

CELEBRATING FREEDOM

A MOMENT OF SILENCE



Can Supply Shocks Cause Demand Shortages

PRINCETON
UNIVERSITY



Webinar



Veronica Guerrieri
(Chicago Booth)

Introductory
remarks by
Markus
Brunnermeier

PAST AND FUTURE SPEAKERS

- Last



Raj Chetty
"Tracking real time impact of COVID"

- Today



Veronica Guerrieri
"Can supply shocks cause demand shortages"

- Next webinars




Philip Lane
"ECB's Pandemic Emergency Purchase Program"



Erik Hurst
"The US Labor Market during COVID:
Real Time Evidence from Payroll Data"

SHOCKS AND AMPLIFICATION

- **Nature** of the initial economic **shock**

- Temporary vs. permanent (V, U, L, whoosh-shaped)
- **Supply vs. demand** (1970s) 
- Aggregate vs. idiosyncratic (finance)
- ...

- **Nature of amplification**/feedback effects/spirals/non-linearities


- Risk-on to risk-off
 - Flight-to-safety (safe asset = good friend indeed)
 - Multiple equilibria
- 

POLL: DEMAND VS. SUPPLY

1. Do we need a demand stimulus now?
 - a. Yes
 - b. No
2. COVID is a supply (chain) shock
 - a. Temporary and we will return to pre-COVID steady state
 - b. Market forces will trigger necessary supply reallocation
 - c. Requires targeted industrial policy by the government
3. Drop in restaurant consumption is due to a
 - a. Supply shock, e.g. due to shutdown regulation
 - b. Demand shock, e.g. due to fear
 - c. Difficult to say, but important to determine
 - d. Classification does not matter, other classification is more important
4. Increase in unemployment is due to decline in
 - a. Labor demand, ...
 - b. Labor supply, ...
 - c. Difficult to say, ...
 - d. This classification does not matter

RESTAURANT DEMAND OR SUPPLY

- Supply shock: due to lockdown restaurant cannot supply service
- Demand shock: due to fear citizens do not demand service

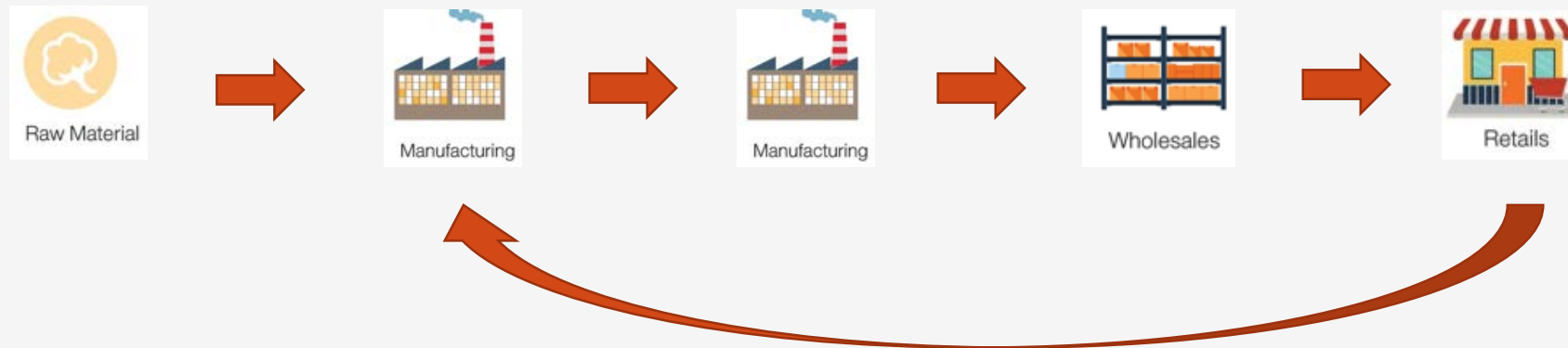
- Key: exact specification of good
 - A meal served in a nice and **safe** restaurant **ambient**
 - Demand exists but lack of supply  **Priceless!**
Price = ∞

(price $\neq 0$)
- How to specify consumption basket
- ... and measure **inflation measure**
 - Quantity * price = $0 * \infty = ?$
 - Reason why good leaves consumption basket

PRODUCTION CHAIN AND DEMAND AND SUPPLY

- Supply chain


- Each entity in the middle of the supply chain is **supplies and demands**
- Households are also suppliers of labor



- Is it only a matter of our simple models without production chains?

WHAT IS A DEMAND SHOCK IN MODERN MACRO MODELS?

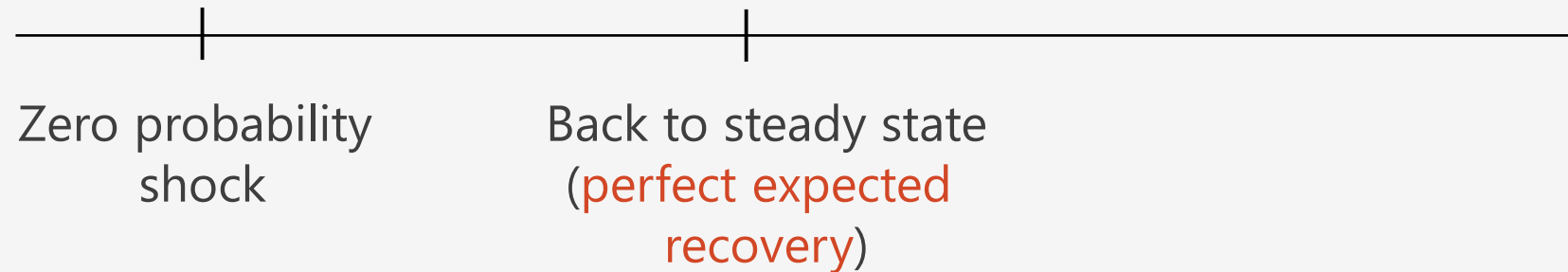
- Preference shock (discount rate ρ / discount factor β)
 - Consumption-savings
 - ... but also affects labor supply
 - Why would one ignore this?

 - Risk shock (idiosyncratic) – risk aversion shock
 - Precautionary savings (consumption) demand shock
 - ... but also affects portfolio choice (into safe asset)
 - Why would one ignore this?
- 

UNCERTAINTY ABOUT LENGTH OF PANDEMIC → DEMAND

- Model:

- Krugman style “infinitely stretched 2 period model”



- What if length of pandemic is random?

- “In-/Deflation Pressures ...”

Brunnermeier, Merkel, Payne and Sannikov (2020)

1. Uncertainty **depresses demand**
2. **Demand boost** after vaccine lifts uncertainty

Can Supply Shocks Cause Demand Shortages

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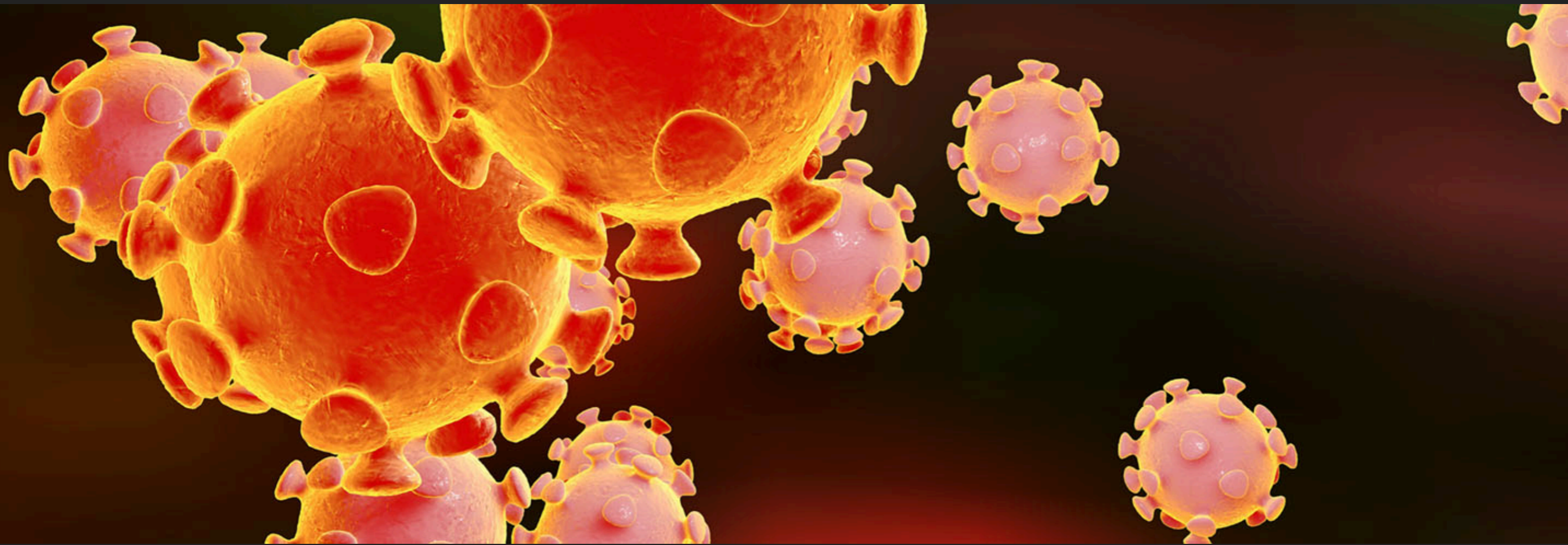


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MACROECONOMIC IMPLICATIONS OF COVID-19: CAN NEGATIVE SUPPLY SHOCKS CAUSE DEMAND SHORTAGES?

GUERRIERI + LORENZONI + STRAUB + WERNING

(BOOTH)

(NWU)

(HARVARD)

(MIT)

CONTEXT

- ▶ COVID-19 pandemic is having quick and deep impact on the macroeconomy
- ▶ Governments and Central Banks have implemented a number of different policies to help the economy
- ▶ **Active debate:** should policy “stimulate” spending?
- ▶ **Textbook approach:**

Is the pandemic a supply or a demand shock?

THIS PAPER

- ▶ **Multiple sectors** crucial to think about the effects of a pandemic

Pandemic = asymmetric shock to the economy

- ▶ **"Keynesian Supply Shock":**

A negative supply shock that causes demand shortages

- ▶ **Key ingredients:**

1. complementarities across sectors
2. incomplete markets

- ▶ **Amplification:** input-output linkages + business exit

- ▶ **Policy debate:**

- ▶ Monetary Policy Easing + Fiscal Policy may be desirable but less effective
- ▶ Crucial: Social Insurance + Preserving Job Matches

RESULTS: DEMAND SHORTAGE FROM SUPPLY SHOCK?

	Complete Markets	Incomplete Markets
One Sector	NO (Standard)	
Multiple Sectors		

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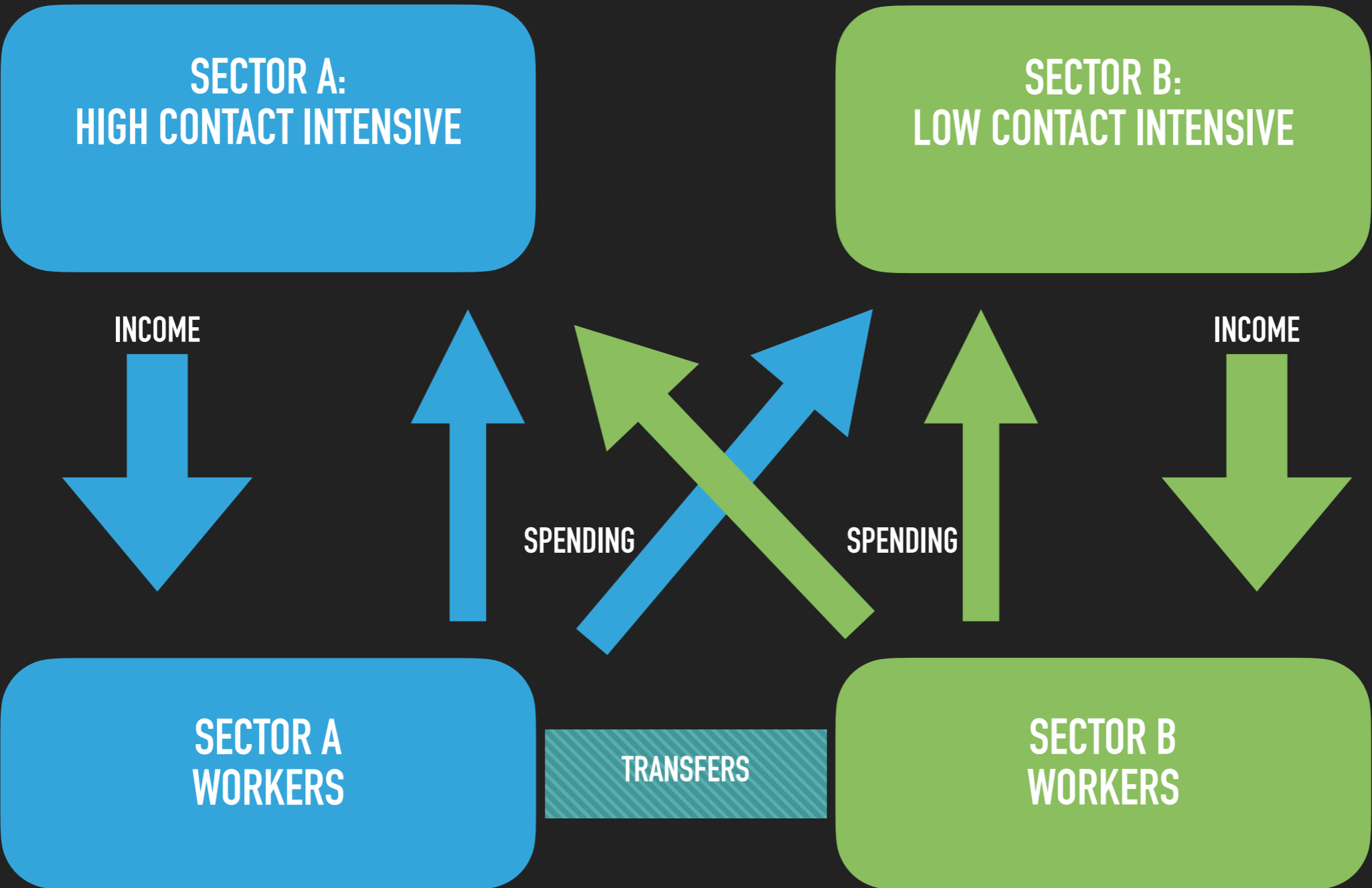
RESULTS: DEMAND SHORTAGE FROM SUPPLY SHOCK?

	Complete Markets	Incomplete Markets
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Multiple Sectors	POSSIBLE	

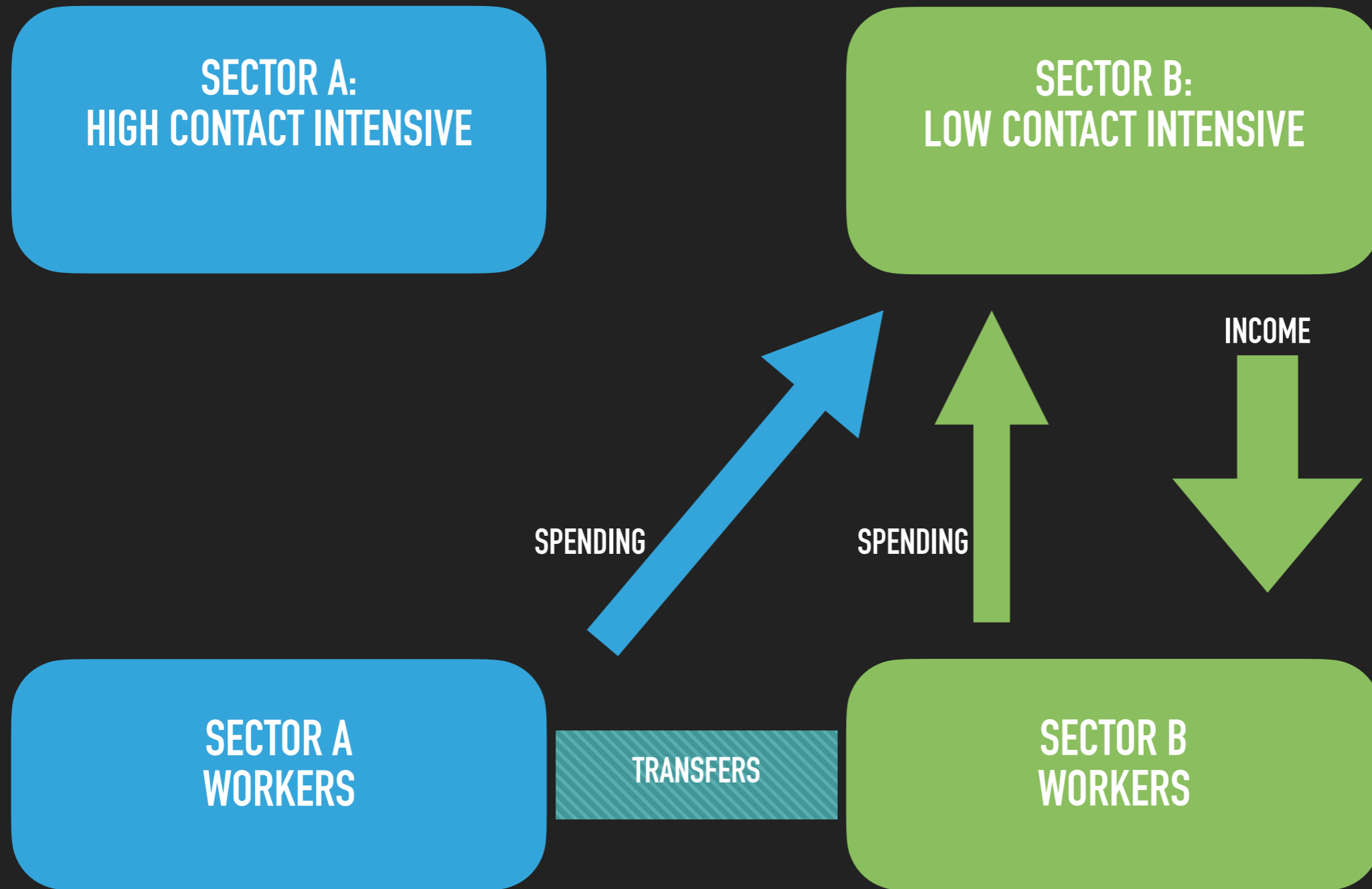
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BEFORE THE SHOCK



SECTORAL SHOCK: COMPLETE MARKETS



SECTORAL SHOCK: INCOMPLETE MARKETS

**SECTOR A:
HIGH CONTACT INTENSIVE**

**SECTOR B:
LOW CONTACT INTENSIVE**

**SECTOR A
WORKERS**

**SECTOR B
WORKERS**

SPENDING

INCOME

MODEL

PREFERENCES AND TECHNOLOGY

► Preferences

$$\sum_{t=0}^{\infty} \beta^t U(c_{At}, c_{Bt})$$

$$U(c_{At}, c_{Bt}) = \frac{\sigma}{\sigma - 1} \left(\phi^{\frac{1}{\epsilon}} c_{At}^{\frac{\epsilon-1}{\epsilon}} + (1 - \phi)^{\frac{1}{\epsilon}} c_{Bt}^{\frac{\epsilon-1}{\epsilon}} \right)^{\frac{\epsilon}{\epsilon-1} \frac{\sigma-1}{\sigma}}$$

► Technology: for $j = A, B$

$$Y_{jt} = N_{jt}$$

► Continuum of measure 1 of agents: each with labor endowment

$$n_{it} = \bar{n}$$

► Fraction ϕ of workers specialized in sector A and $1 - \phi$ in sector B (labor is immobile)

MARKETS

- ▶ Agents have access to zero-net-supply one-period bonds
- ▶ Budget constraint

$$p_{At}c_{iAt} + p_{Bt}c_{iBt} + a_{it} \leq w_t n_{it} + (1 + i_{t-1})a_{1t-1}$$

- ▶ Fraction μ face borrowing constraint

$$a_{it} \geq 0$$

- ▶ Limit cases:
 - ▶ $\epsilon \rightarrow \infty$: one sector model
 - ▶ $\mu \rightarrow 0$: equivalent to complete markets in the aggregate

PANDEMIC SHOCK

- ▶ MIT shock:
 - ▶ Time 0: temporary shutdown of sector A = fraction ϕ of workers get $n_{i0} = 0$
 - ▶ Time 1,2,3,...: back to normal (flexible price allocation)
- ▶ Assume:
 1. Downward rigid nominal wages
 2. Central Bank keeps interest rate unchanged
- ▶ **Question:** at time 0, is there excess demand or insufficient demand?

PERFECT SUBSTITUTES

Proposition: One sector ($\epsilon \rightarrow \infty$)

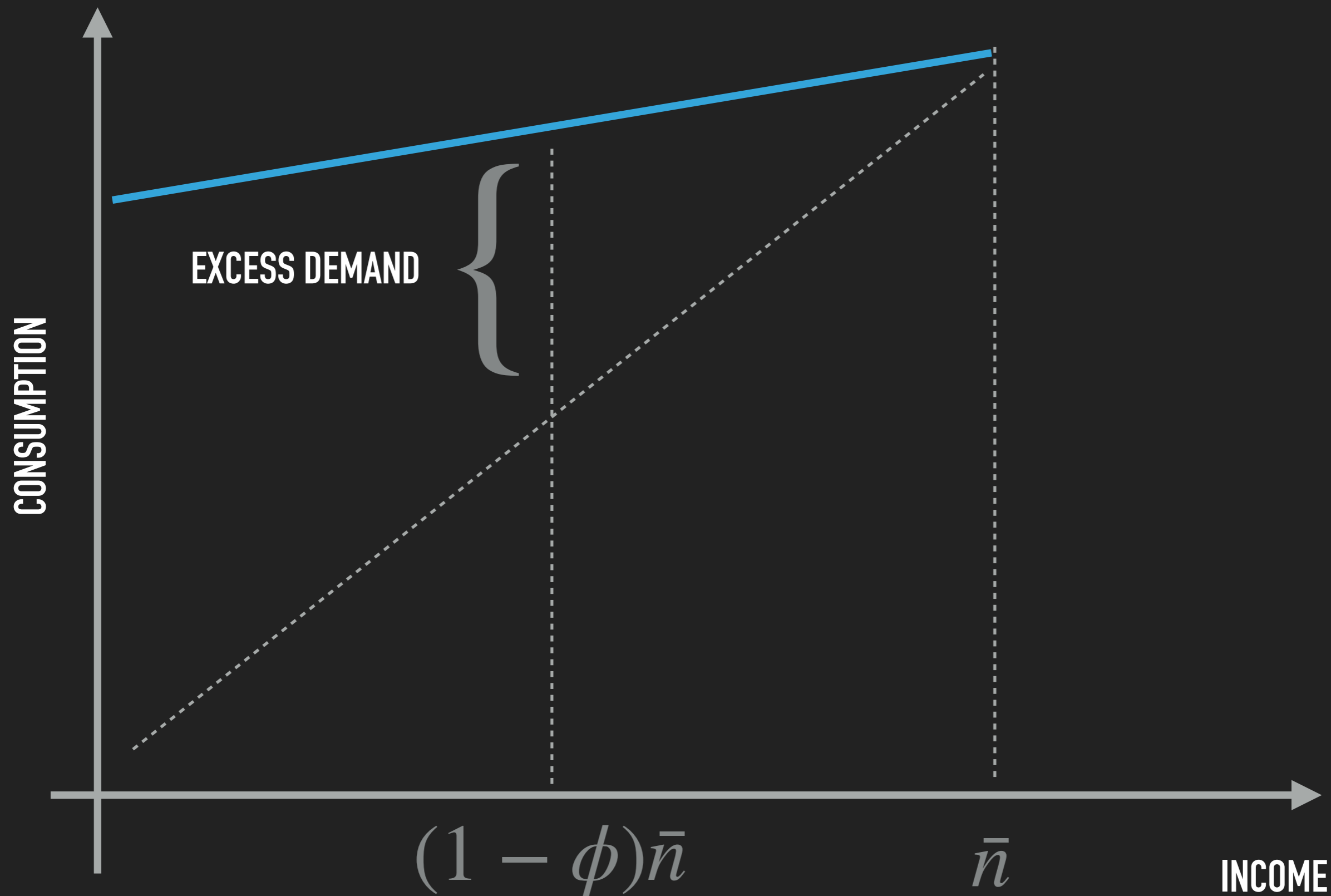
Negative
Supply Shock



Higher natural rate
+
Excess demand

- ▶ Why?
 - ▶ temporary negative supply shock = good news shock
 - ▶ agents want to borrow (not save!), but they might not be able to...
- ▶ Limit case: $\mu \rightarrow 1$ and no excess demand

CONSUMPTION FUNCTIONS: ONE SECTOR, COMPLETE MARKETS



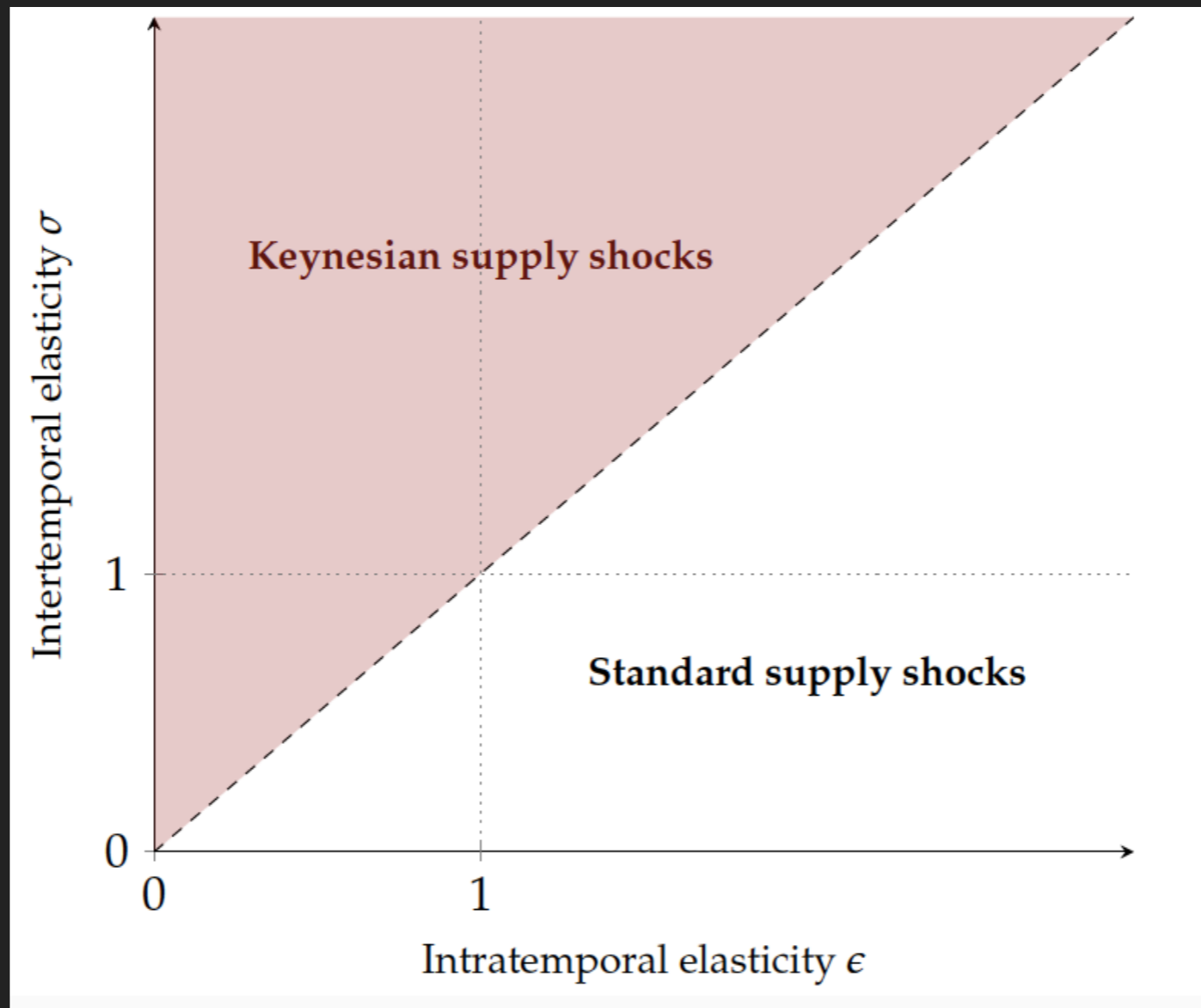
Proposition. Multiple Sectors + Complete Markets

Negative
Supply Shock

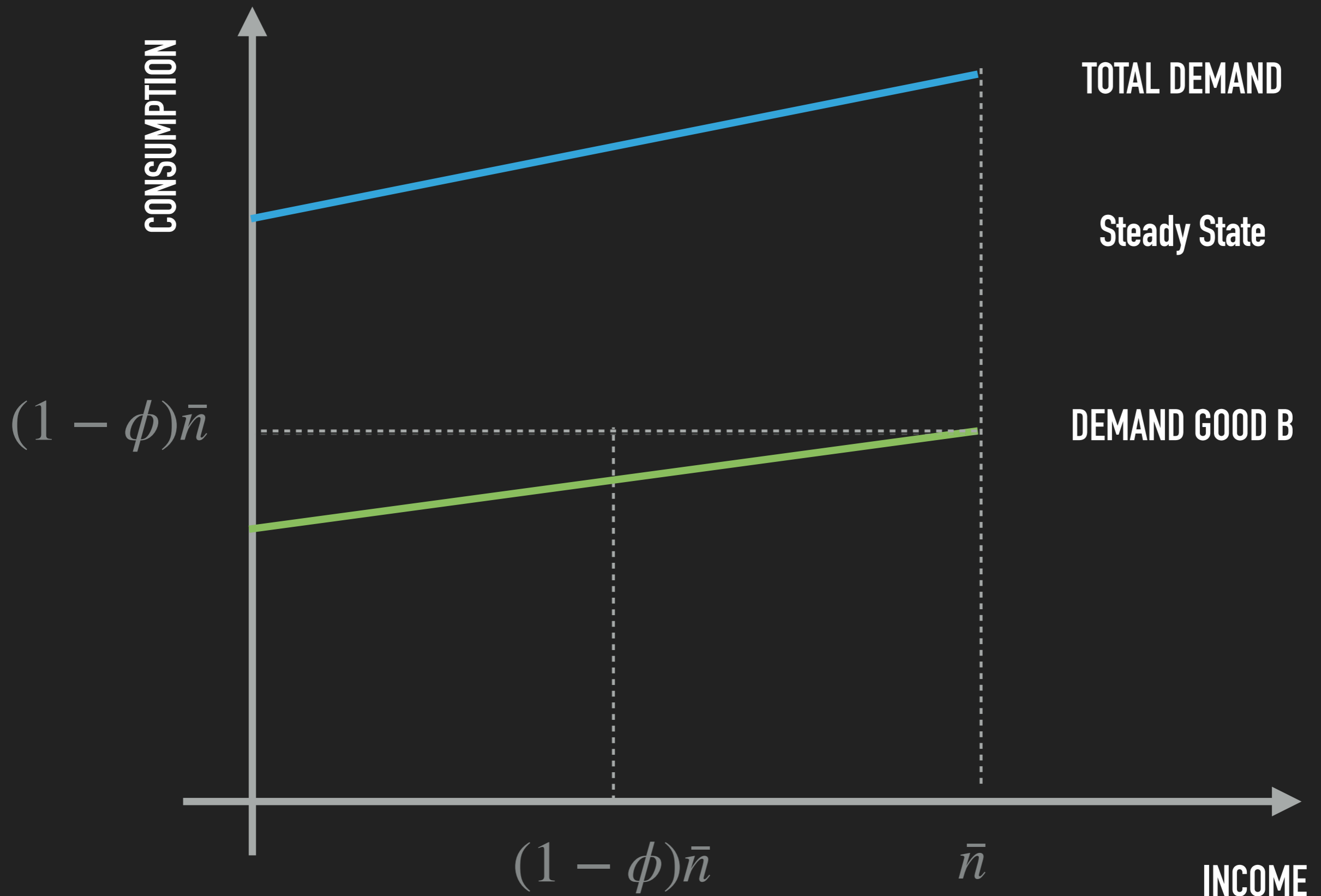


Lower natural rate
+
Deficient demand

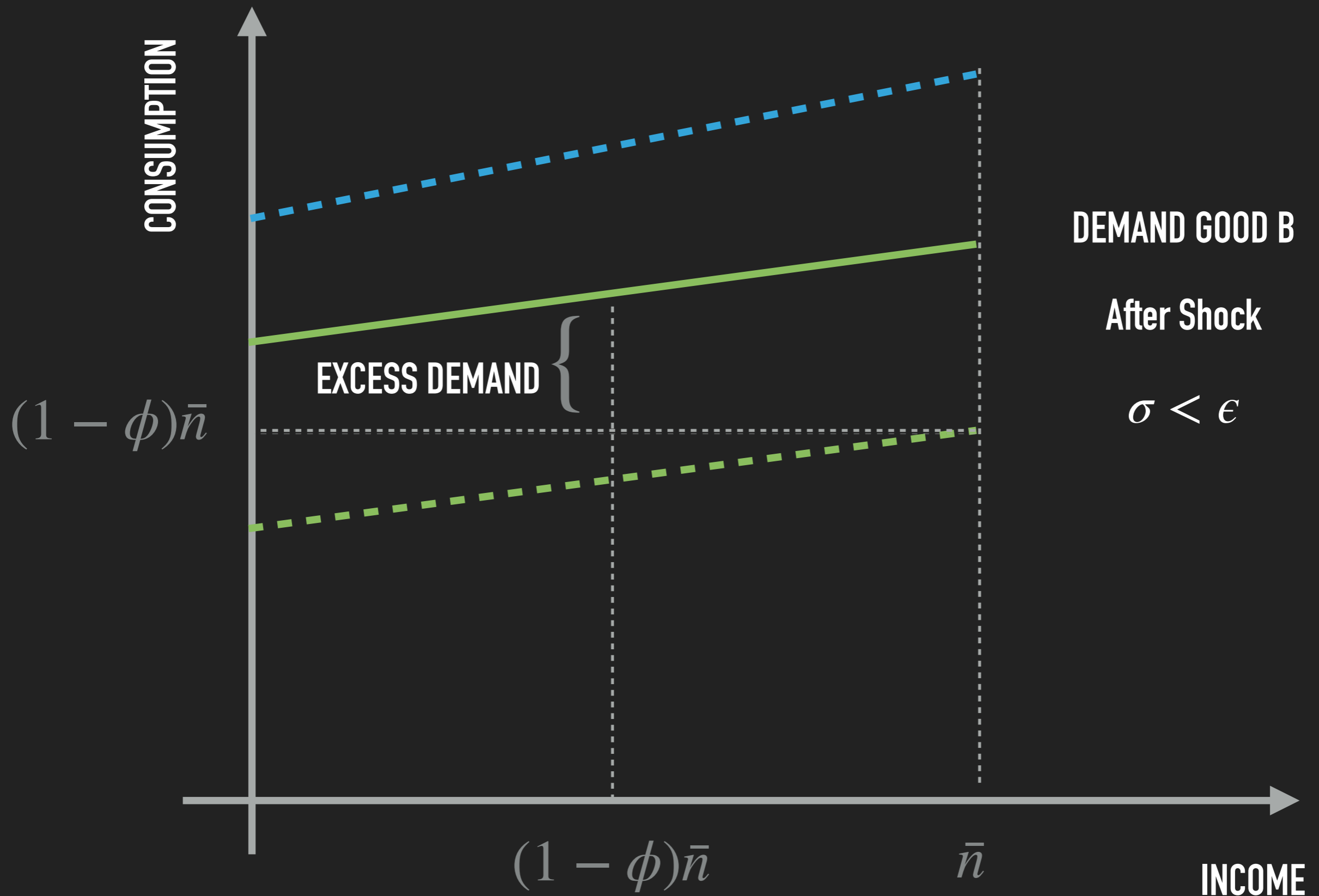
$$\sigma > \epsilon$$



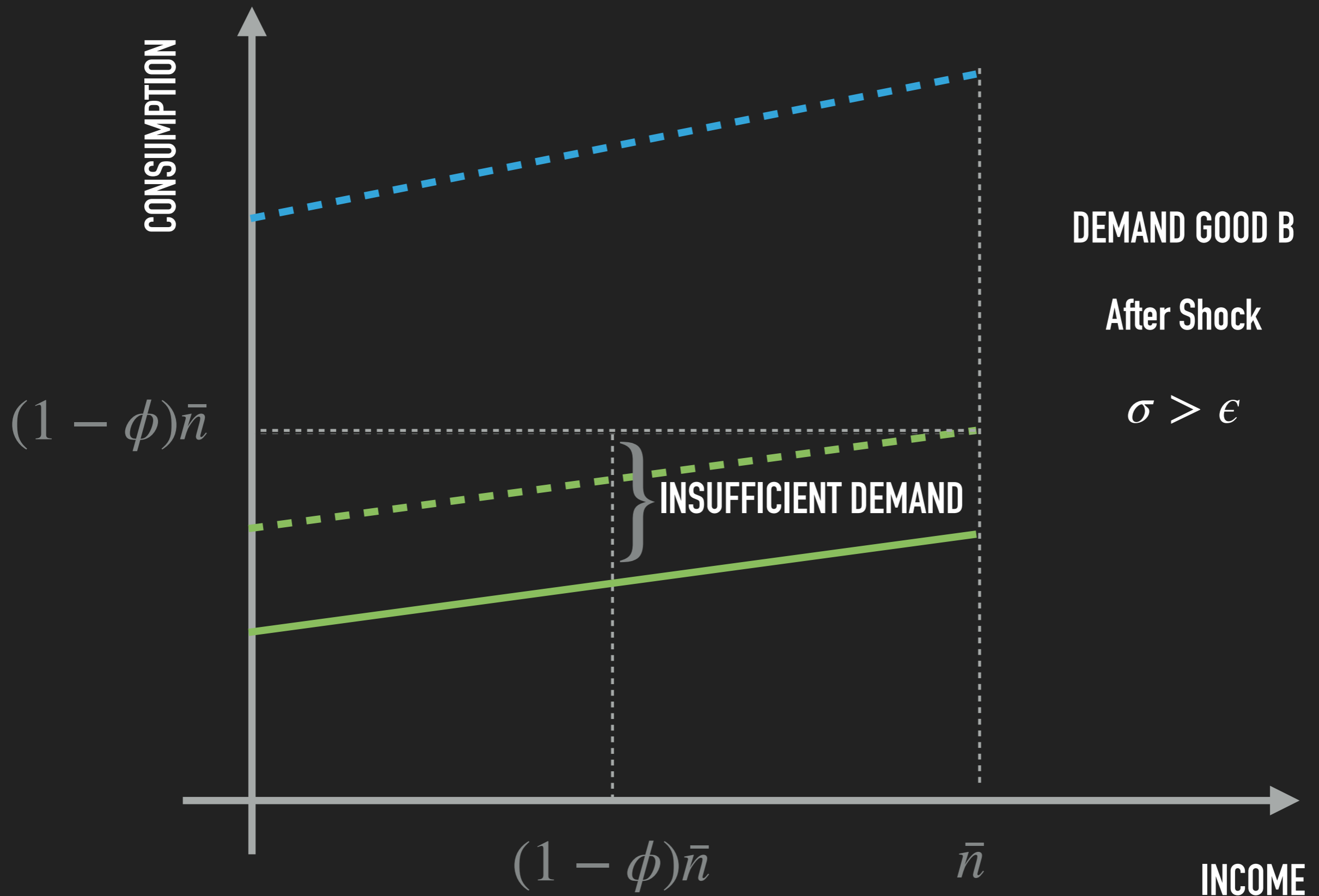
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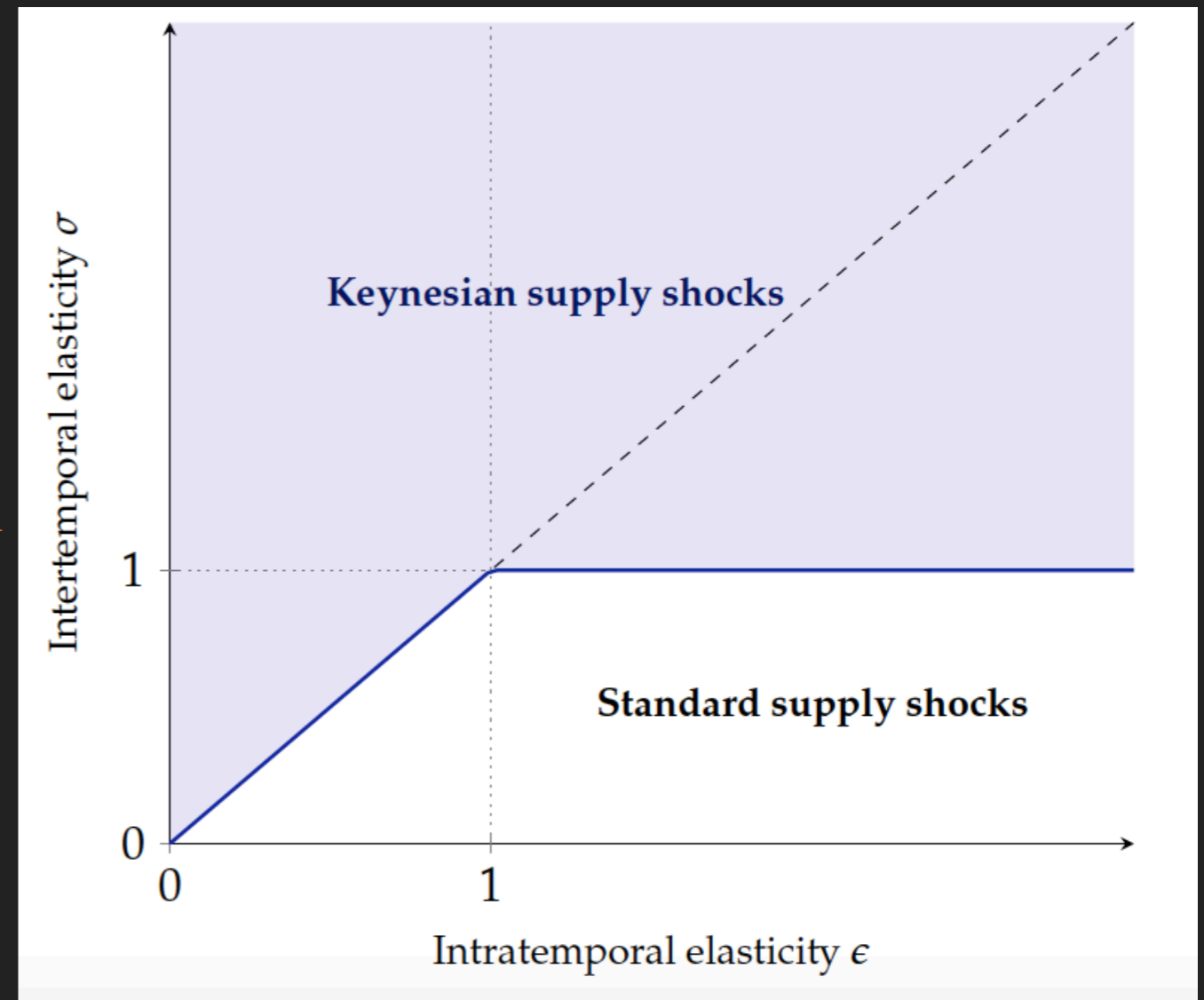
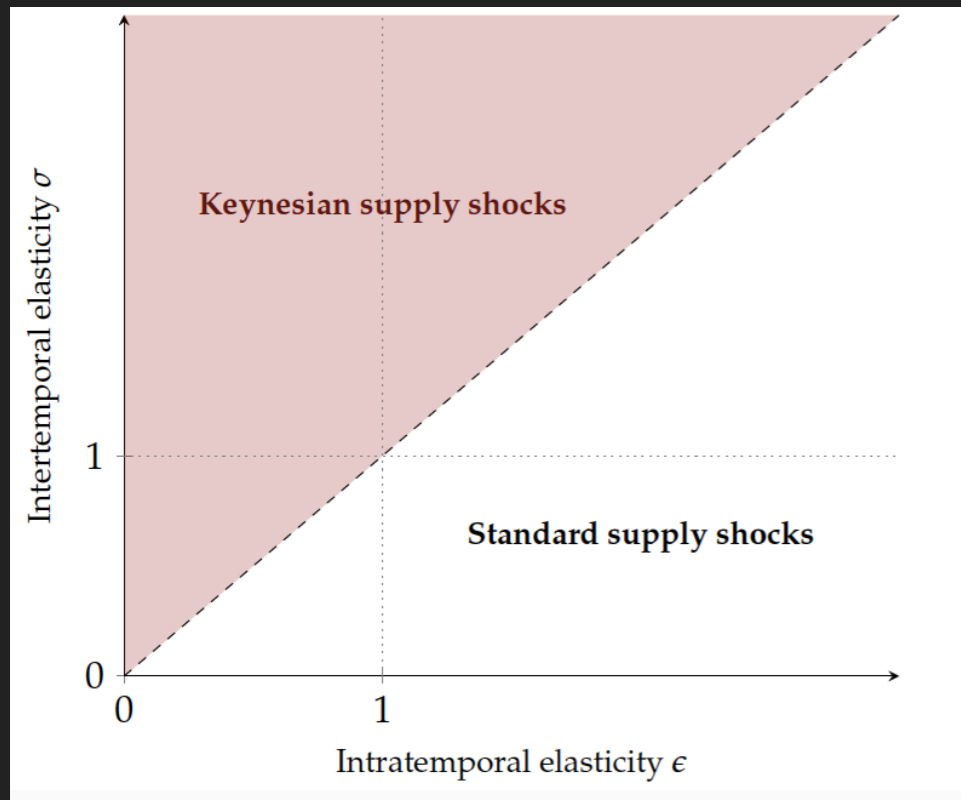
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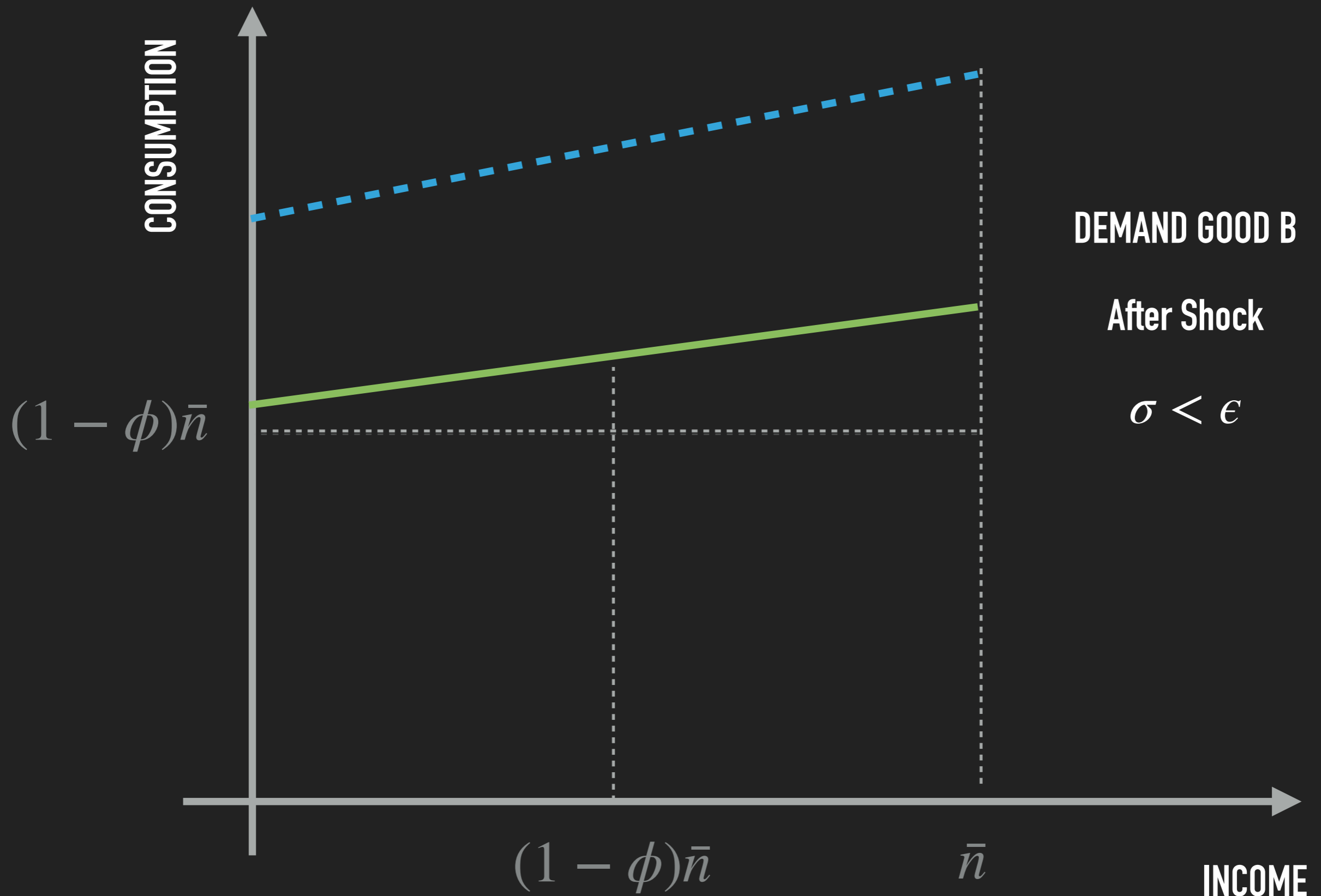


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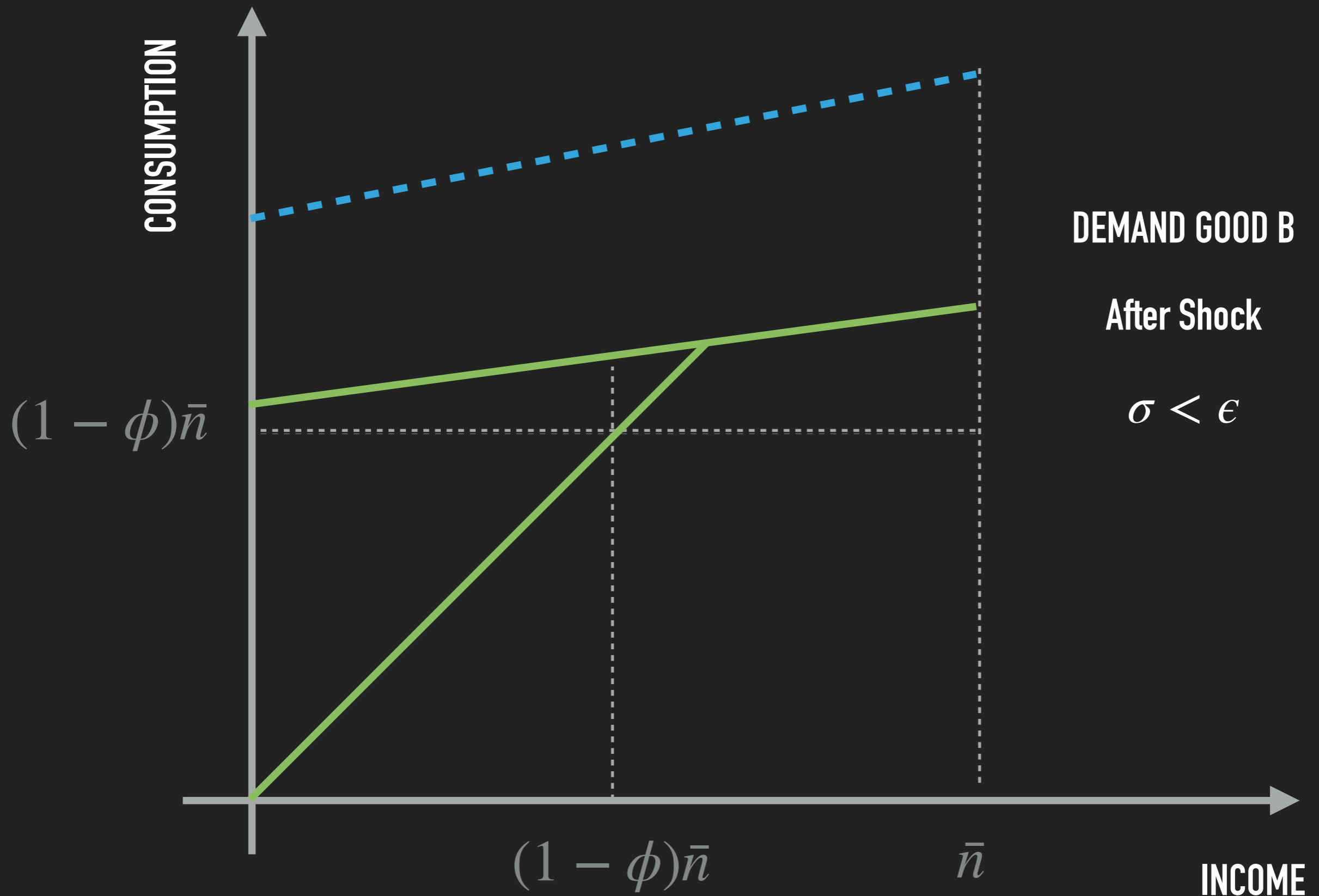
$$\sigma > (1 - \omega)\epsilon + \omega$$



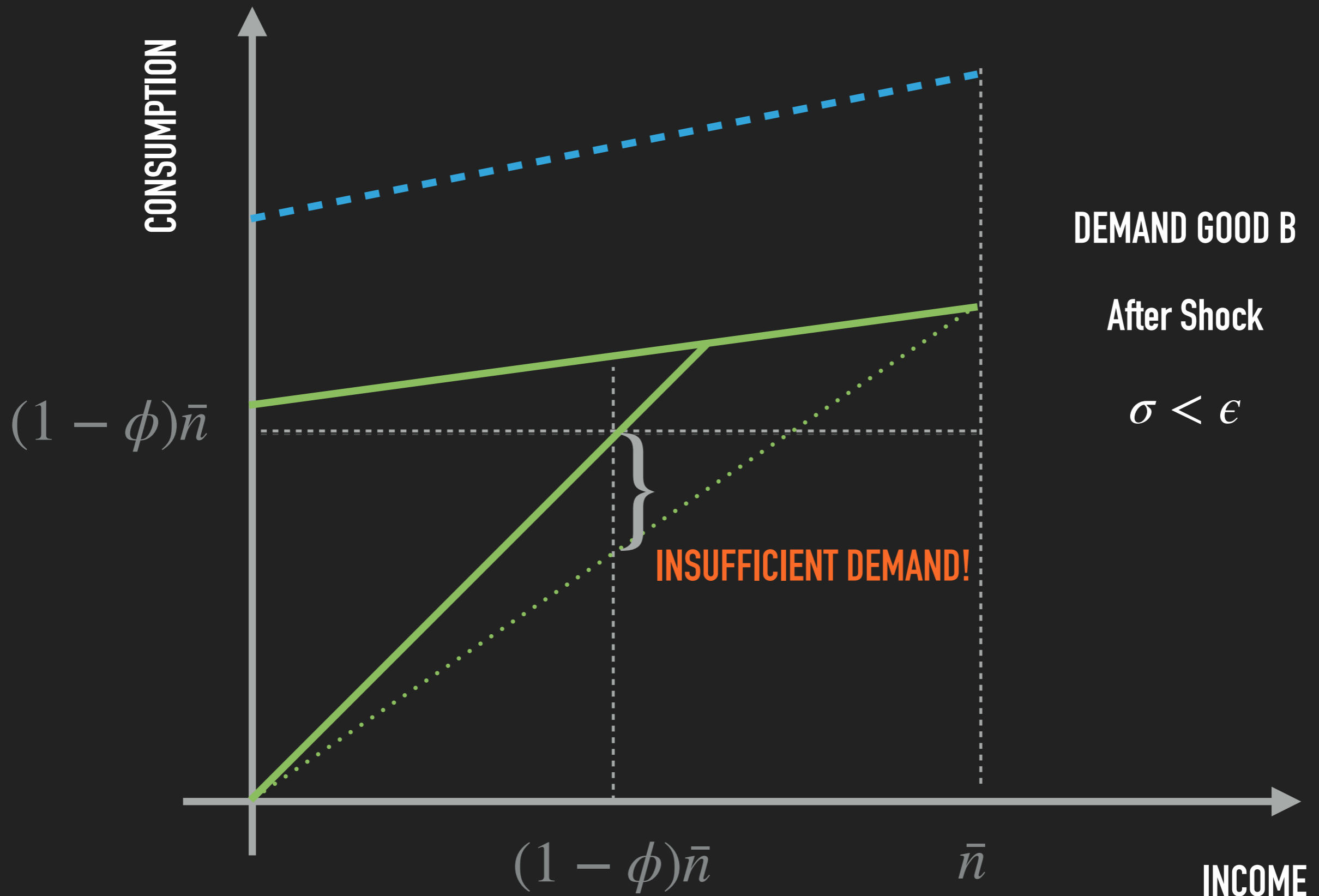
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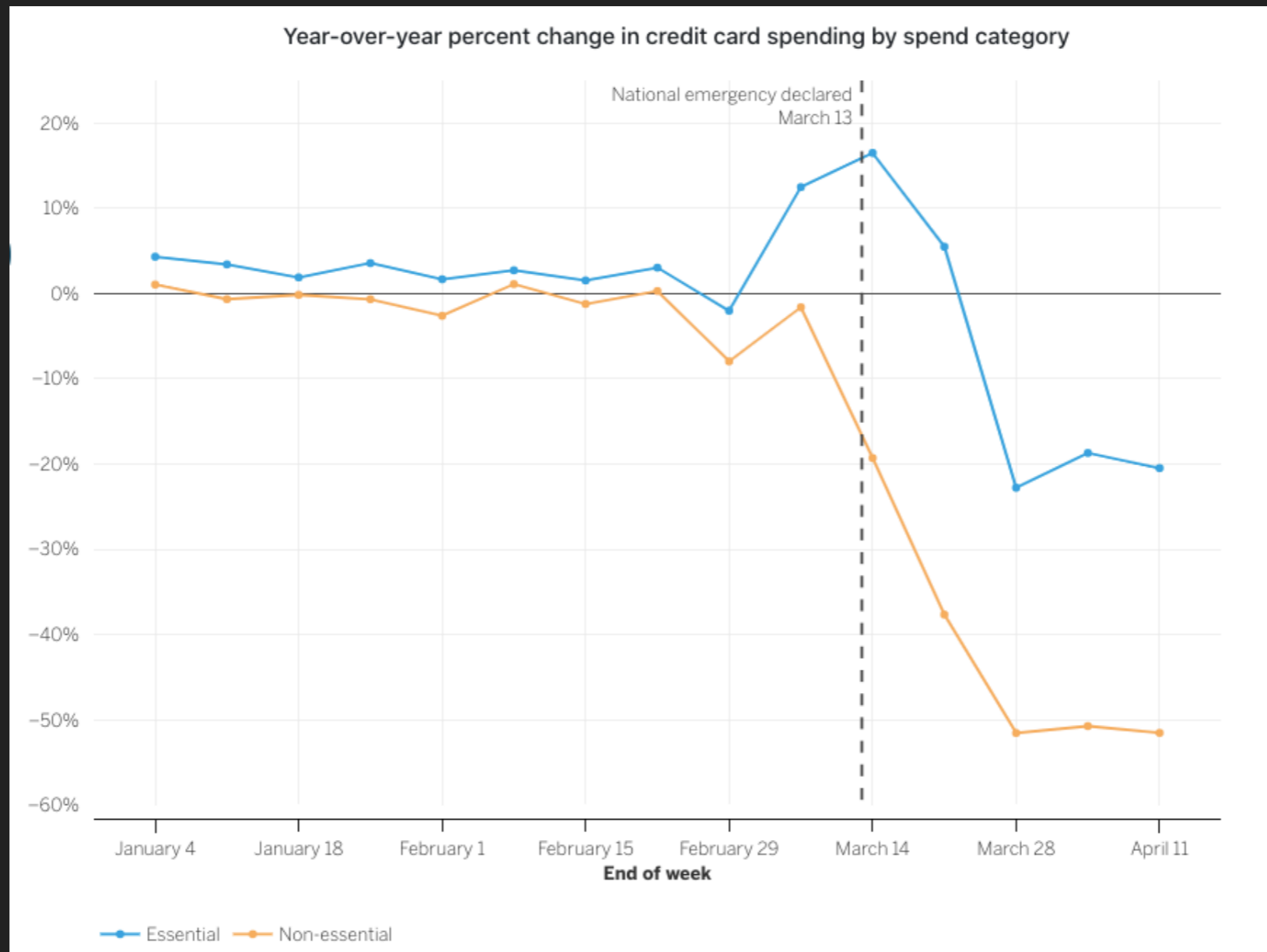
POLICY

- ▶ **Remark 1:** Fiscal multiplier on government spending = 1
- ▶ No 2nd round Keynesian cross operating because sector A employment does not respond!
- ▶ **Remark 2:** Introducing explicit health dimension in preferences and standard health externality implies that unemployment in sector A may not be socially inefficient!
- ▶ Horse raise between Keynesian Wedge and Pigouvian Externality
- ▶ **Remark 3:** Targeted transfers help to obtain the **first best** and hit three birds with one stone:
 - ▶ Provides insurance
 - ▶ Raises natural rate (important if at ZLB)
 - ▶ Makes public health policy more desirable

**CONNECTING TO
REAL TIME EVIDENCE**

EVIDENCE FOR KSS FORCES AT WORK

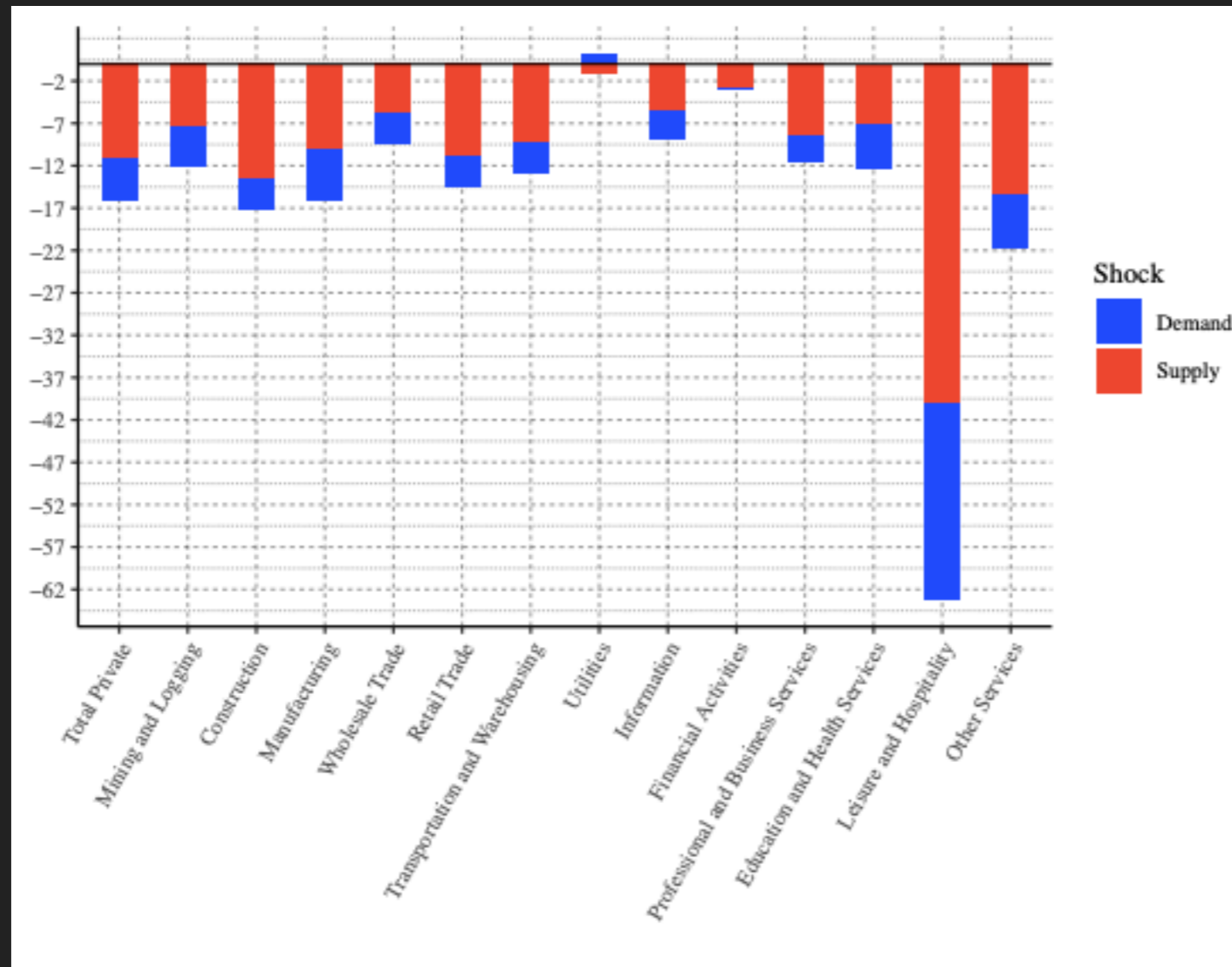
▶ Consumption drop



From Cox, Farrell, Ganong, Grieg, Noel, Vavra, Wong (2020)

EVIDENCE FOR KSS FORCES AT WORK

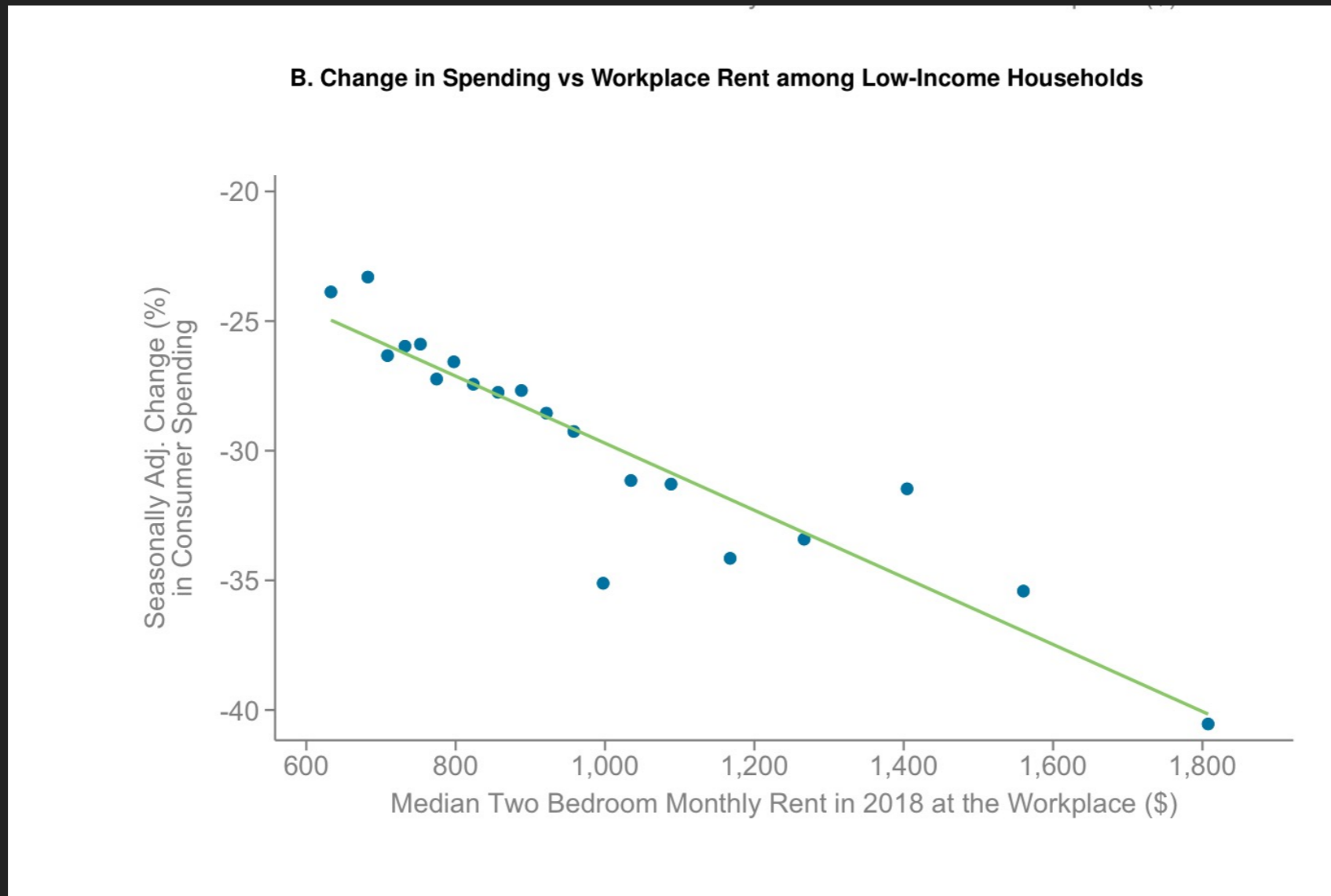
► Broad contraction in most sectors



From Brinca, Duarte, Faria e Castro (2020)

EVIDENCE FOR KSS FORCES AT WORK

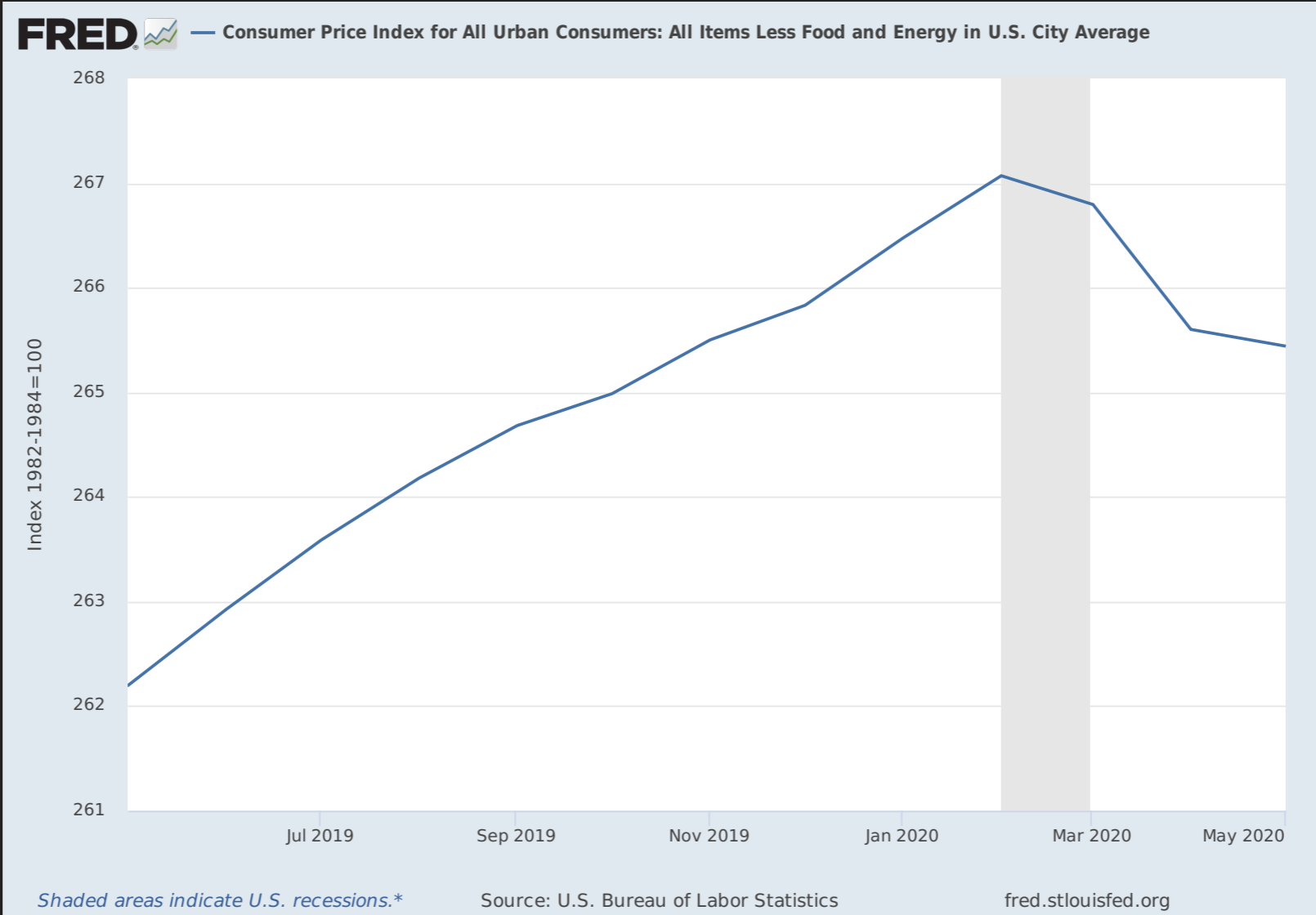
▶ Spillover to low income spending



Chetty, Friedman, Hendren, Stepner, Opportunity Insights Team (2000)

EVIDENCE FOR KSS FORCES AT WORK

▶ CPI down

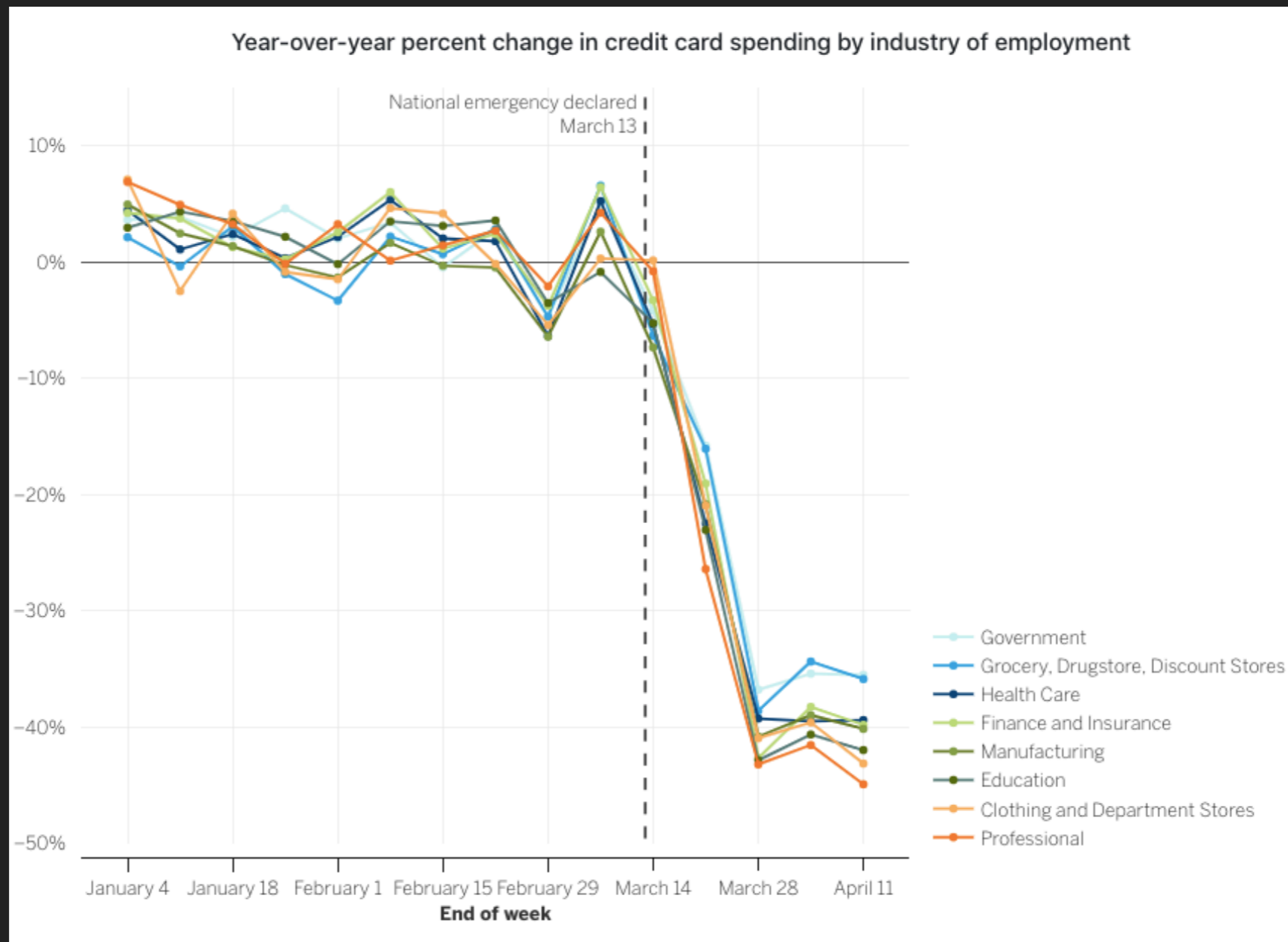


ASIDE ON INFLATION

- ▶ Two different ways to look at inflation:
 1. **measure of slack**: prices go down for traded goods reflecting lack of demand
 2. **cost of living**: welfare-based CPI goes up (Jaravel-O'Connell)
- ▶ Alternative intuition for result: expected deflation and intertemporal substitution drive spending down

COMPLEMENTARITIES

- ▶ Evidence suggesting complementarities main force:

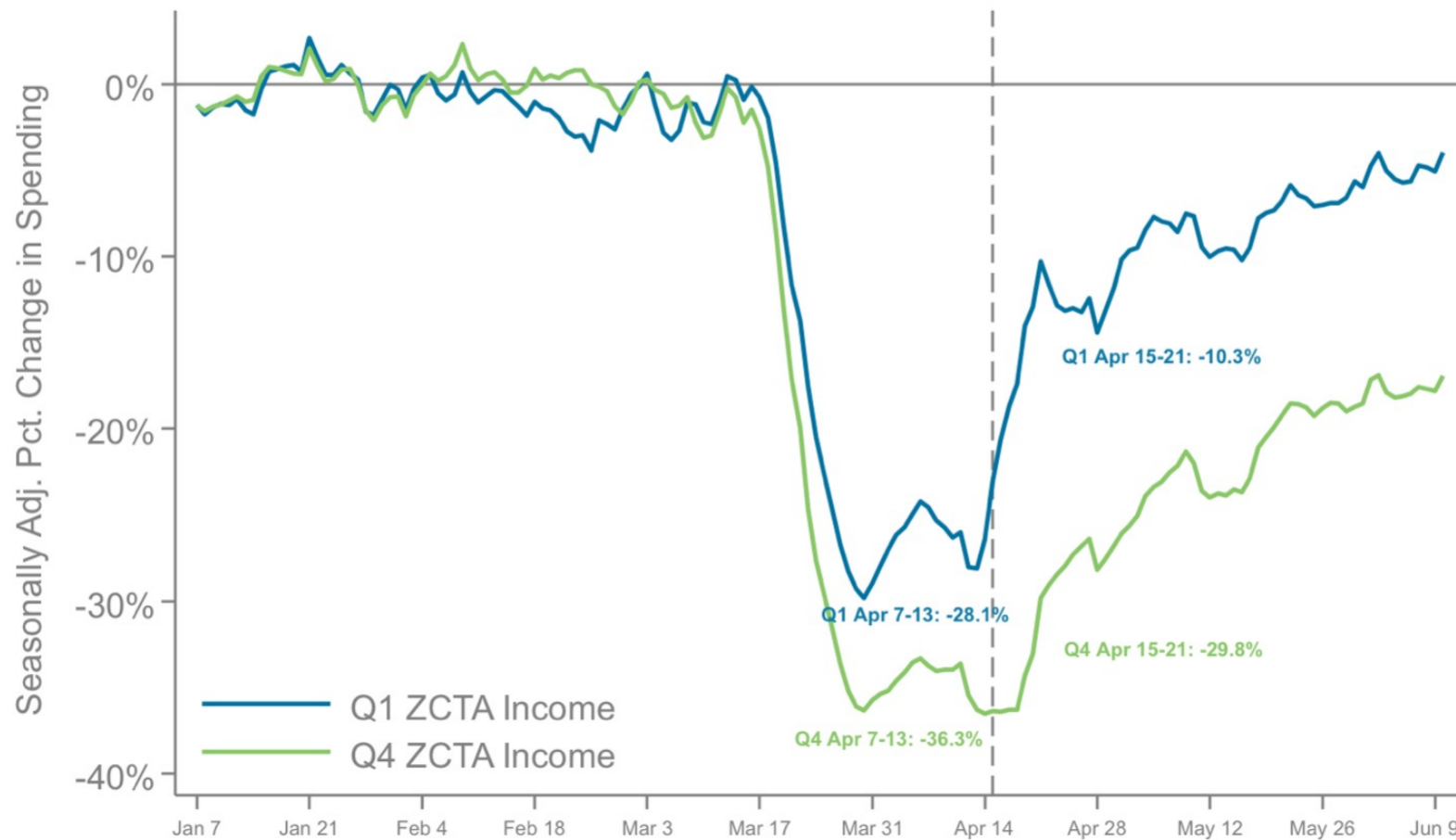


From Cox, Farrell, Ganong, Grieg, Noel, Vavra, Wong (2020)

SOCIAL INSURANCE AT WORK

► Unemployment insurance

A. Seasonally Adjusted Spending Changes by Income Quartile



Chetty, Friedman, Hendren, Stepner, Opportunity Insights Team (2000)

MEASURABLE PARTIAL EQUILIBRIUM RESPONSES

- ▶ A condition for KSS in terms of measurable objects

$$(1 - \mu) MPC^{S,U} + \mu MPC^{S,C} > \left[\frac{\Delta c_B}{\Delta c_A} \right]^{shutdown}$$

- ▶ Quantity on RHS also a type of cross-goods MPC: if you save x on hotels because hotels are closed, how much do you spend on other stuff?

MORE...

- ▶ Stronger complementarities if we consider **input-output linkages** across sectors
- ▶ Incentivizing **labor hoarding** achieves two objectives:
 1. Provide social insurance
 2. Preserves job match value
- ▶ Endogenous **business exit** generates cascade effects



CONCLUSIONS

- ▶ KSS = asymmetric supply shocks that generate demand shortages in the rest of the economy
- ▶ KSS are more plausible when sectors are more complementary (through preferences or input-output linkages) and when markets are more incomplete
- ▶ Policy recommendation: targeted transfers! Untargeted policies are not going to reach workers of affected sectors
- ▶ Tentative reading of real time evidence: CARES Act has been successful and we need caution in reducing social insurance going forward

THANK YOU!

	Complete Markets	Incomplete Markets
One Sector	NO (Standard)	NO! (New)
Multiple Sectors	POSSIBLE	EVEN MORE POSSIBLE

EXTRA SLIDES

SUPPLY CHAINS

- ▶ How strong are complementarities between sectors?
- ▶ Stronger if we consider **input-output linkages** across sectors
- ▶ If affected sectors use intermediate inputs or capital goods produced in non-affected sectors, complementarity stronger!
- ▶ E.g.: restaurants use dishwashing machines and repair services
- ▶ Demand shocks travel **from downstream to upstream!**

LABOR HOARDING TO PRESERVE JOB MATCHES

$$V_0 = \max\left\{-w + \frac{1}{R}V_1, 0\right\}$$

$$-w + \frac{1}{R}V_1 < 0 \longrightarrow \text{Destroy Matches}$$

$$-w + \frac{1}{R}V_1 \geq 0 \longrightarrow \text{Labor Hoarding} \longrightarrow \text{Perfect Insurance!}$$



BUSINESS EXIT CASCADES

- ▶ From two sectors to a continuum of sectors ...
- ▶ Lack of demand can cause some **non-affected businesses to shut down** (if they can't cover fixed costs)
- ▶ Set of goods produced is endogenous and contracts beyond the lockdown
- ▶ In the presence of complementarities + incomplete markets: amplification!

