Reconciling Hayek's and Keynes' views of recessions

Paul Beaudry, Dana Galizia & Franck Portier

Vancouver School of Economics, VSE & Toulouse School of Economics

BIS Conference
March 10-11, 2015

0. Introduction
Recessions

- Recessions often come after periods of rapid accumulation of assets (productive capital, houses, durable goods)
- Two opposite views of economic policy in those recessions
  - Hayek
  - Keynes

0. Introduction
Recessions

- Recessions often come after periods of rapid accumulation of assets (productive capital, houses, durable goods)
- Two opposite views of economic policy in those recessions
  - × Hayek
  - × Keynes

0. Introduction
Recessions

- Recessions often come after periods of rapid accumulation of assets (productive capital, houses, durable goods)
- Two opposite views of economic policy in those recessions
  - × Hayek
  - × Keynes

0. Introduction
Recessions

- Recessions often come after periods of rapid accumulation of assets (productive capital, houses, durable goods)
- Two opposite views of economic policy in those recessions
  - × Hayek
  - × Keynes

0. Introduction

The Liquidationist View (Friedrich Hayek)

- Recessions are needed to cleanse the economy.
- Gvt spendings, aggregate demand management only delays necessary adjustment

0. Introduction

The Liquidationist View (Friedrich Hayek)

- Recessions are needed to cleanse the economy.
- Gvt spendings, aggregate demand management only delays necessary adjustment

0. Introduction

The Aggregate Demand View (John Maynard Keynes)

- Recessions are periods of insufficient demand
- Activist fiscal policy is needed

0. Introduction

The Aggregate Demand View (John Maynard Keynes)

- Recessions are periods of insufficient demand
- Activist fiscal policy is needed

0. Introduction
This Paper

- Show that the two views are not mutually exclusive
- "Over-" ("mal-") accumulation of physical assets creates the need *liquidation* $\rightsquigarrow$ recession
- *Liquidation* can produce periods where the economy functions particularly inefficiently.
- Many socially desirable trades between individuals may remain unexploited.
- In this sense, a need for liquidation can cause recessions characterized by deficient aggregate demand.
- Some stimulative policies may remain desirable even if they postpone a recovery.

0. Introduction
This Paper

- Show that the two views are not mutually exclusive
- "Over-" ("mal-") accumulation of physical assets creates the need *liquidation* $\rightsquigarrow$ recession
- *Liquidation* can produce periods where the economy functions particularly inefficiently.
- Many socially desirable trades between individuals may remain unexploited.
- In this sense, a need for liquidation can cause recessions characterized by deficient aggregate demand.
- Some stimulative policies may remain desirable even if they postpone a recovery.

0. Introduction
This Paper

- Show that the two views are not mutually exclusive
- "Over-" ("mal-") accumulation of physical assets creates the need *liquidation* $\rightsquigarrow$ recession
- *Liquidation* can produce periods where the economy functions particularly inefficiently.
- Many socially desirable trades between individuals may remain unexploited.
- In this sense, a need for liquidation can cause recessions characterized by deficient aggregate demand.
- Some stimulative policies may remain desirable even if they postpone a recovery.

- Show that the two views are not mutually exclusive
- "Over-" ("mal-") accumulation of physical assets creates the need *liquidation* $\rightsquigarrow$ recession
- *Liquidation* can produce periods where the economy functions particularly inefficiently.
- Many socially desirable trades between individuals may remain unexploited.
- In this sense, a need for liquidation can cause recessions characterized by deficient aggregate demand.
- Some stimulative policies may remain desirable even if they postpone a recovery.

- Show that the two views are not mutually exclusive
- "Over-" ("mal-") accumulation of physical assets creates the need *liquidation* $\rightsquigarrow$ recession
- *Liquidation* can produce periods where the economy functions particularly inefficiently.
- Many socially desirable trades between individuals may remain unexploited.
- In this sense, a need for liquidation can cause recessions characterized by deficient aggregate demand.
- Some stimulative policies may remain desirable even if they postpone a recovery.

- Show that the two views are not mutually exclusive
- "Over-" ("mal-") accumulation of physical assets creates the need *liquidation* $\rightsquigarrow$ recession
- *Liquidation* can produce periods where the economy functions particularly inefficiently.
- Many socially desirable trades between individuals may remain unexploited.
- In this sense, a need for liquidation can cause recessions characterized by deficient aggregate demand.
- Some stimulative policies may remain desirable even if they postpone a recovery.

0. Introduction
Main Ingredients

- Environment with decentralized markets & flexible prices .
- Two imperfections:
  - Labor market matching friction in the spirit of Diamond-Mortensen-Pissarides $\rightsquigarrow$ umeployment risk
  - Adverse selection in the insurance market : unemployment risk is not insurable.

0. Introduction
Main Ingredients

- Environment with decentralized markets & flexible prices .
- Two imperfections:
  - × Labor market matching friction in the spirit of Diamond-Mortensen-Pissarides $\rightsquigarrow$ umeployment risk
  - × Adverse selection in the insurance market : unemployment risk is not insurable.

0. Introduction
Main Ingredients

- Environment with decentralized markets & flexible prices .
- Two imperfections:
  - × Labor market matching friction in the spirit of Diamond-Mortensen-Pissarides $\rightsquigarrow$ umeployment risk
  - × Adverse selection in the insurance market : unemployment risk is not insurable.

0. Introduction
Main Ingredients

- Environment with decentralized markets & flexible prices .
- Two imperfections:
  - × Labor market matching friction in the spirit of Diamond-Mortensen-Pissarides $\rightsquigarrow$ umeployment risk
  - × Adverse selection in the insurance market : unemployment risk is not insurable.

0. Introduction
Main Mechanism

- If the economy finds itself with an excess of accumulated goods (houses, durables and/or capital goods):
  - × Consumers and firms will spend less because they already have a lot, (Hayek *view, this is the efficient thing to do*)
  - × Firms will hire less as demand is low
  - × Consumers will consume less by fear of being unemployed,
  - × Spendings will therefore be low (Keynes *view, a (negative) multiplier shows up*)
  - × etc...
- There will be socially excessive precautionary savings
- Government spending can boost mutually beneficial trades ...
- ... but it will postpone the recovery by slowing down the liquidation process (*in the dynamic version of the model*)

0. Introduction
Main Mechanism

- If the economy finds itself with an excess of accumulated goods (houses, durables and/or capital goods):
  - × Consumers and firms will spend less because they already have a lot, (HAYEK *view, this is the efficient thing to do*)
  - × Firms will hire less as demand is low
  - × Consumers will consume less by fear of being unemployed,
  - × Spendings will therefore be low (KEYNES *view, a (negative) multiplier shows up*)
  - × etc...
- There will be socially excessive precautionary savings
- Government spending can boost mutually beneficial trades ...
- ... but it will postpone the recovery by slowing down the liquidation process (*in the dynamic version of the model*)

0. Introduction
Main Mechanism

- If the economy finds itself with an excess of accumulated goods (houses, durables and/or capital goods):
  - × Consumers and firms will spend less because they already have a lot, (HAYEK *view, this is the efficient thing to do*)
  - × Firms will hire less as demand is low
  - × Consumers will consume less by fear of being unemployed,
  - × Spendings will therefore be low (KEYNES *view, a (negative) multiplier shows up*)
  - × etc...
- There will be socially excessive precautionary savings
- Government spending can boost mutually beneficial trades ...
- ... but it will postpone the recovery by slowing down the liquidation process (*in the dynamic version of the model*)

0. Introduction
Main Mechanism

- If the economy finds itself with an excess of accumulated goods (houses, durables and/or capital goods):
  - × Consumers and firms will spend less because they already have a lot, (HAYEK *view, this is the efficient thing to do*)
  - × Firms will hire less as demand is low
  - × Consumers will consume less by fear of being unemployed,
  - × Spendings will therefore be low (KEYNES *view, a (negative) multiplier shows up*)
  - × etc...
- There will be socially excessive precautionary savings
- Government spending can boost mutually beneficial trades ...
- ... but it will postpone the recovery by slowing down the liquidation process (*in the dynamic version of the model*)

0. Introduction
Main Mechanism

- If the economy finds itself with an excess of accumulated goods (houses, durables and/or capital goods):
  - × Consumers and firms will spend less because they already have a lot, (HAYEK *view, this is the efficient thing to do*)
  - × Firms will hire less as demand is low
  - × Consumers will consume less by fear of being unemployed,
  - × Spendings will therefore be low (KEYNES *view, a (negative) multiplier shows up*)
  - × etc...
- There will be socially excessive precautionary savings
- Government spending can boost mutually beneficial trades ...
- ... but it will postpone the recovery by slowing down the liquidation process (*in the dynamic version of the model*)

- If the economy finds itself with an excess of accumulated goods (houses, durables and/or capital goods):
  - × Consumers and firms will spend less because they already have a lot, (HAYEK *view, this is the efficient thing to do*)
  - × Firms will hire less as demand is low
  - × Consumers will consume less by fear of being unemployed,
  - × Spendings will therefore be low (KEYNES *view, a (negative) multiplier shows up*)
  - × etc...
- There will be socially excessive precautionary savings
- Government spending can boost mutually beneficial trades ...
- ... but it will postpone the recovery by slowing down the liquidation process (*in the dynamic version of the model*)

- If the economy finds itself with an excess of accumulated goods (houses, durables and/or capital goods):
  - × Consumers and firms will spend less because they already have a lot, (HAYEK *view, this is the efficient thing to do*)
  - × Firms will hire less as demand is low
  - × Consumers will consume less by fear of being unemployed,
  - × Spendings will therefore be low (KEYNES *view, a (negative) multiplier shows up*)
  - × etc...
- There will be socially excessive precautionary savings
- Government spending can boost mutually beneficial trades ...
- ... but it will postpone the recovery by slowing down the liquidation process (*in the dynamic version of the model*)

0. Introduction
Main Mechanism

- If the economy finds itself with an excess of accumulated goods (houses, durables and/or capital goods):
  - × Consumers and firms will spend less because they already have a lot, (HAYEK *view, this is the efficient thing to do*)
  - × Firms will hire less as demand is low
  - × Consumers will consume less by fear of being unemployed,
  - × Spendings will therefore be low (KEYNES *view, a (negative) multiplier shows up*)
  - × etc...
- There will be socially excessive precautionary savings
- Government spending can boost mutually beneficial trades ...
- ... but it will postpone the recovery by slowing down the liquidation process (*in the dynamic version of the model*)

- If the economy finds itself with an excess of accumulated goods (houses, durables and/or capital goods):
  - × Consumers and firms will spend less because they already have a lot, (HAYEK *view, this is the efficient thing to do*)
  - × Firms will hire less as demand is low
  - × Consumers will consume less by fear of being unemployed,
  - × Spendings will therefore be low (KEYNES *view, a (negative) multiplier shows up*)
  - × etc...
- There will be socially excessive precautionary savings
- Government spending can boost mutually beneficial trades ...
- ... but it will postpone the recovery by slowing down the liquidation process (*in the dynamic version of the model*)

0. Introduction

What we do not do

- We do not propose a theory of why the economy might find itself with a (too) large stock of capital.
  - × Noisy news
  - × Lax monetary policy
  - × Exhuberance

0. Introduction

What we do not do

- We do not propose a theory of why the economy might find itself with a (too) large stock of capital.
  - × Noisy news
  - × Lax monetary policy
  - × Exhuberance

What we do not do

- We do not propose a theory of why the economy might find itself with a (too) large stock of capital.
  - × Noisy news
  - × Lax monetary policy
  - × Exhuberance

What we do not do

- We do not propose a theory of why the economy might find itself with a (too) large stock of capital.
  - × Noisy news
  - × Lax monetary policy
  - × Exhuberance

0. Introduction

What I will present

- I will spend much of my time on a static version of model.
- I will also work with a model in which "capital" is indeed "durable goods"
- More general version in the paper

0. Introduction

What I will present

- I will spend much of my time on a static version of model.
- I will also work with a model in which "capital" is indeed "durable goods"
- More general version in the paper

0. Introduction
What I will present

- I will spend much of my time on a static version of model.
- I will also work with a model in which "capital" is indeed "durable goods"
- More general version in the paper

- Lucas [1990]
- Lagos and Wright [2005]
- Angeletos and La'O [2013]
- Carroll [1992]
- Guerrieri and Lorenzoni [2009]
- Ravn and Sterk [2012]
- Chamley [2014], Kaplan and Menzio [2013], Heathcote and Perri [2012]

0. Introduction
Roadmap

1. Static model setup
2. Equilibrium
3. Interesting Properties of the Static Equilibrium
4. Extensions / Dynamics / Policy Trade-offs

0. Introduction
Roadmap

1. Static model setup
2. Equilibrium
3. Interesting Properties of the Static Equilibrium
4. Extensions / Dynamics / Policy Trade-offs

1. Static model setup

Figure 1: Overview: timeline

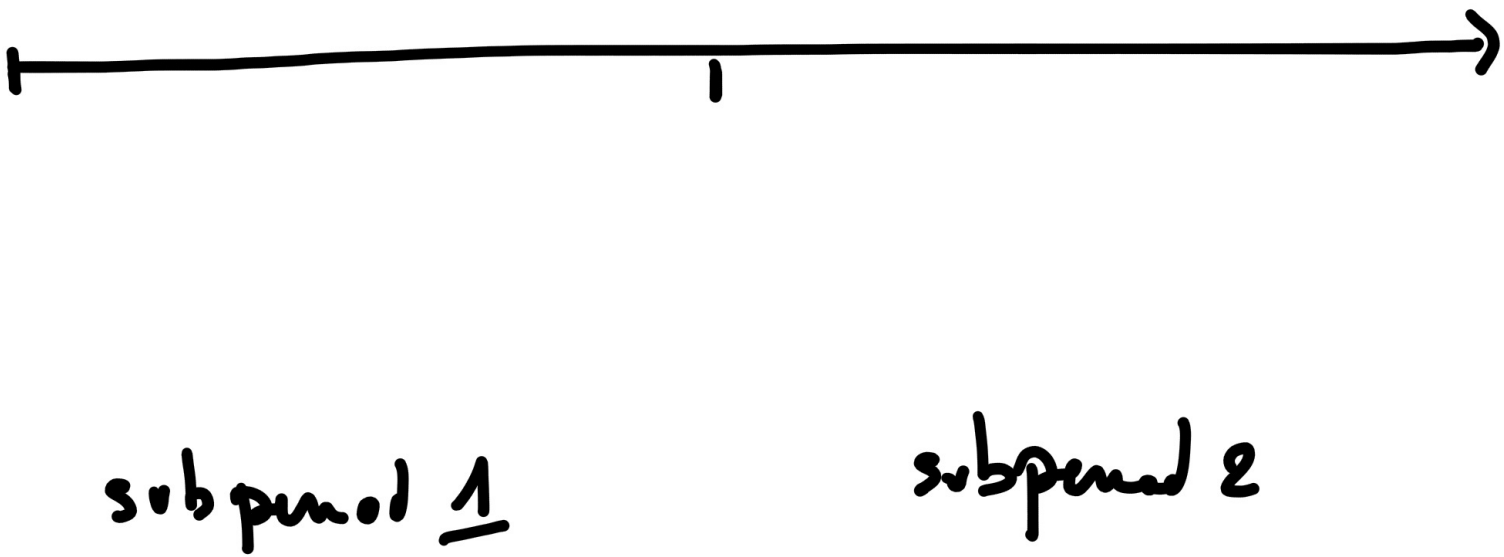
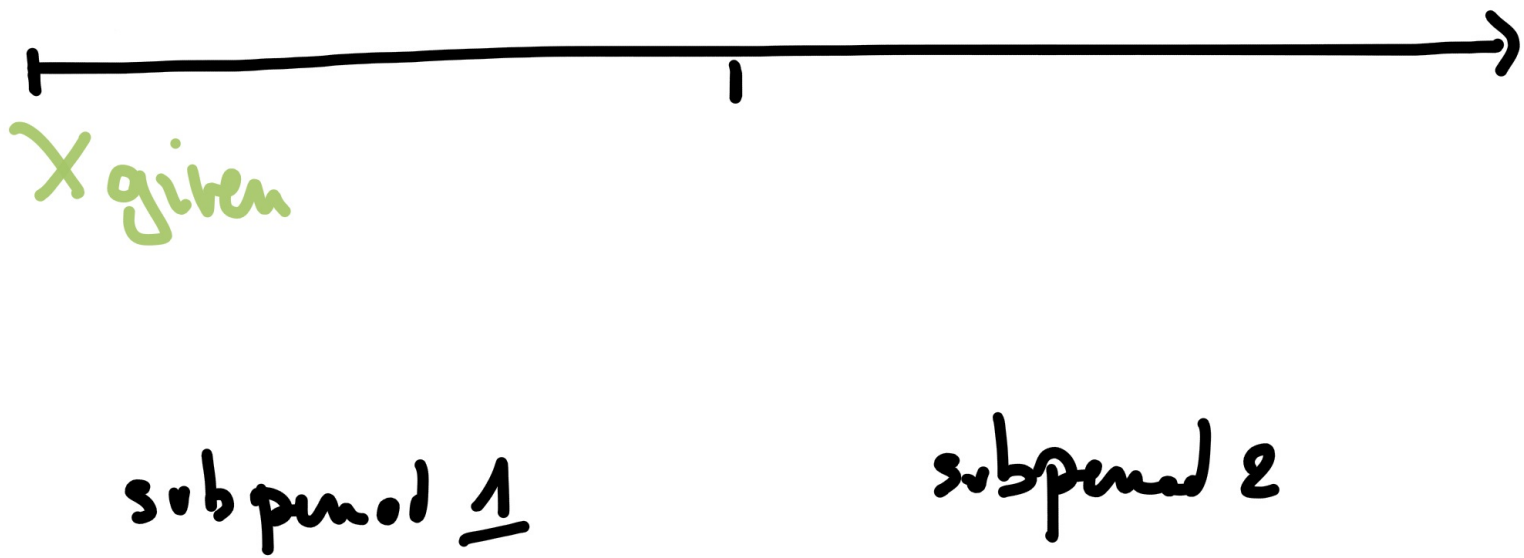


Figure 2: Overview: Initial goods



1. Static model setup

Figure 3: Overview: markets

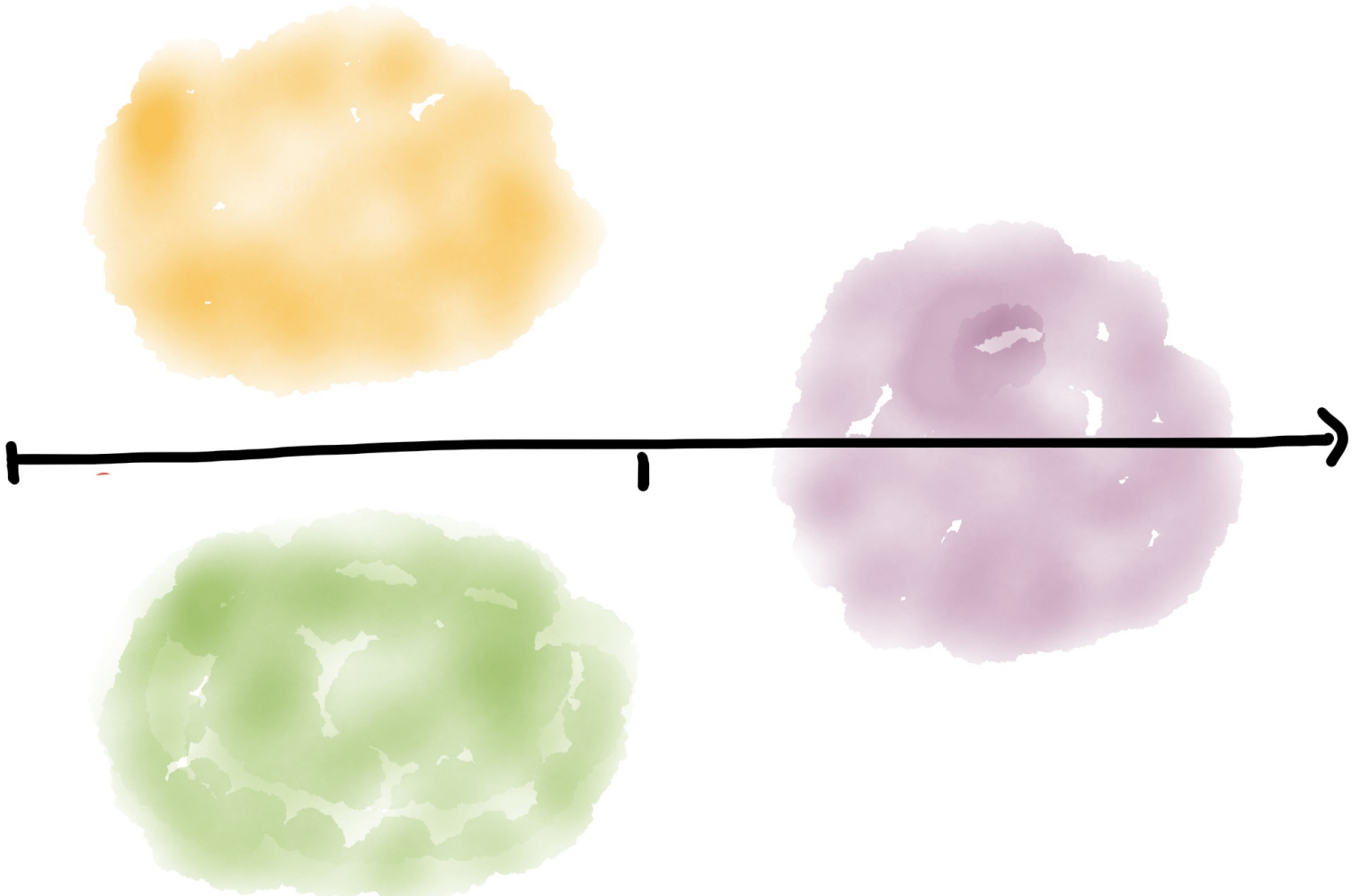


Figure 4: Overview: markets

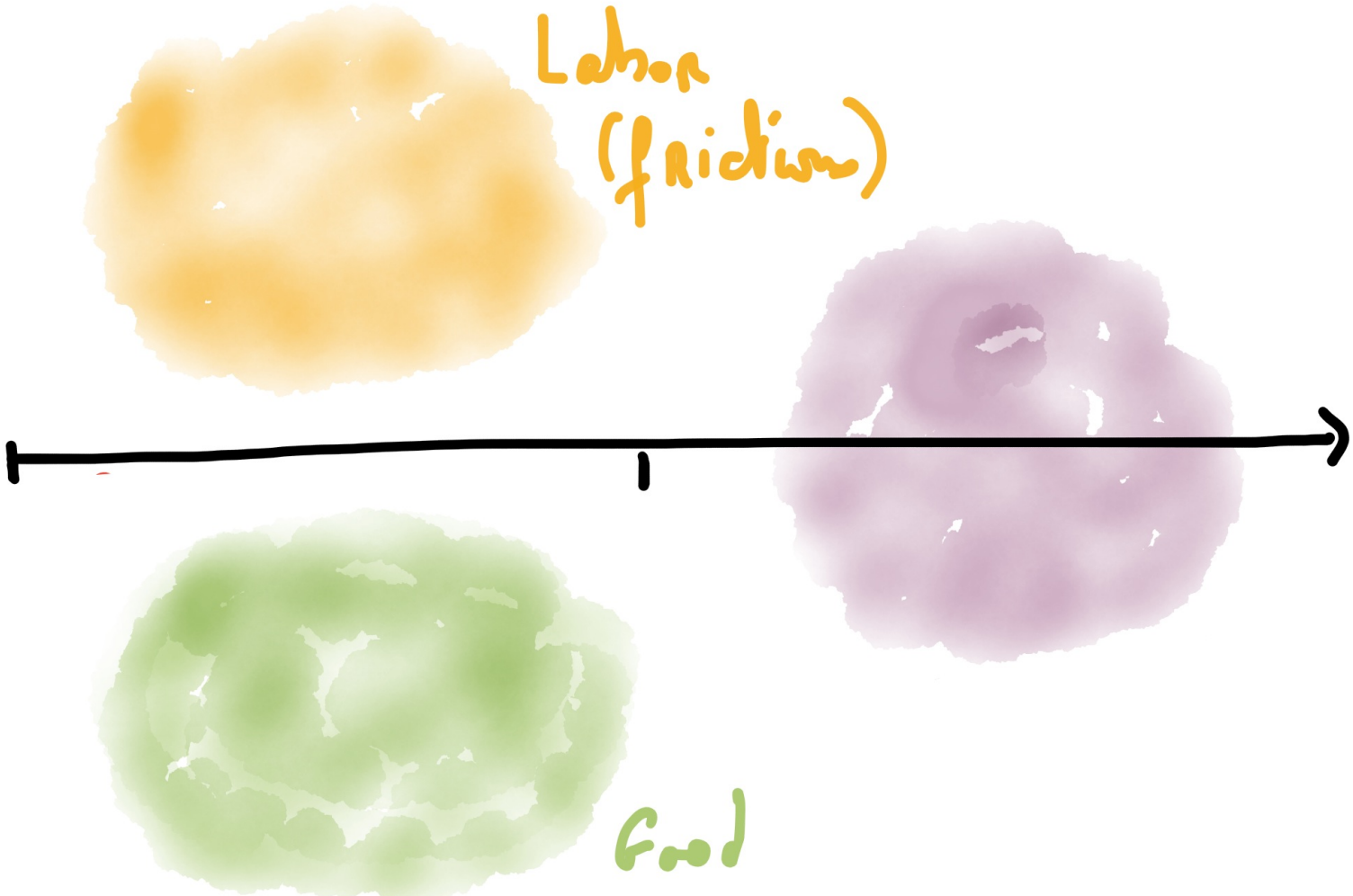


Figure 5: Overview: markets

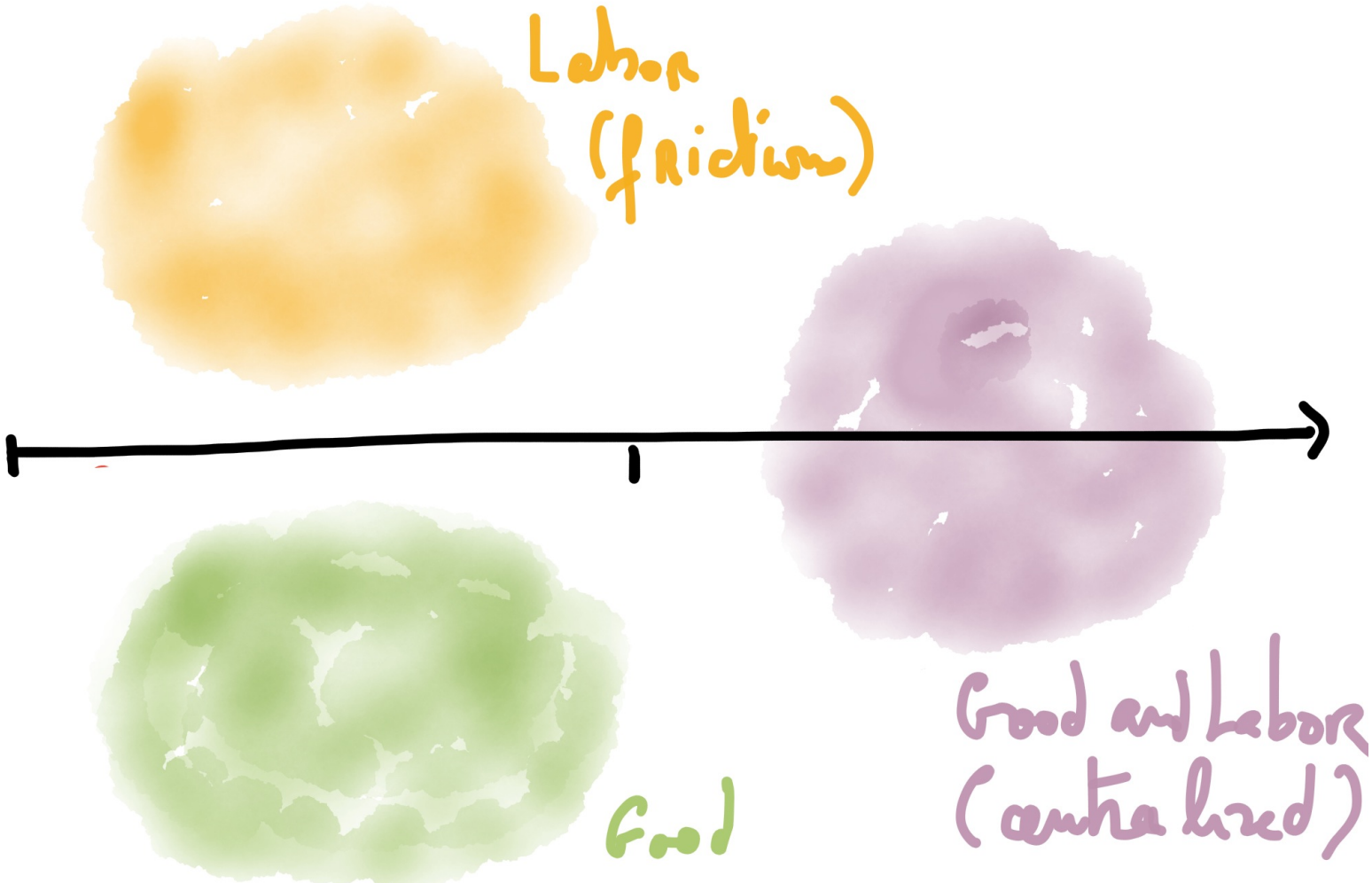


Figure 6: Overview: firms

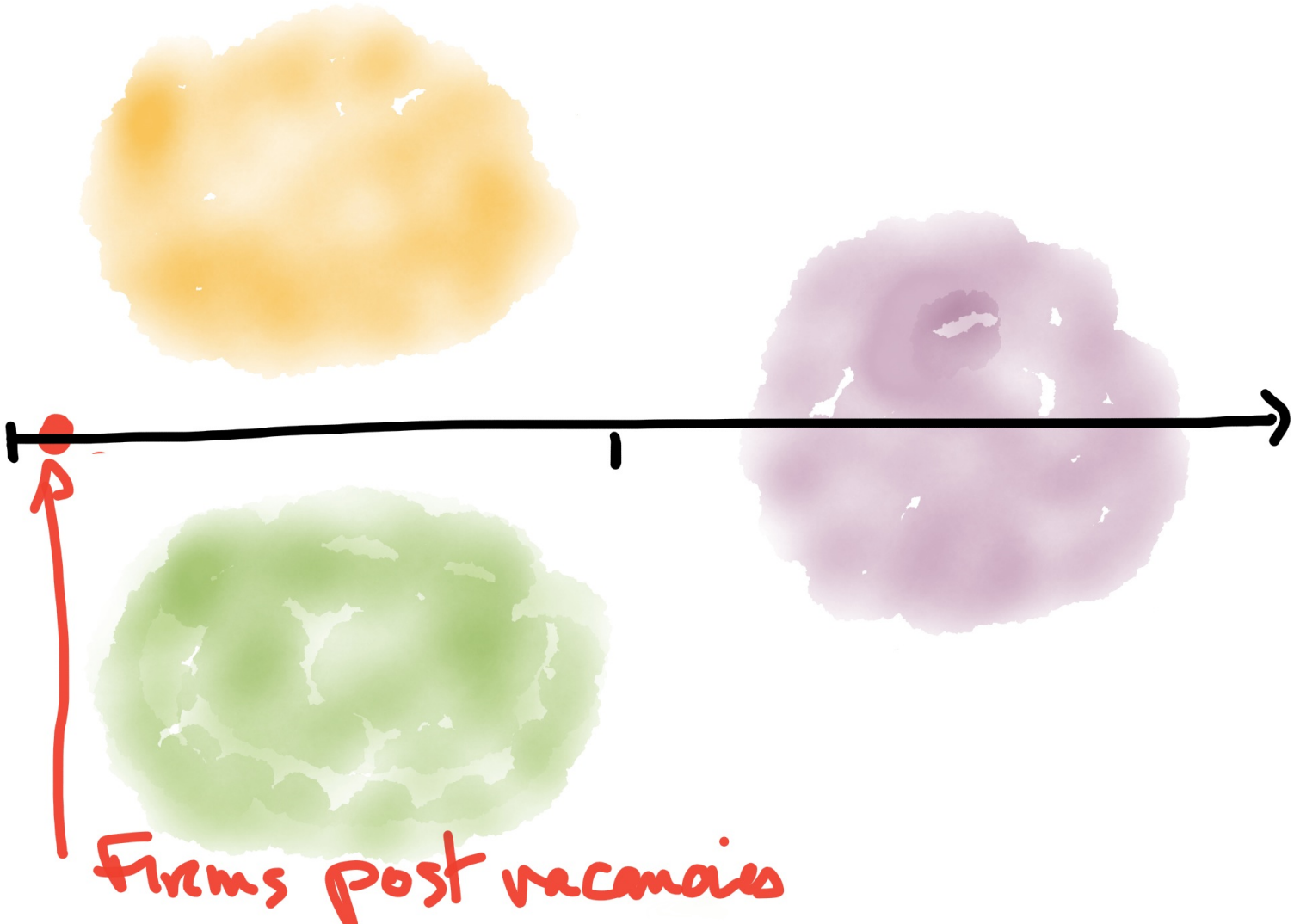


Figure 7: Overview: firms

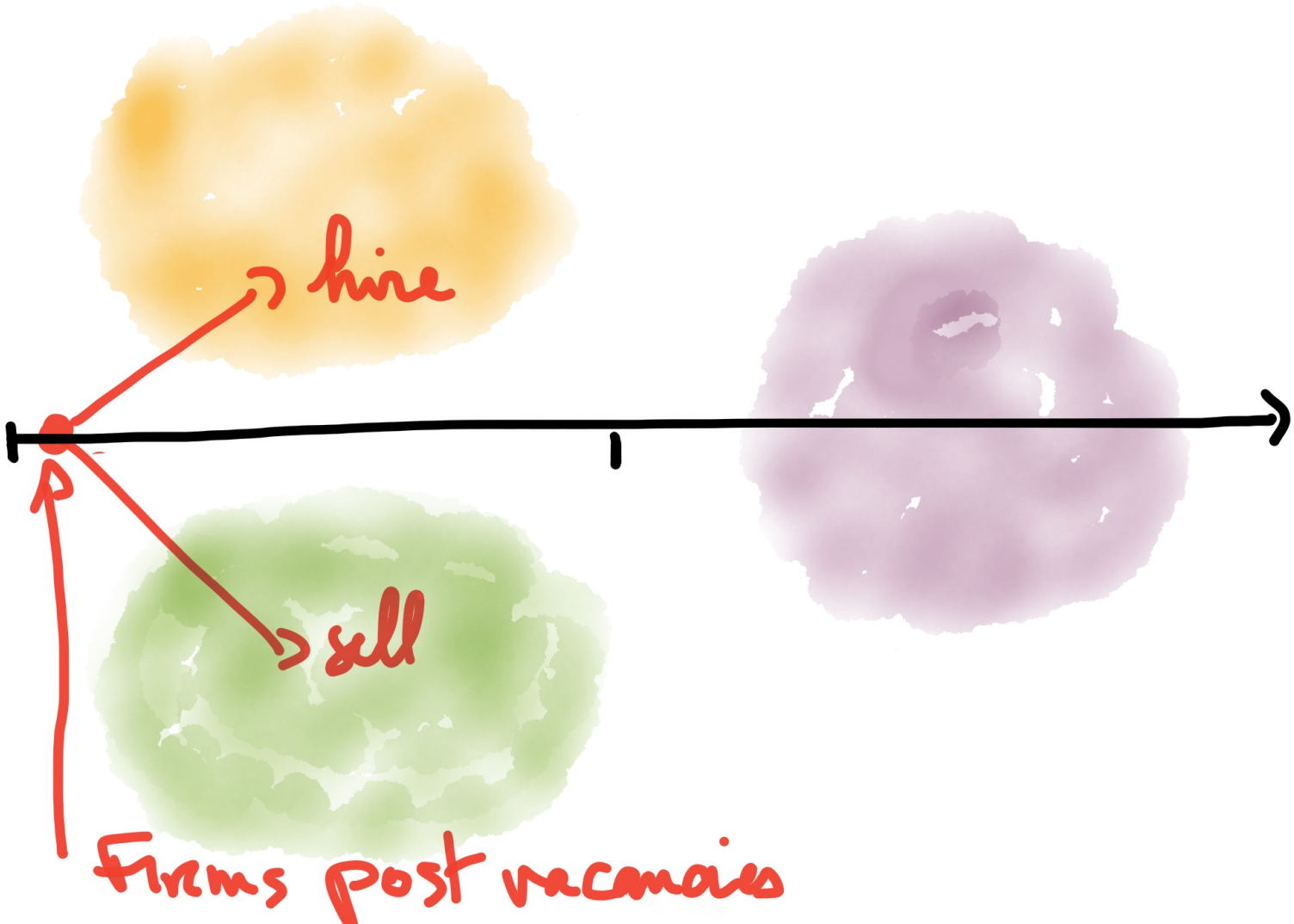


Figure 8: Overview: households

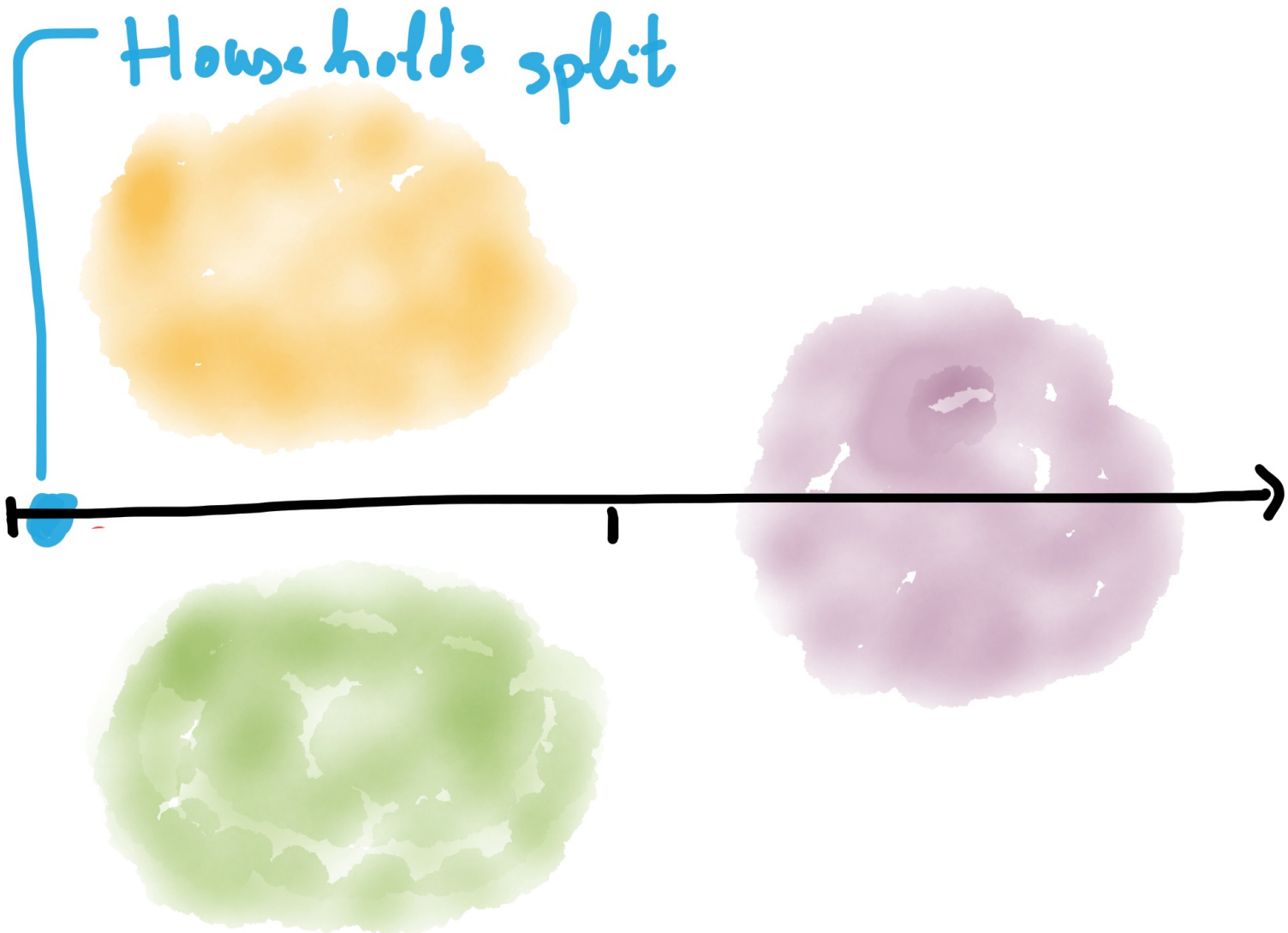


Figure 9: Overview: households

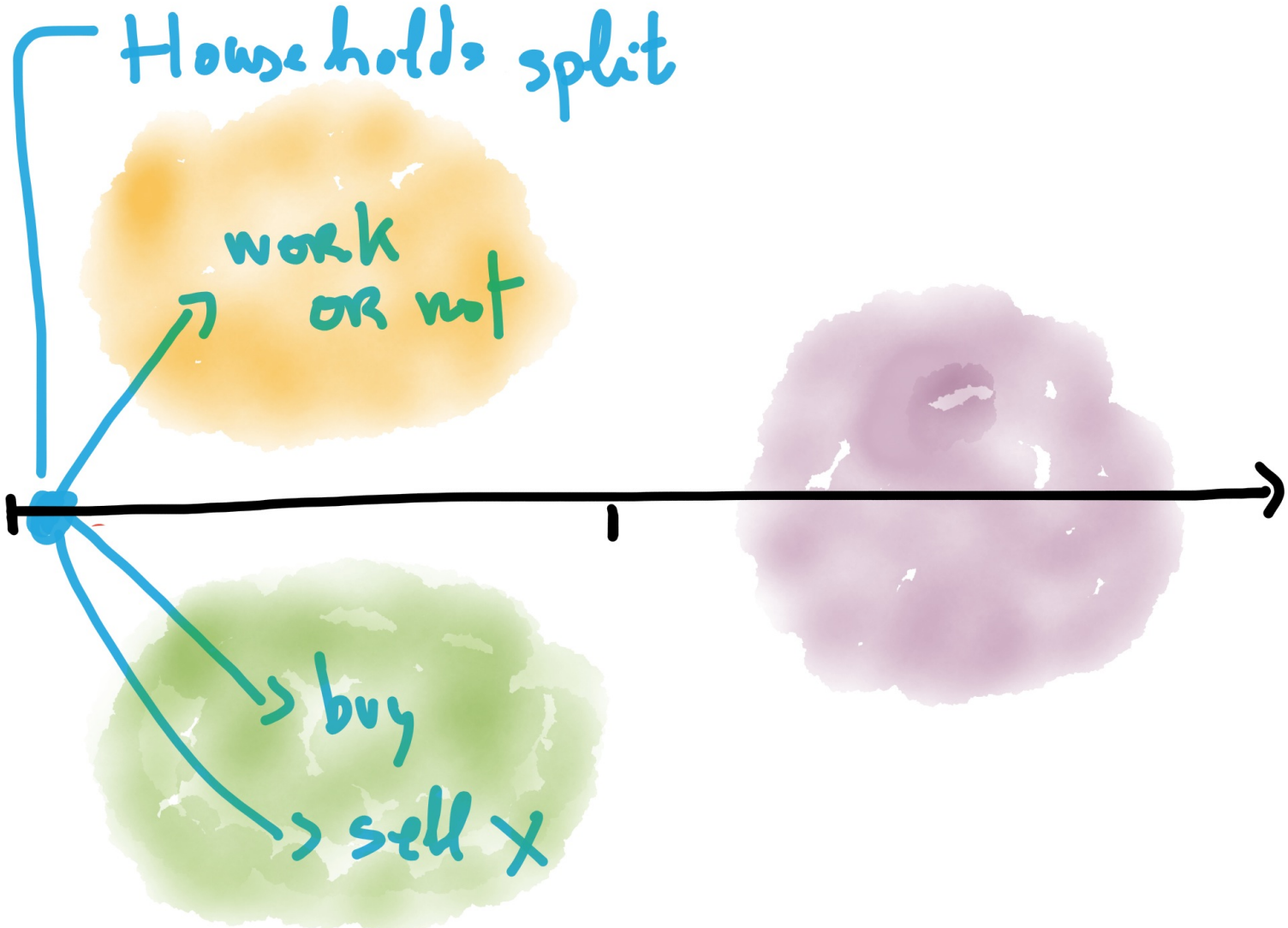


Figure 10: Overview: households

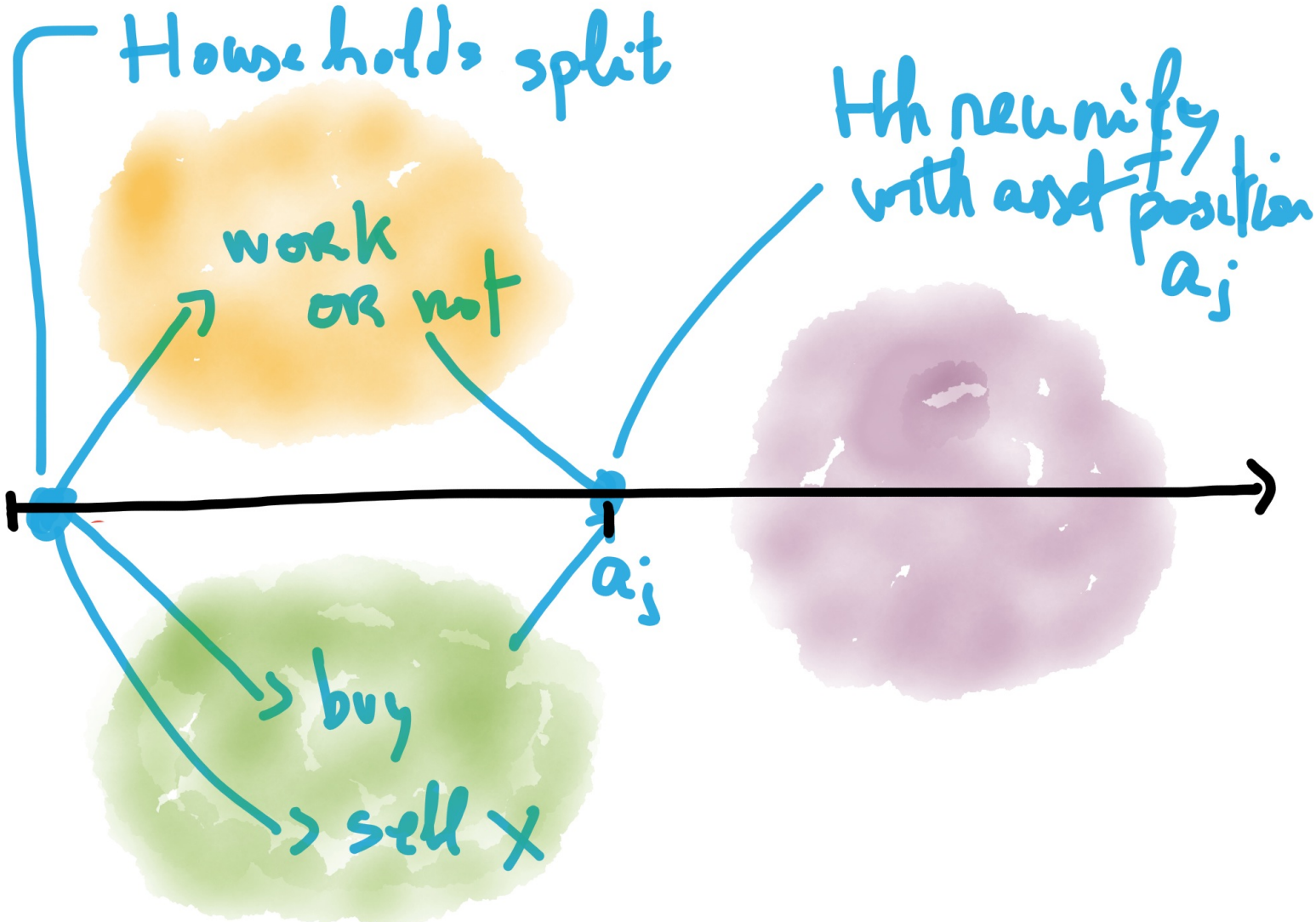
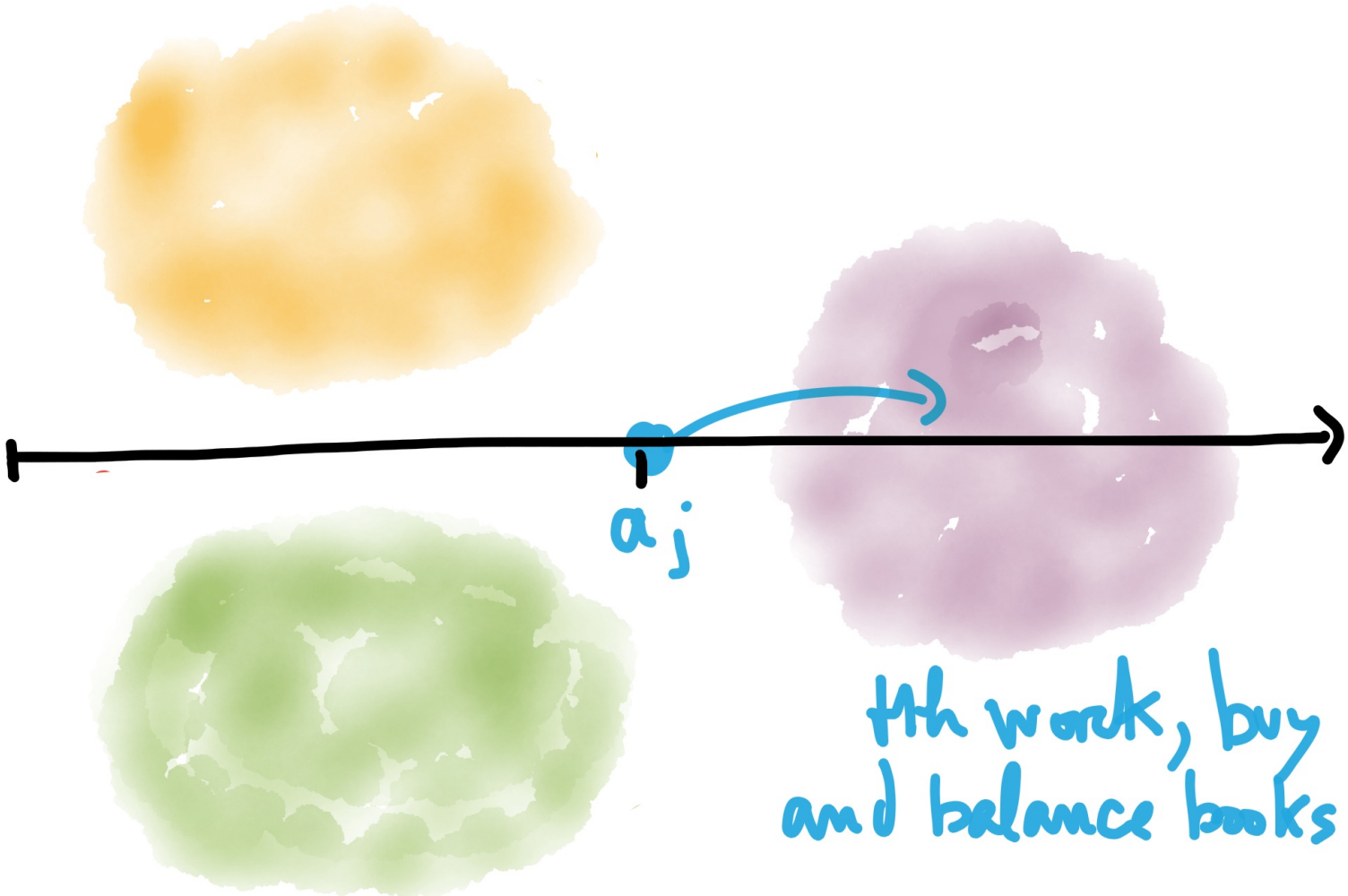


Figure 11: Overview: households



1. Static model setup
Checklist

- X: exogenous amount of good that is already in households hands
- Mass L of households always looking for jobs
- Sub-period two is centralized, all the action is in sub-period 1
- Frictions on the labor market
- Unemployment risk that is not insured
- No coordination between firms, buyers and workers
- Buyers and workers credit/debit a bank account that they will clear in sub-period 2.
- Good 2 serves as the numéraire.

1. Static model setup
Checklist

- X: exogenous amount of good that is already in households hands
- Mass L of households always looking for jobs
- Sub-period two is centralized, all the action is in sub-period 1
- Frictions on the labor market
- Unemployment risk that is not insured
- No coordination between firms, buyers and workers
- Buyers and workers credit/debit a bank account that they will clear in sub-period 2.
- Good 2 serves as the numéraire.

1. Static model setup
Checklist

- X: exogenous amount of good that is already in households hands
- Mass L of households always looking for jobs
- Sub-period two is centralized, all the action is in sub-period 1
- Frictions on the labor market
- Unemployment risk that is not insured
- No coordination between firms, buyers and workers
- Buyers and workers credit/debit a bank account that they will clear in sub-period 2.
- Good 2 serves as the numéraire.

1. Static model setup
Checklist

- X: exogenous amount of good that is already in households hands
- Mass L of households always looking for jobs
- Sub-period two is centralized, all the action is in sub-period 1
- Frictions on the labor market
- Unemployment risk that is not insured
- No coordination between firms, buyers and workers
- Buyers and workers credit/debit a bank account that they will clear in sub-period 2.
- Good 2 serves as the numéraire.

1. Static model setup
Checklist

- X: exogenous amount of good that is already in households hands
- Mass L of households always looking for jobs
- Sub-period two is centralized, all the action is in sub-period 1
- Frictions on the labor market
- Unemployment risk that is not insured
- No coordination between firms, buyers and workers
- Buyers and workers credit/debit a bank account that they will clear in sub-period 2.
- Good 2 serves as the numéraire.

1. Static model setup
Checklist

- X: exogenous amount of good that is already in households hands
- Mass L of households always looking for jobs
- Sub-period two is centralized, all the action is in sub-period 1
- Frictions on the labor market
- Unemployment risk that is not insured
- No coordination between firms, buyers and workers
- Buyers and workers credit/debit a bank account that they will clear in sub-period 2.
- Good 2 serves as the numéraire.

1. Static model setup
Checklist

- X: exogenous amount of good that is already in households hands
- Mass L of households always looking for jobs
- Sub-period two is centralized, all the action is in sub-period 1
- Frictions on the labor market
- Unemployment risk that is not insured
- No coordination between firms, buyers and workers
- Buyers and workers credit/debit a bank account that they will clear in sub-period 2.
- Good 2 serves as the numéraire.

Checklist

- X: exogenous amount of good that is already in households hands
- Mass L of households always looking for jobs
- Sub-period two is centralized, all the action is in sub-period 1
- Frictions on the labor market
- Unemployment risk that is not insured
- No coordination between firms, buyers and workers
- Buyers and workers credit/debit a bank account that they will clear in sub-period 2.
- Good 2 serves as the numéraire.

- $$U(\underbrace{X_j + e_j}_{c_j}) - \nu(\ell_j) + V(\underbrace{-pe_j + \mathcal{I}_j w \ell_j}_{a_j}).$$
- Initial endowment of X_j units of good 1.
- Continuation value $V(a_j)$ given (in this talk)
- $\mathcal{I}_j = \begin{cases} 1 & \text{if employed} \\ 0 & \text{if unemployed} \end{cases}$

1. Static model setup
Firms

- Vacancy posting cost Φ.
- Decreasing-returns-to-scale production function $F(\ell)$.
- Net production of a firm hiring ℓ hours of labor from one worker is $F(\ell) - \Phi$.

1. Static model setup
Firms

- Vacancy posting cost Φ.
- Decreasing-returns-to-scale production function $F(\ell)$.
- Net production of a firm hiring ℓ hours of labor from one worker is $F(\ell) - \Phi$.

- Vacancy posting cost Φ.
- Decreasing-returns-to-scale production function $F(\ell)$.
- Net production of a firm hiring ℓ hours of labor from one worker is $F(\ell) - \Phi$.

1. Static model setup
Matching

- $N =$ number firms who decide to search for workers.
- $M(N, L) =$ number of matches (CRS).
- Upon a match, a Walrasian auctioneer equilibrates the demand and supply of labor among the two parties in the match:

$$pF'(\ell) = w$$

1. Static model setup
Matching

- $N =$ number firms who decide to search for workers.
- $M(N, L) =$ number of matches (CRS).
- Upon a match, a Walrasian auctioneer equilibrates the demand and supply of labor among the two parties in the match:

$$pF'(\ell) = w$$

- $N =$ number firms who decide to search for workers.
- $M(N, L) =$ number of matches (CRS).
- Upon a match, a Walrasian auctioneer equilibrates the demand and supply of labor among the two parties in the match:

$$pF'(\ell) = w$$

1. Static model setup

Household first sub-period decisions

- Normalization: $L = 1$
- Symmetry: $X_j = X$
- Worker problem:

$$\max_{\ell_j} -\nu(\ell_j) + V(\underbrace{-pe_j - \mathcal{I}_j w \ell_j}_{a_j})$$

- Buyer problem:

$$\max_{c_j} U(c_j) + \mu V(w\ell_j - pe_j) + (1-\mu) V(-pe_j)$$

where $\mu \equiv M(N, L)/L$ is the probability that a worker finds a job.

1. Static model setup

Household first sub-period decisions

- Normalization: $L = 1$
- Symmetry: $X_j = X$
- Worker problem:

$$\max_{\ell_j} -\nu(\ell_j) + V(\underbrace{-pe_j - \mathcal{I}_j w \ell_j}_{a_j})$$

- Buyer problem:

$$\max_{c_j} U(c_j) + \mu V(w\ell_j - pe_j) + (1-\mu) V(-pe_j)$$

where $\mu \equiv M(N, L)/L$ is the probability that a worker finds a job.

1. Static model setup

Household first sub-period decisions

- Normalization: $L = 1$
- Symmetry: $X_j = X$
- Worker problem:

$$\max_{\ell_j} -\nu(\ell_j) + V(\underbrace{-pe_j - \mathcal{I}_j w \ell_j}_{a_j})$$

- Buyer problem:

$$\max_{c_j} U(c_j) + \mu V(w\ell_j - pe_j) + (1-\mu) V(-pe_j)$$

where $\mu \equiv M(N, L)/L$ is the probability that a worker finds a job.

- Normalization: $L = 1$
- Symmetry: $X_j = X$
- Worker problem:

$$\max_{\ell_j} -\nu(\ell_j) + V(\underbrace{-pe_j - \mathcal{I}_j w \ell_j}_{a_j})$$

- Buyer problem:

$$\max_{c_j} U(c_j) + \mu V(w\ell_j - pe_j) + (1-\mu) V(-pe_j)$$

where $\mu \equiv M(N, L)/L$ is the probability that a worker finds a job.

1. Static model setup

Deriving the value function $V(a)$

- Not here...
- $V(a)$ is strictly concave, with the key property that $V'(a_1) > V'(a_2)$ if $a_1 < 0 < a_2$

- Not here...
- $V(a)$ is strictly concave, with the key property that $V'(a_1) > V'(a_2)$ if $a_1 < 0 < a_2$

Figure 12: The Value Function $V(a)$

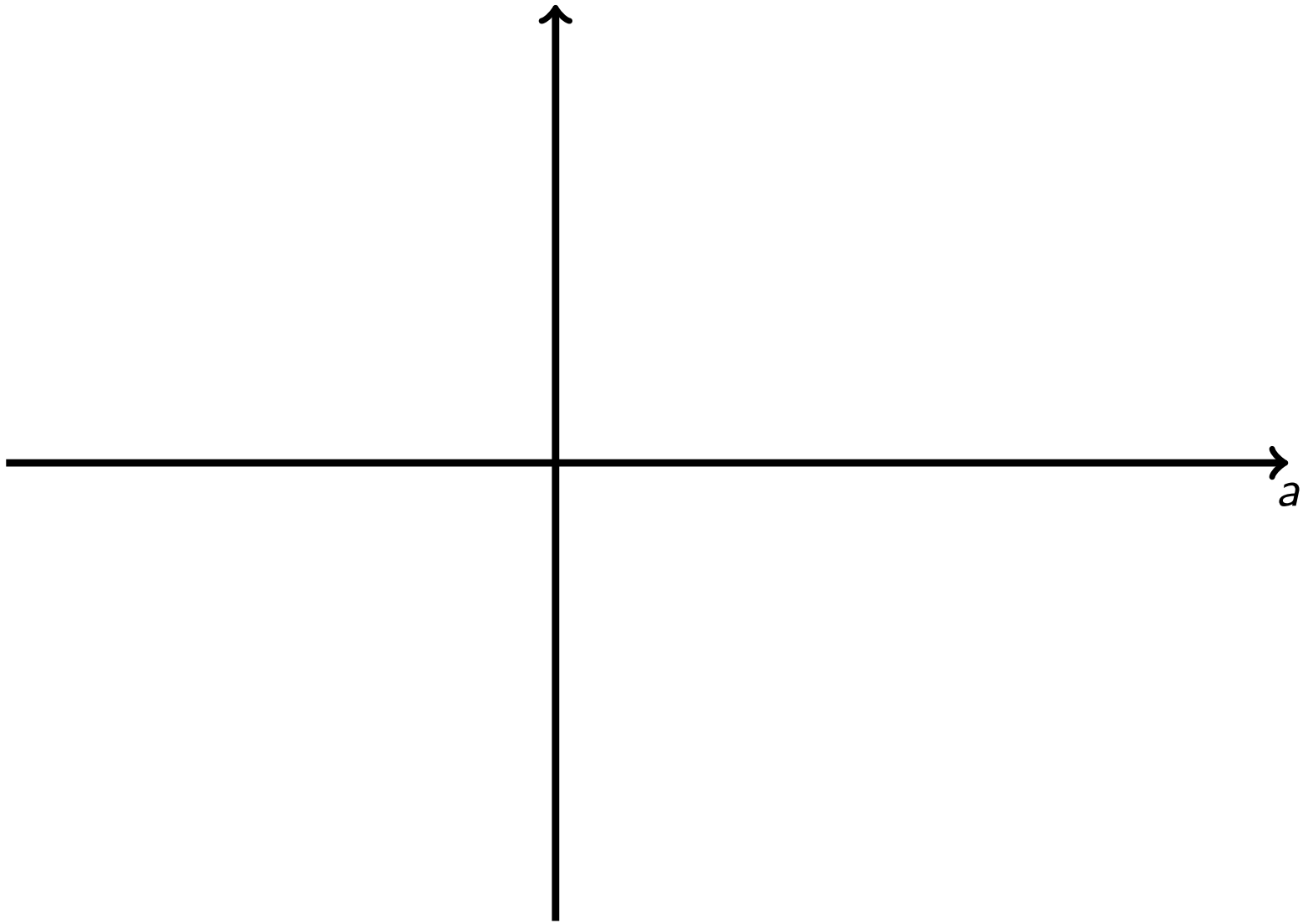


Figure 12: The Value Function $V(a)$

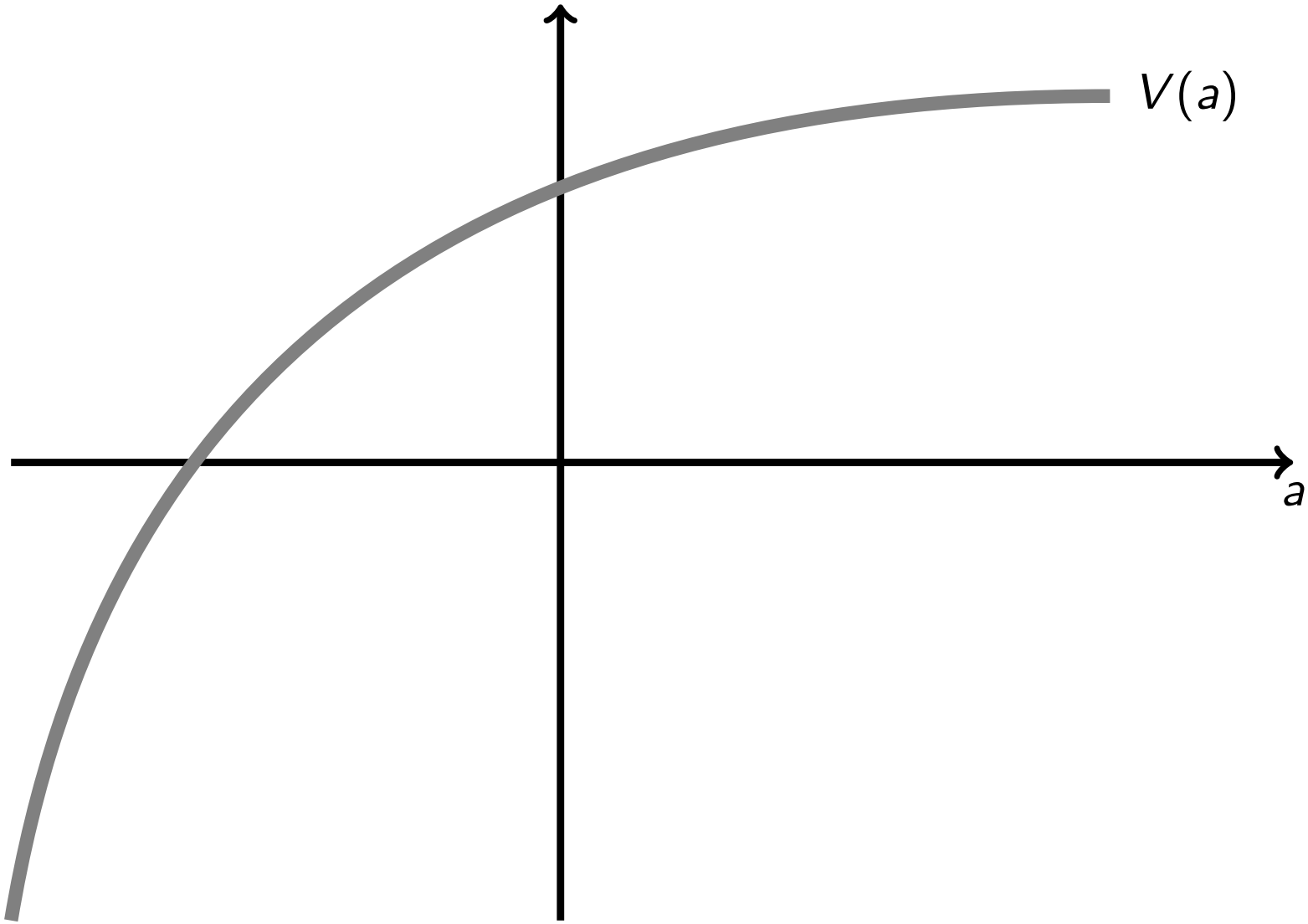


Figure 12: The Value Function $V(a)$

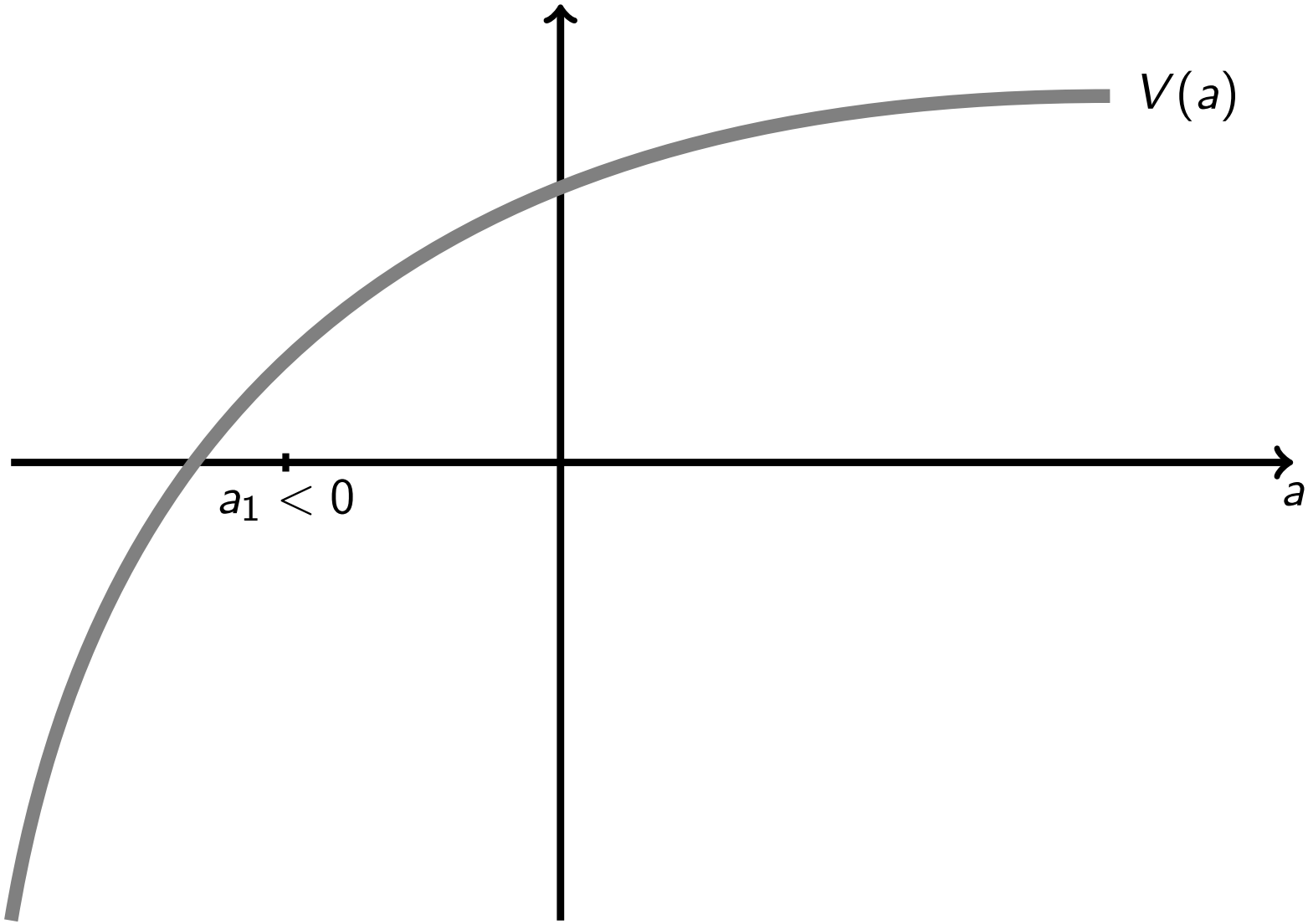


Figure 12: The Value Function $V(a)$

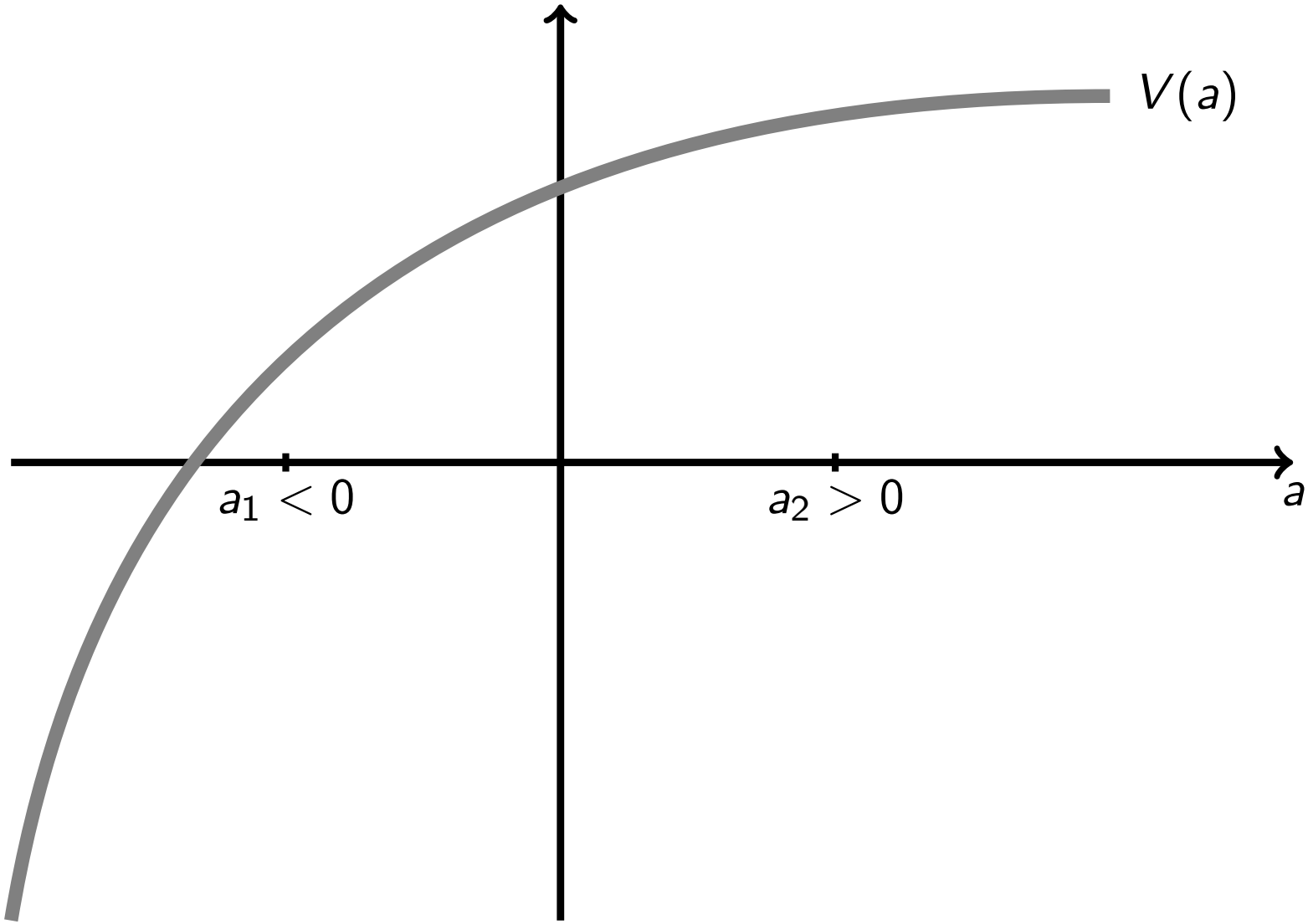


Figure 12: The Value Function $V(a)$

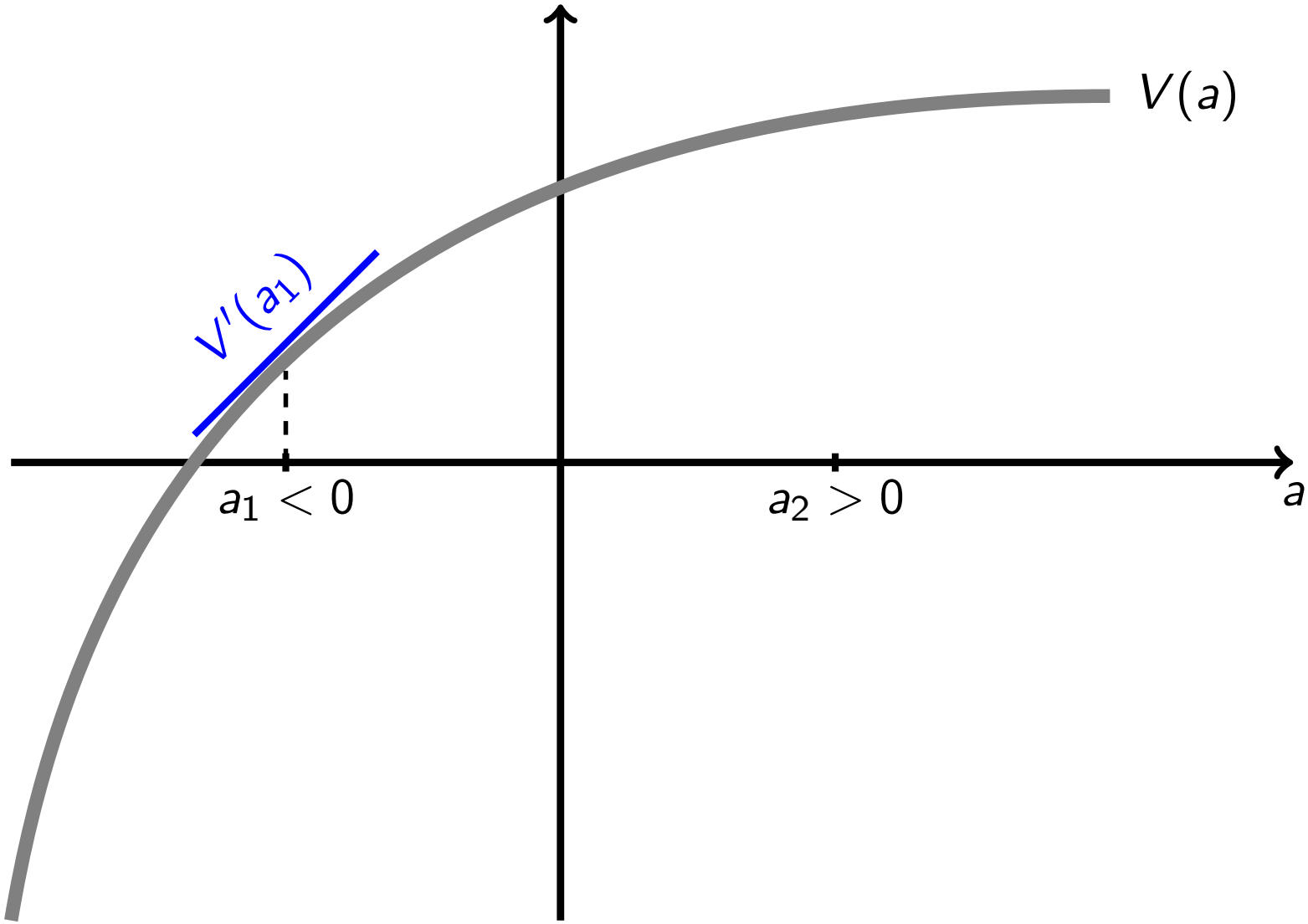
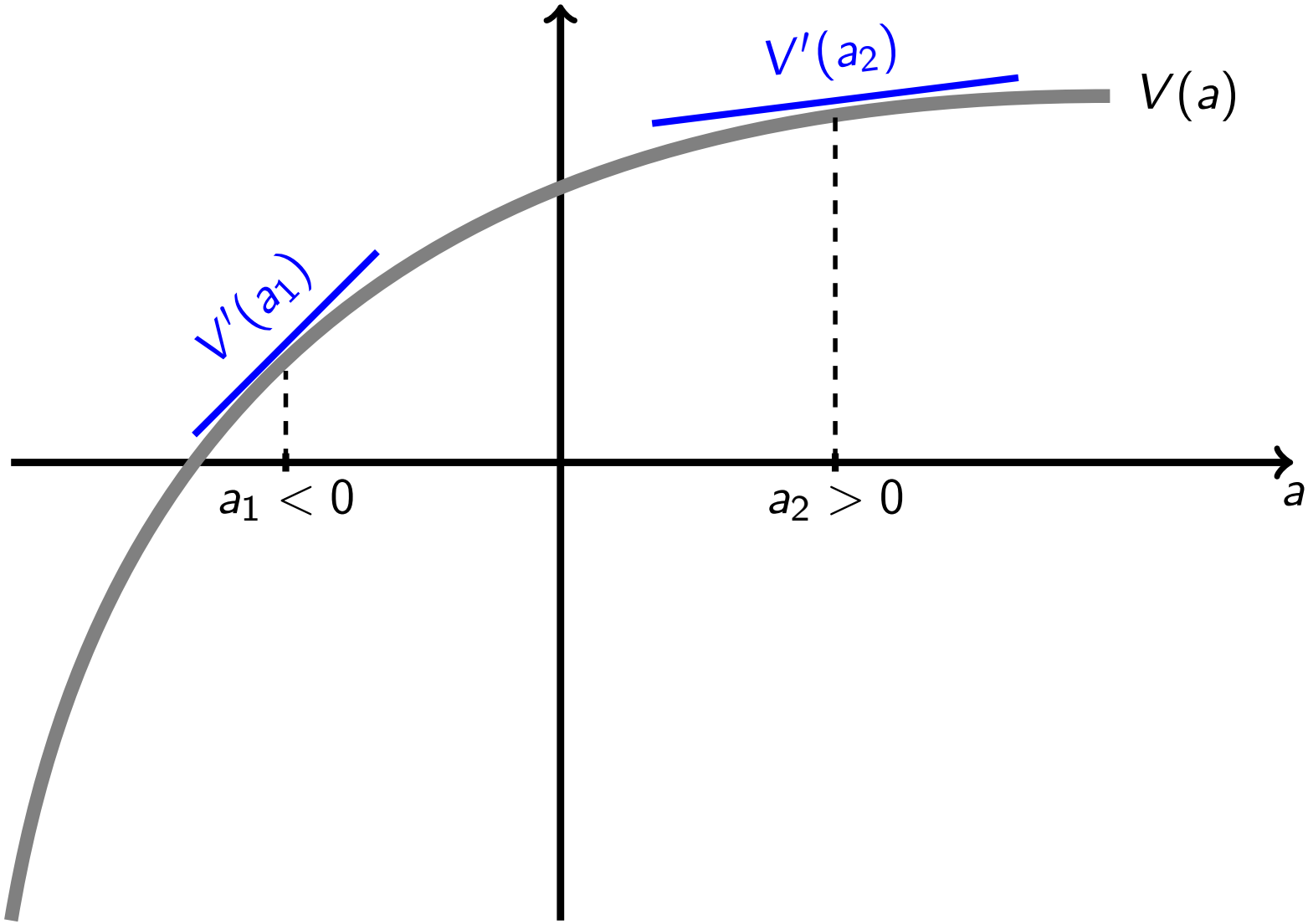


Figure 12: The Value Function $V(a)$



1. Static model setup
2. Equilibrium
3. Interesting Properties of the Static Equilibrium
4. Extensions / Dynamics / Policy Trade-offs

2. Equilibrium

- Second sub-period: accounts are balanced.
- First sub-period: markets clear and agents optimize

2. Equilibrium

- Second sub-period: accounts are balanced.
- First sub-period: markets clear and agents optimize

2. Equilibrium

First sub-period

- The equilibrium is given by the following equations

$$\frac{1}{p}U'(c) = \frac{M(N,L)}{L}V'\left(w\ell - p\left(c - X\right)\right) + \left[1 - \frac{M(N,L)}{L}\right]V'\left(-p\left(c - X\right)\right)$$

$$\nu'(\ell) = V'\left(w\ell - p\left(c - X\right)\right)w$$

$$pF'(\ell) = w$$

$$\frac{M(N,L)}{N}[pF(\ell) - w\ell] = p\Phi$$

$$M(N,L)F(\ell) = L(c - X) + N\Phi$$

2. Equilibrium

First sub-period

- The equilibrium is given by the following equations
-
$$\frac{1}{p}U'(c) = \frac{M(N,L)}{L}V'\left(w\ell - p\left(c - X\right)\right) + \left[1 - \frac{M(N,L)}{L}\right]V'\left(-p\left(c - X\right)\right)$$
-
$$\nu'(\ell) = V'\left(w\ell - p\left(c - X\right)\right)w$$
-
$$pF'(\ell) = w$$
-
$$\frac{M(N,L)}{N}[pF(\ell) - w\ell] = p\Phi$$
-
$$M(N,L)F(\ell) = L(c - X) + N\Phi$$

2. Equilibrium

First sub-period

- The equilibrium is given by the following equations
- $$\frac{1}{p}U'(c) = \frac{M(N,L)}{L}V'\left(w\ell - p\left(c - X\right)\right) + \left[1 - \frac{M(N,L)}{L}\right]V'\left(-p\left(c - X\right)\right)$$
- $$\nu'(\ell) = V'\left(w\ell - p\left(c - X\right)\right)w$$
- $$pF'(\ell) = w$$
- $$\frac{M(N,L)}{N}[pF(\ell) - w\ell] = p\Phi$$
- $$M(N,L)F(\ell) = L(c - X) + N\Phi$$

2. Equilibrium

First sub-period

- The equilibrium is given by the following equations
- $$\frac{1}{p}U'(c) = \frac{M(N,L)}{L}V'\left(w\ell - p\left(c - X\right)\right) + \left[1 - \frac{M(N,L)}{L}\right]V'\left(-p\left(c - X\right)\right)$$
- $$\nu'(\ell) = V'\left(w\ell - p\left(c - X\right)\right)w$$
- $$pF'(\ell) = w$$
- $$\frac{M(N,L)}{N}[pF(\ell) - w\ell] = p\Phi$$
- $$M(N,L)F(\ell) = L(c - X) + N\Phi$$

2. Equilibrium

First sub-period

- The equilibrium is given by the following equations
- $$\frac{1}{p}U'(c) = \frac{M(N,L)}{L}V'\left(w\ell - p\left(c - X\right)\right) + \left[1 - \frac{M(N,L)}{L}\right]V'\left(-p\left(c - X\right)\right)$$
- $$\nu'(\ell) = V'\left(w\ell - p\left(c - X\right)\right)w$$
- $$pF'(\ell) = w$$
- $$\frac{M(N,L)}{N}[pF(\ell) - w\ell] = p\Phi$$
- $$M(N,L)F(\ell) = L(c - X) + N\Phi$$

2. Equilibrium

First sub-period

- The equilibrium is given by the following equations
-
$$\begin{aligned}\frac{1}{p}U'(c) &= \frac{M(N,L)}{L}V'\left(w\ell - p\left(c-X\right)\right) \\ &\quad + \left[1 - \frac{M(N,L)}{L}\right]V'\left(-p\left(c-X\right)\right)\end{aligned}$$
-
$$\nu'(\ell) = V'\left(w\ell - p\left(c-X\right)\right)w$$
-
$$pF'(\ell) = w$$
-
$$\frac{M(N,L)}{N}[pF(\ell) - w\ell] = p\Phi$$
-
$$M(N,L)F(\ell) = L(c-X) + N\Phi$$

2. Equilibrium

A labor market wedge

- $$\frac{\nu'(\ell)}{U'(c)} \underbrace{\left\{1 + (1-\mu)\left[\frac{V'\left(-p\left(c-X\right)\right)}{V'\left(w\ell - p\left(c-X\right)\right)} - 1\right]\right\}}_{1+ \text{ labor wedge}} = F'(\ell)$$

  - The labor wedge is caused by precautionary savings and absent insurance market.
  - The level of this wedge is influenced by X.

- $$\frac{\nu'(\ell)}{U'(c)} \underbrace{\left\{1 + (1-\mu)\left[\frac{V'\left(-p\left(c-X\right)\right)}{V'\left(w\ell - p\left(c-X\right)\right)} - 1\right]\right\}}_{1+ \text{ labor wedge}} = F'(\ell)$$

- The labor wedge is caused by precautionary savings and absent insurance market.
- The level of this wedge is influenced by X.

- $$\frac{\nu'(\ell)}{U'(c)} \underbrace{\left\{1 + (1-\mu)\left[\frac{V'\left(-p\left(c-X\right)\right)}{V'\left(w\ell - p\left(c-X\right)\right)} - 1\right]\right\}}_{1+ \text{ labor wedge}} = F'(\ell)$$

- The labor wedge is caused by precautionary savings and absent insurance market.
- The level of this wedge is influenced by X.

0. Introduction
Roadmap

1. Static model setup
2. Equilibrium
3. Interesting Properties of the Static Equilibrium
4. Extensions / Dynamics / Policy Trade-offs

3. Interesting Properties of the Static Equilibrium

Goal and parametric restrictions

- Our main goal now is to explore the effects of changes in X on equilibrium outcomes.
- Why and when an increase in X can actually lead to a reduction in consumption and/or welfare?
- Can liquidation periods be socially painful?
- We restrict the analysis to
  - $M(N, L) = \min\{N, L\}$

3. Interesting Properties of the Static Equilibrium

Goal and parametric restrictions

- Our main goal now is to explore the effects of changes in X on equilibrium outcomes.
- Why and when an increase in X can actually lead to a reduction in consumption and/or welfare?
- Can liquidation periods be socially painful?
- We restrict the analysis to
  - $M(N, L) = \min\{N, L\}$

3. Interesting Properties of the Static Equilibrium

Goal and parametric restrictions

- Our main goal now is to explore the effects of changes in X on equilibrium outcomes.
- Why and when an increase in X can actually lead to a reduction in consumption and/or welfare?
- Can liquidation periods be socially painful?
- We restrict the analysis to
  - $M(N, L) = \min\{N, L\}$

3. Interesting Properties of the Static Equilibrium

Goal and parametric restrictions

- Our main goal now is to explore the effects of changes in X on equilibrium outcomes.
- Why and when an increase in X can actually lead to a reduction in consumption and/or welfare?
- Can liquidation periods be socially painful?
- We restrict the analysis to
  - $M(N, L) = \min\{N, L\}$

3. Interesting Properties of the Static Equilibrium

Goal and parametric restrictions

- Our main goal now is to explore the effects of changes in X on equilibrium outcomes.
- Why and when an increase in X can actually lead to a reduction in consumption and/or welfare?
- Can liquidation periods be socially painful?
- We restrict the analysis to
  - $\times$ $M(N, L) = \min\{N, L\}$

Figure 13: The Matching Function $M(N, L)$

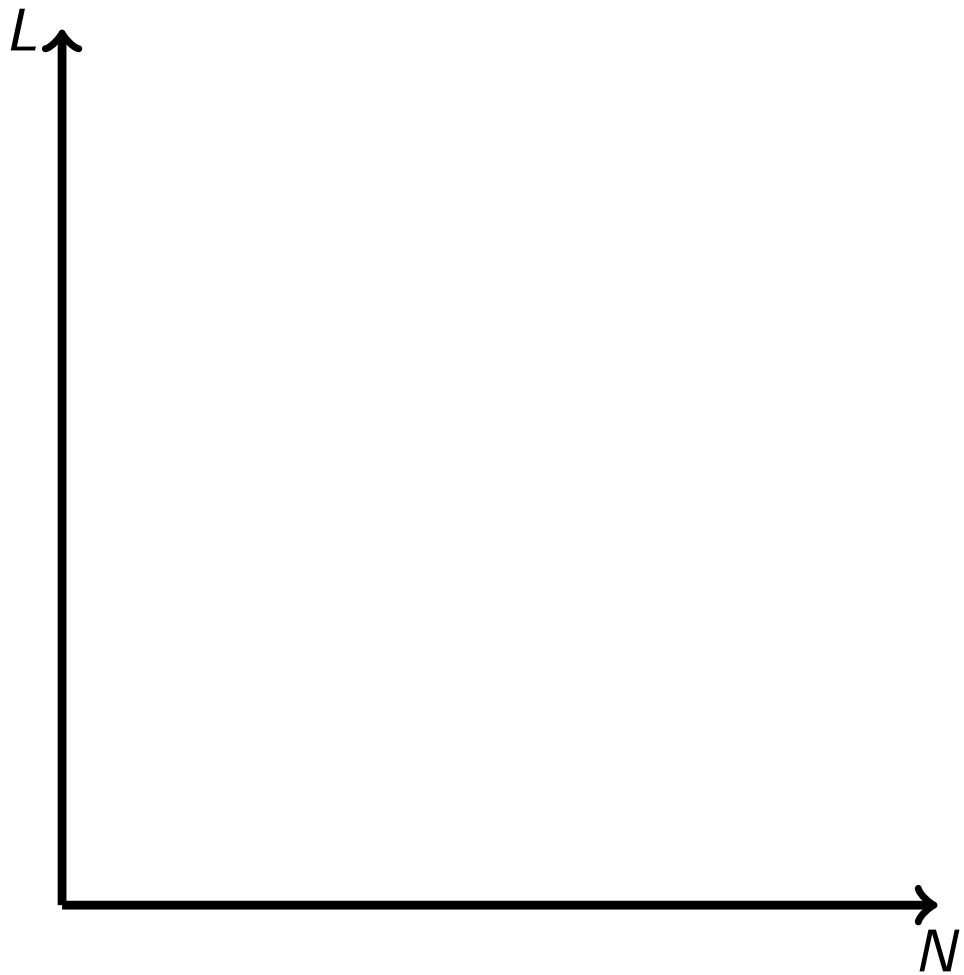


Figure 13: The Matching Function $M(N, L)$

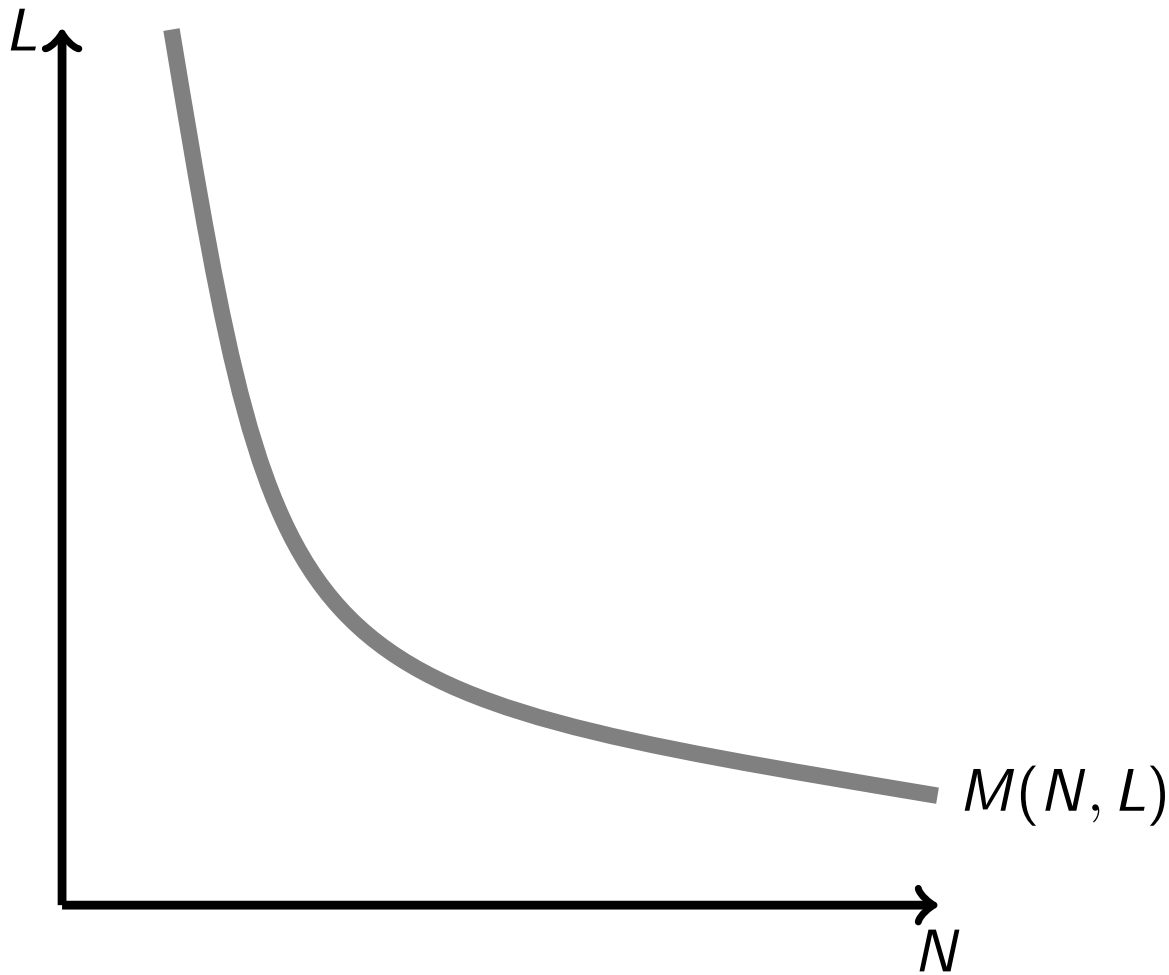


Figure 13: The Matching Function $M(N, L)$

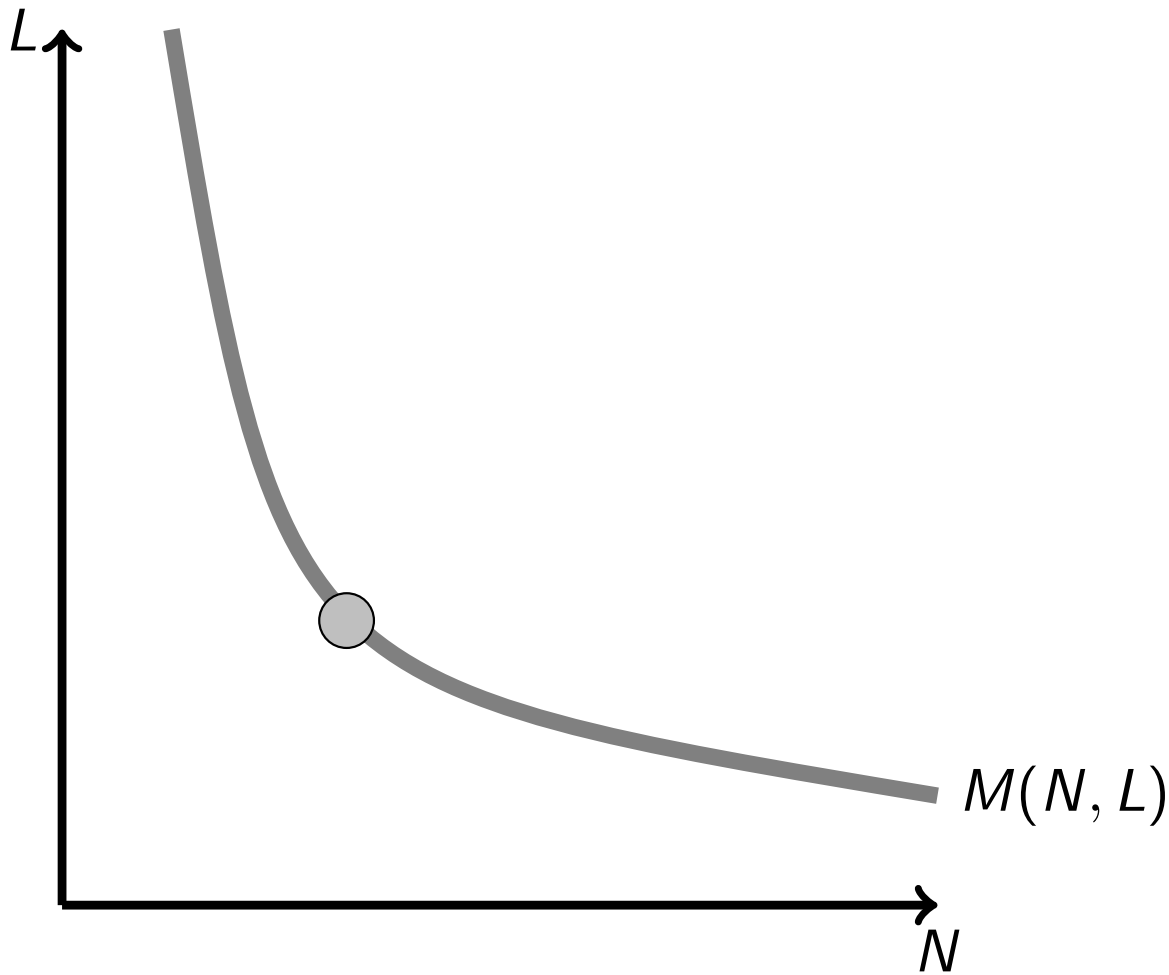
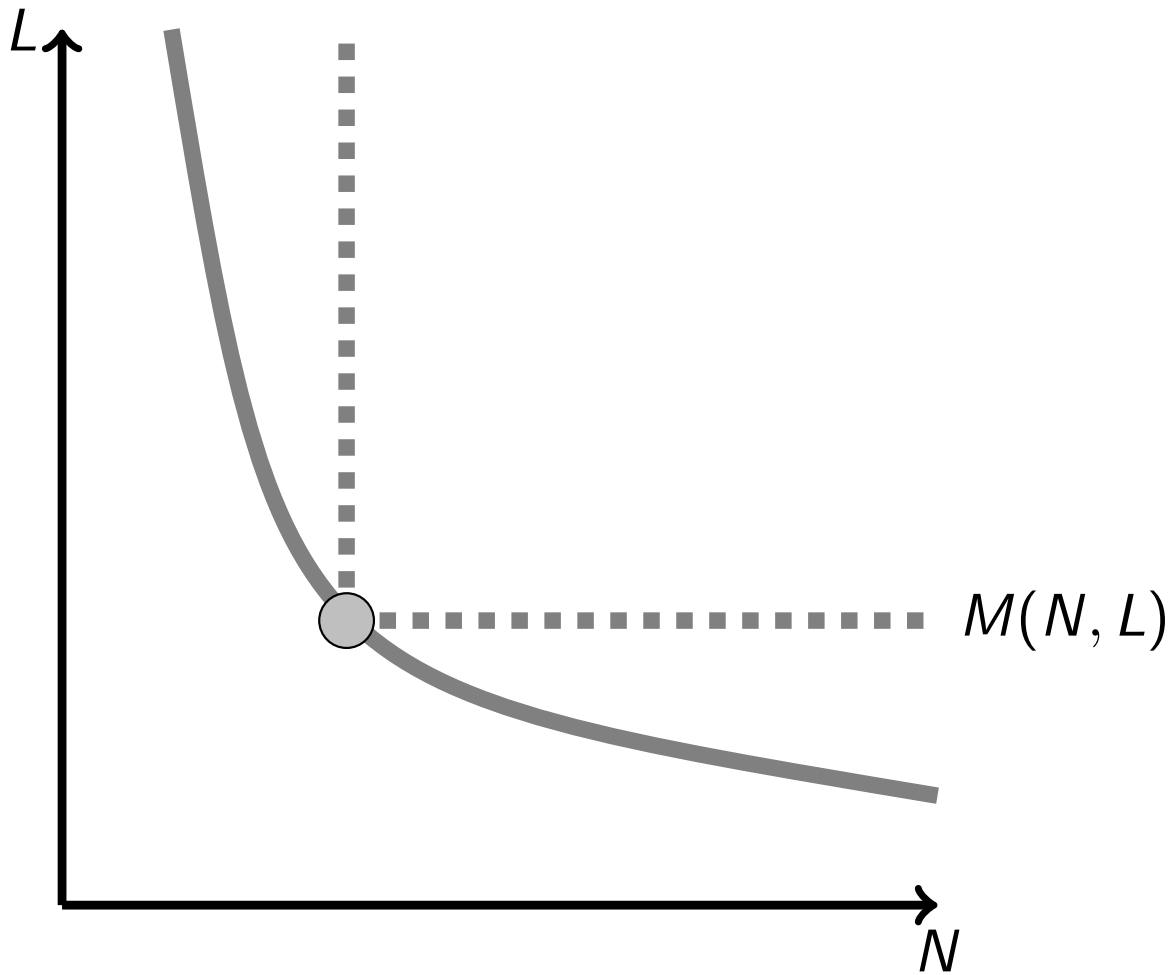


Figure 13: The Matching Function $M(N, L)$



3. Interesting Properties of the Static Equilibrium

Goal and parametric restrictions

- Our main goal now is to explore the effects of changes in X on equilibrium outcomes.
- Why and when an increase in X can actually lead to a reduction in consumption and/or welfare?
- Can liquidation periods be socially painful?
- We restrict the analysis to
  - $M(N, L) = \min\{N, L\}$
  - $V(a) = \begin{cases} (1+\tau) \cdot v \cdot a & \text{if } a < 0 \\ v \cdot a & \text{if } a \geq 0 \end{cases}$

3. Interesting Properties of the Static Equilibrium

Goal and parametric restrictions

- Our main goal now is to explore the effects of changes in X on equilibrium outcomes.
- Why and when an increase in X can actually lead to a reduction in consumption and/or welfare?
- Can liquidation periods be socially painful?
- We restrict the analysis to
  - $M(N, L) = \min\{N, L\}$
  - $V(a) = \begin{cases} (1+\tau) \cdot v \cdot a & \text{if } a < 0 \\ v \cdot a & \text{if } a \geq 0 \end{cases}$

Figure 14: The Value Function $V(a)$

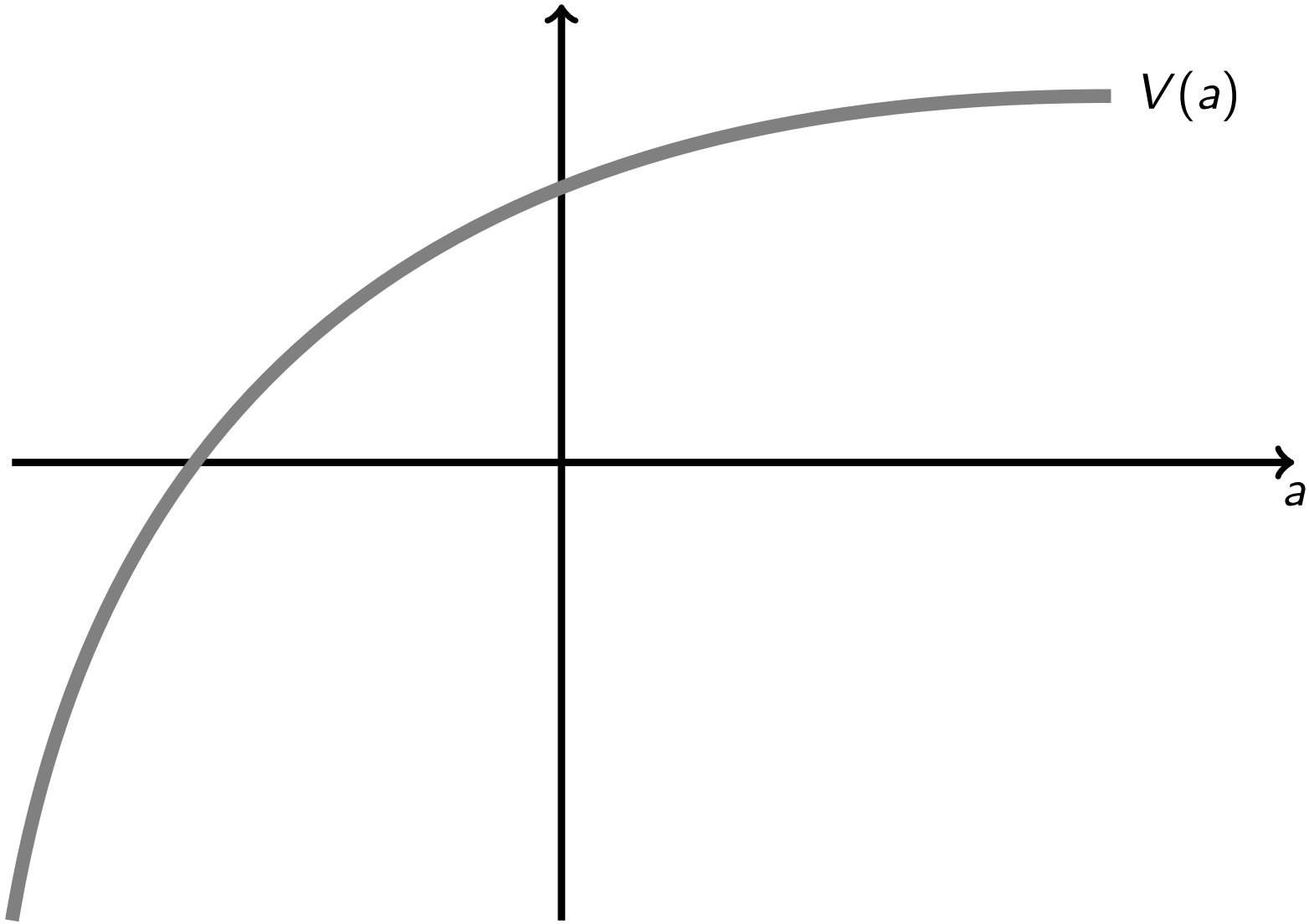


Figure 14: The Value Function $V(a)$

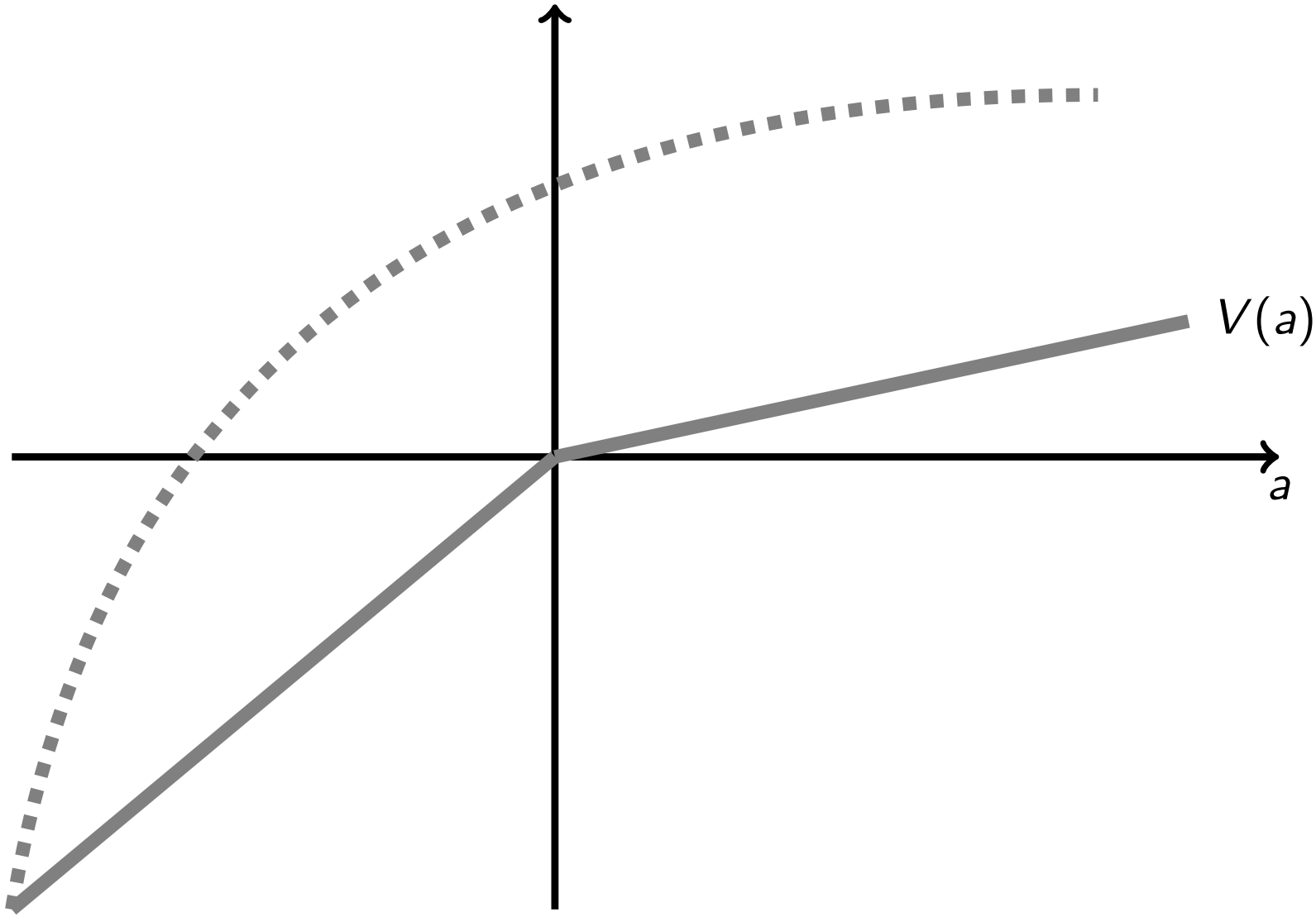


Figure 14: The Value Function $V(a)$

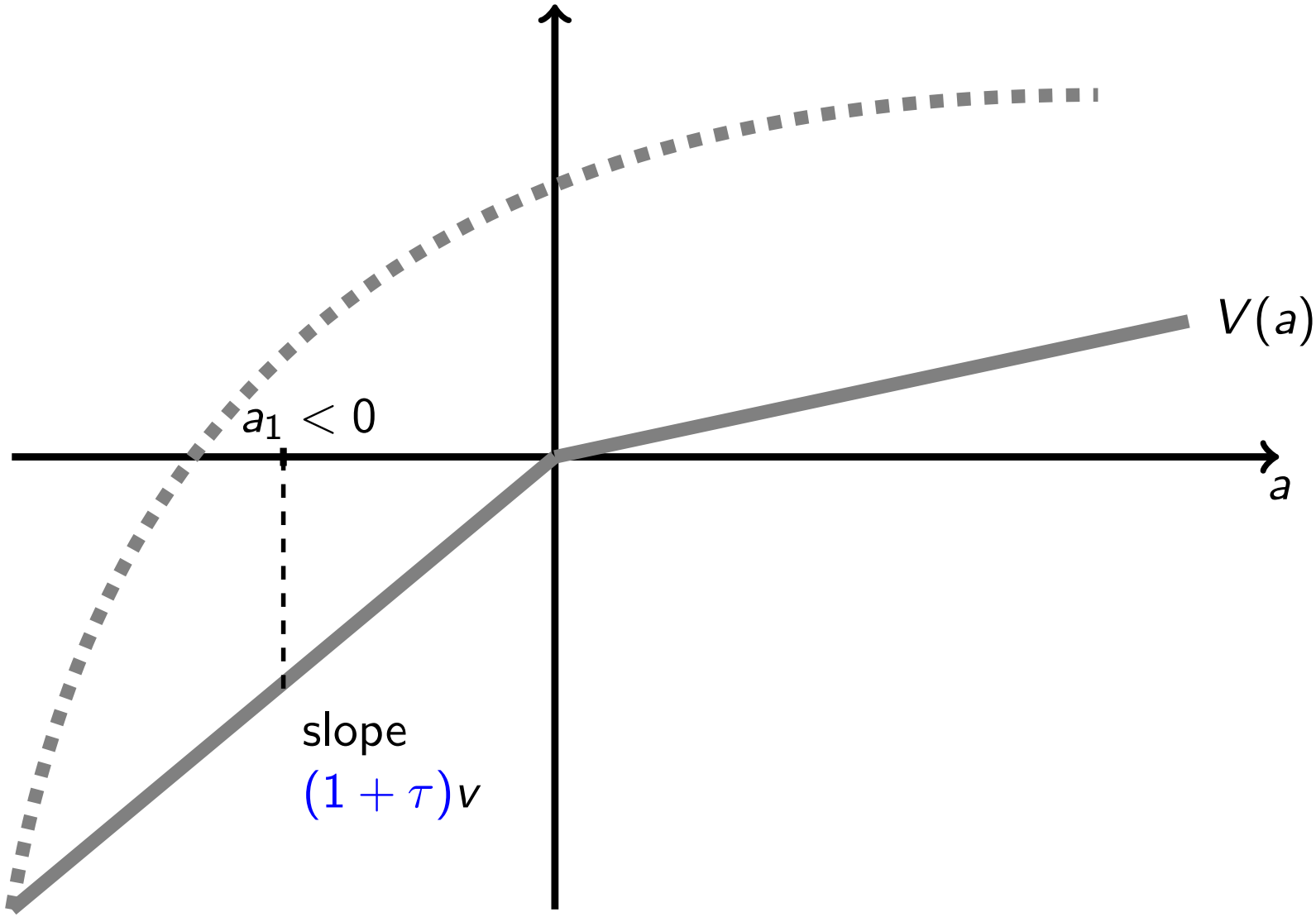


Figure 14: The Value Function $V(a)$

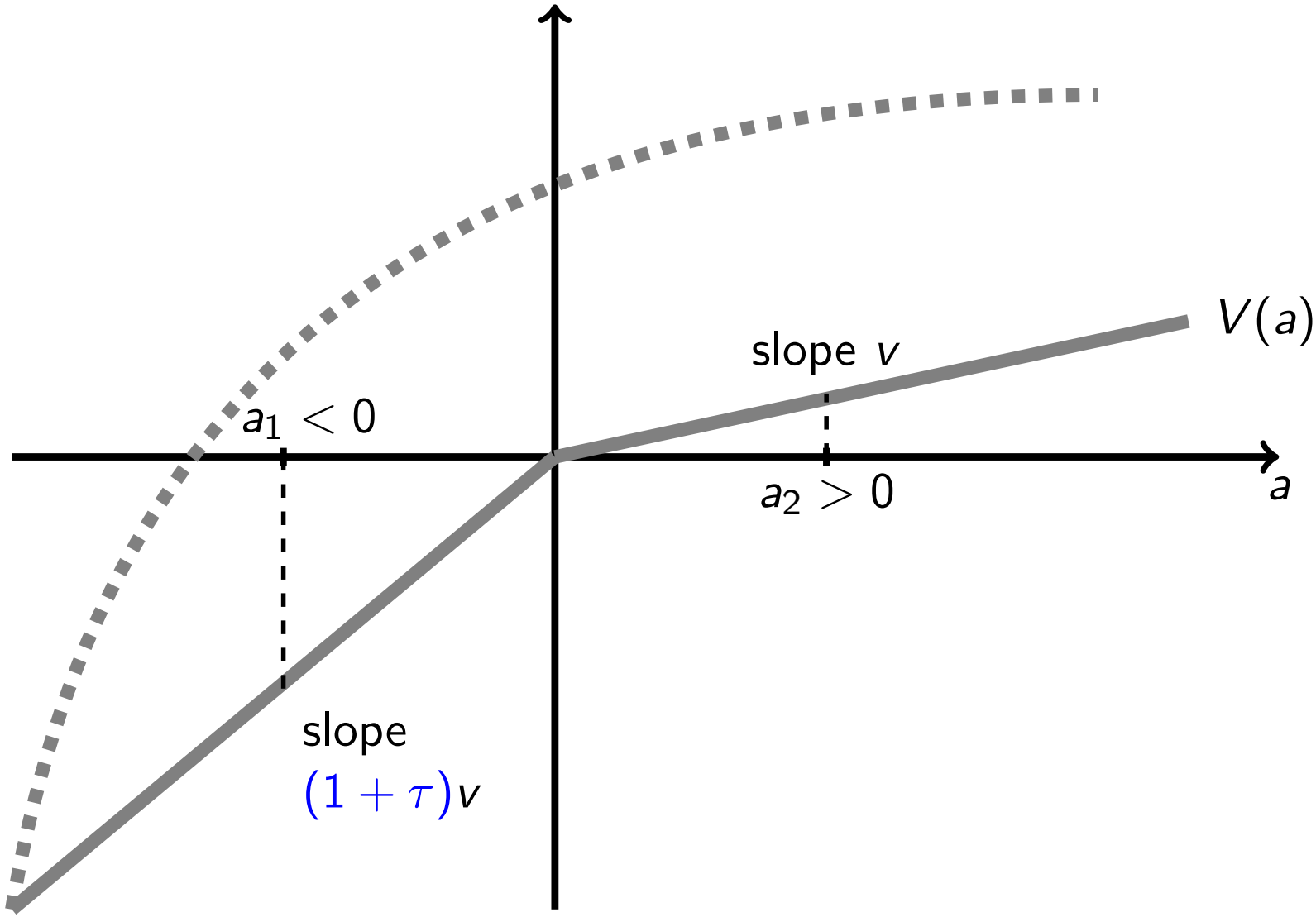


Figure 15: Proposition 1: Existence and Uniqueness

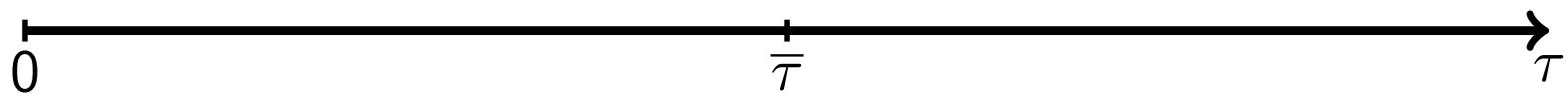


Figure 15: Proposition 1: Existence and Uniqueness

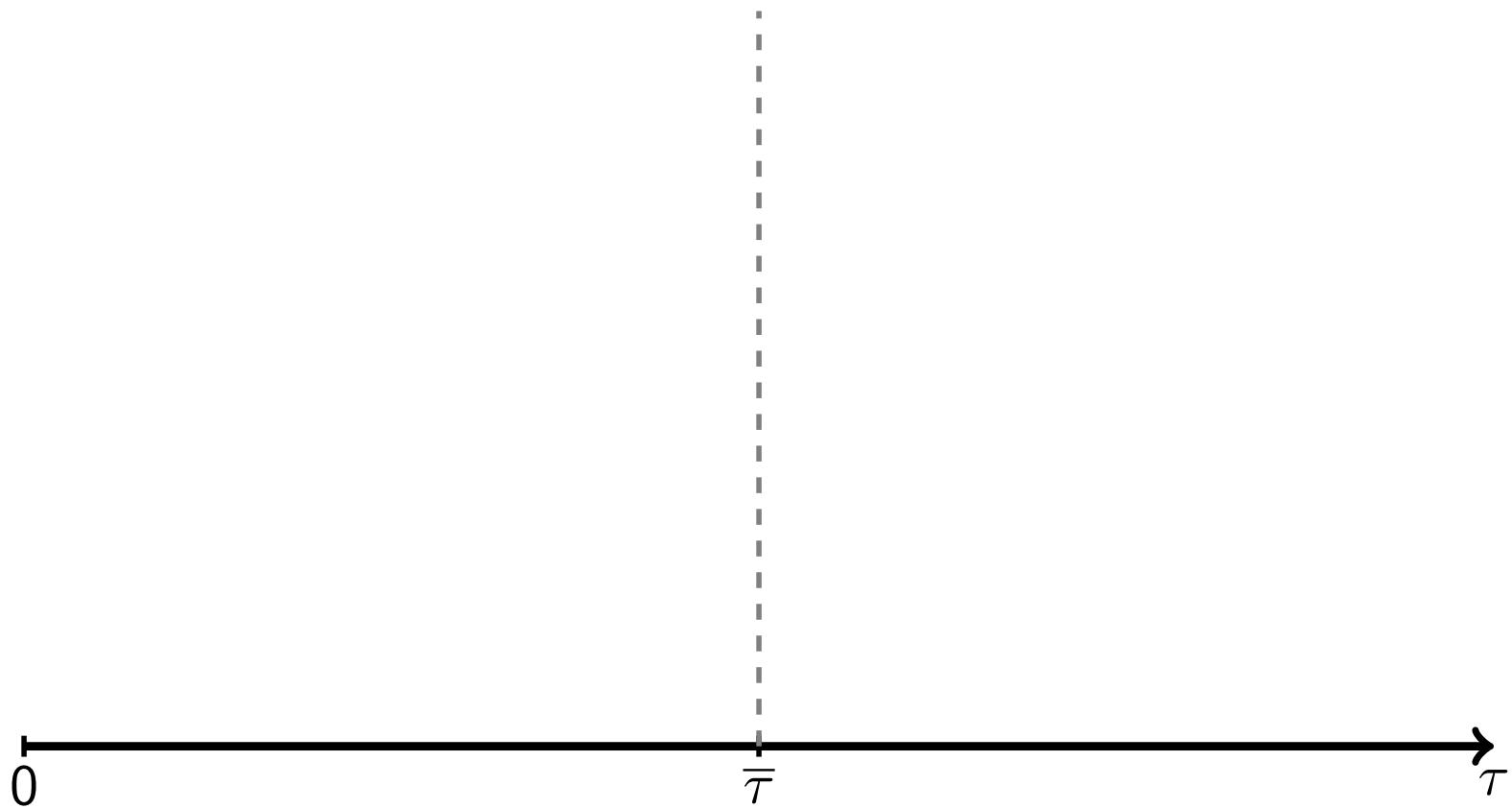


Figure 15: Proposition 1: Existence and Uniqueness

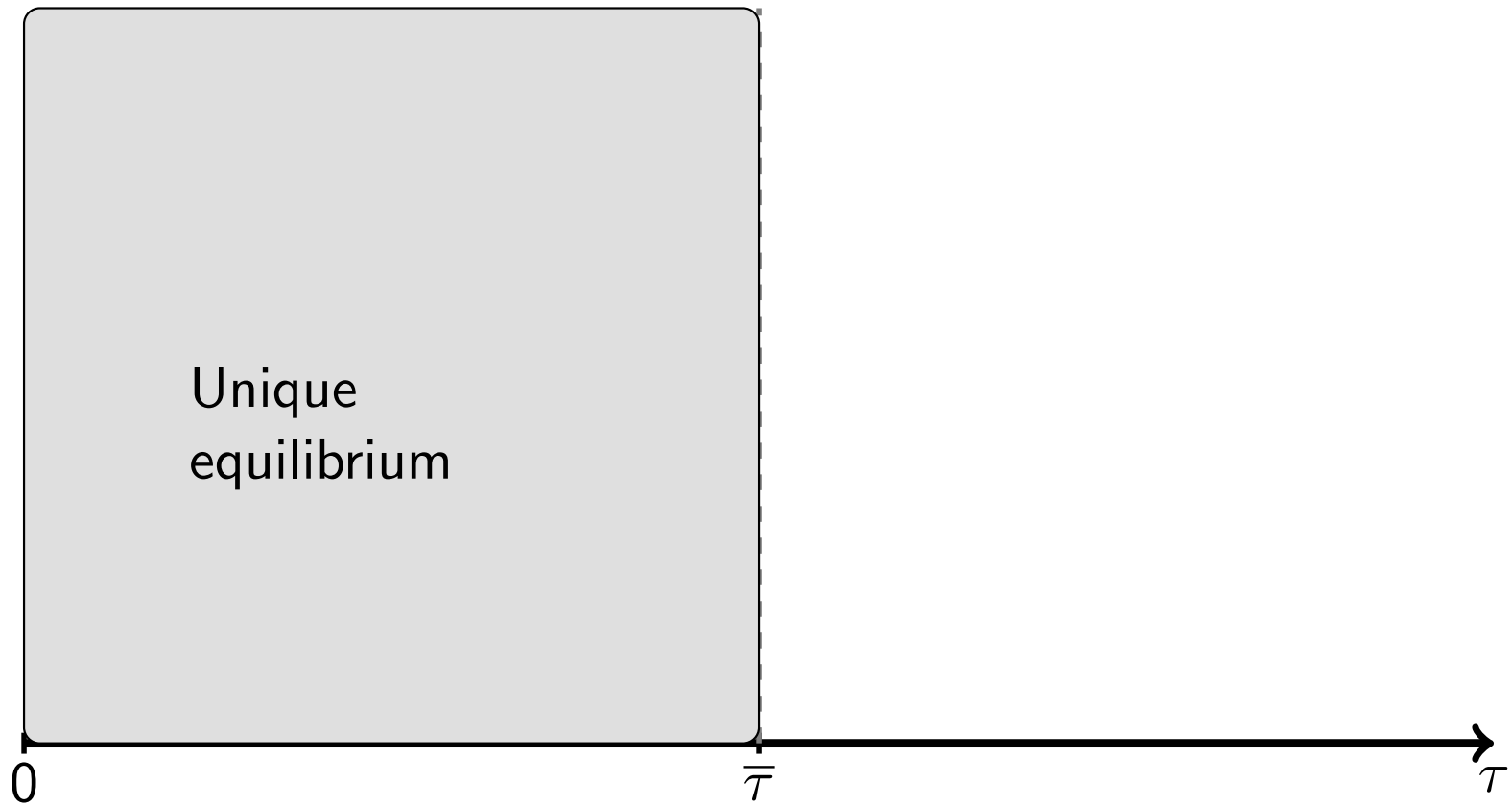


Figure 15: Proposition 1: Existence and Uniqueness

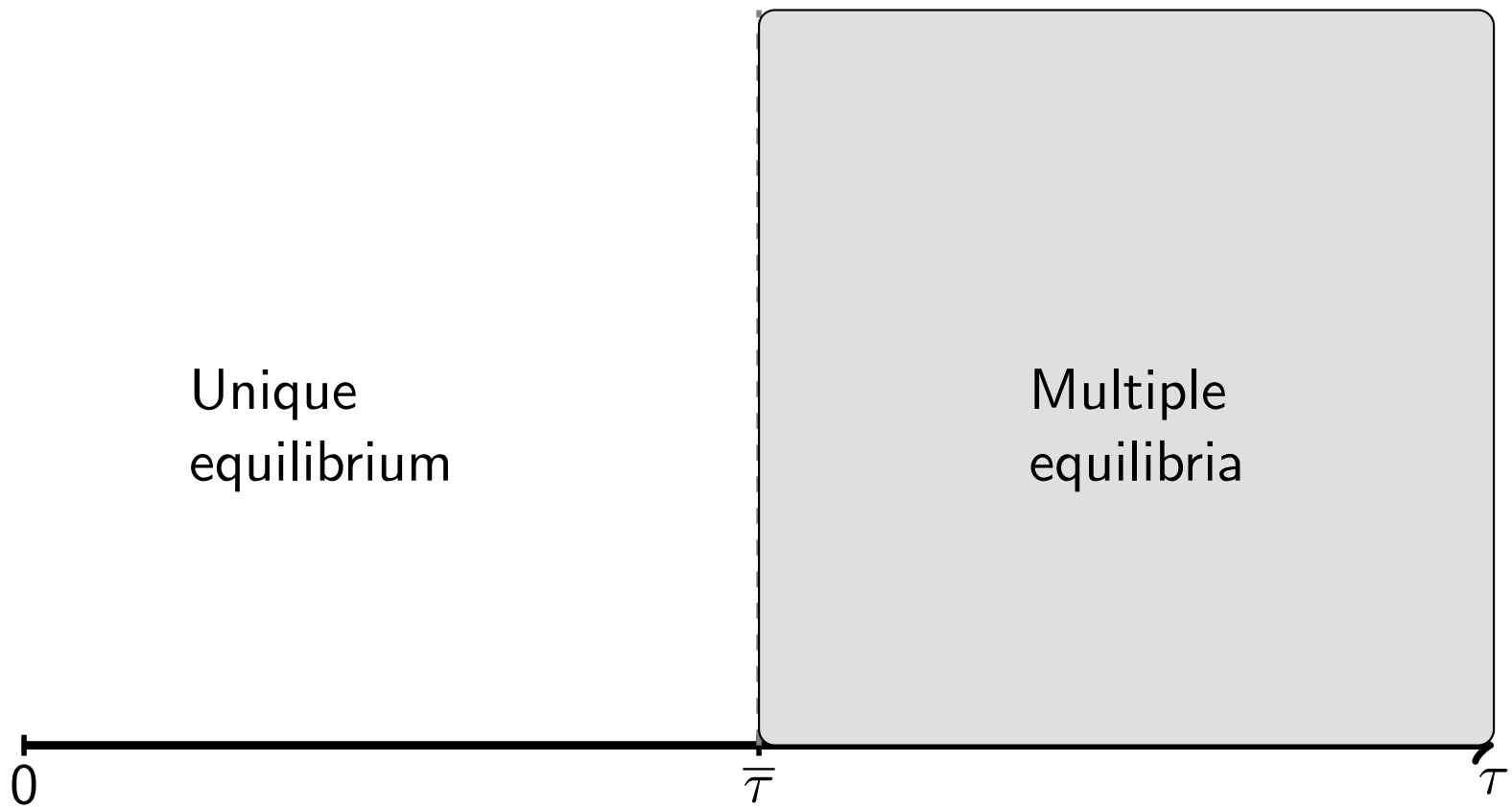


Figure 16: Proposition 2: The three regimes

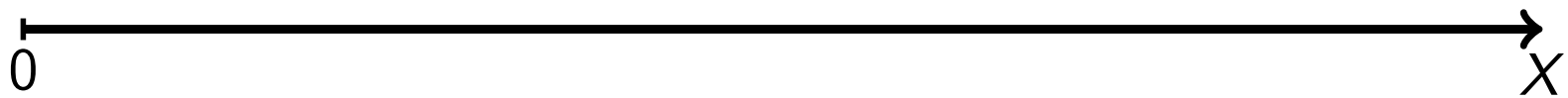


Figure 16: Proposition 2: The three regimes

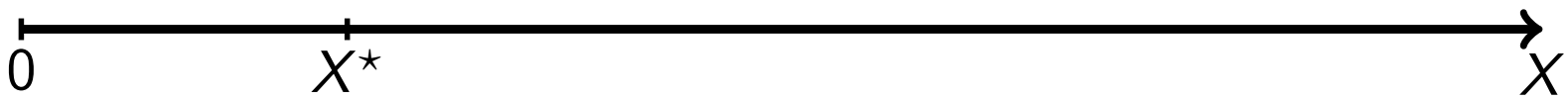


Figure 16: Proposition 2: The three regimes

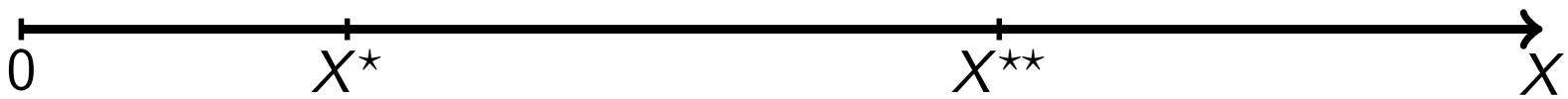


Figure 16: Proposition 2: The three regimes

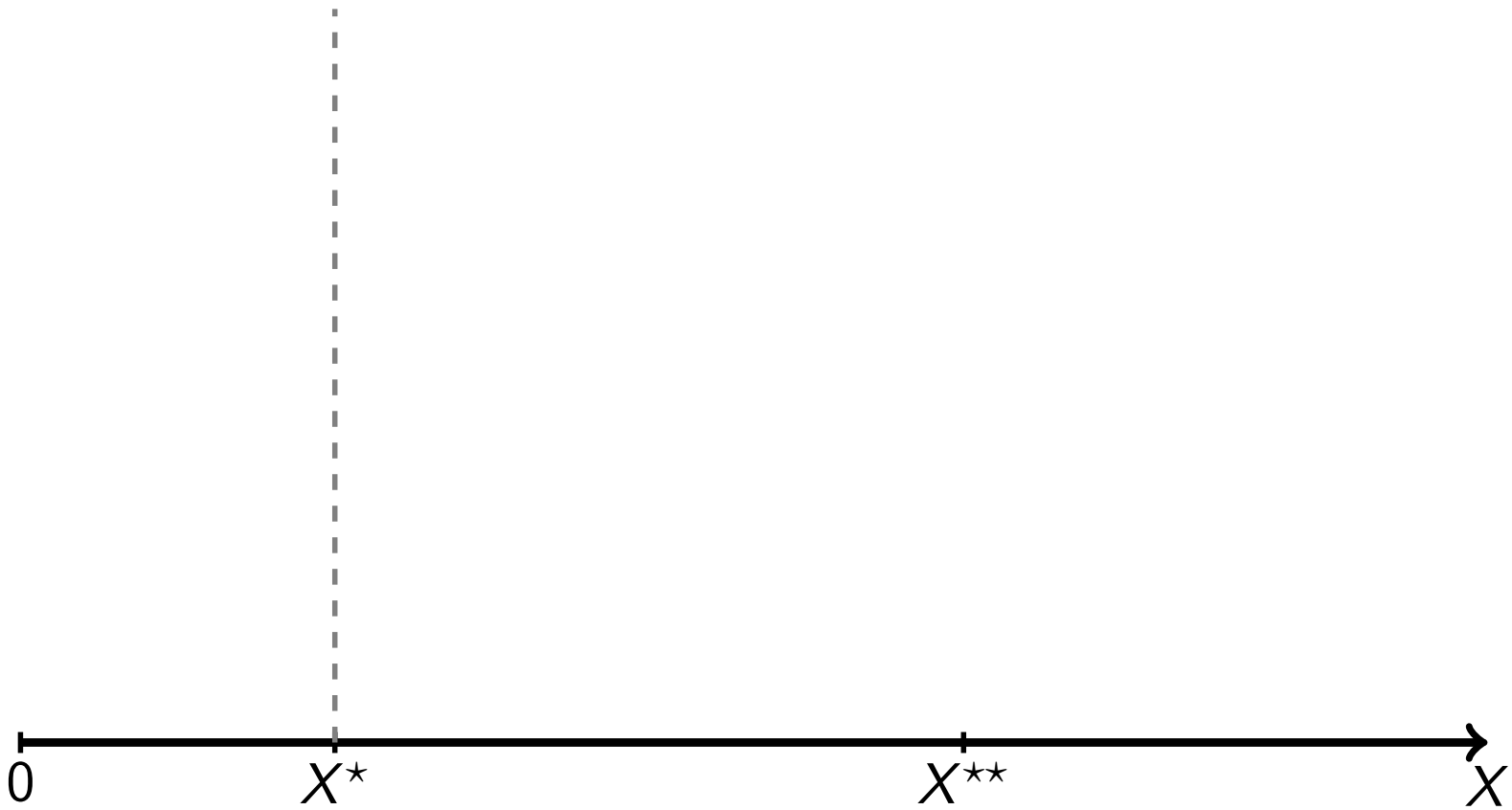


Figure 16: Proposition 2: The three regimes

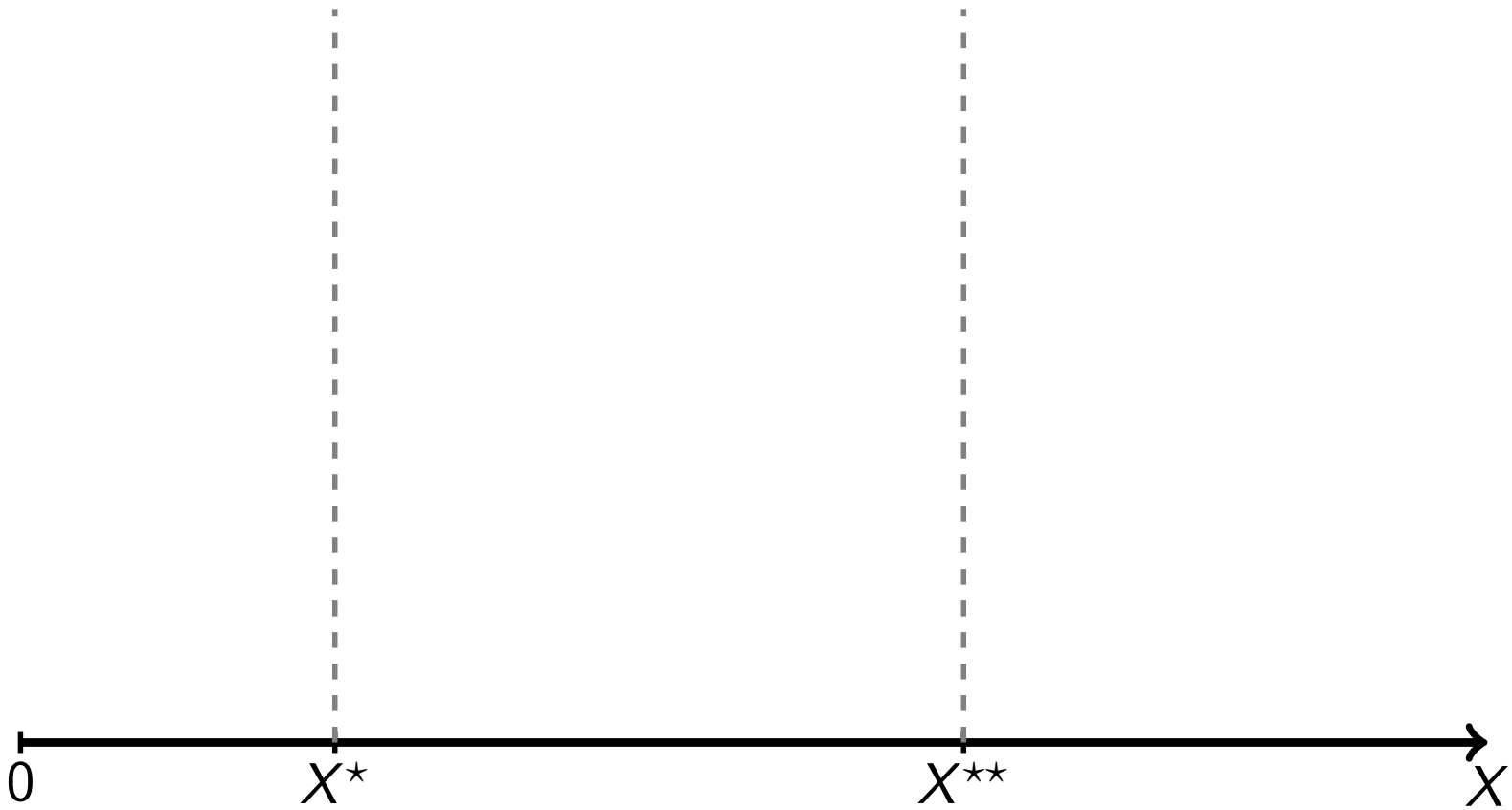


Figure 16: Proposition 2: The three regimes

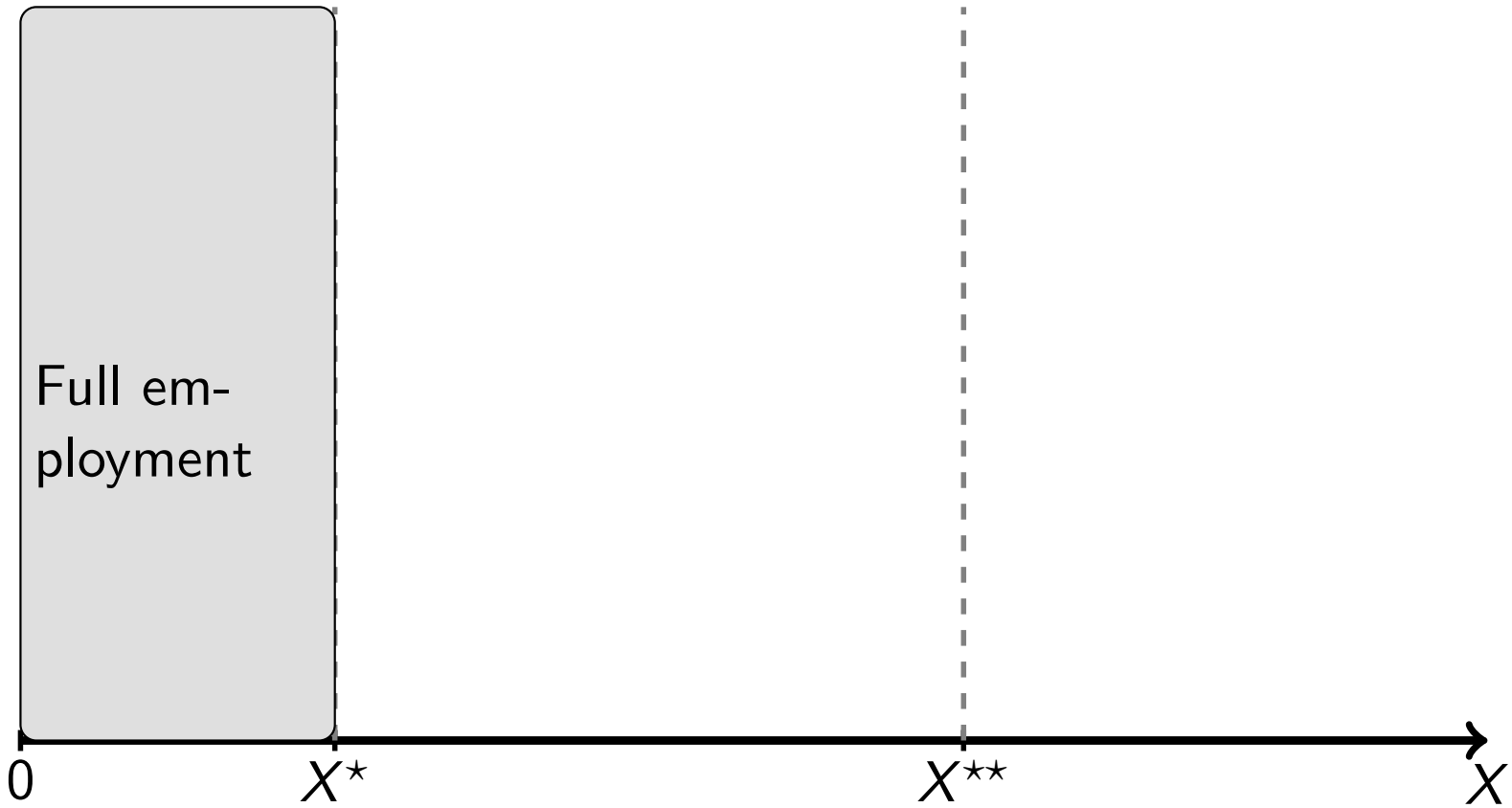


Figure 16: Proposition 2: The three regimes

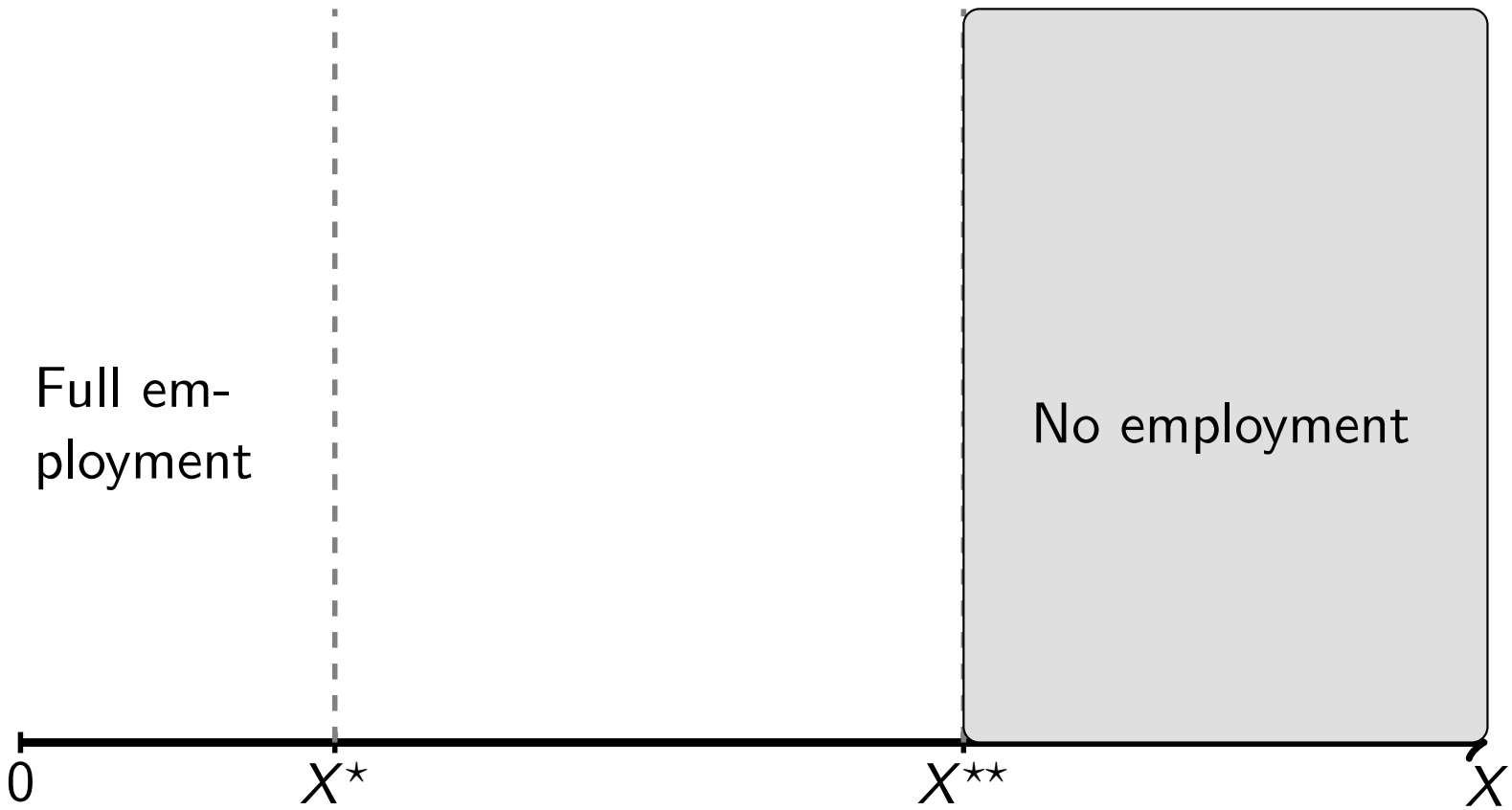
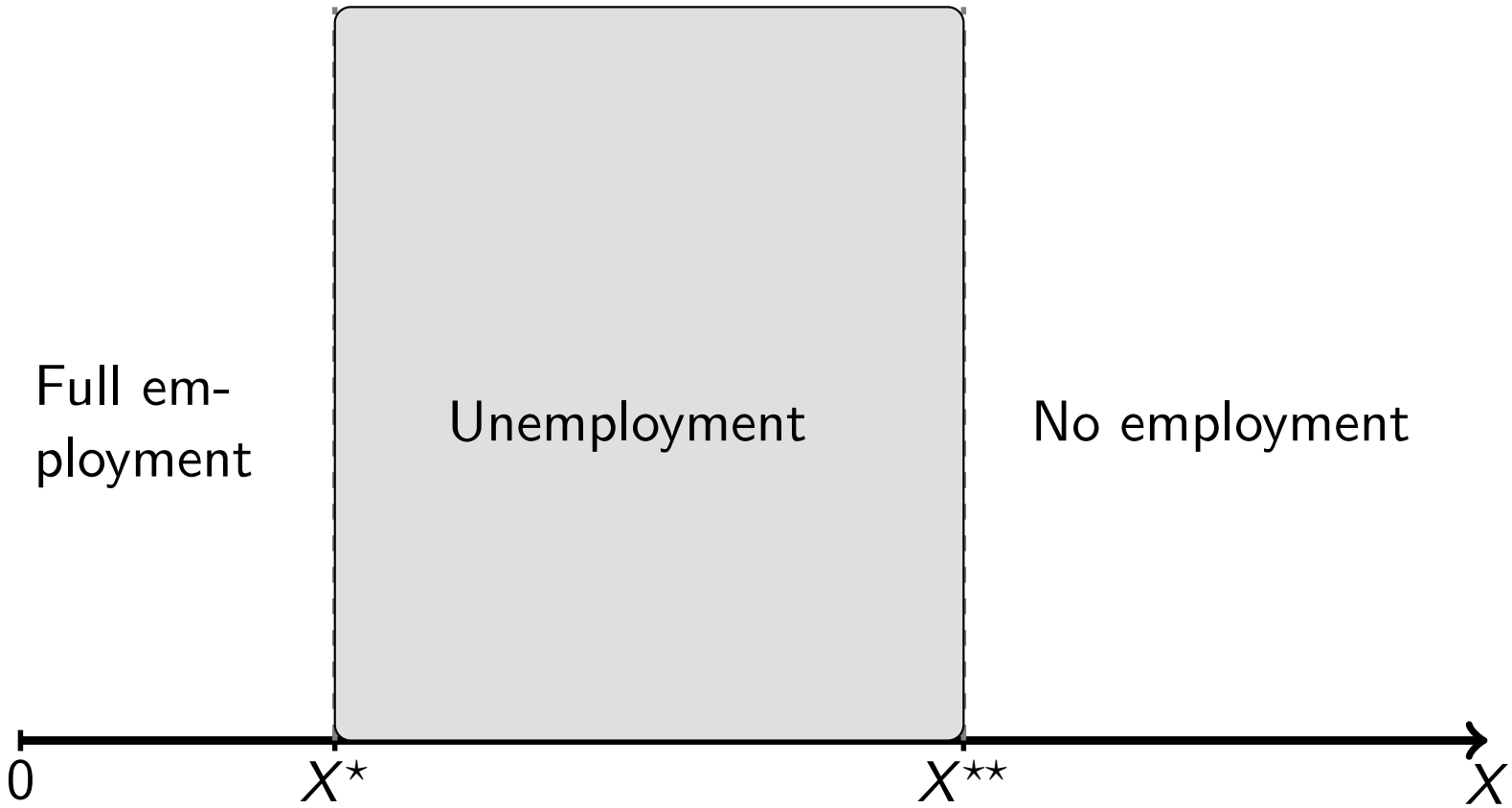


Figure 16: Proposition 2: The three regimes



3. Interesting Properties of the Static Equilibrium

Consumption as a function of X

- How does vary equilibrium consumption when X increases?
- In the full employment regime (which corresponds to no frictions):
  - Marginal utility of spendings decrease with $X \rightsquigarrow$ less production
  - But less than proportional to the increase in X
  - Overall, c increases with X
- In the no employment regime :
  - $c = X$
  - c increases one to one with X
- In the unemployment regime
  - "Multiplier > 1"
  - Spendings decrease more than one to one with X
  - Therefore c *decreases* with X

3. Interesting Properties of the Static Equilibrium

Consumption as a function of X

- How does vary equilibrium consumption when X increases?
- In the full employment regime (which corresponds to no frictions):
  - × Marginal utility of spendings decrease with $X \rightsquigarrow$ less production
  - × But less than proportional to the increase in X
  - × Overall, c increases with X
- In the no employment regime :
  - × $c = X$
  - × c increases one to one with X
- In the unemployment regime
  - × "Multiplier > 1"
  - × Spendings decrease more than one to one with X
  - × Therefore c *decreases* with X

3. Interesting Properties of the Static Equilibrium

Consumption as a function of X

- How does vary equilibrium consumption when X increases?
- In the full employment regime (which corresponds to no frictions):
  - × Marginal utility of spendings decrease with $X \rightsquigarrow$ less production
  - × But less than proportional to the increase in X
  - × Overall, c increases with X
- In the no employment regime :
  - × $c = X$
  - × c increases one to one with X
- In the unemployment regime
  - × "Multiplier > 1"
  - × Spendings decrease more than one to one with X
  - × Therefore c *decreases* with X

3. Interesting Properties of the Static Equilibrium

Consumption as a function of X

- How does vary equilibrium consumption when X increases?
- In the full employment regime (which corresponds to no frictions):
  - × Marginal utility of spendings decrease with $X \rightsquigarrow$ less production
  - × But less than proportional to the increase in X
  - × Overall, c increases with X
- In the no employment regime :
  - × $c = X$
  - × c increases one to one with X
- In the unemployment regime
  - × "Multiplier > 1"
  - × Spendings decrease more than one to one with X
  - × Therefore c *decreases* with X

3. Interesting Properties of the Static Equilibrium

Consumption as a function of X

- How does vary equilibrium consumption when X increases?
- In the full employment regime (which corresponds to no frictions):
  - × Marginal utility of spendings decrease with $X \rightsquigarrow$ less production
  - × But less than proportional to the increase in X
  - × Overall, c increases with X
- In the no employment regime :
  - × $c = X$
  - × c increases one to one with X
- In the unemployment regime
  - × "Multiplier > 1"
  - × Spendings decrease more than one to one with X
  - × Therefore c *decreases* with X

3. Interesting Properties of the Static Equilibrium

Consumption as a function of X

- How does vary equilibrium consumption when X increases?
- In the full employment regime (which corresponds to no frictions):
  - × Marginal utility of spendings decrease with $X \rightsquigarrow$ less production
  - × But less than proportional to the increase in X
  - × Overall, c increases with X
- In the no employment regime :
  - × $c = X$
  - × c increases one to one with X
- In the unemployment regime
  - × "Multiplier > 1"
  - × Spendings decrease more than one to one with X
  - × Therefore c *decreases* with X

3. Interesting Properties of the Static Equilibrium

Consumption as a function of X

- How does vary equilibrium consumption when X increases?
- In the full employment regime (which corresponds to no frictions):
  - × Marginal utility of spendings decrease with $X \rightsquigarrow$ less production
  - × But less than proportional to the increase in X
  - × Overall, c increases with X
- In the no employment regime :
  - × $c = X$
  - × c increases one to one with X
- In the unemployment regime
  - × "Multiplier > 1"
  - × Spendings decrease more than one to one with X
  - × Therefore c *decreases* with X

3. Interesting Properties of the Static Equilibrium

Consumption as a function of X

- How does vary equilibrium consumption when X increases?
- In the full employment regime (which corresponds to no frictions):
  - × Marginal utility of spendings decrease with $X \rightsquigarrow$ less production
  - × But less than proportional to the increase in X
  - × Overall, c increases with X
- In the no employment regime :
  - × $c = X$
  - × c increases one to one with X
- In the unemployment regime
  - × "Multiplier > 1"
  - × Spendings decrease more than one to one with X
  - × Therefore c *decreases* with X

3. Interesting Properties of the Static Equilibrium

Consumption as a function of X

- How does vary equilibrium consumption when X increases?
- In the full employment regime (which corresponds to no frictions):
  - × Marginal utility of spendings decrease with $X \rightsquigarrow$ less production
  - × But less than proportional to the increase in X
  - × Overall, c increases with X
- In the no employment regime :
  - × $c = X$
  - × c increases one to one with X
- In the unemployment regime
  - × "Multiplier > 1"
  - × Spendings decrease more than one to one with X
  - × Therefore c *decreases* with X

3. Interesting Properties of the Static Equilibrium

Consumption as a function of X

- How does vary equilibrium consumption when X increases?
- In the full employment regime (which corresponds to no frictions):
  - × Marginal utility of spendings decrease with $X \rightsquigarrow$ less production
  - × But less than proportional to the increase in X
  - × Overall, c increases with X
- In the no employment regime :
  - × $c = X$
  - × c increases one to one with X
- In the unemployment regime
  - × "Multiplier > 1"
  - × Spendings decrease more than one to one with X
  - × Therefore c *decreases* with X

3. Interesting Properties of the Static Equilibrium

Consumption as a function of X

- How does vary equilibrium consumption when X increases?
- In the full employment regime (which corresponds to no frictions):
  - × Marginal utility of spendings decrease with $X \rightsquigarrow$ less production
  - × But less than proportional to the increase in X
  - × Overall, c increases with X
- In the no employment regime :
  - × $c = X$
  - × c increases one to one with X
- In the unemployment regime
  - × "Multiplier > 1"
  - × Spendings decrease more than one to one with X
  - × Therefore c *decreases* with X

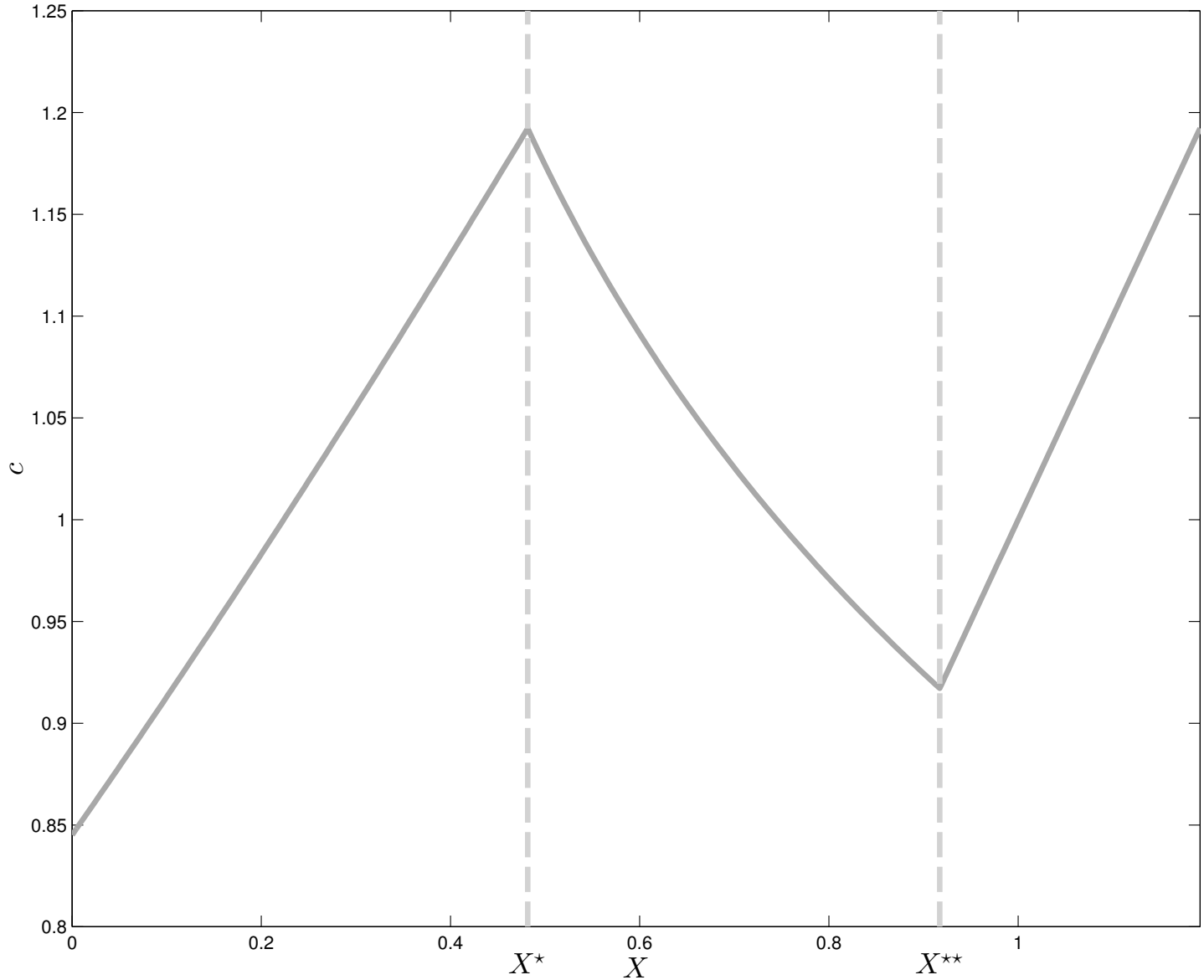
3. Interesting Properties of the Static Equilibrium

Consumption as a function of X

- How does vary equilibrium consumption when X increases?
- In the full employment regime (which corresponds to no frictions):
  - × Marginal utility of spendings decrease with $X \rightsquigarrow$ less production
  - × But less than proportional to the increase in X
  - × Overall, c increases with X
- In the no employment regime :
  - × $c = X$
  - × c increases one to one with X
- In the unemployment regime
  - × "Multiplier > 1"
  - × Spendings decrease more than one to one with X
  - × Therefore c *decreases* with X

3. Interesting Properties of the Static Equilibrium

Figure 17: Proposition 3, Consumption as function of X.



3. Interesting Properties of the Static Equilibrium

Multiple equilibria

- We are ruling out cases with multiple equilibria in the analysis
- Meaning that τ is not too large (Proposition 1)

3. Interesting Properties of the Static Equilibrium
Multiple equilibria

- We are ruling out cases with multiple equilibria in the analysis
- Meaning that τ is not too large (Proposition 1)

3. Interesting Properties of the Static Equilibrium

Is there deficient demand in the unemployment regime?

3. Interesting Properties of the Static Equilibrium

Is there deficient demand in the unemployment regime?

Proposition 4 (Aggregate Demand)

- *When the economy is in the unemployment regime* $(X^{\star} < X < X^{\star\star})$*,*
- *if all but one households coordinate to increase purchases of the first sub-period consumption good,*
- *then it is optimal for the last household to also increase its spendings.*
- *Furthermore, this increases the expected utility of all households.*

3. Interesting Properties of the Static Equilibrium

Effects of changes in X on welfare

3. Interesting Properties of the Static Equilibrium

Effects of changes in X on welfare

Proposition 5 (Welfare)

- *If the economy is the unemployment regime and if τ is large enough (close enough to $\bar{\tau}$),*
- *then an increase in X leads to a fall in expected welfare.*

3. Interesting Properties of the Static Equilibrium
Introducing government spending

- Add a government to the first sub-period.
- It buys goods, and it taxes employed individuals (lump-sum).
- We assume that the government runs a balanced budget
- Two types of government purchases: wasteful, and non-wasteful:
  - Wasteful government purchases, denoted G_w, are not valued by households.
  - Non-wasteful purchases, denoted G_n, are perfect substitute to private consumption.

3. Interesting Properties of the Static Equilibrium

Introducing government spending

- Add a government to the first sub-period.
- It buys goods, and it taxes employed individuals (lump-sum).
- We assume that the government runs a balanced budget
- Two types of government purchases: wasteful, and non-wasteful:
  - Wasteful government purchases, denoted G_w, are not valued by households.
  - Non-wasteful purchases, denoted G_n, are perfect substitute to private consumption.

3. Interesting Properties of the Static Equilibrium
Introducing government spending

- Add a government to the first sub-period.
- It buys goods, and it taxes employed individuals (lump-sum).
- We assume that the government runs a balanced budget
- Two types of government purchases: wasteful, and non-wasteful:
  - Wasteful government purchases, denoted G_w, are not valued by households.
  - Non-wasteful purchases, denoted G_n, are perfect substitute to private consumption.

3. Interesting Properties of the Static Equilibrium

Introducing government spending

- Add a government to the first sub-period.
- It buys goods, and it taxes employed individuals (lump-sum).
- We assume that the government runs a balanced budget
- Two types of government purchases: wasteful, and non-wasteful:
  - × Wasteful government purchases, denoted G_w, are not valued by households.
  - × Non-wasteful purchases, denoted G_n, are perfect substitute to private consumption.

3. Interesting Properties of the Static Equilibrium

Introducing government spending

- Add a government to the first sub-period.
- It buys goods, and it taxes employed individuals (lump-sum).
- We assume that the government runs a balanced budget
- Two types of government purchases: wasteful, and non-wasteful:
  - × Wasteful government purchases, denoted G_w, are not valued by households.
  - × Non-wasteful purchases, denoted G_n, are perfect substitute to private consumption.

3. Interesting Properties of the Static Equilibrium

Introducing government spending

- Add a government to the first sub-period.
- It buys goods, and it taxes employed individuals (lump-sum).
- We assume that the government runs a balanced budget
- Two types of government purchases: wasteful, and non-wasteful:
  - × Wasteful government purchases, denoted G_w, are not valued by households.
  - × Non-wasteful purchases, denoted G_n, are perfect substitute to private consumption.

3. Interesting Properties of the Static Equilibrium
Introducing government spending *(continued)*

Proposition 6 (Fiscal Mulitpliers)

- *An increase in non-wasteful government purchases has no effect on economic activity.*
- *An increase in wasteful government purchases leads to an increase in economic activity.*
- *If the economy is in the unemployment regime, wasteful government purchases are associated with a multiplier that is greater than one.*
- *If the economy is in the full-employment regime, wasteful government purchases are associated with a multiplier that is less than one.*

3. Interesting Properties of the Static Equilibrium

Introducing government spending *(continued)*

Proposition 6 (Fiscal Mulitpliers)

- *An increase in non-wasteful government purchases has no effect on economic activity.*
- *An increase in wasteful government purchases leads to an increase in economic activity.*
- *If the economy is in the unemployment regime, wasteful government purchases are associated with a multiplier that is greater than one.*
- *If the economy is in the full-employment regime, wasteful government purchases are associated with a multiplier that is less than one.*

3. Interesting Properties of the Static Equilibrium

Introducing government spending *(continued)*

Proposition 6 (Fiscal Mulitpliers)

- *An increase in non-wasteful government purchases has no effect on economic activity.*
- *An increase in wasteful government purchases leads to an increase in economic activity.*
- *If the economy is in the unemployment regime, wasteful government purchases are associated with a multiplier that is greater than one.*
- *If the economy is in the full-employment regime, wasteful government purchases are associated with a multiplier that is less than one.*

3. Interesting Properties of the Static Equilibrium
Introducing government spending *(continued)*

Proposition 6 (Fiscal Mulitpliers)

- *An increase in non-wasteful government purchases has no effect on economic activity.*
- *An increase in wasteful government purchases leads to an increase in economic activity.*
- *If the economy is in the unemployment regime, wasteful government purchases are associated with a multiplier that is greater than one.*
- *If the economy is in the full-employment regime, wasteful government purchases are associated with a multiplier that is less than one.*

3. Interesting Properties of the Static Equilibrium

Introducing government spending *(continued)*

Proposition 7 (Fiscal polict and welfare)

- *If the economy is in the unemployment regime*
- *if X is in the range such that a fall in X would increase welfare,*
- *then an increase in wasteful government purchases will increase welfare.*

0. Introduction
Roadmap

1. Static model setup
2. Equilibrium
3. Interesting Properties of the Static Equilibrium
4. Extensions / Dynamics / Policy Trade-offs

4. Extensions / Dynamics / Policy Trade-offs

Relaxing functional-form assumptions

- Results are robust to:
  - × Relaxing functionnal assumptions
  - × Other ways of splitting the surplus
  - × Introduction of productive capital
  - × Addition of another good
- Simple characterization is not possible any more
- but main results hold.

Relaxing functional-form assumptions

- Results are robust to:
  - × Relaxing functionnal assumptions
  - × Other ways of splitting the surplus
  - × Introduction of productive capital
  - × Addition of another good
- Simple characterization is not possible any more
- but main results hold.

4. Extensions / Dynamics / Policy Trade-offs

Relaxing functional-form assumptions

- Results are robust to:
  - × Relaxing functionnal assumptions
  - × Other ways of splitting the surplus
  - × Introduction of productive capital
  - × Addition of another good
- Simple characterization is not possible any more
- but main results hold.

Relaxing functional-form assumptions

- Results are robust to:
  - × Relaxing functionnal assumptions
  - × Other ways of splitting the surplus
  - × Introduction of productive capital
  - × Addition of another good
- Simple characterization is not possible any more
- but main results hold.

- Results are robust to:
  - × Relaxing functionnal assumptions
  - × Other ways of splitting the surplus
  - × Introduction of productive capital
  - × Addition of another good
- Simple characterization is not possible any more
- but main results hold.

- Results are robust to:
  - × Relaxing functionnal assumptions
  - × Other ways of splitting the surplus
  - × Introduction of productive capital
  - × Addition of another good
- Simple characterization is not possible any more
- but main results hold.

- Results are robust to:
  - × Relaxing functionnal assumptions
  - × Other ways of splitting the surplus
  - × Introduction of productive capital
  - × Addition of another good
- Simple characterization is not possible any more
- but main results hold.

Dynamic Setup

- An infinite number of periods t,
- Each period consists of the two previous sub-periods
- The only financial trade is between sub-periods by assumption
- $$X_{t+1} = (1-\delta)X_t + \gamma e_t$$
- $$\mathcal{U} = \sum_{t=0}^{\infty} \beta^t \Big(U(c_t) - \nu(\ell_t) + V(a_t) \Big)$$

Dynamic Setup

- An infinite number of periods t,
- Each period consists of the two previous sub-periods
- The only financial trade is between sub-periods by assumption
- $$X_{t+1} = (1 - \delta)X_t + \gamma e_t$$
- $$\mathcal{U} = \sum_{t=0}^{\infty} \beta^t \Big(U(c_t) - \nu(\ell_t) + V(a_t) \Big)$$

Dynamic Setup

- An infinite number of periods t,
- Each period consists of the two previous sub-periods
- The only financial trade is between sub-periods by assumption
-
$$X_{t+1} = (1-\delta)X_t + \gamma e_t$$
-
$$\mathcal{U} = \sum_{t=0}^{\infty} \beta^t \Big(U(c_t) - \nu(\ell_t) + V(a_t) \Big)$$

Dynamic Setup

- An infinite number of periods t,
- Each period consists of the two previous sub-periods
- The only financial trade is between sub-periods by assumption
-

$$X_{t+1} = (1 - \delta)X_t + \gamma e_t$$

-

$$\mathcal{U} = \sum_{t=0}^{\infty} \beta^t \Big(U(c_t) - \nu(\ell_t) + V(a_t) \Big)$$

Dynamic Setup

- An infinite number of periods t,
- Each period consists of the two previous sub-periods
- The only financial trade is between sub-periods by assumption
- $$X_{t+1} = (1 - \delta)X_t + \gamma e_t$$
- $$\mathcal{U} = \sum_{t=0}^{\infty} \beta^t \Big(U(c_t) - \nu(\ell_t) + V(a_t) \Big)$$

Policy Trade-off

- When X is high, the economy will converge with the SS with inefficiently low demand on the way.
- Welfare today would be increased by stimulating demand today.
- But this would imply higher X tomorrow,
- And therefore lower consumption in all subsequent periods until the liquidation is complete.
- This tradeoff is aimed at capturing the tension between the Keynesian and Hayekian prescriptions in recession.

Policy Trade-off

- When X is high, the economy will converge with the SS with inefficiently low demand on the way.
- Welfare today would be increased by stimulating demand today.
- But this would imply higher X tomorrow,
- And therefore lower consumption in all subsequent periods until the liquidation is complete.
- This tradeoff is aimed at capturing the tension between the Keynesian and Hayekian prescriptions in recession.

Policy Trade-off

- When X is high, the economy will converge with the SS with inefficiently low demand on the way.
- Welfare today would be increased by stimulating demand today.
- But this would imply higher X tomorrow,
- And therefore lower consumption in all subsequent periods until the liquidation is complete.
- This tradeoff is aimed at capturing the tension between the Keynesian and Hayekian prescriptions in recession.

Policy Trade-off

- When X is high, the economy will converge with the SS with inefficiently low demand on the way.
- Welfare today would be increased by stimulating demand today.
- But this would imply higher X tomorrow,
- And therefore lower consumption in all subsequent periods until the liquidation is complete.
- This tradeoff is aimed at capturing the tension between the Keynesian and Hayekian prescriptions in recession.

Policy Trade-off

- When X is high, the economy will converge with the SS with inefficiently low demand on the way.
- Welfare today would be increased by stimulating demand today.
- But this would imply higher X tomorrow,
- And therefore lower consumption in all subsequent periods until the liquidation is complete.
- This tradeoff is aimed at capturing the tension between the Keynesian and Hayekian prescriptions in recession.

Proposition 8 (Aggregate demand management is desirable)

- *Suppose the economy is in steady state in the unemployment regime.*
- *Then, to a first-order approximation, a (feasible) change in the path of expenditures from this steady state equilibrium will increase the present discounted value of expected welfare*
- *if and only if it increases the presented discounted sum of the resulting expenditure path,* $\sum_{i=0}^{\infty} \beta^i e_{t+i}$.
- *Aggregate demand management is therefore desirable.*