

1 Evans and Jovanovic (1989) Model of Entrepreneurial Credit Constraints

Individuals can choose to be entrepreneurs or work as wage workers. Wage workers receive w for working. Entrepreneurial income depends on entrepreneurial skill θ and earnings (y) are produced according to the production function:

$$y = \theta k^\alpha$$

where k represents the amount of capital invested in the venture and $0 < \alpha < 1$ is a technology parameter. Entrepreneurial income is given by:

$$I = y + r(z - k)$$

where z is initial wealth and r is the interest rate. We suppose credit constraints on the entrepreneur such that $k \leq \lambda z$, where $\lambda \geq 1$ is the measure of constraints. The entrepreneur can be a new saver or a net borrower depending on whether $k^* > z$.

To analyze the choice of whether to become an entrepreneur, first consider the choice of k for the entrepreneur:

$$\max_k \theta k^\alpha + r(z - k)$$

$$F.O.C \quad \alpha \theta k^{\alpha-1} - r = 0$$

For an interior solution:

$$k^* = \left(\frac{\alpha \theta}{r} \right)^{\frac{1}{1-\alpha}} = b \theta^{\frac{1}{1-\alpha}}$$

where $b = \left(\frac{\alpha}{r} \right)^{\frac{1}{1-\alpha}}$. The entrepreneur will be unconstrained whenever the optimal k^* is below λz , i.e.

$$\theta \leq \frac{r}{\alpha} (\lambda z)^{1-\alpha} \tag{1}$$

To determine whether or not to become an entrepreneur, the individual compares earnings under entrepreneurship to wage earnings (in both cases she receives interest income on her wealth, so this terms drops out of the calculation), i.e.:

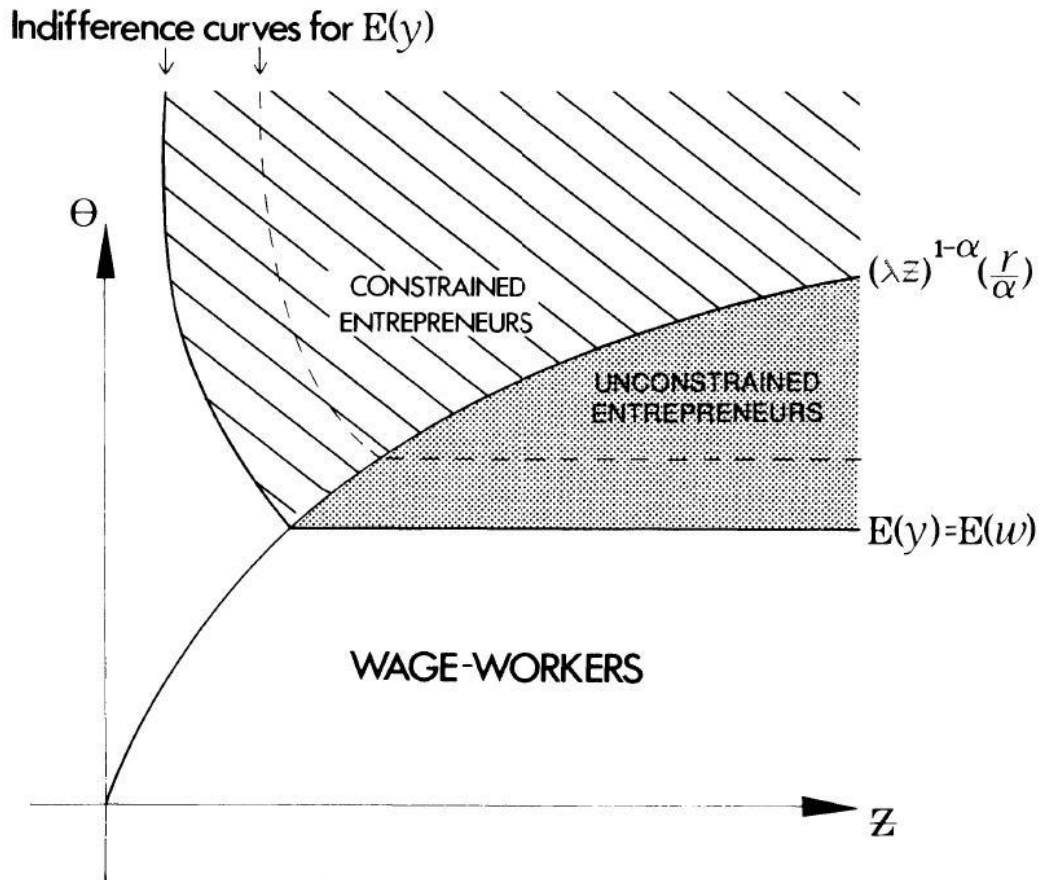
$$I = \max \left\{ (b^\alpha - rb) \theta^{\frac{1}{1-\alpha}}, w \right\} \text{ if } \theta \leq \frac{r}{\alpha} (\lambda z)^{1-\alpha} \tag{2}$$

$$= \max \left\{ \theta (\lambda z)^\alpha - r \lambda z, w \right\} \text{ if } \theta > \frac{r}{\alpha} (\lambda z)^{1-\alpha} \tag{3}$$

A little algebra can show that $b^\alpha - rb$ is unambiguously positive. Notice that in the unconstrained situation whether or not the person chooses to become an entrepreneur depends solely on the value of θ , not on initial wealth. They will become an entrepreneur whenever θ exceeds a cutoff value.

There are two sources of inefficiency arising from the credit constraint. One is that there are some people who should be entrepreneurs but instead choose wage work because they have low assets. The second is that there are some businesses that would like to invest in more capital but cannot.

We can now consider this case diagrammatically in (z, θ) space. We start by noting that equation 1 describes the boundary between constrained and unconstrained entrepreneurs, individuals below the boundary will be unconstrained and above the boundary will be constrained. It is important to remember that income is identical for unconstrained and constrained entrepreneurs who lie exactly on the boundary.



In the unconstrained region, as explained above there is some cutoff value of θ above which people become entrepreneurs, and this does not depend on their level of z . In this region capital invested is the same for all agents and so are the returns from being an entrepreneur (since these returns are determined only by the amount of capital).

To see the shape of the indifference curves in the constrained region, we can set (3) equal to some sort of constant \bar{I} and then solve for θ in terms of z , which yields $\theta = \bar{I}(\lambda z)^{-\alpha} + r(\lambda z)^{1-\alpha}$.

Suppose that z and θ are uncorrelated. Several empirical predictions arise from this model:

1. The probability of starting a business is correlated with initial wealth only when there are credit constraints. This follows from the fact that in the unconstrained case z does not enter into the final maximization.
2. Wealthier entrepreneurs will enjoy higher levels of entrepreneurial returns, because they have more capital to invest. We can see this by noting that as z increases, we are able to hit higher level curves on the indifference map.
3. Poorer entrepreneurs must devote a larger proportion of their assets to their businesses.
4. Smaller firms will grow faster than larger firms started at the same time. This occurs because smaller firms will be initially credit constrained and will thus have more incentive to invest profits back into the business, generating growth. To see this, think about a person who starts in the constrained region of the chart. θ remains constant over time, but over time z increases. At some point the individual will shift from the constrained to the unconstrained zone. Notice that once someone is in the unconstrained zone, further increases in z no longer increase investment in the business; this follows from point (1).
5. Over time, assets should become a less important determinant of firm returns because smaller firms will be able to overcome the credit constraint and catch up with larger firms. This follows from the same logic as point (4)—essentially at some point all the small firms will move into the unconstrained zone, and then investment and returns are fixed going forward.

Are there any potential policy implications of the model? Think about a policy that provided better education, which increased people's level of θ . One thing

that we can see is that if individuals are sufficiently poor (low z), such a policy will not actually increase entrepreneurship. Diagrammatically this is like moving up and down in the region to the left of the indifference curves. This might be a reasonable description of some developing countries.

Alternatively, we can think of a policy that offers subsidies for individuals starting small businesses. This model predicts that such subsidies would be valuable only to more skilled entrepreneurs. Many subsidies to entrepreneurs are targeted towards certain types of individuals (e.g., minority set-asides, microcredit loans to poor/women, entrepreneur competitions for MBA students). If these characteristics are correlated with entrepreneurial ability, that could increase or decrease the efficacy of such subsidy programs.

Reference

Evans, David S. and Boyan Jovanovic. 1989. "An Estimated Model of Entrepreneurial Choice under Liquidity Constraints." *Journal of Political Economy* 97(4) 808-827.