

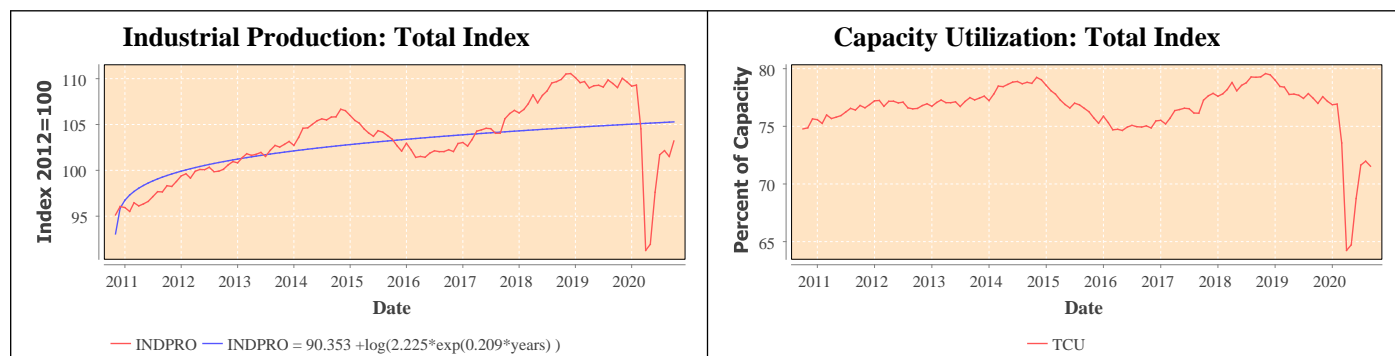
Finance in Montana

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This week,(Nov. 17), we review the Industrial Production Index. Production is the driving force of any modern economy. That statement is true despite the advancements of the internet and information age. I offer 11 sets of two regressions to examine how Industry and Production drive the economy.



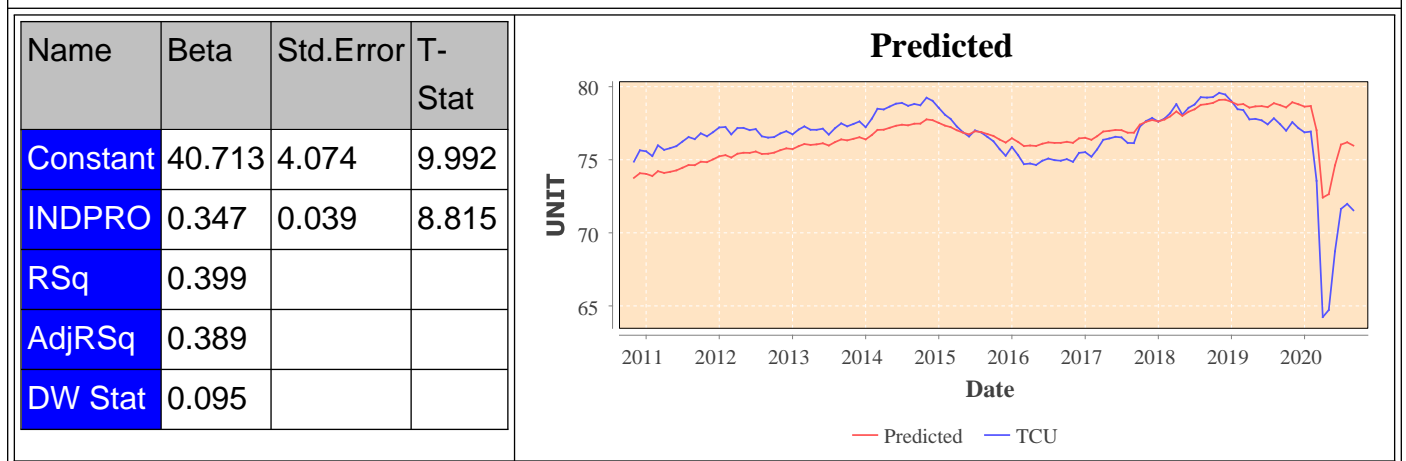
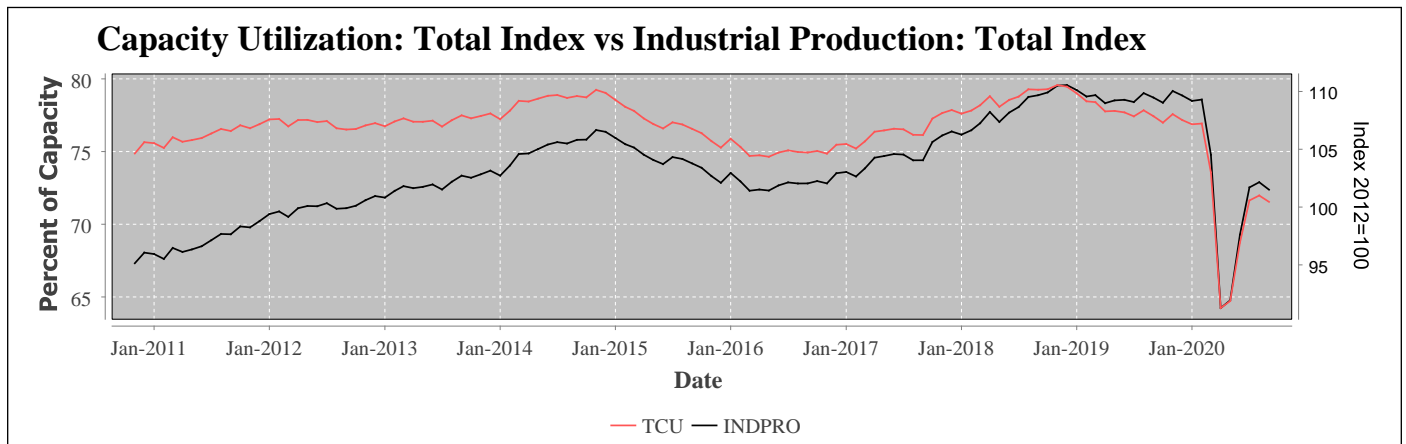
The **Industrial Production: Total Index** is producer index of producer inputs and outputs expressed in real terms. "On a monthly basis, the individual indexes of industrial production are constructed from two main types of source data: (1) output measured in physical units and (2) data on inputs to the production process, from which output is inferred. Data on physical products, such as tons of steel or barrels of oil, are typically obtained from private trade associations and from government agencies; data of this type are used to estimate monthly IP wherever possible and appropriate. Production indexes for a few industries are derived by dividing estimated nominal output (calculated using unit production and unit values or sales) by a corresponding Fisher price index; the most notable of these fall within the high-technology grouping and include semiconductors." The details of the calculation are found [here](#).

The trend line for industrial production index is generally positive with an current implied growth rate of 0.299 Percent. The real growth rate is lower that that of the general population. Slow growth has social implications.**Capacity Utilization: Total Index** trend is also distinctly downward. The TCU and lack of growth illustrate continued slack in the producers optimal production schedules.

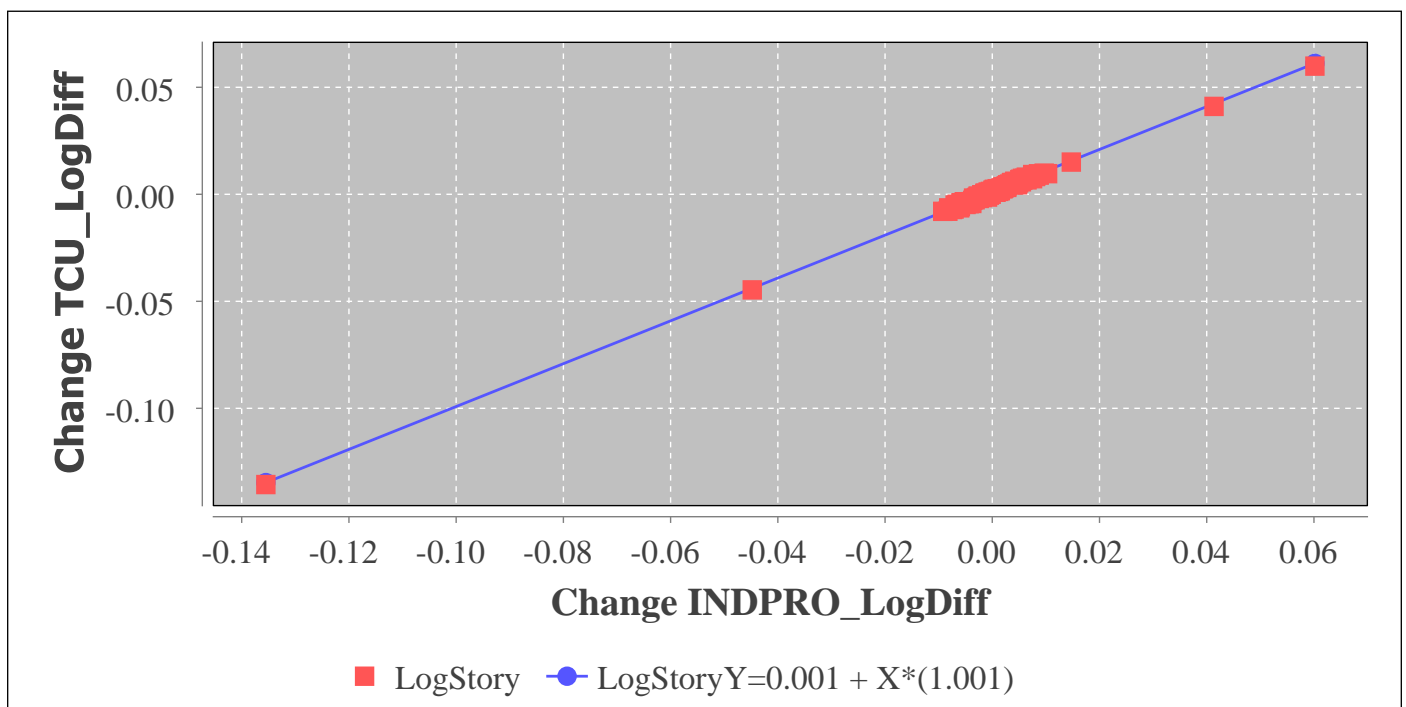
Policy leadership needs to increase its effort in fostering Industrial Production. Plain and simple.

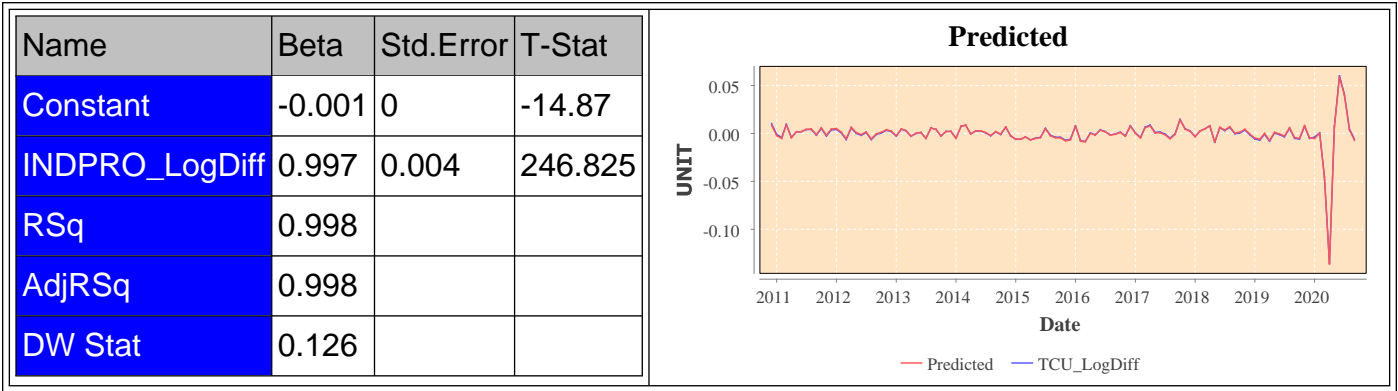
Now let's take a look at the regressions -- two regressions for each page for graphical clarity. Because of the pandemic crisis, I also included a **dummy variable** called COVID19. You will see that in most cases a that COVID19 variable is statistically significant

Capacity Utilization: Total Index



A first difference analysis, we estimate that a one percent change in Industrial Production: Total Index will result in a 0.997 percent change in Capacity Utilization: Total Index. The 95 percent confidence interval of the elasticity estimate is between 1.005 and 0.989 percent. The log regression suggests a monthly trend of -0.001 percent.

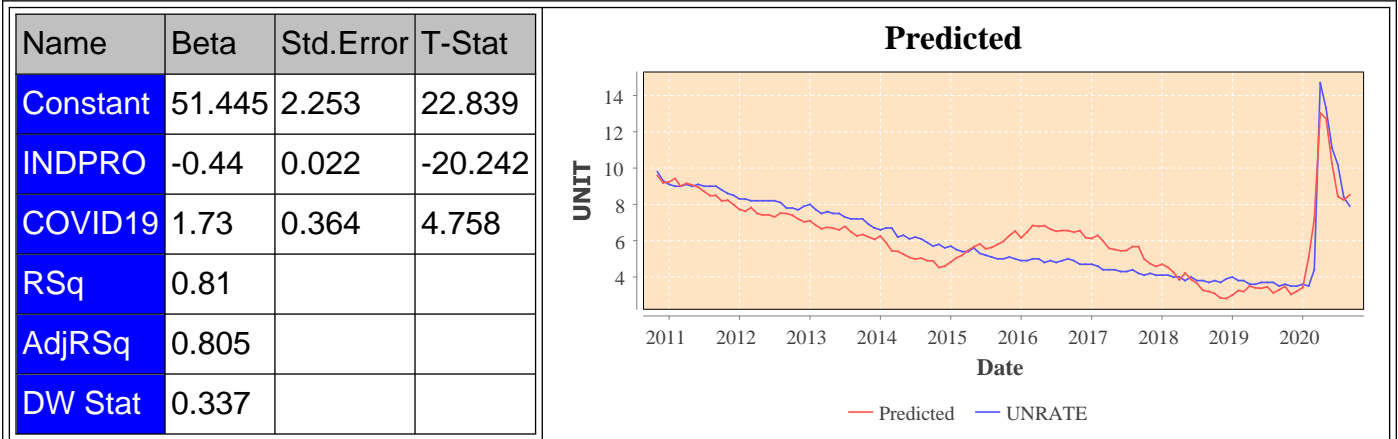
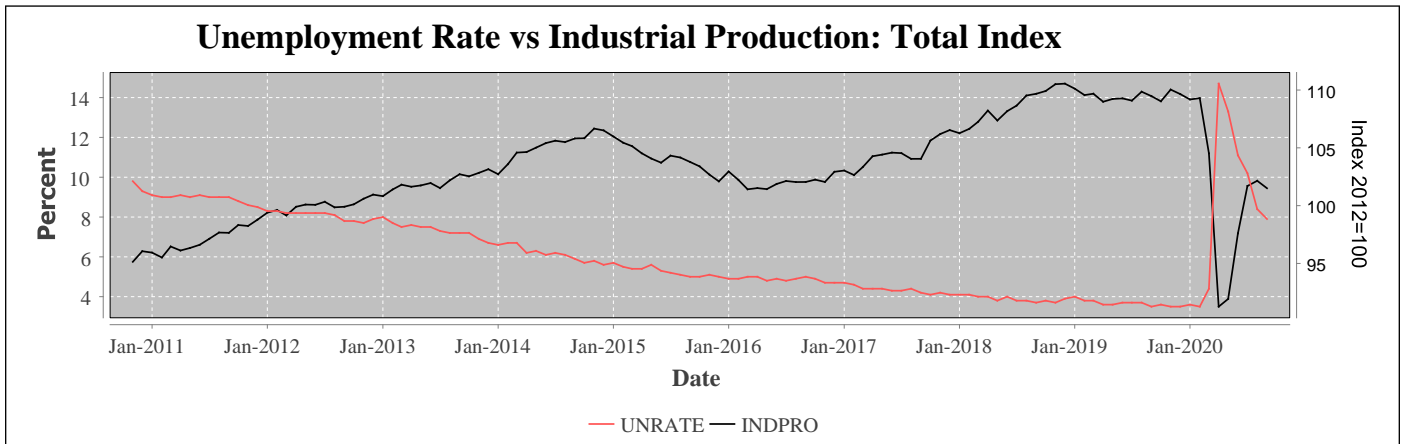




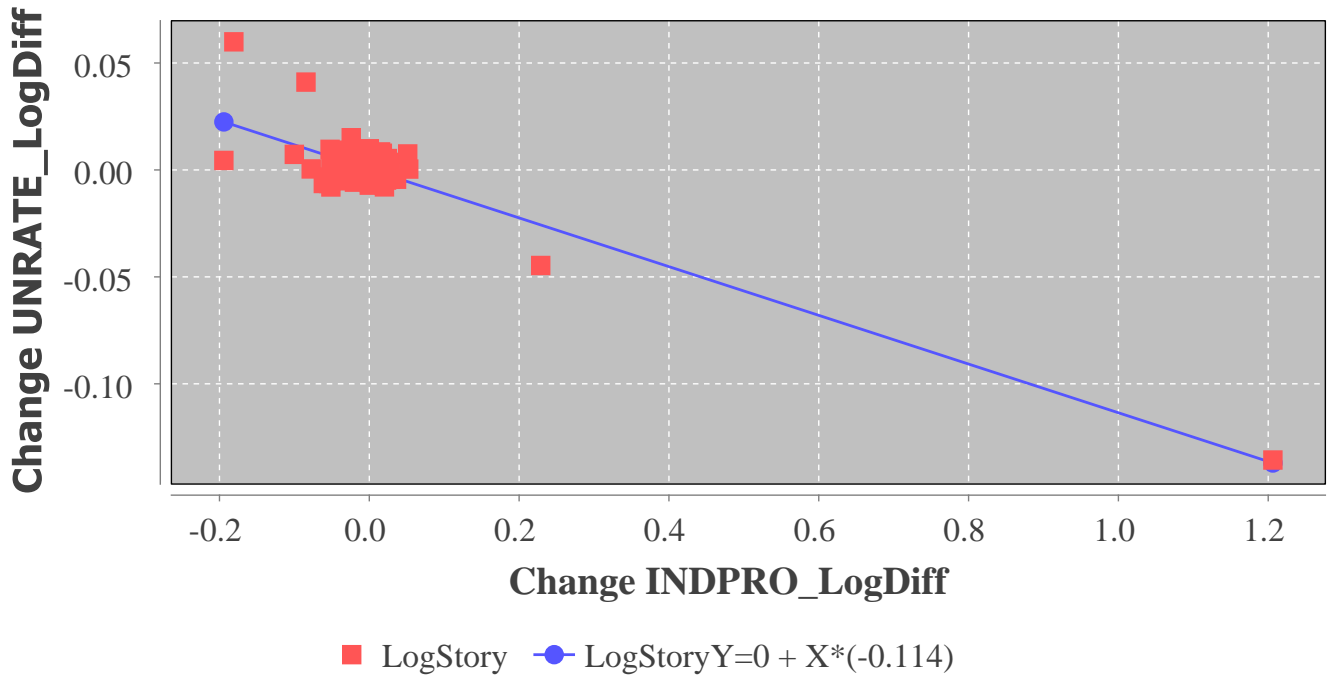
The above regression is obvious. In fact, TCU and INDPRO the are essentially the same measure. The impact coefficient with other economic statistics affect is rather sizable. Let's start with

Unemployment Rate

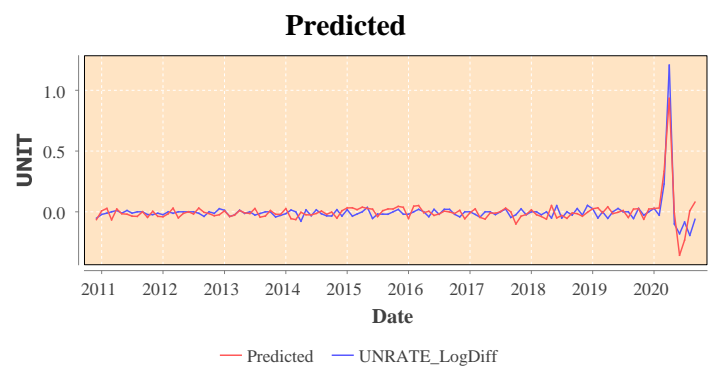
The next two regressions are the socially important employment rates. From the COVID19 variable we can see the pandemic added at least 1.73 percent to the unemployment rate



A first difference analysis, we estimate that a one percent change in Industrial Production: Total Index will result in a -6.601 percent change in Unemployment Rate The 95 percent confidence interval of the elasticity estimate is between -5.905 and -7.297 percent. The log regression suggest a monthly trend of -0.001 percent

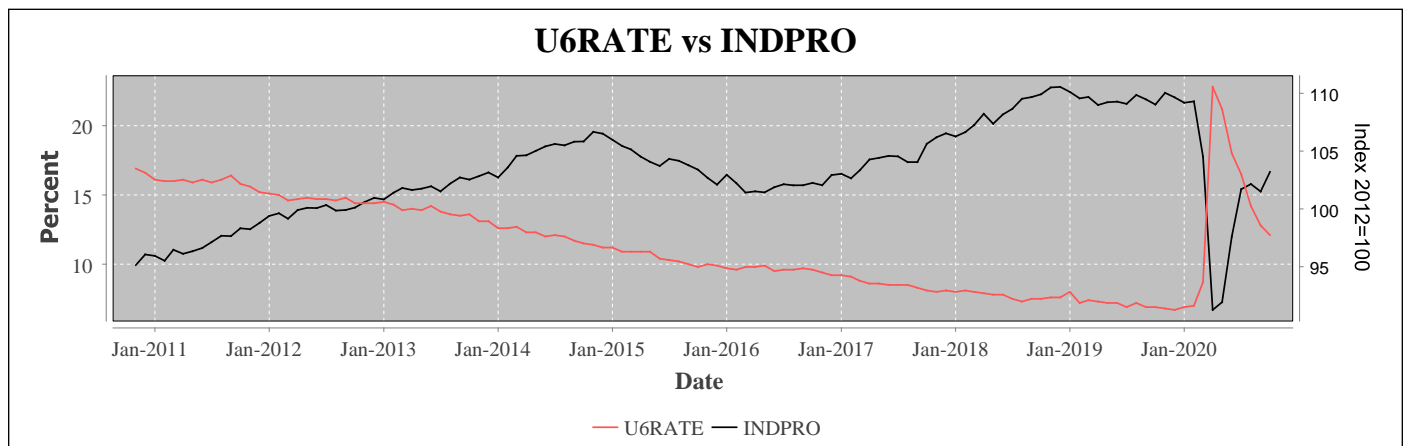


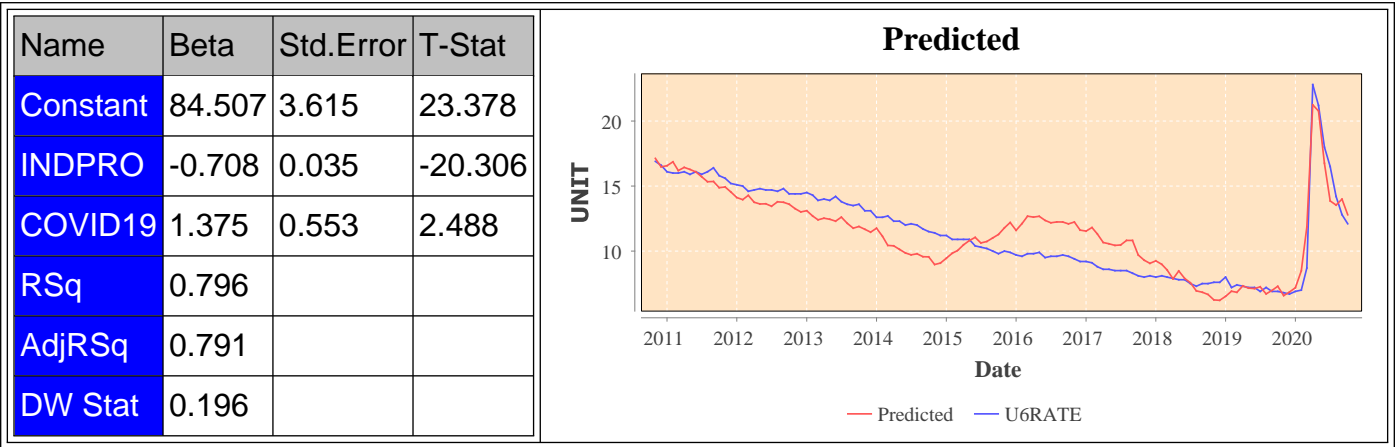
Name	Beta	Std.Error	T-Stat
Constant	-0.001	0.006	-0.152
INDPRO_LogDiff	-6.601	0.348	-18.968
COVID19	0.039	0.021	1.812
RSq	0.77		
AdjRSq	0.764		
DW Stat	2.362		



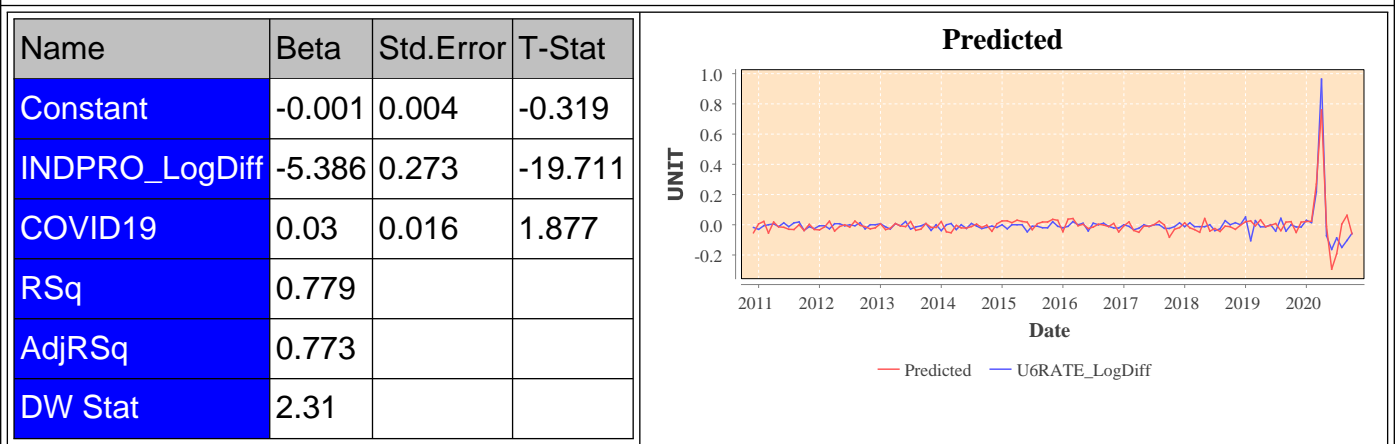
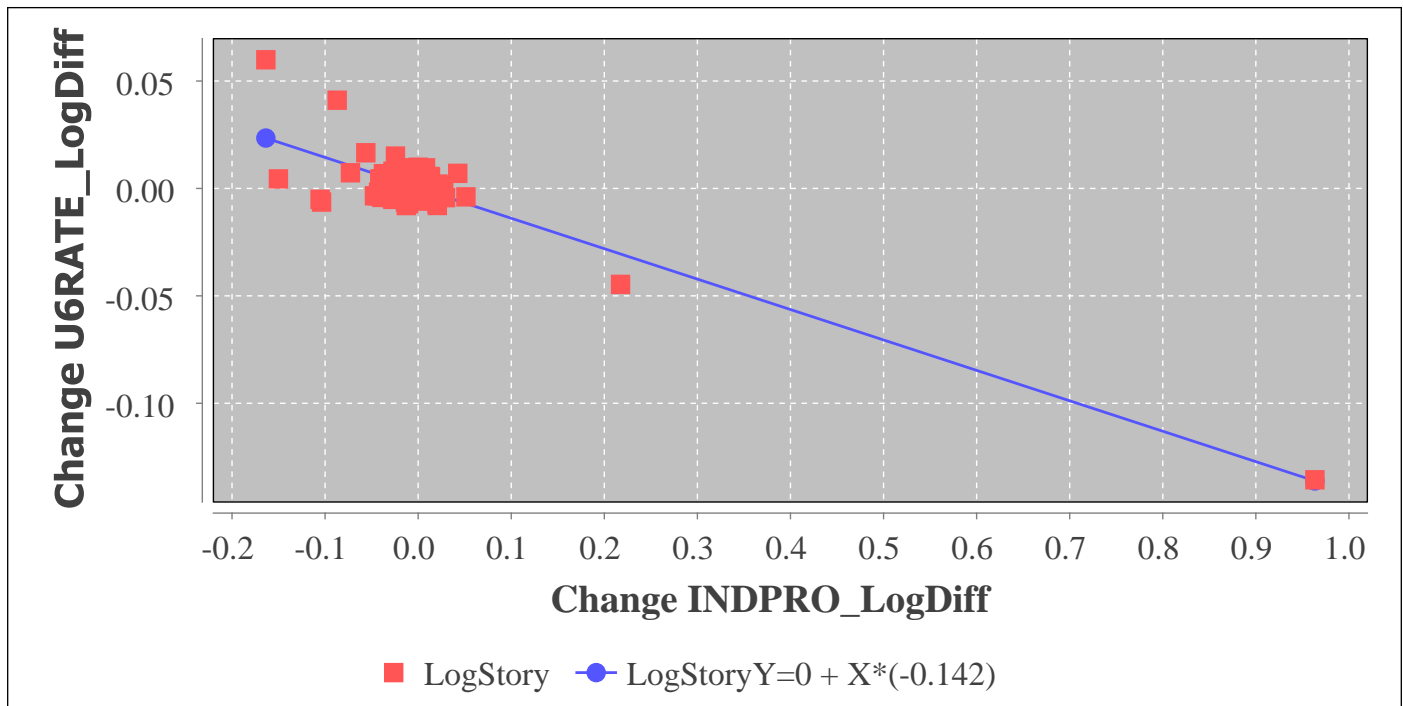
Total Unemployed, Plus All Persons Marginally Attached to the Labor Force, Plus Total Employed Part Time for Economic Reasons, as a Percent of the Civilian Labor Force Plus All Persons Marginally Attached to the Labor Force (U-6)

For those marginally employed, an increase in industrial production is quite helpful. The coefficient of elasticity is only slightly better.





A first difference analysis, we estimate that a one percent change in Industrial Production: Total Index will result in a -5.386 percent change in Total Unemployed, Plus All Persons Marginally Attached to the Labor Force, Plus Total Employed Part Time for Economic Reasons, as a Percent of the Civilian Labor Force Plus All Persons Marginally Attached to the Labor Force (U-6) The 95 percent confidence interval of the elasticity estimate is between -4.839 and -5.932 percent. The log regression suggest a monthly trend of -0.001 percent

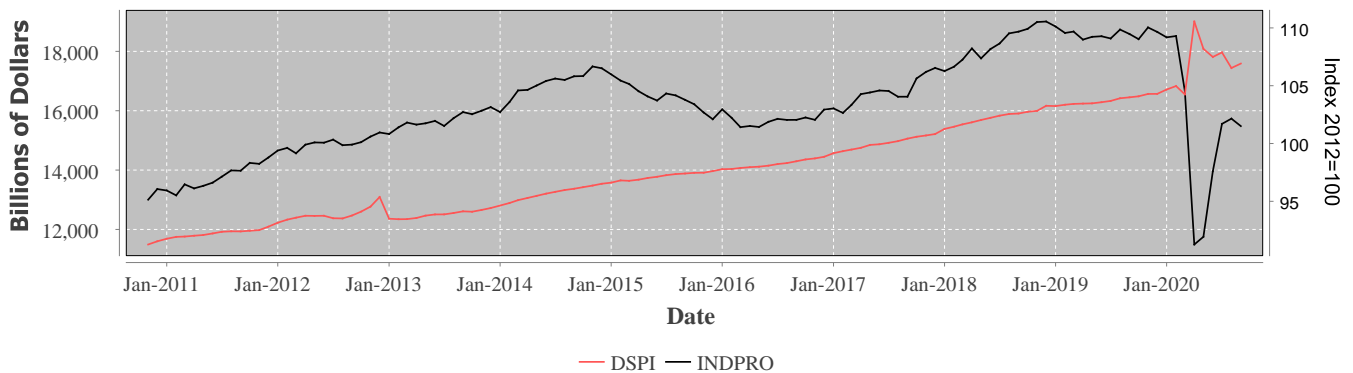


Disposable Personal Income

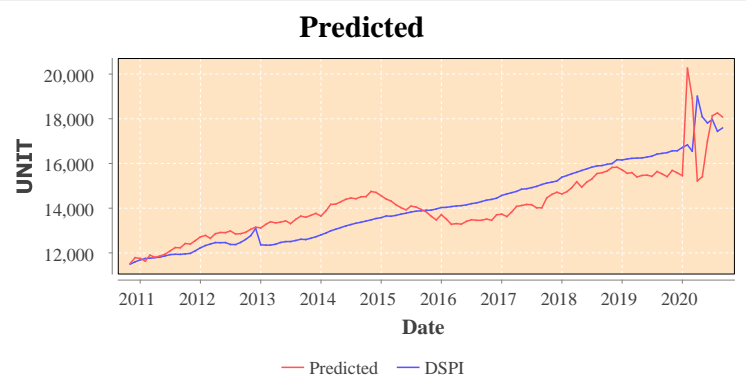
Disposable Personal Income is a real oddity. You would think that we would see a positive

correlation. The sizeable negative effect of the pandemic on production in conjunction with the positive effect of the massive stimulus package skew the figures such that an decrease in production increases disposable income.

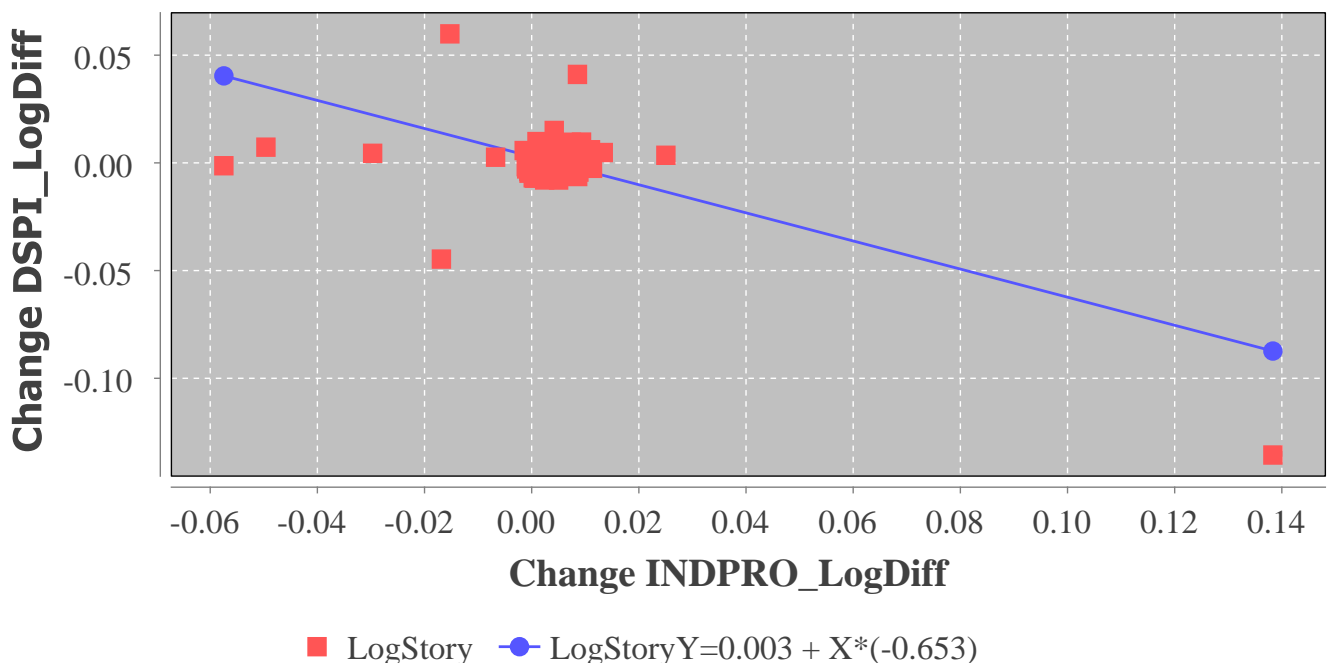
Disposable Personal Income vs Industrial Production: Total Index

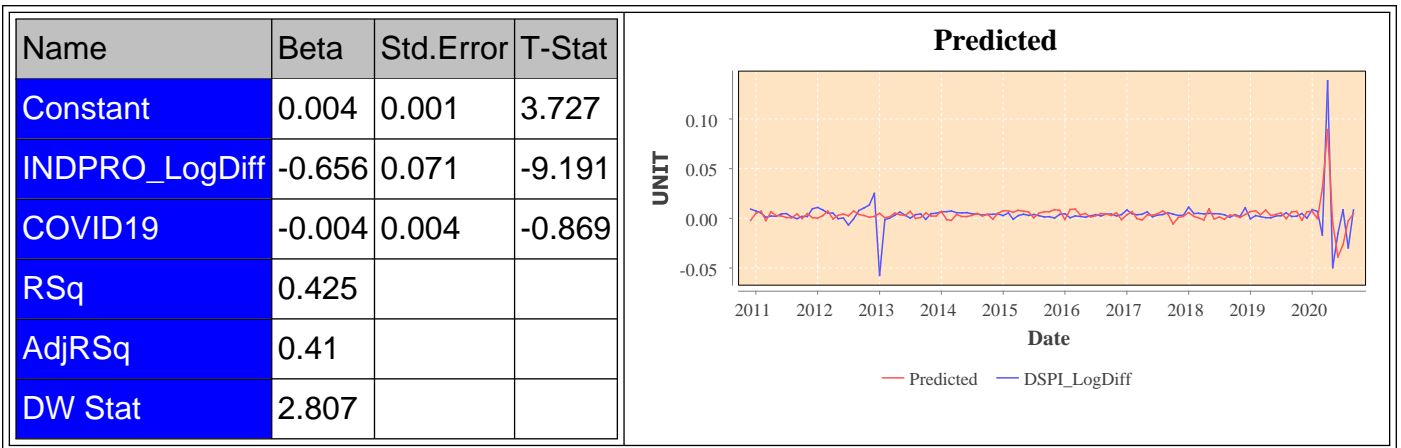


Name	Beta	Std.Error	T-Stat
Constant	-15,051.478	2,150.833	-6.998
INDPRO	279.376	20.751	13.463
COVID19	4,774.183	347.233	13.749
RSq	0.725		
AdjRSq	0.717		
DW Stat	0.701		



A first difference analysis, we estimate that a one percent change in Industrial Production: Total Index will result in a -0.656 percent change in Disposable Personal Income. The 95 percent confidence interval of the elasticity estimate is between -0.513 and -0.798 percent. The log regression suggest a monthly trend of 0.004 percent.

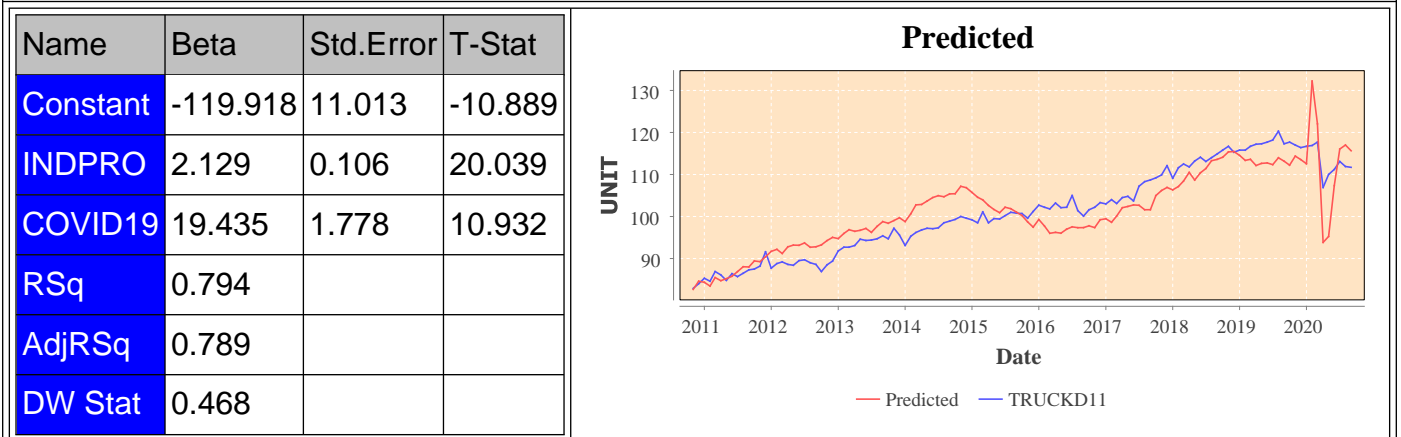
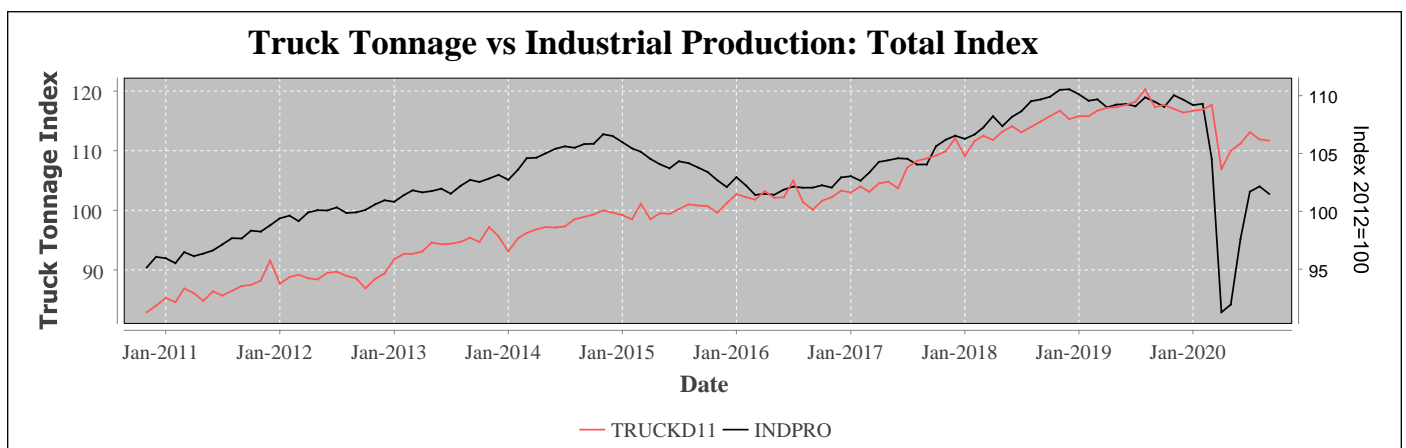




Using dummy variable we see the impact of the stimulus package is \$4,774.183 Billions of Dollars. That about is about equal to the total stimulus package. Even when accounting for COVID19 the elasticity of Disposable to Industrial Production is -0.656. We need to study this phenomena a bit more. My first impression is that because the rate of growth in industrial production is so meager, disposable income is driven by other sources .ie. software.

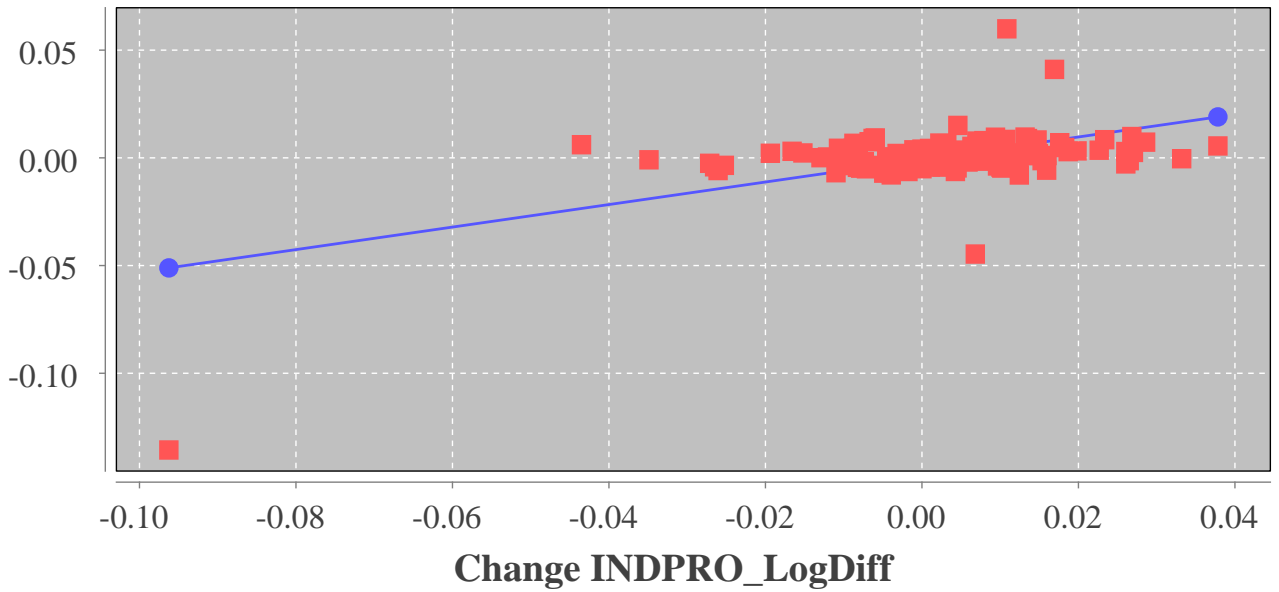
Truck Tonnage

I now allow the reader the review the following regressions with their own interpretations. In each regression I also the COVID19 dummy variable



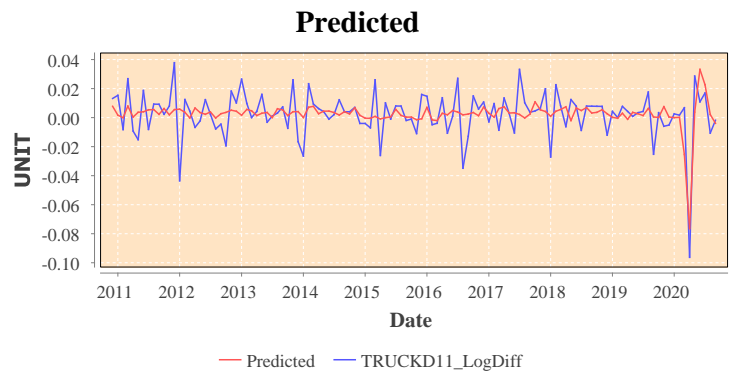
A first difference analysis, we estimate that a one percent change in Industrial Production: Total Index will result in a 0.561 percent change in Truck Tonnage The 95 percent confidence interval of the elasticity estimate is between 0.726 and 0.396 percent. The log regression suggest a monthly trend of 0.002 percent

Change TRUCKD11_LogDif



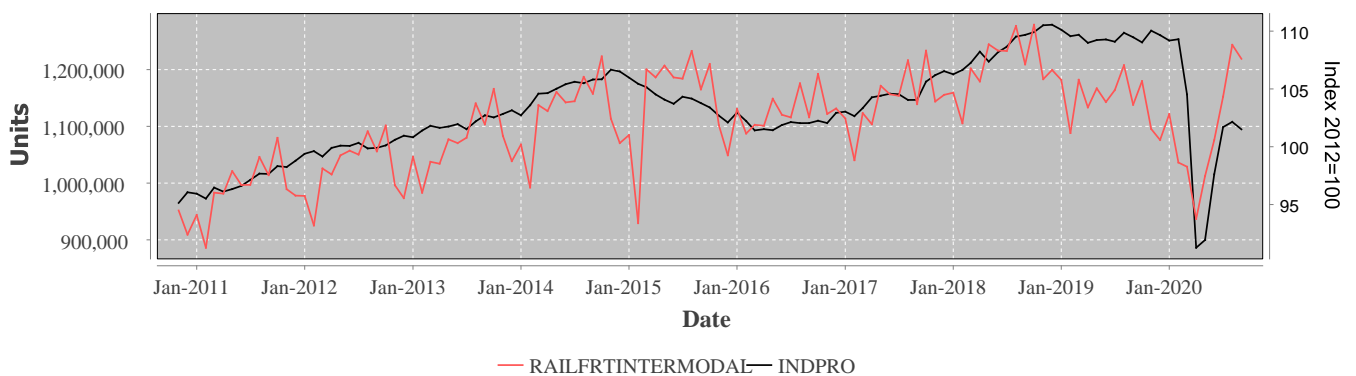
■ LogStory ● LogStory Y=-0.001 + X*(0.523)

Name	Beta	Std.Error	T-Stat
Constant	0.002	0.001	1.834
INDPRO_LogDif	0.561	0.083	6.793
COVID19	-0.003	0.005	-0.543
RSq	0.299		
AdjRSq	0.281		
DW Stat	2.738		

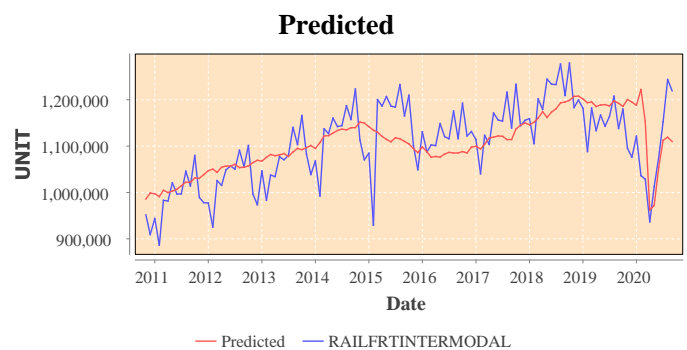


Rail Freight Intermodal Traffic

Rail Freight Intermodal Traffic vs Industrial Production: Total Index

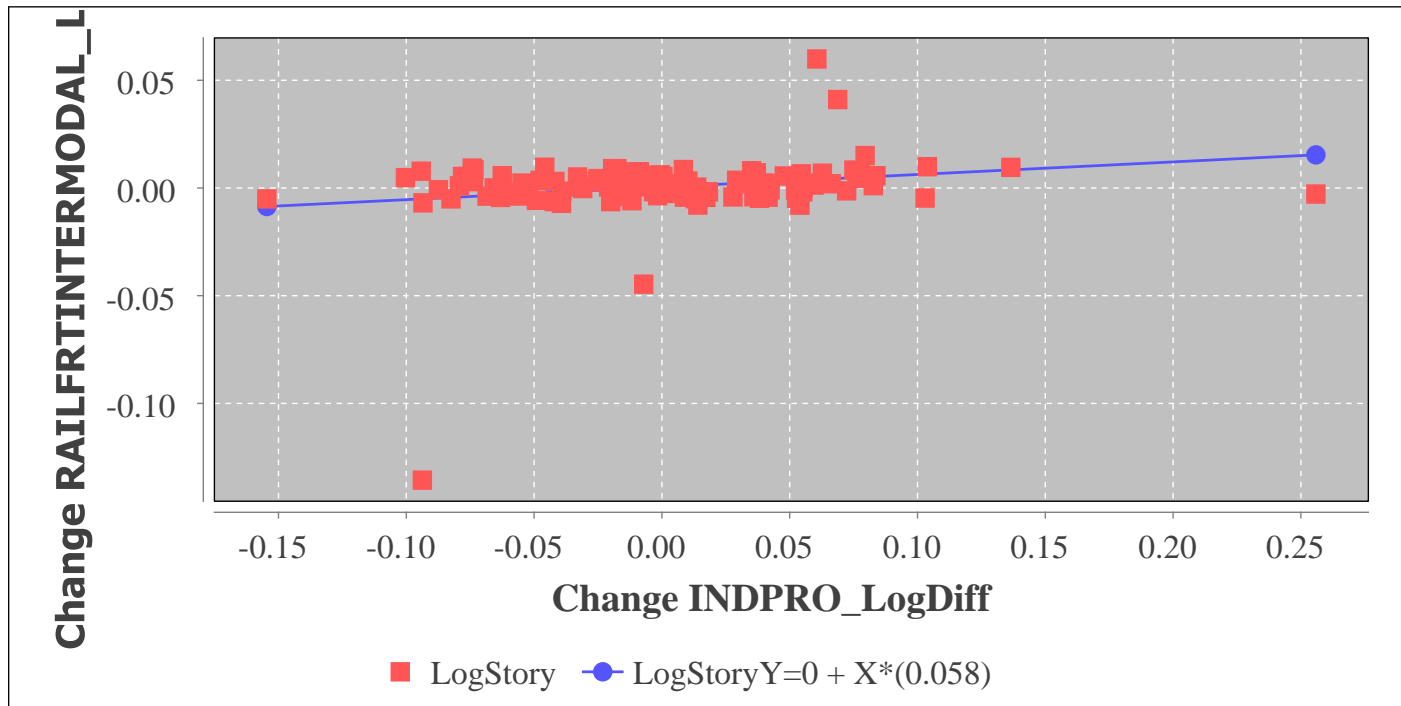


Name	Beta	Std.Error	T-Stat
Constant	-385,781.583	145,957.645	-2.643
INDPRO	14,415.551	1,408.166	10.237
COVID19	32,376.107	23,563.553	1.374
RSq	0.476		
AdjRSq	0.463		

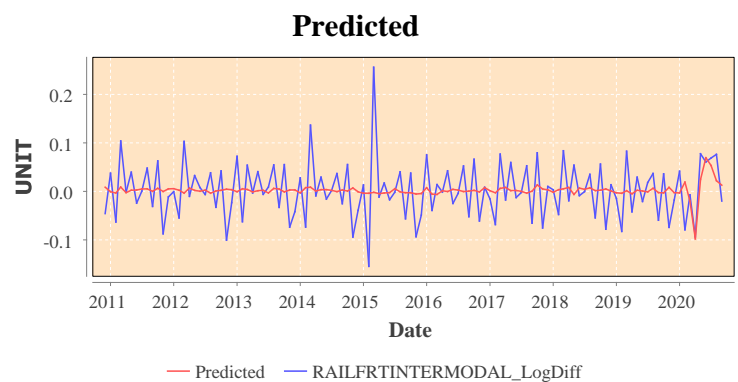


Name	Beta	Std.Error	T-Stat
DW Stat	1.004		

A first difference analysis, we estimate that a one percent change in Industrial Production: Total Index will result in a 0.855 percent change in Rail Freight Intermodal Traffic. The 95 percent confidence interval of the elasticity estimate is between 1.54 and 0.171 percent. The log regression suggest a monthly trend of 0 percent

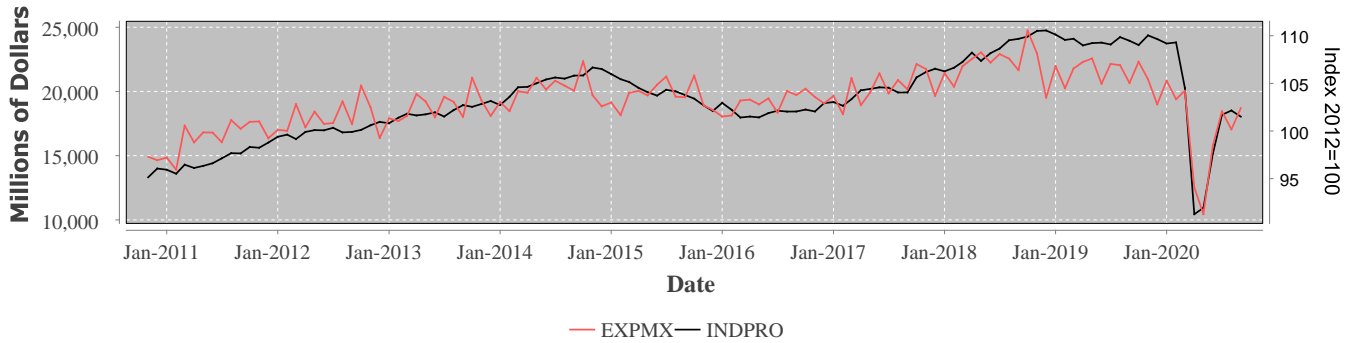


Name	Beta	Std.Error	T-Stat
Constant	0	0.005	0.078
INDPRO_LogDiff	0.855	0.342	2.5
COVID19	0.018	0.021	0.842
RSq	0.053		
AdjRSq	0.028		
DW Stat	3.045		

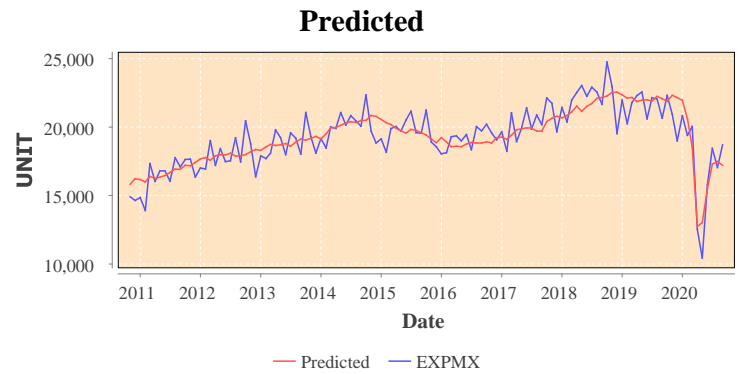


U.S. Exports of Goods by F.A.S. Basis to Mexico

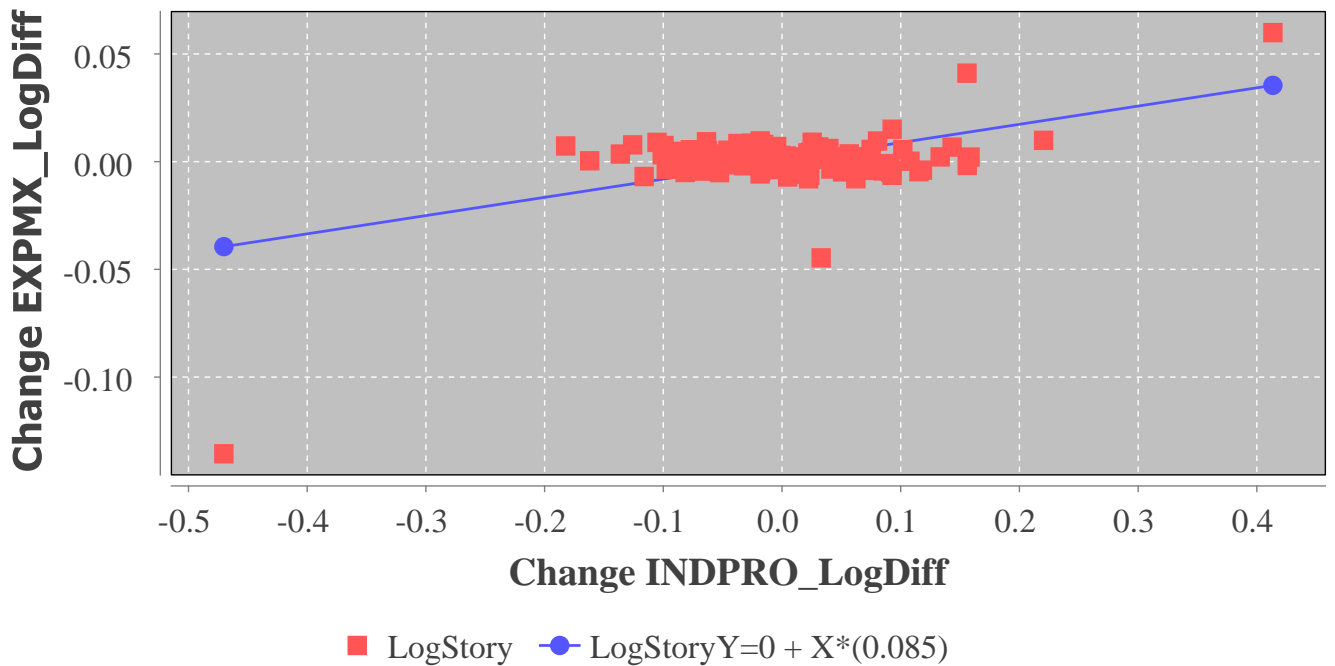
U.S. Exports of Goods by F.A.S. Basis to Mexico vs Industrial Production: Total Index

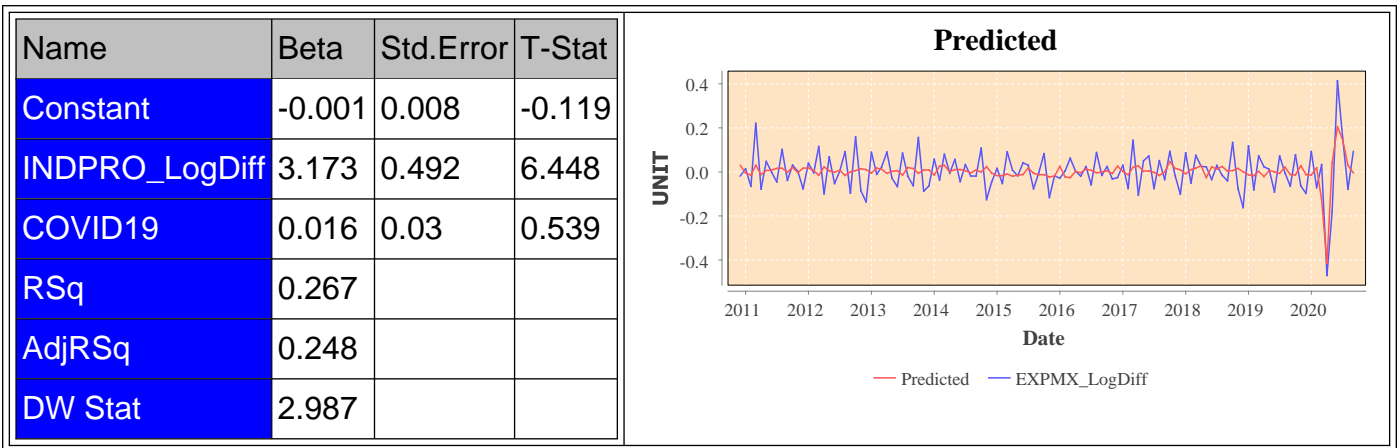


Name	Beta	Std.Error	T-Stat
Constant	-25,679.384	2,615.348	-9.819
INDPRO	436.231	25.232	17.289
COVID19	-1,392.638	422.225	-3.298
RSq	0.751		
AdjRSq	0.745		
DW Stat	1.77		

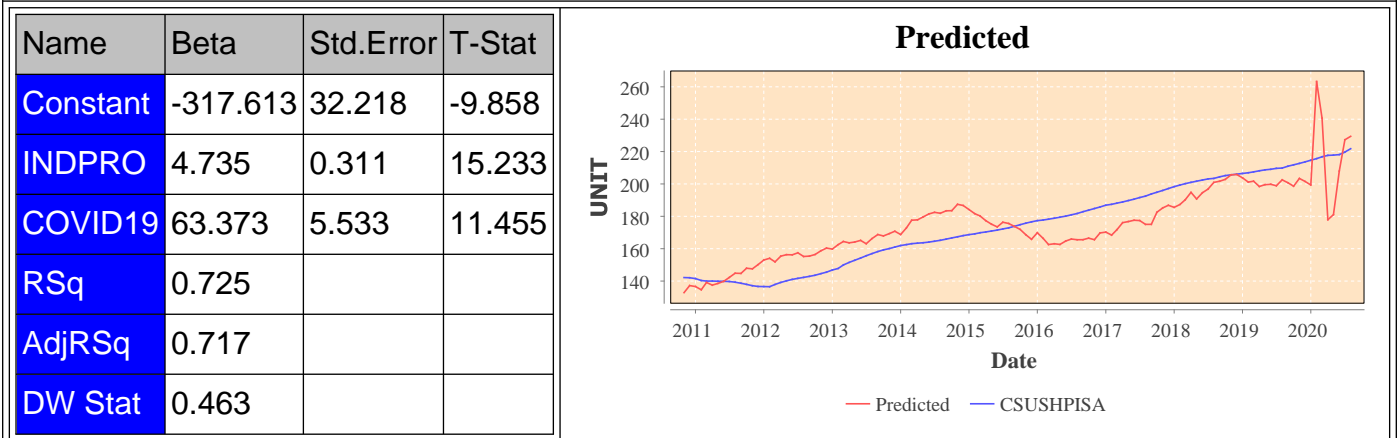
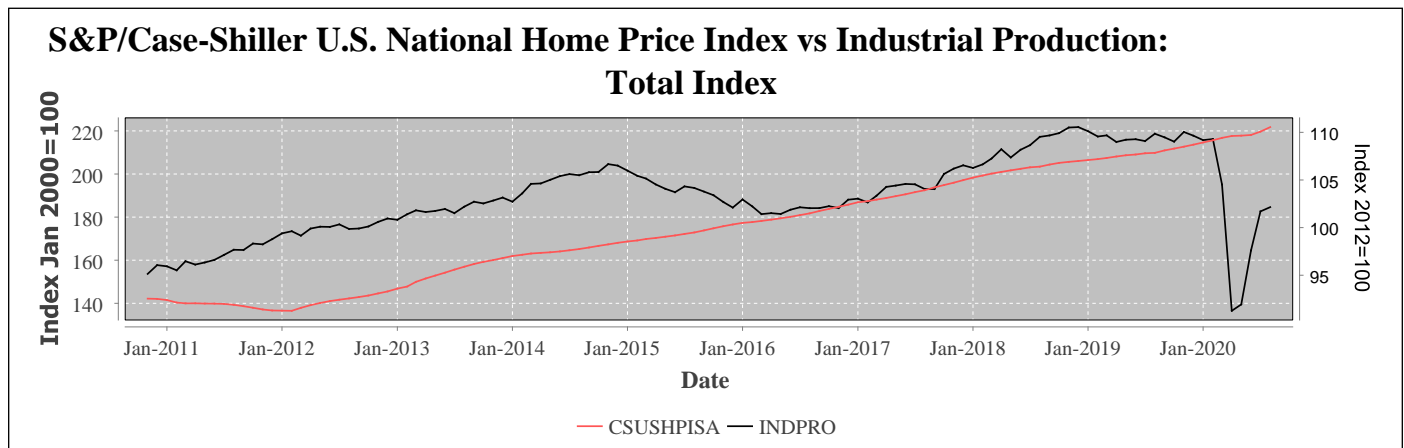


A first difference analysis, we estimate that a one percent change in Industrial Production: Total Index will result in a 3.173 percent change in U.S. Exports of Goods by F.A.S. Basis to Mexico. The 95 percent confidence interval of the elasticity estimate is between 4.157 and 2.189 percent. The log regression suggest a monthly trend of -0.001 percent.



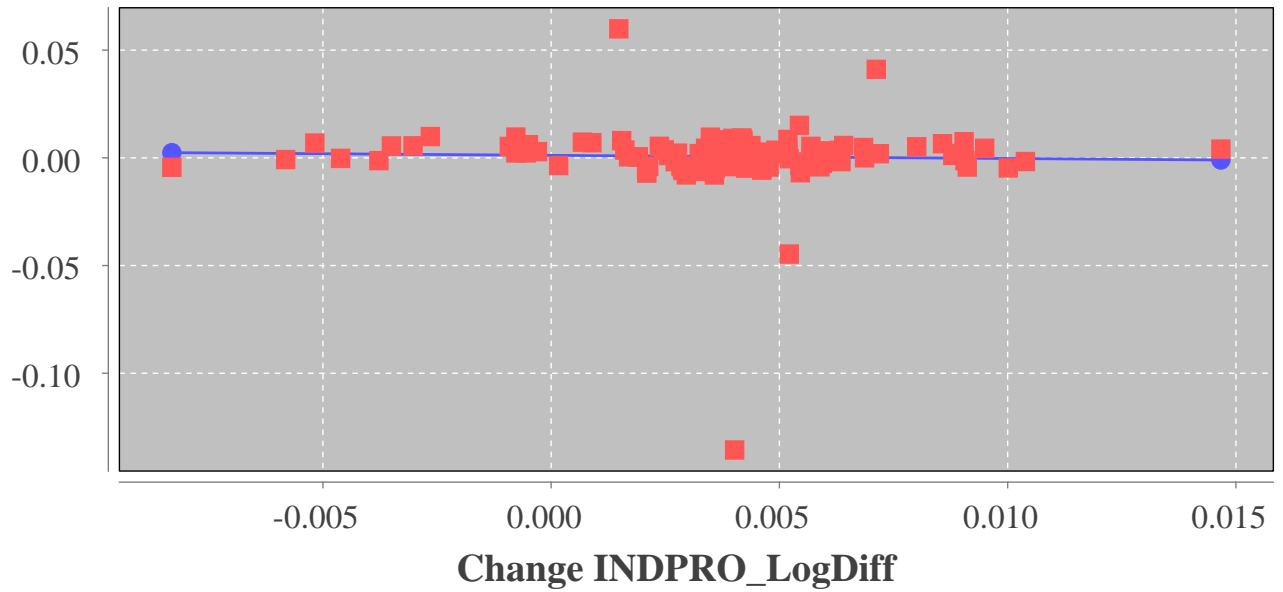


S&P/Case-Shiller U.S. National Home Price Index



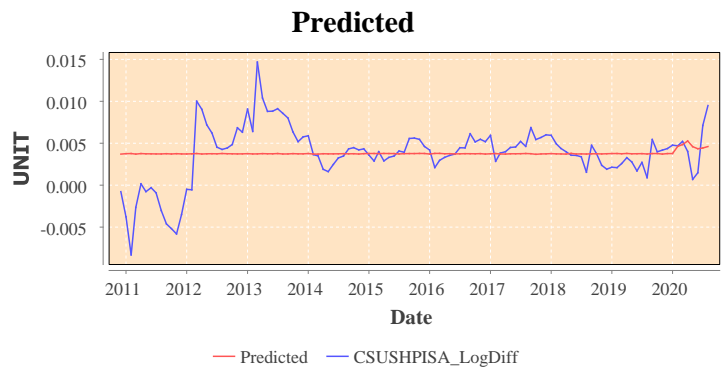
A first difference analysis, we estimate that a one percent change in Industrial Production: Total Index will result in a -0.005 percent change in S&P/Case-Shiller U.S. National Home Price Index. The 95 percent confidence interval of the elasticity estimate is between 0.036 and -0.046 percent. The log regression suggest a monthly trend of 0.004 percent.

Change CSUSHPISA_LogDif



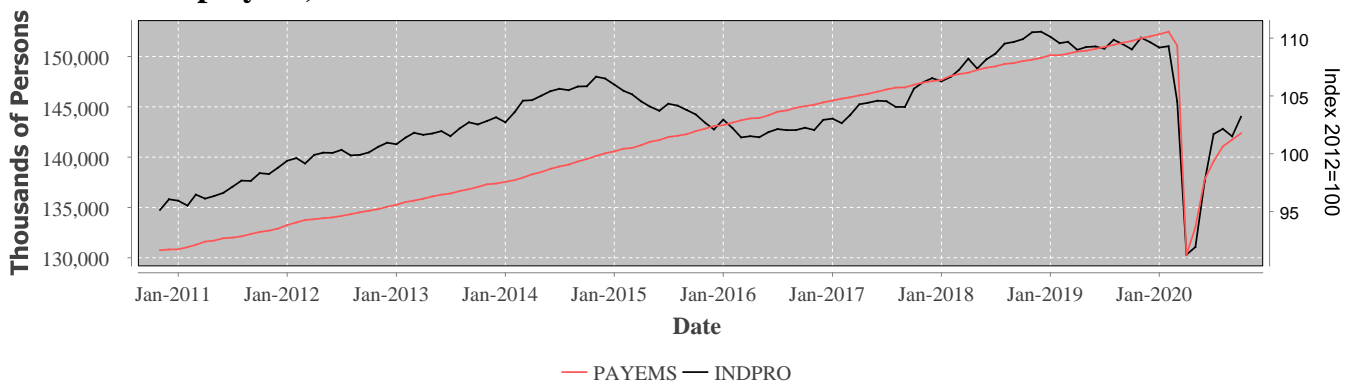
■ LogStory ● LogStory Y=0.001 + X*(-0.148)

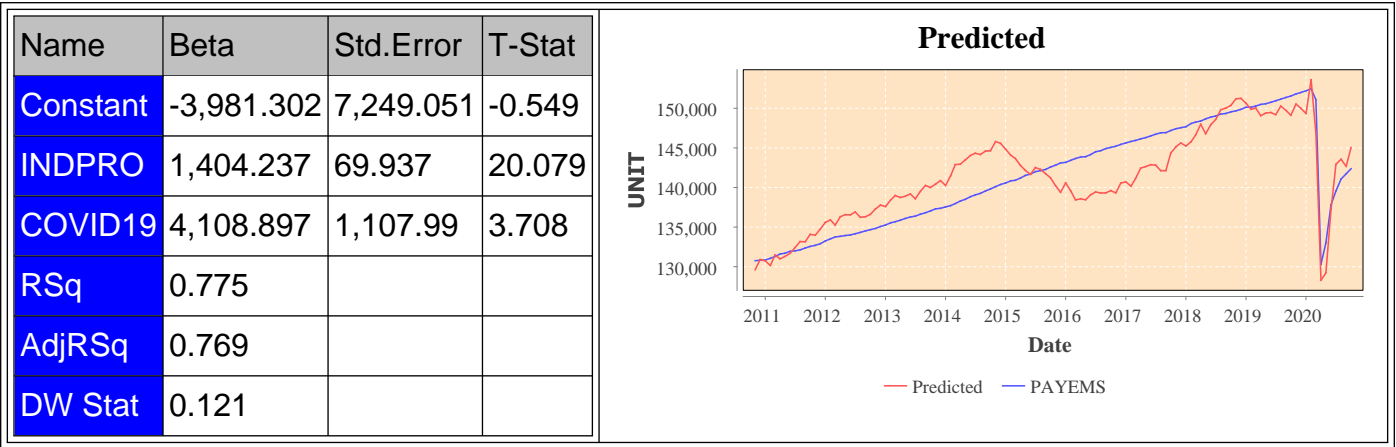
Name	Beta	Std.Error	T-Stat
Constant	0.004	0	11.507
INDPRO_LogDiff	-0.005	0.021	-0.232
COVID19	0.001	0.001	0.651
RSq	0.005		
AdjRSq	-0.022		
DW Stat	0.354		



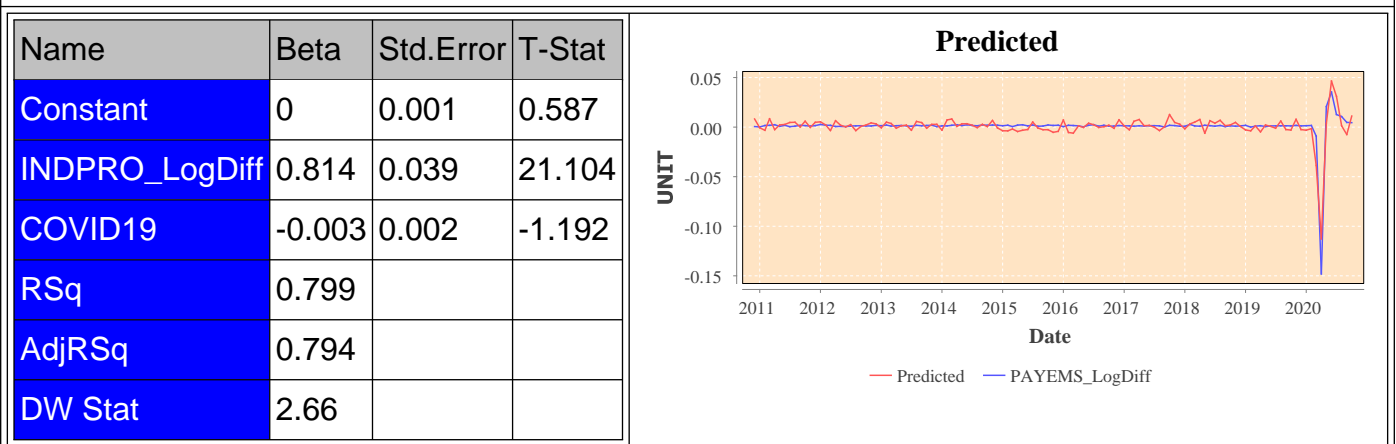
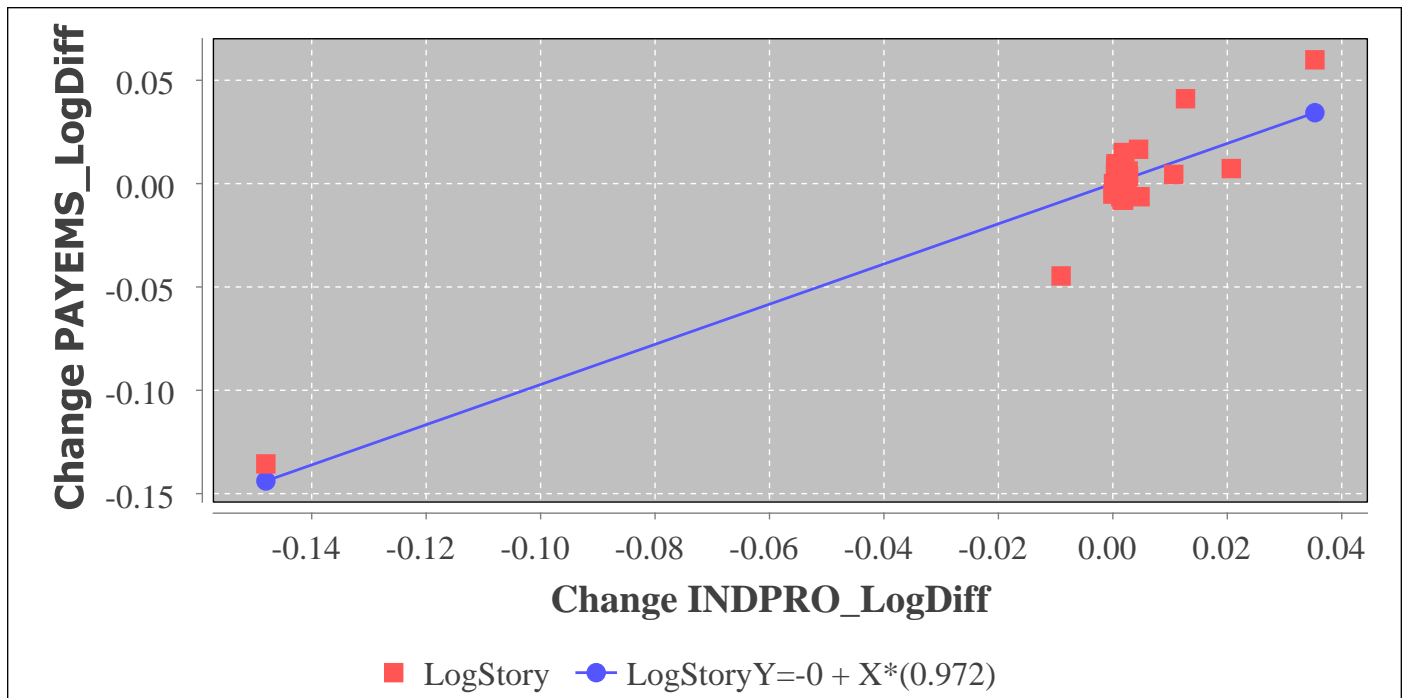
All Employees, Total Nonfarm

All Employees, Total Nonfarm vs Industrial Production: Total Index



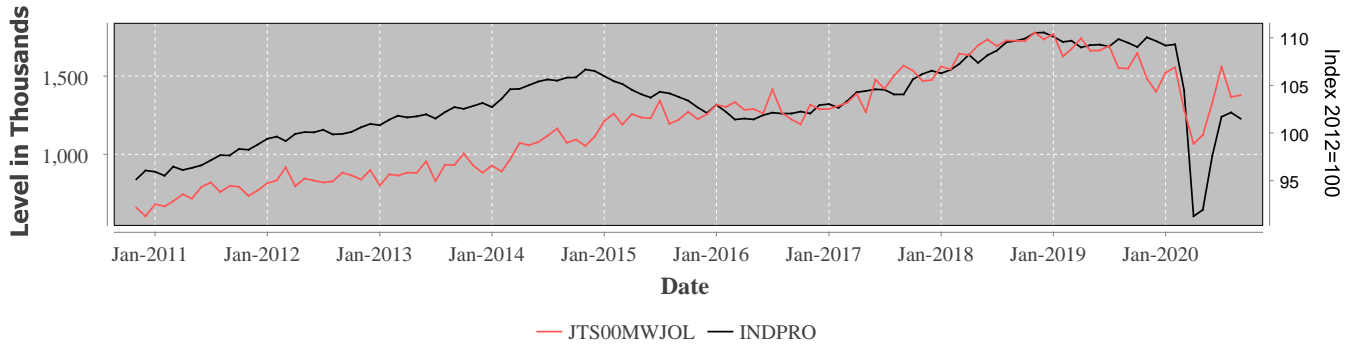


A first difference analysis, we estimate that a one percent change in Industrial Production: Total Index will result in a 0.814 percent change in All Employees, Total Nonfarm. The 95 percent confidence interval of the elasticity estimate is between 0.891 and 0.736 percent. The log regression suggest a monthly trend of 0 percent

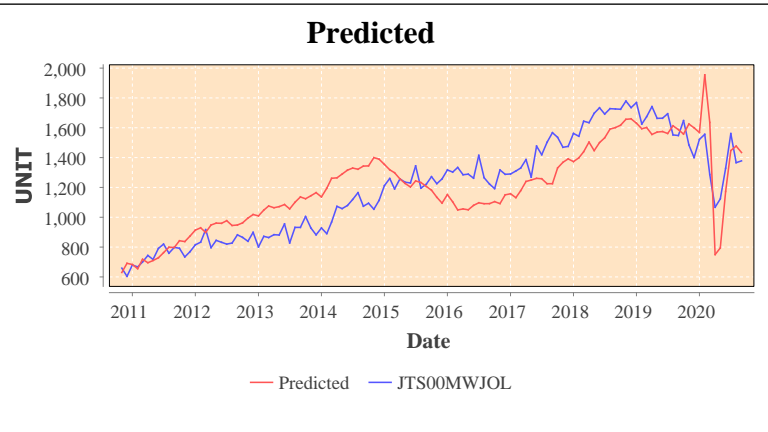


Job Openings: Total Nonfarm in Midwest Census Region

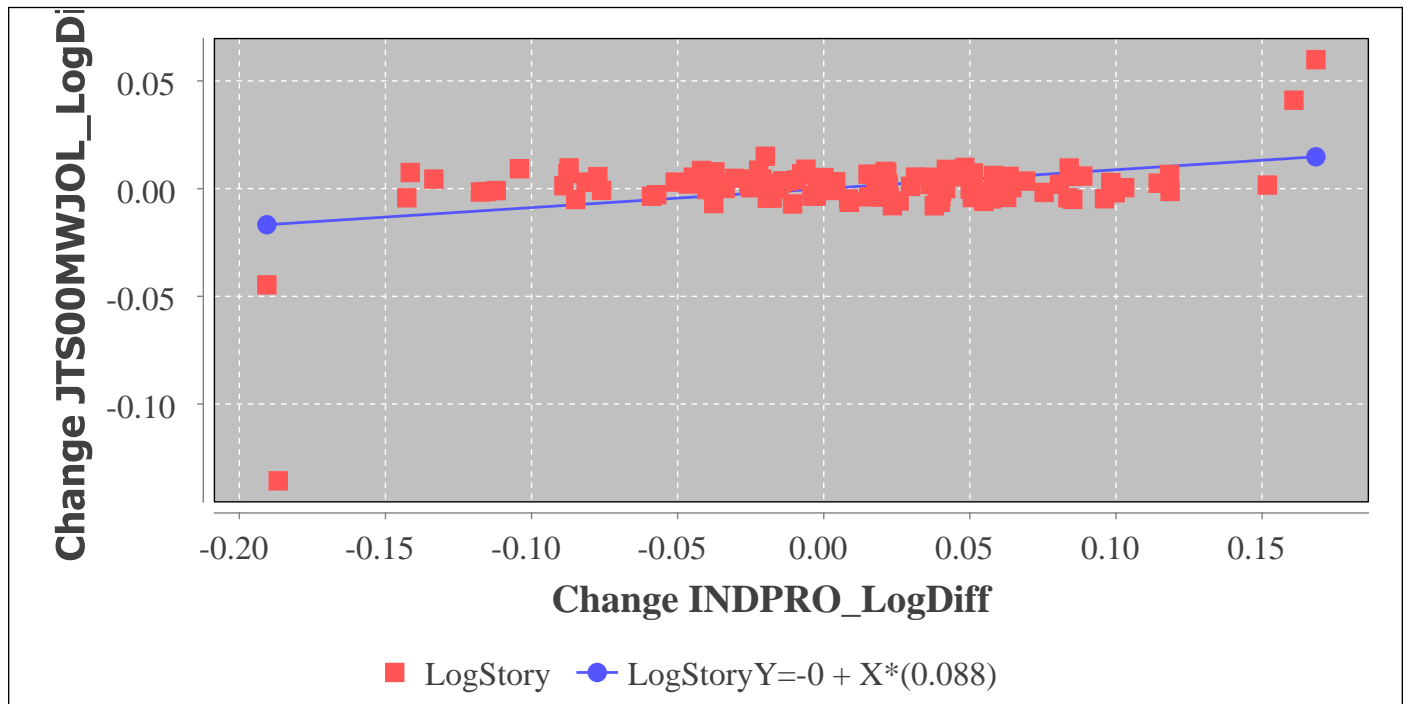
Job Openings: Total Nonfarm in Midwest Census Region vs Industrial Production: Total Index

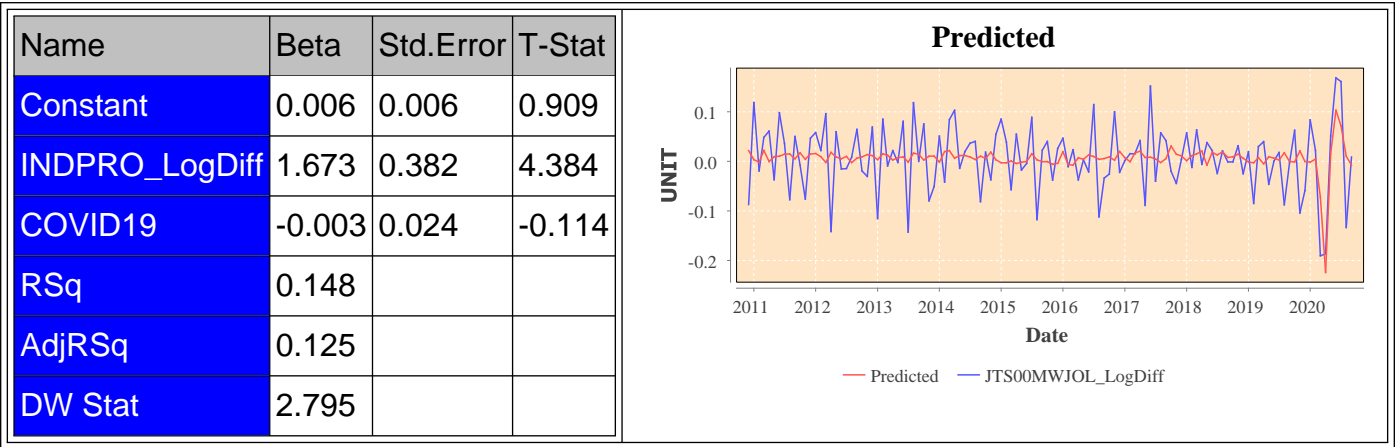


Name	Beta	Std.Error	T-Stat
Constant	-5,728.442	403.664	-14.191
INDPRO	66.829	3.894	17.16
COVID19	378.933	65.168	5.815
RSq	0.721		
AdjRSq	0.713		
DW Stat	0.387		

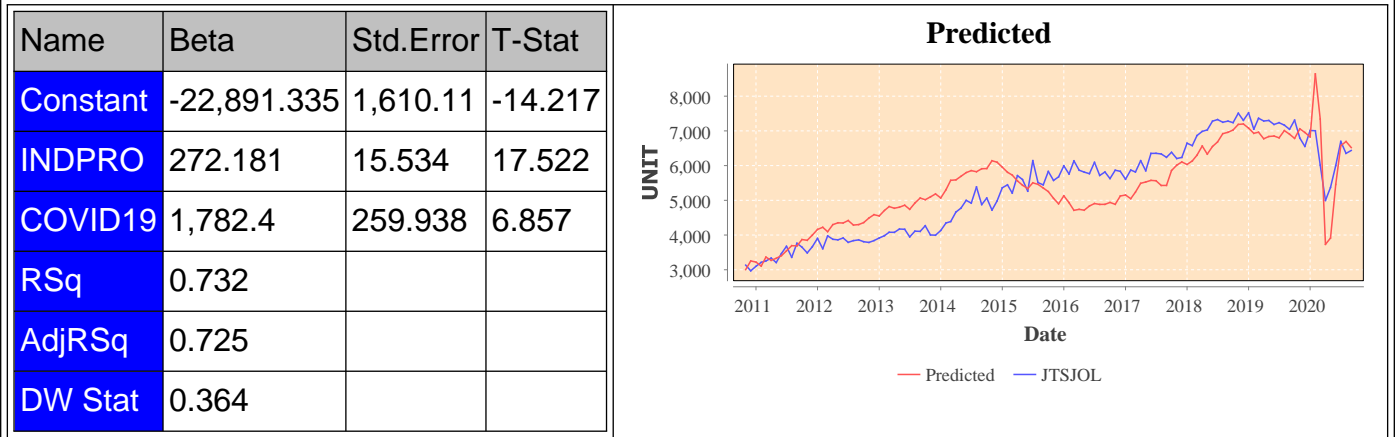
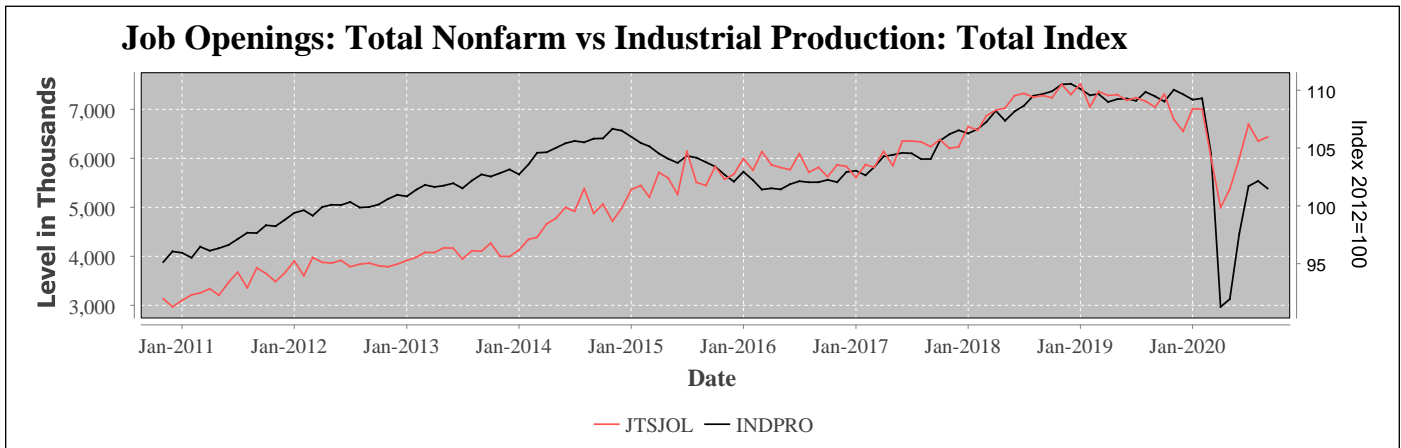


A first difference analysis, we estimate that a one percent change in Industrial Production: Total Index will result in a 1.673 percent change in Job Openings: Total Nonfarm in Midwest Census Region. The 95 percent confidence interval of the elasticity estimate is between 2.437 and 0.91 percent. The log regression suggest a monthly trend of 0.006 percent.

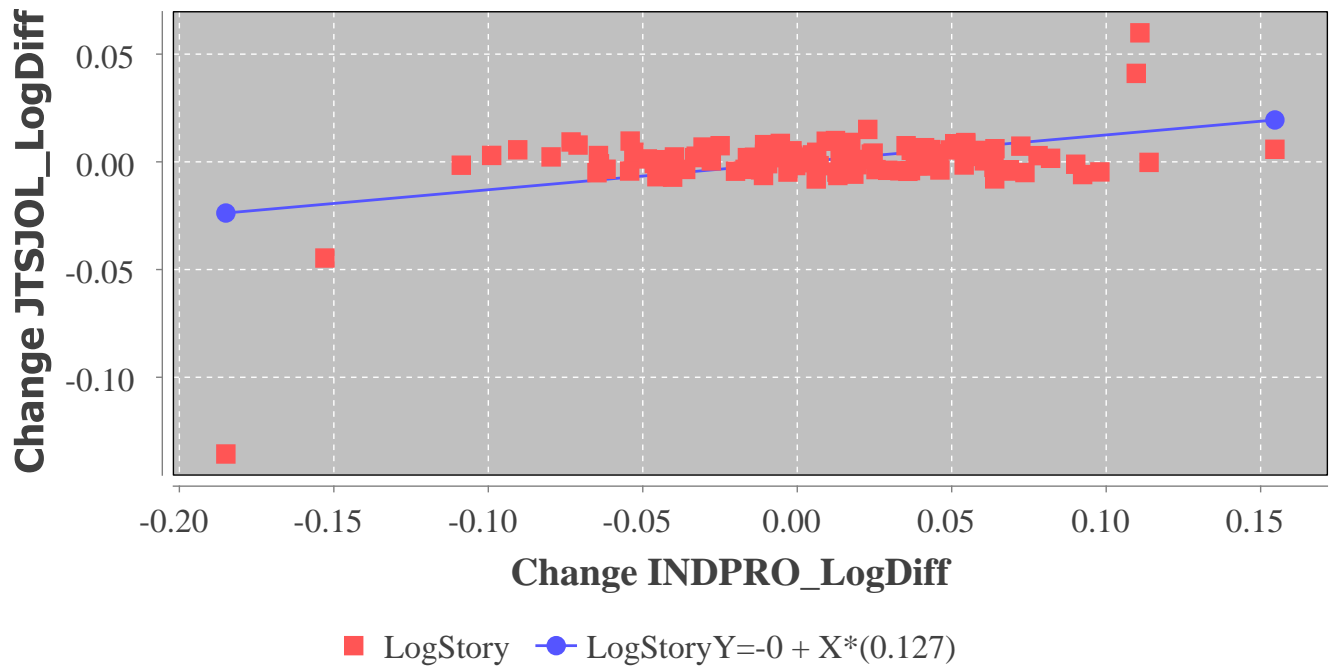




Job Openings: Total Nonfarm



A first difference analysis, we estimate that a one percent change in Industrial Production: Total Index will result in a 1.494 percent change in Job Openings: Total Nonfarm. The 95 percent confidence interval of the elasticity estimate is between 2.079 and 0.91 percent. The log regression suggests a monthly trend of 0.005 percent.



Name	Beta	Std.Error	T-Stat
Constant	0.005	0.005	1.174
INDPRO_LogDiff	1.494	0.292	5.115
COVID19	-0.003	0.018	-0.141
RSq	0.191		
AdjRSq	0.17		
DW Stat	2.94		

