Specialization and Human Capital

Specialization

- We learn from consumer theory that people have preferences for diversity in consumption, captured by diminishing marginal rates of substitution (convex indifference curves in the goods space)
- But people seldom do very different tasks at work—specialization is the norm in the workplace, despite the fact that many of us find specialization at work rather boring

Human Capital and Specialization

- Suppose education improves productivity (wages) at a decreasing rate. Specifically, let the education-wage relationship be the following:

educational expense	daily wage
0	\$100
\$2,000	\$120
\$4,000	\$130

- Let's say a worker without any education is spending 150 days on activity A and 150 days on activity B for variety's sake. His total income is \$30,000.
- If he specializes in activity A, his total income (for the same amount of work) would still be \$30,000.

Investing in Skills without Specialization

- Suppose this worker is interested in improving his situation by investing in education. He invests $2,000 on activity A and $2,000 on activity B, and divides his time equally as before. Total earnings are now $36,000. Net income is $32,000, which is better than before.
- Because of diminishing returns, it is not worth investing $4,000 in both activities, because net income would become $31,000.

How Specialization Changes the Picture

- But he can do even better than that. Instead of investing in both activities, suppose he only acquires knowledge about activity A. His daily wage in activity A will be $120 while his wage in activity B will remain at $100.
- Obviously, this person will now spend all 300 days of work on activity A. Indulging in his preference for variety would become too costly.
- His total earnings are still $36,000, but net income is now $34,000.
- Once the person specializes, it is advantageous for him to invest even more. For example, investing $4,000 in activity A will generate a net income of $35,000.
- The actual benefits may be even bigger than this. With a daily wage of $130 instead of $100, the person may want to work more days in a year. The costs of education do not change as he utilize it more intensively, but the returns do. For example, if he works 320 days, his net income would be $37,600.

Reinforcement

- The incentive to invest in human capital and the incentive to specialize reinforce one another due to the fact that the rate of return to human capital investment increases with utilization
- Karl Marx wrote,
  - "In a communist society, where nobody has one exclusive sphere of activity but each can become accomplished in any branch he wishes, society regulates the general production and thus makes it possible for me to do one thing today and another tomorrow, to hunt in the morning, fish in the afternoon, rear cattle in the evening, criticize after dinner, just as I have a mind, without ever becoming hunter, fisherman, shepherd, or critic."
- The key error is that becoming accomplished in a branch requires investment. And once you become accomplished in hunting, going fishing in the afternoon has high opportunity cost.

Balanced Skills and Entrepreneurship

- Entrepreneurs perform many tasks—consider the owner of a small coffee shop
- Even if she delegates and uses outsourcing, she must have some basic understanding of the outsourced areas to make sure
  - she delegates/outsources to the right person
  - she can properly manage their relationship
- She must be a jack-of-all-trades

Investments in Human Capital

- Different tasks requires different kinds of skills
- Say there are two different skills, x and y
- Each person is endowed with some levels of these two skills. Let this endowment be represented by (x_0, y_0)
- One can improve her skills by investing. To improve skills from (x_0, y_0) to (x', y'), the investment cost is

$$C(x' - x_0) + C(y' - y_0)$$

- Assume that marginal cost of investment is positive and increasing (i.e., $C' > 0$, $C'' > 0$)

Specialists vs. Entrepreneurs

- Specialists perform only one task

$$\text{income for specialist} = \max\{x', y'\}$$

- Entrepreneurs perform multiple tasks

$$\text{income for entrepreneur} = \lambda \min\{x', y'\}$$

  - λ is parameter that sets the price of entrepreneurial talent and is determined by production technology and market-determined conditions that balances supply and demand

Investment by Specialists

- Specialists will invest in only one skill
- If $x_0 > y_0$, then it is cheaper to invest in x than in y in order to reach a certain target level of income
- If $C'(0) > 1$, then the specialist chooses $x^* = x_0$ (does not invest).
- If $C'(0) < 1$, then optimal amount of investment is determined by

$$1 - C'(x^* - x_0) = 0$$

Investment by Entrepreneurs

- Suppose $x_0 > y_0$
- If this entrepreneur does not invest, her income is λy_0
- Optimal investment:
  - If $C'(0) > \lambda$ (marginal cost of investing in the first unit of y exceeds marginal benefit), then the entrepreneur chooses $x^* = x_0$ and $y^* = y_0$ (does not invest).
  - If $C'(0) < \lambda$ but $C'(x_0 - y_0) > \lambda$ (marginal cost of investing in the first unit of y is less than marginal benefit but marginal cost of investing further after y has reached $y = x_0$ is lower than marginal benefit), then the entrepreneur only invests in y. Her final skill level is $y^* \in (y_0, x_0)$ and is determined by

$$\lambda - C'(y^* - y_0) = 0$$

  - If $C'(x_0 - y_0) < \lambda$ but $C'(0) + C'(x_0 - y_0) > \lambda$, then she chooses $y^* = x_0$ and $x^* = x_0$.
  - If $C'(0) + C'(x_0 - y_0) < \lambda$, then she invests in both skills to bring them up from (x_0, y_0) to (z^*, z^*), where

$$\lambda - C'(z^* - x_0) - C'(z^* - y_0) = 0$$

Contrasts

- A specialist invests only in the area that will strengthen his initial advantage
- An entrepreneur invests more in the area that will strengthen her initial disadvantage
- An entrepreneur invests in different types of skills

Stanford MBAs

- Lazear (2004) looks at courses chosen by Stanford MBAs
- He codes the variable

$$\text{SPECIAL} = \#\text{ courses in field of specialty} - \text{average } \#\text{ courses in other fields}$$

  - example: 8 in finance, 2 in econ, 2 in organizational behavior, 4 in stat, 4 in accounting
  - $\text{SPECIAL} = 8 - (2 + 2 + 4 + 4)/4 = 5$
- The prediction is that those who specialize are less likely to become entrepreneurs

Evidence

TABLE 3—TOBIT AND LOGITS WITH STANFORD COURSE DATA: NUMBER OF BUSINESSES STARTED (TOBIT) AND EVER STARTED A BUSINESS (LOGIT)

Variable	Logit	Tobit
EXPERIENCE	0.0259	0.0266
	(0.0185)	(0.0196)
SPECIAL	−0.1458	−0.1452
	(0.0581)	(0.0592)
MALE	0.6025	0.6305
	(0.1511)	(0.1531)
MBA year	−0.0318	−0.0384
	(0.0215)	(0.0224)
AGE	0.0250	0.0264
	(0.0179)	(0.1531)
Constant	0.0202	0.3243
	(2.4182)	(2.4897)
Log likelihood:	−841	−1,181
Number of observations:	1,952	1,950

Note: Standard errors are reported in parentheses.

- 1 s.d. decrease in SPECIAL (from 2.48 to 1.36) raises the chance of being ever an entrepreneur by 1/8 (from 0.24 to 0.27)