

Chapter 6, part II

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Outline

1. Does school quality matter?
2. Post-schooling human capital investments (training)
3. Application: training programs

1. Does school quality matter?

School quality

Up to this point, we were considering schooling as a very homogenous thing: one year of schooling

But, schooling can vary dramatically

What is the course of study? College preparatory high school vs “shop” high school

What is the average class size?

How much are teachers paid?

What is the qualification of teachers?

Does school quality matter?

I hope this question strikes you as absurd... 😊

The real question (like everything else) is how much does school quality matter

The problem: our empirical measurements for a long time routinely delivered the answer “not much”

The answer in 1990s

Hanushek review of the literature

“There appears to be no strong or systematic relationship between school expenditures and student performance.”

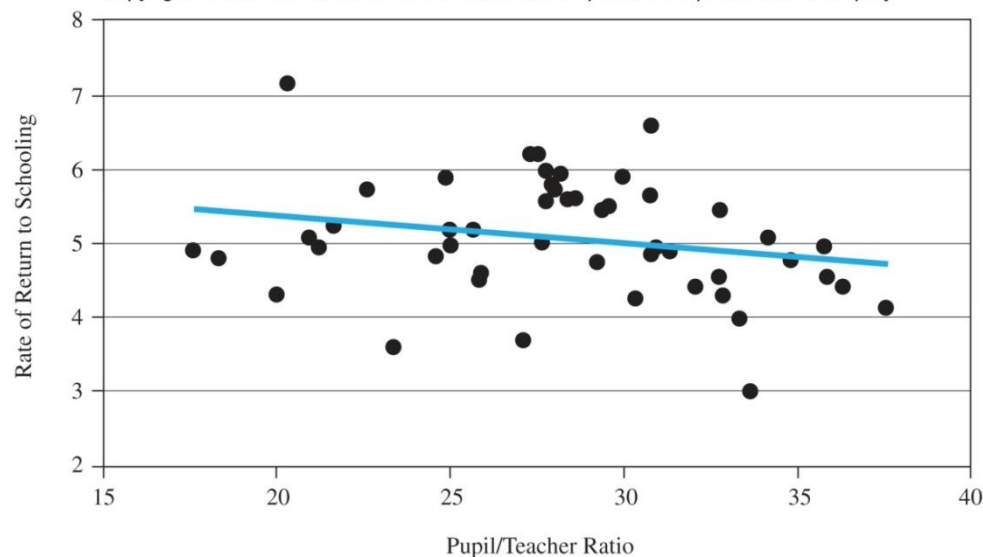
Example: Card & Krueger 1992

State-level schooling returns vs. pupil/teacher ratio

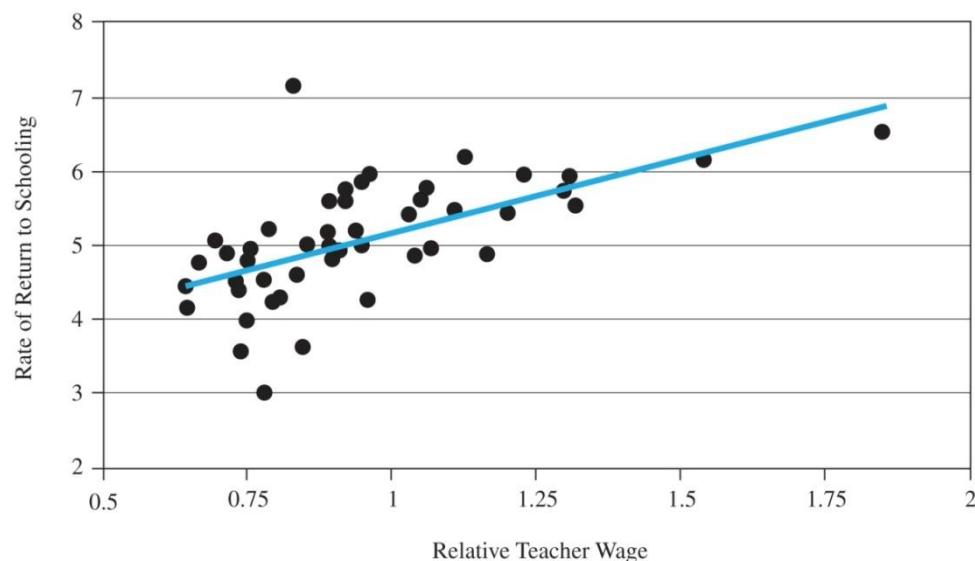
State-level schooling returns vs. teacher wage

Typical finding: class size doesn't matter

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(a) Impact of Pupil/Teacher Ratio



(b) Impact of Teacher Salaries

Since the 1990s

The problem with these large-scale studies is that it is hard to convincingly isolate causality

Areas that are doing poorly may invest more education

Studies have tackled the problem with many more fancy strategies (including an RCT) to try to more convincingly answer the question

Tennessee STAR

A large-scale RCT of class size

Result: smaller classes led to better test scores

“Maimonides’s Rule” study

Israeli rule: maximum class size is 40. If 41 students...

Result: smaller classes led to better test scores

Since the 1990s

Studies that have tackled the problem

Accepted, but don't attend...

“Elite” colleges tend to have better students by definition—do the students do better because the students do better to begin with or because the elite college provide more

Compare those who were accepted to elite colleges but chose elsewhere, to those who were accepted and attended

Finding: No value-added to elite colleges

Potential problem: might those who were accepted but didn't attend do so exactly because their relative payoff was low?

Perhaps an elite college helps a lawyer or doctor more than a tech entrepreneur

Bottom line....

The economics of education has been a booming field in economics

There have been tons of RCT studies and plausible observational studies to examine all sorts of aspects of it

Do school expenditures matter? Class size? Teacher pay?
Teacher qualifications? Charter schools? School of choice?
Gifted programs?

Common finding: Yes, they can help, but they generally are not sufficient. It depends on the context and how things are implemented

2. Post-schooling human capital investments (training)

After schooling...

Human capital investment does not need to stop after schooling is completed

NOTE: Even this is still highly stylized—individuals can return to schooling

Training

“Post schooling human capital investment”

Training is provided in the context of a specific job, “On-the-job training”

Training may be provided by the employer or may be contracted out to a community college

Training may be general: learning a new software package that is generally available, like Microsoft Access

Training may be specific to a firm

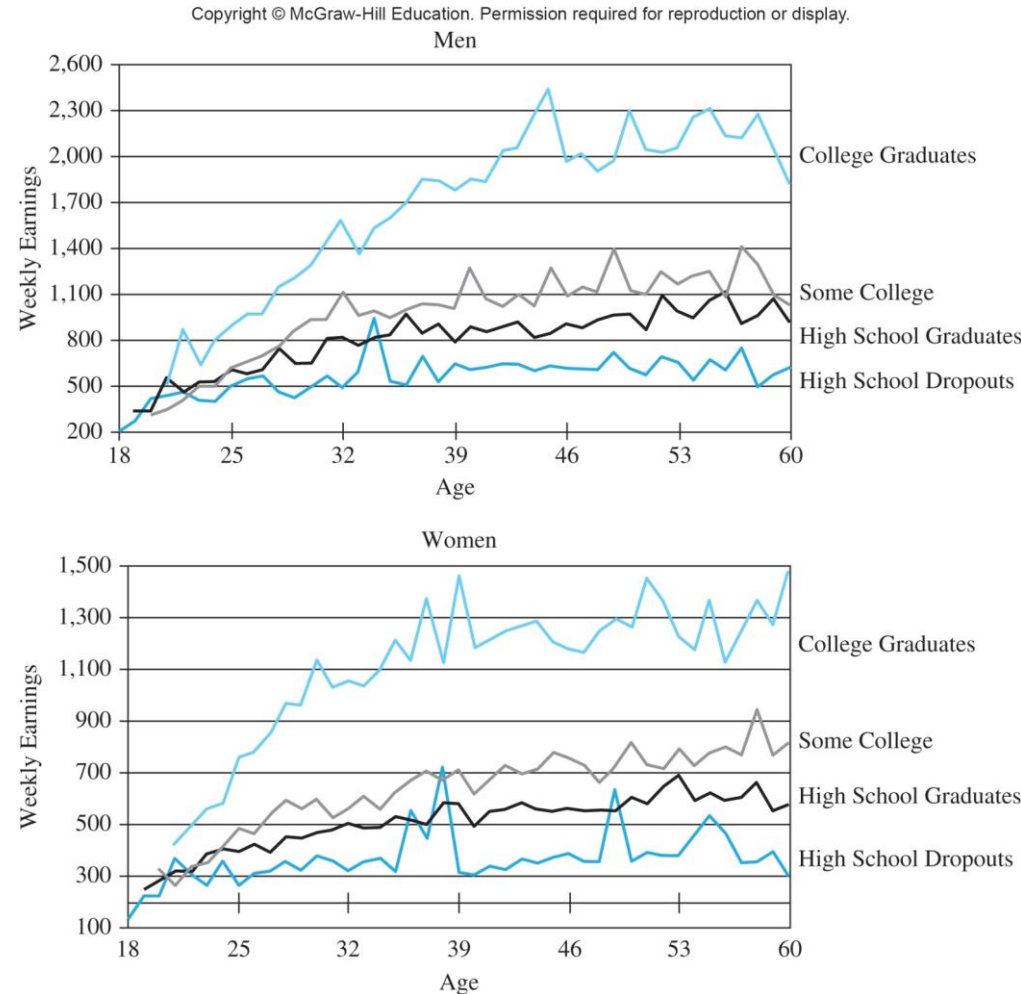
Is training important? Some data

Wage profiles increase with education
Due to ability or signaling

Wage profiles are increasing with age
Training? Experience?

Wage profiles are concave
The rate of growth is declining
Less training as one ages?

Wage profiles increase faster for highly educated
Might those with a knack for schooling have a knack for training?



On-the-Job Training (OJT) model

Suppose there are two types of OJT

General: skills that are valued outside the firm (Microsoft)

Specific: skills that are not valued outside the firm (proprietary software)

Note: This is just like costs (where we divide them into two polar categories, fixed and variable) where the division is meant to highlight the differences in incentives.

In reality, (1) OJT is often a mixture of the two and (2) training is likely to be valued differently by different firms

A simple model

Suppose there are two periods

Let TC be the total cost of hiring a worker

Let VMP be value of the worker

Let r be the interest rate

OJT model

Profit maximization implies

$$TC_1 + \frac{TC_2}{1+r} = VMP_1 + \frac{VMP_2}{1+r}$$

Workers must be paid their marginal product

Adding in training

Suppose the total cost of hiring a worker is the wage w and the cost of training H

Suppose all training has to take place in the first period

$$w_1 + H + \frac{w_2}{1+r} = VMP_1 + \frac{VMP_2}{1+r}$$

General OJT

Suppose that the training in question is general

Implication 1: The worker's value at all firms in period 2 is VMP_2 , so the firm must pay the worker VMP_2 in the second period or lose the worker

Thus, the previous expression simplifies to

$$w_1 = VMP_1 - H$$

Implication 2: The firm is only willing to pay a wage equal to the VMP minus the training costs—or the firm only provides general training if the worker pays the entire cost

The training is on-the-job, but the worker is paid less during that training period

Why? If the firm paid some, it couldn't pay the VMP in both periods—and then another firm would hire the worker away

General OJT

Does this mean the training isn't worthwhile? No. The training is worthwhile as long as the increase in VMP in the second period (discounted) is greater than H

Bottom line: General OJT will always be paid for by the worker through lower first period wages

Specific OJT

Suppose that the training is specific to the firm

In this case, the worker's outside wage does not depend on training—the training does not increase the worker's productivity elsewhere

Denote this outside wage as w_{bar}

One could think of $w_{bar} = VMP_1$ if the process of training did not reduce the worker's output in the first period. In other words, we might assume that VMP_1 is the productivity of an untrained worker

That seems like a strong assumption—that training doesn't affect productivity, so let's just call this outside wage w_{bar}

In thinking through the options, remember employment is generally “at will”

Labor law term that means firms can generally fire workers without cause

The same is true for employees: We can leave an employer whenever we like

Specific OJT

Bad Option 1: firm pays

The firm may like to pay H if VMP_2 was high enough, but the firm cannot guarantee the worker won't quit

If worker quits, the investment is lost

Bad Option 2: individual pays

The individual may like to pay H if VMP_2 was high enough, but the worker cannot guarantee she won't be fired

If worker is fired, the investment is lost

Good Option 3: costs are split with long term contract

Contract: H is split and $\bar{w} < w_2 < VMP_2$

The wage implies that the benefits of training are split

Individual prefers to stay because wage is better staying, and firm prefers to retain worker because of productivity gains

The costs H are then split to the employment and the worker

Specific OJT

Implication 1: w no longer equals VMP each period

W is less than VMP in period 1 because the training costs are split and W is less than VMP in period 2 because the benefits are split

Implication 2: we now have a justification for long term contracting

If workers are always paid their VMP, workers and firms are completely interchangeable

We don't see that in the real world—we tend to see long-term worker/firm relationships

Might these long-term relationships be due to firm specific investments that were made and are now paying off?

Specific OJT

Implication 3: we have a motivation for hiring and layoff behavior

Many firms adopt a “last hired, first fired” approach to downsizing. Why? The first hired are being paid more than the VMP because of training costs, whereas the last hired are being paid less than the VMP because of splitting gains.

Profit maximizing firms should fire the first hired

Temporary layoffs. Many firms will temporarily layoff workers, and those workers wait. Why? They have firm specific human capital that would be wasted if they went to work elsewhere

OJT over the lifecycle

The picture writes down formulas and draws pictures, but the idea is easy...

Suppose we think of human capital as “efficiency units”

This is extending the concept of years of schooling to the training side—how much units of training should one obtain?

At 20, a unit might pay off for 45 years

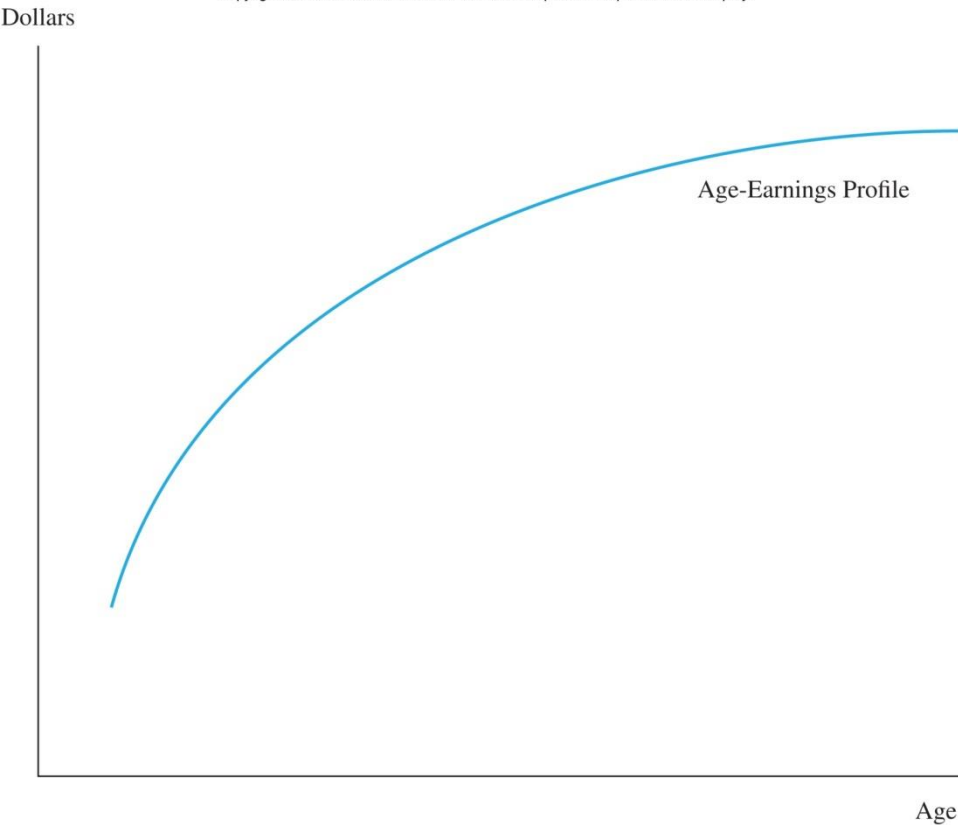
At 30, a unit might pay off for 35 years

I should invest to have more units around at 20 than at 30 because the marginal benefit at age 20 is greater than the marginal benefit at age 30

Implication: my earnings growth should be greater at 20 than at 30 because I am investing more at age 20 than age 30

OJT over the lifecycle

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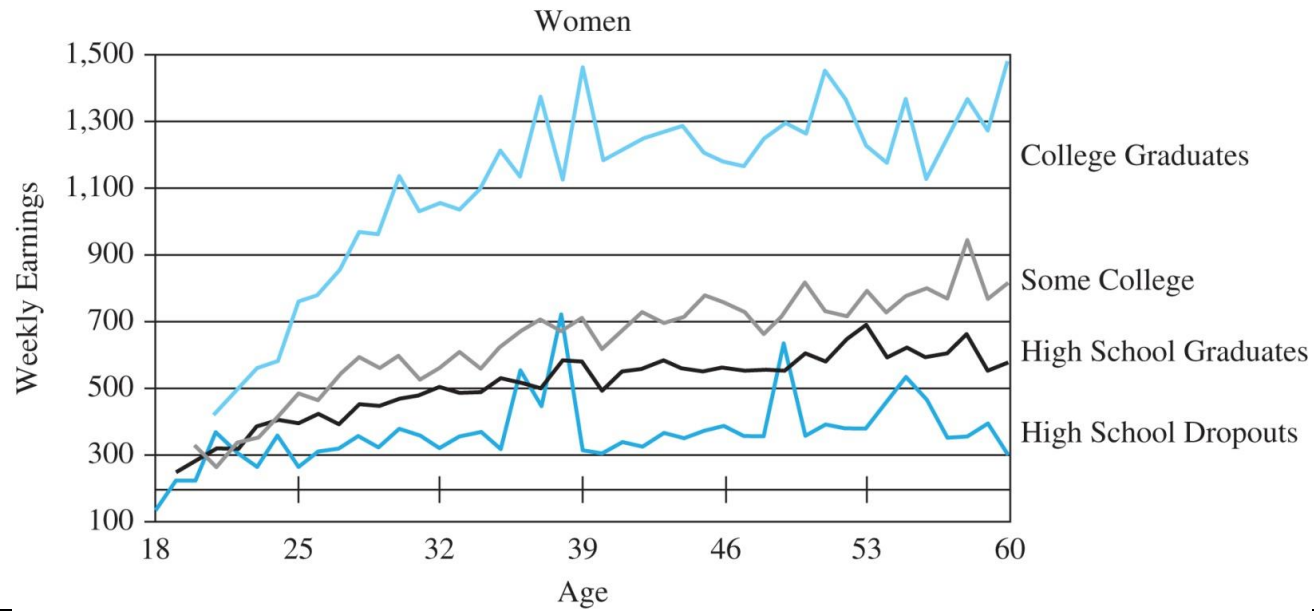
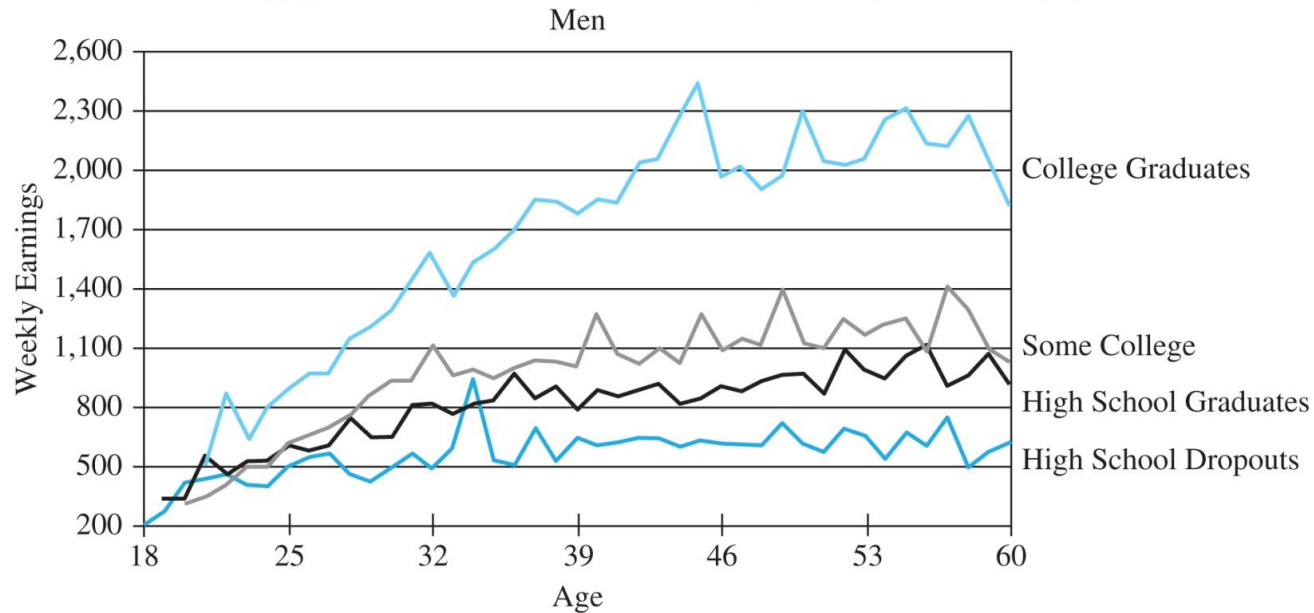
Implication: the age earnings profile should be concave over the lifecycle with optimal investment

High wage growth early because there are more investments early than late in life

It also explains why schooling, which is intensive and expensive training, is grouped early in life

...which is what we saw in the data

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...and included in our Mincer equation

We wrote our Mincer earnings equation as being a quadratic in experience (or age)

$$\log w = \beta_0 + \beta_1 S + \beta_2 \text{exp} + \beta_3 \text{exp}^2 + \beta_4 X + \varepsilon$$

This human capital equation is estimated all of the time in labor economics

The coefficient on S is interpreted as the returns to education—but is so only if there is no ability bias

Experience is included as a quadratic function (or a quartic) so that it can be concave—and is justified as the returns to on-the-job training, which can be thought of as a justification for why experience matters

3. Application: training programs

Job training programs

Another common approach to increase earnings for low-wage workers is to offer job training programs

These programs may be targeted at specific groups—young high school dropouts, “displaced” workers, etc.

There is a long history of performing RCTs on such programs

Example: National Supported Work Demonstration

Objective: ease transition of disadvantaged workers into the labor market

Provided counseling and experience in the context of jobs

A real RCT, with a treatment group and a control group

NSW guaranteed services 9 to 18 months, after which they had to find a job on their own

Cost: \$12,500 per participant

Job training programs

Result

This is a real RCT—no worries about comparability with each other (“internal validity”)

Treatment group’s annual earnings grew by \$1400 more than control group

Interpretation 1: unsuccessful

Treatment group is still very poor

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TABLE 6-4 The Impact of the NSW Program on the Earnings of Trainees (in 1998 dollars)

Source: Robert J. LaLonde, “Evaluating the Econometric Evaluations of Training Programs with Experimental Data,” *American Economic Review* 76 (September 1986): 604–620, Table 2.

Group	Pretraining Annual Earnings (1975)	Posttraining Annual Earnings (1979)	Difference
Treatment group	1,512	7,888	6,376
Control group	1,481	6,450	4,969
Difference-in-differences	—	—	1,407

Job training programs

Interpretation 2: human capital is human capital

Result: earnings go up by \$1400

Cost: \$12,500

Rate of return? Depending on discount rate, it is about 10%-- just like we saw from schooling!

If you wanted this to be an anti-poverty program, you needed to invest more!

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Job training programs

An aside: But is the RCT really the gold-standard?

Is this what we should expect to happen if we rolled the program out nationally?

With growth of RCTs in economics over the last decade, this has become a very controversial issue

What an RCT does: provides internal validity

For the group in question, the effect was \$1400

What an RCT cannot do: provide external validity or GE effects

External validity 1: The groups that were randomized were those that applied—the effect may be different for those who wouldn't apply

External validity 2: Some programs may be less “scalable” than others

General equilibrium: A national program may increase the labor supply of a certain skill group, reducing the overall wage

Like so many areas in this world, people speak too strongly about the problems (they are internally valid!) and benefits (they only apply to the group in question)