NERDING OUT

INDUSTRIAL POLICY APPENDIX & FURTHER READING

Data

Initially intended to gather data on US federal spending, particularly on industrial policies, to calculate whether the spending revealed a comparative advantage in those specific industries or not. In order not to affect the validity of our revealed comparative advantage (RCA) calculation and be able to analyze trends within a sector, we looked at data for the past 3-4 decades.

The US has not had such policies for decades, but also industrial policies have shifted since the 1980s, so the specific data was unavailable. The next best alternative data that is publicly available was US tax credit by industry as it essentially reflects federal spending. These tax credits are rebate incentives given to specific industries by the federal government as opposed to being collected as revenue.

The USICA 2021 industrial policy is also a federal spending bill that will allow the US to finance $50 billion to boost semiconductor production and more. Both industrial policies and tax credits within the same sector ideally capture government spending.

Specifically looking at the tax credit given to the manufacturing sector, we were able to numerically identify how much the federal government is spending to protect or incentivize the sector. We gathered the primary data from the Tax Policy Center ranging from the years 2000 to 2013. We focused on this timeframe because after the year 2013 the data available becomes more aggregate (sector based). The data did not include the total income tax credit, so we calculated the change in total income tax before and after credit. In order to calculate RCA, we also gathered US and world trade data on export commodities from the UN Comtrade database from 2000 to 2013.

We went through a series of data conversion to make sure the export commodity trade classification for both the US and the world matches our tax credit data before running any models. The tax credit data that was gathered from the Tax Policy Center used the North American Industry Classification System (NAICS 31-33) for manufacturing codes. Whereas the US and world export commodity trade are under the Harmonized System (HS) codes. The final converted list (NAICS 31-33) consists of 20 industries within the manufacturing sector. We then calculated US's RCA in the manufacturing sector using the following:

$$RCA_{Ai} = \frac{\frac{X_{Ai}}{\sum_{j \epsilon P} X_{Aj}}}{\frac{X_{wi}}{\sum_{j \epsilon P} X_{wj}}} \geq 1$$

Where:

- P is the set of all products (with i∈P),
- X_{Ai} is the US's exports of product i,
- X_{wi} is the worlds' exports of product i, 15
- $\sum_{j \epsilon P} X_{Aj}$ is the US's total exports (of all products j in P), and
- $\sum_{j \epsilon P} X_{wj}$ is the world's total exports (of all products j in P)
- RCA ≥ 1 reveals a comparative advantage of products. The higher the value, the more advantage there is.

Methodology

To test the relationship between our independent variable, which is US tax credit in the manufacturing sector, and dependent variable, which is the revealed comparative advantage in the same sector, we used regression models. We ran regression over these variables by creating a panel data which comprises tax credits given to the industries in the manufacturing sector from 2000 to

2013 and calculated RCA. However, we do acknowledge that some industries within the manufacturing sector inherently have a comparative advantage than the rest of the world while other industries do not. We also understand that there is an omitted variable bias that leaves out the year (time) and industry variables when calculating the regression of just tax credits and RCA. Hence, to accurately capture the relationship between our dependent and independent variables, we have included year (time) and industry fixed effects and run the following four different models:

Model 1= Tax credit + RCA
Model 2= Tax credit + RCA + year (time) fixed effects
Model 3= Tax credit + RCA + industry fixed effects
Model 4= Tax credit + RCA + year & industry fixed effects

Results

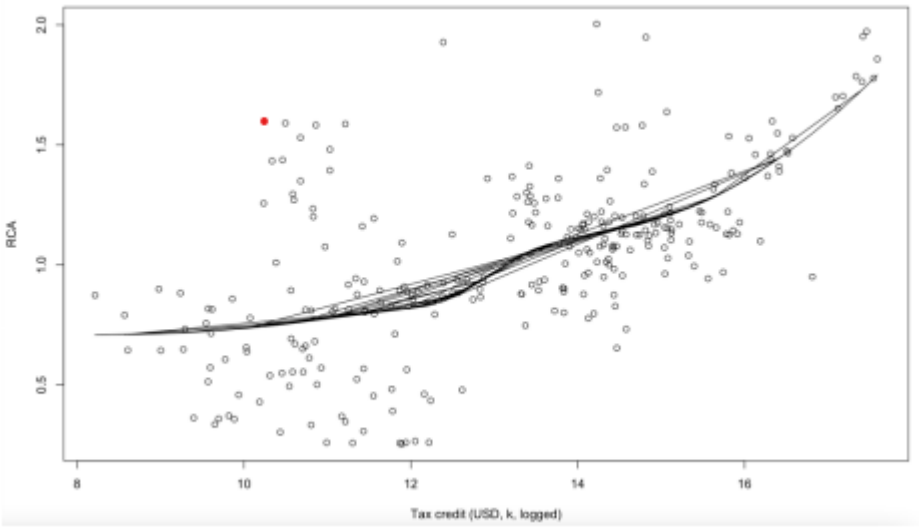
Table 1: Regression Analysis

	Dependent variable:			
	US_RCA			
	(1)	(2)	(3)	(4)
tax_credit_ln	0.106***	0.108***	0.003	0.016
	(0.008)	(0.008)	(0.019)	(0.021)
Constant	-0.370***	-0.347***	1.012***	0.867***
	(0.105)	(0.121)	(0.282)	(0.302)
Observations	280	280	280	280
R2	0.395	0.417	0.769	0.783
Adjusted R2	0.393	0.387	0.751	0.754
Residual Std. Error	0.281 (df = 278)	0.283 (df = 265)	0.180 (df = 259)	0.179 (df = 246)
F Statistic	181.432*** (df = 1; 278)	13.558*** (df = 14; 265)	43.065*** (df = 20; 259)	26.845*** (df = 33; 246)
Note:				*p<0.1; **p<0.05; ***p<0.01

With 280 observations (20 industries across 14-year timespan) for all 4 models, Table 1 shows the results for each regression model. We present our analysis for each model as follows. Calculating the regression of just our dependent and independent variables, Model 1 reveals that there is a positive and significant correlation between tax credit and RCA. We see this relationship

clearly in the figure below where there are values above 1 revealing a comparative advantage for the US.

Figure 1: Linear Regression



However, looking at our adjusted R-squared only about 40 percent of our variation in the output variables are explained by our input variables. Controlling for time reveals a similar output where the change is not that significant. Conversely, when controlling for industries we see that there is no significant correlation between tax credits and RCA. The model reveals that industries that have inherent comparative advantages for producing in the US do not show an increase in RCA. These industries already have an advantage with or without the additional tax credit they receive. Additional tax credit is essentially a disadvantage to the US as it does not increase RCA. We are also confident with our model fit as our adjusted R-squared almost doubles to 75 percent. Finally, controlling for both year (time) and industry, we arrive at a similar outcome with no significant correlation. Looking at specific industries, reveals RCA values are (all below one) when controlled for both time and industry fixed effects.

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