Empirics of my model: overview

Nicolas Fernandez-Arias

May 3, 2018

1 Introduction

It would be nice to actually solve my model. And nest it and the standard model in a general model, and then the discrepancies between it and the standard model can be used for identification.

2 Stylized facts

3 Identification

We can imagine a model with 7 parameters: $\{\lambda, \nu, \chi, p, \xi, \beta, \rho\}$. This assumes the same innovation technology for entrants and incumbents. There will still be R&D by incumbents in equilibrium since free entry does not occur immediately.

3.1 Level of innovation intensity

3.2 Relative innovation intensities

One key prediction of my model is on the time-path of the ratio of innovation effort by incumbents and entrants. This time path is determined by p, λ, ν.

Incumbents and entrants have R&D technology given by:

$$
\begin{aligned}
R(z) &= \chi z \phi(z) \\
\hat{R}(z; \bar{z}) &= \chi z \phi(\chi) \\
\phi(z) &= z^{-p}
\end{aligned}
$$

and given a choice of curvature and level productivity of this function, λ is identified by the extent to which entrants innovate relative to incumbents. In equilibrium, entrant innovation effort is given by

$$\hat{z}(m) = \xi \min(m, M)$$
$$M = \left[\frac{\tilde{\beta}}{\lambda V(0)}\right]^{-1/p}$$

and incumbent innovation effort is

$$z(m) = \left[\frac{\tilde{\beta} - \nu W(m) - \nu V'(m)}{(1-p)(\lambda V(0) - V(m))}\right]^{-1/p}$$

This implies that, for all m, we have

$$\frac{z(m)}{\hat{z}(m)} = \left[\frac{\tilde{\beta} - \nu W(m) - \nu V'(m)}{\tilde{\beta}} \times \frac{\lambda V(0)}{(1-p)(\lambda V(0) - V(m))}\right]^{-1/p} \tag{1}$$
$$= D(m)(1-p)^{1/p} \tag{2}$$

In addition, the fact that $V'(m) = 0, W(m) = 0$ if $m \geq M$ implies that, for $m > M$, $D(m) = D(M)$ and so

$$\frac{z(m)}{\hat{z}(m)} = D(M)(1-p)^{1/p} \tag{3}$$

Identification of p First, consider equation (1). From here we see that p shifts the ratio for all m in a similar way. In particular, taking logs, get

$$\log(z(m)) = \log(\hat{z}(m)) - \frac{1}{p}\log\Big(D(m)\Big) - \frac{\log(1-p)}{p} \tag{4}$$
$$= \log(\hat{z}(m)) - \underbrace{\frac{1}{p}\Big(D(m) - D(M)\Big)}_{\text{Slope in } m} - \underbrace{\frac{\log(1-p) + D(M)}{p}}_{\text{Level shift}} \tag{5}$$

Hence, taking other parameters as given, p determines:[1]

1. First term: higher p attenuates the rate of change of ratio in m
2. Second term: p shifts level of ratio. Direction?

[1] I am only keeping track of *direct effects* of changing p. Changing p also changes the function D through its effect on equilibrium values V, W. Still thinking about how to make this all work.

Identification of λ, ν We have defined

$$D(m) = \Big(\frac{\tilde{\beta} - \nu W(m) - \nu V'(m)}{\tilde{\beta}} \times \frac{\lambda V(0)}{(1-p)(\lambda V(0) - V(m))}\Big)^{-1/p}$$

4 Extensions