

Compensating Differentials

- Plan:
- 1) Basic Idea
 - 2) Theory - Symmetric Info
 - 3) Policy Effects - Symmetric Info.
 - 4) Theory - Asymmetric Info [brief discussion]
 - 5) Theory- Role of heterogeneous worker productivity
 - 6) Evidence
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1) Basic Idea

! one cause of wage diffs across workers, even (indeed, most visibly) when workers equally “qualified / skilled” is pleasantness / unpleasantness, safety / danger of the job itself. While it is probably not most important of all factors causing wage diffs across individuals, it does contribute especially in some circumstances.

! this idea is a very old one - back to Adam Smith:

2) Theory with Symmetric Information

! job attributes are known to both worker and firm when worker is hired

! questions we will address:

- how do comp diffs for job attributes arise?
- what sign will they be in equilibrium?
- what info do they reflect / reveal about tastes and technologies?
- comp statics: effects of policies like safety regulation, unemployment insurance (subs to high risk worker / firms)

! focus here on perfectly competitive (free-entry, $J = 0$) markets only

! in our formal analysis, we'll consider only Compensating Diffs. for aspects of Jobs that are “goods” for all workers, and are costly for all firms to supply

! example - job safety.

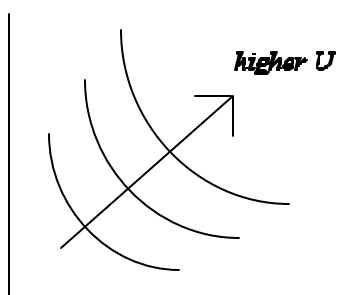
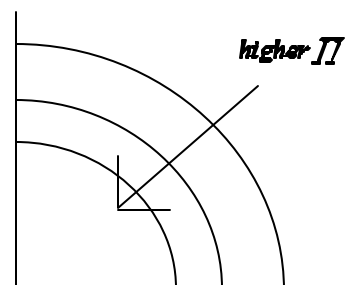
Plan for this section:

- i. homogenous workers and firms
- ii. homogenous workers, heterogenous firms
- iii. heterogenous workers, homogenous firms
- iv. heterogenous workers and firms

i) homogenous workers and firms

! key to analysis: think of competition between firms not on pure wages but on wage-safety bundles

! firms offer, not just a wage, but a wage-safety bundle. Given any fixed level of J , there is only a certain feasible set of combinations of w , S , the firm can afford, called iso J curve. Looks like a ppf. (same for all firms)



! workers evaluate job offers based not just on wage offered but total (wages, safety) bundles and choose the job with the bundle offering highest total utility. Any set level of U can be attained by various wage, safety combinations; so we have an indiff. curve (same for all workers)

! it is important to think here about individuals as making rational choices regarding, among other things, expected longevity. Note, we do this all the time: smoking, driving, flying, jogging, french fries...

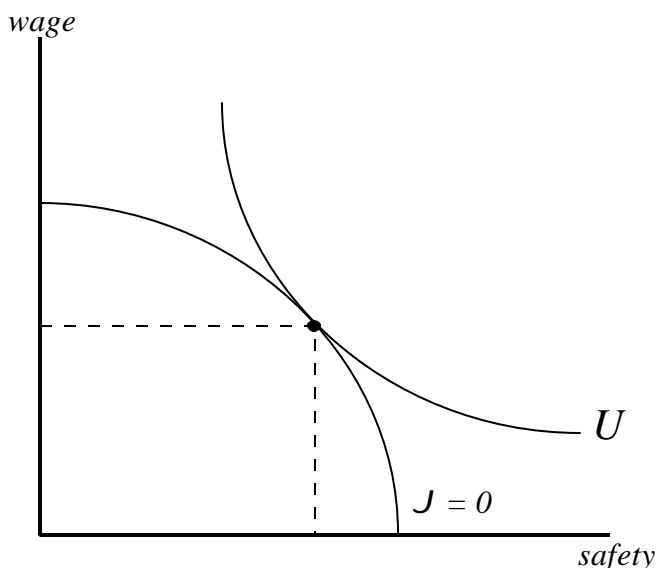
! where will market equil. be in perfect comp?

- if there is free entry of firms into this market, then $J = 0$ in all firms nails down one particular iso J curve it must be on
- if there is free mobility of workers among firms, it must maximize workers' utility, subject to zero J constraint (otherwise, would get no workers...)

^ market equil. wage, safety level:

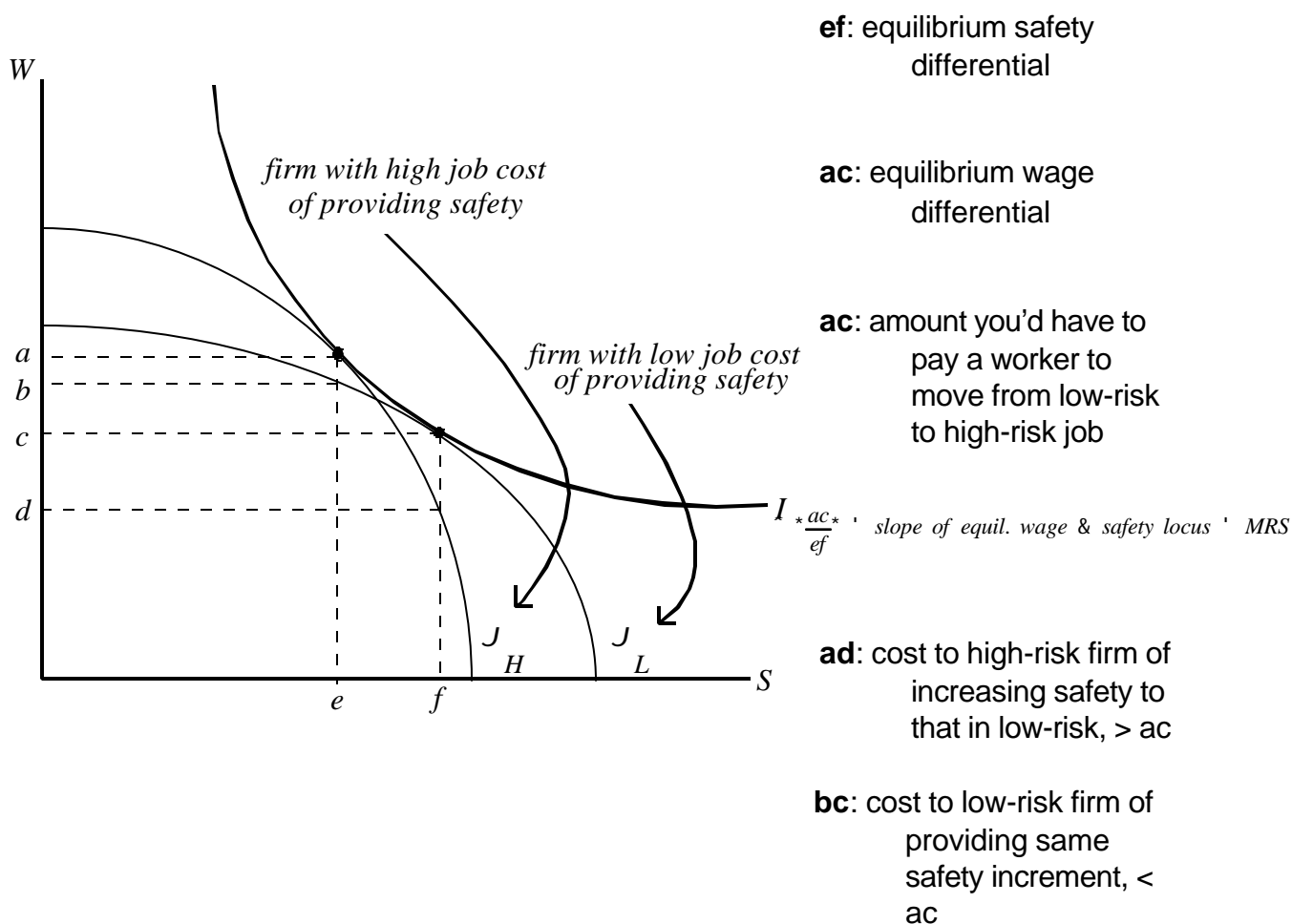
Results:

! in some sense, the safety level that occurs is not the maximal one but the optimal one - workers' most preferred wage/safety bundle given firms have minimal incentive to employ them



! note in this simple world, the wage paid in equil. will reflect the level of safety in the job, costs of providing it, workers tastes, etc. but won't observe any comp. wage diffs. between safer and less safe jobs. This is because all jobs pay the same wage, have same safety level.

ii) homogenous workers, heterogenous firms

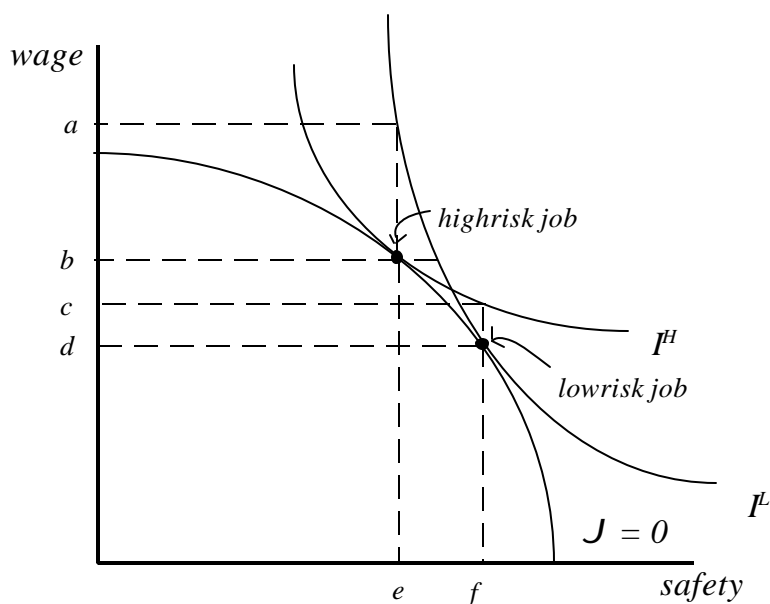


Thus, the equilibrium wage differential tells you about *utility*: It gives workers' MRS, or willingness to pay, for the safety differential **ef**.

Note also that the firms where it costs least to increase safety are those which provide more of it...(there is an efficient allocation of safety levels to firms)

iii) heterogenous workers, homogenous firms

! now assume that all firms have same technology, but workers have different tastes: some workers are risk-tolerant, others are risk-averse.



ef: equil. safety differential

bd: equil wage differential

bd: cost to firm of providing the equil. safety differential

($\hat{|\text{bd}/\text{ef}|}$ = slope of equil. wage safety locus = MRT)

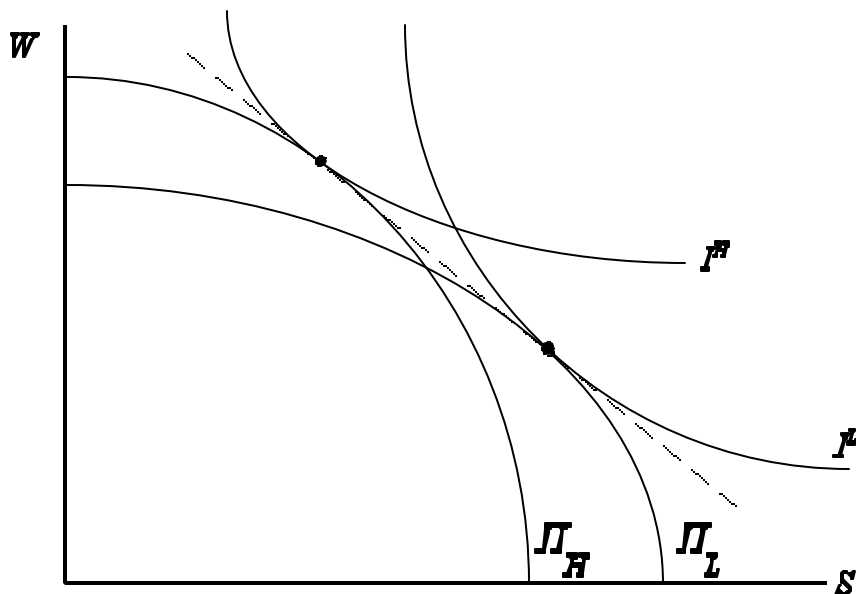
bc: amount of income a "high-risk" worker (with little aversion to risk) would give up to get a low risk job, < bd

ad: amount you'd have to pay a "low-risk" worker (risk averse) if put into a high risk job, > bd

In sum we have:

- efficient allocation of workers to jobs
- safety levels max U subject to zero J on a given job
- again, w, s negatively related
- all firms still earn 0 economic profits

iv) heterogeneous workers, heterogeneous firms



Results:

- wages and safety still negatively related

- all firms at zero J ; workers at:

- firm that can give them best bundle (efficient matching)
- best bundle that firm can offer (efficiency within a match)

- but now slope of equil. wage safety locus traces out neither an iso J curve nor an indiff. curve; it reflects a combination of all the iso J curves and all the indiff. curves

- the reason the equil locus is negatively sloped is that:

- safety is costly for all firms to provide
- all workers prefer more safety to less

Summary of basic theory:

If all workers are identical, all firms identical- only one (w,S) combination will be observed in the market. There are no compensating differentials.

If workers are identical, but firms differ - compensating differentials exist, and trace out an indiff. curve (thus they tell us about workers' tastes)

If workers differ but all firms are identical - comp. diffs exist, and trace out an iso J curve ... (thus they tell us about technology)

If both firms and workers differ, the hedonic equilibrium locus reflects both tastes and technology factors.

In all cases, expect safer jobs to pay lower wages.

In all cases the market works efficiently*, in that every worker as well off as possible given firms have min possible incentive to operate.

* efficiency both in a) matching of firms/workers
b) best wage/safety mix given the match

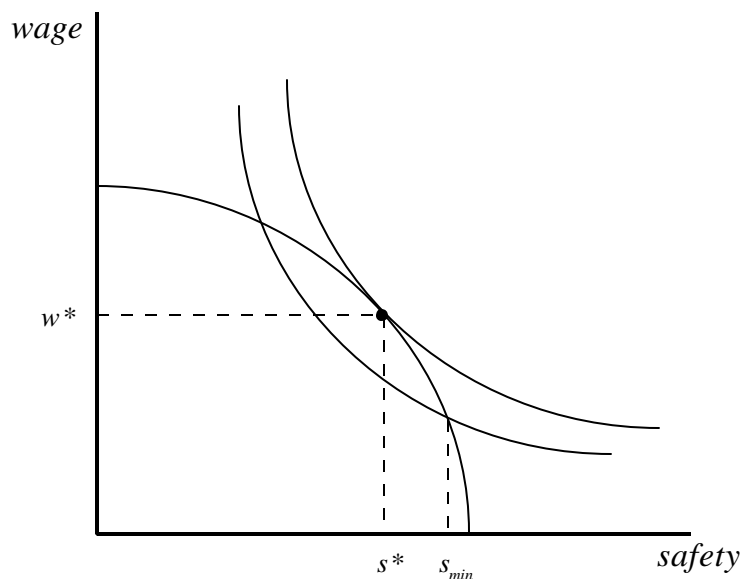
3) Effect of Safety Legislation

i) Simplest Case: homogenous workers and firms

- any safety standard below s^* (equil. level) has no effect.

- any standard above s^* (e.g. s_{min}) will $\downarrow s$ and $\downarrow w$

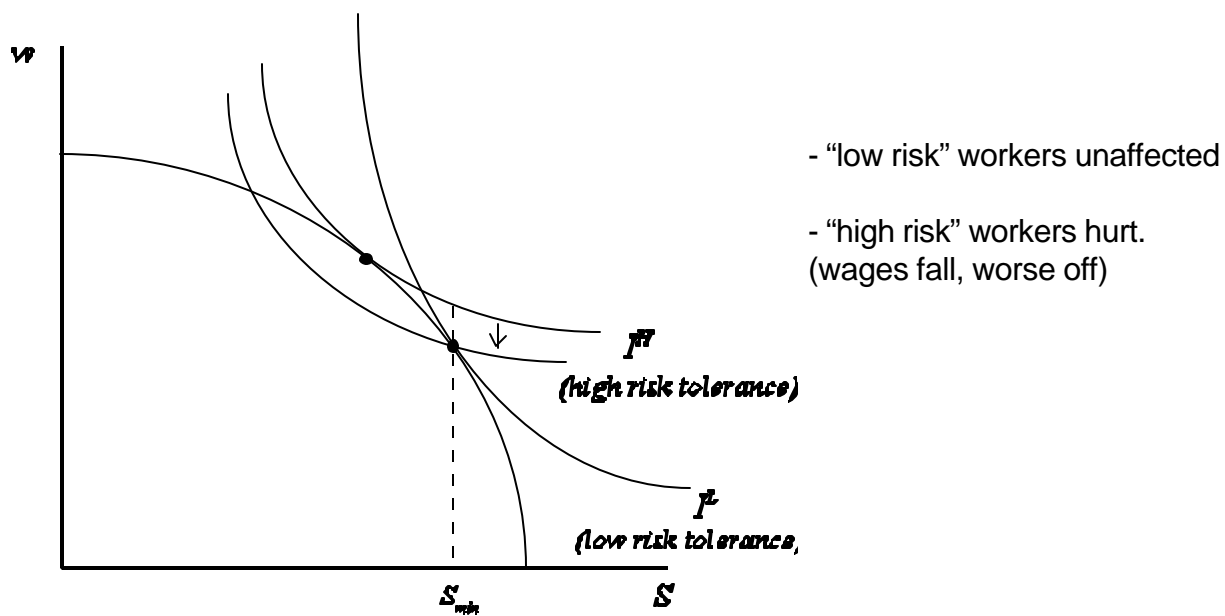
-overall, utility falls as the increase in safety is not enough to compensate for the decline in wages.



In the real world, firms might not cut wages immediately in response to safety legislation; indeed the legislation might explicitly prohibit this. But in the long run, adding costly safety equipment may mean that nominal wage grow less rapidly than they would have otherwise.

ii) Heterogeneous workers

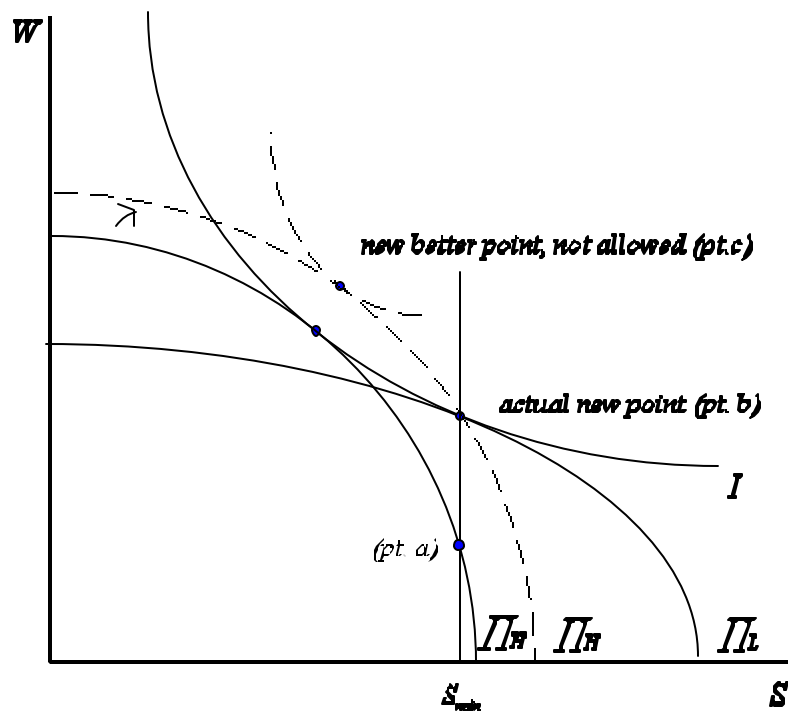
Suppose legislation designed to bring all jobs up to s_{\min} (a “best practice” kind of standard)



In sum, the most risk tolerant (least risk-averse) workers are most likely to be hurt by minimum safety standards ...

iii) Heterogenous firms

Again, consider imposing a “best-practice” standard at S_{\min} .



Now, if the high-safety-cost firms offered S_{\min} it would not attract any workers (pt. a)

Two possible outcomes:

1. -this sector might shut down.
2. -alternatively, if demand for this sector's product is inelastic enough, its product price will rise to prevent shutdown. This shifts its iso J curve outward. New equil is at b.

Note however that the new equilibrium is Pareto-inefficient: workers could be made better off with no change in profits at point (c).

Overall, despite the inefficiency, neither workers nor firms are now hurt by the safety standard (both remain at their original utility, profit levels). Now it is consumers who pay, via a lower product price.

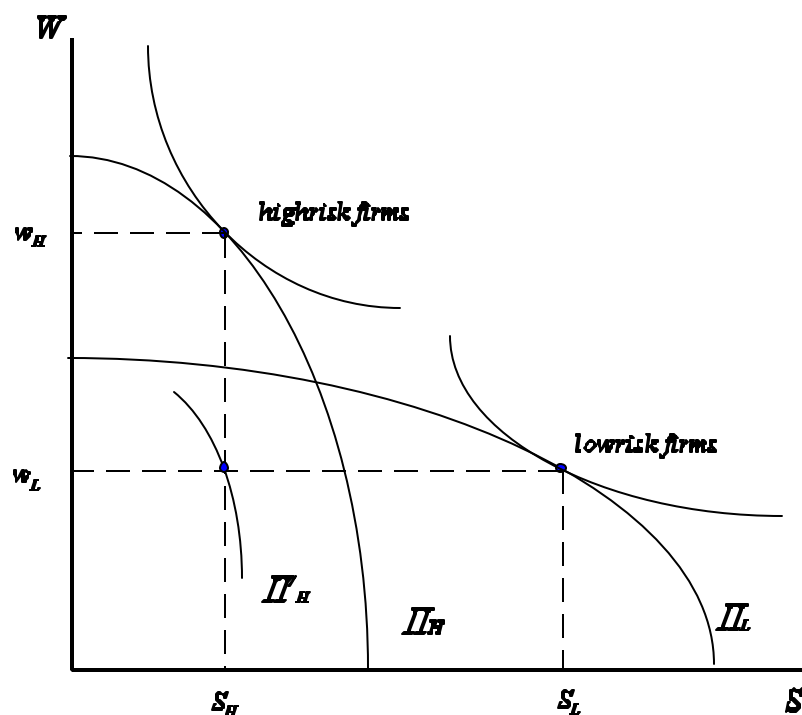
4) The Effect of Asymmetric Information

Suppose now that the safety level on a given job / in a given firm is not known with certainty

(1) If it is unknown to *both* firm and worker (“symmetrically imperfect information”), there is change to analysis: just recast it in terms of expected values... [replace S axis by E(S)]

(2) If firms know more than workers, things change dramatically.

e.g. Suppose we had the following equil. with symmetric information: (2 types of firms, workers)



In the full information equilibrium, both types of firms earn zero profits:

$$J^H(S^H, w^H) = J^L(S^L, w^L) = 0$$

But if workers can't see which type the firm truly is, a new, high risk firm can announce it is actually a low-risk firm, pay the low-risk wage, and make a profit:

- it provides S_H , but pays W_L
This raises profits because $J^H(S^H, w^L) > J^H(S^H, w^H)$

repercussions: -unless there is a credible way to signal safety, no one will believe even true hi-safety firms, ^ everyone's announcements become useless. Thus no firm will invest in safety and all provide the “least common denominator” level of safety. Thus it is the most risk-averse workers who are hurt most by the presence of asymmetric information.

5) The Effect of Heterogeneous Worker Productivity

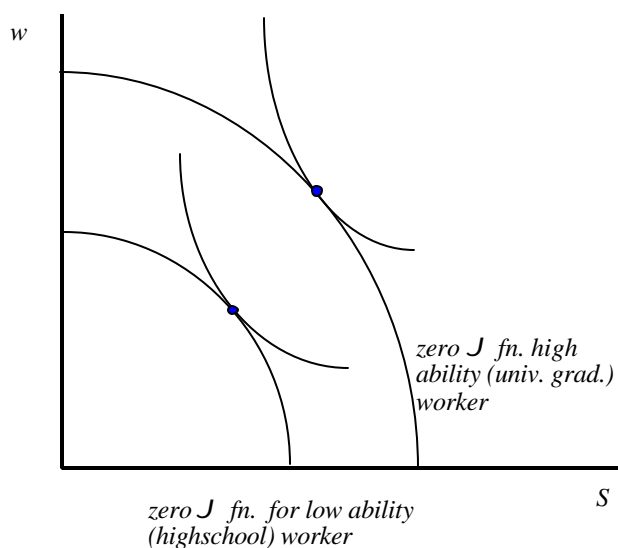
Before going directly to the evidence, we need to think about one more limitation of the current model

This is the implicit assumption we have made, the all workers are equally productive. We made this assumption by assuming the firm's isoprofit curves were the same for every worker they might employ. Thus, so far we have allowed workers' tastes to differ, but not their productivities.

What happens if we introduce ability/earnings power differentials: (a 3rd source of heterogeneity):

Simplest case: - workers don't differ in tastes, firms don't differ in technologies. (Only het. is in workers earnings abilities.)

- if safety is a normal good, expect high-abil workers to "purchase" more of it as well as wage income



- unlike before, there is now a *positive* correlation between w & S : safe jobs pay *better* wages.

Message ! The theory of comp. diffs applies only for workers of a *given level of ability*. We don't expect it to hold overall necessarily. In empirical studies, we need to control for earnings ability as well as possible in order to observe compensating differentials.

6) Evidence

Compensating differentials for the following job aspects have been modelled or studied empirically:

-Risk of Death/Injury. (Morin; Viscusi). Using occupational death/injury statistics, one can show that a premium *is* paid by the market for dangerous work.

-Unemployment Risk. (Topel, others). In the absence, of UI, jobs with high unemployment risk will need to pay more. Because this is not as necessary when there is UI, there is some evidence that introducing UI, or making it more generous, reduces wages in those kinds of jobs (e.g. construction).

-Mandated benefits (e.g. maternity leave, accomodation for disabled, injured workers): there is some evidence that these, too, are "paid for" by workers in the form of lower wages.

-rank in firm (R. Frank has proposed that compensating differentials for "prestige" or its absence explain why firms "compress" wages)