

Table S1: Comparisons of significant correlations in Figure 1B.

Condition 1	Condition 2	<i>P</i> -value	Adjusted <i>P</i> -value
stationary phase 30h	synthetic rich	1.00×10^{-3}	0.01
stationary phase 30h	stationary phase 16h	6.00×10^{-4}	4.20×10^{-3}
stationary phase 30h	glucose	0.02	0.11
stationary phase 30h	glycerol	0.01	0.07
stationary phase 30h	lactose	0.12	0.82
stationary phase 30h	NaCl	2.00×10^{-3}	0.01
stationary phase 30h	ciprofloxacin	0.28	> 0.99
glucose	synthetic rich	0.38	> 0.99
glucose	stationary phase 16h	0.28	> 0.99
glucose	stationary phase 30h	0.02	0.11
glucose	glycerol	$< 10^{-4}$	$< 10^{-4}$
glucose	lactose	0.39	> 0.99
glucose	NaCl	0.49	> 0.99
glucose	ciprofloxacin	1.00×10^{-4}	7.00×10^{-4}
glycerol	synthetic rich	$< 10^{-4}$	$< 10^{-4}$
glycerol	stationary phase 16h	$< 10^{-4}$	$< 10^{-4}$
glycerol	stationary phase 30h	0.01	0.07
glycerol	glucose	$< 10^{-4}$	$< 10^{-4}$
glycerol	lactose	$< 10^{-4}$	$< 10^{-4}$
glycerol	NaCl	$< 10^{-4}$	$< 10^{-4}$
glycerol	ciprofloxacin	0.13	0.88
lactose	synthetic rich	0.07	0.52
lactose	stationary phase 16h	0.05	0.34
lactose	stationary phase 30h	0.12	0.82
lactose	glucose	0.39	> 0.99
lactose	glycerol	$< 10^{-4}$	$< 10^{-4}$
lactose	NaCl	0.13	0.91
lactose	ciprofloxacin	0.01	0.05
ciprofloxacin	synthetic rich	$< 10^{-4}$	$< 10^{-4}$
ciprofloxacin	stationary phase 16h	$< 10^{-4}$	$< 10^{-4}$
ciprofloxacin	stationary phase 30h	0.28	> 0.99
ciprofloxacin	glucose	1.00×10^{-4}	7.00×10^{-4}
ciprofloxacin	glycerol	0.13	0.88
ciprofloxacin	lactose	0.01	0.05
ciprofloxacin	NaCl	1.00×10^{-4}	7.00×10^{-4}

Significant *P*-values are bolded (see *Methods*).

Table S2: Comparisons of significant White tests in Figure 1B.

Condition 1	Condition 2	<i>P</i> -value	Adjusted <i>P</i> -value
stationary phase 16h	synthetic rich	0.49	> 0.99
stationary phase 16h	stationary phase 30h	0.67	> 0.99
stationary phase 16h	glucose	0.03	0.22
stationary phase 16h	glycerol	1.00×10^{-4}	7.00×10^{-4}
stationary phase 16h	lactose	0.27	> 0.99
stationary phase 16h	NaCl	4.50×10^{-3}	0.03
stationary phase 16h	ciprofloxacin	2.00×10^{-4}	1.40×10^{-3}
glycerol	synthetic rich	$< 10^{-4}$	$< 10^{-4}$
glycerol	stationary phase 16h	1.00×10^{-4}	7.00×10^{-4}
glycerol	stationary phase 30h	3.60×10^{-3}	0.03
glycerol	glucose	0.01	0.04
glycerol	lactose	0.06	0.42
glycerol	NaCl	0.00	3.50×10^{-3}
glycerol	ciprofloxacin	0.59	> 0.99
ciprofloxacin	synthetic rich	$< 10^{-4}$	$< 10^{-4}$
ciprofloxacin	stationary phase 16h	2.00×10^{-4}	1.40×10^{-3}
ciprofloxacin	stationary phase 30h	4.00×10^{-4}	2.80×10^{-4}
ciprofloxacin	glucose	1.00×10^{-3}	0.01
ciprofloxacin	glycerol	0.59	> 0.99
ciprofloxacin	lactose	0.01	0.04
ciprofloxacin	NaCl	$< 10^{-4}$	$< 10^{-4}$

Significant *P*-values are bolded (see *Methods*).

Table S3: Comparisons of significant correlations in Figure 2C.

Condition 1	Condition 2	<i>P</i>-value	Adjusted <i>P</i>-value
stationary phase 30h	synthetic rich	0.15	> 0.99
stationary phase 30h	stationary phase 16h	0.83	> 0.99
stationary phase 30h	glucose	0.50	> 0.99
stationary phase 30h	glycerol	0.53	> 0.99
stationary phase 30h	lactose	0.39	> 0.99
stationary phase 30h	NaCl	0.36	> 0.99
stationary phase 30h	ciprofloxacin	0.23	> 0.99

Significant *P*-values are bolded (see *Methods*).

Table S4: Comparisons of significant correlations in Figure 2D.

Condition 1	Condition 2	<i>P</i> -value	Adjusted <i>P</i> -value
synthetic rich	stationary phase 16h	0.96	> 0.99
synthetic rich	stationary phase 30h	0.85	> 0.99
synthetic rich	glucose	0.34	> 0.99
synthetic rich	glycerol	0.26	> 0.99
synthetic rich	lactose	0.37	> 0.99
synthetic rich	NaCl	0.61	> 0.99
synthetic rich	ciprofloxacin	0.35	> 0.99
stationary phase 16h	synthetic rich	0.96	> 0.99
stationary phase 16h	stationary phase 30h	0.88	> 0.99
stationary phase 16h	glucose	0.29	> 0.99
stationary phase 16h	glycerol	0.20	> 0.99
stationary phase 16h	lactose	0.30	> 0.99
stationary phase 16h	NaCl	0.55	> 0.99
stationary phase 16h	ciprofloxacin	0.29	> 0.99
stationary phase 30h	synthetic rich	0.85	> 0.99
stationary phase 30h	stationary phase 16h	0.88	> 0.99
stationary phase 30h	glucose	0.24	> 0.99
stationary phase 30h	glycerol	0.17	> 0.99
stationary phase 30h	lactose	0.25	> 0.99
stationary phase 30h	NaCl	0.48	> 0.99
stationary phase 30h	ciprofloxacin	0.23	> 0.99
glucose	synthetic rich	0.34	> 0.99
glucose	stationary phase 16h	0.29	> 0.99
glucose	stationary phase 30h	0.24	> 0.99
glucose	glycerol	0.84	> 0.99
glucose	lactose	0.97	> 0.99
glucose	NaCl	0.67	> 0.99
glucose	ciprofloxacin	0.99	> 0.99
glycerol	synthetic rich	0.26	> 0.99
glycerol	stationary phase 16h	0.20	> 0.99
glycerol	stationary phase 30h	0.17	> 0.99
glycerol	glucose	0.84	> 0.99
glycerol	lactose	0.81	> 0.99
glycerol	NaCl	0.53	> 0.99
glycerol	ciprofloxacin	0.82	> 0.99
lactose	synthetic rich	0.37	> 0.99
lactose	stationary phase 16h	0.30	> 0.99
lactose	stationary phase 30h	0.25	> 0.99
lactose	glucose	0.97	> 0.99
lactose	glycerol	0.81	> 0.99
lactose	NaCl	0.70	> 0.99
lactose	ciprofloxacin	0.98	> 0.99
NaCl	synthetic rich	0.61	> 0.99
NaCl	stationary phase 16h	0.55	> 0.99
NaCl	stationary phase 30h	0.48	> 0.99
NaCl	glucose	0.67	> 0.99
NaCl	glycerol	0.53	> 0.99
NaCl	lactose	0.70	> 0.99
NaCl	ciprofloxacin	0.68	> 0.99
ciprofloxacin	synthetic rich	0.35	> 0.99
ciprofloxacin	stationary phase 16h	0.29	> 0.99
ciprofloxacin	stationary phase 30h	0.23	> 0.99
ciprofloxacin	glucose	0.99	> 0.99
ciprofloxacin	glycerol	0.82	> 0.99
ciprofloxacin	lactose	0.98	> 0.99
ciprofloxacin	NaCl	0.68	> 0.99

Significant *P*-values are bolded (see *Methods*).

Table S5: Comparisons of significant White tests in Figure 2D.

Condition 1	Condition 2	<i>P</i> -value	Adjusted <i>P</i> -value
NaCl	synthetic rich	0.07	0.48
NaCl	stationary phase 16h	0.03	0.20
NaCl	stationary phase 30h	0.08	0.59
NaCl	glucose	0.23	> 0.99
NaCl	glycerol	0.09	0.64
NaCl	lactose	0.41	> 0.99
NaCl	ciprofloxacin	0.09	0.60

Significant *P*-values are bolded (see *Methods*).

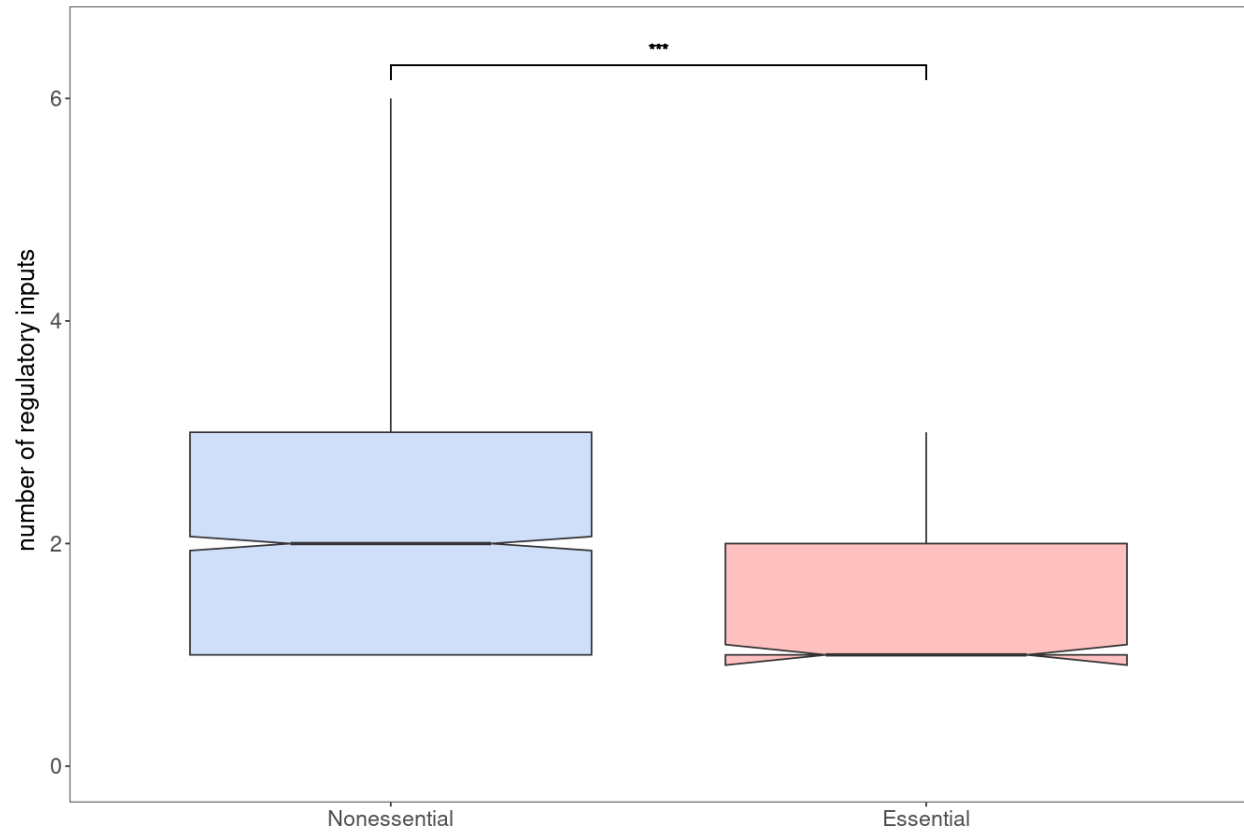


Figure S1: Distributions of the number of regulatory inputs from TFs for nonessential and essential genes in *E. coli*. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, NS - not significant (see *Methods*).

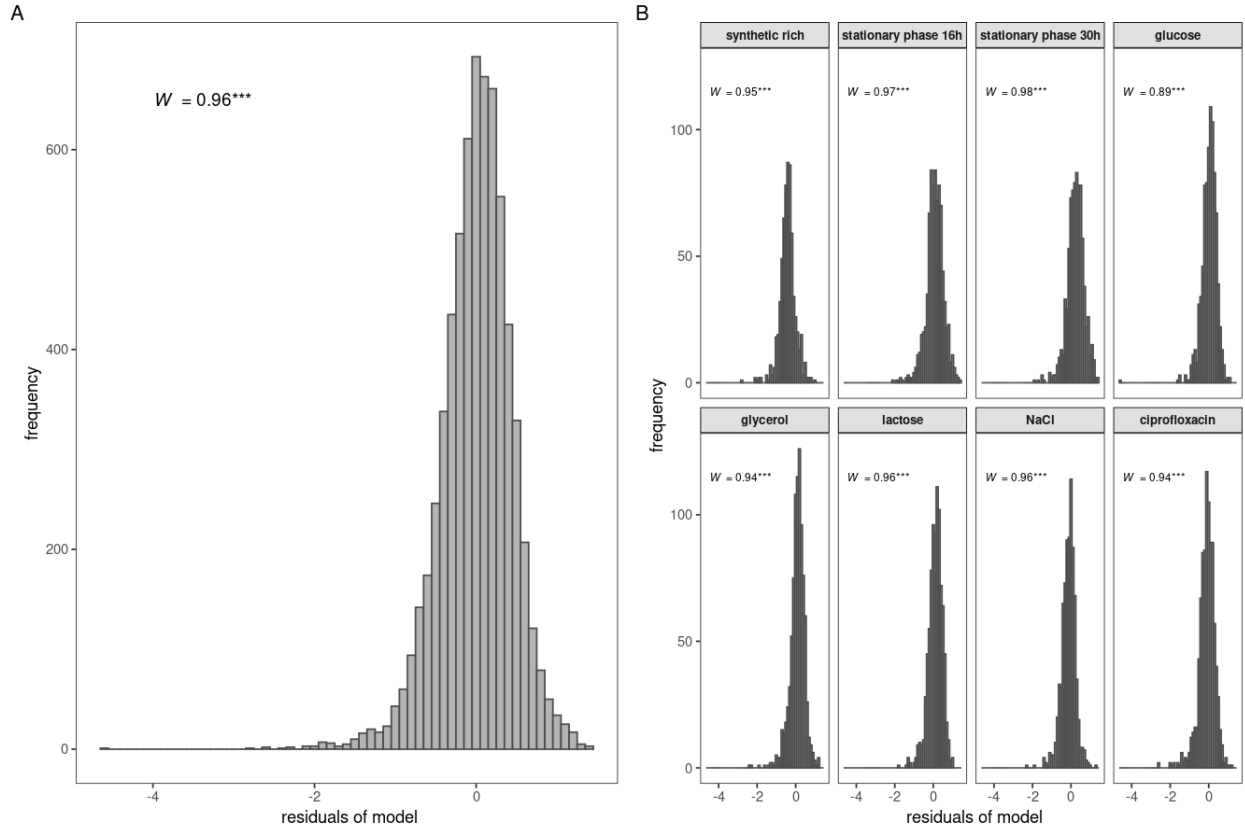


Figure S2: Distributions of residuals from linear regression models evaluating relationships of expression level with expression noise across (A) and within (B) eight conditions in *E. coli*. Shapiro-Wilk test statistics (W) are shown in the upper left corner of each plot. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, NS - not significant (see *Methods*).

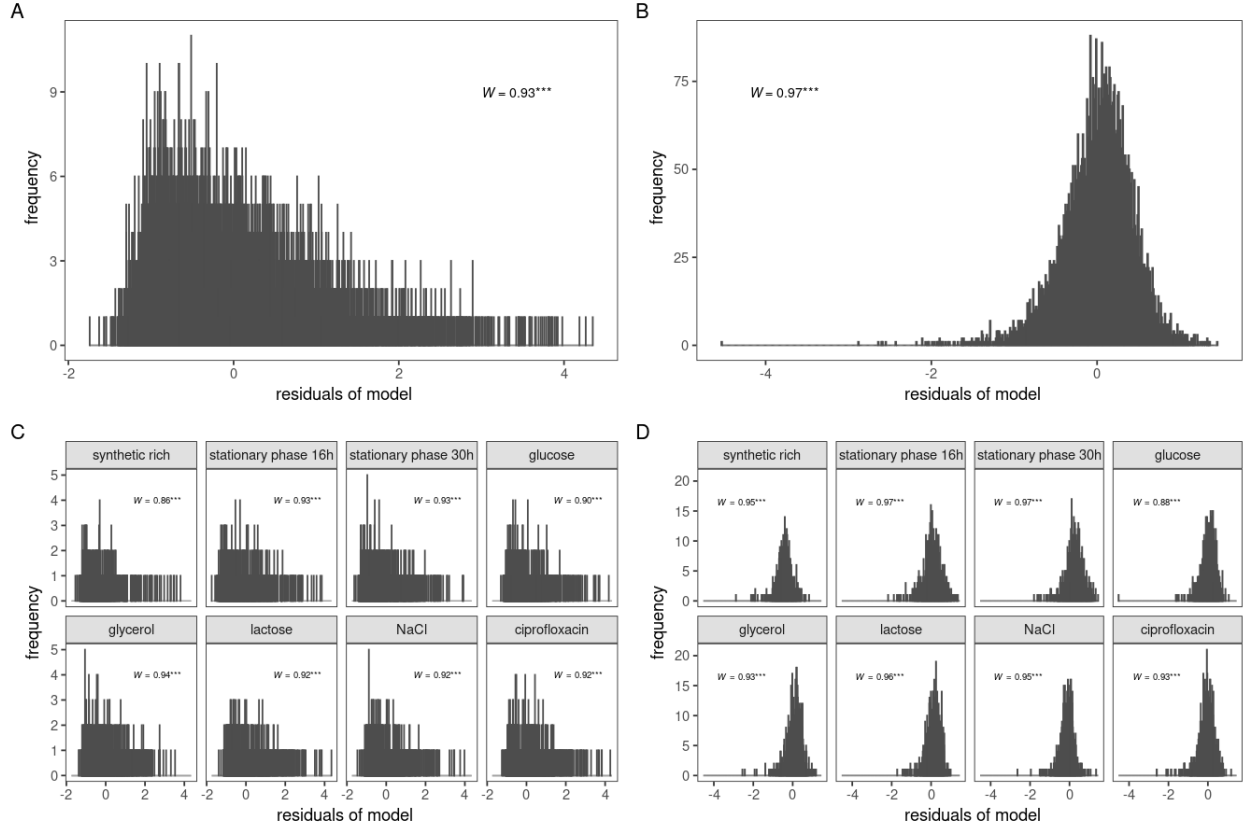


Figure S3: Distributions of residuals from linear regression models evaluating relationships of the number of regulatory inputs from TFs with expression level (left) and expression noise (right) across (A, B) and within (C, D) eight conditions in *E. coli*. Shapiro-Wilk test statistics (W) are shown in the upper right corner of each plot in panels A and B, and in the upper left corner of each plot in panels B and D. $*P < 0.05$, $**P < 0.01$, $***P < 0.001$, NS - not significant (see *Methods*).