Lecture 8
THE AGGREGATE EXPENDITURE MODEL

A STYLIZED LOOK AT

BUSINESS CYCLE DYNAMICS

September 25th 2019

A Quick Review:

- We have several motivations for studying macro
  - Good citizens
  - Intelligent economic actors
- We have measurements

  Y ≡ output U ≡ unemployment π ≡ inflation
- We have historical trends
  - Growth is the rule, over the long run
  - Boom and bust cycles dominate the short run

- We can begin to build models
  - What forces drive the overall economy?

GDP: overall spending on final goods and services

- Y ≡ Real GDP = C + I + G + NX
- Consumption (households purchases of goods and services)
- Investment (housing plus business investment on equipment/software/buildings plus inventories)
- Government (defense, infrastructure…)
- Net Exports (Exports minus imports)

We embrace the “invisible hand” insight from microeconomic theory

- Adam Smith tells us ‘market forces’ drive the overall economy toward good places.

- When supply and demand are in balance, we can champion the efficiency of ‘free market forces’

What are we looking for with this macroeconomic model?

- We acknowledge that boom/bust cycles are regular occurrences
- Periodically, we see big imbalances
  - Millions want jobs, but can't find them
    - Unemployment jumps
  - New found millions want to drive cars and trucks
    - Gasoline prices soar and inflation jumps
- We want a model that identifies equilibrium, BUT ALLOWS FOR IMBALANCES

The Aggregate Expenditure (AE) Model

A Super Simple Picture

- **Expectations** drive decision makers. But the future is *uncertain*.

- In the AE model, when plans go awry, **inventories** are the buffer

  - Inventory swings, in the AE model, explain periods in which production was too big or too small.

- Swings in inventories, in the AE model, over time drive the economy back toward equilibrium

Four Key Considerations:

- Expectations drive decisions amid uncertainty.
- When expectations are misguided, imbalances arise.
- Market forces then push the economy back toward equilibrium.
- Thus the Aggregate Expenditure Model describes a self-correcting system

The AE model
what do we 'assume away'?

- The AE model ignores inflation and financial markets.
- We assume that swings in the economy are completely captured by swings in output
- We don't allow for very weak demand to lower the overall level of prices.
- We don't allow interest rates, stock prices, or other Wall Street dynamics to operate on their own.

The AE Model: Summing Aggregate Expenditures

$$AE = C + I + G + NX$$

C = Consumption

I = Planned Investment

G = Government

NX = net exports

For starters, lets make the model much simpler:

- Let's assume NO GOVERNMENT
  - No government taxes
  - No government spending

- Let's assume NO FOREIGN SECTOR
  - No exports
  - No imports

$$AE = C + I$$

The key to the AE model?
Pay attention to “planned” vs “actual”

$$Y \equiv C + I$$

$$Y \equiv C + I$$

Income or Output

Aggregate Expenditure or Aggregate Spending

For **actual,** the GDP Identity IS ALWAYS TRUE (But this does not validate **SAYS'S LAW**)

- GDP Identity: $Y^a \equiv C^a + I^a$

$Y^a \equiv$ Actual Real Income $\equiv$ Actual Real Output

$C^a \equiv$ Actual Real Consumption Expenditures

$I^a \equiv$ Actual Real Investment Expenditures

- Always True when variables are Actual magnitudes

Jean-Baptiste Say

A Treatise on Political Economy (*Traité d'économie politique*, 1803)

"Supply creates its own demand"

If you make stuff, and pay people to do it, wages increase, they buy more, and the stuff gets purchased.

(An enticing proposition: but it is WRONG)

Continued

- Equilibrium Condition: $Y^p = C^p + I^p$

$Y^p \equiv$ Planned Real Income $\equiv$ Planned Real Output

$C^p \equiv$ Planned Real Consumption Expenditures

$I^p \equiv$ Planned Real Investment Expenditures

- Only True in Equilibrium when variables are Planned magnitudes

Simplifications

- Assume

$Y^a = Y^p = Y$: Actual Income = Planned Income

$C^a = C^p = C$: Actual Consumption Expenditures
= Planned Consumption Expenditures

- Assume

$$I^a = I^p + I^u$$

I^a = Actual Investment Expenditures

I^p = Planned Investment Expenditures

I^u = Unplanned Investment Expenditures

- Assume

$$I^p = I$$

$$I^a = I^p + I^u = I + I^u$$

Inventory Investment: Shock absorber (a simple numerical example)

planned car production	planned car sales	planned inventory investment	actual (=planned) car production	actual car sales	Actual inventory investment
42	40	2	42	38	4
Planned Fixed Investment	Planned inventory Investment	Planned Total investment	Actual (=Planned) Fixed Investment	Actual inventory investment	Actual Total Investment
10	2	12	10	4	14

Note: Income equals expenditures. In equilibrium, unintended inventory expenditures equal zero

GDP Identity: $Y \equiv C + I^a \equiv C + I + I^u$

Equilibrium Condition: $Y = C + I$

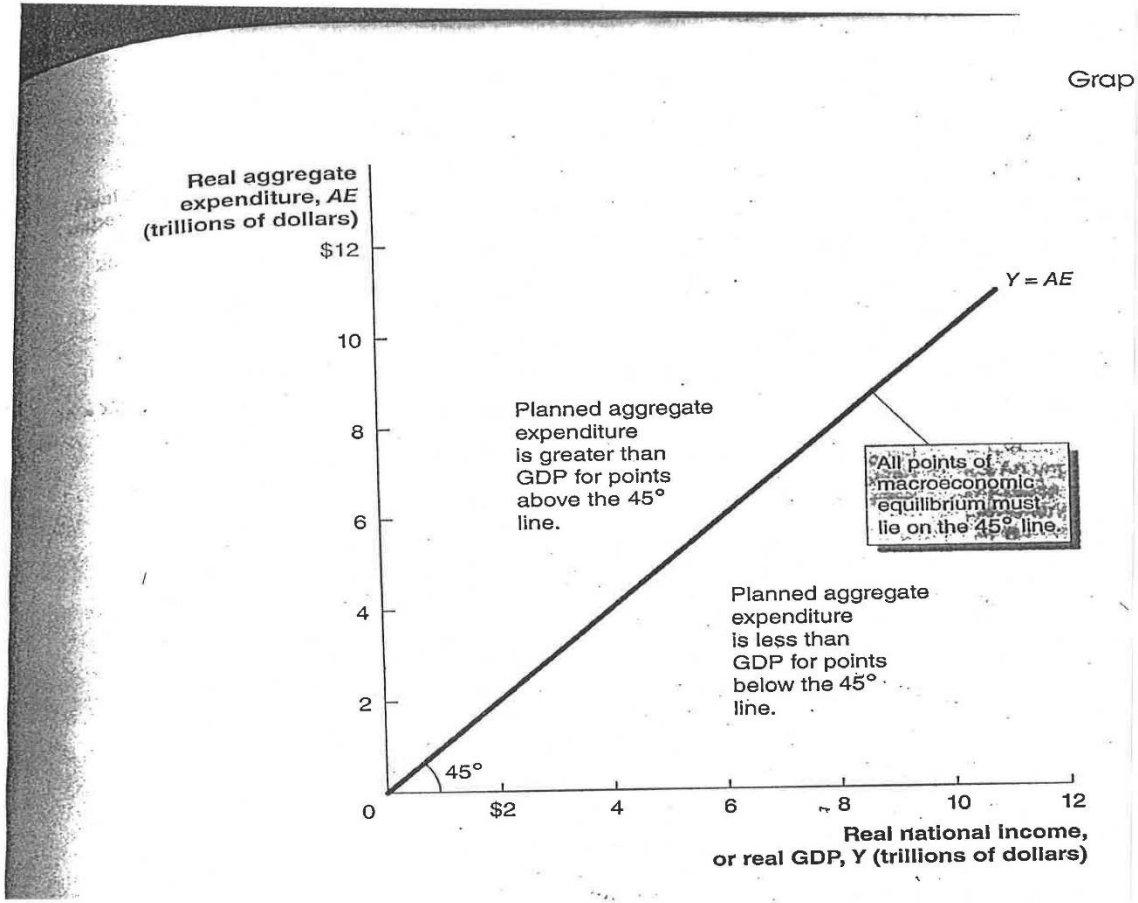
The AE Model:
The Graphical Backdrop

The X axis tracks output, Y.

Since output equals income, the X axis also tracks income.

The Y axis tracks aggregate expenditure , AE.

Y = AE along the 45° line



Aggregate Expenditure(AE) Output(Y) and Employment

The 45º Line: AE = GDP

Inventories are unchanged

Macro equilibrium

AE Below 45º Line: AE<GDP

Unplanned Inventory Rise

(GDP and Jobs decrease,

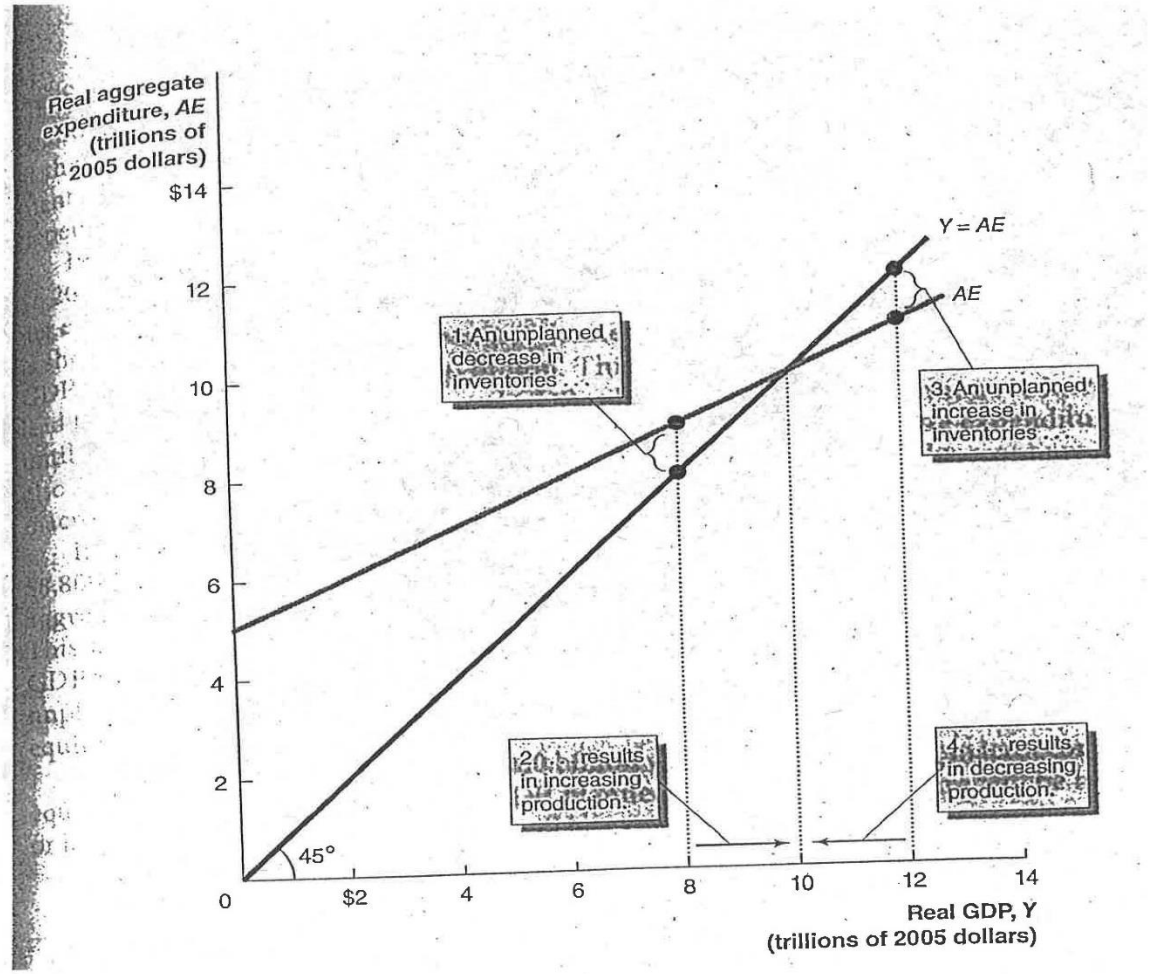
in the next period)

AE Above 45º Line: AE>GDP

Unplanned Inventory Fall

(GDP and Jobs Increase

in the next period)



The AE Model: An Equilibrium Seeking Framework

- Supply/demand charts, in microeconomics. We imagine shifts toward equilibrium price.

- AE Model, with inventory swings, provide a storyline for system that seeks equilibrium.

- When we introduce Wall Street, we discover forces that, at times, DON'T PUSH US TOWARD EQUILIBRIUM: ADVERSE FEEDBACK LOOPS

What Drives AE Components?

What key variables explain swings in

C ≡ consumption

I ≡ Investment

Key Drivers of Consumption

- Current Disposable Income
- Expected Future Disposable Income
- Wealth
- Interest Rates
- Consumers' State of Confidence

Consumption function

$$C = C(Y_{dis}) = \bar{C} + bY_{dis}$$

- $\bar{C}$ = Autonomous Real Consumption Expenditure
- Determined by the "State of Consumer Confidence"

Disposable Income

(we now reintroduce government)

- Real Disposible Income:

$$Y_{dis} = Y - TX + TR$$

- TX = Real Personal Taxes

- TR = Real Transfer Payments

The Marginal Propensity to Consume

- Marginal Propensity to Consume (MPC): Loosely, if you get one more dollar of income, how much more do you spend?

$$\text{MPC} = \frac{\Delta C}{\Delta Y_{\text{dis}}}$$

(last year, a Graduate Student Seminar:
Poor, MPC = 0.9, average = 0.75, Wealthy = 0.25)

MPC: Very High 1984-2007
Moderate 2007-2017

	1975	1984	2007	2017
Yp_{dis}	1,222	2,915	10,516	14,796
C	1,058	2,585	10,124	13,810
C as % of Yp_{dis}	86.6%	88.7%	96.3%	93.3%
		2007 vs	2017 vs	
		1984	2007	
	ΔYP_{dis}	7,601	4,280	
	ΔC	7,539	3,686	
$MPC = \Delta C/\Delta YP_{dis}$	MPC	99%	86%	

MPC + MPS = 1

- Marginal Propensity to Save (MPS): Loosely, if you get one more dollar of income, how much more do you save?

- 1970-2000 MPC = 96% MPS = 4%

- 2000-2010: MPC = 86% MPS = 14%

Saving: The Objective is **Wealth Accumulation**.

Wealth Can Rise Via Saving. Or…

Wealth can Rise via Rising Prices for Your Assets

			BOB'S FINANCES		
	FLOW:			STOCK:	
	12/31/2012			12/31/2012	12/31/2013
	12/31/2013		CASH	30,000	35,000
Y_d	$50,000		EQUITY HOLDINGS	0	0
C	$45,000		TOTAL	30,000	35,000
S	$5,000				

			SUSAN'S FINANCES		
	FLOW:			STOCK:	
	12/31/2012			12/31/2012	12/31/2013
	12/31/2013		CASH	10,000	15,000
Y_d	$50,000		APPLE SHARES	20,000	25,000
C	$45,000		TOTAL	30,000	40,000
S	$5,000				

Consumption: Wealth Contraction Takes its Toll

- 1995-2005, wealth grew 8.4%/year
- 2005-2009, wealth plunged, then recovered,
- 2005-2015, wealth grew only 3.5% per year

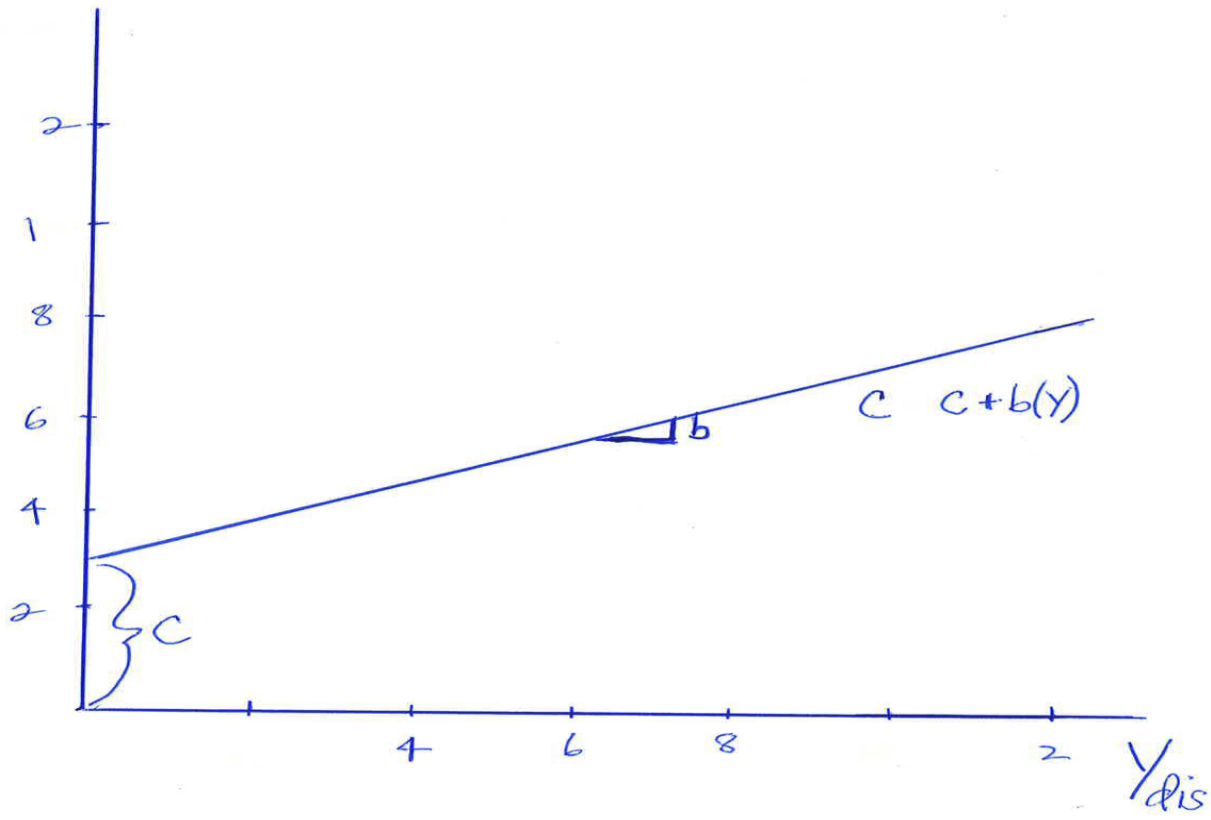
	1995	2005	2009	2015
C/Y_{pd}	90%	94%	90%	91%
W	27600	61640	56000	87170
W/Y_{pd}	5.0	6.6	5.1	6.4

Consumption function (repeat slide)

$$C = C(Y_{dis}) = \bar{C} + bY_{dis}$$

- $\bar{C}$ = Autonomous Real Consumption Expenditure
- Determined by the "State of Consumer Confidence"

The consumption function



- $b = \dfrac{\Delta C}{\Delta Y_{dis}}$

  = Marginal Propensity to Consume

  = MPC

- Assume

$$0 < b < 1$$

$$0 < MPC < 1$$

Key Drivers of Consumption

- Movements along the curve:

  Current Disposable Income

- Shifts of the curve:

  Changes in MPC (slope):

  - Expected Future Disposable Income
  - Wealth
  - Interest Rates

  – Changes in autonomous expenditures (intercept):

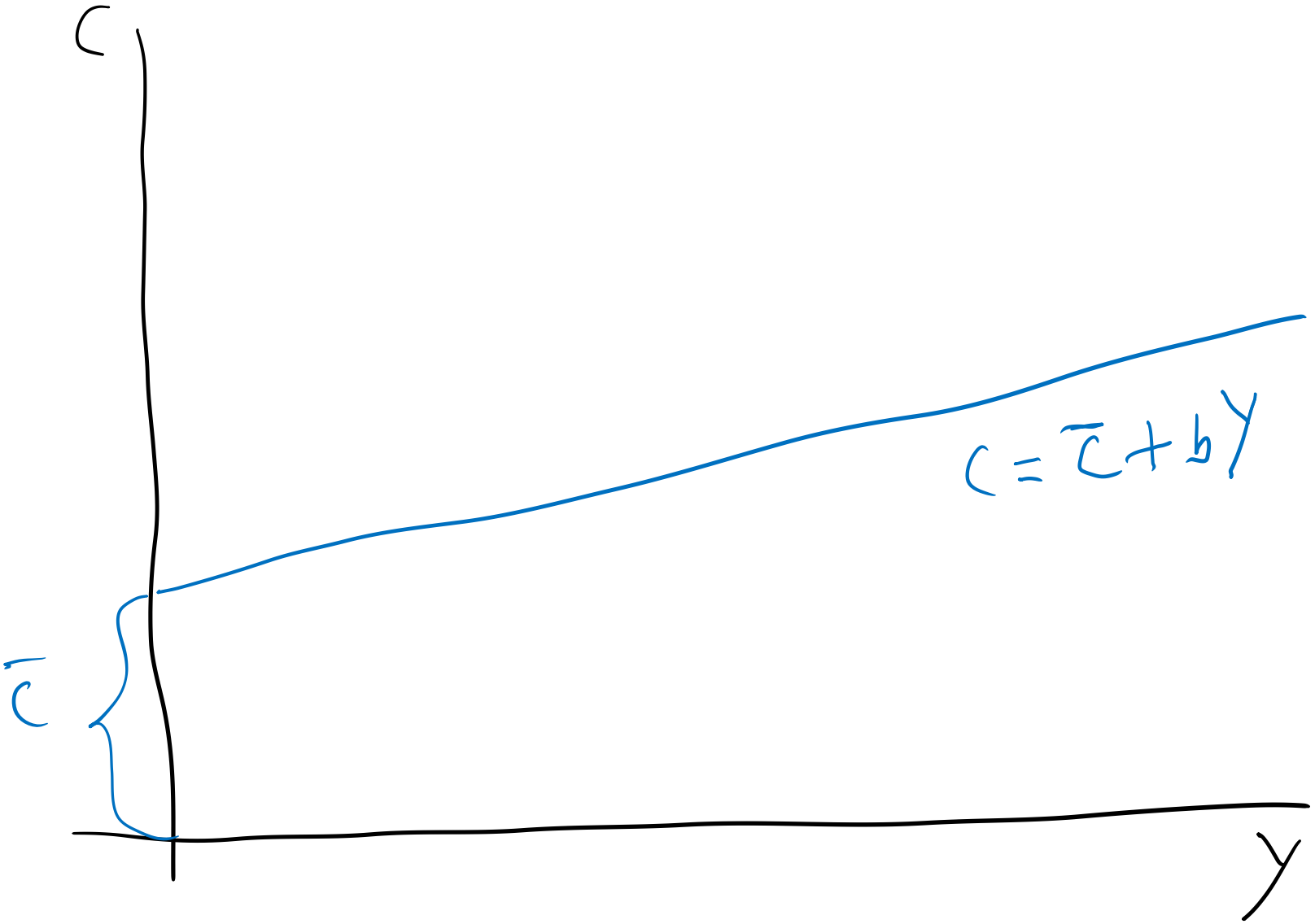
  - Consumers' State of Confidence

Revised Consumption Function

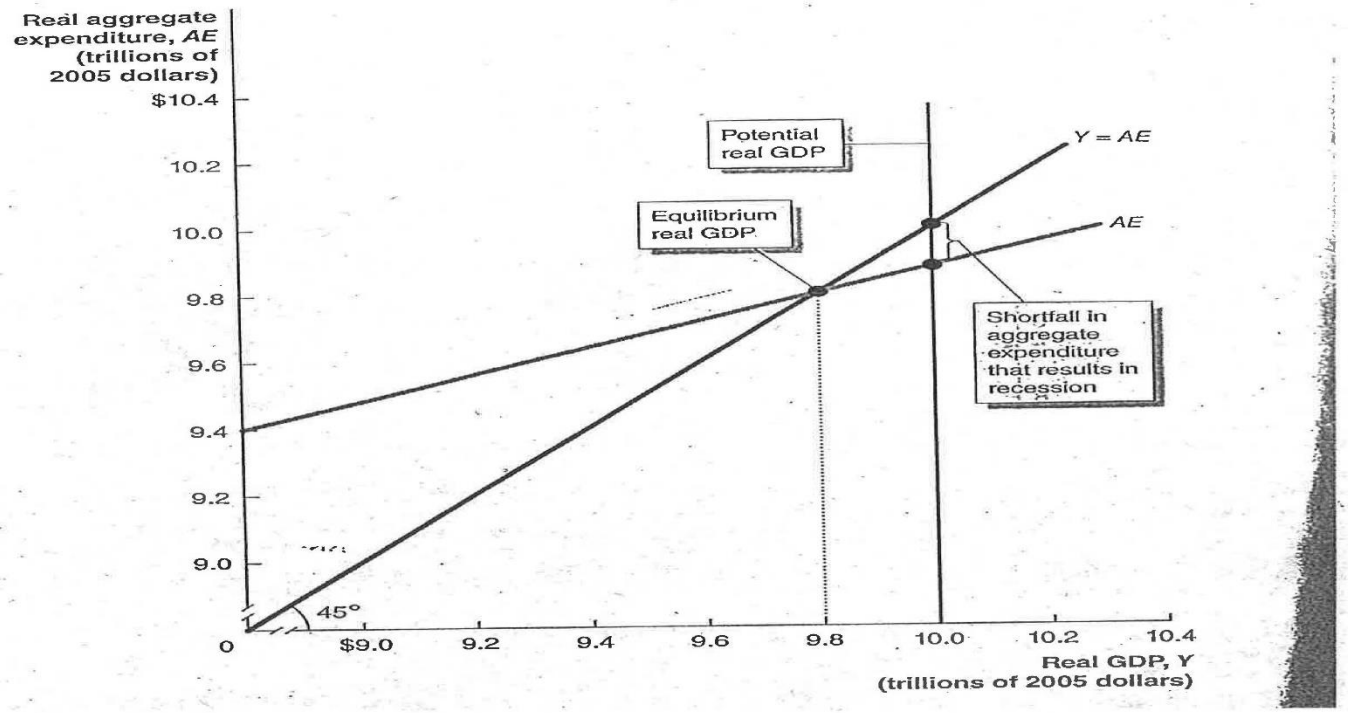
$$C = \bar{C} + bY$$

$$\bar{C} > 0$$

$$0 < b < 1$$


C
$C = \bar{C} + bY$
$\bar{C}$
Y

A Simple Model That Can Explain Recessions



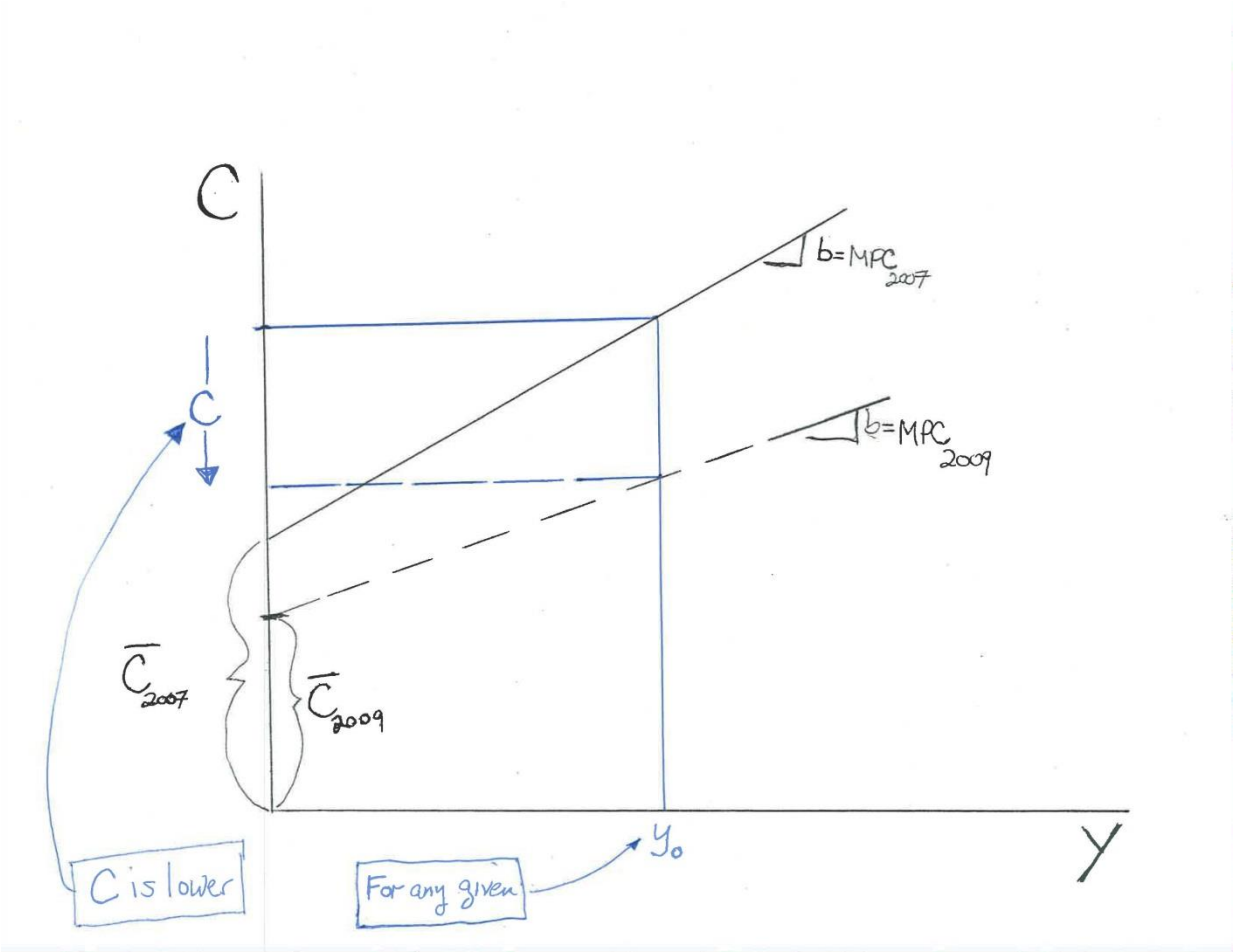
A model: A grand but USEFUL simplification

- We strip away many important issues.
- We find a streamlined picture of the world.
- Despite the picture's simplicity, we learn important things about how the real economy works.

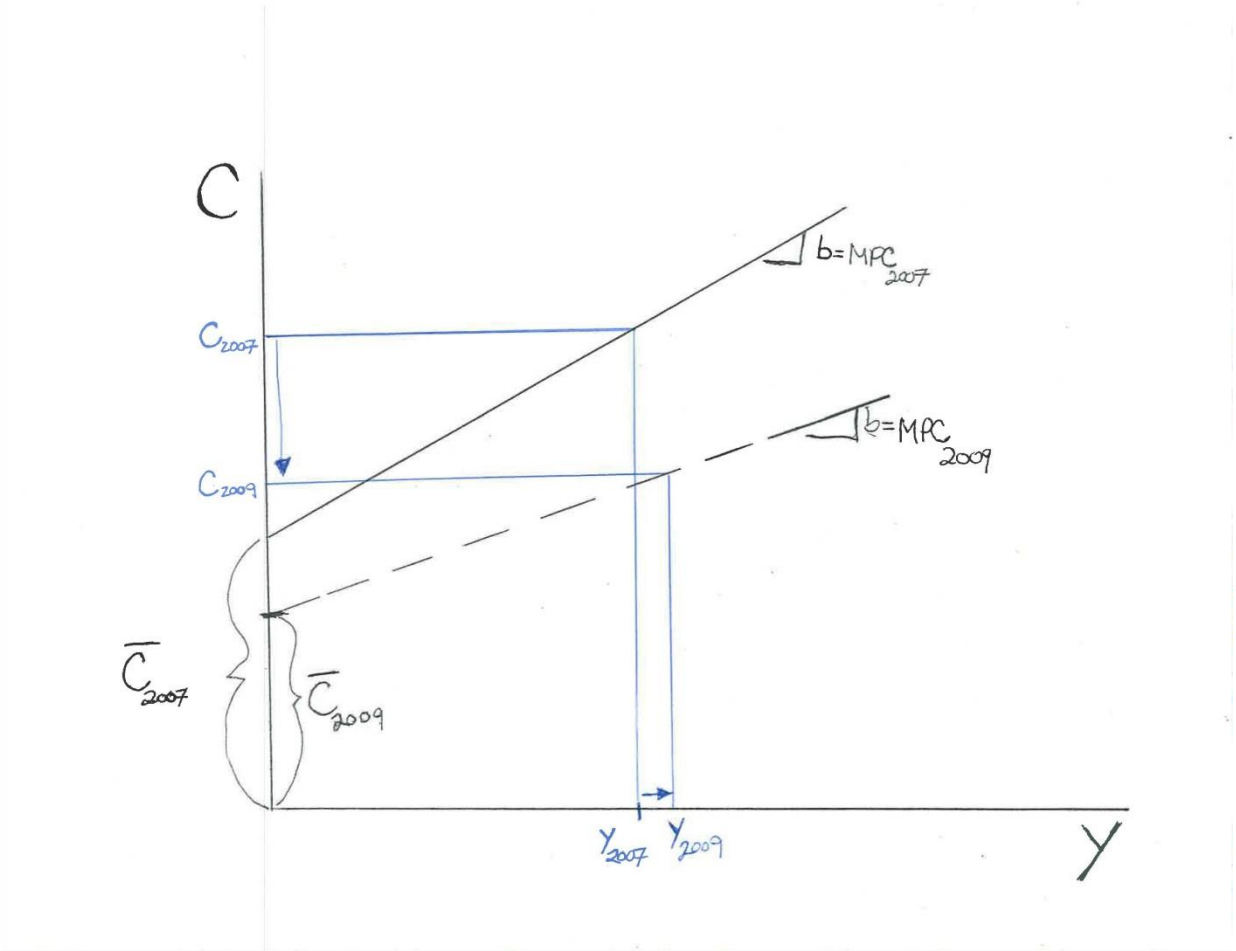
Imagine Briefing then President Obama in early 2009…

NIPA	Billions of $	S.A.A.R.	
	2007:Q4	2009:Q2	
$Y_{p,n}$	12,184	12,720	2.9%
π	98.3	99.6	0.9%
Y_p	12,395	12,771	2.0%
PCE_n	9,910	9,770	-0.9%
C	10,081	9,809	-1.8%
Saving	295	780	
Saving %	2.8%	7.1%	

Falling consumer sentiment drove autonomous spending down.
Plunging wealth drove the MPC down.



The **AE model** depicts the sharp fall for spending, and limited income rise.



During 2011-2019, the flows into Inventory = 0.43% of Real GDP flows