Response to Chikis, Goldberg, and Lopez-Salido (2023), "A Comment on: Low Interest Rates, Market Power, and Productivity Growth"

Liu, Mian, and Sufi (2022) (LMS henceforth) present a theoretical result that steady state productivity growth is non-monotonic in the interest rate. Starting from a high level of the interest rate, growth rises with a fall in the interest rate due to the traditional expansionary effect of lower rates. However, a fall in the interest rate in a low-rate environment has the opposite effect. The reason is that a second strategic effect starts to dominate, which favors industry leaders over industry followers, thus making market structure more monopolistic and reducing growth.

In Section 7.3 of LMS, we conducted a quantitative exercise to explore the transition dynamics associated with this mechanism. This quantitative exercise involved interpreting the impulse response in our model to a sudden drop in the discount rate r from 3% to 1% (or equivalently the real interest rate from about 4% to 2%), as plotted in LMS Figure 8. Chikis, Goldberg, and Lopez-Salido (2023) (CGL henceforth) point out a scaling error in that figure. Because annualized rates are coded in percent, the X-axis should be 100 times the units displayed in the published paper. The scaling error led us to incorrectly interpret the transition dynamics in this exercise. In Section 7.3 we stated "the convergence is rapid", with a productivity growth boom of 0.75 quarters. Correcting for the X-axis, the productivity boom in this exercise is actually 20 years. We thank CGL for pointing out the error. As CGL state in their abstract, the error is "related to the quantitative exercises, and do not affect the key theoretical contributions of LMS."

Why does this exercise, in which interest rates fall suddenly from 4% to 2%, result in a prolonged productivity boom before an eventual steady state decline in growth? It is because the initial interest rate of 4% in this exercise is high, and our model predicts that a small decline in r from a high initial level leads to a *permanent* growth boom. In contrast, a small decline in r from a low initial level leads to a decline in steady state growth. The prolonged transition dynamics in this exercise reflect a combination of these two outcomes: the initial r is high, but with a large decline, the final r is low. The scaling error masked from us the fact that this exercise was less than ideal to explore the speed of transition dynamics, especially given also that the 200 basis points decline in r studied in the exercise occurred over two decades in reality.

A more appropriate experiment for analyzing transition dynamics is to see how an economy responds to a realistic interest rate shock in a high-rate environment, and then contrast it with a similar interest rate shock in a low-rate environment. Figure 1 below conducts such an exercise (with a corrected X-axis) using the period 1984–2000 as the high-rate environment with a discount rate of $r = 3.59\%$, and 2001–2016 as the low-rate environment with $r = 0.33\%$ as in LMS. We consider a decline of 6 basis points in r, which is the typical quarterly interest rate shock during this period.[1]

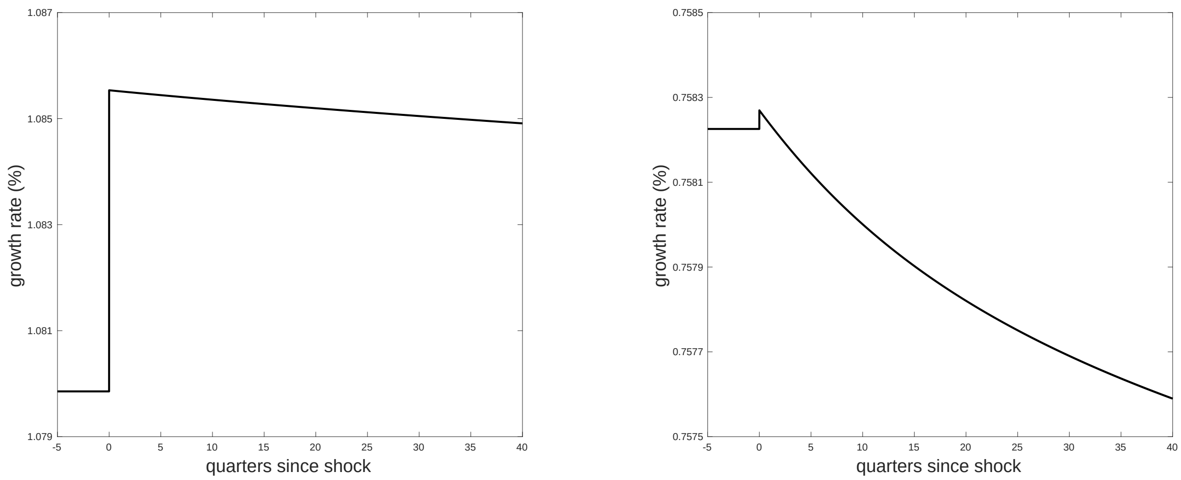
Figure 1 shows that starting from the high-rate environment, the decline in r results in a permanent increase in productivity growth relative to the initial steady-state. In contrast, starting from the low-rate environment, the boom in productivity growth is short-lived and lasts only 1.4 quarters.[2] These transition dynamics echo the central theoretical prediction of LMS: the steady-state productivity growth is non-monotonic in the discount rate.

CGL also raise the critique that LMS figure 8 uses the balanced-growth-path formula to calculate the transition growth rate, omitting a composition term that scales with the rate-of-change of the measure of neck-to-neck markets. This term theoretically vanishes as $r \to 0$ and is thus not quantitatively relevant in a low-rate environment, but we thank CGL for pointing out its relevance when the discount rate is high, and we correct for it in Figure 1. We also thank CGL for pointing out an inconsistency in calculating investment costs in LMS Section 6.2 and for posting the corrected code.

In conclusion, transition dynamics with corrected scaling are quantitatively consistent with the key LMS theoretical mechanism, that starting from a low initial r, a further decline in r reduces growth. Future research would be beneficial to further understand the empirical relevance of the mechanism.

Figure 1. Impulse response following 6 basis points decline in r from different initial r levels

(a) initial $r = 3.59\%$; infinite boom **(b)** initial $r = 0.33\%$; boom lasts 1.4 quarters



Notes

1. These numbers are based on estimates from Farhi and Gourio (2019) used in LMS. Using LMS notation: define $r = \hat{r} - g$, where r is the rate used to discount profits, $\hat{r}$ is the real interest rate, and g is the productivity growth rate. For 1984-2000, $g = 1.1\%$ (LMS Table 1) and $\hat{r} = 4.69\%$ (page 213 of LMS) which gives a discount rate $r = 3.59\%$. The same calculation for 2001-2016 yields $r = 0.33\%$.

2. The code is available at https://doi.org/10.5281/zenodo.11182430.

References

Craig A. Chikis, Jonathan Goldberg, and David Lopez-Salido. A comment on: "low interest rates, market power, and productivity growth". *Econometrica*, 2023.

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