

Human Capital and Signaling

January 15, 2019

Introduction

Introduction

- Why do high school students desire to go to the Ivy League?
- Why do employers want to hire Ivy league graduates?
- **Question of the week:** Do we go to school (or training) to learn new skills or does schooling separate those with higher ability from those with lower ability?
- OR IS BOTH!?! ... we shall find out (or maybe not).

Introduction

- Why do high school students desire to go to the Ivy League?
- Why do employers want to hire Ivy league graduates?
- **Question of the week:** Do we go to school (or training) to learn new skills or does schooling separate those with higher ability from those with lower ability?
- OR IS BOTH!?! ... we shall find out (or maybe not).

Introduction

- Why do high school students desire to go to the Ivy League?
- Why do employers want to hire Ivy league graduates?
- **Question of the week:** Do we go to school (or training) to learn new skills or does schooling separate those with higher ability from those with lower ability?
- OR IS BOTH!?! ... we shall find out (or maybe not).

Introduction

- Why do high school students desire to go to the Ivy League?
- Why do employers want to hire Ivy league graduates?
- **Question of the week:** Do we go to school (or training) to learn new skills or does schooling separate those with higher ability from those with lower ability?
- OR IS BOTH!?! ... we shall find out (or maybe not).

Human Capital Model

Basics of Human Capital

- What separates human capital from other forms of capital?
 - Human capital cannot be **collateralized**, meaning that it is not a physical asset that can be seized by a lender if a loan is not paid back.
 - Human capital cannot be owned by anyone other than the individual and cannot be sold.
- Human capital includes more than just formal education (e.g. athletic or musical talent).
- Broadly it covers the skills, knowledge, and attributes of a worker that have value in the labor market.

Basics of Human Capital

- What separates human capital from other forms of capital?
 - Human capital cannot be **collateralized**, meaning that it is not a physical asset that can be seized by a lender if a loan is not paid back.
 - Human capital cannot be owned by anyone other than the individual and cannot be sold.
- Human capital includes more than just formal education (e.g. athletic or musical talent).
- Broadly it covers the skills, knowledge, and attributes of a worker that have value in the labor market.

Basics of Human Capital

- What separates human capital from other forms of capital?
 - Human capital cannot be **collateralized**, meaning that it is not a physical asset that can be seized by a lender if a loan is not paid back.
 - Human capital cannot be owned by anyone other than the individual and cannot be sold.
- Human capital includes more than just formal education (e.g. athletic or musical talent).
- Broadly it covers the skills, knowledge, and attributes of a worker that have value in the labor market.

Basics of Human Capital

- What separates human capital from other forms of capital?
 - Human capital cannot be **collateralized**, meaning that it is not a physical asset that can be seized by a lender if a loan is not paid back.
 - Human capital cannot be owned by anyone other than the individual and cannot be sold.
- Human capital includes more than just formal education (e.g. athletic or musical talent).
- Broadly it covers the skills, knowledge, and attributes of a worker that have value in the labor market.

Basics of Human Capital

- What separates human capital from other forms of capital?
 - Human capital cannot be **collateralized**, meaning that it is not a physical asset that can be seized by a lender if a loan is not paid back.
 - Human capital cannot be owned by anyone other than the individual and cannot be sold.
- Human capital includes more than just formal education (e.g. athletic or musical talent).
- Broadly it covers the skills, knowledge, and attributes of a worker that have value in the labor market.

Human Capital Model

- Basic Costs

- Direct costs (e.g. tuition, interest on student loans)
- Foregone wages

- Basic Benefits

- Increased wages (decreasing in age)
- non-monetary life improvements

Human Capital Model

- Basic Costs
 - Direct costs (e.g. tuition, interest on student loans)
 - Foregone wages
- Basic Benefits
 - Increased wages (decreasing in age)
 - non-monetary life improvements

Human Capital Model

- Basic Costs
 - Direct costs (e.g. tuition, interest on student loans)
 - Foregone wages
- Basic Benefits
 - Increased wages (decreasing in age)
 - non-monetary life improvements

Human Capital Model

- Basic Costs
 - Direct costs (e.g. tuition, interest on student loans)
 - Foregone wages
- Basic Benefits
 - Increased wages (decreasing in age)
 - non-monetary life improvements

Human Capital Model

- Basic Costs
 - Direct costs (e.g. tuition, interest on student loans)
 - Foregone wages
- Basic Benefits
 - Increased wages (decreasing in age)
 - non-monetary life improvements

Human Capital Model

- Basic Costs
 - Direct costs (e.g. tuition, interest on student loans)
 - Foregone wages
- Basic Benefits
 - Increased wages (decreasing in age)
 - non-monetary life improvements

Human Capital Model

- Basic Costs
 - Direct costs (e.g. tuition, interest on student loans)
 - Foregone wages
- Basic Benefits
 - Increased wages (decreasing in age)
 - non-monetary life improvements

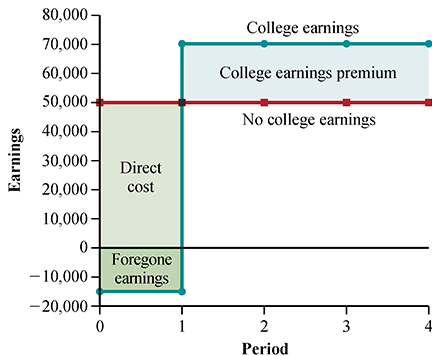


Figure 4.1

Predictions from the HC Model

- Demand for formal education is positively correlated with the college wage premium (and demand for skilled workers).
- There are diminishing marginal returns to education
- People will consume education until marginal rate of return equals the marginal cost of capital

Predictions from the HC Model

- Demand for formal education is positively correlated with the college wage premium (and demand for skilled workers).
- There are diminishing marginal returns to education
- People will consume education until marginal rate of return equals the marginal cost of capital

Predictions from the HC Model

- Demand for formal education is positively correlated with the college wage premium (and demand for skilled workers).
- There are diminishing marginal returns to education
- People will consume education until marginal rate of return equals the marginal cost of capital

Predictions from the HC Model

- Demand for formal education is positively correlated with the college wage premium (and demand for skilled workers).
- There are diminishing marginal returns to education
- People will consume education until marginal rate of return equals the marginal cost of capital

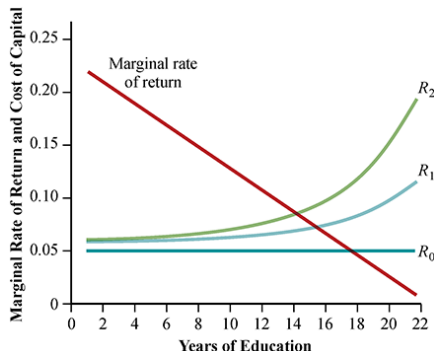


Figure 4.4

Levinsohn/Turner, *Economics of Education*, 1e

Signaling Theory

Signaling Theory Setup

- The labor market has information asymmetries as employers don't have full information about the potential quality of new hires.
- Therefore employers look for markers or signals of quality
 - Educational attainment
 - Selectivity of undergraduate institution
 - Law school review
- Intuition is that only individuals with the desired skills have the ability to complete the "signal"
 - Higher ability individuals see the better returns to certain fields/careers
 - Pursuing signals are less costly for them
- The signal does not represent skills and knowledge acquired during the learning process.

Signaling Theory Setup

- The labor market has information asymmetries as employers don't have full information about the potential quality of new hires.
- Therefore employers look for markers or signals of quality
 - Educational attainment
 - Selectivity of undergraduate institution
 - Law school review
- Intuition is that only individuals with the desired skills have the ability to complete the "signal"
 - Higher ability individuals see the better returns to certain fields/careers
 - Pursuing signals are less costly for them
- The signal does not represent skills and knowledge acquired during the learning process.

Signaling Theory Setup

- The labor market has information asymmetries as employers don't have full information about the potential quality of new hires.
- Therefore employers look for markers or signals of quality
 - Educational attainment
 - Selectivity of undergraduate institution
 - Law school review
- Intuition is that only individuals with the desired skills have the ability to complete the "signal"
 - Higher ability individuals see the better returns to certain fields/careers
 - Pursuing signals are less costly for them
- The signal does not represent skills and knowledge acquired during the learning process.

Signaling Theory Setup

- The labor market has information asymmetries as employers don't have full information about the potential quality of new hires.
- Therefore employers look for markers or signals of quality
 - Educational attainment
 - Selectivity of undergraduate institution
 - Law school review
- Intuition is that only individuals with the desired skills have the ability to complete the "signal"
 - Higher ability individuals see the better returns to certain fields/careers
 - Pursuing signals are less costly for them
- The signal does not represent skills and knowledge acquired during the learning process.

Signaling Theory Setup

- The labor market has information asymmetries as employers don't have full information about the potential quality of new hires.
- Therefore employers look for markers or signals of quality
 - Educational attainment
 - Selectivity of undergraduate institution
 - Law school review
- Intuition is that only individuals with the desired skills have the ability to complete the "signal"
 - Higher ability individuals see the better returns to certain fields/careers
 - Pursuing signals are less costly for them
- The signal does not represent skills and knowledge acquired during the learning process.

Signaling Theory Setup

- The labor market has information asymmetries as employers don't have full information about the potential quality of new hires.
- Therefore employers look for markers or signals of quality
 - Educational attainment
 - Selectivity of undergraduate institution
 - Law school review
- Intuition is that only individuals with the desired skills have the ability to complete the "signal"
 - Higher ability individuals see the better returns to certain fields/careers
 - Pursuing signals are less costly for them
- The signal does not represent skills and knowledge acquired during the learning process.

Signaling Theory Setup

- The labor market has information asymmetries as employers don't have full information about the potential quality of new hires.
- Therefore employers look for markers or signals of quality
 - Educational attainment
 - Selectivity of undergraduate institution
 - Law school review
- Intuition is that only individuals with the desired skills have the ability to complete the "signal"
 - Higher ability individuals see the better returns to certain fields/careers
 - Pursuing signals are less costly for them
- The signal does not represent skills and knowledge acquired during the learning process.

Signaling Theory Setup

- The labor market has information asymmetries as employers don't have full information about the potential quality of new hires.
- Therefore employers look for markers or signals of quality
 - Educational attainment
 - Selectivity of undergraduate institution
 - Law school review
- Intuition is that only individuals with the desired skills have the ability to complete the "signal"
 - Higher ability individuals see the better returns to certain fields/careers
 - Pursuing signals are less costly for them
- The signal does not represent skills and knowledge acquired during the learning process.

Signaling Theory Setup

- The labor market has information asymmetries as employers don't have full information about the potential quality of new hires.
- Therefore employers look for markers or signals of quality
 - Educational attainment
 - Selectivity of undergraduate institution
 - Law school review
- Intuition is that only individuals with the desired skills have the ability to complete the "signal"
 - Higher ability individuals see the better returns to certain fields/careers
 - Pursuing signals are less costly for them
- The signal does not represent skills and knowledge acquired during the learning process.

Signaling Equilibrium

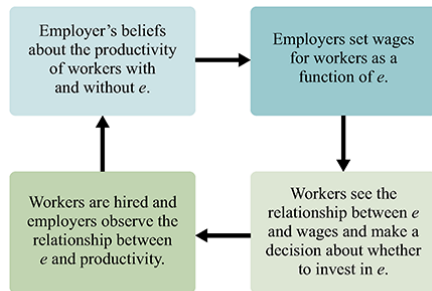


Figure 5.1

Lovenheim/Turner, *Economics of Education*, 1e,

© 2018 Worth Publishers

Separating and Pooling Equilibria

- A **separating equilibrium** exists when
 - education (e) can be used to distinguish high (H) and low (L) ability workers
 - employees can then pay H workers a higher wage w_H and L workers a lower wage w_L
- a **pooling equilibrium** exists when the cost of e is low enough that both H and L workers can afford it
 - Employers therefore pay a wage that is a weighted average of type H and type L workers in the field
 - Why do teacher bonuses for Masters degrees create a pooling equilibrium?

Separating and Pooling Equilibria

- A **separating equilibrium** exists when
 - education (e) can be used to distinguish high (H) and low (L) ability workers
 - employees can then pay H workers a higher wage w_H and L workers a lower wage w_L
- a **pooling equilibrium** exists when the cost of e is low enough that both H and L workers can afford it
 - Employers therefore pay a wage that is a weighted average of type H and type L workers in the field
 - Why do teacher bonuses for Masters degrees create a pooling equilibrium?

Separating and Pooling Equilibria

- A **separating equilibrium** exists when
 - education (e) can be used to distinguish high (H) and low (L) ability workers
 - employees can then pay H workers a higher wage w_H and L workers a lower wage w_L
- a **pooling equilibrium** exists when the cost of e is low enough that both H and L workers can afford it
 - Employers therefore pay a wage that is a weighted average of type H and type L workers in the field
 - Why do teacher bonuses for Masters degrees create a pooling equilibrium?

Separating and Pooling Equilibria

- A **separating equilibrium** exists when
 - education (e) can be used to distinguish high (H) and low (L) ability workers
 - employees can then pay H workers a higher wage w_H and L workers a lower wage w_L
- a **pooling equilibrium** exists when the cost of e is low enough that both H and L workers can afford it
 - Employers therefore pay a wage that is a weighted average of type H and type L workers in the field
 - Why do teacher bonuses for Masters degrees create a pooling equilibrium?

Separating and Pooling Equilibria

- A **separating equilibrium** exists when
 - education (e) can be used to distinguish high (H) and low (L) ability workers
 - employees can then pay H workers a higher wage w_H and L workers a lower wage w_L
- a **pooling equilibrium** exists when the cost of e is low enough that both H and L workers can afford it
 - Employers therefore pay a wage that is a weighted average of type H and type L workers in the field
 - Why do teacher bonuses for Masters degrees create a pooling equilibrium?

Separating and Pooling Equilibria

- A **separating equilibrium** exists when
 - education (e) can be used to distinguish high (H) and low (L) ability workers
 - employees can then pay H workers a higher wage w_H and L workers a lower wage w_L
- a **pooling equilibrium** exists when the cost of e is low enough that both H and L workers can afford it
 - Employers therefore pay a wage that is a weighted average of type H and type L workers in the field
 - Why do teacher bonuses for Masters degrees create a pooling equilibrium?

Differences between the Theories

- Why is it important for education policy to differentiate between the human capital and signaling models?
- The models differ on two key dimensions
 - All returns in the signaling model are private. In the HC model society receives some benefit.
 - In the HC model, how we arrange inputs and/or design the education process matters. In signaling it does not.
- Due to the positive externalities of education in the HC model, it is useful for governments to intervene. Why is this not the case under the signaling model?
- Important to keep in mind that in most cases reality is a blend of both models.

Differences between the Theories

- Why is it important for education policy to differentiate between the human capital and signaling models?
- The models differ on two key dimensions
 - All returns in the signaling model are private. In the HC model society receives some benefit.
 - In the HC model, how we arrange inputs and/or design the education process matters. In signaling it does not.
- Due to the positive externalities of education in the HC model, it is useful for governments to intervene. Why is this not the case under the signaling model?
- Important to keep in mind that in most cases reality is a blend of both models.

Differences between the Theories

- Why is it important for education policy to differentiate between the human capital and signaling models?
- The models differ on two key dimensions
 - All returns in the signaling model are private. In the HC model society receives some benefit.
 - In the HC model, how we arrange inputs and/or design the education process matters. In signaling it does not.
- Due to the positive externalities of education in the HC model, it is useful for governments to intervene. Why is this not the case under the signaling model?
- Important to keep in mind that in most cases reality is a blend of both models.

Differences between the Theories

- Why is it important for education policy to differentiate between the human capital and signaling models?
- The models differ on two key dimensions
 - All returns in the signaling model are private. In the HC model society receives some benefit.
 - In the HC model, how we arrange inputs and/or design the education process matters. In signaling it does not.
- Due to the positive externalities of education in the HC model, it is useful for governments to intervene. Why is this not the case under the signaling model?
- Important to keep in mind that in most cases reality is a blend of both models.

Differences between the Theories

- Why is it important for education policy to differentiate between the human capital and signaling models?
- The models differ on two key dimensions
 - All returns in the signaling model are private. In the HC model society receives some benefit.
 - In the HC model, how we arrange inputs and/or design the education process matters. In signaling it does not.
- Due to the positive externalities of education in the HC model, it is useful for governments to intervene. Why is this not the case under the signaling model?
- Important to keep in mind that in most cases reality is a blend of both models.

Differences between the Theories

- Why is it important for education policy to differentiate between the human capital and signaling models?
- The models differ on two key dimensions
 - All returns in the signaling model are private. In the HC model society receives some benefit.
 - In the HC model, how we arrange inputs and/or design the education process matters. In signaling it does not.
- Due to the positive externalities of education in the HC model, it is useful for governments to intervene. Why is this not the case under the signaling model?
- Important to keep in mind that in most cases reality is a blend of both models.

Human Capital or Signaling

- The National Board Certification for teachers?
- A college degree versus no college degree?
- An economics PhD versus an undergraduate degree in economics?
- A Harvard economics PhD versus a Penn State Economics PhD?

Human Capital or Signaling

- The National Board Certification for teachers?
- A college degree versus no college degree?
- An economics PhD versus an undergraduate degree in economics?
- A Harvard economics PhD versus a Penn State Economics PhD?

Human Capital or Signaling

- The National Board Certification for teachers?
- A college degree versus no college degree?
- An economics PhD versus an undergraduate degree in economics?
- A Harvard economics PhD versus a Penn State Economics PhD?

Human Capital or Signaling

- The National Board Certification for teachers?
- A college degree versus no college degree?
- An economics PhD versus an undergraduate degree in economics?
- A Harvard economics PhD versus a Penn State Economics PhD?

Regression Discontinuity Designs

- Along with RCTs, RDs have become the gold standard of education and social policy research
- When done correctly, they provide an internally valid estimate of a policy/practice/treatment, but there are external validity costs
- RDs rely on a decision rule where treatment is controlled by a person's (or some other unit) value on a forcing variable
 - Math score on a placement exam for remedial math
 - Income for post-secondary financial aid
 - SAT cutoffs for university admissions
- A comparison of individuals' outcomes just below/above the treatment cutoff will provide an unbiased treatment effect estimate
- RD comes in two flavors: Sharp and Fuzzy
 - Sharp=A setting where treatment is 100% dictated by your score on the forcing variable
 - Fuzzy=A setting where there's a jump in the likelihood of treatment at a threshold, but your forcing variable score does not perfectly determine treatment (e.g. non-compliance)

- Along with RCTs, RDs have become the gold standard of education and social policy research
- When done correctly, they provide an internally valid estimate of a policy/practice/treatment, but there are external validity costs
- RDs rely on a decision rule where treatment is controlled by a person's (or some other unit) value on a forcing variable
 - Math score on a placement exam for remedial math
 - Income for post-secondary financial aid
 - SAT cutoffs for university admissions
- A comparison of individuals' outcomes just below/above the treatment cutoff will provide an unbiased treatment effect estimate
- RD comes in two flavors: Sharp and Fuzzy
 - Sharp=A setting where treatment is 100% dictated by your score on the forcing variable
 - Fuzzy=A setting where there's a jump in the likelihood of treatment at a threshold, but your forcing variable score does not perfectly determine treatment (e.g. non-compliance)

- Along with RCTs, RDs have become the gold standard of education and social policy research
- When done correctly, they provide an internally valid estimate of a policy/practice/treatment, but there are external validity costs
- RDs rely on a decision rule where treatment is controlled by a person's (or some other unit) value on a forcing variable
 - Math score on a placement exam for remedial math
 - Income for post-secondary financial aid
 - SAT cutoffs for university admissions
- A comparison of individuals' outcomes just below/above the treatment cutoff will provide an unbiased treatment effect estimate
- RD comes in two flavors: Sharp and Fuzzy
 - Sharp=A setting where treatment is 100% dictated by your score on the forcing variable
 - Fuzzy=A setting where there's a jump in the likelihood of treatment at a threshold, but your forcing variable score does not perfectly determine treatment (e.g. non-compliance)

- Along with RCTs, RDs have become the gold standard of education and social policy research
- When done correctly, they provide an internally valid estimate of a policy/practice/treatment, but there are external validity costs
- RDs rely on a decision rule where treatment is controlled by a person's (or some other unit) value on a forcing variable
 - Math score on a placement exam for remedial math
 - Income for post-secondary financial aid
 - SAT cutoffs for university admissions
- A comparison of individuals' outcomes just below/above the treatment cutoff will provide an unbiased treatment effect estimate
- RD comes in two flavors: Sharp and Fuzzy
 - Sharp=A setting where treatment is 100% dictated by your score on the forcing variable
 - Fuzzy=A setting where there's a jump in the likelihood of treatment at a threshold, but your forcing variable score does not perfectly determine treatment (e.g. non-compliance)

- Along with RCTs, RDs have become the gold standard of education and social policy research
- When done correctly, they provide an internally valid estimate of a policy/practice/treatment, but there are external validity costs
- RDs rely on a decision rule where treatment is controlled by a person's (or some other unit) value on a forcing variable
 - Math score on a placement exam for remedial math
 - Income for post-secondary financial aid
 - SAT cutoffs for university admissions
- A comparison of individuals' outcomes just below/above the treatment cutoff will provide an unbiased treatment effect estimate
- RD comes in two flavors: Sharp and Fuzzy
 - Sharp=A setting where treatment is 100% dictated by your score on the forcing variable
 - Fuzzy=A setting where there's a jump in the likelihood of treatment at a threshold, but your forcing variable score does not perfectly determine treatment (e.g. non-compliance)

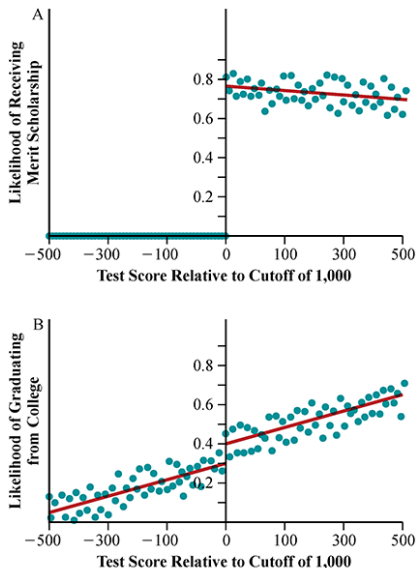
- Along with RCTs, RDs have become the gold standard of education and social policy research
- When done correctly, they provide an internally valid estimate of a policy/practice/treatment, but there are external validity costs
- RDs rely on a decision rule where treatment is controlled by a person's (or some other unit) value on a forcing variable
 - Math score on a placement exam for remedial math
 - Income for post-secondary financial aid
 - SAT cutoffs for university admissions
- A comparison of individuals' outcomes just below/above the treatment cutoff will provide an unbiased treatment effect estimate
- RD comes in two flavors: Sharp and Fuzzy
 - Sharp=A setting where treatment is 100% dictated by your score on the forcing variable
 - Fuzzy=A setting where there's a jump in the likelihood of treatment at a threshold, but your forcing variable score does not perfectly determine treatment (e.g. non-compliance)

- Along with RCTs, RDs have become the gold standard of education and social policy research
- When done correctly, they provide an internally valid estimate of a policy/practice/treatment, but there are external validity costs
- RDs rely on a decision rule where treatment is controlled by a person's (or some other unit) value on a forcing variable
 - Math score on a placement exam for remedial math
 - Income for post-secondary financial aid
 - SAT cutoffs for university admissions
- A comparison of individuals' outcomes just below/above the treatment cutoff will provide an unbiased treatment effect estimate
- RD comes in two flavors: Sharp and Fuzzy
 - Sharp=A setting where treatment is 100% dictated by your score on the forcing variable
 - Fuzzy=A setting where there's a jump in the likelihood of treatment at a threshold, but your forcing variable score does not perfectly determine treatment (e.g. non-compliance)

- Along with RCTs, RDs have become the gold standard of education and social policy research
- When done correctly, they provide an internally valid estimate of a policy/practice/treatment, but there are external validity costs
- RDs rely on a decision rule where treatment is controlled by a person's (or some other unit) value on a forcing variable
 - Math score on a placement exam for remedial math
 - Income for post-secondary financial aid
 - SAT cutoffs for university admissions
- A comparison of individuals' outcomes just below/above the treatment cutoff will provide an unbiased treatment effect estimate
- RD comes in two flavors: Sharp and Fuzzy
 - Sharp=A setting where treatment is 100% dictated by your score on the forcing variable
 - Fuzzy=A setting where there's a jump in the likelihood of treatment at a threshold, but your forcing variable score does not perfectly determine treatment (e.g. non-compliance)

- Along with RCTs, RDs have become the gold standard of education and social policy research
- When done correctly, they provide an internally valid estimate of a policy/practice/treatment, but there are external validity costs
- RDs rely on a decision rule where treatment is controlled by a person's (or some other unit) value on a forcing variable
 - Math score on a placement exam for remedial math
 - Income for post-secondary financial aid
 - SAT cutoffs for university admissions
- A comparison of individuals' outcomes just below/above the treatment cutoff will provide an unbiased treatment effect estimate
- RD comes in two flavors: Sharp and Fuzzy
 - Sharp=A setting where treatment is 100% dictated by your score on the forcing variable
 - Fuzzy=A setting where there's a jump in the likelihood of treatment at a threshold, but your forcing variable score does not perfectly determine treatment (e.g. non-compliance)

- Along with RCTs, RDs have become the gold standard of education and social policy research
- When done correctly, they provide an internally valid estimate of a policy/practice/treatment, but there are external validity costs
- RDs rely on a decision rule where treatment is controlled by a person's (or some other unit) value on a forcing variable
 - Math score on a placement exam for remedial math
 - Income for post-secondary financial aid
 - SAT cutoffs for university admissions
- A comparison of individuals' outcomes just below/above the treatment cutoff will provide an unbiased treatment effect estimate
- RD comes in two flavors: Sharp and Fuzzy
 - Sharp=A setting where treatment is 100% dictated by your score on the forcing variable
 - Fuzzy=A setting where there's a jump in the likelihood of treatment at a threshold, but your forcing variable score does not perfectly determine treatment (e.g. non-compliance)

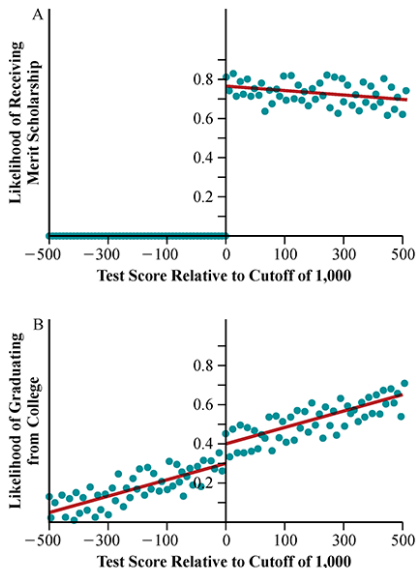


- In Figure A, we see there is a 75 percentage point difference in the likelihood of winning a merit scholarship at a test score cutoff (fuzzy cutoff)
- We can use this fuzzy cutoff to estimate the effect of merit aid on graduating college

Figure 3.4

Lovenheim/Turner, *Economics of Education*, 1e,

© 2018 Worth Publishers



- In Figure A, we see there is a 75 percentage point difference in the likelihood of winning a merit scholarship at a test score cutoff (fuzzy cutoff)
- We can use this fuzzy cutoff to estimate the effect of merit aid on graduating college

Figure 3.4

Lovenheim/Turner, *Economics of Education*, 1e,

© 2018 Worth Publishers

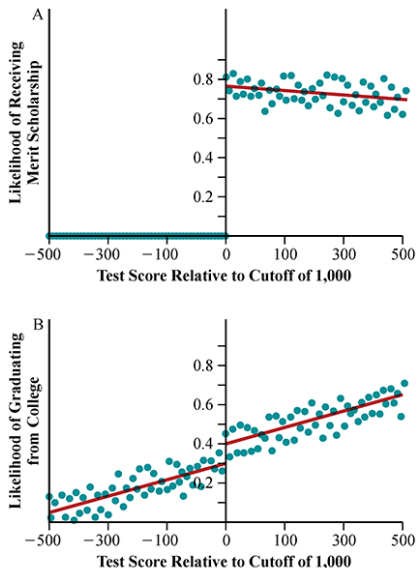


Figure 3.4

Lovenheim/Turner, *Economics of Education*, 1e,

© 2018 Worth Publishers

- In a fuzzy framework, we divide the difference in outcomes at the threshold (10 percentage point increase in graduating from college (or .1)) by the difference in the likelihood of treatment (75 percentage points (or .75))
- Here we find a 13.3 percentage point increase in the likelihood of graduating from college due to merit based financial aid

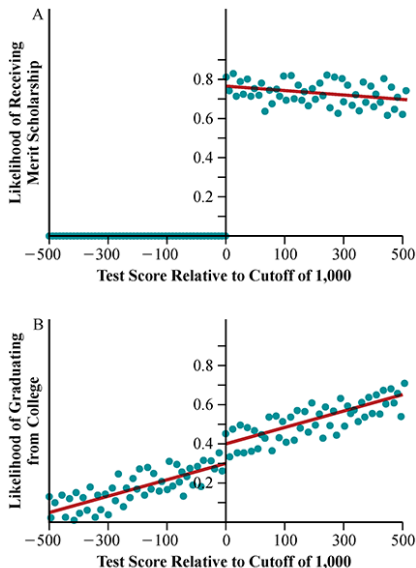


Figure 3.4

Lovenheim/Turner, *Economics of Education*, 1e,

© 2018 Worth Publishers

- In a fuzzy framework, we divide the difference in outcomes at the threshold (10 percentage point increase in graduating from college (or .1)) by the difference in the likelihood of treatment (75 percentage points (or .75))
- Here we find a 13.3 percentage point increase in the likelihood of graduating from college due to merit based financial aid