

Table S4. Transcription related parameters for 2 doub/h, 37°C. Transcription related parameters as defined in [28], obtained here for 2 doub/h. Values in bold were estimated. See S1.2 in Text S1 for further explanations.

| Genetic parameter | Units | P1 ^a | P2 ^a | constitutive ^a | repressable ^a | pause ^a |
|--|-------------------------|-------------------|-------------------|---------------------------|---------------------------|--------------------------|
| $D_i = V_{cell}(2 \text{ doub/h}) \cdot d_i$ | average copies per cell | 27 ^b | 27 ^b | 40.4 ^c | 408.4 ^d | 161.8 ^e |
| V_i^{\max} | ini/min | 110 ^f | 110 ^f | 33 ^g | 1.5 ^h | 3.3 ⁱ |
| c_i | nuc/sec | 85 ^j | 85 ^j | 52 ^j | 52 ^j | 0.89 ^d |
| $K_{m,i}$ | molec/cell | 1240 ^l | 2531 ^k | 405 ^k | 405 ^k | 405 ^k |
| L_i | base pairs | 6000 ^m | 6000 ^m | 2000 ^m | 1000 ^m | 1000 ^m |

^a Promoter classes as defined by [28].

^b The average number of copies of the *rrn* operon per cell, $D_{rrn}(\mu)$, is given by Eq. S7: $D_{rrn}(\mu) = \sum_{j=1}^7 2^{\mu(C(1-m_j^{(rrn)})+D)}$, where $m_j^{(rrn)}$ are the *rrn* operon map locations given in Table S1.

^c According to [28], $[P_{constitutive}] = 1.5[P_{rn}]$, in order to fit to (1) transcription of all r-proteins and (2) mRNA synthesis rate. This is consistent with the length of the r-protein gene class given in Table S1: the total DNA per chromosome associated with this gene class is roughly $40.4/(27/7 = \text{gene dosage per gene}) \cdot (2000 \text{ bp}) = 20,948 = \text{total length of constitutive class coding genes}$, compared with $L_{r-protein} = 21252$ (Table S1).

^d Estimated value - see S1.2.

^e According to [28], based on known fractions of intermittently inactive RNAP in the cell $[P_{pause}] = 6[P_{rn}]$.

^f Estimated in [3]. Assumed to be growth rate independent [28].

^g As measured for the *spc* ribosomal promoter, which is a representative promoter for this class (see [28]).

^h As measured for β -lactamase promoter, which is taken to be a representative promoter for this class (see [28]).

ⁱ Maximum initiation rate was set to be ten fold lower than the V^{\max} for the constitutive gene class, assuming pause genes are blocked 90% of the time [28].

^j See table 3 in [17].

^k Constitutive promoter binding affinities scale according to cell volume with respect to their values at 2.5 doub/h and are taken from [28]. Volumes are given in Table S2.

^l Taken from table 5 of [105]: $K_{P1}:K_{P2}$ at (2.14 doub/h) = 0.49:1, i.e. $1240 = 0.49 \cdot 2531$.

^m See tables 1 and 2 in [28].