Notes on calculating RK

Yes, the implied capital shares are much too large (or at least they seem way too big to me). Two possible issues are that R is calculated as being too big (meaning Barkai's method or our implementation is wrong) or that K is too big (we're using the wrong K numbers).

I think one big issue is the second problem, with K, which you already noted. You're using the nominal K data for Farms, Manufacturing, and Non-F Non-M for *all* the subindustries. That can't be right, of course, because the total for all manufacturing sub-industries has to add up to the nominal K for all of manufacturing.

In short, I think we're calculating the R's okay, but I think the K data is wrong. But I think there is a way to improve this.

First, we can get more specific K data by sub-industry using KLEMS. Their site, http://www.euklems.net, has a sheet called "US_capital_17i", and I put that in the USA folder in Dropbox.

1. We can use the R you calculated for the three asset types - non-res, equip, IP - and apply those to the nominal capital stock data reported by KLEMS to get total nominal payments to capital for the industries in KLEMS.

2. KLEMS breaks down capital into more types than just non-res, equip, and IP. So to do step 1, we have to roll up the KLEMS capital types into non-res, equip, and IP. This should not be hard, as the second tab of the KLEMS sheet includes a nice figure showing how all the cap types are related.

   2a. Non-res capital = K_Ocon

   2b. Equipment = K_TraEq + K_OMach + K_IT + K_CT

   2c. IP = K_OIPP + K_Soft_DB + K_RD

3. So you'll need to first create measures of Non-res capital, equipment, and IP for each of the KLEMS industries by pulling in those separate measures of K_? and adding them up. Should be straightforward. You can then apply the R rates to each of the K series, and then add up as per your equation (1) to get to total RK for each industry in KLEMS.

The problem now becomes how we get the correct RK value for an I/O sub-industry when all we've got is the RK value for a KLEMS industry, and each KLEMS industry contains several I/O sub-industries? We're going to use the "US_output_17i" file from KLEMS that is also in the US folder.

1. The output file from KLEMS contains sheets showing the nominal value added (VA), the nominal gross output (GO), and the nominal compensation of employees (COMP). And this file has the same breakdown of industries as the KLEMS file with the capital data.

2. Once you've got the RK data for each of the KLEMS industries, you merge that with the KLEMS output data. Now, for each KLEMS industry we know total payments to capital (RK) and total payments to labor (COMP), as well as value-added (VA) and gross output (GO). You're going to calculate the following few things for each KLEMS industry:

   2a. RK/VA 2b. RK/GO 2c. COMP/VA 2d. COMP/GO 2e. RK/COMP

3. Note that each of these is a ratio, not a total nominal value. This will allow us to apply it to other industries without over-stating how much RK there is in total.

That leaves us now with the problem of translating these KLEMS ratios into ratios for the I/O sub-industries. Of course, KLEMS and the I/O table do not use the same definitions. KLEMS uses fewer industries. What we do have is the great spreadsheet "BEA_industry_codes" that you're already using to cross-walk from one source to the next.

1. We need to create new columns in that spreadsheet, like "CODE IN KLEMS", that links the I/O industries to a group in KLEMS. Multiple I/O industries will get linked to the same KLEMS industry. But the breakdown should be pretty straightfoward.

2. Once you have that crosswalk, then what you need to do is to give the *ratios* from the industry in KLEMS to all the sub-industries it matche in I/O. For example, if the RK/VA ratio is 0.2 for the KLEMS "Mining and Quarrying" industry, then the RK/VA ratio for "Oil and gas extraction", "Mining, except oil and gas", and "Support activities for mining" in the I/O table should all be given the value of 0.2.

Finally! We're almost there. Now that you have the right *ratios* for every sub-industry in the I/O table, you have what you need to calculate the labor and capital elasticities. But there still remain a few ways to do this:

1. Start with the I/O table. Use the I/O value for labor compensation, and solve for RK in each I/O sub-industry by using the KLEMS ratio RK/COMP for that sub-industry.

2. Start with the I/O table. Use the I/O value for value-added, and solve for RK in each industry in each I/O sub-industry by using the KLEMS ratio RK/VA for that sub-industry.

3. Start with the I/O table. Use the I/O value for gross output, and solve for RK in each industry in each I/O sub-industry by using the KLEMS ratio RK/GO for that sub-industry.

You can calculate the labor and capital elasticities now. You can actually calculate them three times, using the three different ways of getting to RK in the above three points.

One last item. We should be including government in everything. It is in the I/O table. If you don't have depreciation values for government, fine. They don't need to be included in the calculation of the R values initially. But once you have the R values, you should calculate RK for government industries and include them (they are in KLEMS, under code "O").

That was a lot! Let me know if you have questions.