

Expenses

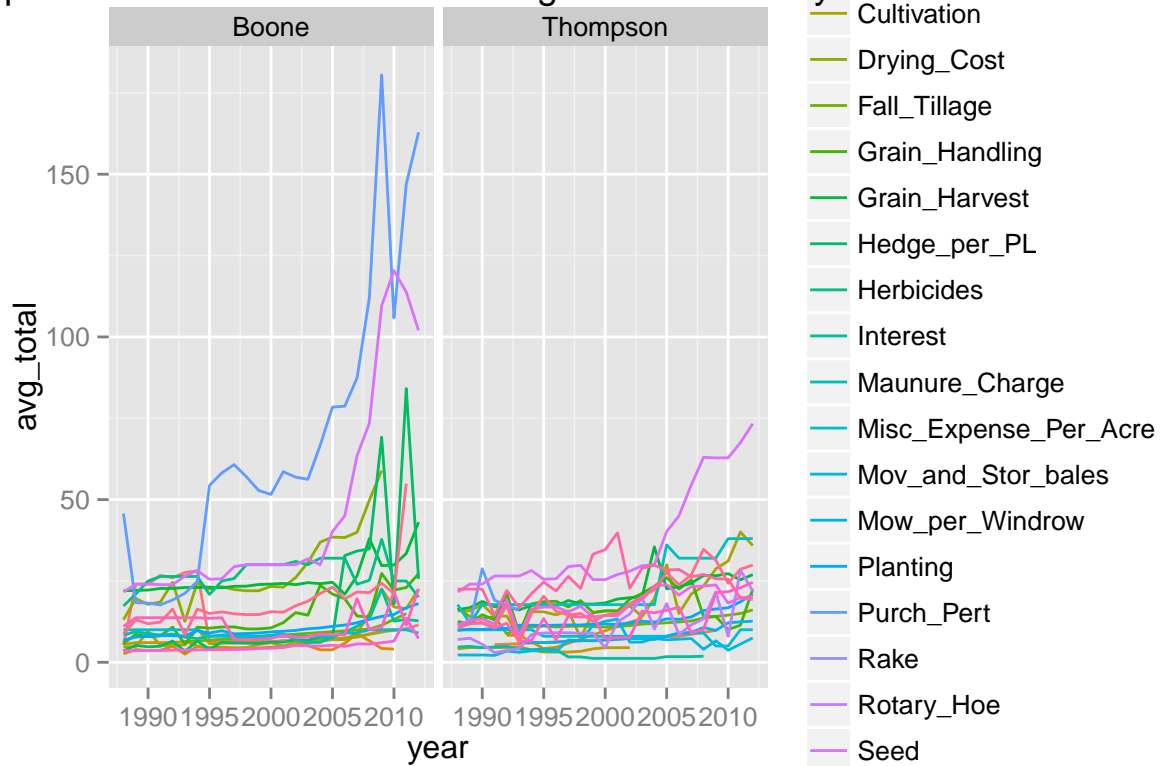
Colin

Sunday, November 2, 2014

```
library(ggplot2)
library(dplyr)
library(tidyr)
library(gridExtra)

##### Read in Data #####
#pfi <- read.csv("C:/Users/Colin LB/Documents/GitHub/PFI/data/PFI_clean.csv")
#let's try to work with relative paths so that code works for everyone.
pfi <- read.csv("../data/PFI_clean.csv")
#Let's remove Land_Change since that's assumed the same for both farms.
##### Exploring #####
pfi[complete.cases(pfi),] %>%
  filter(item_type == "Expense") %>%
  filter(crop %in% c("Corn")) %>%
  filter(item != "Land_Change") %>%
  filter(value > .01) %>%
  group_by(farmer, year, crop, field_id, item) %>%
  summarise(total = sum(value)) %>%
  group_by(farmer, year, item) %>%
  summarise(avg_total = mean(total)) %>%
  ggplot() +
  geom_line(aes(x=year, y=avg_total, colour=item)) +
  facet_wrap(~farmer) +
  ggtitle('Expenses over time for Corn Averaged Over Plots by Item')
```

expenses over time for Corn Averaged Over Plots by Item



Libraries

Let's just pull out the costs that seem "large"

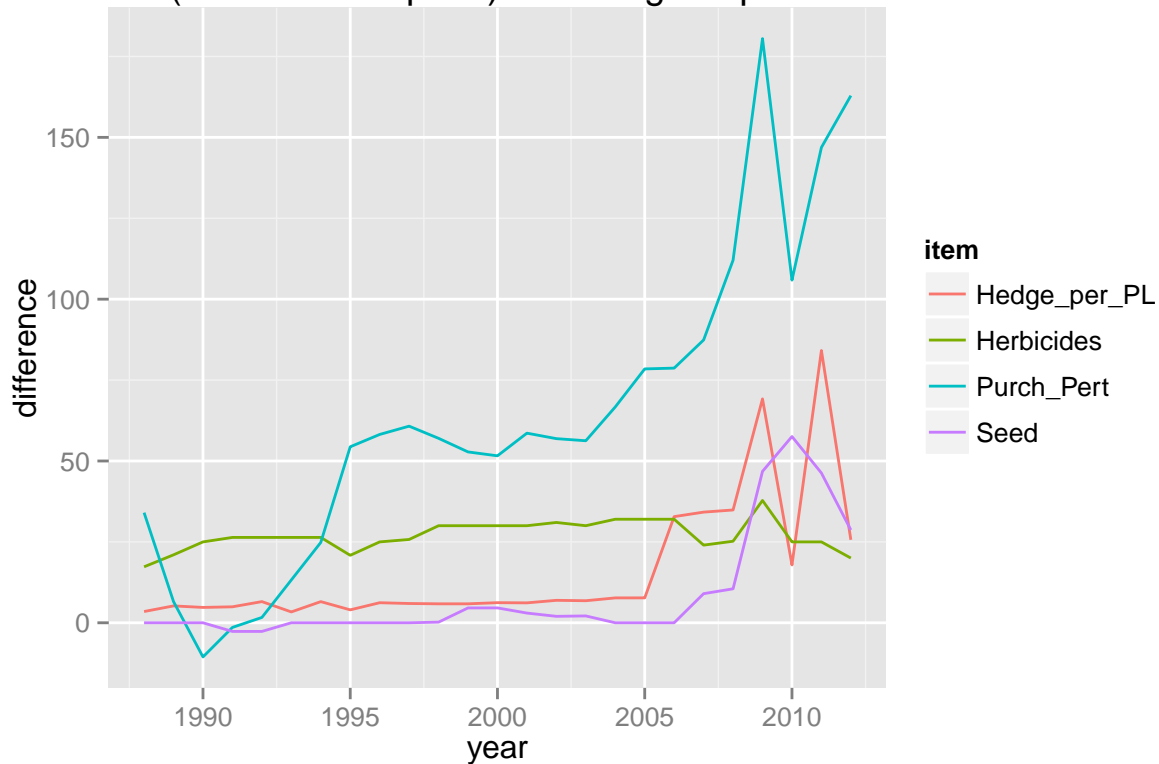
```
#pfi[complete.cases(pfi),] %>%
#filter(item_type == "Expense") %>%
#filter(crop %in% c("Corn")) %>%
#filter(item %in% c("Purch_Pert", "Seed", "Herbicides")) %>%
#group_by(farmer, year, crop, field_id, item) %>%
#summarise(total = sum(value)) %>%
#group_by(farmer, year, item) %>%
#summarise(avg_total = mean(total)) %>%
#ggplot() +
#geom_line(aes(x=year, y=avg_total, color=item)) +
#facet_wrap(~farmer) +
#ggtitle('Expenses over time for Corn Averaged over Plots by Item')
```

Differences in Expenses for Corn

```
pfi[complete.cases(pfi),] %>%
filter(item_type == "Expense") %>%
filter(crop %in% c("Corn")) %>%
filter(item %in% c("Purch_Pert", "Seed", "Herbicides", "Hedge_per_PL")) %>%
group_by(farmer, year, crop, field_id, item) %>%
summarise(total = sum(value)) %>%
group_by(farmer, year, item) %>%
summarise(avg_total = mean(total)) %>%
ungroup() %>%
```

```
spread(farmer, avg_total) %>%
mutate(difference = Boone-Thompson) %>%
ggplot() +
geom_line(aes(x=year, y=difference, color=item)) +
ggtitle('Difference (Boone-Thompson) in Average Expenses for Corn')
```

Difference (Boone-Thompson) in Average Expenses for Corn



Did we confirm what Purch_Pert (Fertilizer) and Hedge_per_PL is?

```
#pfi[complete.cases(pfi),] %>%
#filter(item_type == "Expense") %>%
#filter(crop %in% c("SB")) %>%
#filter(item != "Land_Change") %>%
#filter(value > .01) %>%
#group_by(farmer, year, crop, field_id, item) %>%
#summarise(total = sum(value)) %>%
#group_by(farmer, year, item) %>%
#summarise(avg_total = mean(total)) %>%
#ggplot() +
#geom_line(aes(x=year, y=avg_total, colour=item)) +
#facet_wrap(~farmer) +
#ggtitle('Expenses over time for SB Averaged Over Plots by Item')
```

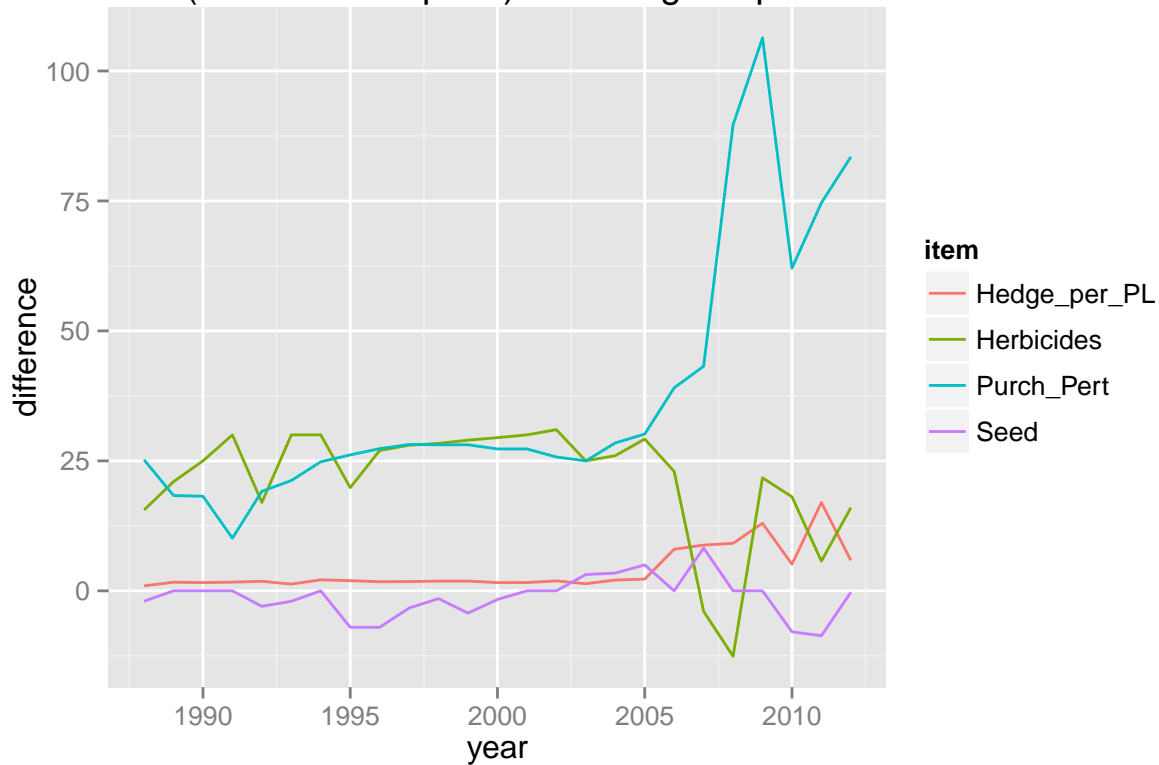
Differences in Expenses for SB

```

pfi[complete.cases(pfi),] %>%
  filter(item_type == "Expense") %>%
  filter(crop %in% c("SB")) %>%
  filter(item %in% c("Purch_Pert", "Seed", "Herbicides", "Hedge_per_PL")) %>%
  group_by(farmer, year, crop, field_id, item) %>%
  summarise(total = sum(value)) %>%
  group_by(farmer, year, item) %>%
  summarise(avg_total = mean(total)) %>%
  ungroup() %>%
  spread(farmer, avg_total) %>%
  mutate(difference = Boone-Thompson) %>%
  ggplot() +
  geom_line(aes(x=year, y=difference, color=item)) +
  ggtitle('Difference (Boone-Thompson) in Average Expenses for SB')

```

Difference (Boone-Thompson) in Average Expenses for SB



```

q<-pfi[complete.cases(pfi),] %>%
  filter(item_type == "Expense") %>%
  filter(crop %in% c("Corn")) %>%
  filter(item != "Land_Change") %>%
  filter(value==0 & farmer=="Thompson", field_id==1) %>%
  group_by(item)

unique(q$item)

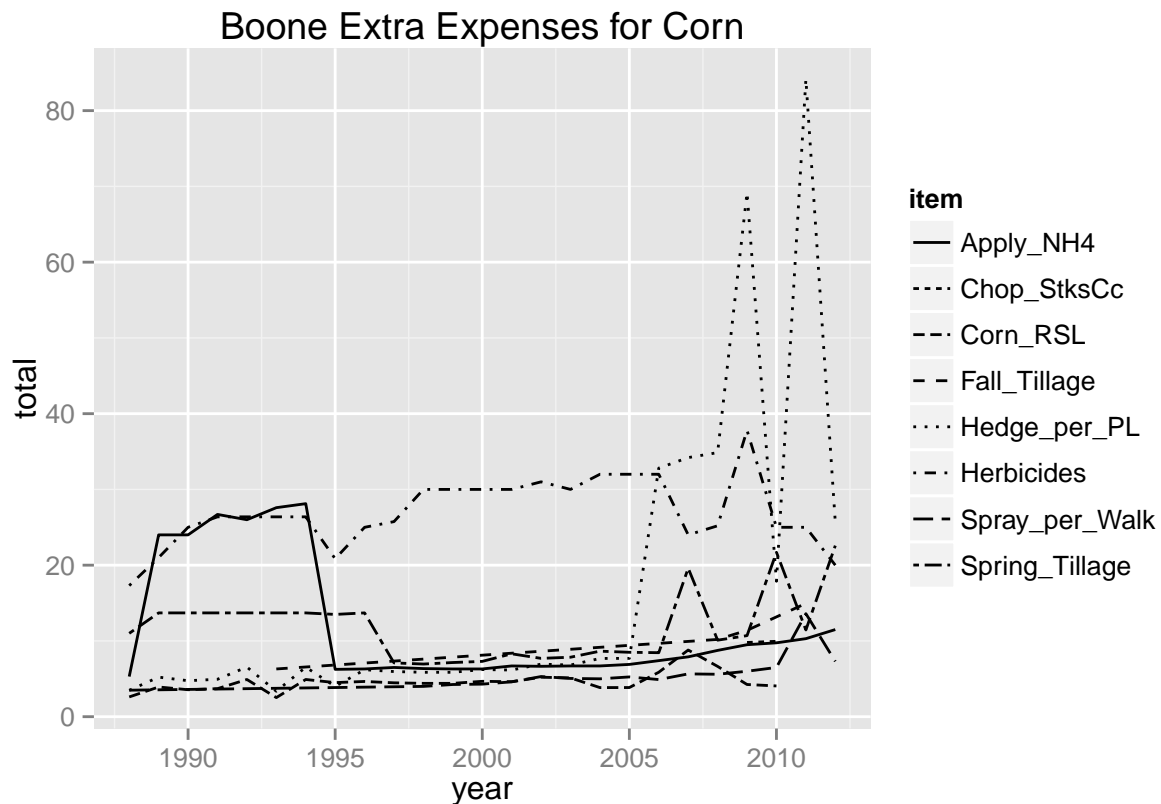
```

Let's try and see all the expenses Thompson records as 0 vs. what Boone pays.

```
## [1] Drying_Cost      Bale_Hay      Stubble_Costs  Hedge_per_PL
## [5] Corn_RSL          Straw_Costs   Herbicides     Windrow_Oats
## [9] Mow_per_Windrow Rake          Spring_Tillage Cover_Crop
## [13] Fall_Tillage      Chop_StksCc   Spray_per_Walk Apply_NH4
## [17] Purch_Pert        Crop_Ins      Interest
## 41 Levels: Apply_NH4 Bale_Hay Chop_StksCc ... Yield_Per_Acre_Bu_per_pound
```

```
boone_extra_expense<-pfi[complete.cases(pfi),] %>%
  filter(item_type == "Expense") %>%
  filter(farmer=="Boone") %>%
  filter(crop %in% c("Corn")) %>%
  filter(item %in% c("Apply_NH4","Hedge_per_PL","Corn_RSL","Herbicides","Spring_Tillage","Chop_StksCc"),
  filter(value>.01) %>%
  group_by(year,item) %>%
  summarise(total = sum(value)) %>%
  ggplot() +
  geom_line(aes(x=year, y=total,linetype=item)) +
  ggtitle('Boone Extra Expenses for Corn')

boone_extra_expense
```



Plots of Yields for Corn and SB between Boone and Thompson. Thompson seems to be doing consistently better in SB. The yield advantage is less strong for corn.

```

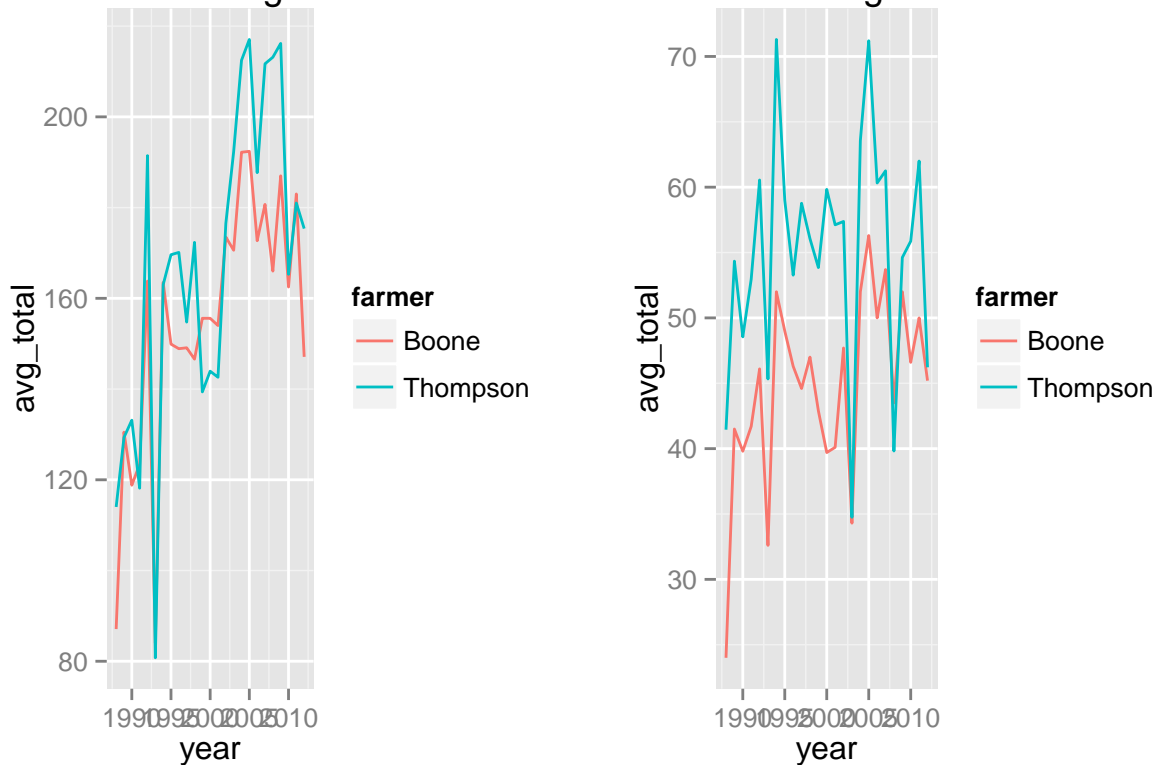
corn_yield<-pfi[complete.cases(pfi),] %>%
filter(item_type == "Unit Quantity") %>%
filter(crop %in% c("Corn")) %>%
group_by(farmer, year,field_id) %>%
summarise(total = sum(value)) %>%
group_by(farmer, year) %>%
summarise(avg_total = mean(total)) %>%
ggplot() +
geom_line(aes(x=year, y=avg_total,color=farmer)) +
ggtitle('Yields for Corn Averaged Over Plots')

sb_yield<-pfi[complete.cases(pfi),] %>%
filter(item_type == "Unit Quantity") %>%
filter(crop %in% c("SB")) %>%
group_by(farmer, year,field_id) %>%
summarise(total = sum(value)) %>%
group_by(farmer, year) %>%
summarise(avg_total = mean(total)) %>%
ggplot() +
geom_line(aes(x=year, y=avg_total,color=farmer)) +
ggtitle('Yields for SB Averaged Over Plots')

grid.arrange(corn_yield,sb_yield, ncol=2)

```

Yields for Corn Averaged Over Plots Yields for SB Averaged Over Plots



```

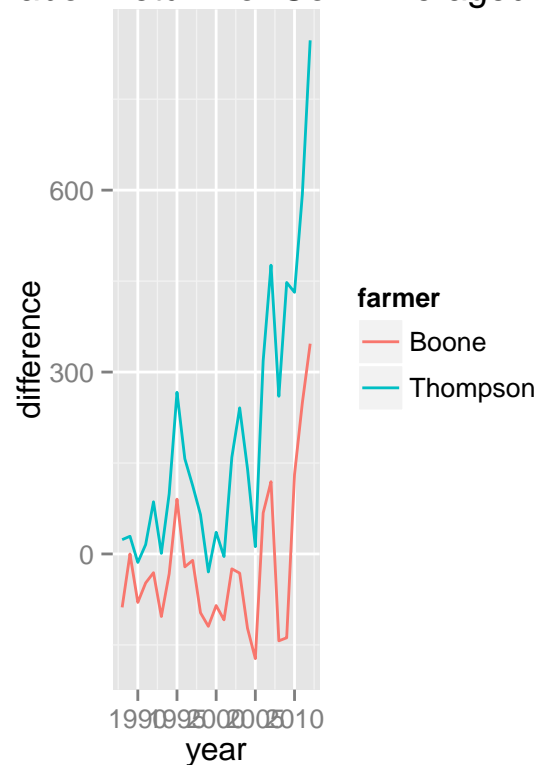
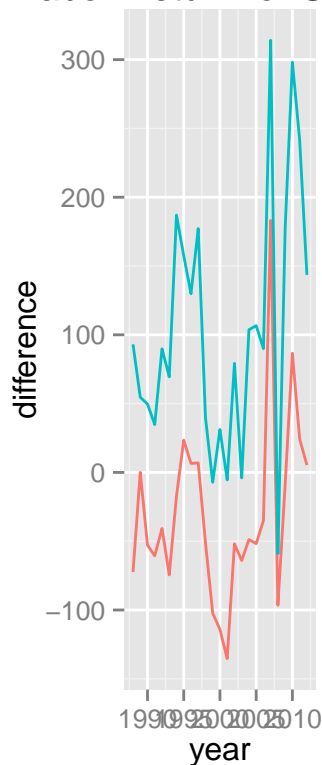
sb<-pfi[complete.cases(pfi),] %>%
filter(item_type == "Derived") %>%
filter(crop %in% c("SB")) %>%
filter(item %in% c("Labor_Return", "LaborandMR_dollar_per_A")) %>%
group_by(farmer, year, field_id, item) %>%
summarise(total = sum(value)) %>%
group_by(farmer, year, item) %>%
summarise(avg_total = mean(total)) %>%
ungroup() %>%
spread(item, avg_total) %>%
mutate(difference = LaborandMR_dollar_per_A - Labor_Return) %>%
ggplot() +
geom_line(aes(x=year, y=difference, color=farmer)) +
ggtitle('LaborMR/acre - Labor Return for SB Averaged Over Plots')

corn<-pfi[complete.cases(pfi),] %>%
filter(item_type == "Derived") %>%
filter(crop %in% c("Corn")) %>%
filter(item %in% c("Labor_Return", "LaborandMR_dollar_per_A")) %>%
group_by(farmer, year, field_id, item) %>%
summarise(total = sum(value)) %>%
group_by(farmer, year, item) %>%
summarise(avg_total = mean(total)) %>%
ungroup() %>%
spread(item, avg_total) %>%
mutate(difference = LaborandMR_dollar_per_A - Labor_Return) %>%
ggplot() +
geom_line(aes(x=year, y=difference, color=farmer)) +
ggtitle('LaborMR/acre - Labor Return for Corn Averaged Over Plots')

grid.arrange(sb, corn, ncol=2)

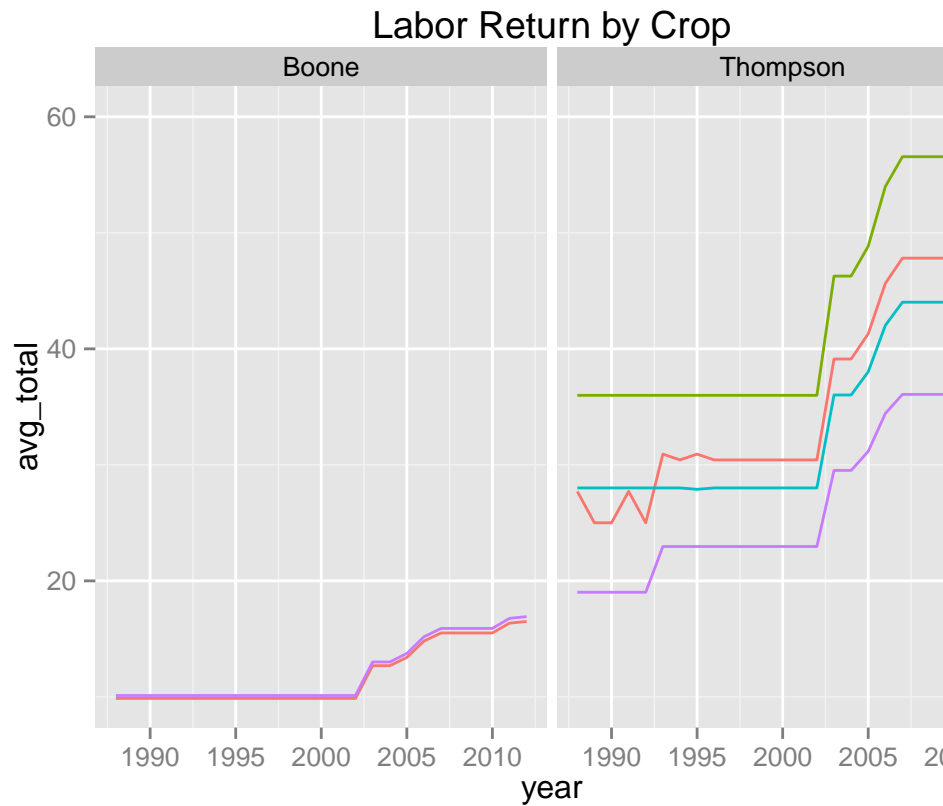
```

– Labor Return for Soybean Averaged Over Labor Return for Corn Averaged Over



```
pfi[complete.cases(pfi),] %>%
  filter(item_type == "Derived") %>%
  #filter(crop %in% c("Corn")) %>%
  filter(item %in% c("Labor_Return", "LaborandMR_dollar_per_A")) %>%
  group_by(farmer, year, crop, field_id, item) %>%
  summarise(total = sum(value)) %>%
  group_by(farmer, year, crop, item) %>%
  summarise(avg_total = mean(total)) %>%
  filter(item %in% c("Labor_Return")) %>%
  ggplot() +
  geom_line(aes(x=year, y=avg_total, color=crop)) + facet_wrap(~farmer) +
  ggtitle('Labor Return by Crop')
```

If I understand the measures correctly, this is showing us (Total Revenue-Total Expenses)/Acre. I am surprised the corn differences are not bigger: especially in 1992 where according to the Thompson Report, Dick saved \$61/acre on drying costs—and drying costs are not considered labor. I know revenue could explain the difference, but it seems doubtful a revenue difference



scaled per acre could be that great.

Let's just look at labor return alone, which is labor Return/costs (wages). It's odd that all 4 crops move in lockstep. I would think each crop would have different returns and costs of labor where they wouldn't scale so perfectly. It looks like something happened in 2001 that shot the returns up. From looking at average corn prices (farmdoc.illinois.edu) they are flat between 2000-2005. I am guessing it's an expense thing (or accounting change)?