# Spelling Mistake (Typo) in Blanchard/Kahn p.1309

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For textbook macroeconomic exercises one may rely on

> Blanchard, O., and Ch. Kahn. 1980. 'The Solution to Linear Difference Models under Rational Expectations.' *Econometrica*, 48:5, pp. 1305-1312.

It presents the general solution to linear difference models (typically linearized around steady states) under rational expectations.

## The typo

On p. 1309 Blanchard and Kahn provide the solution for the textbook 2-dimensional case with one predetermined and one 'jump' variable. Unfortunately there seems to be a typo: One paragraph reads:

> *Define* $\mu \equiv (\lambda_1 - a_{11})\lambda_1 - a_{12}\lambda_2$.

For specific examples, one might remark that the the 2-dimensional solution is at odds with the general solution given at p. 1308. Although I could not find any other source giving a correct solution I provide one here: Actually the above line should read:

> *Define* $\mu \equiv (\lambda_1 - a_{11})\gamma_1 - a_{12}\gamma_2$

## Demonstration

In case the second eigenvalue matrix $J_2$ is a scalar $\lambda_2$, then the expression given for the general case in equation (2) that corresponds to $\mu$ for the $2 \times 2$ case is

$$-\left(B_{11}J_1C_{12} + B_{12}J_2C_{22}\right)C_{22}^{-1}\left(C_{21}\gamma_1 + C_{22}\gamma_2\right)$$

where $B$ is the eigenvector matrix of matrix $A$, and $C$ its inverse. In the $2 \times 2$ case, $J_1$ would be $\lambda_1$ (the eigenvalue with $|\lambda_1| < 1$) and $J_2$ is $\lambda_2$ (the eigenvalue with $|\lambda_2| > 1$). Let the respective block components be

$$A = \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix} \qquad B = \begin{pmatrix} B_{11} & B_{12} \\ B_{21} & B_{22} \end{pmatrix} \qquad C = \begin{pmatrix} C_{11} & C_{12} \\ C_{21} & C_{22} \end{pmatrix}$$

Then we have for the two eigenvalues $\lambda_1 \neq \lambda_2$ that

$$B = \begin{pmatrix} a_{12} & a_{12} \\ \lambda_1 - a_{11} & \lambda_2 - a_{11} \end{pmatrix} \qquad C = B^{-1} = \frac{1}{a_{12}(\lambda_2 - \lambda_1)} \begin{pmatrix} \lambda_2 - a_{11} & -a_{12} \\ a_{11} - \lambda_1 & a_{12} \end{pmatrix}$$

Substituting into the expression for $\mu$ yields:

$$\mu = -\left(B_{11}J_1C_{12} + B_{12}J_2C_{22}\right)C_{22}^{-1}\left(C_{21}\gamma_1 + C_{22}\gamma_2\right) = (\lambda_1 - a_{11})\gamma_1 - a_{12}\gamma_2$$

Substituting into equation (3) (for $P_t$) verifies that the solution for the jump variables holds for this $\mu$ too.