$k \equiv \frac{(n-1)\sigma_\mu^2(n)}{n\sigma^2}$

From the file Calculated values 2005 the estimate using data up to 2005 is

$\frac{\sigma^2}{b^2} = 10249$

From the file "temp for Larry GLS.doc" the estimate of variance for the regional model is $\frac{\sigma_\mu^2}{b^2} = 4333160$

If I believed these two numbers I get $k \equiv \frac{(n-1)\sigma_\mu^2(n)}{n\sigma^2} = 1268.365\,694$

$$\widehat{var\,(b_{0i})} \equiv \left(\frac{1}{n}\sum_i b_{0i}^2\right) - \left(\frac{1}{n}\sum_i b_{0i}\right)^2. \tag{1}$$

The b_i for the three regions Bric, Eu, and Other are (taken from the GLS estimation "temp for Larry GLS estimation"
$b_B = 4296$
$b_E = 2745$
$b_0 = 4186$

The estimate from "calculated values 2005" of the intercept in the aggregate model is

$B_0 = -5349$
The missing region is Canada and US, call this b_N

I have $-5349 = \frac{4296+2745+4186+x}{4}$, Solution is: $-32\,623$

1. Indeed, I was using an old estimate, $\frac{\sigma^2}{b^2} = 1.61e+12$, not the one in the Feb 25 file, $\frac{\sigma^2}{b^2} = 10249$. Your GLS estimate is $\frac{\sigma_\mu^2}{nb^2} = 4333159$. So the estimate of k is

$$k = (n-1)\,\frac{\frac{\sigma_\mu^2}{nb^2}}{\frac{\sigma^2}{b^2}} = 3\frac{4333159}{10249} = 425.8$$

With this correction, the estimate of k goes from being essentially 0 to 426. It is possible that this number is correct. It means that absent trade, the quantity-based policy is not even in the running in the competition with taxes. This could well be the case. I had it in my mind that k should

be a number like 1.... but now I don't know why I thought that. There is no apparent upper bound on k. The magnitude of k still worries me, but you have assured me that you used the same units of emissions for both the regional and the aggregate models... That would be an easy source of error.

2. You wrote "I just tried to calculate Eq. 25 of the March 5 manuscript, but realized this equation calls for the inverse of the Omega matrix. However, I think the determinant of this matrix is zero, so its inverse does not exist." I think that you might be confusing the nxn matrix $\tilde{\Omega}$ defined in the proof of Remark 1 (page 40 of the March 5 document) with the (n-1)x(n-1) matrix Ω defined above equation 25 on page 29. The former is indeed singular (as I note on page 40), but the inverse of the latter is

$$\Omega^{-1} = \begin{pmatrix} 4-1 & -1 & -1 \\ -1 & 4-1 & -1 \\ -1 & -1 & 4-1 \end{pmatrix}^{-1} = \begin{pmatrix} \frac{1}{2} & \frac{1}{4} & \frac{1}{4} \\ \frac{1}{4} & \frac{1}{2} & \frac{1}{4} \\ \frac{1}{4} & \frac{1}{4} & \frac{1}{2} \end{pmatrix}$$

   My main reason for wanting to calculate 25 was as a consistency check between your GLS estimation and my algebra. I am pretty confident that my algebra is correct, and you appear to be pretty confident that your estimation is correct. Given the amount of time that you have sunk into this project, I think that we can dispense with calculating 25.

3. The region fixed effect in the file "temp for larry GLS" is actually $\frac{b_{0i}-B_0}{b}$. (This incorrect labelling is something that you inherited from a mistake that I made early on.) The three numbers for regions B,E,O (BRIC, Europe, Other) are 4296.5, 2745, and 4185 (from the file temp for larry GLS)