1 Lazear (2005) Model of Entrepreneurship

Consider a world with two skills, x_1 and x_2. Individuals can choose to specialize or be entrepreneurs. Specialist income is given by:

$$I_s = max\{x_1, x_2\}$$

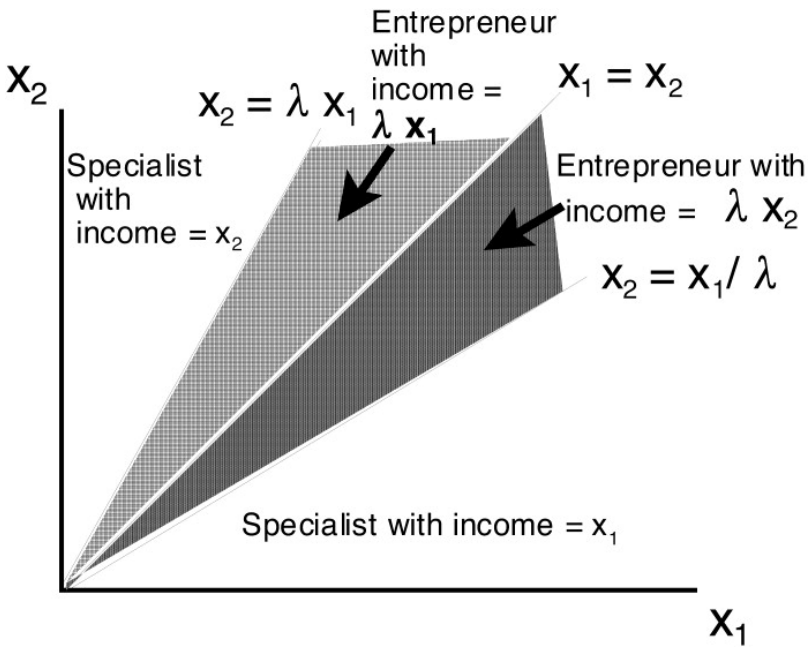
Entrepreneur income is given by:

$$I_e = \lambda \cdot min\{x_1, x_2\}$$

Implicit in this model is the notion that entrepreneurship requires mastery of a wider variety of skills than specialization. λ represents the market return to entrepreneurship. An individual becomes an entrepreneur whenever:

$$\lambda \cdot min\{x_1, x_2\} > max\{x_1, x_2\}$$

Notice that as we add skills, the number of entrepreneurs must weakly drop, since the left-hand side of this expression cannot be increasing, while the right hand side may increase. This implies that in professions that require a larger number of skills, we are less likely to find entrepreneurs.



We can now draw a simple diagram in x_1, x_2 space that can capture some of the intuition of the model. Notice that when we are below the 45° line, this means that $x_1 > x_2$. In this case, we require that $\lambda x_2 > x_1$, in order for individuals to become an entrepreneur. Diagrammatically, this corresponds to the area between the 45° line and $x_2 = \frac{x_1}{\lambda}$ line. In this region the entrepreneur earns income of λx_2. Similarly, those below the $x_1 = \frac{x_2}{\lambda}$ line and above the 45° line will be entrepreneurs earning λx_1.

Several important intuitions arise from this diagram. Note that the probability of becoming an entrepreneur depends on the relative areas in the graph.

1. Notice that as λ rises, the boundary lines drop, increasing the area for entrepreneurs.

2. As x_1 and x_2 become more highly correlated, there is more mass along the 45° line, which means more entrepreneurs. This suggests that in professions in which the set of skills are highly complementary (such as accounting, which requires accounting knowledge and business management knowledge) we should see more entrepreneurs than in professions in which the skills are less complementary (such as art, which requires artistic ability and business management knowledge).

The model could be extended in a number of directions. If we allow heterogenous λs, then we can account for different levels of entrepreneurial skill. We can also allow λ to be drawn stochastically from some distribution, which would model entrepreneurial risk.

Now we can consider human capital investment. Suppose investments in skills 1 and 2 (i_1 and i_2) can be made with costs given by $C(i_1, i_2)$ with $C_j > 0$ and $C_{jj} > 0$. Without loss of generality, let the skill with the lower endowment be denoted skill 2. For the wage worker, there is only incentive to invest in the skill that would be highest at an optimum, since any investment in the other still will generate no additional return. The wage worker's problem is:

$$\max_{i_j} \; i_j - C$$

The F.O.C. is $1 - C_i = 0$, implying that the wage worker should keep investing so long as $1 > C_i$. Optimization is completed by comparing $x_1^0 + i_1^*$

to $x_2^0+i_2^*$ and then choosing the skill to specialize in based upon which of these is larger. Notice that the cost structure may be such that the entrepreneur should invest in skill 2 or make no investment, but if investment occurs, it will be in a single skill.

For the entrepreneur, there is no point in investing in skill 1 until skill 2 is at least equal to skill 1. Investment for the entrepreneur occurs whenever $\lambda > C_2$. Once skill 2 has reached the level of skill 1, the entrepreneur must invest in both skills in order to increase profits. Investment will continue so long as $\lambda > max\{C_1, C_2\}$. Thus, for the entrepreneur, investment may be made in no skills, one skill, or both skills. In general, we'd expect entrepreneurs to invest in a wider variety of skills than non- entrepreneurs. Tests of this prediction of the model typically examine whether those who are self-employed have taken a broader set of course or majors or have experience in a broader set of past industries.

A few other comments about the model:

1. This model requires that $\lambda > 1$, otherwise no one would become an entrepreneur. How do we reconcile this with empirical evidence suggesting that earnings for entrepreneurs are below those of wage workers? One possibility is that included in the returns to entrepreneurship are non-pecuniary benefits (such as being able to do what you want) which we don't capture well when looking at pure compensation measures.

2. How shall we think about innovation in this framework? One way of thinking about it is that innovation is more likely when someone knows about a variety of different subjects.

3. Suppose we had data on types of skills required for different types of industries, along with the concentration of various industries. We might think of the number of distinct establishments as representing the number of entrepreneurs. Could we use this to test the model, by looking to see if industries requiring a broad range of skills were more concentrated? Possibly, but we'd have to be careful about technology here. Different industries may have different technologies (such as returns to scale) that could affect concentration.

4. Betrand and Schoar (JEP, Spring 2006) find that people are more likely to be entrepreneurs in countries in which family-owned firms predominate. Can this model provide insight into that empirical fact? One

possibility is that when the family owns a firm you are still constrained by the min, but you can select the least bad family member to do each job, which would tend to increase the likelihood of becoming an entrepreneur.

Lazear presents empirical evidence in support of his model using data on Stanford MBAs. The key evidence is in Figure 2, Table 4 and Table 6. Figure 2 and Table 4 show that those with more prior roles in past firms are more likely to become entrepreneurs. Table 6 shows that those who took concentrations of classes in a particular area are less likely to become entrepreneurs.

What are some policy implications of this model? One might be that encouraging general education may lead to more entrepreneurial activity. An empirical test of the model might be to examine cross-country variation in the degree of specialization of the educational system and see how that correlated with entrepreneurial activity. A more sophisticated test might be to use admission cutoffs to examine if people who get sorted into training programs that provide different levels of educational specificity (such as liberal arts colleges or vocational programs in European countries) have different propensities to become entrepreneurs.

Reference

Lazear, Edward. 2005. "Entrepreneurship." *Journal of Labor Economics* 23(4): 649-680.