

THE ECONOMICS OF LOVE AND MARRIAGE

J. Mao

The Perception of Love as Passionate and Irrational

Love looks not with the eyes, but with the mind;
And therefore is wing'd Cupid painted blind:
Nor hath Love's mind of any judgement taste;
Wings and no eyes figure unheedy haste:
And therefore is Love said to be a child,
Because in choice he is so oft beguiled.
As waggish boys in game themselves forswear,
So the boy Love is perjured every where.

- Shakespeare, *A Midsummer Night's Dream* (1.1.234-41)



In Reality...



Shanghai People's Park



Finding Love as an Optimal Stopping Problem

Finding Love as an Optimal Stopping Problem

- Suppose you are a woman. Imagine you are going to meet n men in your life, but you can only pick one.
- You meet with each man **sequentially**. Before meeting a man, you do not know good he is.
- After meeting him, you can rank him against the other men you have met, and have to decide whether or not to accept him.
- If you accept him, your “search” is stopped and you will not meet with the rest.
- If you reject him, you can go on to meet the next guy, but you will never be able to return to the ones you have already met and rejected.

Finding Love as an Optimal Stopping Problem

- Goal: to find **the best** candidate
 - ▣ You can rank all n candidates from best to worst
 - ▣ You do not care about finding the second best
- Problem: when do you stop?
 - ▣ Stopping too soon: you have not yet met the best candidate available
 - ▣ Stopping too late: you have already met (and rejected) the best candidate available

Don' t Stop too late!

劝君莫惜金缕衣，劝君惜取少年时；有花堪折直须折，莫待无花空折枝。——杜秋娘《金缕衣》

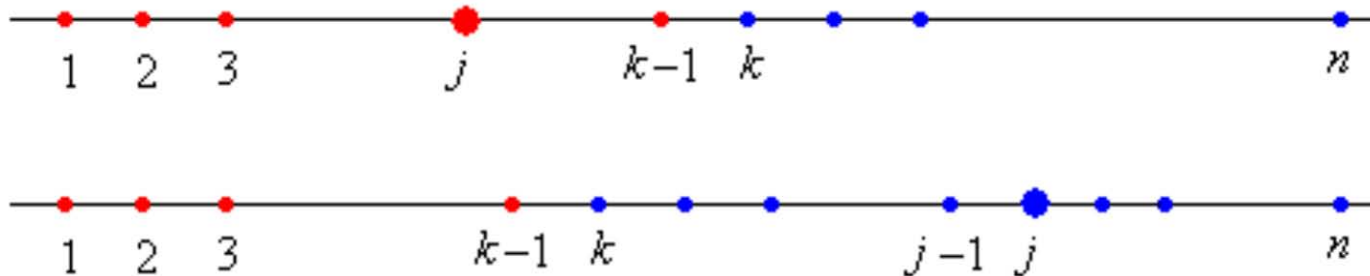
Finding Love as an Optimal Stopping Problem

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- Can the princess find her best prince?

Finding Love as an Optimal Stopping Problem

- Strategy: reject the first $k-1$ candidates, then select the first candidate who is better than all of the previous candidates (if still available)
- Assuming $k \geq 2$, if the best candidate arrives on the j th, then

$$\Pr(\text{choosing } j \text{ if } j \text{ is the best candidate}) = \begin{cases} 0 & \text{if } j \leq k-1 \\ \frac{k-1}{j-1} & \text{if } k \leq j \leq n \end{cases}$$

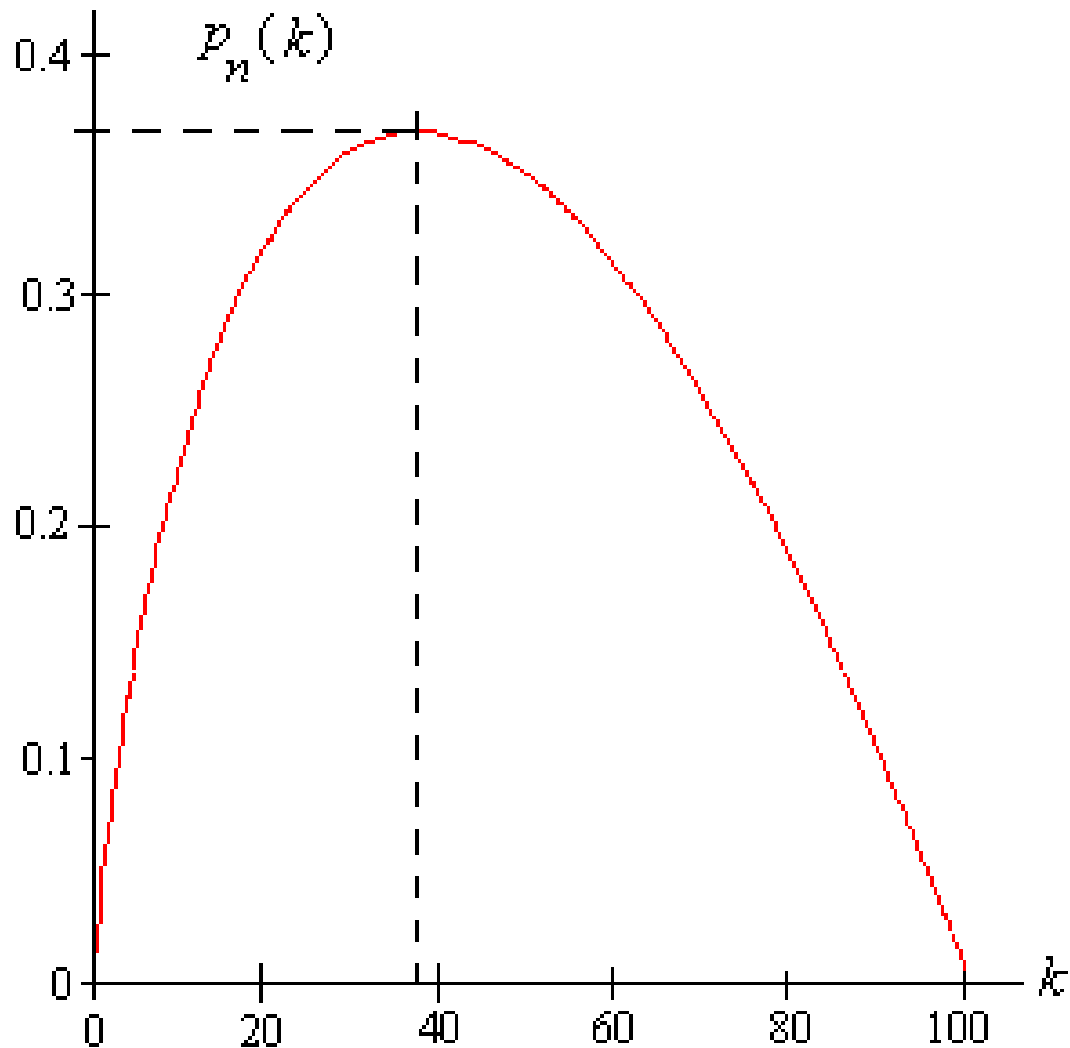


Finding Love as an Optimal Stopping Problem

- Since the best candidate can arrive on any order (with equal probability), for $k \geq 2$,

$$\begin{aligned} p_n(k) &= \Pr(\text{choosing the best candidate}) \\ &= \Pr(j \text{ is the best candidate}) \times \\ &\quad \sum_{j=k}^n \Pr(\text{choosing } j \text{ if } j \text{ is the best candidate}) \\ &= \frac{1}{n} \sum_{j=k}^n \frac{k-1}{j-1} \end{aligned}$$

Finding Love as an Optimal Stopping Problem



Finding Love as an Optimal Stopping Problem

- As $n \rightarrow \infty$,

$$p_n(k) \rightarrow x \int_x^1 \left(\frac{1}{t} \right) dt = -x \ln(x)$$

($x = k/n$, $t = j/n$, $dt = 1/n$)

The 37 Percent Rule

- Both optimal k/n and optimal probability $= 1/e = 0.37$
- For large n , it is optimal to reject the first 37% of the candidates and then select the first candidate (if he appears) that is better than all of the previous candidates.
- The probability of finding the best candidate using this strategy is also 37%

Finding Love as an Optimal Stopping Problem

- Also called

- ▣ The Secretary's Problem

- Hire a secretary among n candidates. Applicants are interviewed one by one in random order and hiring/rejection decision made after each interview

- ▣ Sultan's Dowry Problem

- A Sultan granted a commoner a chance to marry one of his n daughters, each one has a different dowry. The daughters are presented one by one in random order and the commoner must immediately decide whether to accept or reject. The sultan will allow the marriage to take place only if the commoner picks the daughter with the overall highest dowry.

Finding Love as an Optimal Stopping Problem

- Now suppose, in addition to being able to rank all the candidates you have met, you know that the quality of men is uniformly distributed between 0 and 1, and you are able to observe their quality once you meet them.

Assume that the quality of each candidate is uniformly distributed between 0 and 1. Let x_k denote the quality of the k th candidate and let $V_n^k(x_k)$ be the value of meeting a candidate of quality x_k in the k th round when the total number of candidates is n . Then

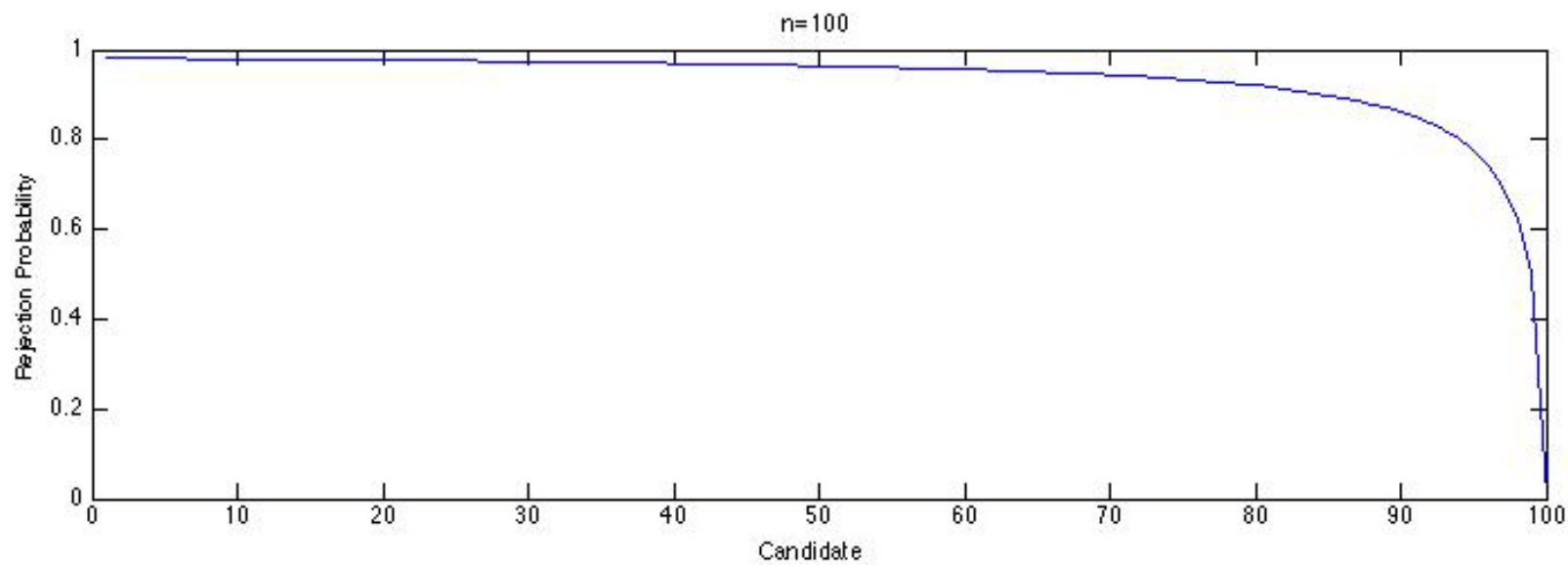
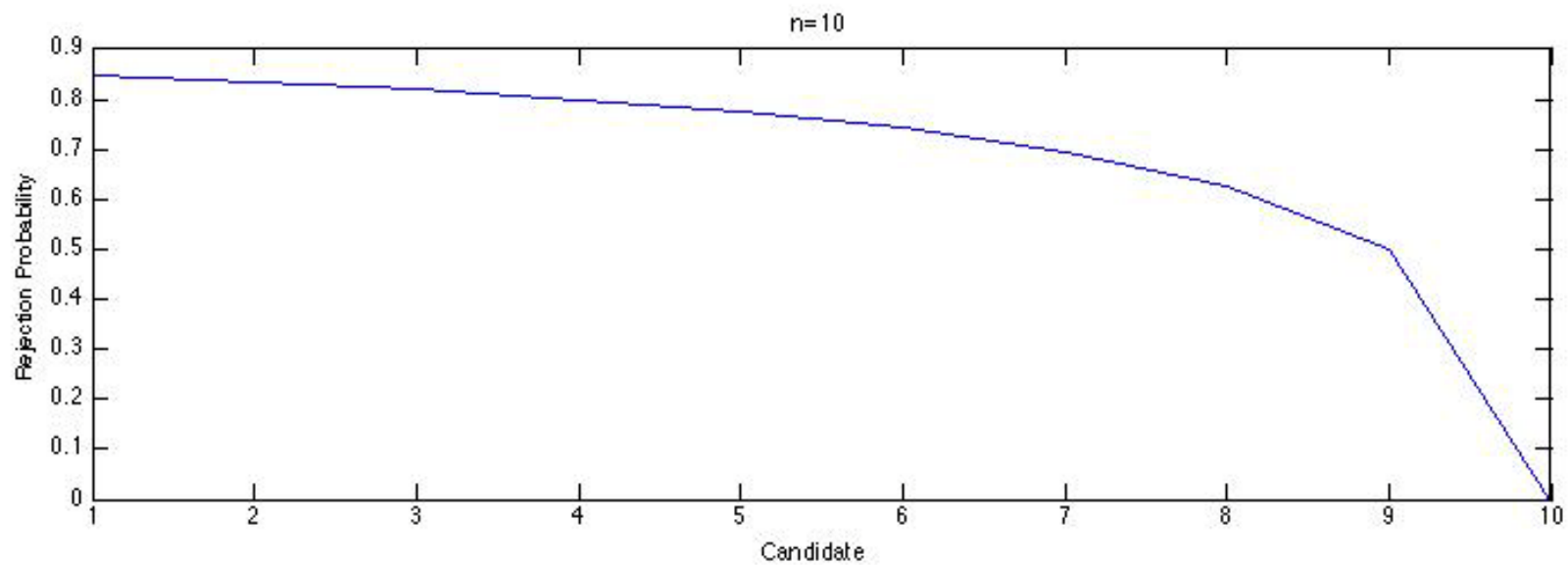
$$V_n^k(x_k) = \max \left\{ x_k, \int_0^1 V_n^{k+1}(x_{k+1}) dx_{k+1} \right\}$$

$$V_n^n(x_n) = x_n$$

Let $W_n^k = \int_0^1 V_n^{k+1}(x_{k+1}) dx_{k+1}$. W_n^k is the value of remaining single and is the opportunity cost of choosing x_k

Let p_n^k be the probability of rejecting the k th candidate before meeting him, then

$$p_n^n = 0, p_n^{n-1} = 0.5, p_n^{n-2} = 0.625, p_n^{n-3} = 0.695, p_n^{n-4} = 0.742, \dots$$



Finding Love as an Optimal Stopping Problem

- How do you know you've found your match?
- “Economically, the answer to this is easy ... You're solving an 'optimal stopping' problem. You know you've found 'the one' when you determine that the expected quality of all future matches is lower than the value of your current partner.”

- Andrew Leigh,
former Australian Labor MP
and economist





The Search-Matching Model of Relationship

The Search-Matching Model of Employment

- In reality, just like searching for a job, the search for a partner happens in a “market” with single individuals trying to meet each other
- Labor market analogy: workers looking for jobs and companies looking for workers

The Search-Matching Model of Employment

- In a perfectly competitive labor market, there should be no unemployment
 - ▣ Demand for labor should equal supply of labor at the equilibrium wage
- In reality, any time there are unemployed workers and unfilled vacancies.

The Search-Matching Model of Employment

- One reason: in practice, time and effort is needed for individuals to learn about available job openings and for firms to learn about available job candidates
 - ▣ Career fairs
 - ▣ Recruiting ads
 - ▣ Online job and professional networking sites
 - ▣ Headhunters, personal networks, etc.
- As a result, at any time, only some individuals are able to find suitable job openings and only some job openings are able to find suitable candidates

The Search-Matching Model of Employment

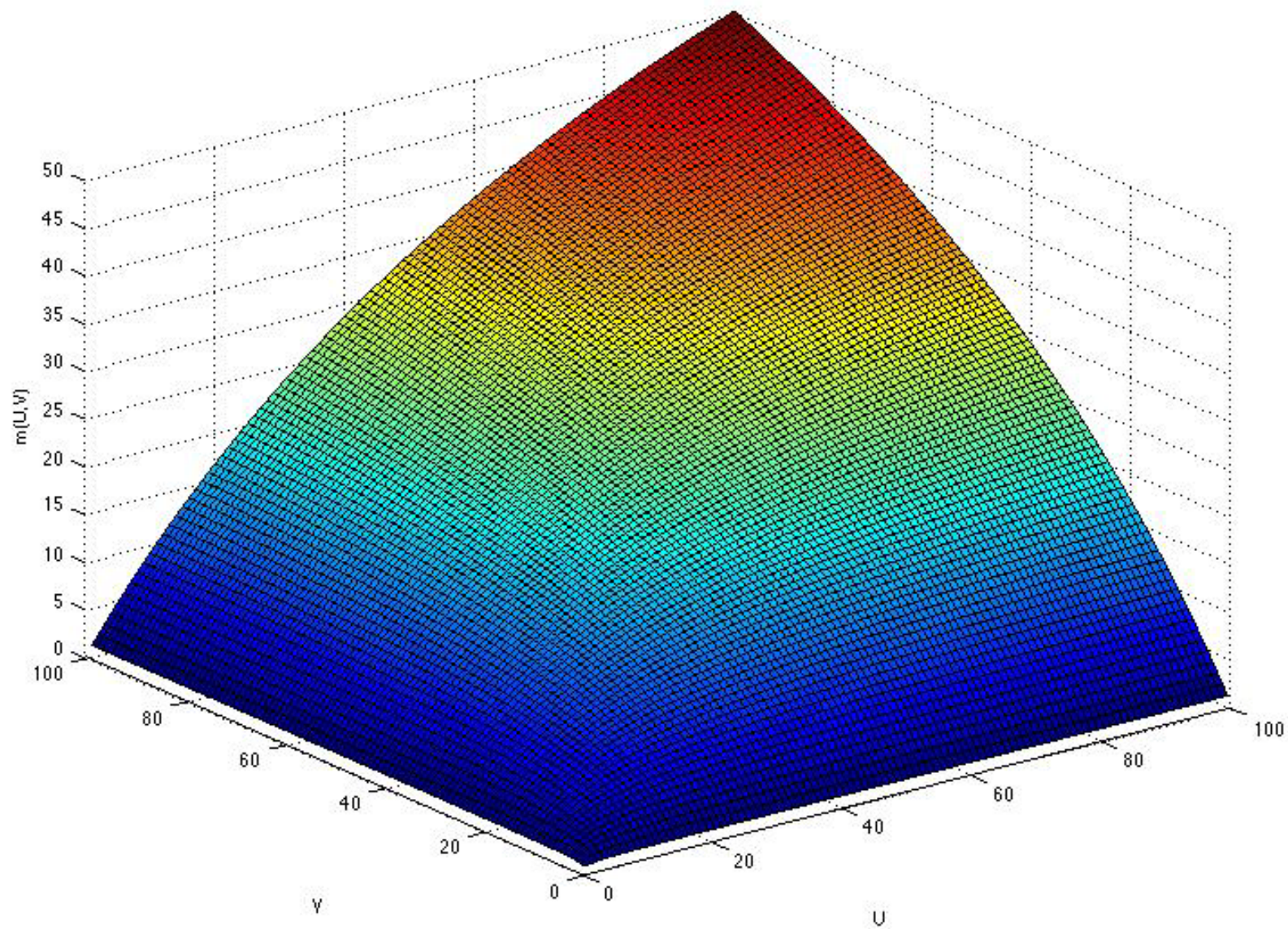
- When a job-seeker finds a suitable opening, a “meeting” is said to have occurred between the job-seeker and the vacancy.
 - ▣ The firm and the individual will then decide whether to accept the match
- The fact that meetings between job seekers and vacancies do not happen instantly for all suitable pairs, but require a search and matching process is called **search friction**
- Search friction prevents the market from being perfectly competitive and makes the market less efficient

The Search-Matching Model of Employment

- In general, search friction exists in any markets in which it takes time and effort for people to seek trading partners.
- In the presence of search friction, markets do not clear, in the sense that there are both buyers who want to buy and sellers who want to sell who are unable to meet.
- Another example is the taxi market: at any time, there are empty taxis and un-served riders co-existing in equilibrium.

Matching Function

- A matching function, $m(U,V)$, describes how many meetings are going to take place in a given period when there are U unemployed workers and V vacancies
- An example matching function: $m(U,V) = UV/(U+V)$
 - ▣ Matching probability for an unemployed worker: $p^U = m(U,V)/U = 1/(1+(U/V)) \propto V/U$
 - ▣ Matching probability for a job vacancy: $p^V = m(U,V)/V = 1/(1+(V/U)) \propto U/V$
- The matching function is intended to represent “heterogeneities, frictions, and information imperfections” (Pissarides 2000).



The Unemployed Worker's Problem

- Suppose when a meeting happens between an unemployed worker and a firm with a job vacancy, the firm makes a wage offer and the worker decides whether to accept or not.
- To further simplify the problem, assume that if the worker accepts, she will receive the wage just once (instead of receiving the wage every period), and then she will not search for jobs anymore. If she rejects, then she will remain unemployed and will look for a job again next period.

The Unemployed Worker's Problem

For an unemployed worker, let $\mathcal{J}_t(w_t)$ be the value of being matched with a job vacancy with wage offer w_t in period t . Let \mathcal{K}_t be the value of remaining unemployed in period t . Let $p_t^U = \frac{m(U_t, V_t)}{U_t}$ be the probability of being matched with a vacancy in period t . Then

$$\mathcal{J}_t(w_t) = \max \{w_t, \mathcal{K}_t\}$$

$$\mathcal{K}_t = p_{t+1}^U \int \mathcal{J}_{t+1}(w_{t+1}) f(w_{t+1}) dw_{t+1} + (1 - p_{t+1}^U) \mathcal{K}_{t+1}$$

, where $f(w_{t+1})$ is the distribution of w_{t+1} .

Here \mathcal{K}_t is the *opportunity cost* of accepting the job. It is also called the **outside option** of the worker.

The Firm Vacancy's Problem

- Suppose when a meeting happens between an unemployed worker and a firm with a vacancy, the worker demands a wage and the firm considers whether to accept or not.
- To further simplify the problem, assume that if the firm accepts, it receives a one time profit = (revenue – wage), and the vacancy will no longer exist.
- If the firm does not accept, then the vacancy remains unfilled and the firm will look for another worker next period.

The Firm Vacancy's Problem

For a job vacancy, let $\mathcal{D}_t(w_t)$ be the value of being matched with an unemployed worker with wage demand w_t . Let π_t be the revenue that the job can produce. Let \mathcal{E}_t be the value of keeping the vacancy unfilled. Let $p_t^V = \frac{m(U_t, V_t)}{V_t}$ be the probability of being matched with an unemployed worker in period t . Then

$$\mathcal{D}_t(w_t) = \max \{ \pi_t - w_t, \mathcal{E}_t \}$$

$$\mathcal{E}_t = p_{t+1}^V \int \mathcal{D}_{t+1}(w_{t+1}) f(w_{t+1}) dw_{t+1} + (1 - p_{t+1}^V) \mathcal{E}_{t+1}$$

Here \mathcal{E}_t is the **outside option** of the firm's vacancy.

The Search-Matching Model of Employment

- The better the outside option of an unemployed worker, the more likely she is going to demand a higher wage or decline an offer (and continue searching next period)
- The better the outside option of a vacancy, the more likely the firm is going to offer a lower wage or refuse to accept a wage demand (and continue searching next period)

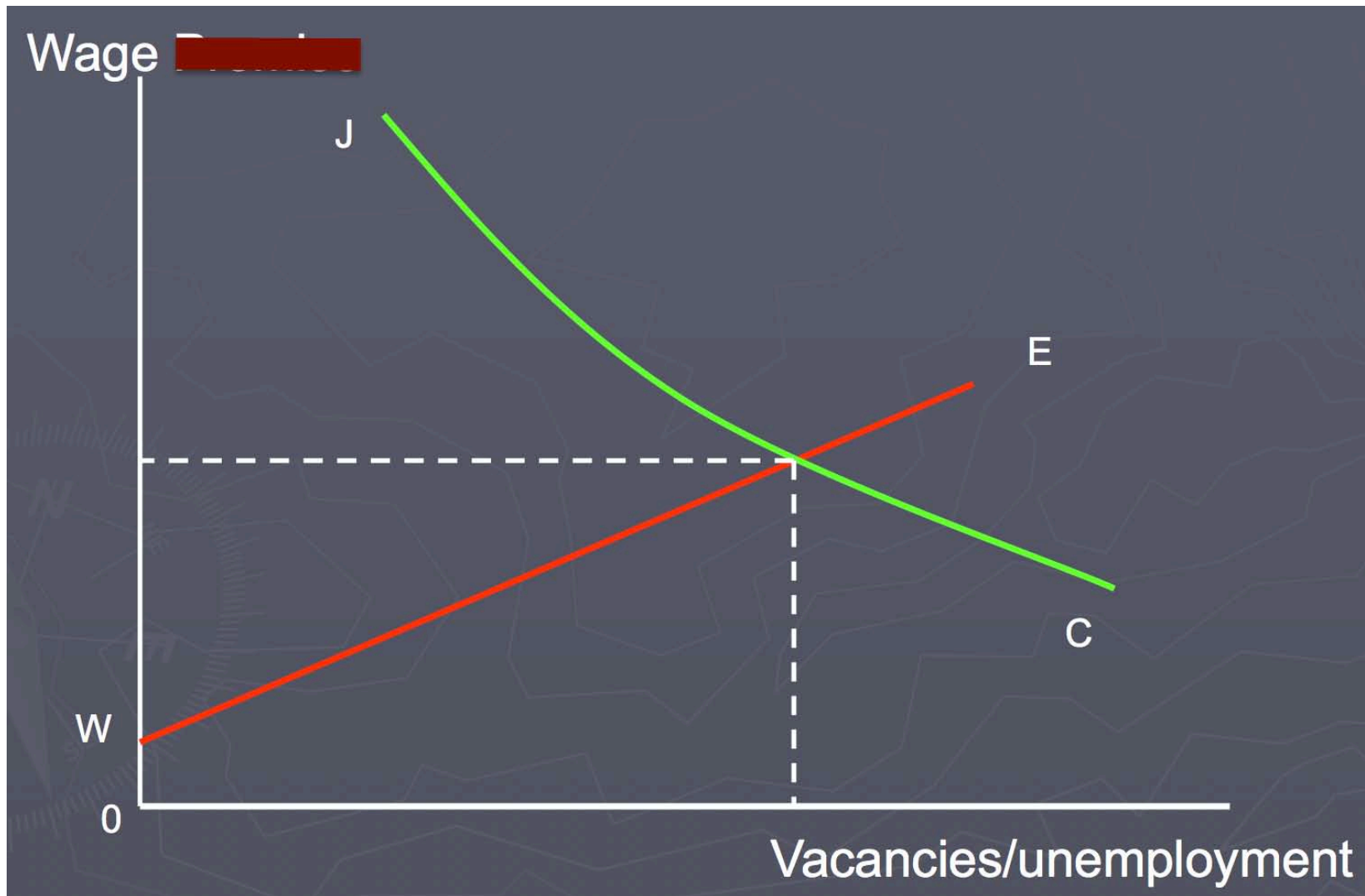
The Search-Matching Model of Employment

- The outside options of unemployed workers and vacancies are affected by their respective matching probabilities
 - ▣ $(V/U) \uparrow \Rightarrow p^U \uparrow \Rightarrow W \uparrow$
 - ▣ $(V/U) \uparrow \Rightarrow p^V \downarrow \Rightarrow F \downarrow$
- Therefore, $(V/U) \uparrow \Rightarrow$ higher negotiated wage when unemployed workers and vacancies meet. $(V/U) \downarrow \Rightarrow$ lower negotiated wage when unemployed workers and vacancies meet.

The Search-Matching Model of Employment

- On the other hand, when wages are low,
 - ▣ firms have more incentives to create vacancies
 - ▣ Unemployed workers have incentives to quit looking for a job
 - ▣ $\Rightarrow (V/U) \uparrow$
- When wages are high,
 - ▣ firms have less incentives to create vacancies
 - ▣ Individuals who are not looking for jobs have incentives to start looking
 - ▣ $\Rightarrow (V/U) \downarrow$
- This is essentially the classic supply and demand relationship in labor markets

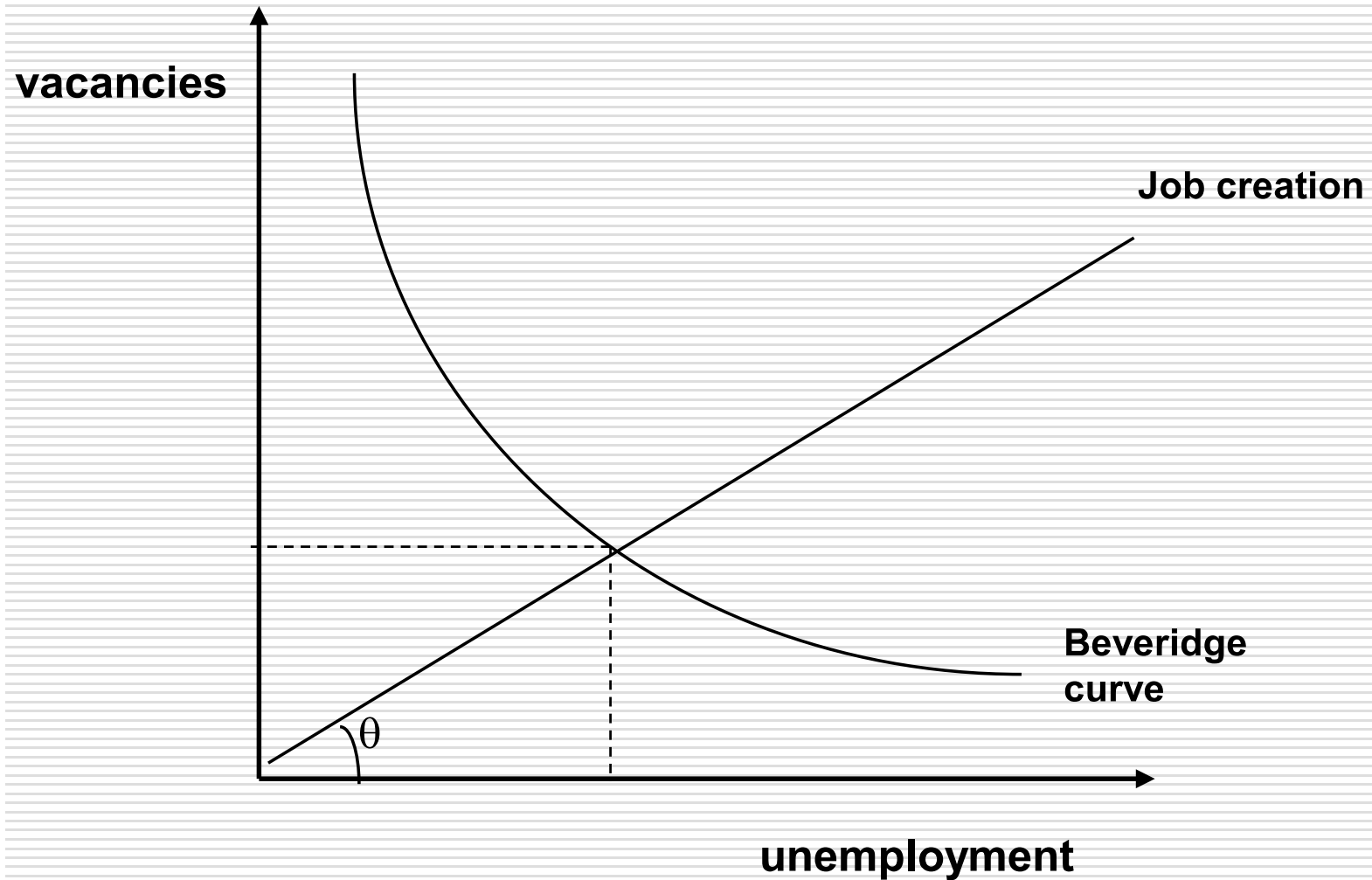
The Search-Matching Model of Employment



Beveridge Curve

- The **Beveridge Curve**, also called the U-V curve, is a graphical representation of the relationship between unemployment and job vacancy rates.
 - ▣ Higher vacancy rates are associated with lower unemployment rates, and vice versa
 - ▣ Vacancy rates are typically measured by the number of job openings at the end of each month, divided by (total employment + job openings)
 - ▣ Unemployment rates are measured by the number of individuals in each month who indicate that they are unemployed and are looking for a job, divided by the size of the labor force.

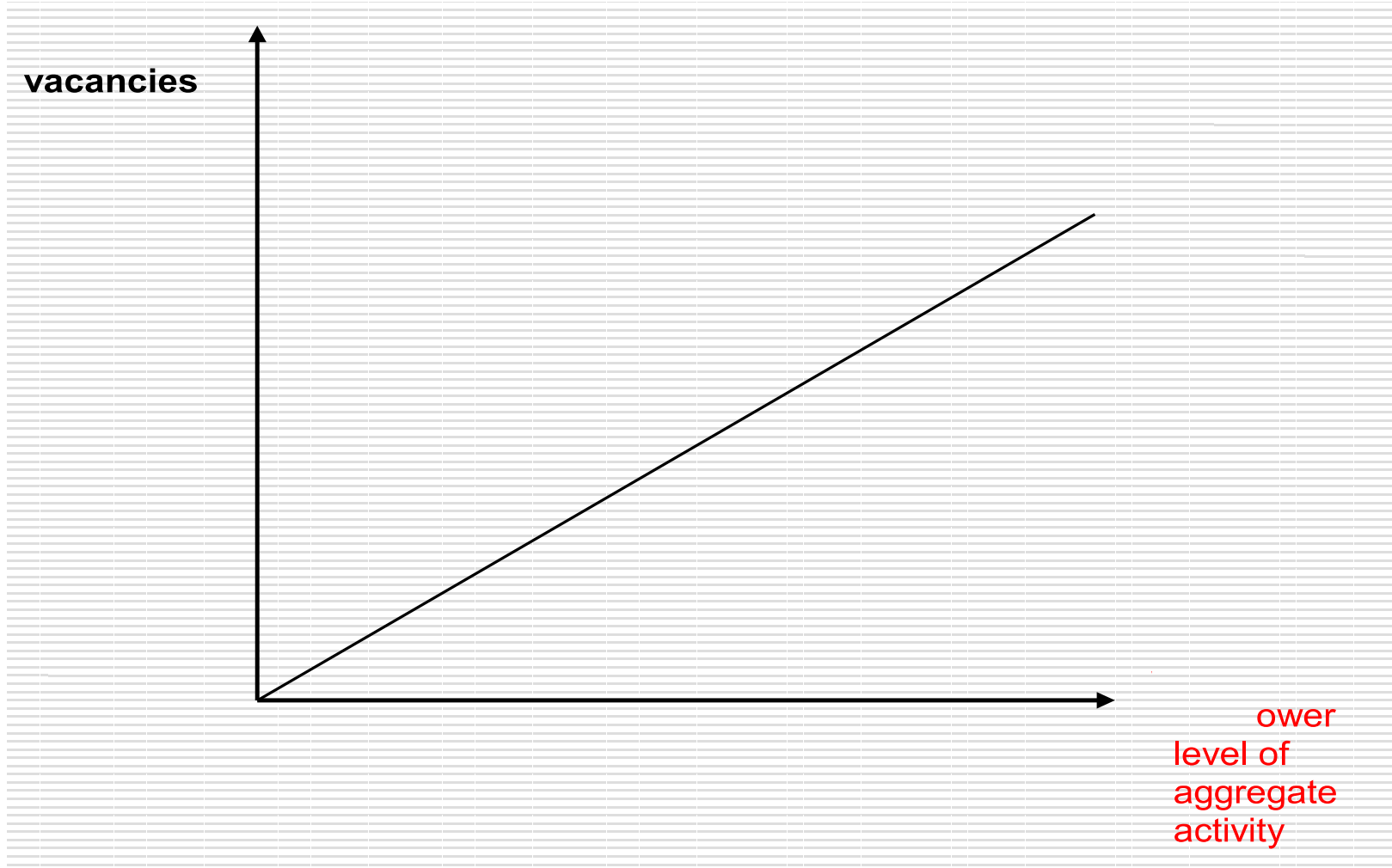
Beveridge Curve



Beveridge Curve

- Movements along the Beveridge curve often reflect the state of the economy in the business cycle
 - ▣ When the economy is booming, firms create more job vacancies at each wage level. Equilibrium wage is high, vacancy rate is high, and unemployment rate is low
 - ▣ When the economy is in bad, firms create fewer job vacancies at each wage level. Equilibrium wage is low, vacancy rate is low, and unemployment rate is high
- Shifts in the Beveridge curve typically reflect changes in matching efficiency
 - ▣ Matching technology
 - ▣ Mismatch

Beveridge Curve



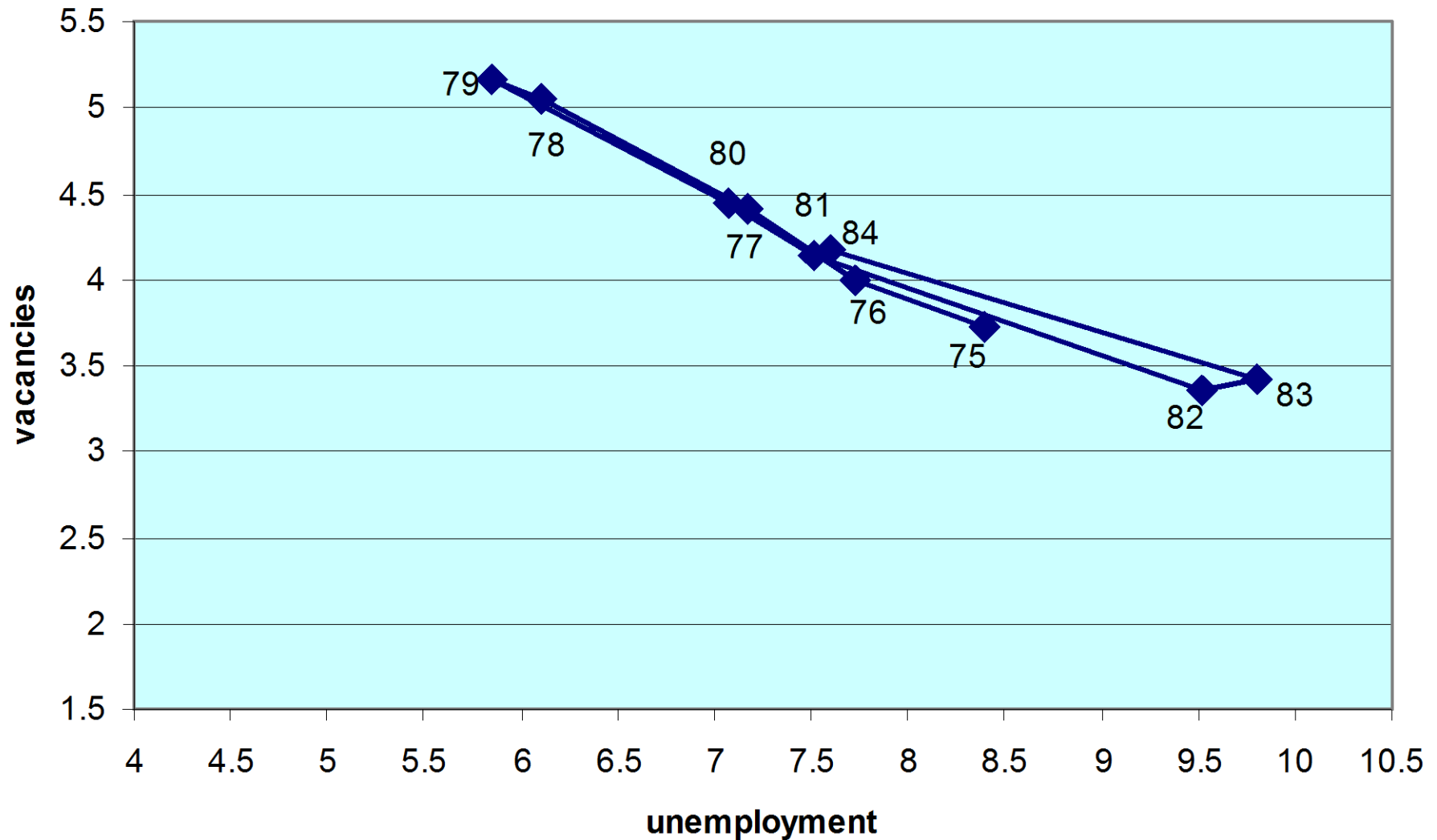
Beveridge Curve

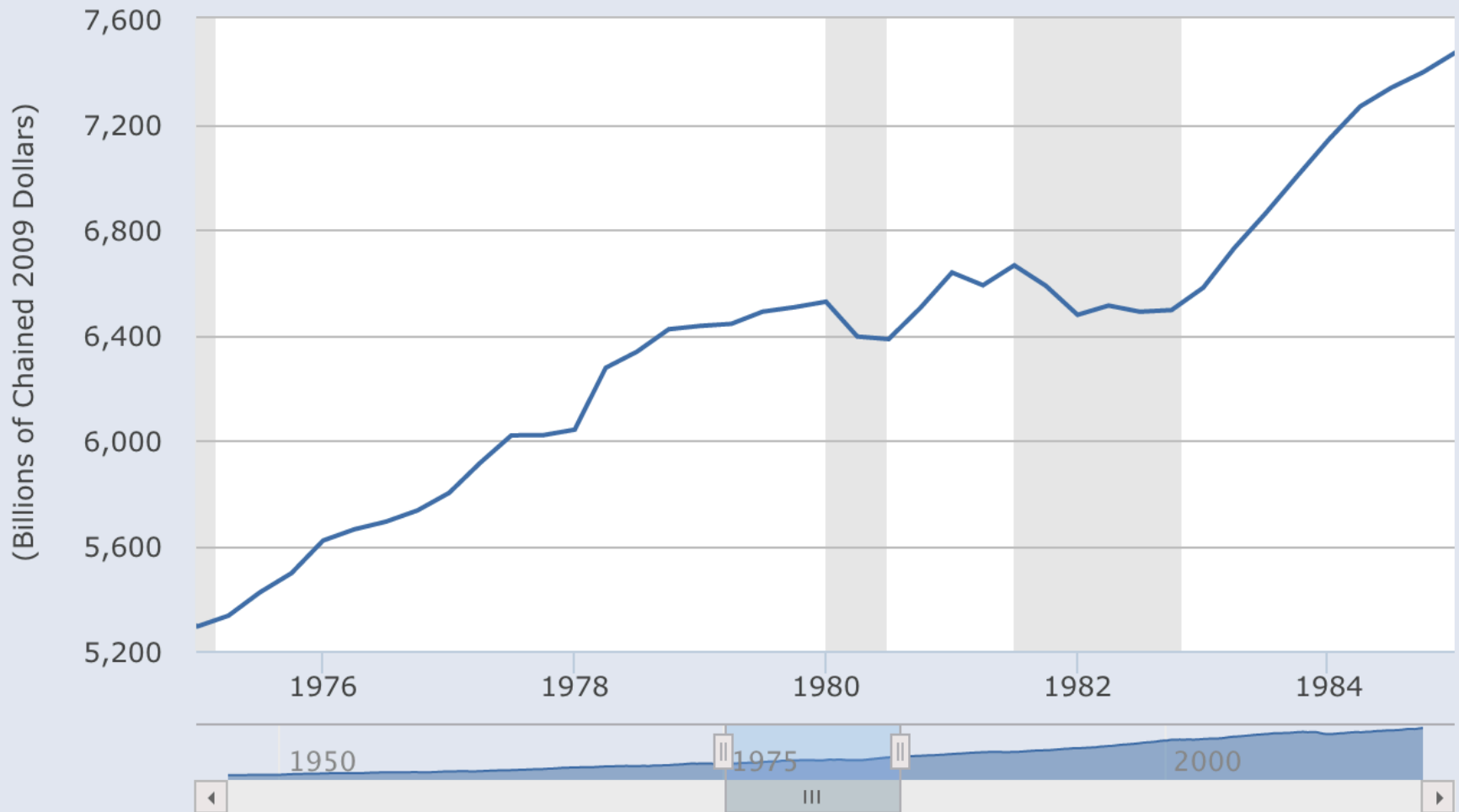
- In addition to business cycle effects and changes in matching efficiency due to technological change or mismatch, many other factors can cause the economy to move along the Beveridge curve or cause the Beveridge curve to shift
- Applications
 - ▣ Unemployment benefits
 - ▣ Expectations

Beveridge Curve

- When unemployment rises because of a movement along the Beveridge curve, it is often said that unemployment has increased due to **cyclical** reasons.
- When unemployment rises because of an outward shift of the Beveridge curve, it is often said that unemployment has increased due to **structural** reasons.
 - ▣ An example is an economy in transition from a manufacturing-oriented economy to a service-oriented economy: manufacturing workers who become unemployed as a result of this transition may have a harder time finding suitable job openings.
 - ▣ Such “structural unemployment” tends to last for longer time (it takes time to acquire new skills)

The U.S. Beveridge Curve, 1975-1984

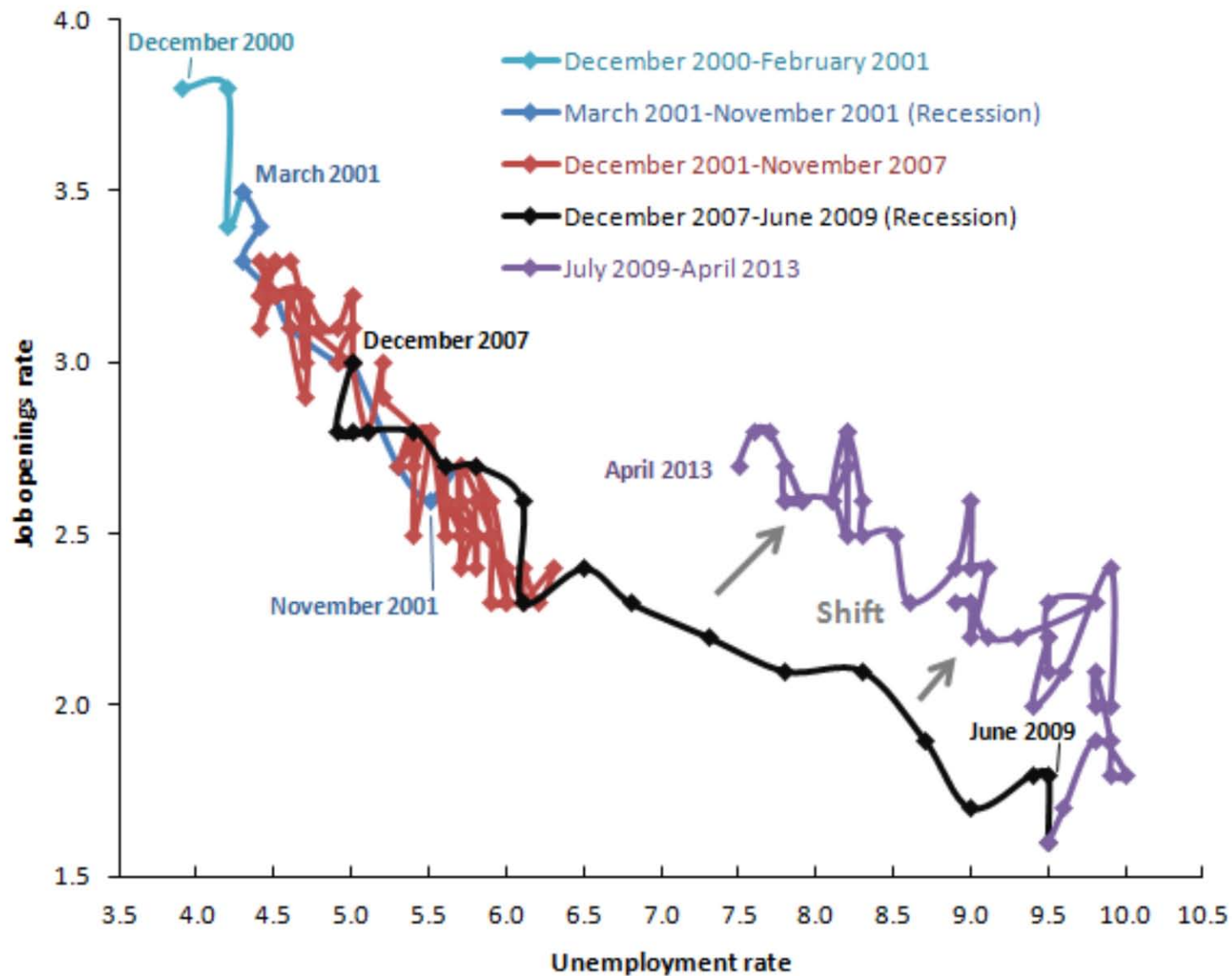




Source: US. Bureau of Economic Analysis

Shaded areas indicate US recessions - 2014 research.stlouisfed.org

**The Beveridge Curve (job openings vs. unemployment rate),
seasonally adjusted, December 2000–April 2013**



Source: U.S. Bureau of Labor Statistics.

The Search-Matching Model of Relationship

- The Search-Matching model can be applied not only to the labor market, where workers and vacancies search for each other, but can be naturally used to describe the “market” where individuals look for each other to form romantic relationships
- Just like in the labor market, it takes time and effort just to be able to meet a suitable partner (let alone to form a relationship)
 - ▣ There exists significant search friction

The Search-Matching Model of Relationship

- In the case of heterosexual relationships, let M be the number of single men and W be the number of single women looking for relationships in a given time

The Search-Matching Model of Relationship

- The Search-Matching model tells us
 - ▣ Why there are always some men and some women who will not be able to find a match and will remain “romantically unemployed”
 - ▣ The higher W/M is, the better outside option a man has, the more he can afford to be picky, and the more bargaining power he has after being matched with a woman.
 - ▣ The higher M/W is, the better outside option a woman has, the more she can afford to be picky, and the more bargaining power she has after being matched with a man.

The Search-Matching Model of Relationship

- A Beveridge curve can similarly be drawn for the market for relationships.
 - ▣ When the single rate of men is high, the single rate of women tends to be low, and vice versa
 - ▣ What would make the Beveridge curve shift in this market? Can there be “structural romantic unemployment”?

The Search-Matching Model of Relationship

- Abramitzky et al. (2011):
- A large number of French men died in WWI. “We find that post war in regions with higher mortality rates: men were less likely to marry women of lower social classes; men were more likely and women less likely to marry; out-of-wedlock births increased ... These findings are consistent with men improving their position in the marriage market as they become scarcer.”



Dating and Information Economics

Information Economics

- **Asymmetric information (Information Asymmetry)** exists when one party to a transaction knows more than the other party
 - ▣ A worker knows more than his employer about how much effort he puts into his job.
 - Informed party: worker; uninformed party: employer
 - ▣ A seller of a used car knows more than the buyer about the car's condition.
 - Informed party: car seller; uninformed party: car buyer
 - ▣ A doctor knows more than the patient about the quality of his diagnosis and prescription
 - Informed party: doctor; uninformed party: patient

Asymmetric Information

- Asymmetric information is a major source of market inefficiency: When some people know more than others, the market may fail to put resources to their best use.
 - People with good health may have trouble getting low-cost health insurance
 - People with low risk may have trouble getting low-interest loans
- In general, a market suffering from a lack of information is said to have **information friction**.
- Two types of problem created by asymmetric information: **moral hazard** and **adverse selection**.

Moral Hazard

- **Moral hazard:** the tendency of a person who is imperfectly monitored to engage in unintended, or dishonest, or otherwise undesirable behavior
 - Workers slack
 - People with insurance behave more recklessly
 - People rely on unemployment benefits rather than looking for jobs
 - Borrowers use borrowed money to gamble
 - Banks engage in risky lending knowing that government will bail them out

Moral Hazard

- Moral hazard can arise either when (1) behavior cannot be well observed or (2) behavior can be well observed but cannot be contracted.
- Solutions
 - Worker slack: bonus, stock options, short contracts
 - Insurance: co-payments
 - Unemployment benefits: EITC
 - The Earned Income Tax Credit (EITC) is a tax benefit in the U.S. for low income *working* individuals and households. The amount of benefit rises with income up to a maximum amount.
 - Borrowing: covenants in loan contracts
 - Covenants are provisions that restrict borrower behavior. For example, Auto loan contracts may require the car owner to maintain a minimum amount of insurance



"Now we just have to sit back and wait for the Fed to bail us out."

Adverse Selection

- Adverse selection is a problem that arises in markets in which the seller knows more about the attributes of the good being sold than the buyer does. In such a situation, the buyer runs the risk of being sold a good of low quality.
- **Adverse selection:** the tendency for the unobserved attributes of a good to become undesirable to the uninformed party
 - Low wage attract low-productivity workers
 - Buyers of insurance tend to be of high risk

Adverse Selection

- You are a venture capitalist (VC). You are approached by two entrepreneurs. Based on the information they provide, you calculate that their business plans have the same expected returns and risk. One is willing to sell you 50% stake for \$10 million. The other is willing to sell you 90% stake for 5 million. Assume both entrepreneurs will retain whatever you do not buy. Which one do you buy?

Asymmetric Information

- In general, adverse selection is an asymmetric information problem *before* the transaction occurs
- Moral hazard is an asymmetric information problem *after* the transaction occurs

Adverse Selection and The Lemons Problem

- When markets suffer from adverse selection, the invisible hand does not necessarily work its magic.
- George Akerlof's classic paper on adverse selection presented an example about used cars to illustrate how adverse selection causes market to malfunction
- In a used car market, there are good used cars and defective used cars ("lemons")
- Assumption: the buyer of a car does not know whether it is a good car or a lemon, but can observe the average quality of cars in a market
- So best offer: the price of an average quality car

Adverse Selection and The Lemons Problem

- => owners of good cars leave the market
- => average quality of cars on the market drops
- => buyers lower their offer for any given car
- => owners of moderately good cars leave the market
- This results in a process in which the goods that are above average in terms of quality will be continuously driven out of the market.
- The result is a market with only the worst lemons and few buyers who want to buy them.
- This is called “**the lemons problem**”

Signaling and Screening

- Markets respond to problems of asymmetric information in many ways
- **Signaling**: an action taken by an informed party to reveal its private information to the uninformed party (usually the information that it is offering a product of high quality)
- **Screening**: an action taken by an uninformed party to induce an informed party to reveal information

Signaling

- For signaling to be useful, the signal must be less costly, or more beneficial, to the person with the higher-quality product
 - ▣ Firm advertising
 - ▣ Education: college and graduate degrees
 - ▣ Sellers offering warranty
 - ▣ Applicants apply for early admission
- Spencer (signaling) and Akerlof (adverse selection) won Nobel prize in 2001

Dating and Information Economics

- The search for an ideal partner is plagued by asymmetric information!
 - “I don’t know you...you don’t know me...”
- Dating is a process of mutual screening
 - Costly, time-consuming, imperfect

Dating and Information Economics

- Signaling in dating
 - Signaling quality (“vertical differentiation”)
 - Education
 - Job
 - Indicators of wealth
 - Signaling compatibility (“horizontal differentiation”)
 - Interests and hobbies
 - Religion and ideology
 - Signaling interest
 - Gifts & flowers

Dating and Information Economics

- But signaling may lead to adverse selection
 - Signals of wealth or good jobs attracts suitors who care mostly about money or social status
 - Signals of interest by gifts or sumptuous dinners invite “free-riders”

Online Dating and Asymmetric Information

- The online dating market is particularly affected by asymmetric information
 - High quality individuals less likely to enter the online dating market (the lemons problem)
 - Ineffective signaling
 - Signaling quality: unverifiable
 - Signaling interest: costless (i.e. “cheap”)
- Possible solutions
 - Independent verification
 - Costly signal of interest
 - Information production: referrals and recommendations

Credible Signaling

- A Korea dating site run “special events”
 - participants pay \$50 to join
 - could show only up to 10 people that they were interested in a date
 - could offer a virtual rose along with two of their date requests
 - Result: sending a virtual rose increases the chances of acceptance by 20%. The effect is particularly large on “less desirable” recipients (almost twice as likely to accept) (Lee *et al.*, 2011)

Online Dating and Asymmetric Information


- How other online markets deal with asymmetric information
 - Online job markets
 - Online used goods markets
 - Online rental markets

Other Applications

- Why is health care in the U.S. so expensive?
 - ▣ The U.S. is alone among developed nations in not having a universal health care system
- Why do many countries require compulsory insurance?
 - ▣ The U.S. starts to require compulsory insurance under the Affordable Care Act (aka “Obama care”)
- Human capital contracts (HCC)
 - ▣ The Yale plan
 - ▣ Australia’s Income-Contingent Student Loan system

Other Applications

- Why do we need banks?
- Bank runs and Deposit Insurance
 - ▣ In the U.S., the Federal Deposit Insurance Corporation (FDIC) is the government agency that insures deposits at U.S. commercial banks
 - ▣ Provides insurance of \$250,000 per bank account
- Peer-to-Peer (P2P) Lending
 - ▣ Example 1, 2, 3, 4



Sources of “Romantic Unemployment”

Sources of “Romantic Unemployment”

- Optimal Stopping
 - The optimal point to stop search has not been reached: the value of remaining single is higher than the value of current candidates
- Search Friction
 - It takes time and effort to find a suitable candidate to meet with. The probability of matching depends on gender ratio, technology, and individual characteristics (sources of “mismatch”)
- Asymmetric Information Problem
 - It takes time and cost to reveal information about yourself and to obtain information about the other
 - Potential moral hazard problem may deter entering into relationships in the first place

Sources of “Romantic Unemployment”

- The leftover women

Sources of “Romantic Unemployment”

1 剩女，你们单身的原因？





A Theory of Marriage

A Theory of Marriage

- Now that you have found a partner through the search and matching process, you have gone through the necessary dating/screening process, and you are very satisfied with him/her so that you decide to stop the search and “live happily together thereafter.”
- But does that mean you have to marry each other? Why do people enter into marriages?



Marriage as Firms

- Economic analysis has been applied to marriage since Gary Becker's seminal paper "A Theory of Marriage" in 1973
- Individuals marry when there is a surplus from their union relative to when they remain single
- Marriages are like firms. There are gains to be had from
 - ▣ Specialization in home and market production
 - ▣ Economies of scale

Marriage as Contract

- Long run relationships are often associated with specific investments and switching costs
 - ▣ Specific investments: investments made for the needs of the specific relationship. The return from such investment is to a large extent not transferrable to other relationships
 - He learns to cook meals that suit her taste. She chooses a job closer to where he is.
 - One of the most important specific investments: **children**
 - ▣ Switching cost: new relationships have to learn about each other and make specific investments again

Marriage as Contract

- Specific investment is associated with immediate cost and future gain.
- Marriage as a long-term contract acts as a **commitment device** to induce partners to make relationship-specific investments



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A Theory of Marriage

- Why you want to marry:
 - ▣ Specialization
 - ▣ Economies of scale
 - ▣ Induce specific investments
 - ▣ Religious belief
 - ▣ Conforming to social norms
 - ▣ Insurance provision and risk sharing
 - ▣ Government benefits

A Theory of Marriage

- Why you *don't* want to marry:
 - ▣ Government “penalties”
 - The marriage tax penalty
 - ▣ Individual states change over time. A relationship that has a joint surplus today may not have a joint surplus tomorrow.

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"It's just that I've changed! I've grown! And you're still stuck in the past!"

A Theory of Marriage

- Why you *don't* want to marry:
 - ▣ Government “penalties”
 - The marriage tax penalty
 - ▣ Individual states change over time. A relationship that has a joint surplus today may not have a joint surplus tomorrow.
 - ▣ Moral hazard

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**"I do so help around the house! I keep dust off the recliner
and make sure all of the remotes are working properly!"**

A Theory of Marriage

- Why you *don't* want to:
 - ▣ Government “penalties”
 - The marriage tax penalty
 - ▣ Individual states change over time. A relationship that has a joint surplus today may not have a joint surplus tomorrow.
 - ▣ Moral hazard
 - ▣ Marriage is an **incomplete contract**: unable to write terms contingent on future states
 - ▣ The contract imposes an exiting cost that provides an incentive for moral hazard and prevents unprofitable relationships from naturally dissolving
 - Where else do we observe 50- and 60-year contracts?

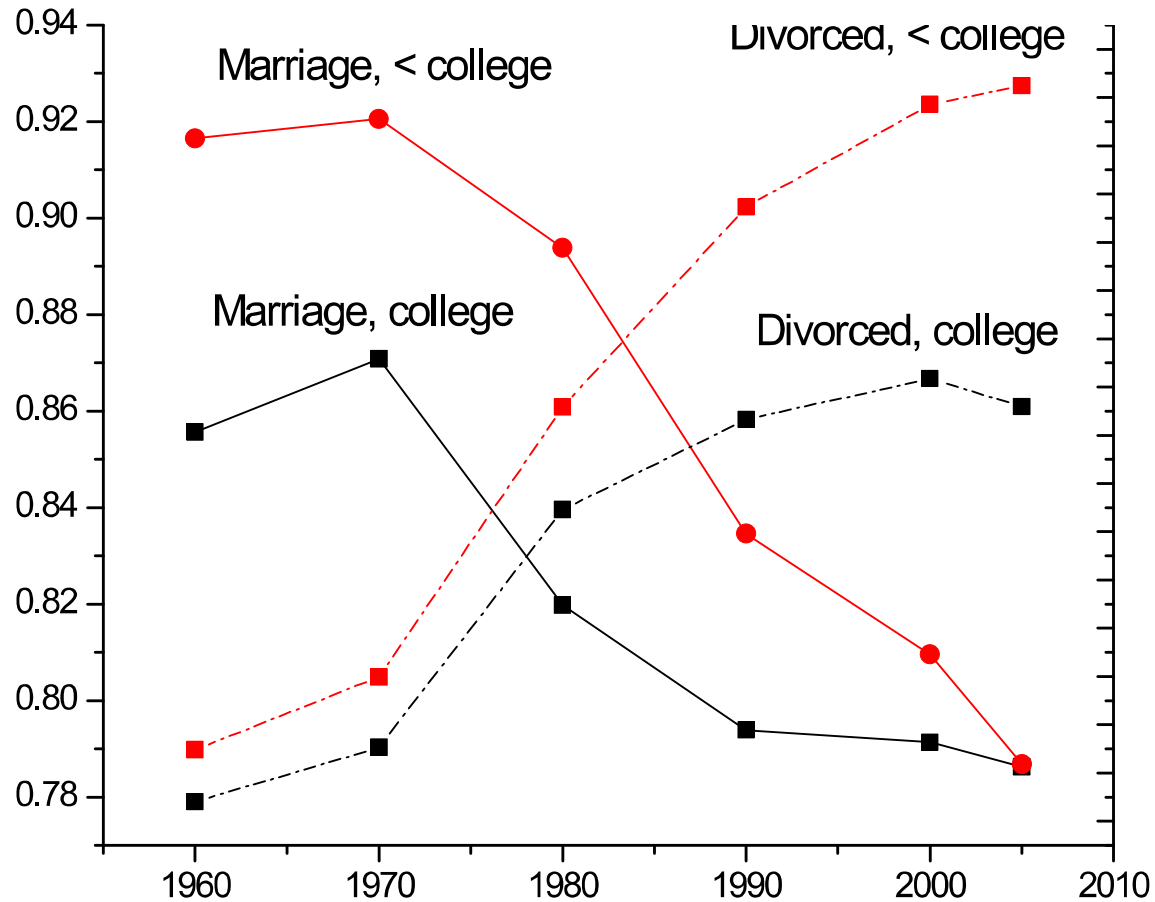


"Kathy, if you agree to these terms of service, click 'I do.'"

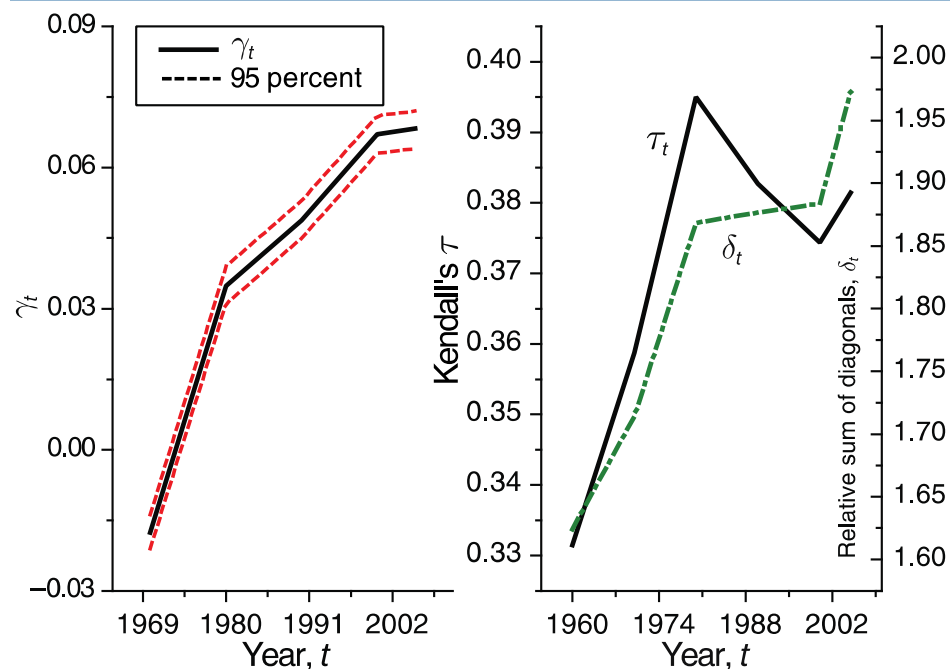
Change in US Marriage Patterns

- Decline in Marriage and rise in Divorce
- Rise in **Assortative Matching**
 - ▣ When individuals marry today, they are more likely to pair with an individual with the same education level and from the same socioeconomic class.

Change in US Marriage Patterns



Change in US Marriage Patterns



Source: Greenwood *et al.* (2014)

FIGURE 1. THE RISE IN POSITIVE ASSORTATIVE MATING, 1960–2005

Notes: The variables γ_t , τ_t , and δ_t are measures of assortative mating for the years $t = 1960, 1970, \dots, 2000, 2005$. A higher value for a variable shows a higher degree of positive assortative mating. See the text for a description of the variables.

"By all means, marry. If you get a good wife, you'll become happy; if you get a bad one, you'll become a philosopher." - Socrates



Appendix 1: Marriage Contract and cooperation

- Short-run relationships face cooperation problems
 - ▣ Where shall we go for dinner?
 - I really like Italian food, but you hate it.
 - You really like Korean food, but I hate it.
 - We can go to a Chinese restaurant, which both of us enjoy, although not as much as our favorite food.

	Ms. Stubborn	Ms. Nice
Mr. Stubborn	$(0, 0)$	$(10, -5)$
Mr. Nice	$(-5, 10)$	$(5, 5)$

A Prisoner's dilemma problem

Appendix 1: Marriage Contract and cooperation

- Game theory: cooperation is sustainable under infinitely repeated prisoner's dilemma game
- Trigger strategy: each person cooperates if the other person has cooperated in all previous periods. Otherwise, the person will stop cooperating forever.
- Marriage as a long-term contract can foster cooperation.

Appendix 2: Impact of Divorce Law

- Divorce laws in the U.S. changed from mutual-consent to unilateral divorce between 1968 and 1977.
 - ▣ Mutual-consent: dissolution of marriage requires the mutual consent of both spouses
 - ▣ Unilateral: either spouse could unilaterally file for divorce and no fault had to be proved.
- The single most important divorce law reform in the U.S. in the past generation
 - Significantly reduced the cost of exiting marriage

Appendix 2: Impact of Divorce Law

- Matouscheck and Rasul (2008)
 - ▣ If marriage serves as a commitment device, then a decrease in divorce cost may increase the average match quality of couples
 - People who do not match each other well have to pay higher cost to cooperate or make specific investments, i.e. “poor matches” need stronger commitment device
 - Lowering divorce cost can make these people less likely to marry
 - ▣ This positive selection effect can lead to a *decrease* in divorce frequency after a decrease in divorce cost

Appendix 2: Impact of Divorce Law

- If people mainly marry for other reasons such as conforming to social norms, tax deductions, economies of scale, etc., then a decrease in divorce cost can lead to more poorly matched couples enter into marriage
- The negative selection effect can lead to an *increase* in divorce frequency after a decrease in divorce cost

Appendix 2: Impact of Divorce Law

- Findings:
 - ▣ For couples married under mutual-consent laws, divorce rates increased significantly in the initial years after unilateral laws were passed, and then decreased back to their previous levels
 - ▣ Couples who married after unilateral divorce laws were passed have been *less likely* to divorce during marriage, other things being equal