Title: Discussion: Taxes and the Global Allocation of Capital

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Discussion: Taxes and the Global Allocation of Capital

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1 Introduction

Evidently there is wide dispersion in capital-output ratios across countries in the developed world. One obvious candidate explanation is taxes on capital. Indeed, there is also considerable dispersion in capital taxes. Backus, Henriksen and Storesletten (BHS, hereafter) find that the evidence relating capital taxes to capital-output ratios is mixed. In particular, basing the correlation on corporate tax law, BHS find a minimal correlation—even positive. Using rates based on corporate tax revenue, however, leads to a clear negative correlation.

There may, of course, be many other factors that cause capital-output ratios to differ across countries. Features of the labor market may be different, for example. However, the data put together by BHS clearly makes the point that the dispersion in tax rates has declined yet the dispersion in capital-output ratios has not, and this is the puzzle. Assembling a consistent data set across countries is certainly a key contribution of this paper.

2 Theory

The theory behind the puzzle can be seen from the following simplified model. The canonical standard real business cycle model is taken as the benchmark. Agents maximize a discounted stream of expected utility over consumption, \( c \) and leisure, \( \ell \),

\[
E_0 \sum_{t=0}^{\infty} B^t U(c_t, \ell_t),
\]

where \( E_0 \) is the expectations operator at time 0.

The household faces a budget constraint,

\[
c_t + i_t = (1 - \tau_\ell)w_t h_t + (1 - \tau_k) r_t k_t + \tau_k \delta k_t + T_t,
\]

where \( \tau_\ell \) is the tax rate on labor income \( w_t h_t \) and \( \tau_k \) the tax rate on capital income \( r_t k_t \). The wage rate is given by \( w \) and hours of work by \( h \). The return to a unit of capital is \( r_t \) and \( k_t \) is the capital stock. \( T \) is a lump sum rebate given to households. The household spends this net income on
consumption, $c_t$, and investment, $i_t$. It turns out that the inclusion of the Capital Consumption Allowance term, $\tau_k \delta k_t$ matters for both the calibration and measurement.

Leaving a host of details aside, the intertemporal equation governing the accumulation of capital is given by the familiar Euler equation:

$$1 = E_t \left\{ \left( \frac{\beta U_{c,t+1}}{U_{c,t}} \right) \left[ 1 + \left( 1 - \tau_k \right) \left( \alpha \frac{y_{t+1}}{k_{t+1}} - \delta \right) \right] \right\}, \quad (3)$$

where $y$ is output. It is evident that $\tau_k$ and $\frac{K}{Y}$ are negatively related. Note also that in steady state, $\frac{K}{Y}$, is not affected by taxes on labor, in contrast to a possibility raised above. However, it may be the case that in response to labor market frictions (e.g. firing restrictions) that countries adopt different technologies. Note that the conclusion that capital output ratios do not depend on labor taxes from 3 was based on countries have the same technologies. BHS impose the same technologies across countries. In other words, the same capital shares are imposed. While this is certainly a standard approach, how realistic might this be? To gain some insight into this, one could ask how different are capital shares across a fairly homogeneous environment, such as across states in the U.S.?

Figure 1 plots the share of capital in each state of the U.S. (excluding the District of Columbia) for manufacturing and services. There are fairly large differences across the states. Of course, there are also different tax rates on capital at the state level and states have different endowments, but the point here is that the states face essentially the same labor market frictions and there are not any barriers to capital or labor mobility. So understanding why capital shares might be so different across states–and how that affects capital-labor ratios–is important to consider.

### 3 Quantitative Issues

It is important to know if the simple model has any hope of delivering the magnitude of dispersion of capital-output ratios. That is, can the model identify some factors that could lead to such differences? It turns out that the capital consumption allowance (CCA) term can have an impact. It
is important, then, to ensure that the measurement across countries is consistent. To see this, and using the functional forms from BHS,

\[ U(C, L) = \ln C + \omega \ln L, \]  

(4)

\[ F(K, 1 - L) = K^{\alpha}(1 - L)^{1-\alpha}. \]  

(5)

Table 3 presents the steady state results from the simple model with various capital shares, with and without the CCA adjustment.

<table>
<thead>
<tr>
<th>( \alpha = .33 )</th>
<th>( \alpha = .23 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \tau_K )</td>
<td>( \frac{K}{Y} )</td>
</tr>
<tr>
<td>0.0</td>
<td>9.4</td>
</tr>
<tr>
<td>0.3</td>
<td>6.6</td>
</tr>
<tr>
<td>0.6</td>
<td>3.8</td>
</tr>
</tbody>
</table>

There are two major things to note from Table 3. First, changing capital’s share from 0.33 to
0.23, with no tax on capital, can reduce the capital-output ratio by about one-third, from 9.4 to 6.5. Second, inclusion of the CCA term increases the capital-output ratio by a significant amount, at least by a third. So, any comparison across countries would need to take into account the possibility that capital shares might differ and that national accounting systems might differ in their methods.

4 Measurement

The measurement of capital stocks is, and has been, problematic. The following quote exemplifies how problematic it can be. The quote is taken from Improved Estimates of Fixed Reproducible Tangible Wealth, 1929-95.1:

The revisions to the levels of net stocks of nonresidential structures, residential capital, and government capital were large. For example, the revisions raised the levels of these three aggregates 44.3 percent, 26.6 percent, and 35.2 percent, respectively, over the previously published levels for 1994. These large increases primarily reflect the new depreciation patterns for structures.

This quote shows that very recent changes to the methods employed by the Bureau of Economic Analysis in the U.S. had extremely large effects on the measured capital stocks. Therefore, any cross-country studies concerning capital stocks should make sure that the methods used in those countries render measures that are comparable.

5 Conclusion

Backus, Henriksen and Storesletten show that both tax rates and capital-output ratios differ substantially across countries, yet there seems to mixed evidence concerning the relationship between them. Statutory versus computed tax revenues give different results. Additionally, there has been

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1Arnold Katz and Shelby Herman, Survey of Current Business, May 1997
convergence in tax rates yet no convergence in capital-output ratios. A key contribution of this paper is the construction of a consistent set of data across countries to examine this puzzle.