In [ ]:

Lecture 27 EEP118

Today will be a review for the Final

Causal Effect of the Boeing door incident on company stock price,

Causal Effect of “Trump” policies on companies’ stock pric,

And then go over the Previous 'sy ear f exam

Estimate Boeing door incident Effect on Stock Prices

1. Estimate Boeing door incident Effect on Stock Prices

January 5, 2024, the door plug of a commercial Boeing 737 Max 9 came off as the plane was climbing, opening a large hole on the side of the plane, alarming passengers onboard, and raising new questions about flight safety in Boeing

Research Question: Can we find a causal effect of the door incident on Boeing Stock Prices?

Data: on Tuesday April 23, 2024 I went to google to

Collect data for Boeing Stock Price for Jan3,4,5, 8, 9 and 10, the treated company

I also collect data for the same days for two other airplane manufacturers, Airbus and Lockheed Martin (that we will use as controls)

Strategy: Estimate a Difference in Differences

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Basic Model

The difference in differences models is

price_{it}= β_0+ β_1 AfterDoor+ β_2 DayTrend+ β_3 Boeing*AfterDoor_{it} + Boeing_i + Airbus_i + u_{ti}

where Boeing_i=1 if the price at day t is for Boeing and equal to Zero otherwise,

AfterDoor=1 if we are on Jan 8,9, or 10 for all brands

And we include a Boeing and an Airbus Fixed effect, not the Lockheed one because we also have a constant, so we can include all but one brand Fixed effect.

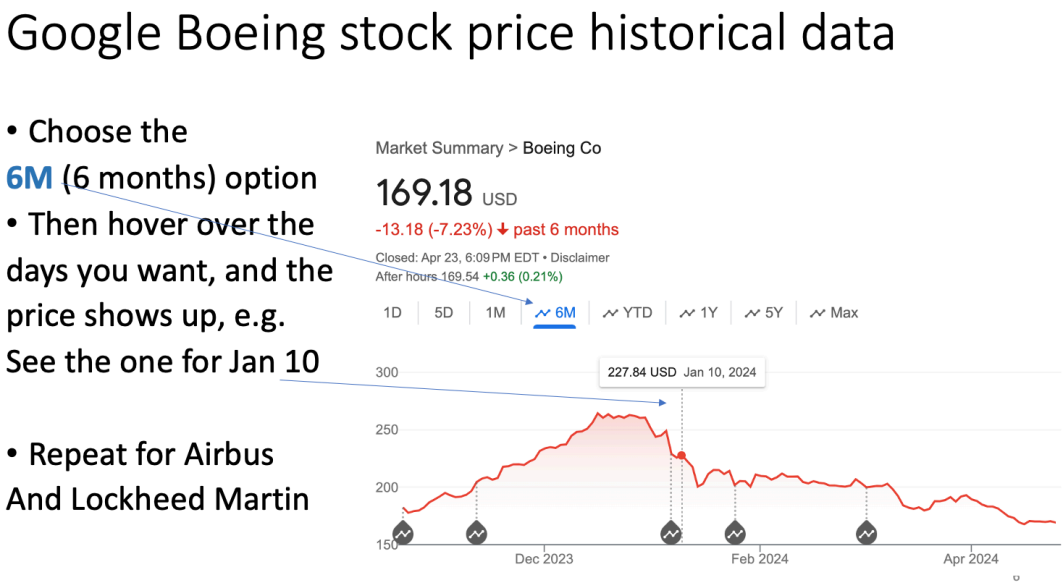
Airbus_i = 1 if the price at day t is for Airbus and equal to Zero otherwise,

beta_3 hat is going to be the estimate Dif in Dif coefficient

We will estimate the above equation in levels of prices in dollars and report the estimates in column (1) of the table below, and also estimate it for the log of price in column (2) of the table below.

Lets go

Gathering the Data needed



Manual data collection and entry in the format below, a row is a day-brand, and columns then say which day and brand

year	month	day	post	boeing	daycounter	brand	stockPrice
2024	jan	3	0	1	1	boeing	243.91
2024	jan	4	0	1	2	boeing	244.94
2024	jan	5	0	1	3	boeing	249
2024	jan	8	1	1	4	boeing	229
2024	jan	9	1	1	5	boeing	225.76
2024	jan	10	1	1	6	boeing	227.84
2024	jan	3	0	0	1	airbus	37.29
2024	jan	4	0	0	2	airbus	37.98
2024	jan	5	0	0	3	airbus	38.08
2024	jan	8	1	0	4	airbus	39.42
2024	jan	9	1	0	5	airbus	39.09
2024	jan	10	1	0	6	airbus	39.39
2024	jan	3	0	0	1	lockheedMartin	459.12
2024	jan	4	0	0	2	lockheedMartin	457.87
2024	jan	5	0	0	3	lockheedMartin	456.5
2024	jan	8	1	0	4	lockheedMartin	458.6
2024	jan	9	1	0	5	lockheedMartin	456.29
2024	jan	10	1	0	6	lockheedMartin	455.4

Sources: Accessed April 23, 2024. Chose 6M option, hovered over days to read and show the prices around Jan 5, day of door incident

N=18 observations, 6 days of stock data for three companies: Boeing, Airbus, and Lockheed Martin

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I then saved the data to then load into R

- Dataset called dataLecture27.dta
- N=18 observations, 6 days of stock data for three companies: Boeing, Airbus, and Lockheed Martin
- Follow along in Lecture27.R or Lecture 27 jupyter notebook

To estimate the door incident Effect on Stock Prices

- Using daily data before (Jan 3-5) and after (Jan 8010) the door incident for Boeing and for other comparison companies as controls

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In [4]:
```
#load packages and load up the data


library(data.table)
library(dplyr)
library(ggplot2)
library(lubridate)
library(haven)
library(stargazer)
library(lfe)
library(gridExtra)
library(multcomp)
```

```
Please cite as:


 Hlavac, Marek (2022). stargazer: Well-Formatted Regression and Summary Stat
istics Tables.

 R package version 5.2.3. https://CRAN.R-project.org/package=stargazer


Loading required package: Matrix


Attaching package: ‘gridExtra’


The following object is masked from ‘package:dplyr’:

    combine


Error in library(multcomp): there is no package called ‘multcomp’
Traceback:

1. library(multcomp)
```

In [6]:
```
##Reading in Stock Data

StockData <- read_dta("dataLecture27.dta")

head(StockData)
```

A tibble: 6 × 8

year	month	day	post	boeing	daycounter	brand	stockprice
<dbl>	<chr>	<dbl>	<dbl>	<dbl>	<dbl>	<chr>	<dbl>
2024	jan	3	0	1	1	boeing	243.91
2024	jan	4	0	1	2	boeing	244.94
2024	jan	5	0	1	3	boeing	249.00
2024	jan	8	1	1	4	boeing	229.00
2024	jan	9	1	1	5	boeing	225.76
2024	jan	10	1	1	6	boeing	227.84

Sources: Accessed April 23, 2024. Chose 6M option, hovered over days to read and show the prices around Jan 5, day of door incident!

Boeing https://www.google.com/search?q=boeing+stock+price+history&rlz=1C5CHFA_enUS744US758&oq=boeing+stock+8#cso=chart-annotations-carousel:444![image.png](attachment:ee1515f3-586d-49ce-8fa6-f2d8547bde4e.png)![image.png](attachment:a876662c-6c40-4520-

9b36-93048893b766.png)![image.png](attachment:5e953a9b-1b6e-49d0-bbd1-ffd0106ebc20.png)![image.png](attachment:98a72488-9e4c-40e4-b895-42014c9910b4.png)

Airbus https://www.google.com/search?q=airbus+stock+price+history&sca_esv=5d0811d5ae0715ef&sca_upv=1&rlz=1C5C
wiz-serp![image.png](attachment:4ff5d7c9-e49b-42a4-9f8e-ebee72fe91c2.png)!
[image.png](attachment:06070d7a-8f90-4188-b4b9-bbf5c1eae430.png)!
[image.png](attachment:ca6b7d9b-00f9-4905-ab22-4499ab658300.png)!
[image.png](attachment:7fe4232b-459e-4a01-a146-ee03ec93c1cb.png)

Lockheed Martin: https://www.google.com/search?q=lockheed+martin+stock+price+history&sca_esv=5d0811d5ae0715ef&sca_upv=1
0PEP6vyNsA4&oq=loc+stock+price+history&gs_lp=Egxnd3Mtd2l6LXNlcnAiF2xvYyB
AEBmAIDoAKhAsICBxAAGIAEGA2YAwCSBwMyLjGgB78U&sclient=gws-wiz-serp#cso=chart-annotations-carousel:6![image.png](attachment:54541563-8d5c-411b-8d74-98bd2edc3ea1.png)![image.png](attachment:ce23e1b8-f1b0-403e-8c7c-e1de0ff02592.png)![image.png](attachment:ff7971c5-89cd-4030-8d27-6022e098fa3d.png)![image.png](attachment:c98c3094-9ae1-4d22-bf04-01b274c03f0f.png)

Look at the Data First

Create an after Door Dummy and plot prices for all three stocks in three graphs

In [7]:
```
##Defining Post "Door" Dummy
StockData$PostDoor <- as.numeric(StockData$day >= 6)


##Boeing, Airbus, and Lockheed Martin Graphs
stockDataB<-filter(StockData,brand=="boeing")
stockDataA<-filter(StockData,brand=="airbus")
stockDataL<-filter(StockData,brand=="lockheedMartin")

BoeingPlot <- ggplot(stockDataB, aes(x = daycounter, y = stockprice))
BoeingPlot <- BoeingPlot + geom_smooth(se=FALSE) + geom_point() + geom_line(
BoeingPlot <- BoeingPlot + theme_bw() + theme(plot.title = element_text(hjus
  scale_x_continuous(breaks=(seq(1,6,1)), labels=c("Jan 3", "Jan4", "Jan5",
BoeingPlot <- BoeingPlot + xlab("Day") + ylab("Stock Price") + ggtitle("Boei

BoeingPlot

AirbusPlot <- ggplot(stockDataA, aes(x = daycounter, y = stockprice))
AirbusPlot <- AirbusPlot + geom_smooth(se=FALSE) + geom_point() + geom_line(
AirbusPlot <- AirbusPlot + theme_bw() + theme(plot.title = element_text(hjus
  scale_x_continuous(breaks=(seq(1,6,1)), labels=c("Jan 3", "Jan4", "Jan5",
AirbusPlot <- AirbusPlot + xlab("Day") + ylab("Stock Price") + ggtitle("Airb
```

```
AirbusPlot

LMPlot <- ggplot(stockDataL, aes(x = daycounter, y = stockprice))
LMPlot <- LMPlot + geom_smooth(se=FALSE) + geom_point() + geom_line(color="b
LMPlot <- LMPlot + theme_bw() + theme(plot.title = element_text(hjust = 0.5)
  scale_x_continuous(breaks=(seq(1,6,1)), labels=c("Jan 3", "Jan4", "Jan5",
LMPlot <- LMPlot + xlab("Day") + ylab("Stock Price") + ggtitle("Lockheed Mar

LMPlot
```

```
`geom_smooth()` using method = 'loess' and formula = 'y ~ x'
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```

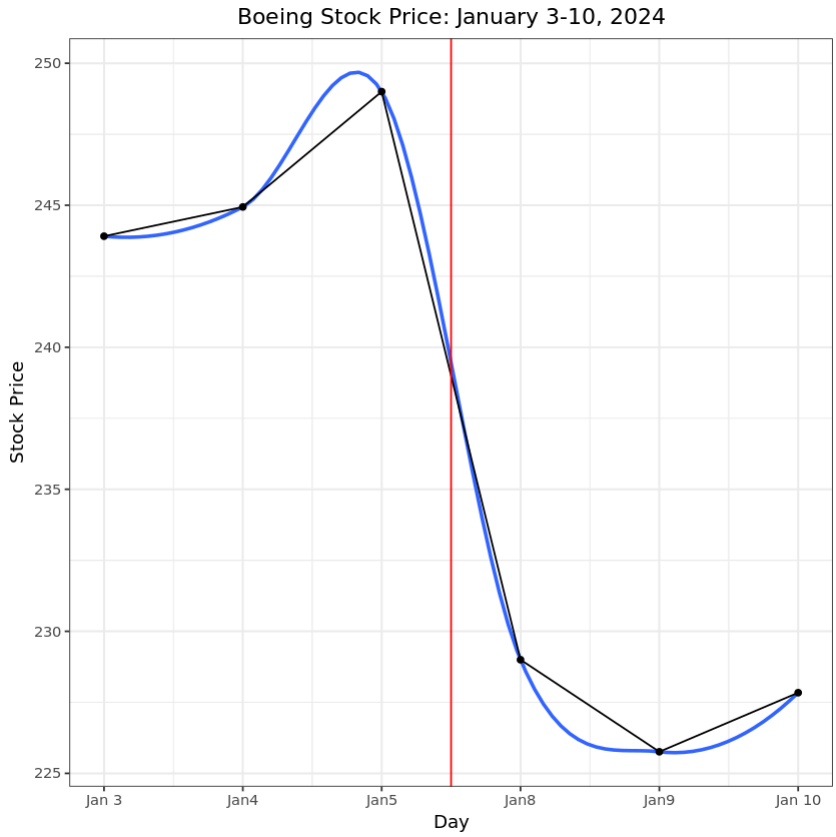


```
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```
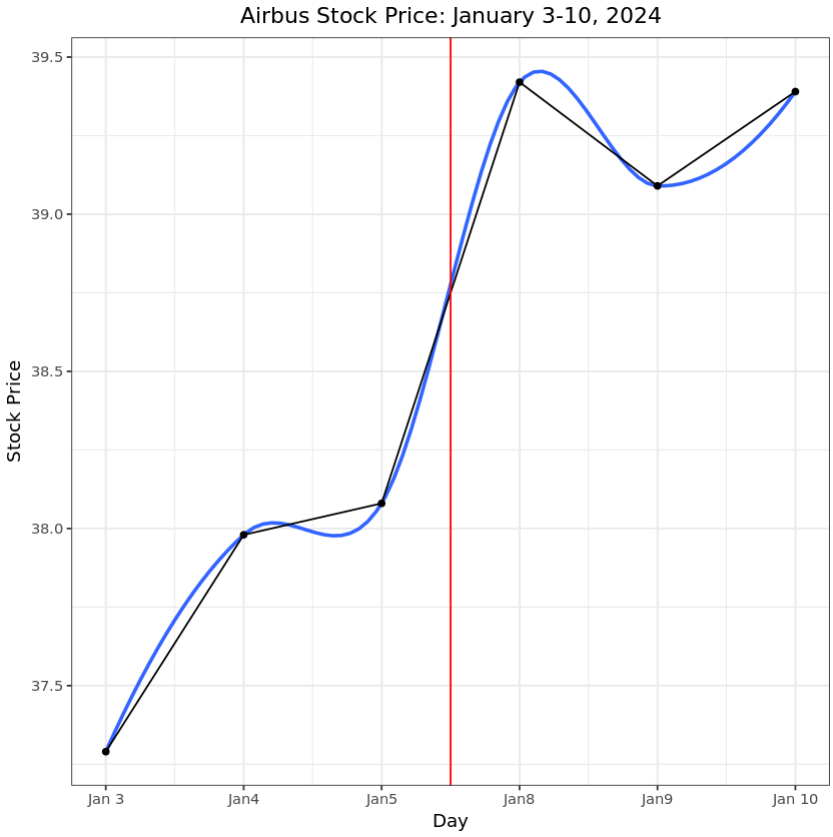
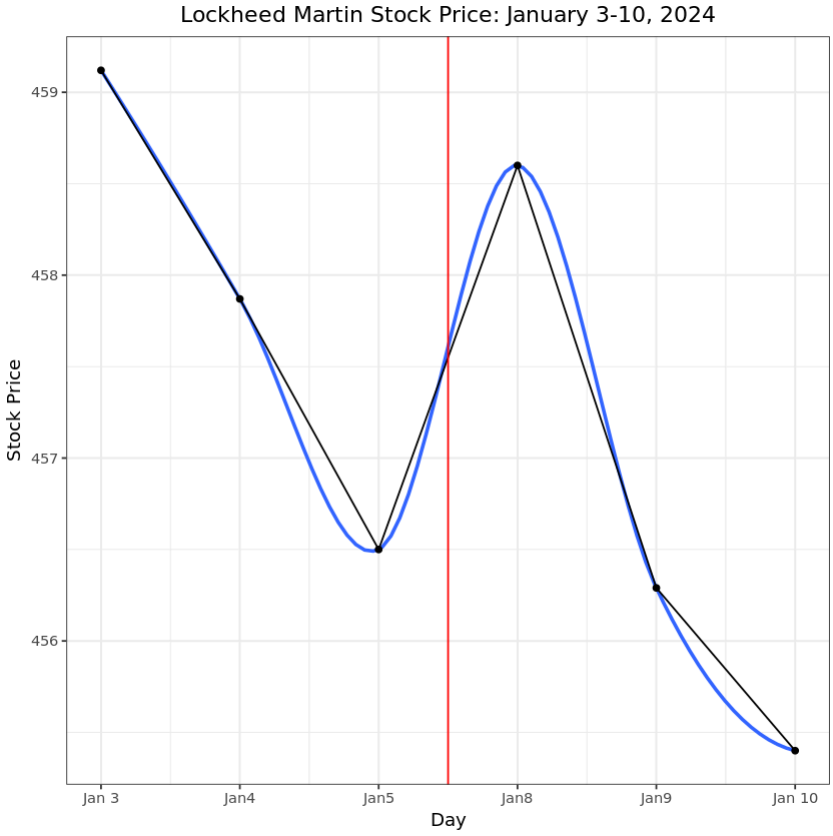
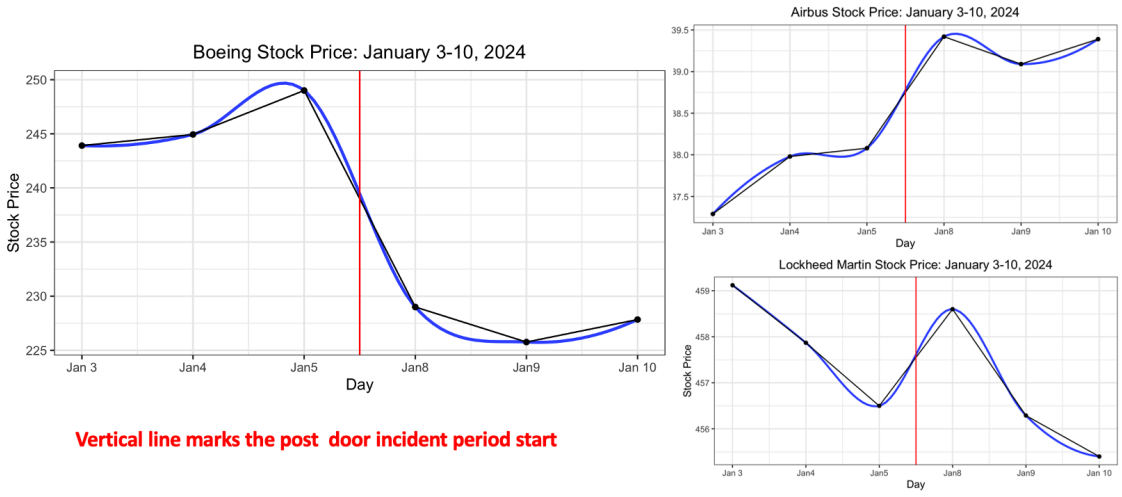


Airbus Stock Price: January 3-10, 2024
39.5
39.0
38.5
38.0
37.5
Stock Price
Jan 3
Jan4
Jan5
Jan8
Jan9
Jan 10
Day


Lockheed Martin Stock Price: January 3-10, 2024
459
458
457
456
Stock Price
Jan 3
Jan4
Jan5
Jan8
Jan9
Jan 10
Day

Look at the raw Data with Scatter Plots

Source Villas-Boas (2024)



Basic Model

The difference in differences models is

price_{it}= β_0+ β_1 AfterDoor+ β_2 DayTrend+ β_3 Boeing*AfterDoor_{it} + Boeing_i + Airbus_i + u_{ti}

where Boeing_i=1 if the price at day t is for Boeing and equal to Zero otherwise,

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And we include a Boeing and an Airbus Fixed effect, not the Lockheed one because we also have a constant, so we can include all but one brand Fixed effect.

Airbus_i = 1 if the price at day t is for Airbus and equal to Zero otherwise,

beta_3 hat is going to be the estimate Dif in Dif coefficient

We will estimate the above equation in levels of prices in dollars and report the estimates in column (1) of the table below, and also estimate it for the log of price in column (2) of the table below.

Lets go

In [8]:
```
##Running regression for all companies at same time, with brand fixed effect

#dependent variable is log of Price
RegAllLogs <- felm(log(stockprice) ~ PostDoor:boeing + PostDoor + daycounter
summary(RegAllLogs)
```

```
Call:
   felm(formula = log(stockprice) ~ PostDoor:boeing + PostDoor +      daycou
nter | brand, data = StockData)

Residuals:
      Min        1Q    Median        3Q       Max
-0.021610 -0.006075 -0.002316  0.009923  0.015409

Coefficients:
                 Estimate Std. Error t value Pr(>|t|)
PostDoor         0.012766   0.013270   0.962    0.355
daycounter       0.001921   0.003681   0.522    0.611
PostDoor:boeing -0.096338   0.012750  -7.556 6.71e-06 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.01275 on 12 degrees of freedom
Multiple R-squared(full model): 0.9999   Adjusted R-squared: 0.9999
Multiple R-squared(proj model): 0.8389   Adjusted R-squared: 0.7717
F-statistic(full model):2.424e+04 on 5 and 12 DF, p-value: < 2.2e-16
F-statistic(proj model): 20.83 on 3 and 12 DF, p-value: 4.764e-05
```

In [9]:
```
#depedent variable is price
##Running regression for all companies at same time, with brand fixed effect
RegAll <- felm(stockprice ~ PostDoor:boeing + PostDoor + daycounter | brand
summary(RegAll)
```

```
Call:
   felm(formula = stockprice ~ PostDoor:boeing + PostDoor + daycounter |
brand, data = StockData)

Residuals:
     Min       1Q   Median       3Q      Max
-2.13417 -1.09187  0.07292  0.79396  3.14417

Coefficients:
                 Estimate Std. Error t value Pr(>|t|)
PostDoor          0.50751    1.75456   0.289    0.777
daycounter       -0.09417    0.48663  -0.194    0.850
PostDoor:boeing -18.64167    1.68573 -11.059  1.2e-07 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.686 on 12 degrees of freedom
Multiple R-squared(full model): 0.9999   Adjusted R-squared: 0.9999
Multiple R-squared(proj model): 0.9372   Adjusted R-squared: 0.9111
F-statistic(full model):3.71e+04 on 5 and 12 DF, p-value: < 2.2e-16
F-statistic(proj model): 59.71 on 3 and 12 DF, p-value: 1.747e-07
```

make table with two columns

Difference in Differences Estimates

Airbus and Lockheed Martin as Controls

Table 1: Difference in Difference Regression: Effect of Boeing Door Explosion on Stock Price: Company-Combined Regression

	Dependent Variable: column (1) Stock Price/ Column (2) log(Stock Price)	
	Stock Price (in US dollars) in Levels	log(Stock Price) in Logs
	(1)	(2)
Post Door Explosion	0.508	0.013
	(1.755)	(0.013)
Day Trend	−0.094	0.002
	(0.487)	(0.004)
Post Door Explosion * Boeing	−18.642***	−0.096***
	(1.686)	(0.013)
Company Fixed Effects	Yes	Yes
Observations	18	18
Residual Std. Error (df = 12)	1.686	0.013
Note:		*p<0.1; **p<0.05; ***p<0.01

Using Airbus and Lockheed's daily Stock prices as controls, we see that the door explosion caused a drop in Boeing's Stock Average Price by 18.6 dollars in column (1)

which is a 9.6 percent drop (column (2) .

The dif in dif Coeff when the dependent variable is the log Price is -0.096, which is a 9.6 percent drop