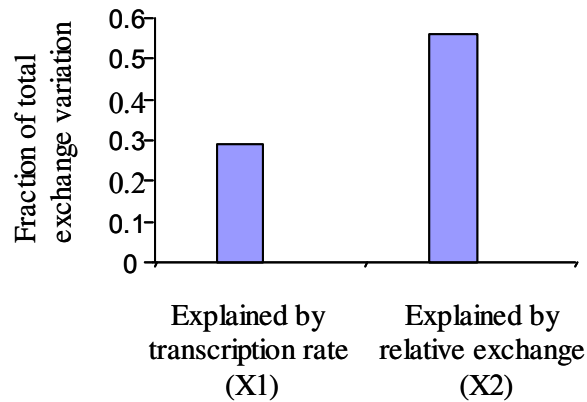


### **Text S2:**

The purpose of this analysis is to establish whether total exchange variation can be explained by transcription rate. To that end, we formalized a linear regression of the general form  $Y = a + bX$ , where  $Y$  is total exchange and  $X$  is transcription rate. Based on regression analysis (Sokal and Rohlf, 1985<sup>1</sup>, Box 14.1) on data from Rufiange et al. (2007), 29% of the total exchange variation is explained by  $X$ , whereas 71% of the variance is the *residual* or *unexplained variation*.

Next, we extended the model as follows:  $Y = a + b_1X_1 + b_2X_2$ , where  $Y$  is total exchange,  $X_1$  is transcription rate, and  $X_2$  is relative exchange.  $X_1$  and  $X_2$  are independent since relative exchange is transcription rate-independent. To test this model, we used transcription rate ( $X_1$ ) and total exchange ( $Y$ ) values from Rufiange et al. (2007). On the other hand, relative exchange values ( $X_2$ ) were taken from another laboratory (Dion et al. 2007). The covariance between  $X_2$  and  $X_1$  is 0.01, indicating that the two variables are independent.

If total exchange reflects only transcription rate and noise, the additional independent variable  $X_2$  will not increase the explained variation. However, if total exchange contains information beyond transcription rate and noise,  $X_2$  might contribute to the explained variation. Based on multiple regression analysis (Sokal and Rohlf, 1985, Box 16.1), 78% of the total exchange variation is explained by  $X_2$  and  $X_1$  and only 22% is still unexplained. The additional independent variable  $X_2$  provides a significant increase in the explained variation [ $P < 10^{-200}$  (F-test for significance of addition of independent variable; Sokal and Rohlf 1985, Eq. 16.14)]. Only 29% of the total exchange variation is explained by  $X_1$ , whereas 56% of the residual variation is explained by  $X_2$ , a reproducible transcription rate-independent variable called relative exchange (**Figure S2.1**).



**Figure S2.1:** 29% of the total exchange variation is explained by transcription rate, whereas 56% of the variation is explained by the transcription rate-independent variable called relative exchange.

<sup>1</sup>Sokal RR and Rohlf FJ (1969). Biometry. W.H. Freeman and Company, New York.