

# STEP BY STEP GUIDE FOR READING IN DATA TO CALIBRATE DEPRECIATION PARAMETERS

Feel free to improve, but here's one algorithm...

## 1. Create crosswalks for industry codes:

- (a) From the BEA detailed fixed asset tables industry code worksheet, create a data frame (or dictionary object) like Table 1:

Table 1:

<u>naics</u>	<u>bea_ind_code</u>
3-digit naics code	corresponding bea code
...	...

- (b) From the SOI Corporate Source Book metadata page with industry classifications, create a data frame (or dictionary object) like Table 2:

Table 2:

<u>naics</u>	<u>soi_ind_code</u>	<u>soi_ind_name</u>
naics code- various levels	corresponding soi code	string var for soi name
...	...	...

- (c) Create some kind of structure (maybe a “tree”, as you described) to relate parent and sibling NAICS codes so one can easily aggregate/disaggregate industry categories when creating future tables. With this, you might just need a list of NAICS codes that correspond to each of the 24 industry categories we will want to use (though the tree might be better).

## 2. Read in the IRS c corporation data

- (a) When read in, you'll want to merge in NAICS codes from 1b.
- (b) Use the aggregation rules from 1c to aggregate/disaggregate to the 24 NAICS categories we'll use.
- (c) A data frame like Table 3 should be created:

Table 3:

<u>naics</u>	<u>fa</u>	<u>inv</u>	<u>land</u>
1	$FA_{1,corp}^{\tau}$	$INV_{1,corp}^{\tau}$	$LAND_{1,corp}^{\tau}$
2	$FA_{2,corp}^{\tau}$	$INV_{2,corp}^{\tau}$	$LAND_{2,corp}^{\tau}$
...	...	...	...
24	$FA_{24,corp}^{\tau}$	$INV_{24,corp}^{\tau}$	$LAND_{24,corp}^{\tau}$

## 3. Follow Step 2 for the s corporation, partnership, sole proprietorship, and farm proprietorship data

- Note that some of these returns have some special instructions that I'm not including here.
- You'll end this step with data frames for each tax entity type that have the same format as Table 3.

## 4. Use the data frames from Step 2 and 3 together to create a table like Table 4:

5. From the data from created in Step 4, create another data frame with the ratio of assets in each industry attributed to the corporate and noncorporate tax treatment. The data frame will look like Table 5:

Table 4:

<u>naics</u>	<u>fa_corp</u>	<u>fa_noncorp</u>	<u>inv_corp</u>	<u>inv_noncorp</u>	<u>land_corp</u>	<u>land_noncorp</u>
1	$FA_{1,c}^\tau$	$FA_{1,nc}^\tau$	$INV_{1,c}^\tau$	$INC_{1,nc}^\tau$	$LAND_{1,c}^\tau$	$LAND_{1,nc}^\tau$
2	$FA_{2,c}^\tau$	$FA_{2,nc}^\tau$	$INV_{2,c}^\tau$	$INV_{2,nc}^\tau$	$LAND_{2,c}^\tau$	$LAND_{2,nc}^\tau$
...	...	...	...	...	...	...
24	$FA_{24,c}^\tau$	$FA_{24,nc}^\tau$	$INV_{24,c}^\tau$	$INV_{24,nc}^\tau$	$LAND_{24,c}^\tau$	$LAND_{24,nc}^\tau$

Table 5:

<u>naics</u>	<u>fa_ratio_corp</u>	<u>fa_ratio_noncorp</u>	<u>inv_ratio_corp</u>	<u>inv_ratio_noncorp</u>	<u>land_ratio_corp</u>	<u>land_ratio_noncorp</u>
1	$\frac{FA_{1,c}^\tau}{FA_1^\tau}$	$\frac{FA_{1,nc}^\tau}{FA_1^\tau}$	$\frac{INV_{1,c}^\tau}{INV_1^\tau}$	$\frac{INV_{1,nc}^\tau}{INV_1^\tau}$	$\frac{LAND_{1,c}^\tau}{LAND_1^\tau}$	$\frac{LAND_{1,nc}^\tau}{LAND_1^\tau}$
2	$\frac{FA_{2,c}^\tau}{FA_2^\tau}$	$\frac{FA_{2,nc}^\tau}{FA_2^\tau}$	$\frac{INV_{2,c}^\tau}{INV_2^\tau}$	$\frac{INV_{2,nc}^\tau}{INV_2^\tau}$	$\frac{LAND_{2,c}^\tau}{LAND_2^\tau}$	$\frac{LAND_{2,nc}^\tau}{LAND_2^\tau}$
...	...	...	...	...	...	...
24	$\frac{FA_{24,c}^\tau}{FA_{24}^\tau}$	$\frac{FA_{24,nc}^\tau}{FA_{24}^\tau}$	$\frac{INV_{24,c}^\tau}{INV_{24}^\tau}$	$\frac{INV_{24,nc}^\tau}{INV_{24}^\tau}$	$\frac{LAND_{24,c}^\tau}{LAND_{24}^\tau}$	$\frac{LAND_{24,nc}^\tau}{LAND_{24}^\tau}$

6. Read in the BEA detailed fixed asset tables (a worksheet for each industry).

- (a) When read in, you'll want to merge in NAICS codes from 1a.
- (b) Use the aggregation rules from 1c to aggregate/disaggregate to the 24 NAICS categories we'll use.
- (c) A data frame like Table 6 should be created:

Table 6:

<u>bea_asset_code</u>	<u>naics_1</u>	<u>naics_2</u>	...	<u>naics_24</u>
1	$FA_{1,1}$	$FA_{1,2}$	...	$FA_{1,24}$
2	$FA_{2,1}$	$FA_{2,2}$	...	$FA_{2,24}$
...	...	...	...	...
$J$	$FA_{J,1}$	$FA_{J,2}$	...	$FA_{J,24}$

7. Use the data frames from Step 5 (ratios of assets to corp/noncorp by industry) and 6 (amounts of FAs by asset type and industry) together to create a table like Table 7:

Table 7:

<u>bea_asset_code</u>	<u>naics_1_corp</u>	<u>naics_1_noncorp</u>	<u>naics_2_corp</u>	<u>naics_2_noncorp</u>	...	<u>naics_24_corp</u>	<u>naics_24_noncorp</u>
1	$FA_{1,1,c}$	$FA_{1,1,nc}$	$FA_{1,2,c}$	$FA_{1,2,nc}$	...	$FA_{1,24,c}$	$FA_{1,24,nc}$
2	$FA_{2,1,c}$	$FA_{2,1,nc}$	$FA_{2,2,c}$	$FA_{2,2,nc}$	...	$FA_{2,24,c}$	$FA_{2,24,nc}$
...	...	...	...	...	...	...	...
$J$	$FA_{J,1,c}$	$FA_{J,1,nc}$	$FA_{J,2,c}$	$FA_{J,2,nc}$	...	$FA_{J,24,c}$	$FA_{J,24,nc}$

- You might create two different data frames for these data
- Or you might create a 3-dimensional array for these data

8. Read in the economic depreciation rates from the BEA to create a table like Table 8:

Table 8:

<u>bea_asset_code</u>	<u>delta</u>
1	$\delta_1$
2	$\delta_2$
...	...
$J$	$\delta_J$

- When read in, you might have to merge with BEA asset codes from the detailed fixed asset tables (thus you'll need to create a crosswalk for asset codes used in the detailed fixed asset tables vs. the codes used in the BEA's estimated depreciation rates.
9. Use the data frames created in Steps 8 and 9 (and the weighted average calculation) to produces a data frame with the format of Table 9. This is what will be read into the dynamic model.

Table 9:

<u>naics</u>	<u>delta_corp</u>	<u>delta_noncorp</u>
1	$\delta_{1,c}$	$\delta_{1,nc}$
2	$\delta_{2,c}$	$\delta_{2,nc}$
...	...	...
24	$\delta_{24,c}$	$\delta_{24,nc}$