

1 Mathematical model from Jones (2001)

The mathematical model being used for this project was taken from Jones (2001). The production function that Jones uses is defined in equation 1.

$$y = a_t^\sigma l_{Yt}^\beta t_t^{1-\beta} \varepsilon \quad (1)$$

Definitions of the production function variables, indexed against some base year.

$$y \equiv Y/Y_0 \quad (2)$$

$$a \equiv A/A_0 \quad (3)$$

$$t \equiv T/T_0 \quad (4)$$

The number of people 100 percent committed to labor in the economy.

$$L = \tau_t N \quad (5)$$

The number of people 100 percent committed to producing children.

$$N - L = (1 - \tau_t)N \quad (6)$$

Time constraints in the economy are represented by the two following equations.

$$c_t = w_t \tau_t \quad (7)$$

$$b_t = \alpha(1 - \tau_t) \quad (8)$$

First-order condition.

$$\frac{u_{\tilde{b}}}{u_{\tilde{c}}} = \frac{w_t}{\alpha} \quad (9)$$

Equations representing compensation for innovation in the knowledge and labor sector respectively.

$$w_{At} L_{At} = \pi_t Y_t \quad (10)$$

$$w_{Yt} L_{Yt} = (1 - \pi_t) Y_t \quad (11)$$

Differential equation representing the change in the stock of knowledge over time.

$$\frac{da}{dt} = \delta l_{At}^\lambda a_t^\phi \quad (12)$$

The utility function for choosing between consumption and having children.

$$u(c_t, b_t) = (1 - \mu) \frac{\tilde{c}_t^{1-\gamma}}{1 - \gamma} + \mu \frac{\tilde{b}_t^{1-\eta}}{1 - \eta} \quad (13)$$

$$\tilde{c}_t \equiv c_t - \bar{c} \quad (14)$$

$$\tilde{b}_t \equiv b_t - \bar{b} \quad (15)$$

Differential equation representing the change in the population over time.

$$\frac{dn}{dt} = b_t n_t - d_t n_t \quad (16)$$

Death rate equation.

$$d_t = \frac{1}{\omega_1 z_t^{\omega_2} + \omega_3 z_t} + \bar{d} \quad (17)$$

1.1 A second order heading

Some text under the subheading. Paragraphs that follow heads are not indented.

Math should also be set in Times. Use the mathptmx package if you do not have any of the commercially available fonts that are compatible with Times.

$$y^{(n)} = \sum_{i=0}^{n-1} a_i(x) y^{(i)} + r(x) \quad (18)$$

All environments provided by the standard LaTeX document classes are unchanged. Vertical spaces within lists have been altered to comply with De Gruyter requirements.

1. This is the first item within the list. Some more text here in order to display the alignment.
2. Another item in the list.
3. Yet another item in the list.

Here is an example of a Figure. It's the same as in standard LaTeX.

An example of a table follows. This is also the same as in standard LaTeX.

Use the thebibliography environment for the references. BibTeX users may use the provided BibTeX style file DeGruyter.bst.

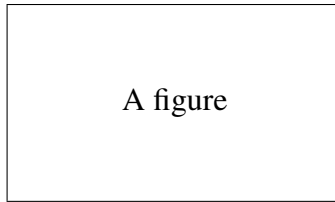


Figure 1: Insert your caption here. If you wish to label your figure for cross-referencing, use a label either within the caption or after it.

Table 1: Insert your table caption here. If you wish to label the table for cross-referencing, use a label either within the caption or after it.

Symbol	LaTeX Command	Symbol	LaTeX Command
α	<code>\alpha</code>	ζ	<code>\zeta</code>
β	<code>\beta</code>	η	<code>\eta</code>
γ	<code>\gamma</code>	θ	<code>\theta</code>
δ	<code>\delta</code>	ϑ	<code>\vartheta</code>
ε	<code>\varepsilon</code>	ι	<code>\iota</code>
ϵ	<code>\epsilon</code>	κ	<code>\kappa</code>

References

- Lamport, L. (1994): *LaTeX: A Document Preparation System: User's Guide and Reference Manual*, Reading, MA, USA: Addison-Wesley, second edition.
- Mittelbach, F., M. Goossens, J. Braams, D. Carlisle, C. Rowley, C. Detig, and J. Schrod (2004): *The LaTeX Companion*, Tools and Techniques for Computer Typesetting, Reading, MA, USA: Addison-Wesley, second edition.
- Oetiker, T. (2008): *The Not So Short Introduction to LaTeX 2 ϵ* , 4.26 edition, URL <http://ctan.tug.org/tex-archive/info/lshort/english/lshort.pdf>.