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Weeks 6-7: The Signs of Signaling: In Case You're Still Not Convinced

I. The Case So Far
   A. I've tried to establish that education has a far bigger effect on earnings than job skills.
   B. This is consistent with signaling, but not human capital, and accordingly seems like a strong argument in favor of the former.
   C. I've also offered a long list of common-sense arguments that favor signaling over human capital.
   D. But are there research literatures that speak to the issue? Yes; there are four big ones. Let's consider each in turn.

II. Basics of the Sheepskin Effect
   A. Suppose you exogenously miss your last final exam, and end up one class short of a degree. Should you return to school to finish your degree?
   B. Human capital and signaling offer radically different advice.
      1. Human capital tells you not to finish. You know just as much as graduates, so you'll be paid just as much as if you'd finished.
      2. Signaling tells you to finish. Employers don't know why you failed to finish, so they'll treat you like the average person without a degree.
      3. Remember conformity signaling?
   C. Labor economists usually specify log-linear effects of education, so every year of education raises income by the same percent.
   D. But when they test for degree-year discontinuities, they almost always find them. Two approaches:
      1. In the absence of explicit degree measures, look at typical graduation years (especially 12 and 16).
      2. In the presence of explicit degree measures, use them!
   E. First approach yields big average sheepskin effects.
      1. High school: +5% for normal year, +12.7% for graduation year.
      2. College: +5.5% for normal year, +23.1% for graduation year.
   F. Second (and superior) approach yields even bigger average sheepskin effects.
      1. High school: +4.4% for normal year, +15.1% for graduation year.
      2. College: +5.1% for normal year, +34.1% for graduation year.
   G. Evidence on graduate sheepskins is thinner, but several studies find the graduate payoff is *all* sheepskin.
   H. The GSS is ideal for estimating sheepskin effects, because there are explicit measures of completion of both degrees and years of school. Basic results:

Table 4.1: Sheepskin Effects in the General Social Survey (1972-2012)

	Effect on Earnings	
Education	If Only Years of Education Matter	If Diplomas Matter Too
Years of Education	+10.9%	+4.5%
High School Diploma	–	+31.7%
Junior College Diploma	–	+16.6%
Bachelor's Degree	–	+31.4%
Graduate Degree	–	+18.2%
All results correct for age, age squared, race, and sex, are limited to labor force participants, and converted from log-dollars to percentages.		

III. Interpreting the Sheepskin Effect

A. Early signaling debates take the connection between the sheepskin effect and signaling for granted. Now that it's undeniable, however, some reinterpret the evidence.

B. How could sheepskin effects *not* reflect signaling?

1. "Best-for-last" theory?
2. Ability bias.

C. But: Correcting for measured ability does nothing to undermine the sheepskin effect, because estimated effects of degrees *and* individual years fall, leaving the ratio roughly constant.

D. Ability bias and sheepskins in the GSS:

Table 4.2: Sheepskin Effects and Ability Bias in the General Social Survey (1972-2012)

	Assumption	
Effect on Earnings	Only Years of Education Matter	Diplomas Matter Too
Years of Education	+10.3%	+4.2%
High School Diploma	–	+32.0%
Junior College Diploma	–	+10.4%
Bachelor's Degree	–	+29.8%
Graduate Degree	–	+17.8%

All results adjust for age, age squared, race, sex, and cognitive ability, and are limited to labor force participants, and converted from log-dollars to percentages.

E. When pay spikes, so does graduation itself. "Finish your degree, then quit" is the modal strategy. If the sheepskin effect weren't real, why would people do this?

F. We can use the sheepskin effect to put a *lower bound* on signaling's share.

1. The Cautious signaling assumption: sheepskin effects reflect signaling, yearly effects reflect human capital.

G. Why only a lower bound? Because education would still send favorable signals in a world without the concept of "degrees."

IV. Malemployment and Credential Inflation

A. Many workers have more education than they use. You could call them:

1. "Overqualified": their education is too good for their jobs.
2. "Malemployed": their jobs aren't good enough for their education.

B. Three main measures of malemployment:

1. Atypical education: Is your education abnormally high given your occupation? Result: 10-20% malemployment. Drawback: what if everyone in an occupation is malemployed?
2. Self-report: Do you have too much, too little, or just enough education for your job? Result: 20-35% malemployment. Drawback: Social Desirability Bias.
3. Job analysis: Researchers judge how much education your job "really requires." Result: 20-35% malemployment. Drawback: skill requirements change over time.
4. The tautological objection: whatever you have is what you "really need."

C. Malemployment has risen over time and during the Great Recession. Long-run estimates:

1. Early 70s to mid-90s, average education rose 1.5 years; higher-skilled occupations account for only .3 years.
2. 1972-2010, average education rose 1.75 years; higher-skilled occupations account for only 19%.

D. Rival interpretations:

1. Human capital: "Malemployment" arises when students fail to acquire marketable job skills in school.
2. Signaling: "Malemployment" reflects credential inflation. The more education workers have, the more they need to signal their quality.

E. Two interpretations diverge on one big issue: Does the labor market reward workers for education they don't *use* on the job?

F. Georgetown Center on Education and the Workforce data tabulates earnings by education for more than a quarter million workers in 500 occupational categories. Two big patterns:

1. High school grads out-earn dropouts in almost all occupations. There are 214 occupations with at least ten dropouts and ten high school grads. High school grads outearn dropouts in 93% of occupations, with a median premium of +37%.
2. College grads out-earn high school grads in almost all occupations. There are 270 occupations with at least ten high school grads and ten college grads. College grads out-earn high school grads in 90% of occupations, with a median premium of +28%.
3. Note: there are no ability controls.

G. What about occupations with little or no plausible connection to academic curricula? Results for six clear-cut cases:

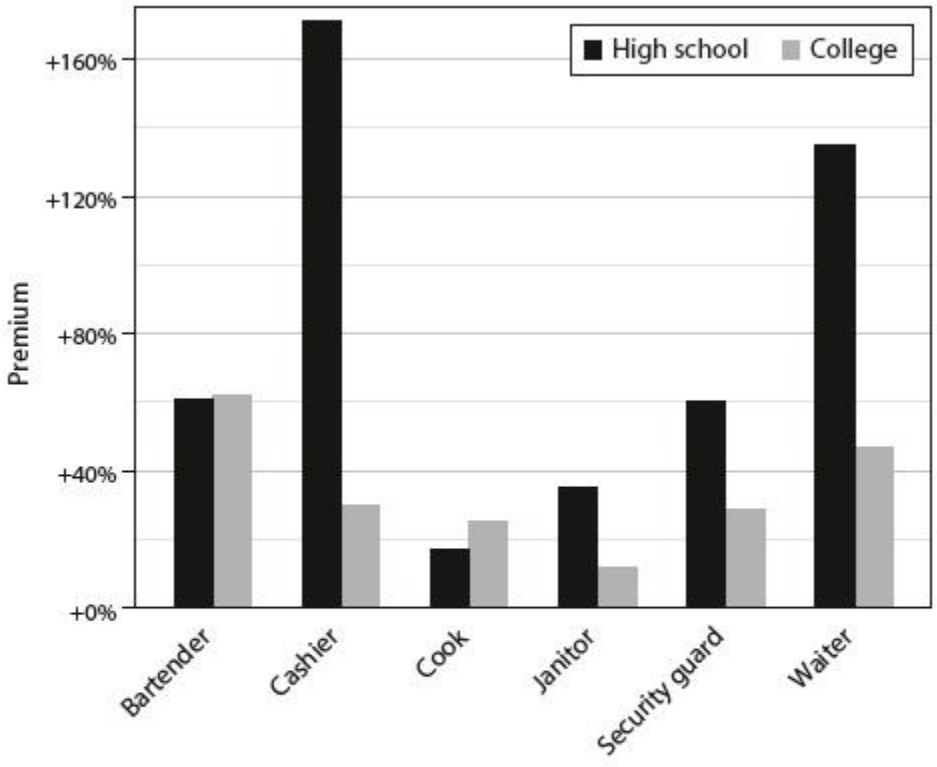

Figure 4.1: Education Premiums in Selected Nonacademic Occupations
Source: Supplementary data for Carnevale et al. 2011, supplied by coauthor Stephen Rose.
High school premium = [(median earnings for high school graduates)/(median earnings for high school dropouts)] −1.
College premium = [(median earnings for college graduates)/(median earnings for high school graduates)] −1.

H. Broadening the sample, about one-third of occupations have at least ten workers in each educational category. About one-third of occupations at

least arguably build on traditional academic coursework. Median premiums for "arguably academic" versus "nonacademic" occupations:

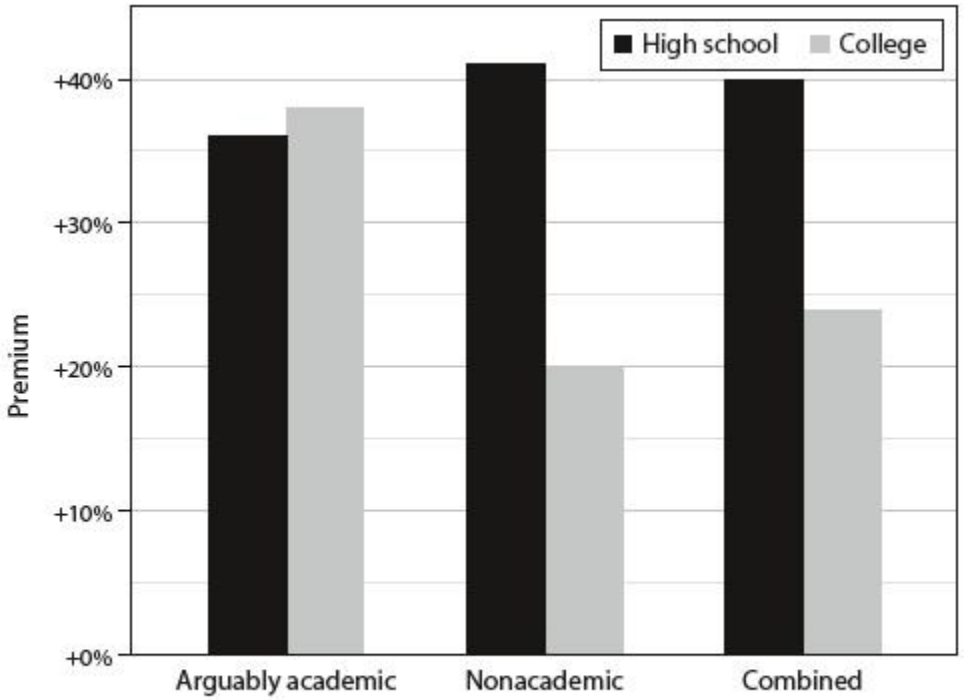

Figure 4.2: Median Education Premiums by Occupational Category
Source: Supplementary data for Carnevale et al. 2011, supplied by coauthor Stephen Rose.

I. We can estimate signaling's share by dividing the nonacademic premium (which presumably reflects something like pure signaling) by the combined premium (which reflects both). Result: near-100% signaling for high school, 80% for college.

J. The Georgetown dilemma: Either employers are fools, or schooling raises productivity in virtually any line of work.
   1. But what about signaling?!

V. Speed of Employer Learning

A. Recall that signaling is a special case of statistical discrimination: using true-on-average stereotypes to save time and money.

B. With repeated interaction, phasing out statistical discrimination is profitable. Every time you interact, you cheaply acquire additional individualized information.

C. This applies to educational signaling: the longer employers know you, the less reason they have to rely on mere credentials. Employers eventually know the "Real You."

D. But how long is "eventually"? Research on the speed of employer learning tries to answer this question.

E. Method: If researchers know credentials and proxies for actual ability (in practice, mostly IQ), then can separately estimate their rewards *over time*.

Employer learning prediction: education premium will fall with experience and ability premium will rise with experience.

F. This prediction is true, at least for U.S. data. But the process takes years or decades.
   1. Two seminal studies: ability premium sharply rises over first decade of work experience, while education premium falls 25-30%.
   2. Later prize-winning study: both premia plateau after about ten years of experience.

G. Employers seem to see through college grads faster than others.
   1. Early study: Academic performance is a strong predictor of job *performance* in both blue- and white-collar jobs, but only college grads receive a noticeable job *reward*.
   2. Recent study: Employers see college grads' ability "nearly perfectly," but less-educated workers (including workers with "some college") wait over a decade to get full reward.
   3. Also: Only paper to measure how sheepskin effects evolve over time finds they take about two decades to disappear.
   4. This is all bad news for "diamonds in the rough" who want to skip college.

H. Major caveats on employer learning:
   1. Employer learning research neglects noncognitive ability.
   2. Learning plateaus do not imply perfect knowledge.
   3. Signals can affect pay even after employers know the truth. (Firing aversion, fairness norms, dehiring).

I. Ignoring these caveats, employer learning papers find a much smaller role for signaling than I claim, ranging from 14-40% signaling.
   1. But we shouldn't ignore these caveats!

VI. The Education Premium: Personal Versus National

A. In a pure human capital model, education equally enriches individuals and nations.

B. In a pure signaling model, education enriches individuals but not nations.

C. This implies another way to estimate human capital/signaling split.
   1. Measure effect of personal education on personal income. (The "Micro-Mincer" premium).
   2. Measure effect of national education on national income. (The "Macro-Mincer" premium).
   3. Divide the later by the former to find the human capital share. The rest is signaling.
   4. Example: If a year of education raises personal income by 10% but national income by 6%, human capital/signaling split is 60/40.

D. International results for personal education:
   1. Premium is positive in every country studied.
   2. U.S. premium is very high for the developed world.

3. Premium is generally lower in richer countries. 50-country study finds 7.4% premium in high-income countries, 10.7% in mid-income countries, 10.9% in low-income countries, and 9.7% for world. (Not ability-corrected, though).

E. Results for national education are very mixed. Some prominent economists even find *negative* effects; others, low but positive effects. The rest find moderate positive effects.

F. Bad Third World data? Problem also holds for OECD. Results for study that tries eight different education measures:

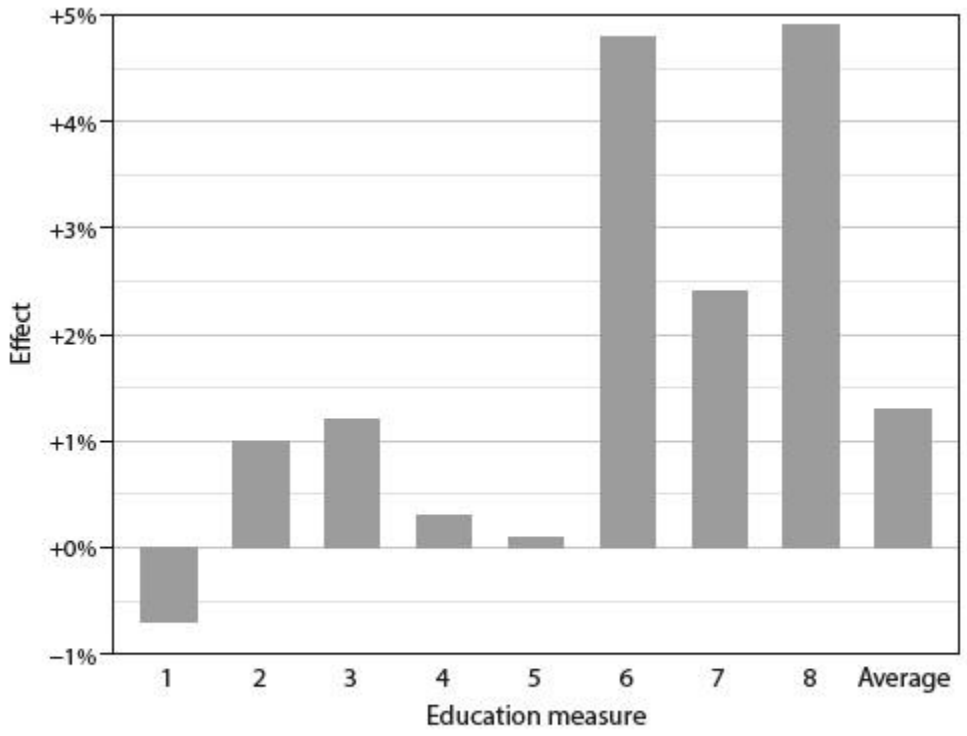

Figure 4.3: Effect of a Year of National Education on National Income
Source: de la Fuente and Doménech 2006b, appendix, p. 52, table A.1.f.

G. Some critics object that measurement error downwardly biases estimates of education's effect. Corrections raise education's measured effect.
   1. As usual, though, these corrections assume everything *except* education is measured without error!

H. Measured effect of education is even less impressive than it looks, because all these papers ignore reverse causation. Main paper to address this issue cuts out another two-thirds of education's effect.

I. Final step: compare. Personal effect estimates are roughly 8-12%. National effect estimates are roughly 1-3%. Big range, but 20/80 is right in the middle.

J. Admission: data quality is poor. But believing the results if they support human capital and ignoring them if they support signaling is bad science.

VII. What About Test Scores?
- A. Chetty and value-added studies.
  1. Cognitive gains fadeout in a few years.
  2. Income effects are lasting.
  3. Average effect of a good teacher is only a few hundred dollars per student per year, but it multiplies to a big payoff.
- B. But: Gain could reflect either human capital, or just promotion of academic gamesmanship. Even if it's entirely the former, teacher effects are only a small share of education's payoff.
- C. Hanushek and national test scores.
  1. Unlike mere years of education, national test scores strongly predict national income.
  2. In fact, national test scores have much *bigger* payoffs than personal test scores.
  3. In Hanushek's preferred specifications, test scores permanently raise the growth rate.
  4. Big underlying claim: These effects are genuinely causal, especially for math and science scores.
- D. My critique:
  1. Not plausible that average math and science scores have much causal effect, because most jobs use little math and almost no science.
  2. Better story: national test scores are disguised average IQ scores. Better math and science teaching would probably only yield hollow gains for actual intelligence.
  3. Even if Hanushek's right about what education could do, signaling model describes what education actually does.

VIII. Labor Economists Versus Signaling
- A. The signaling model is taken serious in sociology, psychology, and education research. It's also taken seriously by non-specialists in economics. Empirical labor and education economists, however, are highly dismissive.
- B. Why should you believe me rather than the consensus of specialists?
  1. Evidentiary double standards (e.g., sheepskin effects and cross-national evidence)
  2. Neglect of evidence from psychology, education, and sociology (especially learning vs. earning evidence).
  3. Pro-education bias.
  4. Intellectual inbreeding.
- C. Is everything signaling? Of course not. But 20% human capital, 80% signaling is a reasonable estimate.
- D. Bringing all the evidence together:

Table 4.3: Signaling in Sum

Issue	What Pure Human Capital Says	What Pure Signaling Says	Advantage?
Learning-Earning Connection	Only job-relevant learning pays.	Irrelevant learning pays too, as long as it's correlated with productivity.	Signaling
Collegiate Exclusion	Colleges prevent unofficial attendance so students actually pay tuition.	Colleges ignore unofficial attendance because the market doesn't reward it anyway.	Signaling
Failing vs. Forgetting	Employers only reward workers for coursework they still know.	Employers also reward workers for coursework they used to know.	Signaling
Easy A's, Cancelled Classes, and Cheating	Students only care about marketable skills, not graduation requirements or grades.	Students only care about graduation requirements and grades, not marketable skills.	Signaling
Sheepskin Effect	Graduation years won't be especially lucrative.	Graduation years may be especially lucrative.	Signaling
Malemployment	Degrees required to *get* a job depend solely on skills required to *do* a job.	Degrees required to get a job rise when those degrees become more common.	Signaling
Employer Learning	Employers instantly discover and reward true worker productivity.	Employers never discover or reward true worker productivity.	Signaling
Personal vs. National Returns	Education equally enriches individuals and nations.	Education enriches individuals but not nations.	Signaling