Master in Economics

Labour economics – Lecture 5

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ISEG
**Lisbon School
of Economics
& Management**
Universidade de Lisboa

Lecture 5

Topics:

- Job matching: the role of worker preferences and information
    - **Individual Choice and its Outcomes**
    - **Assumptions and Predictions**
    - **Empirical Tests for Compensating Wage Differentials**
- Equalizing differences
    - **Hedonic Wage Theory and the Risk of Injury**
    - **Hedonic Wage Theory and Employee Benefits**
    - **Applications**

Bibliography:

- Ehrenberg, Ronald & Robert Smith, *Modern Labor Economics: Theory and Public Policy* – Chapter 8
- Novo, Alvaro, *Compensating differentials, Matching and Mobility*, Mimeo

Compensating wage differentials and the labour markets

- Analyze workers decisions about industry, occupation, or firm

- The influence on job choice of:

  - Work environment

  - Risk of injury

  - Generosity of employee benefits

Job matching: the role of worker preferences and information

- The labour market provides signals and mechanisms by which utility maximizing workers can be matched with profit-maximizing employers
  - Matching not easy:
    - workers with varying skills and preferences
    - employers offer jobs that differ in requirements and working environment
  - Workers attempt to maximize utility - interested in both the pecuniary and the nonpecuniary aspects of their jobs:
    - higher compensation levels in a job (holding job tasks constant) would attract more workers to it
    - pay is not all that matters: occupational tasks and how workers' preferences mesh with those tasks are critical elements in the matching process

Job matching: the role of worker preferences and information

- The labour market provides signals and mechanisms by which utility maximizing workers can be matched with profit-maximizing employers

  - If all jobs in a labour market were exactly alike and located in the same place the individual's decision about where to seek work would be a simple matter of choosing the job with the highest compensation - any differences would imply movement of workers...

but jobs not all equal...

Individual Choice and its Outcomes

- Assume: Two Employers: X   Y
  - Wage: $8.00 $8.00
  - Work environment: Safe/Clean   Noisy/Hazardous
  - To remain competitive in the labour market, employer *Y* must offer a higher wage
- A compensating wage differential
  - the extra wage an employer must pay to attract workers to undesirable working conditions
- An equilibrium differential
  - a difference in wages offered by pleasant and less pleasant jobs that allows both types of jobs to obtain the quantity and quality of workers they wanted
  (and regarding which that there would be no forces causing that differential to change)

Individual Choice and its Outcomes

- The wage differential serves two related, socially desirable ends:
  - a social need - gives people an incentive to voluntarily do dirty, dangerous, or unpleasant work
  - at the individual level - serves as a reward to workers who accept unpleasant jobs by paying them more than comparable workers in more pleasant jobs

- The allocation of labour
  - the compensating wage differentials are the incentives that allow to recruit labour to unpleasant jobs voluntarily
    (an alternative would be to compel people to do these jobs - e.g. the military draft in contemporary world or the slavery in ancient times)

Individual Choice and its Outcomes

- ## Compensation for workers
  - workers accept unpleasant jobs because compared to alternative jobs for which they could qualify they pay well
  - compensating wage differentials serve as individual rewards by paying those who accept bad or arduous working conditions more than they would otherwise receive

- ## Compensating wage differentials
  - the prices at which good working conditions can be purchased by workers
    (or at which the bad ones can be sold by)
  - the valuation of nonpecuniary aspects of employment

Assumptions and Predictions

- Holding worker characteristics constant (e.g., skill levels, age, experience, race, gender, union status, region of the country, and so forth), the simple theory of job choice leads to the prediction that compensating wage differentials will be associated with various job characteristics

- Positive differentials (higher wages) will accompany "bad" job characteristics while negative differentials (lower wages) will be associated with "good" ones.

$$W_{BJC} > W_{GJC}$$

Need to analyse the assumptions

Assumptions and Predictions

- ## Assumptions

  - ### Assumption 1: Utility Maximization - workers seek to maximize their utility, not their income

    - compensating wage differentials arise only if some people do not choose the highest-paying job offered, preferring instead a lower-paying but more pleasant job

    - employers offering lower-paying pleasant jobs are competitive and wages do not equalize

      The net advantages — the overall utility from the pay and the psychic aspects of the job—tend to equalize for the marginal worker

Assumptions and Predictions

- Assumptions
  - Assumption 2: Worker Information - workers are aware of the job characteristics of potential importance to them
    - a company offering a "bad" job with no compensating wage differential would have trouble recruiting or retaining workers – would have to raise the wage
    - workers acquire enough information with which to evaluate the situation through direct observations or word-of-mouth reports from current or recent employees
    - worker information may be incomplete because there are very obscure job characteristics that may be unknown initially

Assumptions and Predictions

- ## Assumptions

  - ### Assumption 3: Worker Mobility - workers are relatively mobile

    - workers have a range of job offers from which to choose – only with a range of offers, workers would be able to select the combination of job characteristics they desire or avoid the ones to which they do not wish exposure

    - each job applicant receives several job offers from which to choose

    - if no offer interesting, can take a job and continue to search and move when a better offer available

    There will be no compensating wage differentials if only the dangerous jobs were/are available to workers

Empirical Tests for Compensating Wage Differentials

- Adam Smith proposed/identified five "principal circumstances which [...] make up for a small pecuniary gain in some employment, and counterbalance in others"

- Among the circumstances Smith listed were:

  - **constancy of employment**

  - **difficulty learning the job**

  - **probability of success**

  - **degree of trust placed in the worker**

  - *The "wage of labour varies with the ease or hardship, the cleanliness or dirtiness, the honourableness or dishonourableness of the employment"*

Empirical Tests for Compensating Wage Differentials

- Two difficulties in estimating compensating wage differential
  - need to create data sets that allow to match, at the level of individual workers, their relevant job characteristics with their personal characteristics (age, education, union status, and so forth) that also influence wages
  - it is necessary to specify in advance those job characteristics that are generally regarded as disagreeable
    (e.g. not everyone may regard outdoor work or repetitive tasks as undesirable)

Empirical Tests for Compensating Wage Differentials

- Most extensive testing for the existence of compensating wage differentials done with respect to the risks of injury or death on the job
  - studies generally, but not always, support the prediction that wages will be higher whenever risks on the job are higher
  - recent estimates of such compensating differentials for the United States suggest that wages tend to be around 1 percent higher for workers facing three times the average risk of job-related fatality than for those who face the average yearly level of risk (about 1 in 30,000)

Empirical Tests for Compensating Wage Differentials

- Other studies of compensating wage differentials have been done, spread across a variety of job characteristics:

  - positive wage premiums have been related, holding other influences constant, to disagreeable characteristics such as: night work, inflexible work schedule, having to stand a lot, working in a noisy or polluted environment, having an unsteady job, working away from home, working long hours

Hedonic Wage Theory and the Risk of Injury

- A presentation of the theory of compensating wage differentials
    - employee considerations
    - employer considerations
    - the matching of employers and employees
    - normative analysis: Occupational Safety and Health Regulation

Hedonic Wage Theory and the Risk of Injury

- Analysis of the theory of compensating wage differentials for a negative job characteristic - the risk of injury

- Application of the concepts to a normative analysis of governmental safety regulations ...

  ... always assuming that compensating differentials for every other job characteristic have already been established

Hedonic Wage Theory and the Risk of Injury

- Employee considerations
  - employees dislike the risk of being injured on the job
    - e.g.: a worker is offered a job for $8 per hour in a firm in which 3% of the workforce is injured each year

      … if the risk of injury increases to 4%, holding other job characteristics constant, the job would have to pay a higher wage to produce the same level of utility
      (except in the unlikely event that the costs of wage loss, medical treatment, and suffering caused by the added injuries were completely covered by the firm or its insurance company)
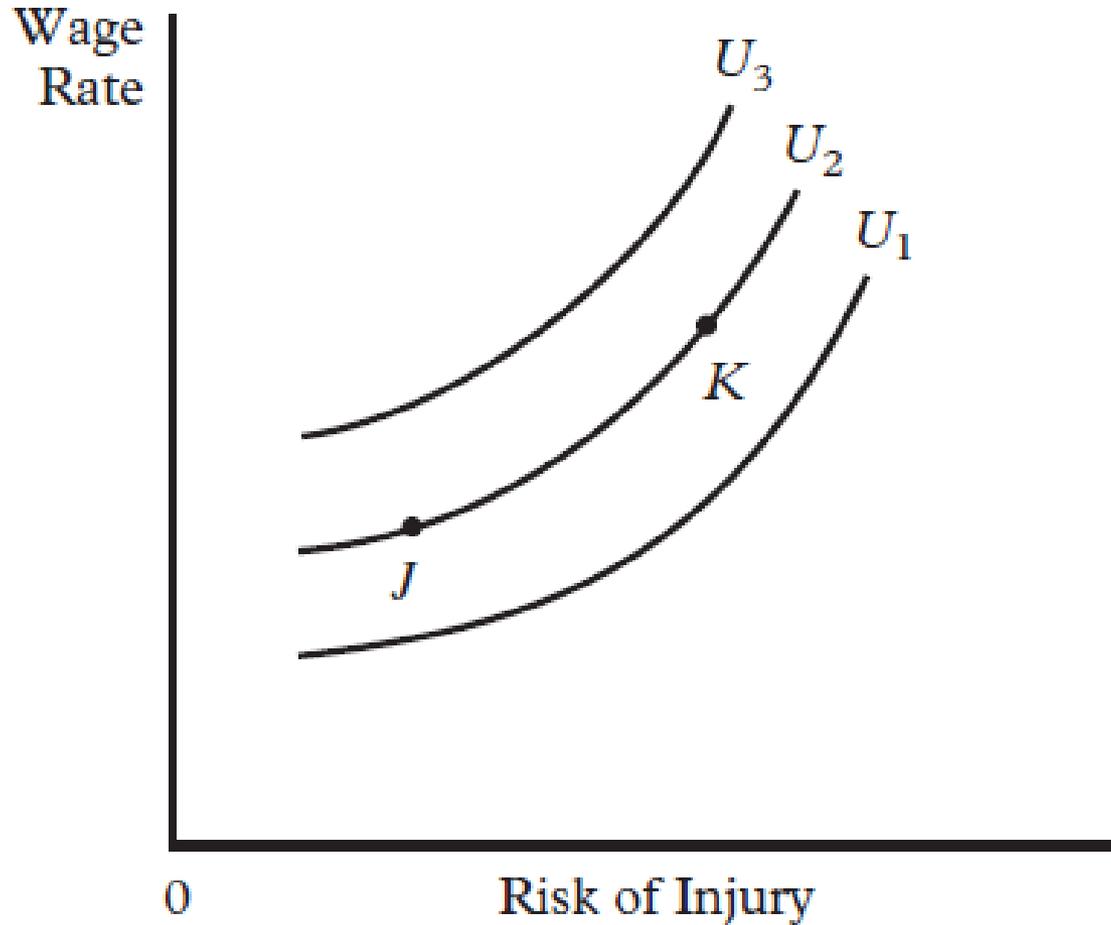
Hedonic Wage Theory and the Risk of Injury

- Employee considerations
  - different combinations of wage rates and risk levels can yield the same utility
    - indifference curves slope upward – the risk of injury is a "bad" job characteristic - if risk increases, wages must rise if utility is to be held constant
    - higher wage at a given risk level will generate more utility - indifference curves lying to the northwest represent higher utility
    - indifference curve convex - diminishing marginal rates of substitution.

  utility (U) = f (wage (W), risk of injury on the job (R))
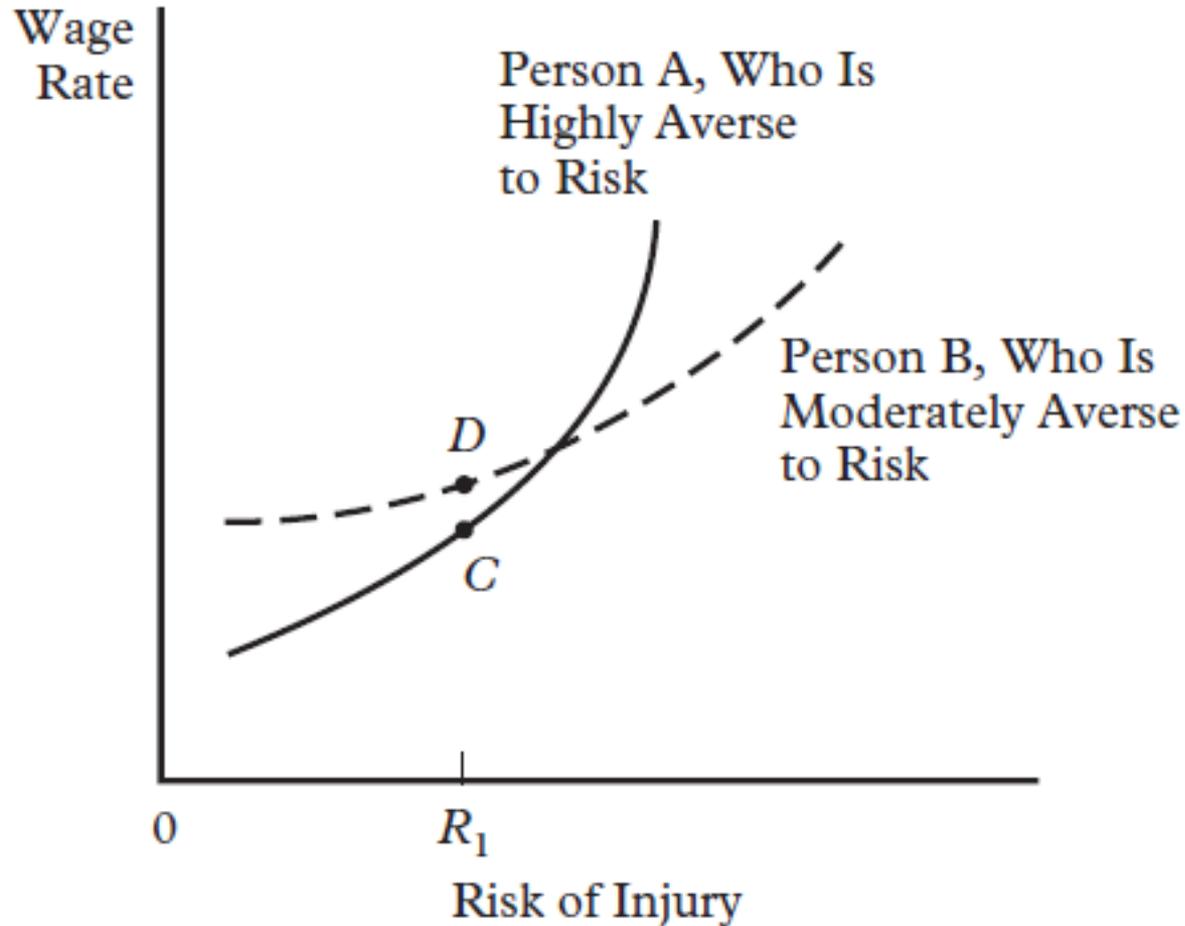
Hedonic Wage Theory and the Risk of Injury

Hedonic Wage Theory and the Risk of Injury

- Employee considerations
  - people differ in their aversion to the risk of being injured
    - risk averse – dislikes being confronted with risk or danger
    - risk lover – loves taking risks (daredevil type of individual)
    - risk neutral – individual is indifferent
  - those very sensitive to risk will require large wage increases for any increase in risk, while those who are less sensitive will require smaller wage increases to hold utility constant.
  - the more-sensitive workers will have indifference curves that are steeper at any level of risk

Hedonic Wage Theory and the Risk of Injury

Hedonic Wage Theory and the Risk of Injury

- ## Employer considerations

    - employers face a wage/risk trade-off derived from three assumptions:

        - it is costly to reduce the risk of injury facing employees - safety equipment must be placed on machines, production time must be sacrificed for safety training sessions, protective clothing must be furnished to workers, etc.

        - competitive pressures will force firms to operate at zero profit (that is, at a point at which all costs are covered and the rate of return on capital is about what it is for similar investments)

        - all other job characteristics are presumably given or already determined such that risk reduction ($R \downarrow$) must be accompanied by wage reduction ($W \downarrow$)

Hedonic Wage Theory and the Risk of Injury

- Employer considerations
    - if a firm undertakes a program to reduce the risk of injury, it must reduce wages to remain competitive - if a firm spends more on safety, it must spend less on other things
    - implication:
        - low risk associated with low wages
        - high risk associated with high wages

        holding other things (employee benefits or other job characteristics) constant

Hedonic Wage Theory and the Risk of Injury

- ## Employer considerations

  - **employer trade-offs between wages and levels of injury risk represented through the use of isoprofit curves**

    - **curves to the southeast represent higher profit levels - with all other items in the employment contract given, each risk level is associated with a lower wage level.**

    - **curves to the northwest represent lower profit levels**

    - **isoprofit curves are concave - there are diminishing marginal returns to safety expenditures**
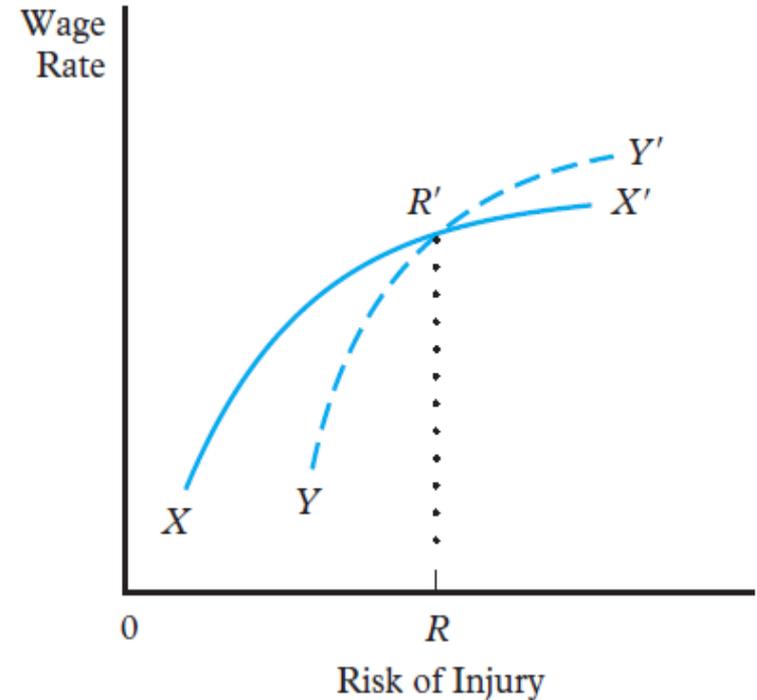
Hedonic Wage Theory and the Risk of Injury
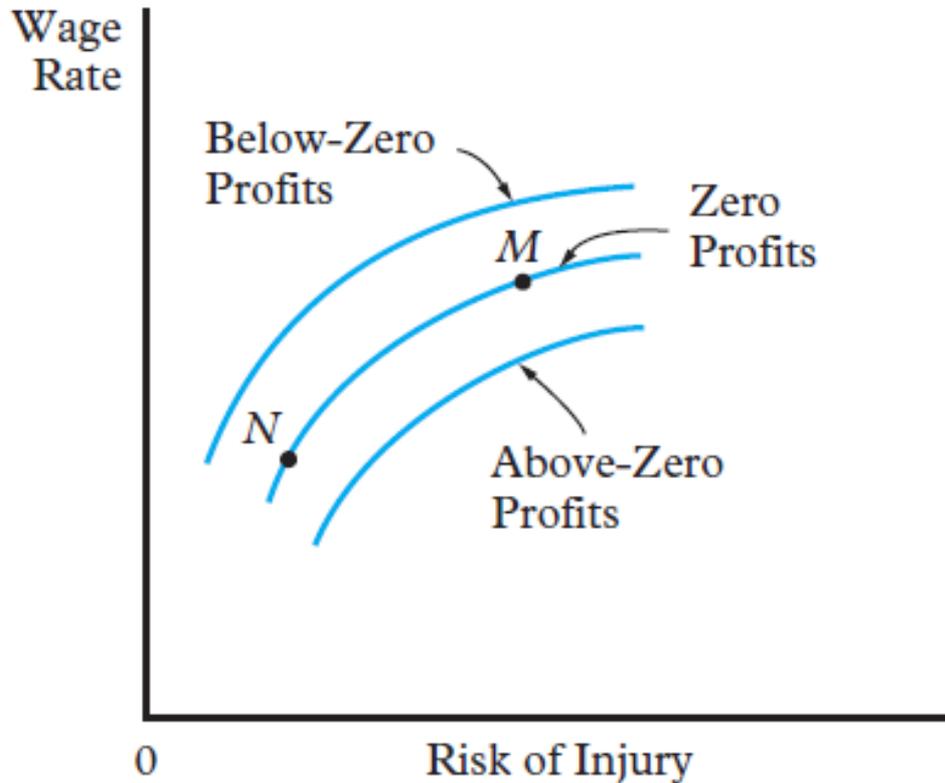
At point *M* - where the level of risk is relatively high - expenditures to reduce risk will have high marginal returns to safety expenditures.

At point *N*, which is the steeper part of the isoprofit curve, further ↓*R* →↓*W* for the employer to maintain its isoprofit curve.

Further increase in safety below point *N* will be very costly.

Hedonic Wage Theory and the Risk of Injury

- ## Employer considerations
  - **employers differ in the ease (cost) with which they can eliminate hazards**
    - **in firms where injuries are costly to reduce, large wage reductions will be required to keep profits constant in the face of a safety program - the isoprofit curve in this case will be steeply sloped – *YY'***
    - **the isoprofit curves of firms where injuries are easier to eliminate are flatter – *XX'***
  - **offers along segment *XR'* will be preferred by workers to those along *YR'* because for given levels of *R*, higher wages are paid**
  - **firm *Y* can outbid firm *X* at higher levels of risk *R* - for employees, offers along *R'Y'* will be preferred to those along *R'X'***

Hedonic Wage Theory and the Risk of Injury

- ## The Matching of Employers and Employees

  - **employees**

    - **aim to achieve the highest possible utility from their choice of a job**

      - **if they receive two offers at the same wage rate, they will choose the lower-risk job**

      - **if they receive two offers in which the risk levels are equal, they will accept the offer with the higher wage rate**

  they will choose the offer that falls on the highest (most northwest) indifference curve

Hedonic Wage Theory and the Risk of Injury

- ## The Matching of Employers and Employees
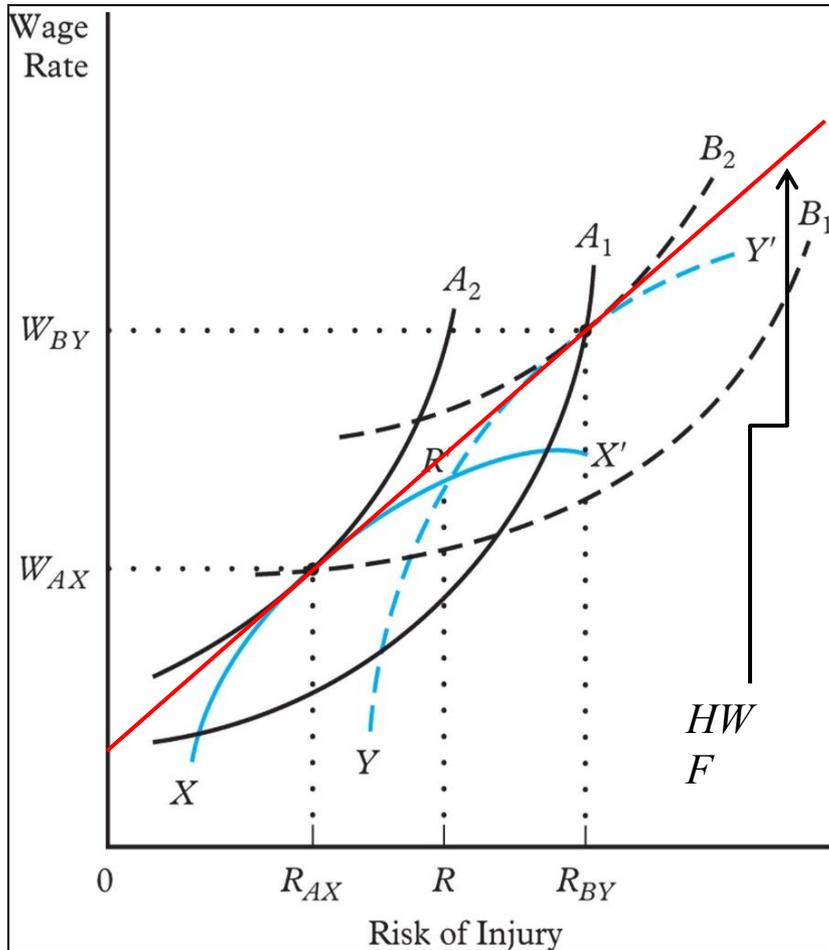 - ### employers
    - #### constrained by two forces:
      - they cannot make outrageously lucrative offers because they will be driven out of business by firms whose costs are lower
      - if their offered terms of employment are very low, they will be unable to attract employees (who will choose to work for other firms)

  ### the two forces compel firms in competitive markets to operate on their zero-profit isoprofit curves

Hedonic Wage Theory and the Risk of Injury

Worker A maximizes utility along A_2 by working for Employer X for W_{AX} and risk level R_{AX}.

Worker B maximizes utility along B_2 by working for Employer Y for high wage W_{BY} and with high risk level R_{BY}.

If Worker A accepts Worker B's offer (W_{BY} and R_{BY}), his/her level of utility will be along A_1 and as someone who values safety very highly, W_{BY} is not high enough to accept such offer.

Worker B who has flatter indifference curve – less risk averse – finds W_{BY} and R_{BY} to be superior to W_{AX} and R_{AX}. This means Worker B is not willing to take a pay cut to W_{AX} in order to reduce risk from R_{BY} to R_{AX} since that places him/her on a lower utility level along B_1.

HWF = Hedonic wage function

Hedonic Wage Theory and the Risk of Injury

- ## The Matching of Employers and Employees
  - matching of *A* with firm *X* and *B* with firm *Y* is not accidental or random
    - if *X* can "produce" safety more cheaply than *Y, X* will be a low-risk producer who attracts employees, such as *A*, who value safety highly
    - employer *Y* generates a lot of cost savings by operating at high risk levels and can thus afford to pay high wages and still be competitive - *Y* attracts people such as *B*, who have a relatively strong preference for money wages and a relatively weak preference for safety

Hedonic Wage Theory and the Risk of Injury

- ## The Matching of Employers and Employees: the offer curve

    - generalization of the job-matching process beyond the case of two employees and two employers

    - in the previous graph, the curve *XR'Y'* the offer curve - only along *XR'Y'* will offers that employers can afford to make be potentially acceptable to employees

    - the more types of firms there are in a market, the smoother this offer curve will be - it will always slope upward because of our twin assumptions that risk is costly to reduce and that employees must be paid higher wages to keep their utility constant if risk is increased
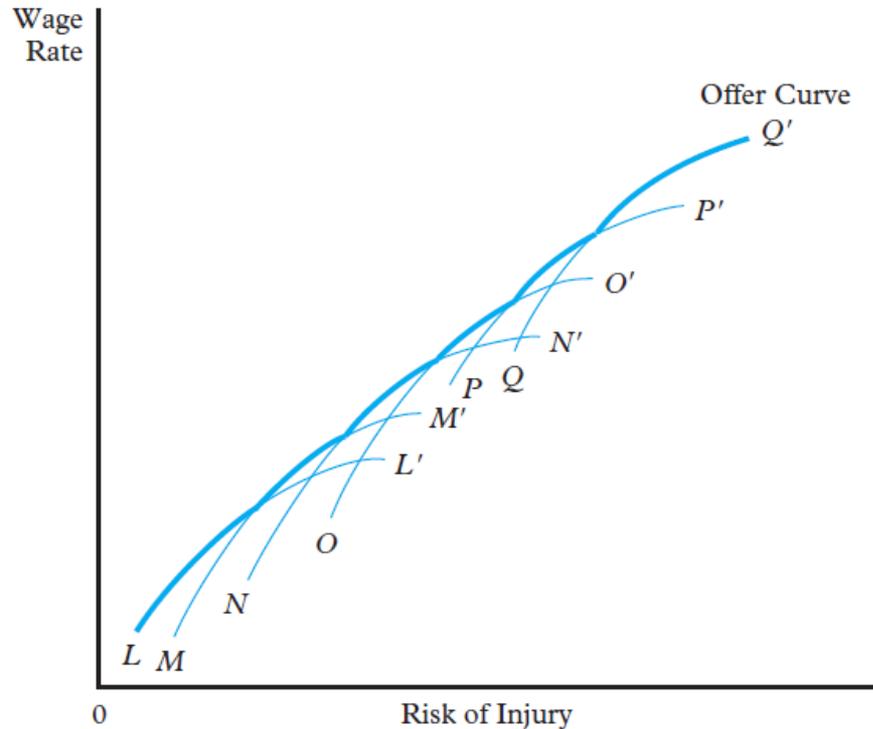
Hedonic Wage Theory and the Risk of Injury

- Two major insights from the hedonic model

  - other things equal, wages rise with risk

    - there will be compensating wage differentials for job characteristics that are viewed as undesirable by workers whom employers must attract

    - workers with strong preferences for safety will tend to take jobs in firms where safety can be generated most cheaply

    - workers who are not as averse to accepting risk will seek out and accept the higher-paying, higher-risk jobs offered by firms that find safety costly to "produce"

  the job-matching process—if it takes place under the conditions of knowledge and choice—is one in which firms and workers offer and accept jobs in a fashion that makes the most of their strengths and preferences

Hedonic Wage Theory and the Risk of Injury

- ## Normative Analysis: Occupational Safety and Health Regulation
  - **analyze questions such as the need for regulation and, if needed, what the goals of the regulation should be**

- ## Question: Are Workers Benefited by the Reduction of Risk?
  - **in 1970, Congress passed the Occupational Safety and Health Act - to issue and enforce safety and health standards for all private employers.**
    - **Safety standards intended to reduce the risk of traumatic injury**
    - **Health standards address worker exposure to substances thought to cause disease**
    - **Goal: to ensure the "highest degree of health and safety protection for the employee"**
  - **implementing the ideal that employees should face the minimum possible risk in the workplace as social policy is not necessarily in the best interest of workers**
    - **The hedonic model can show that reducing risk in some circumstances will lower the workers' utility levels**
    - **Mandated/decreed standards can reduce the wage and utility of workers and the profits of firms**

  safety regulations can improve workers' welfare when workers consistently underestimate the true risks

Hedonic Wage Theory and the Risk of Injury

- Normative Analysis: Occupational Safety and Health Regulation
  - a labour market with two kinds of workers and two kinds of firms
    - Person A, who is very averse to the risk of injury, works at wage W_{AX} and risk R_{AX} for employer X. Person B works for employer Y at wage W_{BY} and risk R_{BY}
  - Department of Labour promulgates a standard that makes risk levels above R_{AX} illegal - the effects would be detrimental to employees such as B
    - Reducing risk is costly, and the best wage offer a worker can obtain at risk R_{AX} is W_{AX}
    - For B, wage W_{AX} and risk R_{AX} generate less utility than did Y's offer of W_{BY} and R_{BY}

Hedonic Wage Theory and the Risk of Injury

- Normative Analysis: Occupational Safety and Health Regulation
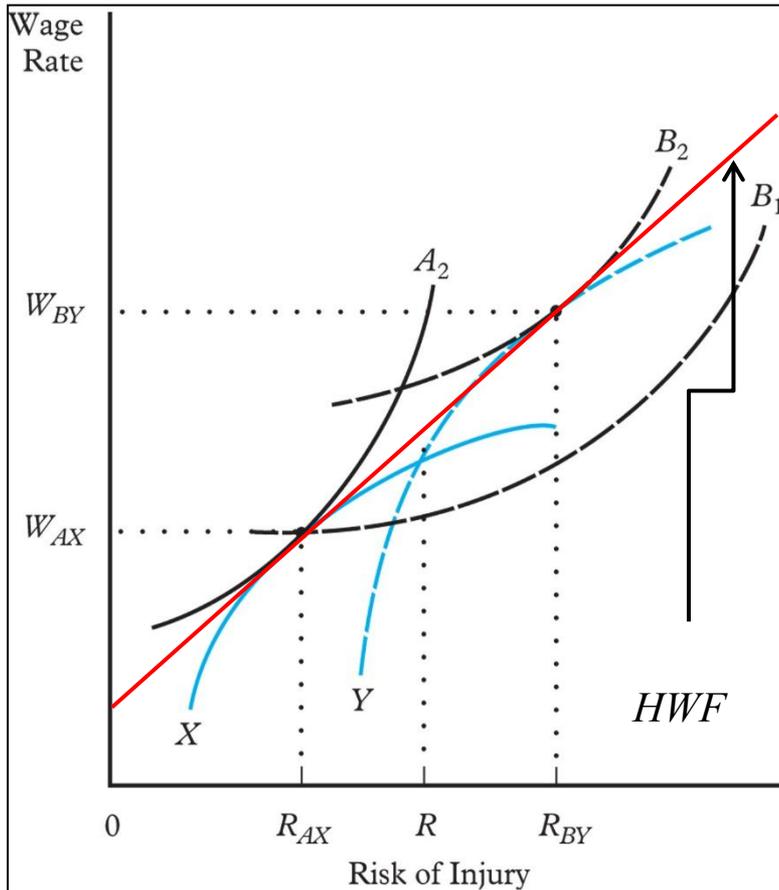
Person *A* very averse to the risk of injury: he/she works for firm *X* at W_{AX} and R_{AX} ,with his/her utility maximized at A_2.

Person *B* is not averse to the risk of injury: he/she works for firm *Y* at W_{BY} and R_{BY} with his/her utility maximized at B_2.

If *OSHA* promulgates a standard that makes risk levels above R_{AX} as illegal, Person *B* would be adversely affected because the best wage offer he/she can get at the mandated/decreed risk – R_{AX} – is W_{AX}. The mandated risk level will put Person *B* on B_1 and this will generate *less utility* if compared to firm *Y* 's offer of W_{BY} and R_{BY}.

Hedonic Wage Theory and the Risk of Injury

- Normative Analysis: Occupational Safety and Health Regulation
  - reducing hazards is costly - the greater the reduction, the more it costs
  - whether in the form of smaller wage increases, more difficult working conditions, or inability to obtain or retain one's first choice in a job, the costs of compliance with health standards will fall on employees
  - the critical issue: whether workers have the knowledge and choice necessary to generate compensating wage differentials

If workers are uninformed and unable to comprehend different risk levels or that they are immobile and thus do not choose risky jobs voluntarily, government regulation could make workers better off
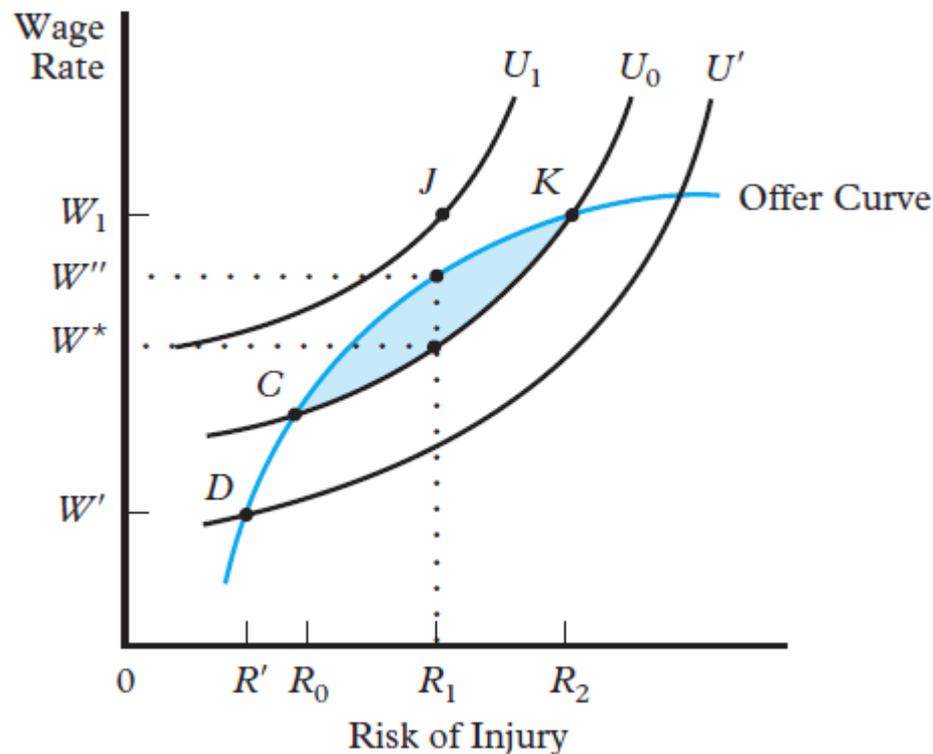
Hedonic Wage Theory and the Risk of Injury

- Normative Analysis: Occupational Safety and Health Regulation - A Worker accepting Unknown Risk

  This worker unknowingly accepts a hazardous job believing that he/she is paid wage W_1 with risk level R_1, and that his/her utility is maximized at point J on U_1 whereas his/her true risk R_2 is much higher – at point K on U_0

  If OSHA forced risk level to R', the best wage offer W' will be at point D on a lower utility level U' – the worker is worse off

  Mandated risk levels between R_0 and R_2 will make the worker better off because he/she would be able to reach an indifference curve higher than U_0 – *within the blue-shaded area*

Hedonic Wage Theory and the Risk of Injury

- Normative Analysis: Occupational Safety and Health Regulation
  - a cost benefit analysis of the regulation - to weight the likely costs of a government regulation against the value that workers place on its expected benefits (as measured by what workers would be willing to pay for these benefits)
  - if regulation mandated that risk levels fall from R_2 to R_1, employer costs would require that wage offers fall to W'' and the per-worker cost of this standard would therefore be ($W_1 - W''$)
  - the benefits of the regulation can be measured by the wage reductions that workers would be willing to take if they could get the reduced risk:
    - in the figure the worker depicted would be willing to take a wage as low as W^* if risk is cut to R_1, because at that wage and risk level, her utility is the same as it is now (recall she is actually at point K on curve U_0)
    - the most she would be willing to pay for this risk reduction is ($W_1 - W^*$)

Hedonic Wage Theory and the Risk of Injury

- Normative Analysis: Occupational Safety and Health Regulation
  - a mandated risk level of R_1 would produce benefits that outweigh costs - the amount that workers would be willing to pay ($W_1 - W^*$) would exceed the costs ($W_1 - W''$)
    - if employers could get the wage down to W^*, they would be more profitable than they are now, and workers would have unchanged utility
    - if the wage were W'', workers would be better off, and employers would have unchanged profits
    - a wage between W^* and W'' would make both parties better off

  all these possible options would be Pareto-improving (at least one party would be better off, and neither would be worse off)

Hedonic Wage Theory and the Risk of Injury

- Normative Analysis: Occupational Safety and Health Regulation
  - mandated risk levels between R_0 and R_2 would produce benefits greater than costs
    - these risk levels could be accompanied by wage rates that place the parties in the shaded zone - illustrates all the Pareto-improving possibilities.
  - risk levels below R_0 would impose costs on society that would be greater than the benefits

Hedonic Wage Theory and Employee Benefits

- Employee benefits are means by which employers can attract workers with certain characteristics the firm is searching for and will discourage applications from others

- Issues to be considered:

  - employee preferences

  - employer preferences

  - the joint determination of wages and benefits

Hedonic Wage Theory and Employee Benefits

- ## Employee preferences

  - **most employee benefits compensate workers in a form other than currently spendable cash**

  - **two broad categories of benefits:**

    - **payments in kind—compensation in the form of commodities such as employer-provided insurance or paid vacation time**

    - **deferred compensation - compensation that is earned now but will be paid in the form of money later**
      (e.g. employer contributions to employee pension plans)

Hedonic Wage Theory and Employee Benefits

- ## Employee preferences

  - payments in kind, other things equal:

    - people would rather receive *$X* in cash than a commodity that costs *$X* - with *$X* in cash, the person can choose to buy the particular commodity or choose instead to buy a variety of other things

    - cash is the form of payment that gives the recipient the most discretion and the most options in maximizing utility
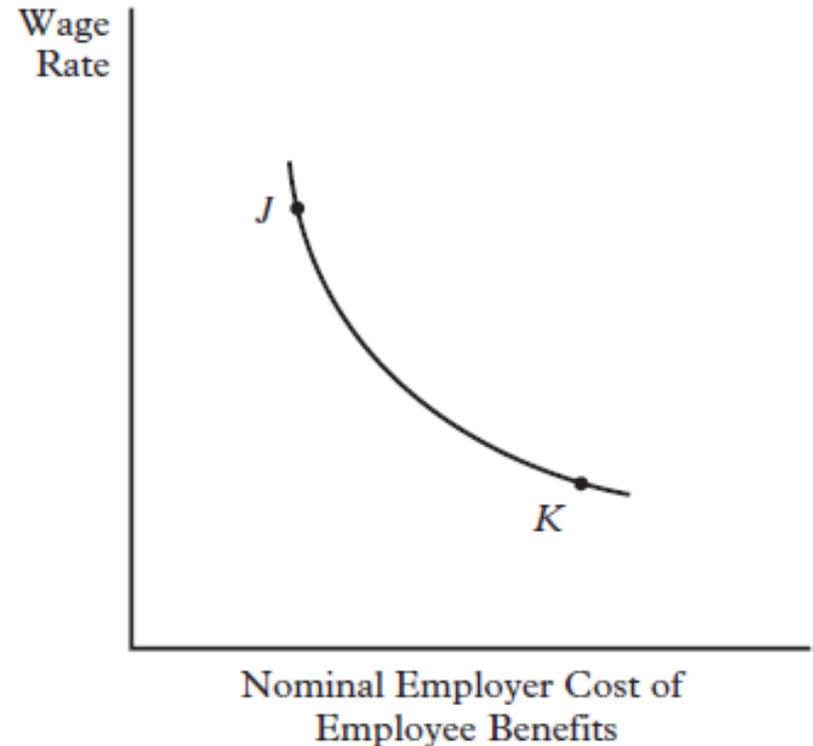
Hedonic Wage Theory and Employee Benefits

- ## Employee preferences
  - ### but "other things" are not equal
    - in-kind payments as employer-provided health insurance offer employees a sizable tax advantage because, for the most part, they are not taxable under current income tax regulations
    - the absence of a tax on important in-kind payments tends to offset their restrictive nature - a worker may prefer $1,000 in cash to $1,000 in some in-kind payment, but if his or her income tax and payroll tax rates total 25 percent, the comparison is really between $750 in cash and $1,000 in the in-kind benefit

Hedonic Wage Theory and Employee Benefits

- ## Employee preferences
  - **Deferred compensation**
    - **deferred compensation schemes are also restrictive but enjoy a tax advantage over current cash payments**
    - **in the case of pensions, employers currently contribute to a pension fund, but employees do not obtain access to this fund until they retire - neither the pension fund contributions made on behalf of employees by employers nor the interest that compounds when these funds are invested is subject to the personal income tax - only when the retirement benefits are received does the ex-worker pay taxes**

Hedonic Wage Theory and Employee Benefits

- ## Employee preferences
  - **indifference curves used to analyse the relationship between wages (cash) and employee benefits (in-kind payments/transfers and deferred compensations)**
  - **effect on indifference curves - two opposing forces shape workers' preferences for employee benefits**
    - **these benefits are accorded special tax treatment**
    - **benefits involve a loss of discretionary control over one's total compensation**

Wage Rate

J

K

Nominal Employer Cost of Employee Benefits

Hedonic Wage Theory and Employee Benefits

- ## Employer preferences
  - **employers have choices to make in the mix of cash compensation and employee benefits offered to their workers**
  - **preferences about the mix can be graphically summarized through the use of isoprofit curves**
  - **we can consider**
    - **isoprofit curves with a unitary slope**
    - **isoprofit curves with a flatter slope**
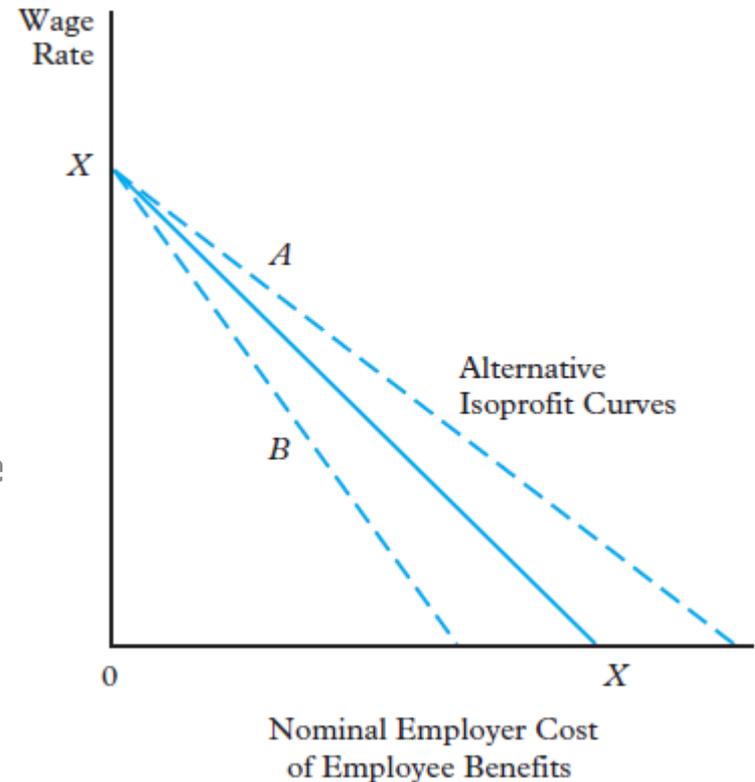   - **Isoprofit curves with a steeper slope**

Hedonic Wage Theory and Employee Benefits

- ## Employer preferences
  - ### Isoprofit curves with a unitary slope
    - employers totally indifferent about whether to spend $X on wages or $X on benefits – both options cost the same
    - their only concern is with the level of compensation - If the market requires $X in total compensation to attract workers to a particular job, firms would be willing to pay $X in wages, $X in benefits, or adopt a mix of the two totaling $X in cost
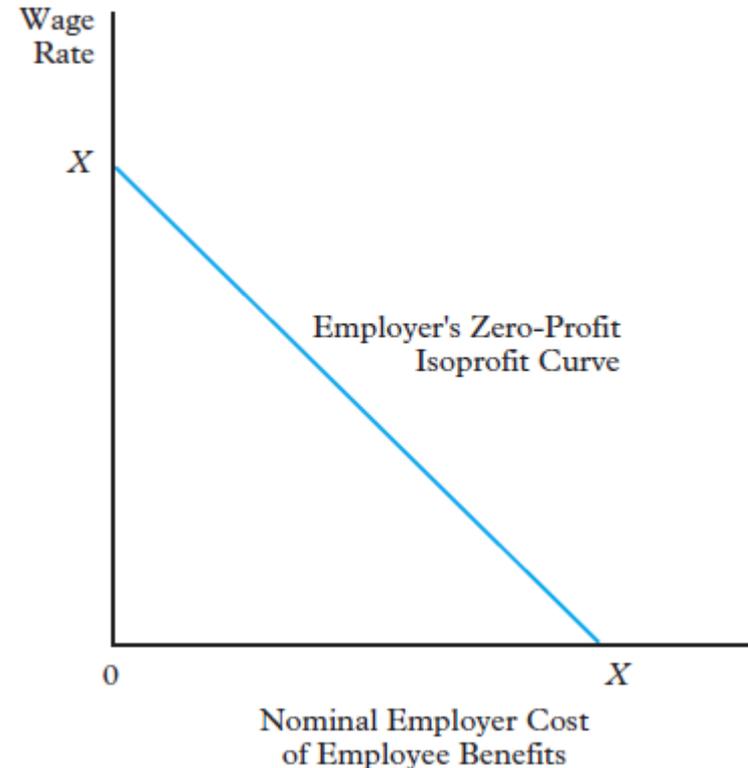
Wage Rate

X

Employer's Zero-Profit Isoprofit Curve

0   X

Nominal Employer Cost of Employee Benefits

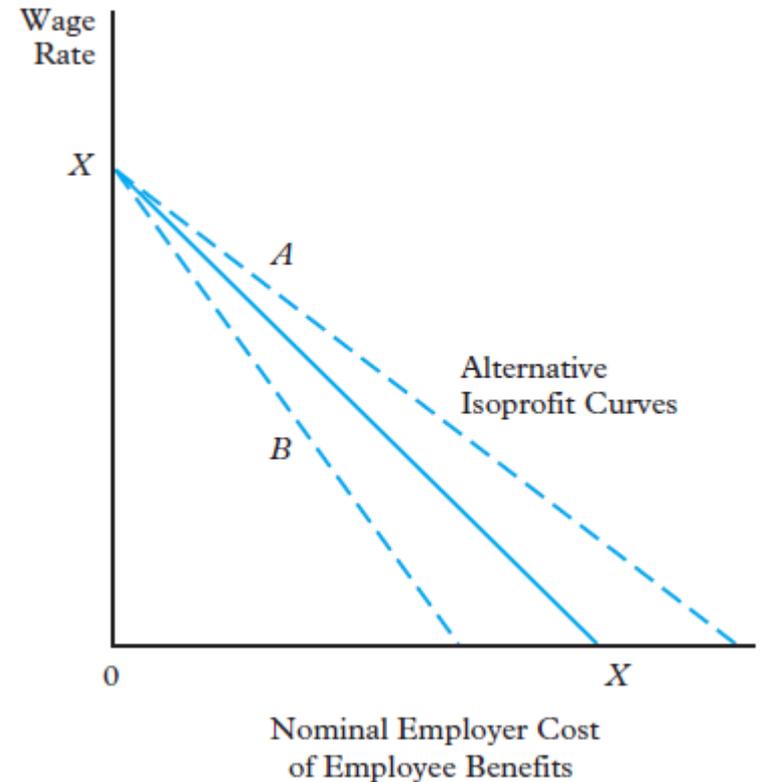# Hedonic Wage Theory and Employee Benefits

- ## Employer preferences
  - ### isoprofit curves with a flatter slope (*A*)
    - some benefits produce tax savings to employers when compared to paying workers in cash
    - offering benefits that are more valued by one group of prospective workers than another can be a clever way to save on the costs of screening applicants – e.g. future oriented workers relatively prefer deferred compensation schemes

Wage Rate

X

A

Alternative Isoprofit Curves

B

0

X

Nominal Employer Cost of Employee Benefits

Hedonic Wage Theory and Employee Benefits

- ## Employer preferences
  - ### isoprofit curves with a steeper slope (*B*)
    - benefits can increase employer costs in other areas and thus end up being more expensive than paying in cash – eg: the value of life and health insurance provided by employers, for example, is typically unaffected by the hours of work (as long as employees are considered "full time"). Increasing insurance benefits rather than wage rates, then, will produce an income effect without a corresponding increase in the price of leisure - this way will push workers in the direction of reduced work hours, possibly through greater levels of absenteeism

Wage Rate

X

A

Alternative Isoprofit Curves

B

0

X

Nominal Employer Cost of Employee Benefits

Hedonic Wage Theory and Employee Benefits

- ## The Joint Determination of Wages and Benefits
  - all firms are assumed to have zero-profit isoprofit curves with slope of *–1*
  - workers make trade-offs between wages and employee benefits and so do employers
  - the choice between cash and employee benefits differs across workers
    - some workers are more future-oriented and will prefer deferred compensation, therefore they would be attracted to employers who offer (generous) employee benefits
    - other workers are more present-oriented and they tend to attach great importance to the availability of currently spendable cash
  - employers tailor their compensation packages to suit the preference of the workers they are trying to attract

Hedonic Wage Theory and Employee Benefits

- The Joint Determination of Wages and Benefits