.7	60.73	3.15	40.80	40.80	40.80	4.15	10.00
2072	.2	0.7	61.81	2.63	40.00	40.00	40.00	3.73	10.00

2099	.2	0.7	60.22	3.32	41.10	41.10	41.10	4.26	10.00
2018	.2	0.7	61.05	2.87	71.10	71.10	71.10	3.91	17.60
2045	.2	0.7	60.73	3.15	74.00	74.00	74.00	4.15	17.60
2072	.2	0.7	61.81	2.63	72.30	72.30	72.30	3.73	17.60
2099	.2	0.7	60.22	3.32	74.20	74.20	74.20	4.26	17.60
2018	rainfed	0.7	42.63	0.00	19.30	19.30	19.30	6.78	4.00
2045	rainfed	0.7	41.52	0.00	19.20	19.20	19.20	7.30	4.00
2072	rainfed	0.7	44.39	0.00	19.60	19.60	19.60	6.36	4.00
2099	rainfed	0.7	39.49	0.00	19.50	19.50	19.50	7.58	4.00
2018	rainfed	0.7	42.63	0.00	49.00	49.00	49.00	6.78	10.00
2045	rainfed	0.7	41.52	0.00	49.00	49.00	49.00	7.30	10.00
2072	rainfed	0.7	44.39	0.00	50.00	50.00	50.00	6.36	10.00
2099	rainfed	0.7	39.49	0.00	49.60	49.60	49.60	7.58	10.00
2018	rainfed	0.7	42.63	0.00	87.90	87.90	87.90	6.78	17.60
2045	rainfed	0.7	41.52	0.00	88.10	88.10	88.10	7.30	17.60
2072	rainfed	0.7	44.39	0.00	90.10	90.10	90.10	6.36	17.60
2099	rainfed	0.7	39.49	0.00	88.80	88.80	88.80	7.58	17.60

Table C.14: Divergent Water Price for Risk Averse Farmers, PIATT, IL, SOYBEAN, RCP

4.5

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.6	0.7	79.67	6.37	0.30	0.30	0.30	0.00	4.00
2045	.6	0.7	80.14	6.32	0.60	0.60	0.60	0.00	4.00
2072	.6	0.7	81.21	6.57	0.70	0.70	0.70	0.00	4.00
2099	.6	0.7	81.60	6.58	0.50	0.50	0.50	0.00	4.00
2018	.6	0.7	79.67	6.37	0.70	0.70	0.70	0.00	10.00
2045	.6	0.7	80.14	6.32	1.30	1.30	1.30	0.00	10.00
2072	.6	0.7	81.21	6.57	1.70	1.70	1.70	0.00	10.00
2099	.6	0.7	81.60	6.58	1.10	1.10	1.10	0.00	10.00
2018	.6	0.7	79.67	6.37	1.10	1.10	1.10	0.00	17.60
2045	.6	0.7	80.14	6.32	2.20	2.20	2.20	0.00	17.60
2072	.6	0.7	81.21	6.57	2.80	2.80	2.80	0.00	17.60
2099	.6	0.7	81.60	6.58	1.80	1.80	1.80	0.00	17.60
2018	.5	0.7	79.59	5.51	0.30	0.30	0.30	0.86	4.00
2045	.5	0.7	79.89	5.50	0.90	0.90	0.90	0.82	4.00
2072	.5	0.7	80.94	5.78	1.00	1.00	1.00	0.79	4.00
2099	.5	0.7	81.14	5.82	1.30	1.30	1.30	0.76	4.00
2018	.5	0.7	79.59	5.51	0.80	0.80	0.80	0.86	10.00
2045	.5	0.7	79.89	5.50	2.00	2.00	2.00	0.82	10.00
2072	.5	0.7	80.94	5.78	2.40	2.40	2.40	0.79	10.00
2099	.5	0.7	81.14	5.82	3.00	3.00	3.00	0.76	10.00
2018	.5	0.7	79.59	5.51	1.30	1.30	1.30	0.86	17.60
2045	.5	0.7	79.89	5.50	3.50	3.50	3.50	0.82	17.60
2072	.5	0.7	80.94	5.78	4.10	4.10	4.10	0.79	17.60

2099	.5	0.7	81.14	5.82	5.20	5.20	5.20	0.76	17.60
2018	.4	0.7	78.17	4.78	2.20	2.20	2.20	1.59	4.00
2045	.4	0.7	77.76	4.78	3.80	3.80	3.80	1.54	4.00
2072	.4	0.7	78.50	4.93	4.20	4.20	4.20	1.64	4.00
2099	.4	0.7	78.36	4.96	5.00	5.00	5.00	1.62	4.00
2018	.4	0.7	78.17	4.78	5.40	5.40	5.40	1.59	10.00
2045	.4	0.7	77.76	4.78	9.30	9.30	9.30	1.54	10.00
2072	.4	0.7	78.50	4.93	10.60	10.60	10.60	1.64	10.00
2099	.4	0.7	78.36	4.96	12.40	12.40	12.40	1.62	10.00
2018	.4	0.7	78.17	4.78	9.40	9.40	9.40	1.59	17.60
2045	.4	0.7	77.76	4.78	16.50	16.50	16.50	1.54	17.60
2072	.4	0.7	78.50	4.93	18.80	18.80	18.80	1.64	17.60
2099	.4	0.7	78.36	4.96	21.90	21.90	21.90	1.62	17.60
2018	.3	0.7	72.01	3.74	8.00	8.00	8.00	2.63	4.00
2045	.3	0.7	71.19	3.73	9.80	9.80	9.80	2.59	4.00
2072	.3	0.7	71.83	3.81	10.00	10.00	10.00	2.76	4.00
2099	.3	0.7	72.23	3.90	10.30	10.30	10.30	2.68	4.00
2018	.3	0.7	72.01	3.74	20.40	20.40	20.40	2.63	10.00
2045	.3	0.7	71.19	3.73	24.90	24.90	24.90	2.59	10.00
2072	.3	0.7	71.83	3.81	25.50	25.50	25.50	2.76	10.00
2099	.3	0.7	72.23	3.90	26.20	26.20	26.20	2.68	10.00
2018	.3	0.7	72.01	3.74	37.00	37.00	37.00	2.63	17.60
2045	.3	0.7	71.19	3.73	45.20	45.20	45.20	2.59	17.60
2072	.3	0.7	71.83	3.81	46.60	46.60	46.60	2.76	17.60
2099	.3	0.7	72.23	3.90	47.70	47.70	47.70	2.68	17.60
2018	.2	0.7	62.05	2.55	14.10	14.10	14.10	3.82	4.00
2045	.2	0.7	61.32	2.36	15.10	15.10	15.10	3.96	4.00

2072	.2	0.7	61.62	2.37	15.10	15.10	15.10	4.20	4.00
2099	.2	0.7	61.29	2.50	16.20	16.20	16.20	4.08	4.00
2018	.2	0.7	62.05	2.55	36.60	36.60	36.60	3.82	10.00
2045	.2	0.7	61.32	2.36	38.80	38.80	38.80	3.96	10.00
2072	.2	0.7	61.62	2.37	38.80	38.80	38.80	4.20	10.00
2099	.2	0.7	61.29	2.50	41.60	41.60	41.60	4.08	10.00
2018	.2	0.7	62.05	2.55	67.30	67.30	67.30	3.82	17.60
2045	.2	0.7	61.32	2.36	71.00	71.00	71.00	3.96	17.60
2072	.2	0.7	61.62	2.37	70.90	70.90	70.90	4.20	17.60
2099	.2	0.7	61.29	2.50	76.10	76.10	76.10	4.08	17.60
2018	rainfed	0.7	45.92	0.00	18.00	18.00	18.00	6.37	4.00
2045	rainfed	0.7	45.14	0.00	19.10	19.10	19.10	6.32	4.00
2072	rainfed	0.7	45.78	0.00	18.90	18.90	18.90	6.57	4.00
2099	rainfed	0.7	45.45	0.00	19.30	19.30	19.30	6.58	4.00
2018	rainfed	0.7	45.92	0.00	46.50	46.50	46.50	6.37	10.00
2045	rainfed	0.7	45.14	0.00	49.20	49.20	49.20	6.32	10.00
2072	rainfed	0.7	45.78	0.00	48.60	48.60	48.60	6.57	10.00
2099	rainfed	0.7	45.45	0.00	49.50	49.50	49.50	6.58	10.00
2018	rainfed	0.7	45.92	0.00	84.90	84.90	84.90	6.37	17.60
2045	rainfed	0.7	45.14	0.00	89.50	89.50	89.50	6.32	17.60
2072	rainfed	0.7	45.78	0.00	88.40	88.40	88.40	6.57	17.60
2099	rainfed	0.7	45.45	0.00	89.60	89.60	89.60	6.58	17.60

Table C.15: Divergent Water Price for Risk Averse Farmers, PIATT, IL, SOYBEAN, RCP

6.0

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.6	0.7	79.04	6.23	0.30	0.30	0.30	0.00	4.00
2045	.6	0.7	80.07	6.69	0.40	0.40	0.40	0.00	4.00
2072	.6	0.7	81.38	7.05	0.50	0.50	0.50	0.00	4.00
2099	.6	0.7	81.90	7.14	0.90	0.90	0.90	0.00	4.00
2018	.6	0.7	79.04	6.23	0.60	0.60	0.60	0.00	10.00
2045	.6	0.7	80.07	6.69	0.90	0.90	0.90	0.00	10.00
2072	.6	0.7	81.38	7.05	1.20	1.20	1.20	0.00	10.00
2099	.6	0.7	81.90	7.14	2.00	2.00	2.00	0.00	10.00
2018	.6	0.7	79.04	6.23	1.00	1.00	1.00	0.00	17.60
2045	.6	0.7	80.07	6.69	1.60	1.60	1.60	0.00	17.60
2072	.6	0.7	81.38	7.05	1.90	1.90	1.90	0.00	17.60
2099	.6	0.7	81.90	7.14	3.50	3.50	3.50	0.00	17.60
2018	.5	0.7	78.97	5.48	0.30	0.30	0.30	0.75	4.00
2045	.5	0.7	79.91	5.86	0.60	0.60	0.60	0.83	4.00
2072	.5	0.7	80.99	6.10	1.10	1.10	1.10	0.95	4.00
2099	.5	0.7	81.30	6.48	1.80	1.80	1.80	0.66	4.00
2018	.5	0.7	78.97	5.48	0.70	0.70	0.70	0.75	10.00
2045	.5	0.7	79.91	5.86	1.30	1.30	1.30	0.83	10.00
2072	.5	0.7	80.99	6.10	2.60	2.60	2.60	0.95	10.00
2099	.5	0.7	81.30	6.48	4.40	4.40	4.40	0.66	10.00
2018	.5	0.7	78.97	5.48	1.20	1.20	1.20	0.75	17.60
2045	.5	0.7	79.91	5.86	2.20	2.20	2.20	0.83	17.60
2072	.5	0.7	80.99	6.10	4.40	4.40	4.40	0.95	17.60

2099	.5	0.7	81.30	6.48	7.50	7.50	7.50	0.66	17.60
2018	.4	0.7	77.39	4.71	2.60	2.60	2.60	1.52	4.00
2045	.4	0.7	78.09	5.31	3.20	3.20	3.20	1.38	4.00
2072	.4	0.7	78.78	5.55	4.40	4.40	4.40	1.50	4.00
2099	.4	0.7	78.01	5.63	6.00	6.00	6.00	1.51	4.00
2018	.4	0.7	77.39	4.71	6.40	6.40	6.40	1.52	10.00
2045	.4	0.7	78.09	5.31	7.90	7.90	7.90	1.38	10.00
2072	.4	0.7	78.78	5.55	11.00	11.00	11.00	1.50	10.00
2099	.4	0.7	78.01	5.63	15.00	15.00	15.00	1.51	10.00
2018	.4	0.7	77.39	4.71	11.00	11.00	11.00	1.52	17.60
2045	.4	0.7	78.09	5.31	14.10	14.10	14.10	1.38	17.60
2072	.4	0.7	78.78	5.55	19.60	19.60	19.60	1.50	17.60
2099	.4	0.7	78.01	5.63	26.80	26.80	26.80	1.51	17.60
2018	.3	0.7	71.24	3.86	9.10	9.10	9.10	2.37	4.00
2045	.3	0.7	71.23	4.23	9.70	9.70	9.70	2.46	4.00
2072	.3	0.7	71.17	4.39	11.40	11.40	11.40	2.66	4.00
2099	.3	0.7	70.85	4.49	11.70	11.70	11.70	2.65	4.00
2018	.3	0.7	71.24	3.86	23.00	23.00	23.00	2.37	10.00
2045	.3	0.7	71.23	4.23	24.90	24.90	24.90	2.46	10.00
2072	.3	0.7	71.17	4.39	29.30	29.30	29.30	2.66	10.00
2099	.3	0.7	70.85	4.49	29.90	29.90	29.90	2.65	10.00
2018	.3	0.7	71.24	3.86	41.50	41.50	41.50	2.37	17.60
2045	.3	0.7	71.23	4.23	45.40	45.40	45.40	2.46	17.60
2072	.3	0.7	71.17	4.39	53.50	53.50	53.50	2.66	17.60
2099	.3	0.7	70.85	4.49	54.50	54.50	54.50	2.65	17.60
2018	.2	0.7	61.93	2.48	14.30	14.30	14.30	3.75	4.00
2045	.2	0.7	60.79	2.80	15.30	15.30	15.30	3.89	4.00

2072	.2	0.7	60.53	2.90	16.50	16.50	16.50	4.15	4.00
2099	.2	0.7	58.60	2.86	17.20	17.20	17.20	4.28	4.00
2018	.2	0.7	61.93	2.48	36.90	36.90	36.90	3.75	10.00
2045	.2	0.7	60.79	2.80	39.40	39.40	39.40	3.89	10.00
2072	.2	0.7	60.53	2.90	42.60	42.60	42.60	4.15	10.00
2099	.2	0.7	58.60	2.86	44.20	44.20	44.20	4.28	10.00
2018	.2	0.7	61.93	2.48	67.40	67.40	67.40	3.75	17.60
2045	.2	0.7	60.79	2.80	72.30	72.30	72.30	3.89	17.60
2072	.2	0.7	60.53	2.90	77.80	77.80	77.80	4.15	17.60
2099	.2	0.7	58.60	2.86	80.50	80.50	80.50	4.28	17.60
2018	rainfed	0.7	43.93	0.00	19.40	19.40	19.40	6.23	4.00
2045	rainfed	0.7	42.90	0.00	19.00	19.00	19.00	6.69	4.00
2072	rainfed	0.7	41.61	0.00	20.00	20.00	20.00	7.05	4.00
2099	rainfed	0.7	41.12	0.00	19.80	19.80	19.80	7.14	4.00
2018	rainfed	0.7	43.93	0.00	49.70	49.70	49.70	6.23	10.00
2045	rainfed	0.7	42.90	0.00	48.40	48.40	48.40	6.69	10.00
2072	rainfed	0.7	41.61	0.00	51.00	51.00	51.00	7.05	10.00
2099	rainfed	0.7	41.12	0.00	50.40	50.40	50.40	7.14	10.00
2018	rainfed	0.7	43.93	0.00	89.70	89.70	89.70	6.23	17.60
2045	rainfed	0.7	42.90	0.00	87.10	87.10	87.10	6.69	17.60
2072	rainfed	0.7	41.61	0.00	91.70	91.70	91.70	7.05	17.60
2099	rainfed	0.7	41.12	0.00	90.70	90.70	90.70	7.14	17.60

Table C.16: Divergent Water Price for Risk Averse Farmers, PIATT, IL, SOYBEAN, RCP

8.5

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.6	0.7	79.47	6.13	0.30	0.30	0.30	0.00	4.00
2045	.6	0.7	80.80	6.38	0.50	0.50	0.50	0.00	4.00
2072	.6	0.7	83.17	7.91	1.50	1.50	1.50	0.00	4.00
2099	.6	0.7	84.10	9.95	2.60	2.60	2.60	0.00	4.00
2018	.6	0.7	79.47	6.13	0.70	0.70	0.70	0.00	10.00
2045	.6	0.7	80.80	6.38	1.30	1.30	1.30	0.00	10.00
2072	.6	0.7	83.17	7.91	3.50	3.50	3.50	0.00	10.00
2099	.6	0.7	84.10	9.95	6.50	6.50	6.50	0.00	10.00
2018	.6	0.7	79.47	6.13	1.10	1.10	1.10	0.00	17.60
2045	.6	0.7	80.80	6.38	2.20	2.20	2.20	0.00	17.60
2072	.6	0.7	83.17	7.91	6.00	6.00	6.00	0.00	17.60
2099	.6	0.7	84.10	9.95	11.30	11.30	11.30	0.00	17.60
2018	.5	0.7	79.36	5.45	0.40	0.40	0.40	0.68	4.00
2045	.5	0.7	80.49	5.74	1.00	1.00	1.00	0.64	4.00
2072	.5	0.7	82.27	7.07	2.70	2.70	2.70	0.84	4.00
2099	.5	0.7	82.69	9.14	4.60	4.60	4.60	0.81	4.00
2018	.5	0.7	79.36	5.45	1.00	1.00	1.00	0.68	10.00
2045	.5	0.7	80.49	5.74	2.50	2.50	2.50	0.64	10.00
2072	.5	0.7	82.27	7.07	6.60	6.60	6.60	0.84	10.00
2099	.5	0.7	82.69	9.14	11.50	11.50	11.50	0.81	10.00
2018	.5	0.7	79.36	5.45	1.70	1.70	1.70	0.68	17.60
2045	.5	0.7	80.49	5.74	4.30	4.30	4.30	0.64	17.60
2072	.5	0.7	82.27	7.07	11.50	11.50	11.50	0.84	17.60

2099	.5	0.7	82.69	9.14	20.30	20.30	20.30	0.81	17.60
2018	.4	0.7	77.97	4.64	2.40	2.40	2.40	1.49	4.00
2045	.4	0.7	78.01	5.03	4.70	4.70	4.70	1.35	4.00
2072	.4	0.7	78.12	6.16	7.70	7.70	7.70	1.75	4.00
2099	.4	0.7	76.73	7.89	10.60	10.60	10.60	2.06	4.00
2018	.4	0.7	77.97	4.64	5.80	5.80	5.80	1.49	10.00
2045	.4	0.7	78.01	5.03	11.80	11.80	11.80	1.35	10.00
2072	.4	0.7	78.12	6.16	19.50	19.50	19.50	1.75	10.00
2099	.4	0.7	76.73	7.89	26.90	26.90	26.90	2.06	10.00
2018	.4	0.7	77.97	4.64	10.20	10.20	10.20	1.49	17.60
2045	.4	0.7	78.01	5.03	20.90	20.90	20.90	1.35	17.60
2072	.4	0.7	78.12	6.16	34.90	34.90	34.90	1.75	17.60
2099	.4	0.7	76.73	7.89	48.30	48.30	48.30	2.06	17.60
2018	.3	0.7	71.68	3.70	8.70	8.70	8.70	2.43	4.00
2045	.3	0.7	71.83	3.85	10.10	10.10	10.10	2.53	4.00
2072	.3	0.7	70.02	4.83	13.20	13.20	13.20	3.08	4.00
2099	.3	0.7	66.99	6.40	15.90	15.90	15.90	3.55	4.00
2018	.3	0.7	71.68	3.70	22.30	22.30	22.30	2.43	10.00
2045	.3	0.7	71.83	3.85	25.70	25.70	25.70	2.53	10.00
2072	.3	0.7	70.02	4.83	33.50	33.50	33.50	3.08	10.00
2099	.3	0.7	66.99	6.40	40.30	40.30	40.30	3.55	10.00
2018	.3	0.7	71.68	3.70	40.50	40.50	40.50	2.43	17.60
2045	.3	0.7	71.83	3.85	46.80	46.80	46.80	2.53	17.60
2072	.3	0.7	70.02	4.83	60.70	60.70	60.70	3.08	17.60
2099	.3	0.7	66.99	6.40	72.50	72.50	72.50	3.55	17.60
2018	.2	0.7	62.08	2.44	14.50	14.50	14.50	3.69	4.00
2045	.2	0.7	60.95	2.46	16.10	16.10	16.10	3.92	4.00

2072	.2	0.7	58.77	3.30	17.60	17.60	17.60	4.61	4.00
2099	.2	0.7	54.08	4.39	18.90	18.90	18.90	5.56	4.00
2018	.2	0.7	62.08	2.44	37.20	37.20	37.20	3.69	10.00
2045	.2	0.7	60.95	2.46	41.20	41.20	41.20	3.92	10.00
2072	.2	0.7	58.77	3.30	44.90	44.90	44.90	4.61	10.00
2099	.2	0.7	54.08	4.39	47.90	47.90	47.90	5.56	10.00
2018	.2	0.7	62.08	2.44	68.00	68.00	68.00	3.69	17.60
2045	.2	0.7	60.95	2.46	75.10	75.10	75.10	3.92	17.60
2072	.2	0.7	58.77	3.30	80.90	80.90	80.90	4.61	17.60
2099	.2	0.7	54.08	4.39	85.50	85.50	85.50	5.56	17.60
2018	rainfed	0.7	46.25	0.00	18.50	18.50	18.50	6.13	4.00
2045	rainfed	0.7	44.75	0.00	19.60	19.60	19.60	6.38	4.00
2072	rainfed	0.7	38.73	0.00	20.10	20.10	20.10	7.91	4.00
2099	rainfed	0.7	31.57	0.00	19.50	19.50	19.50	9.95	4.00
2018	rainfed	0.7	46.25	0.00	47.40	47.40	47.40	6.13	10.00
2045	rainfed	0.7	44.75	0.00	50.00	50.00	50.00	6.38	10.00
2072	rainfed	0.7	38.73	0.00	50.70	50.70	50.70	7.91	10.00
2099	rainfed	0.7	31.57	0.00	49.00	49.00	49.00	9.95	10.00
2018	rainfed	0.7	46.25	0.00	86.10	86.10	86.10	6.13	17.60
2045	rainfed	0.7	44.75	0.00	90.40	90.40	90.40	6.38	17.60
2072	rainfed	0.7	38.73	0.00	90.30	90.30	90.30	7.91	17.60
2099	rainfed	0.7	31.57	0.00	86.40	86.40	86.40	9.95	17.60

C.3 CORN

C.3.1 DEKALB, IL

Table C.17: Divergent Water Price for Risk Averse Farmers, DEKALB, IL, CORN

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.2	0.3	211.97	5.54	0.20	0.20	0.20	0.00	2.40
2045	.2	0.3	196.44	5.20	0.20	0.20	0.20	0.00	2.40
2072	.2	0.3	195.52	4.82	0.20	0.20	0.20	0.00	2.40
2099	.2	0.3	198.16	5.45	0.20	0.20	0.20	0.00	2.40
2018	.2	0.3	211.97	5.54	0.20	0.20	0.30	0.00	4.00
2045	.2	0.3	196.44	5.20	0.30	0.30	0.40	0.00	4.00
2072	.2	0.3	195.52	4.82	0.30	0.30	0.40	0.00	4.00
2099	.2	0.3	198.16	5.45	0.30	0.30	0.40	0.00	4.00
2018	.2	0.3	211.97	5.54	0.80	0.90	1.60	0.00	13.20
2045	.2	0.3	196.44	5.20	1.10	1.20	1.80	0.00	13.20
2072	.2	0.3	195.52	4.82	1.10	1.10	1.40	0.00	13.20
2099	.2	0.3	198.16	5.45	1.30	1.50	2.20	0.00	13.20
2018	rainfed	0.3	141.12	0.00	29.00	29.30	30.40	5.54	2.40
2045	rainfed	0.3	142.02	0.00	24.00	24.40	25.80	5.20	2.40
2072	rainfed	0.3	144.01	0.00	24.10	24.60	26.30	4.82	2.40
2099	rainfed	0.3	139.85	0.00	24.50	24.80	26.20	5.45	2.40
2018	rainfed	0.3	141.12	0.00	49.30	50.10	52.30	5.54	4.00
2045	rainfed	0.3	142.02	0.00	41.30	42.30	45.50	5.20	4.00
2072	rainfed	0.3	144.01	0.00	41.70	42.90	46.70	4.82	4.00
2099	rainfed	0.3	139.85	0.00	42.00	42.90	45.80	5.45	4.00
2018	rainfed	0.3	141.12	0.00	174.70	176.50	173.30	5.54	13.20
2045	rainfed	0.3	142.02	0.00	153.50	157.50	161.10	5.20	13.20
2072	rainfed	0.3	144.01	0.00	158.30	163.30	169.00	4.82	13.20
2099	rainfed	0.3	139.85	0.00	154.00	157.30	160.60	5.45	13.20



Table C.18: Divergent Water Price for Risk Averse Farmers, DEKALB, IL, CORN, RCP 2.6

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.2	0.3	217.35	5.04	0.20	0.20	0.20	0.00	2.40
2045	.2	0.3	188.76	5.07	0.80	0.80	0.90	0.00	2.40
2072	.2	0.3	170.75	4.97	0.30	0.30	0.30	0.00	2.40
2099	.2	0.3	169.07	5.02	0.50	0.50	0.40	0.00	2.40
2018	.2	0.3	217.35	5.04	0.40	0.30	0.30	0.00	4.00
2045	.2	0.3	188.76	5.07	1.30	1.40	1.50	0.00	4.00
2072	.2	0.3	170.75	4.97	0.50	0.50	0.50	0.00	4.00
2099	.2	0.3	169.07	5.02	0.70	0.70	0.70	0.00	4.00
2018	.2	0.3	217.35	5.04	0.70	0.50	0.20	0.00	13.20
2045	.2	0.3	188.76	5.07	5.20	5.70	6.30	0.00	13.20
2072	.2	0.3	170.75	4.97	1.70	1.80	2.00	0.00	13.20
2099	.2	0.3	169.07	5.02	2.00	1.80	1.00	0.00	13.20
2018	rainfed	0.3	154.56	0.00	27.50	27.70	28.70	5.04	2.40
2045	rainfed	0.3	138.00	0.00	22.40	22.60	23.60	5.07	2.40
2072	rainfed	0.3	123.05	0.00	21.00	21.30	22.20	4.97	2.40
2099	rainfed	0.3	122.47	0.00	20.60	20.80	21.50	5.02	2.40
2018	rainfed	0.3	154.56	0.00	46.60	47.30	49.80	5.04	4.00
2045	rainfed	0.3	138.00	0.00	38.10	38.80	41.30	5.07	4.00
2072	rainfed	0.3	123.05	0.00	35.90	36.50	38.70	4.97	4.00
2099	rainfed	0.3	122.47	0.00	34.90	35.40	37.10	5.02	4.00
2018	rainfed	0.3	154.56	0.00	167.50	172.20	182.60	5.04	13.20
2045	rainfed	0.3	138.00	0.00	139.10	143.10	150.20	5.07	13.20
2072	rainfed	0.3	123.05	0.00	130.20	133.30	135.90	4.97	13.20
2099	rainfed	0.3	122.47	0.00	124.40	127.10	132.00	5.02	13.20



Table C.19: Divergent Water Price for Risk Averse Farmers, DEKALB, IL, CORN, RCP 4.5

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.2	0.3	214.26	5.24	0.90	0.80	0.70	0.00	2.40
2045	.2	0.3	196.54	5.32	0.40	0.40	0.40	0.00	2.40
2072	.2	0.3	172.59	5.31	0.60	0.60	0.60	0.00	2.40
2099	.2	0.3	160.37	5.33	1.70	1.60	1.50	0.00	2.40
2018	.2	0.3	214.26	5.24	1.30	1.20	0.90	0.00	4.00
2045	.2	0.3	196.54	5.32	0.60	0.60	0.50	0.00	4.00
2072	.2	0.3	172.59	5.31	1.00	0.90	0.90	0.00	4.00
2099	.2	0.3	160.37	5.33	2.60	2.50	2.00	0.00	4.00
2018	.2	0.3	214.26	5.24	2.50	2.00	1.10	0.00	13.20
2045	.2	0.3	196.54	5.32	1.30	1.00	0.50	0.00	13.20
2072	.2	0.3	172.59	5.31	2.70	2.60	2.20	0.00	13.20
2099	.2	0.3	160.37	5.33	5.60	4.20	0.90	0.00	13.20
2018	rainfed	0.3	150.10	0.00	27.30	27.70	29.30	5.24	2.40
2045	rainfed	0.3	140.03	0.00	23.30	23.60	24.60	5.32	2.40
2072	rainfed	0.3	116.26	0.00	23.00	23.10	23.50	5.31	2.40
2099	rainfed	0.3	110.66	0.00	20.50	20.60	21.10	5.33	2.40
2018	rainfed	0.3	150.10	0.00	46.90	47.90	51.50	5.24	4.00
2045	rainfed	0.3	140.03	0.00	39.70	40.40	42.90	5.32	4.00
2072	rainfed	0.3	116.26	0.00	38.60	38.90	39.70	5.31	4.00
2099	rainfed	0.3	110.66	0.00	34.50	34.90	35.70	5.33	4.00
2018	rainfed	0.3	150.10	0.00	174.30	180.00	187.60	5.24	13.20
2045	rainfed	0.3	140.03	0.00	144.70	149.90	163.00	5.32	13.20
2072	rainfed	0.3	116.26	0.00	131.80	132.50	132.20	5.31	13.20
2099	rainfed	0.3	110.66	0.00	117.90	117.10	107.50	5.33	13.20



Table C.20: Divergent Water Price for Risk Averse Farmers, DEKALB, IL, CORN, RCP 6.0

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.2	0.3	208.51	5.31	0.70	0.70	0.60	0.00	2.40
2045	.2	0.3	173.58	5.47	0.60	0.60	0.50	0.00	2.40
2072	.2	0.3	141.19	5.40	2.20	2.10	1.90	0.00	2.40
2099	.2	0.3	100.87	6.29	1.80	1.70	1.70	0.00	2.40
2018	.2	0.3	208.51	5.31	1.00	1.00	0.70	0.00	4.00
2045	.2	0.3	173.58	5.47	0.90	0.80	0.70	0.00	4.00
2072	.2	0.3	141.19	5.40	3.40	3.20	2.60	0.00	4.00
2099	.2	0.3	100.87	6.29	2.80	2.80	2.60	0.00	4.00
2018	.2	0.3	208.51	5.31	1.90	1.50	0.80	0.00	13.20
2045	.2	0.3	173.58	5.47	2.10	1.80	1.00	0.00	13.20
2072	.2	0.3	141.19	5.40	7.80	6.60	3.90	0.00	13.20
2099	.2	0.3	100.87	6.29	8.40	8.30	8.80	0.00	13.20
2018	rainfed	0.3	145.61	0.00	26.90	27.30	28.60	5.31	2.40
2045	rainfed	0.3	119.53	0.00	21.70	21.90	22.60	5.47	2.40
2072	rainfed	0.3	98.76	0.00	17.80	18.00	18.50	5.40	2.40
2099	rainfed	0.3	65.44	0.00	12.30	12.20	12.10	6.29	2.40
2018	rainfed	0.3	145.61	0.00	46.00	47.00	50.10	5.31	4.00
2045	rainfed	0.3	119.53	0.00	36.80	37.30	38.90	5.47	4.00
2072	rainfed	0.3	98.76	0.00	30.20	30.60	31.90	5.40	4.00
2099	rainfed	0.3	65.44	0.00	20.30	20.20	19.80	6.29	4.00
2018	rainfed	0.3	145.61	0.00	168.70	172.70	174.20	5.31	13.20
2045	rainfed	0.3	119.53	0.00	130.10	132.50	136.60	5.47	13.20
2072	rainfed	0.3	98.76	0.00	106.50	108.40	110.80	5.40	13.20
2099	rainfed	0.3	65.44	0.00	64.40	63.20	58.00	6.29	13.20

C.3.2 FRANKLIN, IA

Table C.21: Divergent Water Price for Risk Averse Farmers, FRANKLIN, IA, CORN, RCP
2.6

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.2	0.3	160.83	5.03	0.90	0.90	0.80	0.00	2.40
2045	.2	0.3	153.06	5.08	2.30	2.30	2.30	0.00	2.40
2072	.2	0.3	152.31	4.97	2.50	2.50	2.60	0.00	2.40
2099	.2	0.3	151.28	5.62	1.80	1.80	1.80	0.00	2.40
2018	.2	0.3	160.83	5.03	1.40	1.40	1.30	0.00	4.00
2045	.2	0.3	153.06	5.08	3.80	3.80	4.00	0.00	4.00
2072	.2	0.3	152.31	4.97	4.20	4.30	4.60	0.00	4.00
2099	.2	0.3	151.28	5.62	2.90	3.00	3.10	0.00	4.00
2018	.2	0.3	160.83	5.03	3.80	3.50	2.00	0.00	13.20
2045	.2	0.3	153.06	5.08	13.40	14.30	21.40	0.00	13.20
2072	.2	0.3	152.31	4.97	15.60	16.50	19.80	0.00	13.20
2099	.2	0.3	151.28	5.62	10.20	10.50	11.50	0.00	13.20
2018	rainfed	0.3	117.33	0.00	19.10	19.30	20.00	5.03	2.40
2045	rainfed	0.3	112.32	0.00	18.20	18.40	19.10	5.08	2.40
2072	rainfed	0.3	112.17	0.00	18.20	18.30	18.90	4.97	2.40
2099	rainfed	0.3	105.52	0.00	18.30	18.50	19.10	5.62	2.40
2018	rainfed	0.3	117.33	0.00	32.40	32.90	34.50	5.03	4.00
2045	rainfed	0.3	112.32	0.00	30.90	31.40	33.00	5.08	4.00
2072	rainfed	0.3	112.17	0.00	30.80	31.20	32.40	4.97	4.00
2099	rainfed	0.3	105.52	0.00	31.10	31.40	32.70	5.62	4.00

2018	rainfed	0.3	117.33	0.00	115.20	116.90	115.30	5.03	13.20
2045	rainfed	0.3	112.32	0.00	110.70	113.00	116.20	5.08	13.20
2072	rainfed	0.3	112.17	0.00	108.30	109.90	111.90	4.97	13.20
2099	rainfed	0.3	105.52	0.00	108.90	110.20	110.20	5.62	13.20

Table C.22: Divergent Water Price for Risk Averse Farmers, FRANKLIN, IA, CORN. RCP

4.5

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2018	.2	0.3	166.22	4.92	0.90	0.90	0.80	0.00	2.40
2045	.2	0.3	146.28	5.22	1.90	1.90	1.90	0.00	2.40
2072	.2	0.3	132.01	5.46	2.40	2.40	2.30	0.00	2.40
2099	.2	0.3	127.90	5.70	1.60	1.60	1.70	0.00	2.40
2018	.2	0.3	166.22	4.92	1.40	1.40	1.30	0.00	4.00
2045	.2	0.3	146.28	5.22	3.20	3.10	3.10	0.00	4.00
2072	.2	0.3	132.01	5.46	3.90	3.90	3.60	0.00	4.00
2099	.2	0.3	127.90	5.70	2.70	2.70	3.00	0.00	4.00
2018	.2	0.3	166.22	4.92	4.10	3.70	2.30	0.00	13.20
2045	.2	0.3	146.28	5.22	9.90	9.70	7.40	0.00	13.20
2072	.2	0.3	132.01	5.46	11.30	10.30	5.10	0.00	13.20
2099	.2	0.3	127.90	5.70	10.30	11.20	12.50	0.00	13.20
2018	rainfed	0.3	122.11	0.00	19.90	20.10	20.80	4.92	2.40
2045	rainfed	0.3	102.22	0.00	18.70	18.80	19.20	5.22	2.40
2072	rainfed	0.3	93.27	0.00	15.70	15.80	16.00	5.46	2.40
2099	rainfed	0.3	87.10	0.00	15.50	15.60	15.70	5.70	2.40
2018	rainfed	0.3	122.11	0.00	33.80	34.30	35.80	4.92	4.00
2045	rainfed	0.3	102.22	0.00	31.50	31.80	32.50	5.22	4.00

2072	rainfed	0.3	93.27	0.00	26.40	26.50	26.70	5.46	4.00
2099	rainfed	0.3	87.10	0.00	26.00	26.10	26.20	5.70	4.00
2018	rainfed	0.3	122.11	0.00	119.70	121.40	118.70	4.92	13.20
2045	rainfed	0.3	102.22	0.00	107.80	108.00	102.20	5.22	13.20
2072	rainfed	0.3	93.27	0.00	87.70	86.10	70.60	5.46	13.20
2099	rainfed	0.3	87.10	0.00	85.80	84.10	68.00	5.70	13.20

Table C.23: Divergent Water Price for Risk Averse Farmers, FRANKLIN, IA, CORN, RCP

6.0

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2099	.3	0.4	113.79	6.38	0.10	0.10	0.10	0.00	2.40
2099	.3	0.4	113.79	6.38	0.10	0.10	0.10	0.00	4.00
2099	.3	0.4	113.79	6.38	0.20	0.20	0.20	0.00	13.20
2018	.2	0.3	157.99	5.54	1.70	1.70	1.70	0.00	2.40
2045	.2	0.3	143.82	5.74	1.30	1.30	1.30	0.00	2.40
2072	.2	0.3	122.75	6.04	0.80	0.80	0.80	0.00	2.40
2099	.2	0.4	113.01	5.66	1.40	1.40	1.40	0.72	2.40
2018	.2	0.3	157.99	5.54	2.90	2.90	2.90	0.00	4.00
2045	.2	0.3	143.82	5.74	2.10	2.10	2.10	0.00	4.00
2072	.2	0.3	122.75	6.04	1.40	1.40	1.40	0.00	4.00
2099	.2	0.4	113.01	5.66	2.30	2.30	2.30	0.72	4.00
2018	.2	0.3	157.99	5.54	10.30	10.30	10.30	0.00	13.20
2045	.2	0.3	143.82	5.74	6.60	6.60	6.60	0.00	13.20
2072	.2	0.3	122.75	6.04	4.00	4.00	4.00	0.00	13.20
2099	.2	0.4	113.01	5.66	5.90	5.90	5.90	0.72	13.20
2018	rainfed	0.3	110.80	0.00	18.90	18.90	18.90	5.54	2.40

2045	rainfed	0.3	97.66	0.00	17.40	17.40	17.40	5.74	2.40
2072	rainfed	0.3	84.20	0.00	13.90	13.90	13.90	6.04	2.40
2099	rainfed	0.4	78.55	0.00	12.40	12.40	12.40	6.38	2.40
2018	rainfed	0.3	110.80	0.00	31.70	31.70	31.70	5.54	4.00
2045	rainfed	0.3	97.66	0.00	29.10	29.10	29.10	5.74	4.00
2072	rainfed	0.3	84.20	0.00	23.20	23.20	23.20	6.04	4.00
2099	rainfed	0.4	78.55	0.00	20.80	20.80	20.80	6.38	4.00
2018	rainfed	0.3	110.80	0.00	108.40	108.40	108.40	5.54	13.20
2045	rainfed	0.3	97.66	0.00	93.20	93.20	93.20	5.74	13.20
2072	rainfed	0.3	84.20	0.00	76.80	76.80	76.80	6.04	13.20
2099	rainfed	0.4	78.55	0.00	69.90	69.90	69.90	6.38	13.20

Table C.24: Divergent Water Price for Risk Averse Farmers, FRANKLIN, IA, CORN, RCP

8.5

Year	TR	MTR	Yield	WU	DWP(1.5)	DWP(2)	DWP(4)	WD	OP
2099	.3	0.4	58.06	7.82	0.10	0.10	0.10	0.00	2.40
2099	.3	0.4	58.06	7.82	0.20	0.20	0.20	0.00	4.00
2099	.3	0.4	58.06	7.82	0.40	0.40	0.40	0.00	13.20
2018	.2	0.3	155.95	5.47	1.50	1.50	1.50	0.00	2.40
2045	.2	0.3	133.66	5.44	3.80	3.80	3.80	0.00	2.40
2072	.2	0.3	97.85	6.36	1.80	1.80	1.80	0.00	2.40
2099	.2	0.4	57.30	6.95	1.30	1.30	1.30	0.87	2.40
2018	.2	0.3	155.95	5.47	2.60	2.60	2.60	0.00	4.00
2045	.2	0.3	133.66	5.44	6.40	6.40	6.40	0.00	4.00
2072	.2	0.3	97.85	6.36	2.80	2.80	2.80	0.00	4.00
2099	.2	0.4	57.30	6.95	2.10	2.10	2.10	0.87	4.00

2018	.2	0.3	155.95	5.47	8.50	8.50	8.50	0.00	13.20
2045	.2	0.3	133.66	5.44	23.30	23.30	23.30	0.00	13.20
2072	.2	0.3	97.85	6.36	6.40	6.40	6.40	0.00	13.20
2099	.2	0.4	57.30	6.95	6.50	6.50	6.50	0.87	13.20
2018	rainfed	0.3	109.40	0.00	19.00	19.00	19.00	5.47	2.40
2045	rainfed	0.3	93.97	0.00	16.40	16.40	16.40	5.44	2.40
2072	rainfed	0.3	64.00	0.00	11.80	11.80	11.80	6.36	2.40
2099	rainfed	0.4	37.22	0.00	5.90	5.90	5.90	7.82	2.40
2018	rainfed	0.3	109.40	0.00	31.90	31.90	31.90	5.47	4.00
2045	rainfed	0.3	93.97	0.00	27.50	27.50	27.50	5.44	4.00
2072	rainfed	0.3	64.00	0.00	19.60	19.60	19.60	6.36	4.00
2099	rainfed	0.4	37.22	0.00	9.80	9.80	9.80	7.82	4.00
2018	rainfed	0.3	109.40	0.00	110.40	110.40	110.40	5.47	13.20
2045	rainfed	0.3	93.97	0.00	92.50	92.50	92.50	5.44	13.20
2072	rainfed	0.3	64.00	0.00	64.00	64.00	64.00	6.36	13.20
2099	rainfed	0.4	37.22	0.00	31.00	31.00	31.00	7.82	13.20

APPENDIX D

RISK AVERSE V.S RISK NETURAL FARMERS

D.1 PEANUTS

D.1.1 DECATUR, GA

Table D.1: Divergent water price for risk neutral v.s. averse farmers ,DECATUR ,GA ,PEANUT ,RCP26

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	5.60	-10.95	5.50	-9.59	0.17
2045	.6	5.30	-25.68	5.40	-27.06	0.17
2018	.6	15.50	1681.25	13.80	1704.42	0.47
2045	.6	14.60	1641.48	15.10	1634.59	0.47
2072	.6	12.90	1678.17	12.70	1680.96	0.47
2099	.6	11.10	1709.02	10.70	1714.54	0.47
2018	.6	25.40	3373.44	20.10	3445.68	0.77
2045	.6	23.90	3308.65	24.90	3294.86	0.77
2072	.6	21.10	3368.97	20.40	3378.71	0.77
2099	.6	18.10	3420.21	17.10	3434.00	0.77
2018	.5	7.90	-48.07	8.00	-49.22	0.17
2045	.5	7.60	-63.22	7.70	-64.40	0.17
2099	.5	7.80	-62.31	7.90	-63.48	0.17
2045	.5	21.00	1537.11	21.30	1533.59	0.47
2072	.5	23.00	1512.55	23.10	1511.37	0.47

2099	.5	21.50	1540.26	21.90	1535.56	0.47
2018	.5	35.80	3205.58	35.60	3207.87	0.77
2045	.5	34.30	3138.62	35.10	3129.23	0.77
2099	.5	35.20	3142.83	36.40	3128.72	0.77
2018	.4	13.00	-130.29	13.30	-133.15	0.17
2045	.4	11.40	-124.94	11.60	-126.84	0.17
2072	.4	12.10	-134.06	12.40	-136.92	0.17
2099	.4	11.60	-123.51	11.70	-124.46	0.17
2018	.4	35.90	1351.95	37.50	1336.69	0.47
2045	.4	31.30	1368.39	33.30	1349.47	0.47
2072	.4	33.50	1340.67	35.60	1320.68	0.47
2099	.4	31.90	1371.92	33.50	1356.70	0.47
2018	.4	58.80	2834.19	62.40	2799.85	0.77
2045	.4	51.30	2860.78	57.50	2802.12	0.77
2072	.4	54.80	2816.35	61.00	2757.33	0.77
2099	.4	52.20	2867.35	56.90	2822.65	0.77
2018	.3	21.70	-269.88	22.70	-276.75	0.17
2045	.3	20.00	-265.75	21.00	-272.34	0.17
2072	.3	20.50	-271.00	21.40	-277.05	0.17
2099	.3	20.20	-263.31	21.00	-268.74	0.17
2018	.3	59.80	966.96	68.50	907.19	0.47
2045	.3	55.20	977.67	64.10	919.02	0.47
2072	.3	56.50	963.71	65.50	903.23	0.47
2099	.3	55.80	984.10	62.60	937.99	0.47
2018	.3	97.90	2203.80	122.60	2034.11	0.77
2045	.3	90.40	2221.09	119.30	2030.64	0.77
2072	.3	92.50	2198.42	121.80	2001.52	0.77

2099	.3	91.40	2231.51	112.40	2089.13	0.77
2018	.2	29.60	-398.07	31.30	-404.03	0.17
2045	.2	27.10	-381.49	28.80	-387.02	0.17
2072	.2	28.20	-397.24	29.80	-402.66	0.17
2099	.2	28.20	-392.30	29.80	-397.74	0.17
2018	.2	81.80	611.35	95.00	565.02	0.47
2045	.2	74.80	657.45	89.50	609.68	0.47
2072	.2	77.80	614.08	91.40	567.98	0.47
2099	.2	77.80	627.72	91.20	582.16	0.47
2018	.2	134.00	1620.77	167.90	1501.78	0.77
2045	.2	122.50	1696.40	163.00	1564.77	0.77
2072	.2	127.50	1625.06	164.90	1498.27	0.77
2099	.2	127.40	1647.75	165.10	1519.57	0.77
2018	rainfed	35.00	-484.32	36.30	-484.32	0.17
2045	rainfed	32.80	-474.21	34.00	-474.21	0.17
2072	rainfed	34.00	-491.82	35.10	-491.82	0.17
2099	rainfed	34.10	-487.50	35.20	-487.50	0.17
2018	rainfed	96.60	372.76	105.00	372.76	0.47
2045	rainfed	90.50	400.72	98.90	400.72	0.47
2072	rainfed	93.80	352.02	101.40	352.02	0.47
2099	rainfed	94.10	363.97	101.40	363.97	0.47
2018	rainfed	158.20	1229.84	177.10	1229.84	0.77
2045	rainfed	148.20	1275.64	167.80	1275.64	0.77
2072	rainfed	153.70	1195.86	171.10	1195.86	0.77
2099	rainfed	154.10	1215.44	170.50	1215.44	0.77

Table D.2: Divergent water price for risk neutral v.s. averse farmers ,DECATUR ,GA ,PEANUT ,RCP45

Year	TR	DWP(Natural)	Profit(Natural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	4.60	8.17	4.50	9.53	0.17
2045	.6	7.60	-70.71	7.40	-67.89	0.17
2072	.6	6.80	-74.78	6.90	-76.19	0.17
2099	.6	7.50	-86.69	7.30	-83.78	0.17
2018	.6	12.70	1734.60	11.90	1745.48	0.47
2045	.6	20.80	1519.26	19.70	1534.73	0.47
2072	.6	18.70	1506.44	19.00	1502.20	0.47
2099	.6	20.60	1474.06	19.10	1495.86	0.47
2018	.6	20.80	3461.02	18.50	3492.30	0.77
2045	.6	34.10	3107.82	31.80	3140.16	0.77
2072	.6	30.70	3086.24	31.20	3079.18	0.77
2099	.6	33.70	3034.81	29.20	3100.20	0.77
2045	.5	10.80	-122.68	11.00	-125.07	0.17
2072	.5	11.50	-152.27	11.90	-157.12	0.17
2099	.5	12.00	-162.28	12.50	-168.55	0.17
2018	.5	22.90	1569.47	22.80	1570.62	0.47
2045	.5	29.80	1373.30	31.90	1348.19	0.47
2072	.5	31.80	1290.71	34.80	1254.32	0.47
2099	.5	33.10	1264.08	36.90	1216.39	0.47
2018	.5	37.50	3190.60	37.40	3191.75	0.77
2045	.5	48.80	2869.29	56.10	2781.98	0.77
2072	.5	52.00	2734.91	61.10	2624.53	0.77
2099	.5	54.20	2690.43	65.40	2549.87	0.77

2018	.4	13.30	-132.27	13.50	-134.17	0.17
2045	.4	15.40	-197.55	16.10	-204.40	0.17
2072	.4	16.00	-226.47	16.70	-233.49	0.17
2099	.4	17.50	-254.24	18.10	-260.48	0.17
2018	.4	36.60	1347.71	38.70	1327.70	0.47
2045	.4	42.60	1165.37	48.10	1111.52	0.47
2072	.4	44.30	1085.00	49.90	1028.83	0.47
2099	.4	48.20	1010.77	53.20	958.72	0.47
2018	.4	59.90	2827.69	66.10	2768.60	0.77
2045	.4	69.70	2529.26	85.60	2373.60	0.77
2072	.4	72.50	2397.47	88.90	2232.98	0.77
2099	.4	79.00	2274.74	93.00	2129.00	0.77
2018	.3	21.70	-268.03	22.70	-274.90	0.17
2045	.3	23.40	-327.67	24.90	-338.35	0.17
2072	.3	24.00	-357.74	25.30	-367.10	0.17
2099	.3	26.40	-404.30	27.70	-414.10	0.17
2018	.3	59.80	972.06	68.60	911.61	0.47
2045	.3	64.70	805.80	76.40	722.50	0.47
2072	.3	66.20	723.82	76.50	649.66	0.47
2099	.3	73.00	593.91	83.00	518.51	0.47
2018	.3	97.90	2212.16	123.20	2038.35	0.77
2045	.3	106.00	1939.28	135.80	1727.10	0.77
2072	.3	108.40	1805.39	135.30	1611.71	0.77
2099	.3	119.60	1592.11	145.40	1397.58	0.77
2018	.2	30.00	-403.16	31.80	-409.65	0.17
2045	.2	31.90	-465.58	34.00	-472.95	0.17
2072	.2	32.90	-505.17	34.30	-510.22	0.17

2099	.2	33.20	-518.01	34.50	-522.81	0.17
2018	.2	82.90	597.30	96.70	547.49	0.47
2045	.2	88.20	424.56	102.00	376.12	0.47
2072	.2	91.00	314.98	99.80	283.21	0.47
2099	.2	91.70	279.95	100.30	248.22	0.47
2018	.2	135.80	1597.76	171.90	1467.44	0.77
2045	.2	144.50	1314.70	174.80	1208.35	0.77
2072	.2	149.00	1135.49	167.30	1069.43	0.77
2099	.2	150.20	1077.91	169.20	1007.80	0.77
2018	rainfed	36.20	-503.09	37.50	-503.09	0.17
2045	rainfed	36.00	-531.67	37.50	-531.67	0.17
2072	rainfed	36.20	-558.98	37.10	-558.98	0.17
2099	rainfed	36.40	-572.28	37.20	-572.28	0.17
2018	rainfed	100.00	320.86	108.40	320.86	0.47
2045	rainfed	99.50	241.85	108.00	241.85	0.47
2072	rainfed	100.00	166.36	104.60	166.36	0.47
2099	rainfed	100.70	129.57	104.50	129.57	0.47
2018	rainfed	163.80	1144.82	181.60	1144.82	0.77
2045	rainfed	162.90	1015.37	179.20	1015.37	0.77
2072	rainfed	163.80	891.69	171.10	891.69	0.77
2099	rainfed	164.90	831.42	171.50	831.42	0.77

Table D.3: Divergent water price for risk neutral v.s. averse farmers ,DECATUR ,GA ,PEANUT ,RCP60

Year	TR	DWP(Natural)	Profit(Natural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	5.90	-25.15	5.80	-23.75	0.17
2045	.6	5.70	-43.44	5.60	-42.01	0.17
2072	.6	6.50	-94.56	6.40	-93.11	0.17
2099	.6	8.60	-180.37	8.50	-178.83	0.17
2018	.6	16.20	1643.80	15.80	1649.39	0.47
2045	.6	15.60	1593.95	14.90	1603.98	0.47
2072	.6	17.90	1451.35	16.60	1470.24	0.47
2099	.6	23.70	1214.27	22.70	1229.70	0.47
2018	.6	26.50	3312.74	25.20	3330.93	0.77
2045	.6	25.60	3229.90	23.60	3258.56	0.77
2072	.6	29.30	2997.27	25.90	3046.67	0.77
2099	.6	38.80	2608.91	36.20	2649.03	0.77
2045	.5	9.00	-98.50	9.10	-99.72	0.17
2072	.5	11.90	-185.17	12.20	-188.95	0.17
2099	.5	13.60	-269.51	13.80	-272.17	0.17
2018	.5	24.10	1515.19	24.00	1516.37	0.47
2045	.5	24.90	1439.23	25.50	1431.87	0.47
2072	.5	32.80	1201.07	34.90	1174.61	0.47
2099	.5	37.40	969.31	39.20	945.39	0.47
2018	.5	39.50	3101.29	39.00	3107.16	0.77
2045	.5	40.70	2978.18	42.90	2951.21	0.77
2072	.5	53.70	2587.32	59.80	2510.46	0.77
2099	.5	61.30	2206.80	65.40	2152.31	0.77

2018	.4	13.40	-147.30	13.80	-151.09	0.17
2045	.4	13.30	-169.78	13.70	-173.80	0.17
2072	.4	16.80	-267.44	17.40	-273.67	0.17
2099	.4	17.40	-337.51	18.00	-344.08	0.17
2018	.4	37.10	1304.03	39.90	1277.46	0.47
2045	.4	36.70	1243.08	40.60	1203.89	0.47
2072	.4	46.40	972.86	51.00	925.07	0.47
2099	.4	48.00	779.82	52.50	730.54	0.47
2018	.4	60.70	2756.31	68.30	2684.18	0.77
2045	.4	60.10	2655.94	72.50	2531.32	0.77
2072	.4	76.00	2213.16	90.00	2067.70	0.77
2099	.4	78.60	1897.14	89.70	1775.59	0.77
2018	.3	20.70	-265.43	21.70	-272.42	0.17
2045	.3	21.60	-308.18	22.70	-316.12	0.17
2072	.3	25.00	-405.58	26.40	-416.09	0.17
2099	.3	24.20	-458.63	25.50	-469.11	0.17
2018	.3	57.10	978.84	65.90	917.33	0.47
2045	.3	59.70	859.86	68.10	799.21	0.47
2072	.3	69.20	589.84	78.70	518.50	0.47
2099	.3	66.80	444.63	77.00	362.42	0.47
2018	.3	93.60	2222.41	120.20	2036.48	0.77
2045	.3	97.80	2027.90	120.90	1861.12	0.77
2072	.3	113.30	1586.01	136.00	1415.54	0.77
2099	.3	109.30	1348.70	134.00	1149.62	0.77
2018	.2	29.30	-405.11	31.30	-412.11	0.17
2045	.2	29.90	-445.73	31.70	-452.42	0.17
2072	.2	32.30	-527.99	33.80	-533.57	0.17

2099	.2	31.40	-587.32	32.80	-593.16	0.17
2018	.2	80.90	592.12	95.60	540.67	0.47
2045	.2	82.50	480.08	96.20	429.11	0.47
2072	.2	89.30	252.01	98.70	217.05	0.47
2099	.2	86.70	88.46	95.30	52.60	0.47
2018	.2	132.50	1589.35	168.50	1463.35	0.77
2045	.2	135.10	1405.88	167.70	1284.61	0.77
2072	.2	146.20	1032.40	165.40	960.97	0.77
2099	.2	142.00	764.24	159.00	693.35	0.77
2018	rainfed	34.60	-490.58	36.30	-490.58	0.17
2045	rainfed	34.50	-523.07	35.90	-523.07	0.17
2072	rainfed	35.10	-574.50	36.20	-574.50	0.17
2099	rainfed	33.20	-619.91	34.00	-619.91	0.17
2018	rainfed	95.50	355.44	106.00	355.44	0.47
2045	rainfed	95.40	265.63	103.50	265.63	0.47
2072	rainfed	97.00	123.44	102.60	123.44	0.47
2099	rainfed	91.80	-2.11	95.50	-2.11	0.47
2018	rainfed	156.40	1201.47	178.50	1201.47	0.77
2045	rainfed	156.30	1054.34	172.80	1054.34	0.77
2072	rainfed	158.80	821.37	168.10	821.37	0.77
2099	rainfed	150.30	615.69	155.30	615.69	0.77

Table D.4: Divergent water price for risk neutral v.s. averse farmers ,DECATUR ,GA ,PEANUT ,RCP85

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	6.20	-25.94	6.00	-23.15	0.17
2099	.6	7.40	-404.37	7.70	-409.86	0.17
2018	.6	17.00	1642.02	15.60	1661.53	0.47
2045	.6	17.40	1531.08	16.60	1542.79	0.47
2072	.6	18.20	1216.01	17.70	1223.72	0.47
2099	.6	20.50	593.06	22.90	549.11	0.47
2018	.6	27.80	3309.99	23.40	3371.28	0.77
2045	.6	28.40	3129.07	25.80	3167.13	0.77
2072	.6	29.70	2613.14	28.30	2634.74	0.77
2099	.6	33.50	1592.31	40.10	1471.46	0.77
2045	.5	11.40	-151.77	11.80	-156.72	0.17
2072	.5	12.00	-276.33	12.30	-280.30	0.17
2099	.5	11.70	-493.84	12.30	-503.43	0.17
2018	.5	27.30	1474.51	27.40	1473.30	0.47
2045	.5	31.60	1291.14	34.70	1252.82	0.47
2072	.5	33.10	948.80	35.20	921.00	0.47
2099	.5	32.30	347.19	36.80	275.28	0.47
2018	.5	44.70	3035.14	44.80	3033.93	0.77
2045	.5	51.70	2735.28	61.10	2619.10	0.77
2072	.5	54.20	2173.93	59.60	2102.44	0.77
2099	.5	52.80	1189.83	65.50	986.88	0.77
2018	.4	15.20	-172.35	15.40	-174.37	0.17
2045	.4	15.90	-227.63	16.50	-233.83	0.17

2072	.4	16.60	-358.34	17.10	-363.83	0.17
2099	.4	15.10	-564.39	15.50	-569.84	0.17
2018	.4	42.00	1235.50	43.40	1221.38	0.47
2045	.4	43.90	1083.05	48.70	1033.42	0.47
2072	.4	45.70	723.21	50.40	671.55	0.47
2099	.4	41.60	153.40	45.10	105.69	0.47
2018	.4	68.80	2643.36	71.90	2612.08	0.77
2045	.4	71.80	2394.77	85.90	2248.97	0.77
2072	.4	74.80	1804.75	88.10	1658.58	0.77
2099	.4	68.10	871.19	76.70	753.97	0.77
2018	.3	24.50	-323.24	25.50	-330.49	0.17
2045	.3	22.70	-342.49	23.70	-349.96	0.17
2072	.3	22.90	-471.14	23.90	-479.14	0.17
2099	.3	20.90	-685.97	21.60	-693.16	0.17
2018	.3	67.70	818.36	76.20	756.73	0.47
2045	.3	62.70	765.32	71.10	702.58	0.47
2072	.3	63.20	410.09	72.00	339.69	0.47
2099	.3	57.80	-184.92	62.20	-230.11	0.47
2018	.3	110.80	1960.68	135.60	1780.88	0.77
2045	.3	102.70	1873.14	127.00	1691.62	0.77
2072	.3	103.40	1292.12	128.60	1090.52	0.77
2099	.3	94.70	316.13	104.60	214.46	0.77
2018	.2	32.20	-447.65	33.50	-452.71	0.17
2045	.2	30.90	-481.23	32.40	-486.92	0.17
2072	.2	29.30	-585.54	30.20	-589.16	0.17
2099	.2	24.00	-750.46	24.20	-751.51	0.17
2018	.2	88.80	475.01	99.30	434.16	0.47

2045	.2	85.40	381.40	97.00	337.44	0.47
2072	.2	80.90	93.33	87.50	66.80	0.47
2099	.2	66.40	-363.29	66.60	-364.34	0.47
2018	.2	145.40	1397.67	172.40	1292.64	0.77
2045	.2	139.90	1244.04	169.40	1132.24	0.77
2072	.2	132.40	772.61	147.70	711.10	0.77
2099	.2	108.70	24.41	107.10	32.81	0.77
2018	rainfed	37.50	-533.97	38.60	-533.97	0.17
2045	rainfed	35.80	-563.66	36.80	-563.66	0.17
2072	rainfed	31.90	-631.71	32.30	-631.71	0.17
2099	rainfed	24.20	-753.92	24.00	-753.92	0.17
2018	rainfed	103.50	235.51	110.50	235.51	0.47
2045	rainfed	98.90	153.42	105.50	153.42	0.47
2072	rainfed	88.00	-34.72	90.30	-34.72	0.47
2099	rainfed	66.80	-372.62	64.80	-372.62	0.47
2018	rainfed	169.60	1004.98	184.30	1004.98	0.77
2045	rainfed	162.00	870.50	176.20	870.50	0.77
2072	rainfed	144.20	562.27	148.30	562.27	0.77
2099	rainfed	109.50	8.69	102.90	8.69	0.77

D.1.2 SEMINOLE, GA

Table D.5: Divergent water price for risk neutral v.s. averse farmers ,SEMINOLE ,GA ,PEANUT ,RCP26

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	6.10	-61.62	6.20	-63.07	0.17

2045	.6	5.30	-84.21	5.10	-81.34	0.17
2018	.6	16.90	1540.90	17.10	1538.00	0.47
2045	.6	14.40	1482.57	13.30	1498.39	0.47
2072	.6	13.50	1498.48	13.70	1495.57	0.47
2099	.6	16.20	1444.87	16.00	1447.77	0.47
2018	.6	27.60	3144.86	28.00	3139.07	0.77
2045	.6	23.60	3047.92	20.00	3099.69	0.77
2072	.6	22.20	3072.90	22.80	3064.15	0.77
2099	.6	26.40	2988.31	25.70	2998.47	0.77
2018	.5	10.10	-129.37	10.50	-134.22	0.17
2045	.5	8.40	-137.09	8.60	-139.51	0.17
2072	.5	9.20	-151.40	9.60	-156.33	0.17
2099	.5	10.20	-169.66	10.40	-172.12	0.17
2018	.5	27.80	1355.60	31.60	1309.47	0.47
2045	.5	23.20	1333.03	25.30	1307.62	0.47
2072	.5	25.40	1293.61	28.90	1250.49	0.47
2099	.5	28.10	1243.94	29.90	1221.79	0.47
2018	.5	45.50	2840.57	59.00	2676.68	0.77
2045	.5	38.00	2803.15	45.20	2716.03	0.77
2072	.5	41.60	2738.63	53.40	2593.25	0.77
2099	.5	45.90	2658.78	50.60	2600.92	0.77
2018	.4	14.50	-204.36	15.30	-212.16	0.17
2045	.4	12.90	-213.49	13.40	-218.48	0.17
2072	.4	13.30	-222.23	14.00	-229.29	0.17
2099	.4	13.70	-229.12	14.30	-235.01	0.17
2018	.4	40.10	1146.67	47.50	1074.52	0.47
2045	.4	35.60	1122.17	40.30	1075.26	0.47

2072	.4	36.80	1097.05	43.10	1033.55	0.47
2099	.4	37.90	1078.10	42.20	1035.87	0.47
2018	.4	65.70	2497.69	89.00	2270.52	0.77
2045	.4	58.30	2457.83	73.40	2307.13	0.77
2072	.4	60.30	2416.34	80.80	2209.70	0.77
2099	.4	62.00	2386.29	73.40	2274.34	0.77
2018	.3	21.30	-319.08	22.90	-330.18	0.17
2045	.3	20.00	-334.05	21.40	-343.70	0.17
2072	.3	20.20	-341.09	21.90	-352.99	0.17
2099	.3	21.30	-357.58	22.70	-367.10	0.17
2018	.3	58.70	830.91	73.80	726.12	0.47
2045	.3	55.20	788.85	67.60	703.42	0.47
2072	.3	55.80	769.07	70.50	666.17	0.47
2099	.3	58.90	723.08	69.40	651.68	0.47
2018	.3	96.20	1980.21	141.90	1663.05	0.77
2045	.3	90.50	1911.07	128.00	1652.70	0.77
2072	.3	91.50	1878.53	129.80	1610.43	0.77
2099	.3	96.40	1804.41	124.10	1616.05	0.77
2018	.2	28.90	-447.70	31.10	-455.16	0.17
2045	.2	27.40	-459.18	29.00	-464.57	0.17
2072	.2	26.90	-455.59	28.50	-461.26	0.17
2099	.2	28.30	-475.16	30.10	-481.12	0.17
2018	.2	79.70	474.69	95.90	419.77	0.47
2045	.2	75.60	442.79	88.30	399.99	0.47
2072	.2	74.20	452.78	87.30	406.41	0.47
2099	.2	78.10	398.56	91.00	355.86	0.47
2018	.2	130.50	1397.07	167.20	1272.66	0.77

2045	.2	123.80	1344.76	154.80	1240.29	0.77
2072	.2	121.50	1361.16	152.90	1250.01	0.77
2099	.2	127.80	1272.61	158.70	1170.33	0.77
2018	rainfed	32.50	-508.97	33.90	-508.97	0.17
2045	rainfed	30.30	-509.23	31.40	-509.23	0.17
2072	rainfed	30.30	-515.29	31.40	-515.29	0.17
2099	rainfed	31.50	-528.93	32.50	-528.93	0.17
2018	rainfed	89.70	304.61	98.20	304.61	0.47
2045	rainfed	83.70	303.90	91.00	303.90	0.47
2072	rainfed	83.80	287.15	90.60	287.15	0.47
2099	rainfed	86.90	249.43	93.20	249.43	0.47
2018	rainfed	146.90	1118.19	162.70	1118.19	0.77
2045	rainfed	137.10	1117.03	152.40	1117.03	0.77
2072	rainfed	137.20	1089.59	151.10	1089.59	0.77
2099	rainfed	142.40	1027.80	155.20	1027.80	0.77

Table D.6: Divergent water price for risk neutral v.s. averse farmers ,SEMINOLE ,GA ,PEANUT ,RCP45

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	4.80	-62.42	4.70	-60.97	0.17
2045	.6	7.10	-163.88	7.30	-166.82	0.17
2099	.6	6.00	-200.31	6.10	-201.81	0.17
2018	.6	13.20	1540.22	12.70	1547.42	0.47
2045	.6	19.60	1259.11	20.70	1242.94	0.47
2072	.6	14.70	1200.31	15.00	1195.74	0.47
2099	.6	16.60	1157.79	16.40	1160.80	0.47

2018	.6	21.50	3144.30	19.90	3167.35	0.77
2045	.6	32.10	2682.10	34.50	2646.82	0.77
2072	.6	24.10	2585.36	24.50	2579.26	0.77
2099	.6	27.20	2515.89	25.80	2536.93	0.77
2018	.5	8.90	-131.87	9.10	-134.31	0.17
2045	.5	10.20	-217.95	10.60	-222.97	0.17
2072	.5	9.60	-261.62	9.90	-265.55	0.17
2099	.5	9.50	-261.41	9.60	-262.70	0.17
2018	.5	24.60	1347.26	25.60	1335.07	0.47
2045	.5	28.20	1109.19	30.60	1079.09	0.47
2072	.5	26.40	990.30	28.40	964.14	0.47
2099	.5	26.20	989.86	26.90	980.87	0.47
2018	.5	40.20	2827.60	42.60	2798.34	0.77
2045	.5	46.20	2436.33	52.20	2361.09	0.77
2072	.5	43.20	2242.22	48.00	2179.43	0.77
2099	.5	42.80	2242.42	44.40	2221.88	0.77
2018	.4	13.30	-206.33	14.10	-214.00	0.17
2045	.4	14.30	-289.16	15.10	-297.29	0.17
2072	.4	13.80	-337.51	14.70	-347.16	0.17
2099	.4	13.20	-326.55	13.80	-332.76	0.17
2018	.4	36.80	1141.05	43.20	1079.68	0.47
2045	.4	39.50	912.69	45.40	852.74	0.47
2072	.4	38.20	778.13	45.40	700.95	0.47
2099	.4	36.50	808.88	41.00	762.35	0.47
2018	.4	60.20	2489.39	77.70	2321.57	0.77
2045	.4	64.70	2114.53	80.70	1951.97	0.77
2072	.4	62.60	1893.78	83.20	1672.95	0.77

2099	.4	59.80	1944.32	71.80	1820.24	0.77
2018	.3	19.90	-317.30	21.30	-326.75	0.17
2045	.3	21.40	-412.42	22.90	-423.43	0.17
2072	.3	19.70	-442.71	20.80	-450.88	0.17
2099	.3	19.80	-442.16	21.00	-450.96	0.17
2018	.3	54.80	835.98	66.50	757.00	0.47
2045	.3	59.10	572.01	70.90	485.40	0.47
2072	.3	54.30	489.02	63.50	420.67	0.47
2099	.3	54.80	488.88	64.00	421.45	0.47
2018	.3	89.70	1989.26	120.60	1780.69	0.77
2045	.3	96.80	1556.44	126.50	1338.45	0.77
2072	.3	89.00	1420.02	112.50	1245.41	0.77
2099	.3	89.70	1420.66	113.50	1246.21	0.77
2018	.2	26.70	-432.13	28.80	-439.22	0.17
2045	.2	26.80	-505.65	28.50	-511.59	0.17
2072	.2	25.20	-541.82	26.30	-545.71	0.17
2099	.2	25.10	-534.31	26.20	-538.24	0.17
2018	.2	73.60	517.80	88.00	469.13	0.47
2045	.2	73.90	314.46	85.70	273.28	0.47
2072	.2	69.60	214.05	77.20	187.15	0.47
2099	.2	69.20	235.24	77.30	206.32	0.47
2018	.2	120.60	1467.38	153.30	1356.86	0.77
2045	.2	121.00	1134.57	147.90	1040.69	0.77
2072	.2	114.00	969.92	130.50	911.51	0.77
2099	.2	113.40	1004.43	131.60	939.46	0.77
2018	rainfed	30.40	-495.37	32.00	-495.37	0.17
2045	rainfed	29.60	-554.21	30.60	-554.21	0.17

2072	rainfed	27.40	-581.34	28.00	-581.34	0.17
2099	rainfed	27.10	-569.36	27.90	-569.36	0.17
2018	rainfed	84.00	342.22	93.60	342.22	0.47
2045	rainfed	81.60	179.54	87.60	179.54	0.47
2072	rainfed	75.70	104.53	78.80	104.53	0.47
2099	rainfed	74.80	137.64	79.20	137.64	0.47
2018	rainfed	137.50	1179.81	157.50	1179.81	0.77
2045	rainfed	133.70	913.29	145.20	913.29	0.77
2072	rainfed	124.00	790.40	129.10	790.40	0.77
2099	rainfed	122.50	844.64	130.90	844.64	0.77

Table D.7: Divergent water price for risk neutral v.s. averse farmers ,SEMINOLE ,GA ,PEANUT ,RCP60

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	5.50	-69.31	5.30	-66.51	0.17
2045	.6	5.50	-110.70	5.40	-109.24	0.17
2072	.6	6.00	-202.71	5.80	-199.65	0.17
2099	.6	5.70	-279.93	5.80	-281.50	0.17
2018	.6	15.10	1521.62	13.80	1539.83	0.47
2045	.6	15.20	1405.79	14.40	1417.48	0.47
2072	.6	16.60	1151.15	14.80	1178.73	0.47
2099	.6	15.60	940.35	16.80	921.47	0.47
2018	.6	24.60	3113.96	20.90	3165.79	0.77
2045	.6	24.90	2922.28	22.40	2958.83	0.77
2072	.6	27.10	2506.55	21.90	2586.21	0.77
2099	.6	25.50	2160.62	29.40	2099.27	0.77
2045	.5	10.70	-200.05	10.80	-201.29	0.17
2072	.5	10.50	-282.98	10.60	-284.29	0.17
2099	.5	9.10	-342.15	9.30	-344.81	0.17
2018	.5	26.30	1336.51	26.60	1332.98	0.47
2045	.5	29.40	1160.97	30.50	1147.26	0.47
2072	.5	28.80	932.42	30.00	916.68	0.47
2099	.5	25.10	766.61	26.40	749.29	0.47
2018	.5	43.10	2808.59	43.60	2802.71	0.77
2045	.5	48.10	2521.98	50.90	2487.10	0.77
2072	.5	47.20	2146.50	50.40	2104.55	0.77
2099	.5	41.20	1874.03	44.60	1828.74	0.77

2018	.4	14.10	-211.03	14.60	-215.77	0.17
2045	.4	14.30	-262.23	14.90	-268.25	0.17
2072	.4	14.60	-357.01	15.40	-365.57	0.17
2099	.4	13.20	-416.62	13.50	-419.89	0.17
2018	.4	38.80	1130.05	43.70	1083.60	0.47
2045	.4	39.50	987.13	43.70	944.97	0.47
2072	.4	40.40	724.36	46.50	659.09	0.47
2099	.4	36.30	562.05	39.00	532.64	0.47
2018	.4	63.60	2470.18	78.80	2326.08	0.77
2045	.4	64.60	2237.50	76.10	2122.04	0.77
2072	.4	66.10	1806.80	84.10	1614.20	0.77
2099	.4	59.50	1539.62	66.50	1463.39	0.77
2018	.3	20.80	-321.44	21.90	-328.73	0.17
2045	.3	21.50	-386.50	22.70	-395.14	0.17
2072	.3	20.30	-458.51	21.50	-467.53	0.17
2099	.3	17.80	-500.71	18.50	-506.26	0.17
2018	.3	57.40	823.78	67.70	755.49	0.47
2045	.3	59.40	643.49	69.00	574.37	0.47
2072	.3	56.00	445.05	65.70	372.11	0.47
2099	.3	49.10	328.35	54.40	286.32	0.47
2018	.3	93.90	1969.66	127.10	1749.55	0.77
2045	.3	97.30	1673.49	122.70	1490.61	0.77
2072	.3	91.60	1349.37	118.70	1145.57	0.77
2099	.3	80.40	1157.40	95.00	1041.62	0.77
2018	.2	28.50	-448.50	30.30	-454.54	0.17
2045	.2	27.40	-488.05	28.80	-493.05	0.17
2072	.2	25.40	-550.52	26.50	-554.56	0.17

2099	.2	22.80	-591.60	23.50	-594.23	0.17
2018	.2	78.60	472.46	92.00	427.43	0.47
2045	.2	75.70	362.64	85.70	326.94	0.47
2072	.2	70.20	189.82	78.00	161.19	0.47
2099	.2	62.90	76.67	68.00	57.55	0.47
2018	.2	128.80	1393.07	162.70	1279.17	0.77
2045	.2	124.00	1213.34	147.20	1130.51	0.77
2072	.2	115.00	930.15	133.10	863.73	0.77
2099	.2	103.00	744.94	115.60	697.69	0.77
2018	rainfed	32.50	-514.04	33.90	-514.04	0.17
2045	rainfed	30.70	-544.02	31.70	-544.02	0.17
2072	rainfed	27.80	-593.00	28.50	-593.00	0.17
2099	rainfed	24.50	-622.47	24.80	-622.47	0.17
2018	rainfed	89.70	290.58	98.60	290.58	0.47
2045	rainfed	84.70	207.70	90.90	207.70	0.47
2072	rainfed	76.80	72.30	80.80	72.30	0.47
2099	rainfed	67.60	-9.19	69.50	-9.19	0.47
2018	rainfed	146.90	1095.21	166.50	1095.21	0.77
2045	rainfed	138.70	959.43	151.60	959.43	0.77
2072	rainfed	125.80	737.61	133.90	737.61	0.77
2099	rainfed	110.70	604.09	114.90	604.09	0.77

Table D.8: Divergent water price for risk neutral v.s. averse farmers ,SEMINOLE ,GA ,PEANUT ,RCP85

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	5.10	-55.84	5.00	-54.39	0.17
2045	.6	4.80	-141.79	4.90	-143.29	0.17
2072	.6	5.90	-338.98	6.00	-340.69	0.17
2099	.6	8.00	-632.44	8.20	-636.36	0.17
2018	.6	13.90	1560.28	13.10	1571.85	0.47
2045	.6	13.30	1319.31	13.70	1313.30	0.47
2072	.6	16.10	778.20	17.30	757.68	0.47
2099	.6	22.00	-34.45	23.70	-67.72	0.47
2018	.6	22.70	3176.41	20.20	3212.56	0.77
2045	.6	21.70	2781.91	23.20	2759.38	0.77
2072	.6	26.40	1893.66	30.60	1821.84	0.77
2099	.6	36.10	561.58	41.00	465.69	0.77
2018	.5	9.30	-128.53	9.50	-130.99	0.17
2045	.5	9.50	-223.89	9.70	-226.42	0.17
2072	.5	10.00	-418.72	10.20	-421.62	0.17
2099	.5	9.80	-672.77	10.00	-676.25	0.17
2018	.5	25.80	1355.33	27.30	1336.91	0.47
2045	.5	26.30	1092.32	27.90	1072.07	0.47
2072	.5	27.60	554.82	29.60	525.80	0.47
2099	.5	27.00	-146.62	29.00	-181.34	0.47
2018	.5	42.20	2840.42	46.30	2790.07	0.77
2045	.5	43.10	2408.54	47.90	2347.77	0.77
2072	.5	45.10	1529.80	51.50	1436.94	0.77

2099	.5	44.20	379.53	49.90	280.57	0.77
2018	.4	12.80	-188.87	13.30	-193.86	0.17
2045	.4	13.80	-298.45	14.30	-303.57	0.17
2072	.4	13.50	-486.62	13.80	-490.19	0.17
2099	.4	11.60	-713.49	11.90	-717.80	0.17
2018	.4	35.40	1189.48	39.40	1149.52	0.47
2045	.4	38.00	888.19	43.00	836.99	0.47
2072	.4	37.20	367.86	40.10	333.41	0.47
2099	.4	32.10	-261.25	33.70	-284.23	0.47
2018	.4	57.90	2568.83	70.10	2446.95	0.77
2045	.4	62.20	2074.84	78.30	1909.98	0.77
2072	.4	61.00	1221.16	69.20	1123.75	0.77
2099	.4	52.60	190.99	56.90	129.24	0.77
2018	.3	18.90	-294.03	20.10	-302.31	0.17
2045	.3	20.50	-415.57	21.50	-422.83	0.17
2072	.3	19.00	-593.78	19.60	-598.96	0.17
2099	.3	14.40	-775.54	14.60	-777.69	0.17
2018	.3	52.20	899.22	62.40	828.84	0.47
2045	.3	56.60	563.38	65.40	499.49	0.47
2072	.3	52.60	69.52	57.10	30.73	0.47
2099	.3	39.60	-430.09	41.30	-448.38	0.47
2018	.3	85.50	2092.47	114.30	1893.75	0.77
2045	.3	92.70	1542.33	117.70	1360.83	0.77
2072	.3	86.10	733.68	98.10	630.24	0.77
2099	.3	64.90	-85.72	68.90	-128.76	0.77
2018	.2	26.60	-426.65	28.90	-434.43	0.17
2045	.2	27.00	-528.56	28.00	-532.10	0.17

2072	.2	23.00	-671.01	23.40	-672.62	0.17
2018	.2	73.50	532.34	90.00	476.57	0.47
2045	.2	74.50	250.97	81.70	225.48	0.47
2072	.2	63.50	-143.02	66.40	-154.70	0.47
2099	.2	45.40	-559.97	45.60	-561.04	0.47
2018	.2	120.40	1491.33	160.20	1356.80	0.77
2045	.2	122.00	1030.50	139.10	969.96	0.77
2072	.2	104.00	384.98	110.30	359.59	0.77
2099	.2	74.40	-298.36	74.50	-298.89	0.77
2018	rainfed	30.30	-489.73	32.10	-489.73	0.17
2045	rainfed	29.60	-574.85	30.30	-574.85	0.17
2072	rainfed	24.00	-690.30	24.10	-690.30	0.17
2099	rainfed	16.20	-816.96	16.10	-816.96	0.17
2018	rainfed	83.60	357.82	95.10	357.82	0.47
2045	rainfed	81.90	122.47	85.90	122.47	0.47
2072	rainfed	66.30	-196.70	66.90	-196.70	0.47
2099	rainfed	44.80	-546.90	44.00	-546.90	0.47
2018	rainfed	136.90	1205.36	161.80	1205.36	0.77
2045	rainfed	134.10	819.80	142.00	819.80	0.77
2072	rainfed	108.60	296.90	109.00	296.90	0.77
2099	rainfed	73.40	-276.84	71.10	-276.84	0.77

D.2 SOYBEAN

D.2.1 SIOUX, IA

Table D.9: Divergent water price for risk neutral v.s. averse farmers ,SIOUX ,IA ,SOYBEAN ,RCP26

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	0.70	590.95	0.60	591.77	9.60
2018	.6	1.10	1375.11	0.80	1377.57	16.40
2018	.5	0.50	592.89	0.40	593.65	9.60
2018	.5	0.70	1378.82	0.60	1379.58	16.40
2045	.5	0.30	1408.42	0.20	1409.23	16.40
2099	.5	0.50	1403.95	0.40	1404.74	16.40
2045	.4	0.60	607.27	0.50	608.00	9.60
2099	.4	0.50	606.59	0.40	607.31	9.60
2018	.4	0.70	1379.08	0.50	1380.43	16.40
2045	.4	1.00	1402.39	0.80	1403.86	16.40
2072	.4	0.60	1406.64	0.50	1407.34	16.40
2099	.4	0.80	1401.44	0.70	1402.16	16.40
2045	.3	1.50	82.80	1.40	83.48	5.20
2045	.3	2.70	589.10	2.50	590.46	9.60
2072	.3	2.70	591.60	2.60	592.24	9.60
2018	.3	1.90	1367.95	1.70	1369.14	16.40
2045	.3	4.50	1371.93	4.10	1374.65	16.40
2072	.3	4.60	1375.51	4.20	1378.10	16.40
2099	.3	6.00	1356.74	5.80	1358.07	16.40
2045	.2	10.50	4.64	10.70	3.51	5.20
2072	.2	12.00	2.34	12.30	0.72	5.20
2099	.2	10.80	2.13	10.90	1.57	5.20
2018	.2	10.10	503.21	10.20	502.70	9.60

2045	.2	19.30	444.82	20.00	440.85	9.60
2072	.2	22.20	439.84	23.20	434.44	9.60
2099	.2	19.80	440.48	20.30	437.68	9.60
2018	.2	17.20	1224.72	17.60	1222.68	16.40
2045	.2	33.00	1124.52	34.90	1113.75	16.40
2072	.2	37.90	1116.32	41.00	1099.58	16.40
2099	.2	33.80	1117.42	35.30	1109.01	16.40
2018	rainfed	21.70	-114.55	22.70	-114.55	5.20
2045	rainfed	27.60	-143.67	28.40	-143.67	5.20
2072	rainfed	28.40	-124.74	29.30	-124.74	5.20
2099	rainfed	28.70	-151.52	29.30	-151.52	5.20
2018	rainfed	39.90	224.30	43.50	224.30	9.60
2045	rainfed	51.00	170.54	53.50	170.54	9.60
2072	rainfed	52.30	205.48	55.40	205.48	9.60
2099	rainfed	52.90	156.04	54.80	156.04	9.60
2018	rainfed	68.20	747.96	78.20	747.96	16.40
2045	rainfed	87.00	656.12	93.90	656.12	16.40
2072	rainfed	89.30	715.82	97.80	715.82	16.40
2099	rainfed	90.40	631.36	95.40	631.36	16.40

Table D.10: Divergent water price for risk neutral v.s. averse farmers ,SIOUX ,IA ,SOYBEAN ,RCP45

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	0.50	1371.27	0.60	1370.48	16.40
2045	.6	2.20	1390.27	2.10	1391.19	16.40
2045	.5	0.80	605.43	0.70	606.27	9.60
2018	.5	0.30	1373.08	0.40	1372.35	16.40
2045	.5	1.30	1399.63	1.10	1401.31	16.40
2018	.4	0.10	83.58	0.20	82.91	5.20
2072	.4	0.40	96.62	0.70	94.21	5.20
2018	.4	0.20	589.97	0.30	589.30	9.60
2072	.4	0.60	615.27	1.20	610.43	9.60
2045	.4	1.40	1398.55	1.20	1400.10	16.40
2072	.4	1.10	1415.27	2.00	1408.02	16.40
2099	.4	1.20	1430.32	1.10	1431.11	16.40
2072	.3	2.30	78.54	3.60	68.79	5.20
2045	.3	2.00	593.45	1.90	594.15	9.60
2072	.3	4.20	581.12	6.50	563.87	9.60
2045	.3	3.30	1379.42	3.10	1380.83	16.40
2072	.3	7.10	1358.09	11.10	1328.09	16.40
2099	.3	7.70	1368.86	7.60	1369.60	16.40
2018	.2	6.00	30.08	6.10	29.56	5.20
2045	.2	8.80	7.62	9.00	6.43	5.20
2072	.2	11.60	-10.13	15.50	-34.62	5.20
2099	.2	12.00	-7.76	12.20	-9.00	5.20
2018	.2	11.00	491.69	11.30	490.15	9.60

2045	.2	16.20	450.11	16.80	446.54	9.60
2072	.2	21.40	417.17	29.40	366.93	9.60
2099	.2	22.10	421.77	23.00	416.20	9.60
2018	.2	18.80	1204.72	19.50	1201.13	16.40
2045	.2	27.60	1134.18	29.50	1122.86	16.40
2072	.2	36.40	1078.45	52.30	978.60	16.40
2099	.2	37.70	1085.65	40.40	1068.94	16.40
2018	rainfed	22.70	-121.78	23.60	-121.78	5.20
2045	rainfed	25.20	-157.66	26.10	-157.66	5.20
2072	rainfed	27.70	-162.91	30.70	-162.91	5.20
2099	rainfed	28.50	-163.06	29.10	-163.06	5.20
2018	rainfed	41.90	210.95	44.90	210.95	9.60
2045	rainfed	46.50	144.71	49.40	144.71	9.60
2072	rainfed	51.00	135.02	57.40	135.02	9.60
2099	rainfed	52.50	134.73	54.60	134.73	9.60
2018	rainfed	71.60	725.17	79.70	725.17	16.40
2045	rainfed	79.40	612.01	86.90	612.01	16.40
2072	rainfed	87.10	595.44	100.00	595.44	16.40
2099	rainfed	89.60	594.95	95.10	594.95	16.40

Table D.11: Divergent water price for risk neutral v.s. averse farmers ,SIOUX ,IA ,SOYBEAN ,RCP60

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	1.10	586.50	1.00	587.34	9.60
2018	.6	1.80	1367.40	1.60	1369.07	16.40
2045	.6	0.20	1399.96	0.30	1399.11	16.40
2045	.5	0.10	606.08	0.20	605.31	9.60
2018	.5	1.00	1374.98	0.90	1375.73	16.40
2045	.5	0.20	1399.96	0.30	1399.18	16.40
2018	.4	0.80	1376.89	0.70	1377.57	16.40
2045	.4	0.10	1400.97	0.20	1400.28	16.40
2018	.3	1.30	584.57	1.20	585.18	9.60
2072	.3	3.10	594.45	3.00	595.19	9.60
2018	.3	2.20	1363.56	2.00	1364.79	16.40
2045	.3	1.60	1386.90	1.50	1387.52	16.40
2072	.3	5.20	1381.01	5.00	1382.49	16.40
2099	.3	9.60	1346.25	9.50	1347.07	16.40
2018	.2	5.90	31.52	6.00	31.00	5.20
2045	.2	6.60	30.29	6.70	29.78	5.20
2072	.2	9.30	3.74	9.50	2.47	5.20
2099	.2	13.30	-30.22	13.70	-32.99	5.20
2018	.2	10.90	493.92	11.10	492.88	9.60
2045	.2	12.10	492.12	12.60	489.55	9.60
2072	.2	17.20	442.47	17.90	438.05	9.60
2099	.2	24.50	380.35	25.80	371.36	9.60
2018	.2	18.60	1208.68	19.20	1205.56	16.40

2045	.2	20.70	1205.36	22.10	1198.14	16.40
2072	.2	29.40	1120.58	31.30	1108.57	16.40
2099	.2	41.90	1014.23	45.60	988.66	16.40
2018	rainfed	23.00	-129.99	24.20	-129.99	5.20
2045	rainfed	23.00	-125.21	24.20	-125.21	5.20
2072	rainfed	25.00	-164.94	25.90	-164.94	5.20
2099	rainfed	28.20	-183.14	28.80	-183.14	5.20
2018	rainfed	42.50	195.78	46.20	195.78	9.60
2045	rainfed	42.40	204.62	46.30	204.62	9.60
2072	rainfed	46.10	131.27	48.90	131.27	9.60
2099	rainfed	52.00	97.67	53.80	97.67	9.60
2018	rainfed	72.50	699.26	82.80	699.26	16.40
2045	rainfed	72.40	714.34	83.00	714.34	16.40
2072	rainfed	78.80	589.05	85.70	589.05	16.40
2099	rainfed	88.80	531.65	93.40	531.65	16.40

Table D.12: Divergent water price for risk neutral v.s. averse farmers ,SIOUX ,IA ,SOYBEAN ,RCP85

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2045	.6	0.30	97.81	0.20	98.73	5.20
2018	.6	1.90	583.53	1.80	584.40	9.60
2099	.6	0.70	601.95	0.60	603.38	9.60
2018	.6	3.20	1362.05	2.80	1365.53	16.40
2045	.6	0.70	1419.98	0.60	1420.91	16.40
2099	.6	1.20	1393.06	0.90	1397.34	16.40
2018	.5	0.60	84.28	0.50	85.07	5.20
2018	.5	1.00	592.21	0.90	592.99	9.60
2018	.5	1.60	1377.33	1.40	1378.90	16.40
2099	.5	4.10	1349.02	3.90	1351.75	16.40
2018	.4	0.50	85.27	0.40	85.98	5.20
2018	.4	0.80	594.07	0.70	594.78	9.60
2018	.4	1.30	1380.14	1.20	1380.85	16.40
2072	.4	2.40	1407.63	2.30	1408.60	16.40
2099	.4	7.80	1292.61	7.90	1291.32	16.40
2099	.3	6.40	-1.57	6.50	-2.77	5.20
2018	.3	2.20	580.93	2.10	581.58	9.60
2045	.3	2.90	592.73	2.80	593.46	9.60
2099	.3	11.80	433.05	12.10	429.45	9.60
2018	.3	3.60	1358.24	3.50	1358.89	16.40
2045	.3	4.90	1377.77	4.70	1379.21	16.40
2072	.3	10.30	1313.43	10.40	1312.55	16.40
2099	.3	20.20	1104.09	20.80	1096.88	16.40

2018	.2	7.10	22.69	7.20	22.15	5.20
2045	.2	9.80	2.28	10.00	1.05	5.20
2072	.2	12.00	-38.92	12.20	-40.41	5.20
2099	.2	16.60	-156.47	17.00	-160.53	5.20
2018	.2	13.10	477.70	13.50	475.53	9.60
2045	.2	18.00	440.54	18.70	436.25	9.60
2072	.2	22.10	364.33	22.90	358.36	9.60
2099	.2	30.60	147.37	31.80	135.19	9.60
2018	.2	22.30	1181.30	23.50	1174.77	16.40
2045	.2	30.60	1118.29	33.00	1103.60	16.40
2072	.2	37.70	987.59	40.00	970.43	16.40
2099	.2	52.20	617.31	55.80	580.77	16.40
2018	rainfed	24.70	-143.98	25.70	-143.98	5.20
2045	rainfed	26.50	-166.13	27.20	-166.13	5.20
2072	rainfed	25.80	-203.31	26.30	-203.31	5.20
2099	rainfed	25.90	-298.16	26.00	-298.16	5.20
2018	rainfed	45.60	169.96	48.70	169.96	9.60
2045	rainfed	48.90	129.06	51.20	129.06	9.60
2072	rainfed	47.60	60.42	49.10	60.42	9.60
2099	rainfed	47.80	-114.68	48.00	-114.68	9.60
2018	rainfed	77.80	655.14	86.00	655.14	16.40
2045	rainfed	83.50	585.28	89.70	585.28	16.40
2072	rainfed	81.40	468.02	85.10	468.02	16.40
2099	rainfed	81.70	168.88	81.80	168.88	16.40

D.2.2 DE KALB, IL

Table D.13: Divergent water price for risk neutral v.s. averse farmers ,PIATT ,IL ,SOYBEAN ,RCP26

Year	TR	DWP(Neutral)	Profit(Neutral)	DWP (Averse)	Profit(Averse)	OP
2099	.6	1.10	821.63	1.00	822.38	16.40
2045	.5	1.30	255.30	1.20	255.95	9.60
2045	.5	2.20	801.07	2.10	801.72	16.40
2099	.5	2.50	809.19	2.40	809.87	16.40
2045	.4	7.50	202.88	7.60	202.30	9.60
2099	.4	9.10	192.60	9.20	191.99	9.60
2018	.4	11.90	708.84	12.00	708.30	16.40
2099	.4	15.50	694.10	15.70	692.87	16.40
2018	.3	12.30	-194.40	12.40	-194.83	5.20
2045	.3	13.50	-205.36	13.80	-206.75	5.20
2072	.3	12.20	-186.90	12.50	-188.09	5.20
2099	.3	13.80	-209.79	14.00	-210.78	5.20
2018	.3	22.60	77.33	23.20	74.78	9.60
2045	.3	24.80	57.21	25.80	52.59	9.60
2072	.3	22.50	90.81	23.40	87.24	9.60
2099	.3	25.40	48.84	26.20	44.88	9.60
2018	.3	38.50	497.36	40.50	488.84	16.40
2045	.3	42.40	462.37	45.30	448.97	16.40
2072	.3	38.50	519.68	41.20	508.96	16.40
2099	.3	43.30	448.68	45.90	435.81	16.40
2018	.2	19.90	-254.65	20.20	-255.51	5.20
2045	.2	20.40	-263.46	20.80	-264.72	5.20
2072	.2	20.00	-246.19	20.40	-247.24	5.20

2099	.2	20.60	-270.25	21.10	-271.91	5.20
2018	.2	36.60	-33.96	37.80	-37.41	9.60
2045	.2	37.60	-50.43	39.10	-55.16	9.60
2072	.2	36.90	-18.67	38.30	-22.35	9.60
2099	.2	38.10	-63.38	39.40	-67.70	9.60
2018	.2	62.50	306.85	66.00	296.80	16.40
2045	.2	64.20	278.74	68.60	264.88	16.40
2072	.2	63.00	332.99	67.10	322.21	16.40
2099	.2	65.00	256.81	68.90	243.86	16.40
2018	rainfed	24.70	-293.32	25.20	-293.32	5.20
2045	rainfed	24.60	-299.10	25.10	-299.10	5.20
2072	rainfed	25.00	-284.17	25.50	-284.17	5.20
2099	rainfed	25.10	-309.65	25.50	-309.65	5.20
2018	rainfed	45.60	-105.75	47.00	-105.75	9.60
2045	rainfed	45.40	-116.41	47.00	-116.41	9.60
2072	rainfed	46.10	-88.86	47.90	-88.86	9.60
2099	rainfed	46.30	-135.90	47.60	-135.90	9.60
2018	rainfed	77.90	184.13	81.60	184.13	16.40
2045	rainfed	77.60	165.93	81.90	165.93	16.40
2072	rainfed	78.80	213.00	83.60	213.00	16.40
2099	rainfed	79.00	132.64	82.50	132.64	16.40

Table D.14: Divergent water price for risk neutral v.s. averse farmers ,PIATT ,IL ,SOYBEAN ,RCP45

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2045	.6	0.80	-103.33	0.70	-102.70	5.20
2018	.6	0.70	245.37	0.60	246.01	9.60
2045	.6	1.40	245.50	1.30	246.13	9.60
2072	.6	1.70	253.45	1.60	254.10	9.60
2018	.6	1.10	784.58	1.00	785.22	16.40
2045	.6	2.30	784.76	2.10	786.02	16.40
2072	.6	2.80	798.45	2.70	799.11	16.40
2099	.6	1.90	810.74	1.70	812.05	16.40
2099	.5	1.70	-102.97	1.60	-102.38	5.20
2018	.5	0.80	244.66	0.70	245.21	9.60
2072	.5	2.40	248.15	2.30	248.73	9.60
2099	.5	3.00	246.48	2.90	247.07	9.60
2018	.5	1.30	783.11	1.20	783.66	16.40
2045	.5	3.40	776.50	3.30	777.05	16.40
2072	.5	4.00	789.30	3.90	789.87	16.40
2099	.5	5.10	786.01	4.90	787.18	16.40
2072	.4	5.40	-133.42	5.50	-133.91	5.20
2099	.4	6.40	-139.27	6.50	-139.77	5.20
2018	.4	5.30	210.10	5.20	210.58	9.60
2045	.4	8.90	188.95	9.00	188.48	9.60
2072	.4	10.00	189.30	10.10	188.81	9.60
2018	.4	8.90	724.45	8.80	724.92	16.40
2045	.4	15.20	687.61	15.30	687.13	16.40

2072	.4	17.00	688.59	17.50	686.12	16.40
2099	.4	20.20	669.91	20.40	668.92	16.40
2018	.3	10.20	-178.70	10.40	-179.44	5.20
2045	.3	12.50	-191.44	12.80	-192.56	5.20
2072	.3	12.70	-189.87	13.00	-191.01	5.20
2099	.3	13.10	-190.49	13.40	-191.66	5.20
2018	.3	18.80	105.98	19.60	102.99	9.60
2045	.3	23.10	82.26	23.90	79.28	9.60
2072	.3	23.40	85.41	24.50	81.22	9.60
2099	.3	24.10	84.42	25.10	80.52	9.60
2018	.3	32.10	545.91	34.30	537.68	16.40
2045	.3	39.30	505.93	41.90	496.23	16.40
2072	.3	39.90	510.99	43.20	498.42	16.40
2099	.3	41.20	508.89	44.20	497.19	16.40
2018	.2	17.90	-237.99	18.50	-239.51	5.20
2045	.2	19.20	-241.45	19.70	-242.63	5.20
2072	.2	19.20	-240.08	19.70	-241.26	5.20
2099	.2	20.50	-247.54	21.10	-249.04	5.20
2018	.2	33.00	-3.47	35.00	-8.57	9.60
2045	.2	35.30	-9.64	37.20	-14.12	9.60
2072	.2	35.30	-7.11	37.20	-11.61	9.60
2099	.2	37.90	-21.37	39.90	-26.37	9.60
2018	.2	56.30	359.06	62.20	344.01	16.40
2045	.2	60.30	348.34	65.80	335.36	16.40
2072	.2	60.30	352.66	65.70	339.86	16.40
2099	.2	64.60	328.66	70.50	313.91	16.40
2018	rainfed	22.90	-276.22	23.60	-276.22	5.20

2045	rainfed	24.30	-280.27	25.00	-280.27	5.20
2072	rainfed	23.90	-276.94	24.70	-276.94	5.20
2099	rainfed	24.60	-278.66	25.20	-278.66	5.20
2018	rainfed	42.20	-74.17	44.60	-74.17	9.60
2045	rainfed	44.90	-81.66	47.20	-81.66	9.60
2072	rainfed	44.20	-75.51	46.50	-75.51	9.60
2099	rainfed	45.40	-78.68	47.40	-78.68	9.60
2018	rainfed	72.00	238.09	78.70	238.09	16.40
2045	rainfed	76.60	225.30	83.00	225.30	16.40
2072	rainfed	75.40	235.79	81.90	235.79	16.40
2099	rainfed	77.50	230.38	83.10	230.38	16.40

Table D.15: Divergent water price for risk neutral v.s. averse farmers ,PIATT ,IL ,SOYBEAN ,RCP60

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2018	.6	0.40	-106.48	0.30	-105.86	5.20
2072	.6	0.70	-96.76	0.60	-96.05	5.20
2072	.6	1.20	257.79	1.10	258.49	9.60
2018	.6	1.00	775.03	0.90	775.65	16.40
2072	.6	2.00	805.53	1.80	806.94	16.40
2099	.6	3.40	803.88	3.20	805.31	16.40
2099	.5	4.30	237.62	4.20	238.26	9.60
2018	.5	1.20	773.53	1.10	774.08	16.40
2045	.5	2.20	782.63	2.10	783.22	16.40
2072	.5	4.20	787.62	4.10	788.23	16.40
2099	.5	7.30	771.02	7.10	772.31	16.40
2018	.4	3.40	-128.59	3.30	-128.12	5.20
2072	.4	5.60	-136.42	5.70	-136.98	5.20
2099	.4	7.70	-152.70	7.80	-153.26	5.20
2018	.4	6.20	198.74	6.10	199.21	9.60
2072	.4	10.30	184.12	10.50	183.01	9.60
2099	.4	14.10	154.51	14.40	152.82	9.60
2018	.4	10.50	704.74	10.30	705.68	16.40
2045	.4	12.90	697.18	13.10	696.12	16.40
2072	.4	17.50	679.87	18.20	675.98	16.40
2099	.4	24.10	628.68	24.90	624.18	16.40
2018	.3	11.60	-189.33	11.80	-190.10	5.20
2045	.3	12.40	-197.06	12.70	-198.32	5.20

2072	.3	14.50	-208.57	14.90	-210.33	5.20
2099	.3	14.90	-213.48	15.20	-214.83	5.20
2018	.3	21.40	86.30	22.10	83.60	9.60
2045	.3	22.90	71.94	23.90	67.71	9.60
2072	.3	26.70	51.02	28.00	45.31	9.60
2099	.3	27.40	42.13	28.60	36.75	9.60
2018	.3	36.50	512.45	38.50	504.73	16.40
2045	.3	39.10	487.78	42.10	475.09	16.40
2072	.3	45.60	452.00	49.50	434.88	16.40
2099	.3	46.70	437.26	50.50	420.19	16.40
2018	.2	18.20	-238.10	18.70	-239.34	5.20
2045	.2	19.40	-253.21	20.00	-254.89	5.20
2072	.2	21.00	-261.14	21.60	-262.88	5.20
2099	.2	21.90	-272.91	22.50	-274.63	5.20
2018	.2	33.50	-3.55	35.30	-8.02	9.60
2045	.2	35.90	-31.94	37.80	-37.26	9.60
2072	.2	38.70	-46.14	40.80	-52.23	9.60
2099	.2	40.40	-67.98	42.40	-73.70	9.60
2018	.2	57.30	358.55	62.50	345.65	16.40
2045	.2	61.20	310.60	66.90	294.64	16.40
2072	.2	66.10	286.00	72.10	268.60	16.40
2099	.2	69.00	248.70	74.60	232.68	16.40
2018	rainfed	24.80	-286.56	25.40	-286.56	5.20
2045	rainfed	24.30	-291.92	24.80	-291.92	5.20
2072	rainfed	25.60	-298.63	26.20	-298.63	5.20
2099	rainfed	25.30	-301.18	25.80	-301.18	5.20
2018	rainfed	45.70	-93.27	47.60	-93.27	9.60

2045	rainfed	44.80	-103.16	46.40	-103.16	9.60
2072	rainfed	47.30	-115.54	48.90	-115.54	9.60
2099	rainfed	46.60	-120.25	48.40	-120.25	9.60
2018	rainfed	78.00	205.45	83.30	205.45	16.40
2045	rainfed	76.50	188.56	80.90	188.56	16.40
2072	rainfed	80.80	167.40	85.20	167.40	16.40
2099	rainfed	79.60	159.37	84.30	159.37	16.40

Table D.16: Divergent water price for risk neutral v.s. averse farmers ,PIATT ,IL ,SOYBEAN ,RCP85

Year	TR	DWP(Netural)	Profit(Netural)	DWP (Averse)	Profit(Averse)	OP
2045	.6	1.30	252.39	1.20	253.02	9.60
2072	.6	3.50	255.75	3.40	256.54	9.60
2099	.6	6.30	229.68	6.20	230.67	9.60
2045	.6	2.10	796.72	2.00	797.36	16.40
2072	.6	6.00	801.53	5.60	804.69	16.40
2099	.6	10.70	757.77	10.60	758.77	16.40
2018	.5	0.60	-105.60	0.50	-105.05	5.20
2045	.5	1.40	-104.49	1.30	-103.91	5.20
2045	.5	2.50	243.35	2.40	243.93	9.60
2099	.5	11.00	178.28	11.10	177.37	9.60
2045	.5	4.20	780.93	4.00	782.08	16.40
2072	.5	11.00	756.46	10.70	758.58	16.40
2099	.5	18.80	669.28	18.90	668.37	16.40
2072	.4	10.00	-170.38	10.10	-170.99	5.20
2099	.4	13.70	-224.10	13.90	-225.68	5.20
2045	.4	11.20	177.56	11.30	177.06	9.60
2072	.4	18.40	121.61	18.70	119.76	9.60
2099	.4	25.20	22.78	25.80	18.05	9.60
2045	.4	19.10	668.29	19.40	666.78	16.40
2072	.4	31.30	573.36	32.40	566.58	16.40
2099	.4	43.00	404.10	44.80	389.90	16.40
2018	.3	11.20	-183.70	11.40	-184.44	5.20
2045	.3	12.80	-190.76	13.10	-191.92	5.20

2072	.3	16.80	-232.04	17.20	-233.97	5.20
2099	.3	20.30	-296.57	20.70	-299.13	5.20
2018	.3	20.60	96.91	21.40	93.95	9.60
2045	.3	23.70	83.32	24.70	79.47	9.60
2072	.3	31.10	6.98	32.20	1.67	9.60
2099	.3	37.50	-111.90	38.70	-119.58	9.60
2018	.3	35.10	530.68	37.50	521.80	16.40
2045	.3	40.40	507.47	43.40	495.92	16.40
2072	.3	53.00	377.34	56.30	361.40	16.40
2099	.3	64.10	173.40	67.40	152.28	16.40
2018	.2	18.50	-237.32	18.90	-238.30	5.20
2045	.2	20.40	-248.24	21.00	-249.72	5.20
2072	.2	22.60	-283.98	23.00	-285.30	5.20
2099	.2	24.40	-340.90	24.70	-342.22	5.20
2018	.2	34.00	-1.99	35.70	-6.14	9.60
2045	.2	37.70	-22.62	39.50	-27.05	9.60
2072	.2	41.60	-88.09	43.00	-92.71	9.60
2099	.2	44.90	-192.94	45.90	-197.33	9.60
2018	.2	58.10	361.35	63.00	349.39	16.40
2045	.2	64.30	326.40	69.60	313.36	16.40
2072	.2	71.10	214.20	75.10	201.00	16.40
2099	.2	76.70	35.20	79.50	22.91	16.40
2018	rainfed	23.50	-274.50	24.10	-274.50	5.20
2045	rainfed	25.00	-282.30	25.50	-282.30	5.20
2072	rainfed	25.90	-313.60	26.20	-313.60	5.20
2099	rainfed	25.30	-350.84	25.40	-350.84	5.20
2018	rainfed	43.40	-71.00	45.40	-71.00	9.60

2045	rainfed	46.00	-85.40	48.00	-85.40	9.60
2072	rainfed	47.80	-143.19	48.70	-143.19	9.60
2099	rainfed	46.70	-211.93	47.00	-211.93	9.60
2018	rainfed	74.10	243.50	79.90	243.50	16.40
2045	rainfed	78.60	218.90	83.90	218.90	16.40
2072	rainfed	81.60	120.17	84.00	120.17	16.40
2099	rainfed	79.70	2.75	80.50	2.75	16.40