

Introduction to Economics Fluctuation

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The Nobel Memorial Prize in Economic Sciences

- ▶ Oliver Hart received the Nobel Prize in Economic this year, and earned his Ph.D in Economics at Princeton University in 1974.
- ▶ Angus Deaton was awarded last year.
 - ▶ He was awarded for his analysis of consumption, poverty, and welfare.
 - ▶ He teaches the graduate level econometrics in Princeton.
- ▶ Chris Sims won the prize in 2011.
 - ▶ He was awarded with Tom Sargent for research in macroeconomics.
 - ▶ Professor Sargent is affiliated with NYU, but they teach the graduate level macroeconomics in Princeton together.
- ▶ Eric Maskin won the prize in 2007.
 - ▶ He was awarded with Leonid Hurwicz and Roger Myerson for having laid the foundations of mechanism design theory.
 - ▶ He was teaching the graduate level Microeconomics in Princeton from 2000 to 2011.
- ▶ Paul Krugman from Princeton University won the prize in 2008.

Today's Class: Part I

- ▶ Observation:
 - ▶ Business cycle: short-run fluctuation in output and employment.
 - ▶ Recessions are irregular and common.
- ▶ Question:
 - ▶ What causes short-run fluctuations?
 - ▶ What model should we use to explain them?
 - ▶ Can policymakers avoid recessions?
 - ▶ If so, what policy levers should they use?

Today's Class: Part I

- ▶ Introduction to economic fluctuations.
 - ▶ Examine the data that describe short-run economic fluctuations.
 - ▶ Discuss the key differences between how the economy behaves in the long run and how it behaves in the short run.
 - ▶ Introduce the model of aggregate supply and aggregate demand, which most economists use to explain short-run fluctuations.

Today's Class: Part I

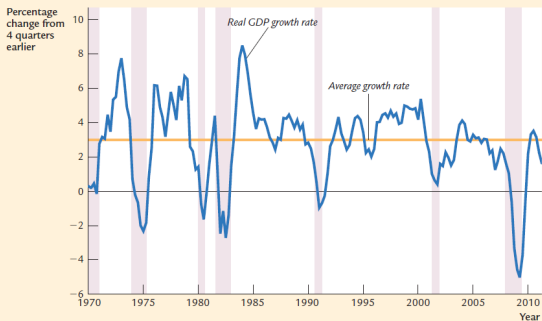
- ▶ The facts about business cycle
- ▶ Time horizons in macroeconomics
- ▶ Aggregate demand
- ▶ Aggregate supply
- ▶ Stabilization policy

The Facts About the Business Cycle

- ▶ How to define a recession
 - ▶ National Bureau of Economic Research (NBER), a nonprofit economics research group.
 - ▶ The NBER's Business Cycle Dating Committee chooses the starting date of each recession, called the business cycle peak, and the ending date, called the business trough.
 - ▶ The NBER's Business Cycle Dating Committee does not follow any fixed rule.
- ▶ GDP and its component
 - ▶ Investment is far more volatile than consumption over the business cycle.
 - ▶ Households respond to the fall in their incomes by consuming less.
 - ▶ The decline in spending on business equipment, structures, new housing, and inventories is even more substantial.

The Facts About the Business Cycle

FIGURE 10-1

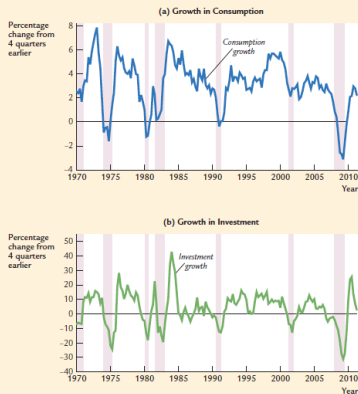


Real GDP Growth in the United States Growth in real GDP averages about 3 percent per year, but there are substantial fluctuations around this average. The shaded areas represent periods of recession.

Source: U.S. Department of Commerce.

The Facts About the Business Cycle

FIGURE 10-2



Growth in Consumption and Investment When the economy heads into a recession, growth in real consumption and investment spending both decline. Investment spending, shown in panel (b), is considerably more volatile than consumption spending, shown in panel (a). The shaded areas represent periods of recession.

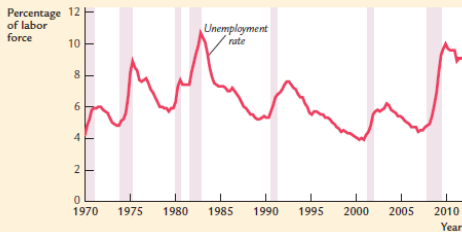
Source: U.S. Department of Commerce.

The Facts About the Business Cycle

- ▶ Unemployment and Okun's law
 - ▶ Unemployment rises in each recession.
 - ▶ This negative relationship between unemployment and GDP is called Okun's law.
 - ▶ $\% \text{ Change in Real GDP} = 3\% - 2 \times \text{Change in Unemployment Rate}$.
- ▶ Remark
 - ▶ Long-run growth in GDP is determined primarily by technological progress.
 - ▶ Short-run movements in GDP are highly correlated with the utilization of the economy's labor force.
 - ▶ The declines in the production of goods and services that occur during recessions are always associated with increases in joblessness.

The Facts About the Business Cycle

FIGURE 10-3



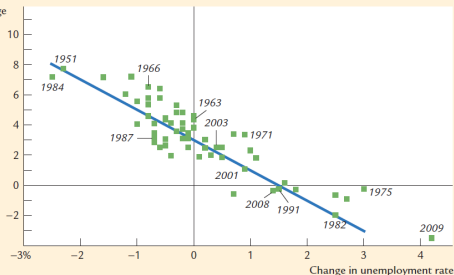
Unemployment The unemployment rate rises significantly during periods of recession, shown here by the shaded areas.

Source: U.S. Department of Labor.

The Facts About the Business Cycle

FIGURE 10-4

Percentage change
in real GDP



Okun's Law This figure is a scatterplot of the change in the unemployment rate on the horizontal axis and the percentage change in real GDP on the vertical axis, using data on the U.S. economy. Each point represents one year. The figure shows that increases in unemployment tend to be associated with lower-than-normal growth in real GDP. The correlation between these two variables is -0.89 .

Sources: U.S. Department of Commerce, U.S. Department of Labor.

The Facts About the Business Cycle

- ▶ Leading indicators: variables tend to fluctuate in advance of the overall economy.
 - ▶ Average workweek of production workers in manufacturing.
 - ▶ Average initial weekly claims for unemployment insurance.
 - ▶ New orders for consumer goods and materials, adjusted for inflation.
 - ▶ New orders for nondefense capital goods.
 - ▶ Index of supplier deliveries.
 - ▶ New building permits issued.
 - ▶ Index of stock prices.
 - ▶ Money supply (M2), adjusted for inflation.
 - ▶ Interest rate spread: the yield spread between 10-year Treasury notes and 3-month Treasury bills.
 - ▶ Index of consumer expectations.

Example: Baltic Dry Index

- ▶ The Baltic Dry Index (BDI) is an economic indicator issued daily by the London-based Baltic Exchange.
- ▶ The index provides "an assessment" of the price of moving the major raw materials by sea.
- ▶ Historical origin
 - ▶ In 1744, the Virginia and Maryland coffee house in London, changed its name to Virginia and Baltick, to more accurately describe the business interests of the merchants who gathered there.
 - ▶ Today's Baltic Exchange has its roots in a committee of merchants formed in 1823 to regulate trading and formalize the exchange of securities on the premises.
 - ▶ The first daily freight index was published by the Baltic Exchange in January 1985.

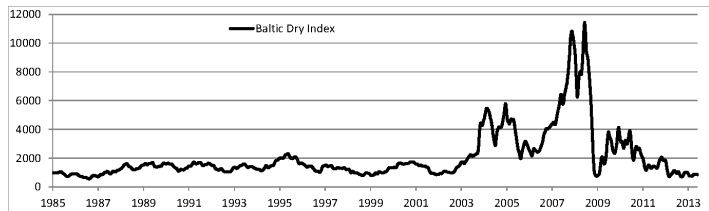
Example: Baltic Dry Index

- ▶ How it works
 - ▶ Every working day, a panel of international shipbrokers submits their view of current freight cost on various routes to the Baltic Exchange.
 - ▶ The BDI contains route assessments based only on time-charter hire rates "USD hire paid per day".
- ▶ Importance
 - ▶ The index measures the demand for shipping capacity versus the supply of dry bulk carriers.
 - ▶ The supply of cargo ships is tight and inelastic in the short run.
 - ▶ Since dry bulk primarily consists of materials that function as raw material, the index is also seen as an efficient economic indicator of future economic growth and production.

Example: Baltic Dry Index

- ▶ Significant levels
 - ▶ On 20 May 2008, BDI reached its record high level since its introduction in 1985, reaching 11,793 points.
 - ▶ On 5 Dec 2008, BDI had dropped by 94%, to 663 points, the lowest since 1986.
 - ▶ During 2009, BDI recovered as high as 4661, but then bottomed out at 1043 in February, 2011, after continued deliveries of new ships and flooding in Australia.
 - ▶ By 3 Feb 2012, the index made a new low of 647 on a continued glut of dry bulk carriers and decreases in orders of iron and coal.
 - ▶ On 10 Feb 2016 the BDI reached the historic low of 290.
 - ▶ South Korea's Hanjin Shipping files for bankruptcy.
 - ▶ Actress Xu Ruoxuan's husband is in financial trouble as well.

Example: Baltic Dry Index



Example: Baltic Dry Index

Baltic Exchange: Baltic Dry Index (.BADI :Exchange)

* Data is delayed

+ WATCHLIST

941.00 USD

4.00 (+0.43%)

0

290.00

941.00

Last | 09/23/2016

Change

Volume

52 week range



QUOTE

CHART

NEWS

PROFILE

EARNINGS

PEERS

FINANCIALS

OWNERSHIP

Stock Summary | Options Chain



Today's Class: Part I

- ▶ Time horizons in macroeconomics
- ▶ Aggregate demand
- ▶ Aggregate supply
- ▶ Stabilization policy

Time Horizons in Macroeconomics

- ▶ How the short run and long run differ?
 - ▶ In the long run, prices are flexible and can respond to changes in supply or demand.
 - ▶ In the short run, many prices are sticky.
- ▶ Example: the Federal Reserve suddenly reduces the money supply by 5 percent.
 - ▶ In the long run, it lowers all prices by 5 percent, while output, employment, and other real variables remain the same.
 - ▶ In the short run, many prices do not respond to changes in monetary policy.
 - ▶ In the short run, real variables such as output and employment must do some of the adjusting instead.

Time Horizons in Macroeconomics

TABLE 10-1

The Frequency of Price Adjustment

This table is based on answers to the question: How often do the prices of your most important products change in a typical year?

Frequency	Percentage of Firms
Less than once	10.2
Once	39.3
1.01 to 2	15.6
2.01 to 4	12.9
4.01 to 12	7.5
12.01 to 52	4.3
52.01 to 365	8.6
More than 365	1.6

Source: Table 4.1, Alan S. Blinder, "On Sticky Prices: Academic Theories Meet the Real World," in N. G. Mankiw, ed., *Monetary Policy* (Chicago: University of Chicago Press, 1994), 117–154.

Time Horizons in Macroeconomics

- ▶ The model of aggregate supply and aggregate demand
 - ▶ In classical macroeconomic theory, the amount of output depends on the economy's ability to supply goods and services.
 - ▶ The theory posits, that prices adjust to ensure that the quantity of output demanded equals the quantity supplied.
 - ▶ With sticky prices, demand depends on other factors: consumers' confidence about their economic prospects, firms' perceptions about the profitability of new investments, and monetary/fiscal policy.

Today's Class: Part I

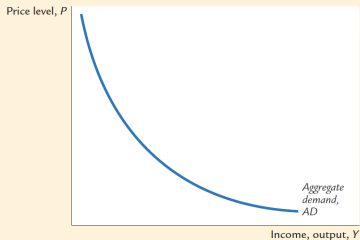
- ▶ Aggregate demand
- ▶ Aggregate supply
- ▶ Stabilization policy

Aggregate Demand

- ▶ The quantity equation as aggregate demand
 - ▶ The quantity theory $MV = PY$.
 - ▶ M is the money supply, V is the velocity of money, P is the price level and Y is the amount of output.
 - ▶ Rewrite in terms of the supply and demand for real money balances: $M/P = (M/P)^d = kY$.
 - ▶ $k = 1/V$ represents how much money people want to hold for every dollar of income.
- ▶ The aggregate demand curve
 - ▶ Assumption: velocity V is constant and the money supply M is fixed by the central bank.
 - ▶ The quantity equation yields a negative relationship between the price level P and output Y .

Aggregate Demand

FIGURE 10-5



The Aggregate Demand Curve

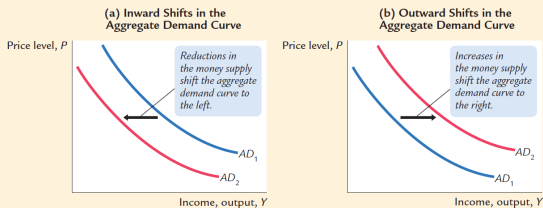
The aggregate demand curve AD shows the relationship between the price level P and the quantity of goods and services demanded Y . It is drawn for a given value of the money supply M . The aggregate demand curve slopes downward: the higher the price level P , the lower the level of real balances M/P , and therefore the lower the quantity of goods and services demanded Y .

Aggregate Demand

- ▶ Why the aggregate demand curve slopes downward
 - ▶ We have assumed the velocity of money is fixed, the money supply determines the dollar value of all transactions in the economy.
 - ▶ If the price level rises, each transaction requires more dollars.
 - ▶ The number of transactions and thus the quantity of goods and services purchased must fall.
 - ▶ Consider it as the supply and demand for real money balances.
- ▶ Shifts in the aggregate demand curve
 - ▶ If the Fed changes the money supply, the aggregate demand curve shifts.

Aggregate Demand

FIGURE 10-6



Shifts in the Aggregate Demand Curve Changes in the money supply shift the aggregate demand curve. In panel (a), a decrease in the money supply M reduces the nominal value of output PY . For any given price level P , output Y is lower. Thus, a decrease in the money supply shifts the aggregate demand curve inward from AD_1 to AD_2 . In panel (b), an increase in the money supply M raises the nominal value of output PY . For any given price level P , output Y is higher. Thus, an increase in the money supply shifts the aggregate demand curve outward from AD_1 to AD_2 .

Today's Class: Part I

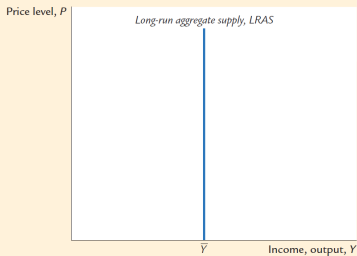
- ▶ Aggregate supply
- ▶ Stabilization policy

Aggregate Supply

- ▶ Aggregate supply
 - ▶ Definition: the relationship between the quantity of goods and services supplied and the price level.
 - ▶ Two different aggregate supply curves: the long-run aggregate supply curve LRAS and the short-run aggregate supply curve SRAS.
- ▶ The long run: the vertical aggregate supply curve
 - ▶ The amount of output produced depends on the fixed amounts of capital and labor and on the available technology.
 - ▶ $Y = F(\bar{K}, \bar{L}) = \bar{Y}$.
 - ▶ In the long run, the intersection of the aggregate demand curve with this vertical aggregate supply curve determines the price level.
 - ▶ This long-run level of output, is called the full-employment, or natural, level of output.

Aggregate Supply

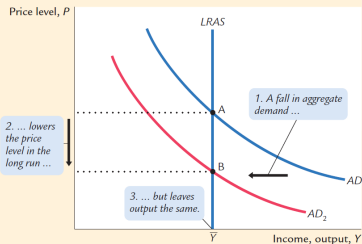
FIGURE 10-7



The Long-Run Aggregate Supply Curve In the long run, the level of output is determined by the amounts of capital and labor and by the available technology; it does not depend on the price level. The long-run aggregate supply curve, *LRAS*, is vertical.

Aggregate Supply

FIGURE 10-8



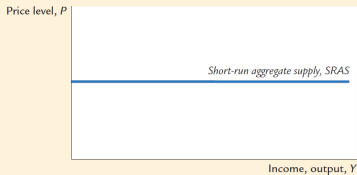
Shifts in Aggregate Demand in the Long Run A reduction in the money supply shifts the aggregate demand curve downward from AD_1 to AD_2 . The equilibrium for the economy moves from point A to point B . Because the aggregate supply curve is vertical in the long run, the reduction in aggregate demand affects the price level but not the level of output.

Aggregate Supply

- ▶ The short run: the horizontal aggregate supply curve
 - ▶ All prices are stuck at predetermined levels.
 - ▶ At these prices, firms are willing to sell as much as their customers are willing to buy.
 - ▶ Short-run equilibrium: the intersection of the aggregate demand curve and this horizontal short-run aggregate supply curve.
- ▶ Example
 - ▶ If the Fed suddenly reduces the money supply, the aggregate demand curve shifts inward.
 - ▶ A fall in aggregate demand reduces output in the short run.
 - ▶ After the sudden fall in aggregate demand, firms are stuck with prices that are too high.
 - ▶ Firms reduce production and lay off workers.
 - ▶ The economy experiences a recession.

Aggregate Supply

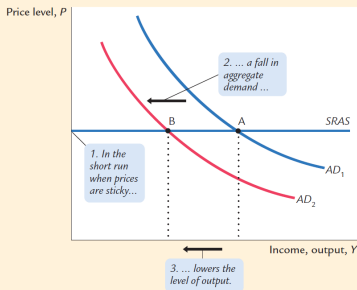
FIGURE 10-9



The Short-Run Aggregate Supply Curve In this extreme example, all prices are fixed in the short run. Therefore, the short-run aggregate supply curve, SRAS, is horizontal.

Aggregate Supply

FIGURE 10-10



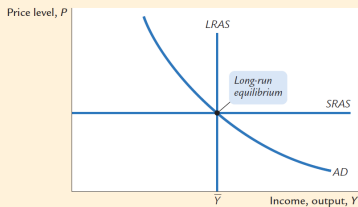
Shifts in Aggregate Demand in the Short Run A reduction in the money supply shifts the aggregate demand curve downward from AD_1 to AD_2 . The equilibrium for the economy moves from point A to point B. Because the aggregate supply curve is horizontal in the short run, the reduction in aggregate demand reduces the level of output.

Aggregate Supply

- ▶ From the short run to the long run: comparison
 - ▶ Over long periods of time, prices are flexible, the aggregate supply curve is vertical, and changes in aggregate demand affect the price level but not output.
 - ▶ Over short periods of time, prices are sticky, the aggregate supply curve is flat, and changes in aggregate demand do affect the economy's output of goods and services.
- ▶ From the short run to the long run: transition
 - ▶ When the economy is in its long-run equilibrium, the short-run aggregate supply curve must cross this point as well.
 - ▶ A shift in aggregate demand affects output in the short run, but this effect dissipates over time as firms adjust their prices.

Aggregate Supply

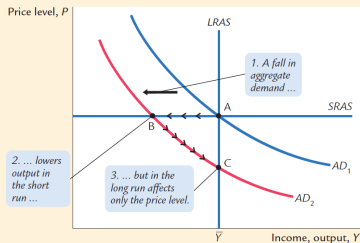
FIGURE 10-11



Long-Run Equilibrium In the long run, the economy finds itself at the intersection of the long-run aggregate supply curve and the aggregate demand curve. Because prices have adjusted to this level, the short-run aggregate supply curve crosses this point as well.

Aggregate Supply

FIGURE 10-12



A Reduction in Aggregate Demand The economy begins in long-run equilibrium at point A. A reduction in aggregate demand, perhaps caused by a decrease in the money supply, moves the economy from point A to point B, where output is below its natural level. As prices fall, the economy gradually recovers from the recession, moving from point B to point C.

Today's Class: Part I

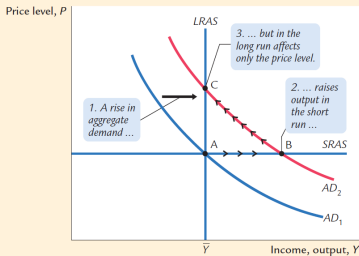
- ▶ Stabilization policy

Stabilization Policy

- ▶ Shocks: exogenous events that shift these curves.
 - ▶ Demand shock: a shock that shifts the aggregate demand curve.
 - ▶ Supply shock: a shock that shifts the aggregate supply curve.
 - ▶ Stabilization policy: policy actions aimed at reducing the severity of short-run economic fluctuations.
- ▶ Shocks to aggregate demand: Example
 - ▶ Credit cards reduces money demand and increases its velocity.
 - ▶ In the short run, the increase in demand raises the output of the economy—it causes an economic boom.
 - ▶ Over time, the high level of aggregate demand pulls up wages and prices.
 - ▶ The Fed might reduce the money supply to offset the increase in velocity.

Stabilization Policy

FIGURE 10-13



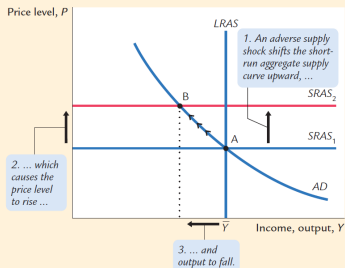
An Increase in Aggregate Demand The economy begins in long-run equilibrium at point A. An increase in aggregate demand, perhaps due to an increase in the velocity of money, moves the economy from point A to point B, where output is above its natural level. As prices rise, output gradually returns to its natural level, and the economy moves from point B to point C.

Stabilization Policy

- ▶ Shocks to aggregate supply
 - ▶ Because supply shocks have a direct impact on the price level, they are sometimes called price shocks.
 - ▶ Adverse supply shocks: they push costs and prices upward.
 - ▶ Favorable supply shocks: they reduce costs and prices.
 - ▶ Stagflation: an experience combines economic stagnation (falling output and rising unemployment) with inflation (rising prices).

Stabilization Policy

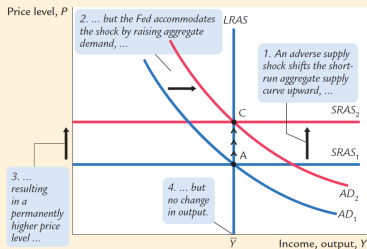
FIGURE 10-14



An Adverse Supply Shock An adverse supply shock pushes up costs and thus prices. If aggregate demand is held constant, the economy moves from point A to point B, leading to stagflation—a combination of increasing prices and falling output. Eventually, as prices fall, the economy returns to the natural level of output, point A.

Stabilization Policy

FIGURE 10-15



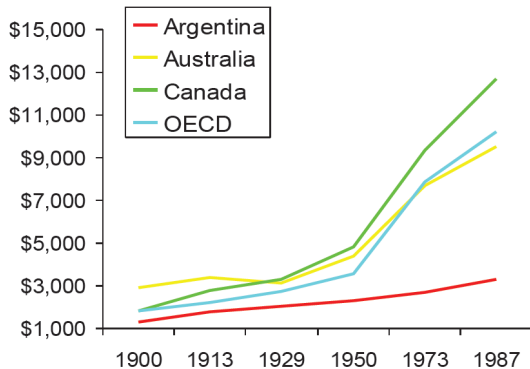
Accommodating an Adverse Supply Shock In response to an adverse supply shock, the Fed can increase aggregate demand to prevent a reduction in output. The economy moves from point A to point C. The cost of this policy is a permanently higher level of prices.

Argentina's Stabilization

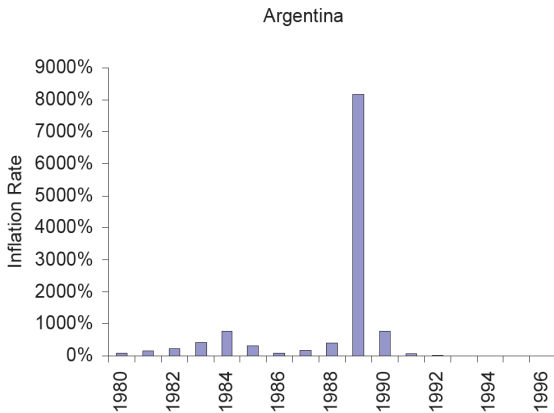
- ▶ Argentina stabilized inflation in the early 1990s
- ▶ Pegged its currency to the dollar
- ▶ Fiscal reform
- ▶ Eventually, peg collapsed

Larger Perspective on Argentina

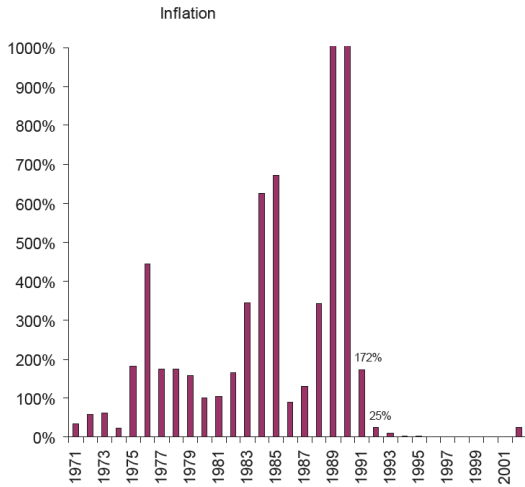
Output per Capita (1980 Dollars)



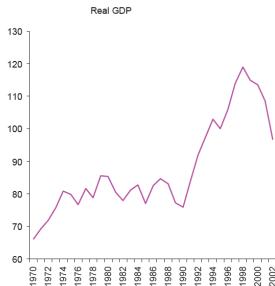
High Inflation: Argentina



Longer Perspective



Longer Perspective



- ▶ Recession in 1989
- ▶ Boom in early 1990s
- ▶ Recession in 1995
- ▶ Decline post-1998

Defeating Inflation

- ▶ Convertibility Law in 1992 established a "currency board"
 - ▶ Base money must be backed by gold and foreign currency reserves
 - ▶ A "strict" version of a peg as it restricts monetary quantities as well as interest rates

Central Bank Balance Sheet

Assets	Liabilities
Foreign Reserves	Currency
	Bank Reserves
Domestic Bonds	

Full Backing

- ▶ The Convertibility Law requires (at least) 100% reserve backing of the monetary base.
- ▶ Ensures that everyone who holds a peso can get one dollar.
- ▶ However, does not ensure that everyone who holds a peso deposit can convert that into dollars.
 - ▶ The Central Bank can cover M0.
 - ▶ Cannot act as a lender of last resort.

Elements of Stabilization

- ▶ Clear nominal anchor on prices and money supply.
- ▶ No direct price controls.
- ▶ Some success on privatization, cutting public spending, and reducing tax evasion.
- ▶ Successfully brought down inflation (although a sustained real appreciation).
- ▶ First few years a tremendous success.

Immediate Aftermath

- ▶ Price stabilization that followed was truly extraordinary
- ▶ The large fiscal deficits driving inflation were eliminated. In 1992 and 1993 Argentina had fiscal surpluses of 0.4% and 1.1% of GDP.
- ▶ Tax revenue rose dramatically in real terms through a combination of higher tax rates and a successful fight against evasion.
- ▶ Numerous state enterprises were privatized. (telecommunications, airline, power, gas and railway services)

Immediate Aftermath

- ▶ Central Bank received official independence in 1992, fully severing the linkage that encouraged funding of deficits.
- ▶ With new confidence in the stabilization, foreign capital owed in at the high rates resulting in an increase in the Central Bank's foreign reserves from 4.6 billion dollars at the end of 1990 to 14.3 billion dollars at the end of 1994.
- ▶ In 1994, Argentina achieved the highest GDP per capita in Latin America, coupled with the lowest rate of inflation.

Early Concerns

- ▶ During the first years of the plan, inflation rates were higher in Argentina than in the U.S. which implied a rise in the Real Exchange Rate.
- ▶ The traded goods sectors were affected more because the price of non-traded goods rose more sharply than the price of traded goods. Pressure to devalue from this sector.
- ▶ Despite high growth, unemployment rose from 1991 until 1995. Increasing inequality in society.

External Pressures

- ▶ External events put pressure on Argentina
- ▶ 1994-1995: Mexico Crisis
 - ▶ Investors pulled \$4 billion on net out of Argentina
 - ▶ Contraction in liquidity caused some 50 financial institutions to close
 - ▶ Severe recession in 1995: Real GDP fell by 4.4% and unemployment reached 17.4%
 - ▶ Pressure to devalue and to undertake expansionary fiscal spending
 - ▶ Argentina does not devalue and GDP recovers quickly, but lingering impact on unemployment and public support for policies

Argentina's Deficits

- ▶ Central government ran surpluses in 1993 and 1994 but then deficits after
- ▶ Consolidated government ran deficits throughout
- ▶ Public debt to GDP increased
- ▶ Issue: Provinces retain power to spend, but revenue was responsibility of central government

More External Crises

- ▶ Asian crisis in 1997-98
- ▶ Russia crisis in 1998
- ▶ Russia crisis lead to reduction in capital flowing to all emerging markets
- ▶ Brazil devalues in 1999
- ▶ Brazil devaluation important for Argentina's competitiveness

Contraction post-1998



Story post-1998

- ▶ Contraction
 - ▶ Government running large deficits
 - ▶ Foreign investors unwilling to lend
 - ▶ State governments started paying wages with newly created bonds. Essentially issuing currency.
- ▶ Collapse
 - ▶ Government defaults at the end of 2001
 - ▶ Convertability is abandoned and peso devalues sharply
 - ▶ Bank accounts are frozen
 - ▶ Banks convert dollar deposits into pesos at an unfavorable rate

Summary of Argentina's Experience

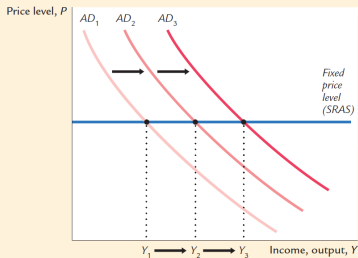
- ▶ Peg and initial fiscal consolidation brought inflation down dramatically
- ▶ Over-valuation due to some inflation "inertia"
- ▶ Boom as capital flowed into a restructured Argentine economy
- ▶ Fiscal policy gets lax and external shocks put pressure on peg
- ▶ Slow decline post-1998
- ▶ Eventually early success turned into collapse and default

Today's Class: Part II

- ▶ Historical background:
 - ▶ Classical theory: incapable of explaining the Great Depression.
 - ▶ Keynes: low aggregate demand is responsible for the low income and high unemployment that characterize economic downturns.
 - ▶ In the long run, prices are flexible, and aggregate supply determines income.
 - ▶ In the short run, prices are sticky, so changes in aggregate demand influence income.
- ▶ The IS-LM model is the leading interpretation of Keynes's theory.
 - ▶ IS stands for investment and saving.
 - ▶ LM stands for liquidity and money.

The IS-LM Model

FIGURE 11-1



Shifts in Aggregate Demand

For a given price level, national income fluctuates because of shifts in the aggregate demand curve. The *IS-LM* model takes the price level as given and shows what causes income to change. The model therefore shows what causes aggregate demand to shift.

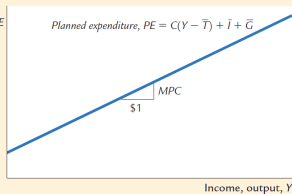
The Goods Market and the IS Curve

- ▶ The Keynesian Cross
 - ▶ Actual expenditure: the amount that households, firms, and the government spend on goods and services.
 - ▶ Planned expenditure: the amount that households, firms, and the government would like to spend on goods and services.
 - ▶ Actual expenditure equals GDP.
- ▶ The determinants of planned expenditure.
 - ▶ Assuming that the economy is closed, and planned expenditure $PE = C + I + G$.
 - ▶ $I = \bar{I}$, $G = \bar{G}$ and $T = \bar{T}$, are all exogenously fixed.
 - ▶ Planned expenditure as a function of Y : $PE = C(Y - \bar{T}) + \bar{I} + \bar{G}$.

The IS-LM Model

FIGURE 11-2

Planned
expenditure, PE



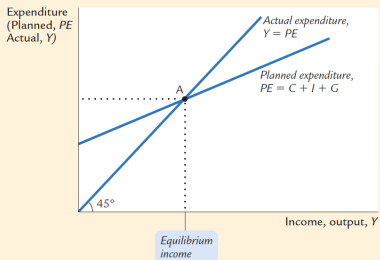
Planned Expenditure as a Function of Income Planned expenditure PE depends on income because higher income leads to higher consumption, which is part of planned expenditure. The slope of the planned-expenditure function is the marginal propensity to consume, MPC .

The Goods Market and the IS Curve

- ▶ The Economy in Equilibrium
 - ▶ Actual Expenditure = Planned Expenditure, or $Y = PE$
 - ▶ Whenever an economy is not in equilibrium, firms experience unplanned changes in inventories, and they change production levels.
 - ▶ Changes in production in turn influence total income and expenditure, moving the economy toward equilibrium.
 - ▶ The Keynesian cross shows how income Y is determined for given levels of planned investment I and fiscal policy G and T .

The Goods Market and the IS Curve

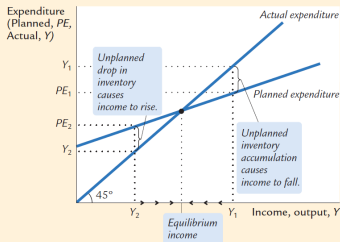
FIGURE 11-3



The Keynesian Cross The equilibrium in the Keynesian cross is the point at which income (actual expenditure) equals planned expenditure (point A).

The Goods Market and the IS Curve

FIGURE 11-4



The Adjustment to Equilibrium in the Keynesian Cross

If firms are producing at level Y_1 , then planned expenditure PE_1 falls short of production, and firms accumulate inventories. This inventory accumulation induces firms to decrease production. Similarly, if firms are producing at level Y_2 , then planned expenditure PE_2 exceeds production, and firms run down their inventories. This fall in inventories induces firms to increase production. In both cases, the firms' decisions drive the economy toward equilibrium.

The Goods Market and the IS Curve

- ▶ Fiscal policy and the multiplier: government purchases
 - ▶ The government-purchases multiplier: $\Delta Y / \Delta G$.
 - ▶ An implication of the Keynesian cross is that the government-purchases multiplier is larger than 1.
 - ▶ According to the consumption function $C = C(Y - T)$, higher income causes higher consumption.
 - ▶ When an increase in government purchases raises income, it also raises consumption, which further raises income, which further raises consumption, and so on.
 - ▶ The government-purchases multiplier is an example of an infinite geometric series: $\Delta Y / \Delta G = 1 / (1 - MPC)$.

The Goods Market and the IS Curve

Initial Change in Government Purchases = ΔG

First Change in Consumption = $MPC \times \Delta G$

Second Change in Consumption = $MPC^2 \times \Delta G$

Third Change in Consumption = $MPC^3 \times \Delta G$

\vdots

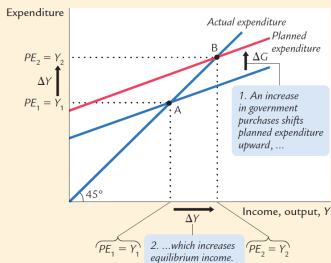
\vdots

$$\Delta Y = (1 + MPC + MPC^2 + MPC^3 + \cdots) \Delta G.$$

$$\Delta Y / \Delta G = 1 + MPC + MPC^2 + MPC^3 + \cdots$$

The Goods Market and the IS Curve

FIGURE 11-5



An Increase in Government Purchases in the Keynesian Cross

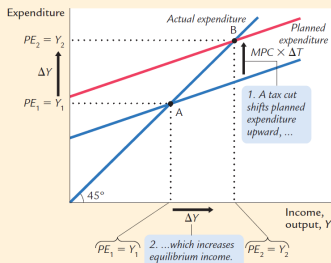
Cross An increase in government purchases of ΔG raises planned expenditure by that amount for any given level of income. The equilibrium moves from point A to point B, and income rises from Y_1 to Y_2 . Note that the increase in income ΔY exceeds the increase in government purchases ΔG . Thus, fiscal policy has a multiplied effect on income.

The Goods Market and the IS Curve

- ▶ Fiscal policy and the multiplier: Taxes
 - ▶ An decrease in tax ΔT immediately raises disposable income $Y - T$ by ΔT .
 - ▶ It raises consumption by $MPC * \Delta T$.
 - ▶ The overall effect on income of the change in taxes is $\Delta Y / \Delta T = -MPC / (1 - MPC)$.
 - ▶ This expression is the tax multiplier, the amount income changes in response to one dollar change in taxes.

The Goods Market and the IS Curve

FIGURE 11-6



A Decrease in Taxes in the Keynesian Cross A decrease in taxes of ΔT raises planned expenditure by $MPC \times \Delta T$ for any given level of income. The equilibrium moves from point A to point B, and income rises from Y_1 to Y_2 . Again, fiscal policy has a multiplied effect on income.

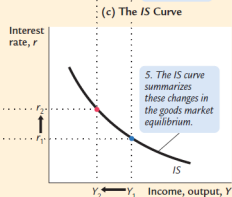
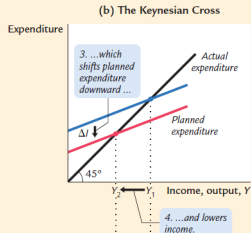
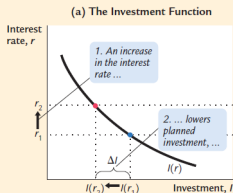
The Interest Rate, Investment, and the IS Curve

- ▶ Add this relationship between the interest rate and investment
 - ▶ The investment function is about the cost of investment: $I = I(r)$.
 - ▶ Combine the investment function with the Keynesian-cross.
- ▶ Example: change in interest rate
 - ▶ An increase in the interest rate reduces the quantity of investment.
 - ▶ The reduction in planned investment shifts the planned-expenditure function downward.
 - ▶ The shift in the planned-expenditure function causes the level of income to fall.
 - ▶ Hence, an increase in the interest rate lowers income.
- ▶ IS curve illustrates how the equilibrium level of income depends on the interest rate.

The Interest Rate, Investment, and the IS Curve

FIGURE 11-7

Deriving the IS Curve Panel (a) shows the investment function: an increase in the interest rate from r_1 to r_2 reduces planned investment from $I(r_1)$ to $I(r_2)$. Panel (b) shows the Keynesian cross: a decrease in planned investment from $I(r_1)$ to $I(r_2)$ shifts the planned-expenditure function downward and thereby reduces income from Y_1 to Y_2 . Panel (c) shows the IS curve summarizing this relationship between the interest rate and income: the higher the interest rate, the lower the level of income.

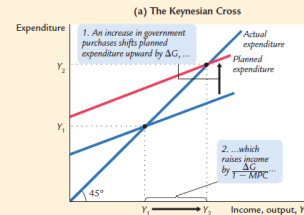


How Fiscal Policy Shifts the IS Curve

- ▶ Example: change in government purchase
 - ▶ Increase in government purchase raises planned expenditure.
 - ▶ It thereby increases equilibrium income.
 - ▶ Increase in government purchases shifts the IS curve outward.
- ▶ Example: change in taxes
 - ▶ A decrease in taxes also expands expenditure and income.
 - ▶ It shifts the IS curve outward.
- ▶ Summary
 - ▶ Changes in fiscal policy that raise the demand for goods and services shift the IS curve to the right.
 - ▶ Changes in fiscal policy that reduce the demand for goods and services shift the IS curve to the left.

How Fiscal Policy Shifts the IS Curve

FIGURE 11-8



An Increase in Government Purchases Shifts the IS Curve Outward Panel (a) shows that an increase in government purchases raises planned expenditure. For any given interest rate, the upward shift in planned expenditure of ΔG leads to an increase in income Y of $\Delta G / (1 - MPC)$. Therefore, in panel (b), the IS curve shifts to the right by this amount.

