

# **Macroeconomics Review**

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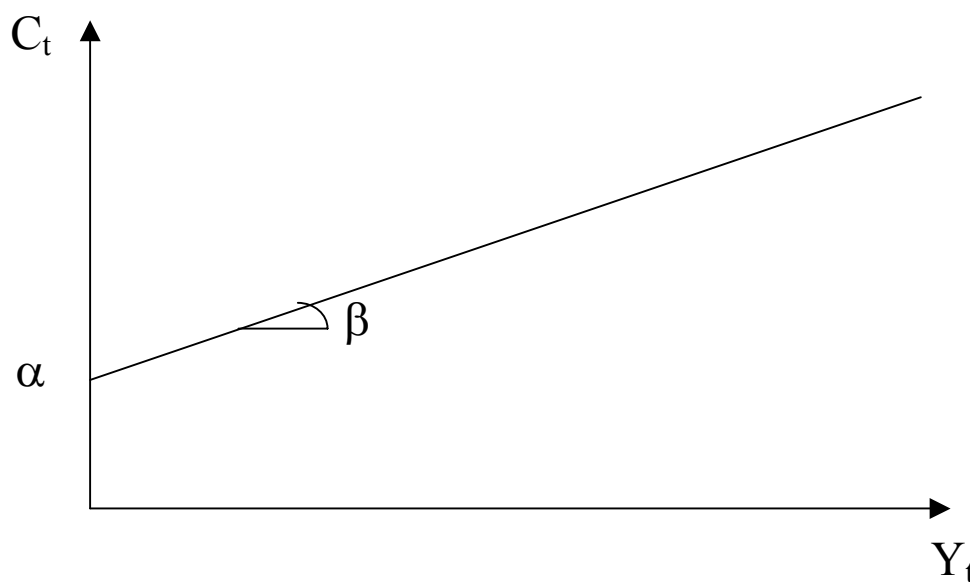
# 1. Introduction

## 1.1. Linearity

- For simplicity, we usually assume linearity only to get the notion and intuition (specially the sign and magnitude of the factors' effect on the endogenous variables).
- *Example:*

$$C = \alpha + \beta Y$$

$$\Rightarrow \beta = \partial C / \partial Y$$



## 1.2. Elasticity

- Definition

$\eta_{C,Y}$  = The percentage change of C due to one percentage change in Y

$$= \% \Delta C / \% \Delta Y$$

$$= [\Delta C / C] / [\Delta Y / Y]$$

$$\eta_{C,Y} = [\Delta C / \Delta Y] * [Y / C] = \text{MPC} * Y / C \quad - \text{How is it represented in the graph?}$$

- If the economic theory assumes an exponential model (instead of previous linear model), then:

$$C_t = A Y_t^\beta i_t^{-\gamma} e^{\varepsilon_t}$$

- Therefore, in order to estimate our theoretical model we can run ln-ln model:

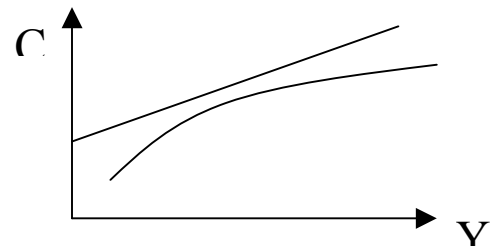
$$\ln(C_t) = \ln(A) + \beta \ln(Y_t) - \gamma \ln(i_t) + \varepsilon_t$$

where:  $\beta = \partial \ln(C_t) / \partial \ln(Y_t)$

- Which means that, instead of assuming a constant propensity to consume (and increasing elasticity of consumption with respect to the disposal income) as in the linear model, the exponential model assumes a constant elasticity of consumption with respect to the disposal income (and decreasing propensity to consume).
- *Proof: Apply the chain rule:*

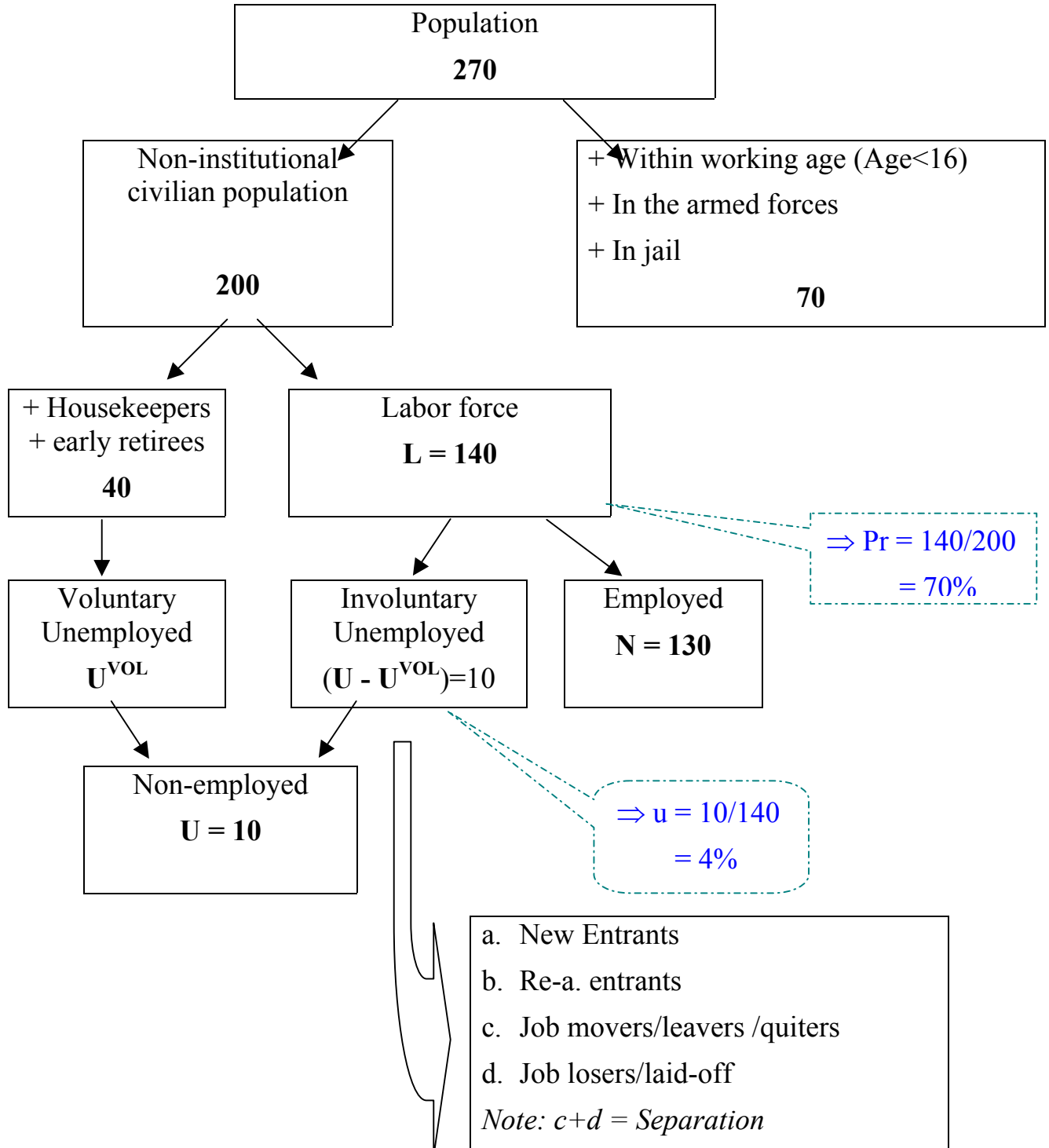
$$\beta = [\partial \ln(C_t) / \partial C] * [\partial C / \partial Y] * [\partial Y / \partial \ln(Y_t)] = [1 / C] * [\partial C / \partial Y] * [Y / 1]$$

$$= [\partial C / \partial Y] * [Y / C] = \eta_{C,Y}$$



## 2. The Policy Tradeoff: Unemployment vs. Inflation

### 2.1. The US CPS





### ***2.3.A Companion Equation for Price Inflation***

- Assume prices are a simple “mark-up” (“cost plus pricing”:  $k \equiv 1 + \mu$ ) on unit labor costs, i.e. nominal wages ( $W$ ) relative to productivity ( $A$ ):

$$(2) \quad \mathbf{P} = \mathbf{K} * (\mathbf{W}/\mathbf{A}) \quad \Rightarrow \quad (3) \quad \mathbf{RP} = \mathbf{RK} + \mathbf{RW} - \mathbf{RA}$$

- *We ignore for a while the other factors.*

- Assuming this markup falls when the economy is sluggish and affected by aggregate supply shocks (e.g., changes in oil and other imported goods prices):

$$(4) \quad \mathbf{RK} = \mathbf{B}_0 - \mathbf{B}_1 * (\mathbf{U} - \mathbf{U}^{\text{VOL}})$$

## 2.4. The Final Form Model of Price Inflation

- Then, by substituting (1) and (4) in (3), we get:

$$(5) \quad \text{RP} - \text{RP}_{-1} = (\text{A}_0 + \text{B}_0 - \text{RA}) - (\text{A}_1 + \text{B}_1) * (\text{U} - \text{U}^{\text{VOL}})$$

- The change in the inflation is negatively correlated with the involuntary unemployment. In other words, the acceleration in prices is tied to the level of excess demand for labor (=Involuntary unemployment).
- This is the Philips curve, which fared well till the late 1960, but needed modifications thereafter.
- **"NAIRU"**
  - $\equiv$  Non Accelerating Inflation Rate of Unemployment.
  - $\equiv$  The rate of unemployment required to keep the inflation rate constant and labor market in equilibrium.
  - $\equiv$  *Natural rate of unemployment.*
  - $\equiv$  That unemployment rate such that the actual price level turns out equal to the expected price level.
  - $\equiv$  It is that unemployment rate such that the actual inflation rate turns out equal to the expected inflation rate.
  - (This is by imposing  $dP = dP^e = dP_{-1}$ ). In our model, it is represented by  $U^{\text{VOL}}$ , therefore, it is the level of unemployment at which everyone who wants a job has one.

## *2.5. Useful Inflation Rules of Thumb (Validated 1959- 93)*

	For each 1% the unemployment rate falls below the full employment norm	For each 1% increase in wholesale energy prices
Consumer price inflation (RCPI) will rise by:	0.5%	0.1%
Wholesale price inflation (RWPI- for finished goods) will rise by:	0.4%	0.2%

Therefore,

$$\mathbf{RP^{CPI} - RP^{CPI}_{-1} = -0.5 * (U - U^{VOL})}$$

## 3. Fiscal Policy: Government Taxation, Spending and Deficit

### 3.1. Instruments and Effectiveness

- Fiscal instruments: G & T
  - Expansionary fiscal policy =  $\uparrow G$  or/and  $\downarrow T$ .
- Monetary instruments:  $i$ .
  - Contractionary monetary policy =  $\uparrow i$ .
- What is the effect of expansionary fiscal policy on Y, C & I:  $\uparrow G = \Delta G$  from  $G_1$  to  $G_2$  ( $G_2 > G_1$ )?
- By how much does the GNP change, while holding interest rate fixed?
- By how much does the GNP change, if instead  $\downarrow T$  by the same amount of  $\Delta G$ , while holding interest rate fixed?
- By how much does the GNP change, if we maintain a budget balance ( $\uparrow G = \downarrow T$ ), while holding interest rate fixed?
- By how much does the GNP change as a result of  $\uparrow G = \Delta G$ , while the Fed responds to changes in the GDP?
- What if the Fed has a tighter response (strict inflation and GNP target)?

See numerical examples in: R. Brinner, *Fiscal Policy*, p.15-19, also *IS-LM*, p. 8-9.

## 4. National Accounting and the Government Budget

- The key actors in the macro economy:
  - ❖ **Firms:** (domestically) producing (**Y**) and investing (**I**) entities.
  - ❖ **Households:** consuming (**C**) and saving (**S**) entities.
  - ❖ **Government Agencies:** raise net taxes ( $T=T_0+tY$ -Transfers), spend on public goods (**G**) and pay interest on their debt.
  - ❖ **Central Bank:** controls the interest rates (**i**) through the money supply (**M**).
  - ❖ **Foreign counterparts:** we export products to them (**EX**) and import products from them (**IM**) and exchange financial assets with them.

$$Y = C + G + I + EX - IM$$

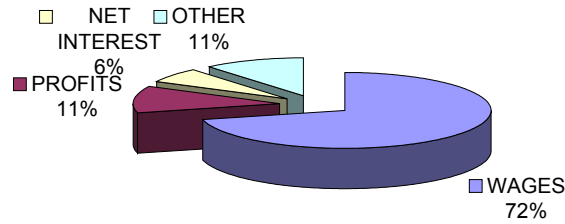
- Three alternative ways for counting the GDP (see example):
  - I. **Final values**: the sum of only *final purchases* (not intermediate purchases) by *final users* (C, I, G or X) from domestic firms (Don't double count. It is as if merging all domestic firms). Adjust for foreign trade: deduct purchases from foreign suppliers and add purchases by foreign buyers.
  - II. **Value added**: the sum of only the difference between value of the output and input of all domestic firms.
  - III. **Households' income**: earnings of all types entitled to the households from domestic firms plus the excise taxes (sales taxes, tariffs, etc.).
- Since we are adding up oranges and apples, we have to multiply quantities with their prices:
  - Nominal GDP- times their *current price*.
  - Real GDP- times their *base year price (constant prices)*.
- **GDP** = Output produced by factors located domestically (in our borders).
- **GNP** = Output produced by factors owned by US citizens (US-nation holders).

- **NNP** =  $GNP - D$ . (a.k.a., **CCA**= Capital Consumption Allowance)
- **NNP** = Net National Income + indirect taxes (sales-like “excise” taxes collected before any private sector unit calculates its income).
- **Indirect taxes** = sales-like “excise” taxes collected before any private sector unit calculates its income.
- **Income** = Earnings of all types: wages, rent, interest, dividends, retained earnings, and depreciation allowances.
- **Consumption** is composed of durable ( $C_D$ ), non-durable ( $C_N$ ) and services ( $C_S$ ).
- **New residential houses** are recorded as an investment of a firm, in the one hand, and rent income, in the other hand (as if they were all owned by firms who rent these house, some of which they rent to their shareholders).
- **Investment** can be broken down to: non-residential investment ( $I_{NR}$ ), residential investment ( $I_R$ ) and inventory investment ( $I_{Inv}$ ).
- **GDP** does not include some **none-market activities** (your mother’s homework), and it does impute some other none-market activities, especially the services of owner-occupied housing.

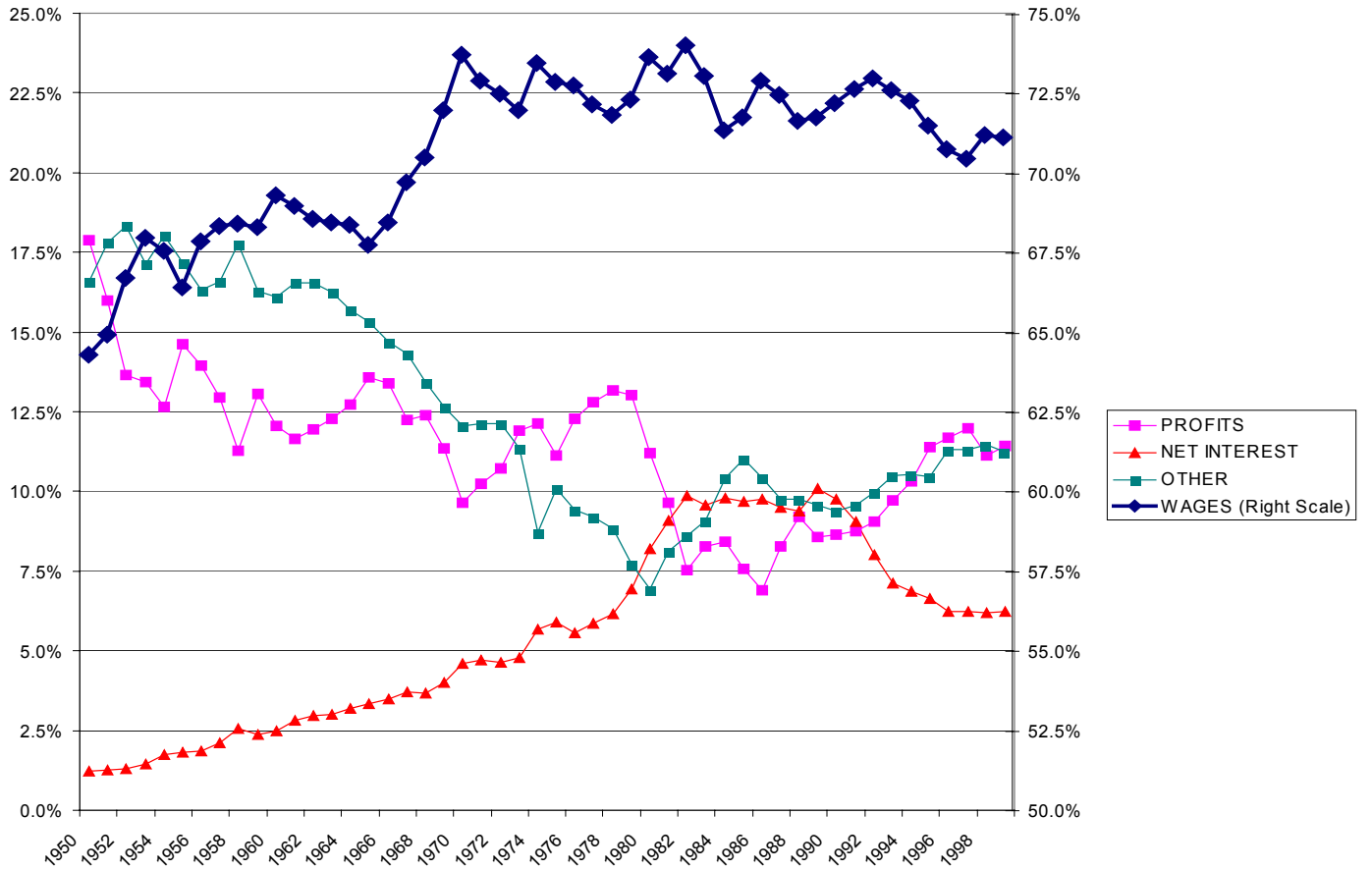
Note, also, there are some **data collection problems**.



**1999 SHARES OF A \$7500 BILLION PIE**



**SHARES OF US NATIONAL INCOME**



### ***4.1. The Government Budget***

- **G:** is all the purchases of goods and services made by the government
- It does NOT including government transfers or interest rate payments (otherwise, you will get double counting).
- **Government outlays** include them all: purchases of goods and services, transfers and or interest rate payments made by the government.
- **Net Taxes** are total taxes after deducting government transfers.
- **Government** includes the Federal, State and local government agencies.
- Note their decomposition of budget.

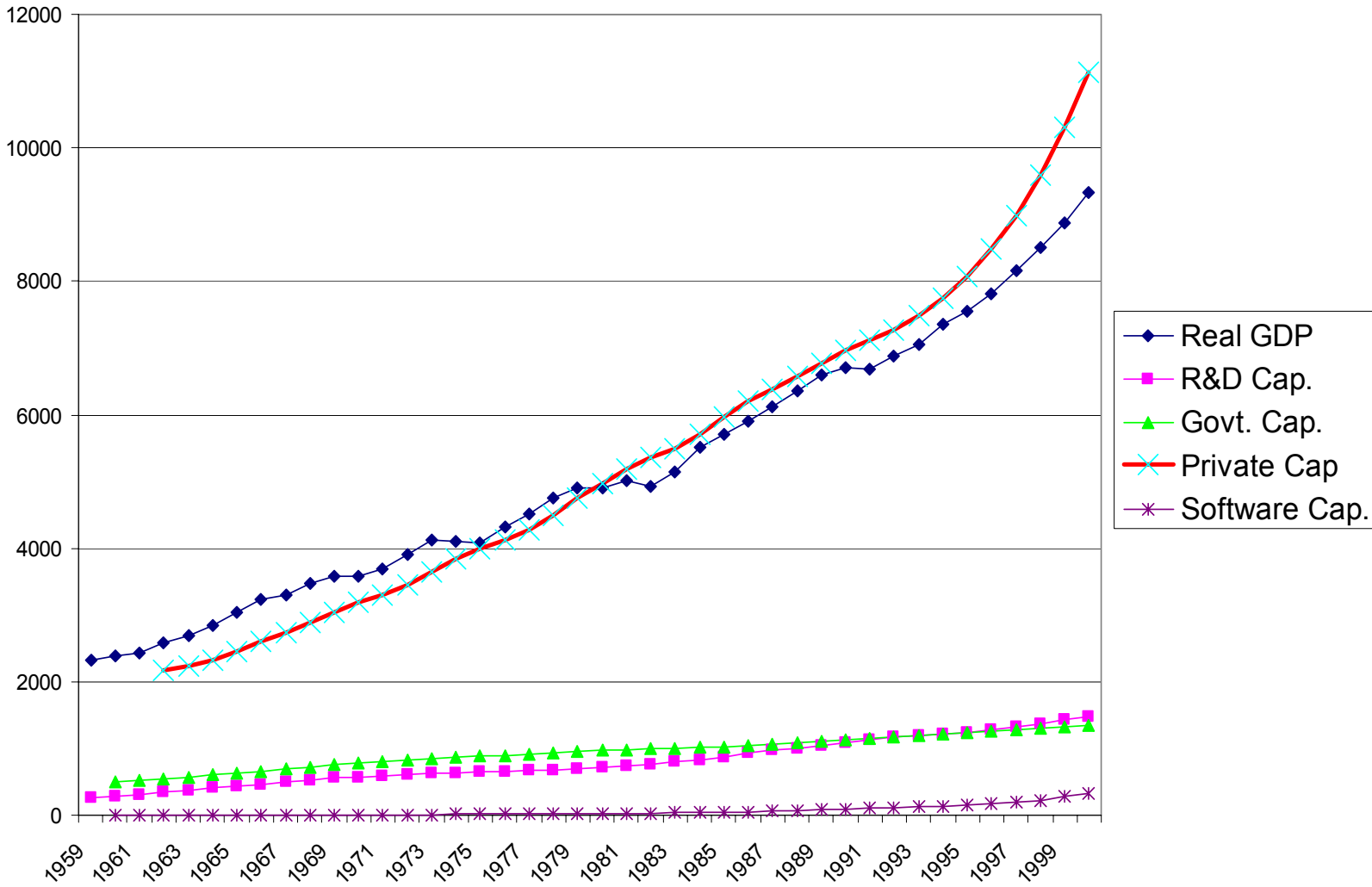
## 4.2. The Federal Budget:

<b><u>1995 US FEDERAL GOVERNMENT (Approximate)</u></b>				
\$BILLION	RECEIPTS		SPENDING	\$BILLION
94	<b>INDIRECT TAXES</b>		<b>TRANSFERS</b>	632
579	<b>PAYROLL</b>			
177	<b>CORP. PROFIT</b>		<b>GRANTS-IN-AID</b>	184
579	<b>PERSONAL</b>		<b>PURCHASES</b>	524
			<b>OF GOOD &amp; SERVICES</b>	
			<i>Military-Pay \$135</i>	
			<i>Military-Goods \$161</i>	
			<i>Other-Pay \$71</i>	
			<i>Other-Goods \$73</i>	
			<b>NET SUBSIDIES</b>	32
	<b>DEFICIT</b>		<b>NET INTEREST</b>	262
	<b>=\$205 BILLION</b>		<b>PAID</b>	
<b>1429</b>	<b>TOTAL</b>		<b>TOTAL</b>	<b>1634</b>

## 5. The Core Growth Theory

### 5.1. Overview

- A good measurement for growth of the standard of living is: the *real output per capita*: RGNP/Pop.  
(USA<sub>2000</sub>=\$40,000 per year).
- In order to have growth, we need to invest in capital.
- Investing in Capital = Accumulating durable productive goods (like machines, hardware and software) and knowledge (R&D and human capital). It does not include *financial* investment.
- Which also means forfeiting *current* consumption (saving) for higher *future* consumption. Therefore, *investments must be equal to savings* (see PS#2). Investing in education may also mean lower *current* production for higher *future* production.
- Types of capital
  - Tangible equipment and structures (narrow definition- such as equipment, buildings and highways).
  - Human, from brains through brawn (human capital).
  - Technological (accumulated R&D).
  - Infrastructure, i.e. tangible goods not owned by one enterprise.



	POPULATION	CIVILIAN POPULATION 16-65	LABOR FORCE	EMPLOYMENT	UNEMPLOYMENT RATE- ALL CIVILIAN WORKERS	OUTPUT PER HOUR	GDP92C	HOURS WEEK
50-98	1.2%	1.2%	1.7%	1.7%	-0.3%	<b>1.9%</b>	<b>3.3%</b>	-0.3%
50-73	1.4%	1.2%	1.6%	1.6%	-0.3%	<b>2.7%</b>	<b>3.9%</b>	-0.4%
73-98	1.0%	1.2%	1.7%	1.8%	-0.3%	<b>1.2%</b>	<b>2.7%</b>	-0.2%

## ***5.2. The Determinants of Labor Productivity***

- Providing “infrastructure” that influences the:
  - Level of output in a **workplace** by education, health, attitudes toward work, regulation and taxation.
  - Efficiency of **connection** between workplaces by communication, transportation, common language, anti- monopoly regulation, global access.
  - The “**state-of-the-art**” potentially available (the “production possibility frontier”).
  - Her/his own **education** and training to absorb the state-of-the-art.
- The **quantity and quality of available**, complementary “tools” such as computers, assembly machines.
- The most rapid growth in developing nations has occurred for those having:
  - Work-force is the best educated and motivated;
  - Indigenous entrepreneurial climate is most positive;
  - Equity investment and trade are encouraged;
  - Government fiscal and monetary policies are best balanced to keep inflation and exchange risks minimal; and
  - The democratic heritage is strongest.
  - High investment shares of GDP
  - High secondary school enrollment rates
  - High trade shares of GDP

- Also, what affects investment are:
  1. Expected earnings from projects. Depends on expected state of the economy.
  2. Current and expected future real interest rates. (Or long-term rates corresponding to earnings stream)
- Implications:
  1. The savings rate has no effect on the *long-run* growth rate
  2. But it does determine the *level* of output in the long run
  3. An increase in the savings rate can produce a temporary acceleration of growth, but eventually runs into diminishing returns
  4. Long run sustained growth depends on technological progress

## 6. Econometrics

- The theoretical economic model assumes linear relation in levels:  $C_t = \alpha + \beta Y_t + \varepsilon_t \Rightarrow \varepsilon_t = (C_t - \alpha - \beta Y_t)$
- The OLS econometric model imposes the following:
  - (I)  $\sum_t \varepsilon_t = 0$
  - (II)  $\text{Min} \sum_t \varepsilon_t^2$

- Gauss-Markov theorem: **OLS** estimators are **BLUE**.

- Estimators:

- $\hat{\beta} = \sum_t c_t y_t / \sum_t y_t^2 \Rightarrow \hat{\beta} = \hat{S}_{cy} / \hat{S}_{yy}$ 
  - Sum of Squares
  - Covariance( $C_t, Y_t$ )
- $\hat{\beta} = [\sum_t c_t y_t / n] / [\sum_t y_t^2 / n] \Rightarrow \hat{\beta} = \sigma_{CY} / \sigma_y^2$ 
  - Variance( $Y_t$ ) =  $\text{STD}(Y_t)^2$
- $\hat{\beta} = (\hat{\sigma}_{CY} / \hat{\sigma}_y \hat{\sigma}_c) \times (\hat{\sigma}_c / \hat{\sigma}_y) \Rightarrow \hat{\beta} = \hat{\rho}_{CY} \times (\hat{\sigma}_c / \hat{\sigma}_y)$ 
  - Correlation( $C_t, Y_t$ )  $\leq 1$

- $\hat{\alpha} = \bar{C} - \hat{\beta} \bar{Y}$

- $(1-\lambda)\%$  confidence interval:  $\beta = \hat{\beta} \pm \hat{S}_{\hat{\beta}} t_{(n-m-1, 1-\lambda/2)}$ , where  $\hat{S}_{\hat{\beta}} = \sqrt{\sum_t \hat{\varepsilon}_t^2 / \sum_t \hat{y}_t^2}$ . If  $t$ -statistic  $\equiv |\hat{\beta} / \hat{S}_{\hat{\beta}}| < t_{(n-m-1, 1-\lambda/2)}$  (= usually 2) then there is NO statistically significant linear correlation between  $C_t$  and  $Y_t$  (at 95% confidence). **Note, correlation does NOT mean causality.**

- Linear Fitness:  $R^2 = \frac{\sum_t \hat{c}_t}{\sum_t c_t} = 1 - \frac{\sum_t \hat{\varepsilon}_t^2}{\sum_t c_t^2} \Rightarrow 0 \leq R^2 \leq 1$

## 7. Money Market and IS-LM Model

### 7.1. *Monetarism and Quantity Theory*

- Previously, we described interest rates as being a policy decision made by the Fed in reaction to the level of economy activity:  $i = f(\text{GNP})$ . It achieved this by manipulating reserves and money was implicit in the function.
- Define: **velocity of money**  $\equiv v \equiv P*Y/M$ . -This is called the **quantity equation**.
- **Strict monetarism** asserts, in the long run,  $Y (=Y_n)$  and  $v$  are fixed in equilibrium. Therefore,  $P*Y = M * v$ , which means that the Fed can have a strict control over inflation via its control of the money (usually, was thought M1).
- Empirically, velocity is not fixed; rather it is sensitive to interest rates.
- Still, the Fed can control the inflation via its grip on the money, but (1) not as easy as it was thought, and (2) not by only controlling M1.

## 7.2. *The Money Demand*

- Basically, two types of financial assets are available for saving:

I. **Perfectly liquid- money (currency and checkable deposits):** can be used for private spending (nominal product-transactions [barter is rare]), precautionary (possible unexpected future transactions), speculative motive (maximizing return on all assets in uncertain world), but it bears zero nominal yields.

II. **Imperfectly liquid- bonds, stocks, options:** not enough liquid for transaction, precautionary and speculative needs, but bear risky positive expected nominal yields.

- Therefore, it's clear that the proportions that you choose depend on two variables:
  - a) **Level of nominal transactions (+):** this is highly correlated (proportional) with the private nominal income and spending.
  - b) **Interest rate on bonds (-).**

- Therefore, the behavioral demand function for money- $M^d$ :

$$M^d = P * Y * L(i)$$

Or, equivalently:

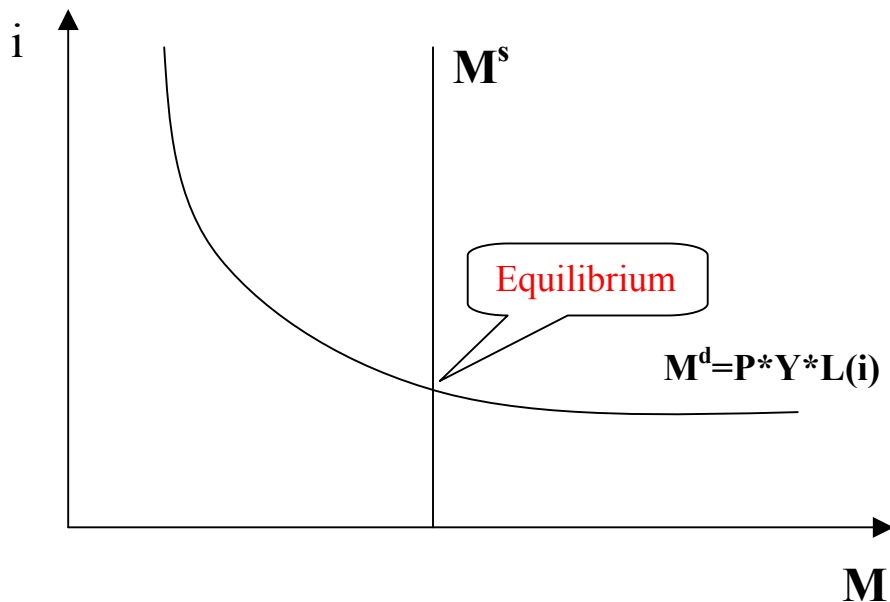
$$M^d/P = Y * L(i)$$

### 7.3. Money Supply Curve

- In this simple model we assume perfectly inelastic money supply curve.

$$M^s = \text{perfectly inelastic}$$

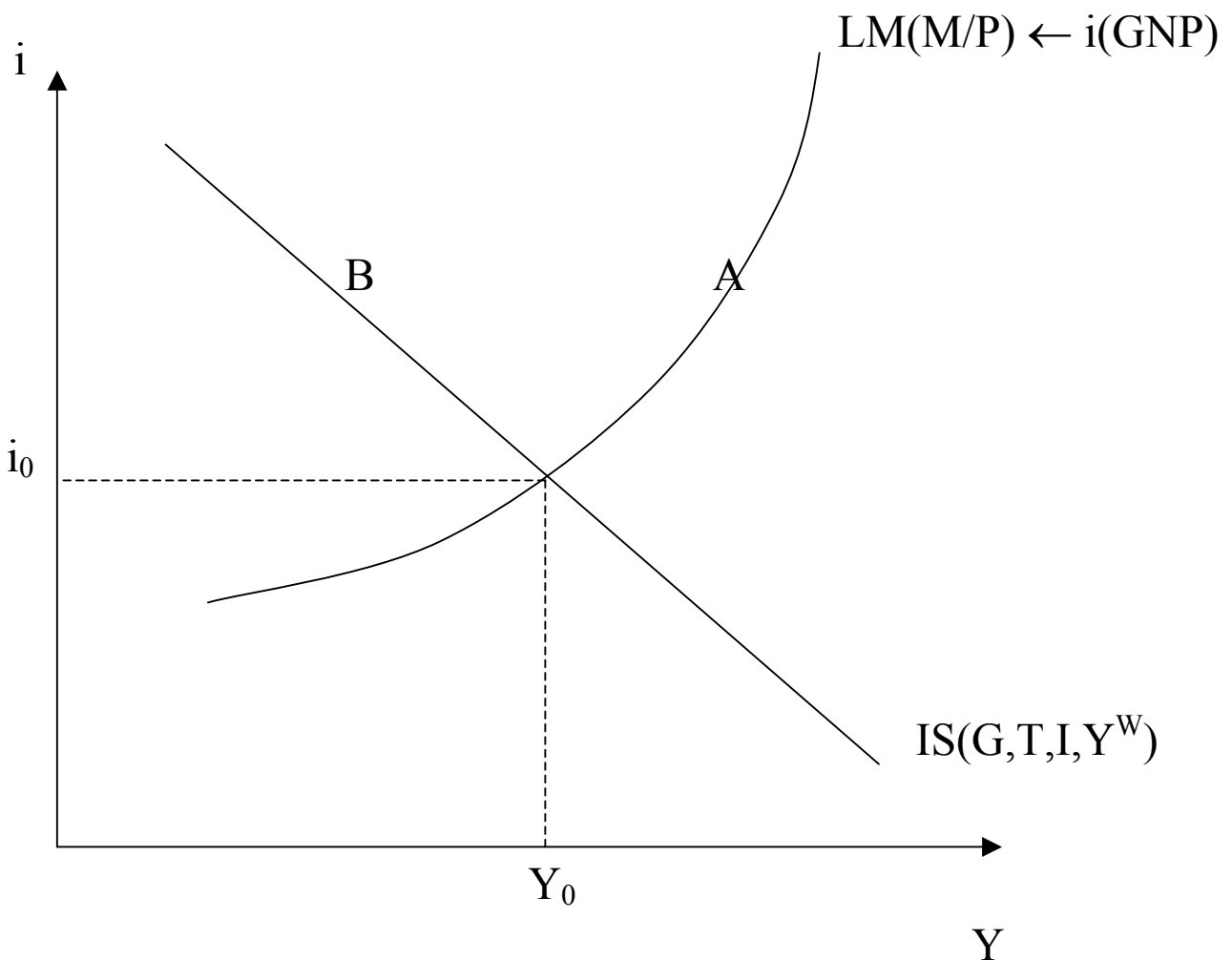
- Draw the *Liquidity Demand* curve in the M-i axes.
- The Fed can affect the money supply (nominal value of bills and coins in circulate and checking account) via different instruments.
- One way is by *open market transactions*: By buying T-bills it sells/circulates/"throw" more currency into the market, and therefore, increasing money supply (shifting the curve to the right). It also works to increase/decrease interest rate via decreasing/increasing bonds/ prices.



- How does the equilibrium interest rate change when the real GNP (=Y) increases?
- Draw the *Liquidity Demand = Money Supply* curve in the Y-i axes (**LM curve**).
- *What are the exogenous variables for the LM-curve?*
- *How does the LM curve change due to the introduction of credit cards?*
- *How does the LM curve change due increase in the price level?*

## 7.4. Integrating Product and Money Markets: IS-LM Model

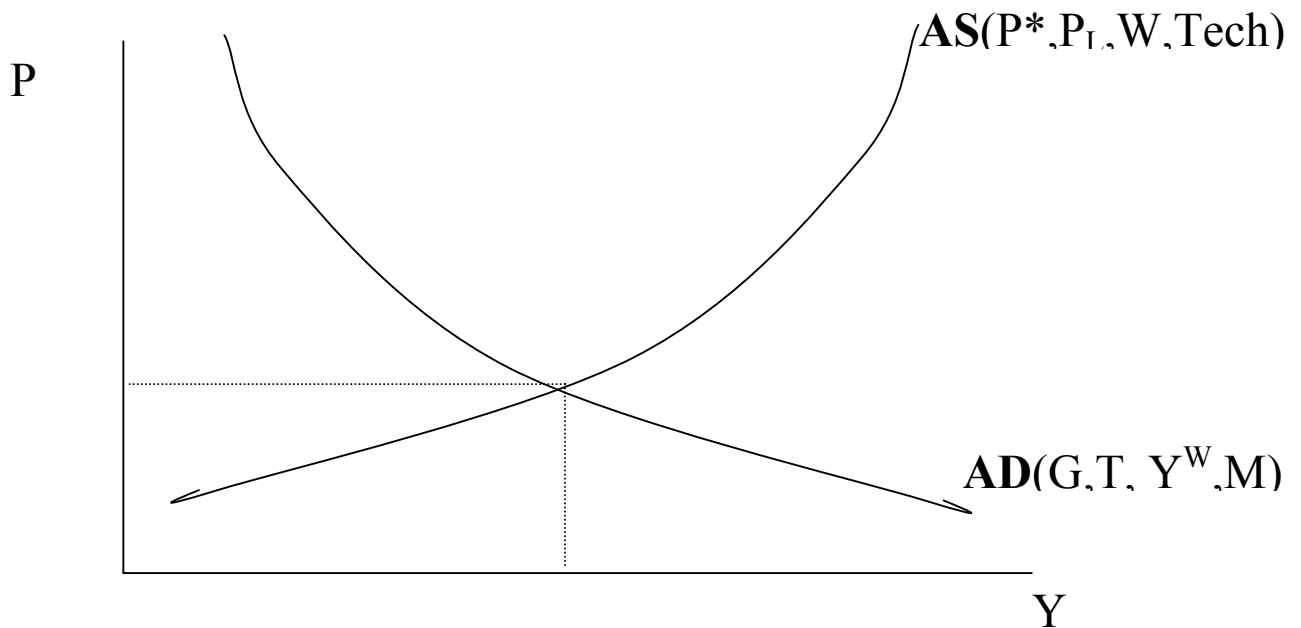
- We integrate both markets by looking at the pairs of  $(Y,i)$  that provide equilibrium in both markets: products and money.
- *How can the fiscal and monetary policies be mixed?*
- *When is the fiscal policy more effective?*



## 8. AS-AD Curves

### 8.1. Deriving AD-AS curves:

- AD shows the pairs  $(Y,P)$  that support equilibrium in both markets- products and money markets (for given monetary and fiscal policies).
- AS represents the pairs  $(Y,P)$  that support equilibrium in the labor market.



### 8.2. Changes in equilibrium

- Which factors do affect the allocation of each curve?
- How changes in these factors affect the equilibrium  $(Y,P)$ ?
- How does fiscal expansion affect the equilibrium?
- How does monetary expansion affect the equilibrium?
- How does foreign shocks affect the equilibrium?

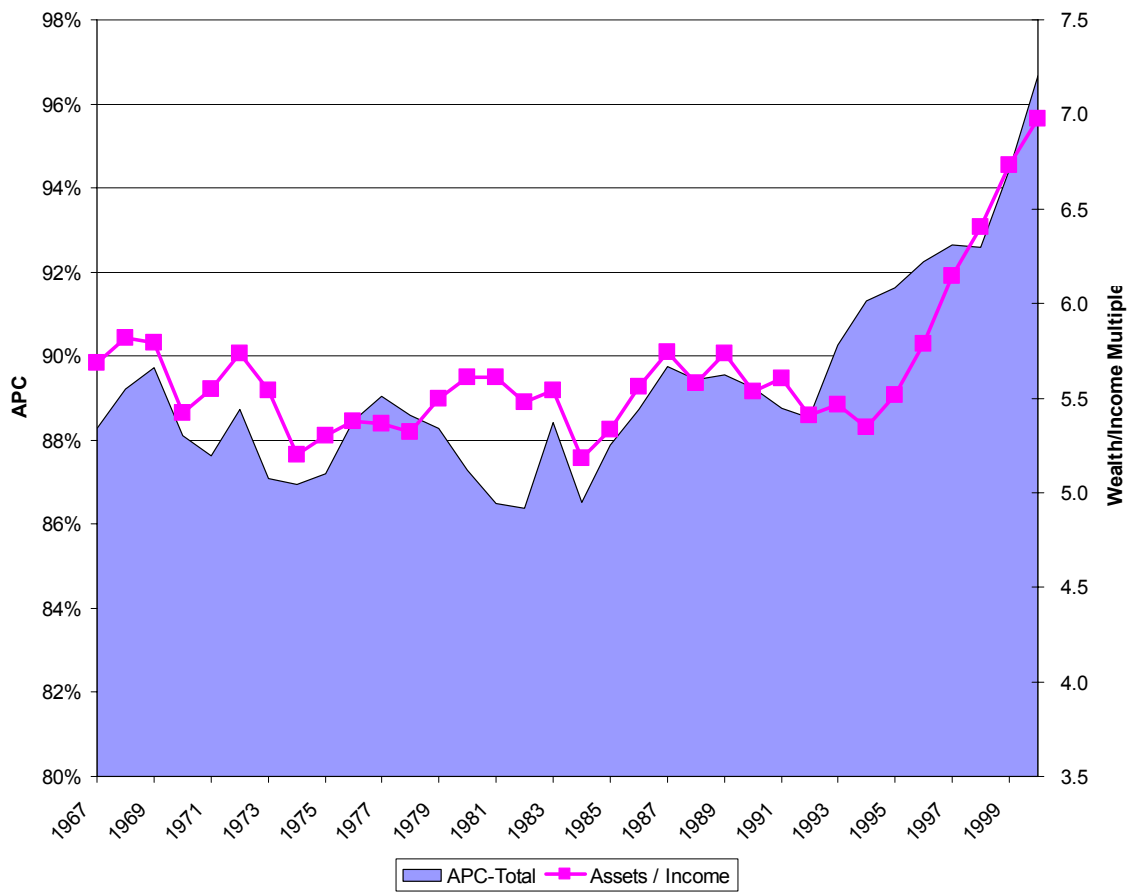
## 9. Consumption and Housing

### 9.1. *The Life Cycle and Permanent Income Hypotheses*

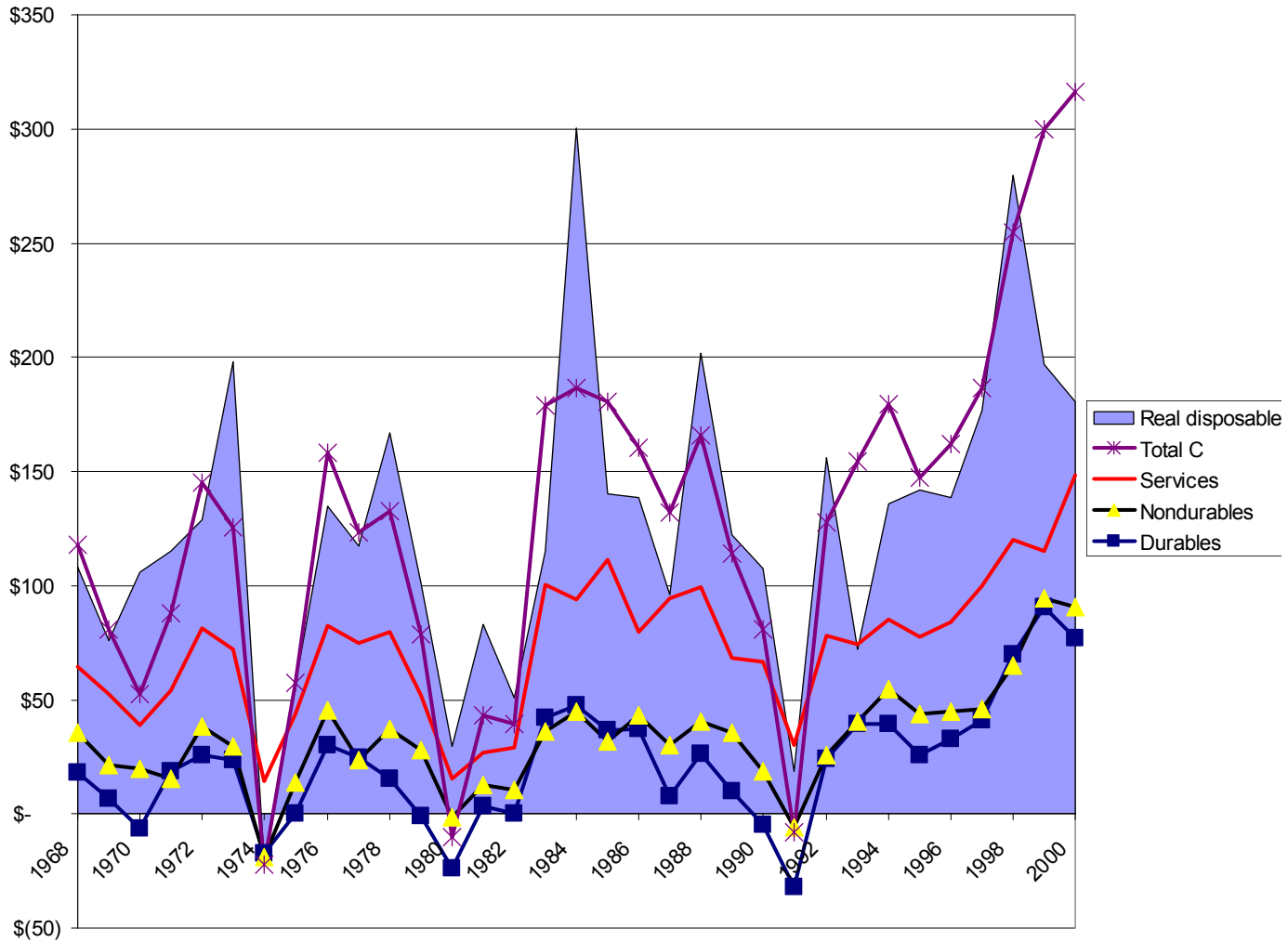
- A rational consumer would:
  - Try to smooth her future consumption based (positively) on her expected total wealth.
  - Increase large purchases (i.e., housing) when finance is cheaper.
  - Account for the “free” retirement income from employer or government.
  - Increase saving (decrease consumption) when uncertainty/worry about health and life expectancy.
  - Increase saving (decrease consumption) to satisfy his desires for leaving bequests.
  
- There are two basic economic theories (hypotheses) that recognize and endogenize some of the above effects:
  - **Life Cycle Hypothesis**, by Franco Modigliani from MIT, emphasizes that consumers’ natural planning horizon is their entire life.
  - **Permanent Income Hypothesis**, by Milton Friedman from Chicago, emphasizes that consumers look beyond current income.

- Life Cycle and Permanent Income Hypotheses both:
  - Recognize current consumption choices reflect thinking about **lifetime income** (their **total wealth** rather than income only; see graph below) and spending.
  - Consumers' spending should be **smoothed** from year to year (rather than vary widely from year to year).
  - Predict short-run **MPC < APC**.
  - Expect dissaving in retirement years.

Obvious Wealth Effects:  
APC charted versus Wealth/Income Ratio



MPCs : Annual Changes in C and YD



- Durables are less volatile than income
- Durables are less volatile than non-durables

## 9.2. A Simple Model of Consumption

- A simple consumption model would be of the form:

$$C_t = C(\text{Total wealth}_t, \text{Cost of Consumption}_t, \text{expected remaining life})$$

- Or:

$$C_t = C(Y_t^D, \text{Total future wealth}_t, P_t, r_t, \text{expected remaining life})$$

- Assuming  $P$  is given (zero inflation), therefore,  $r=i$  and  $P$  affects the intercept.
- Therefore, a good specification would be of the following:

$$C_t = c_0 + c_1 Y_t^D + c_3 TW_{t+1}$$

- Or, another helpful characterization would be:

$$C_t = c_0 + c_1 Y_t^D + c_4 Y_{t-1}^D + c_5 d_t TW$$

- In the long-run (steady-state),  $Y_t^D = Y_{t-1}^D$  and  $d_t TW = \kappa Y_t^D$ , therefore:

$$C = c_0 + (c_1 + c_4 + c_5 \kappa) Y^D$$

- Therefore, we can define two different Propensities to Consume:
  - **Average Propensity to Consume (APC):** Level of Consumer Spending / Level of Disposable income-  $C_t/Y_t^D (\equiv c_0/Y_t^D + MPC)$
  - **Marginal Propensity to Consume (MPC):** for any specific time interval = Absolute change in spending / Absolute change in disposal income-  $d_t C/d_t YD (\equiv c_1 \text{ for the short run, and } \equiv c_1 + c_4 + c_5 \kappa \text{ for the long run})$ .
  - **Elasticity of Consumption ( $\eta_{C,Y}$ ):** Percentage change in spending / Percentage change in disposal income ( $\equiv RC/RD = [dC/\Delta Y] / [C/Y] = MPC / APC$ ).
- So if “autonomous consumption  $\equiv c_0$ ” is small enough, then the **long-run MPC=APC**, and therefore, **the LR elasticity is approximately 1**.
- In the “Long-Run”, both APC and MPC appear to be close to 95% for the US in the postwar period.

### *9.3. Housing Demand*

- The spending decision should follow the same concepts discussed for consumer behavior in general.
- One key difference is the “**price**” because a long-lived asset is purchased or rented.
- Another distinguishing factor is the flexibility of timing: a pool of vacant units is always available, therefore price today vs. tomorrow is critical.
- The Price of a New Home =
  - Mortgage payment: rate after tax \* price of home
  - + Operating Costs & Taxes (Permanent Consumption Obligation)
  - + Expected Depreciation/Appreciation

## 10. Business Investment

### 10.1. Core definitions

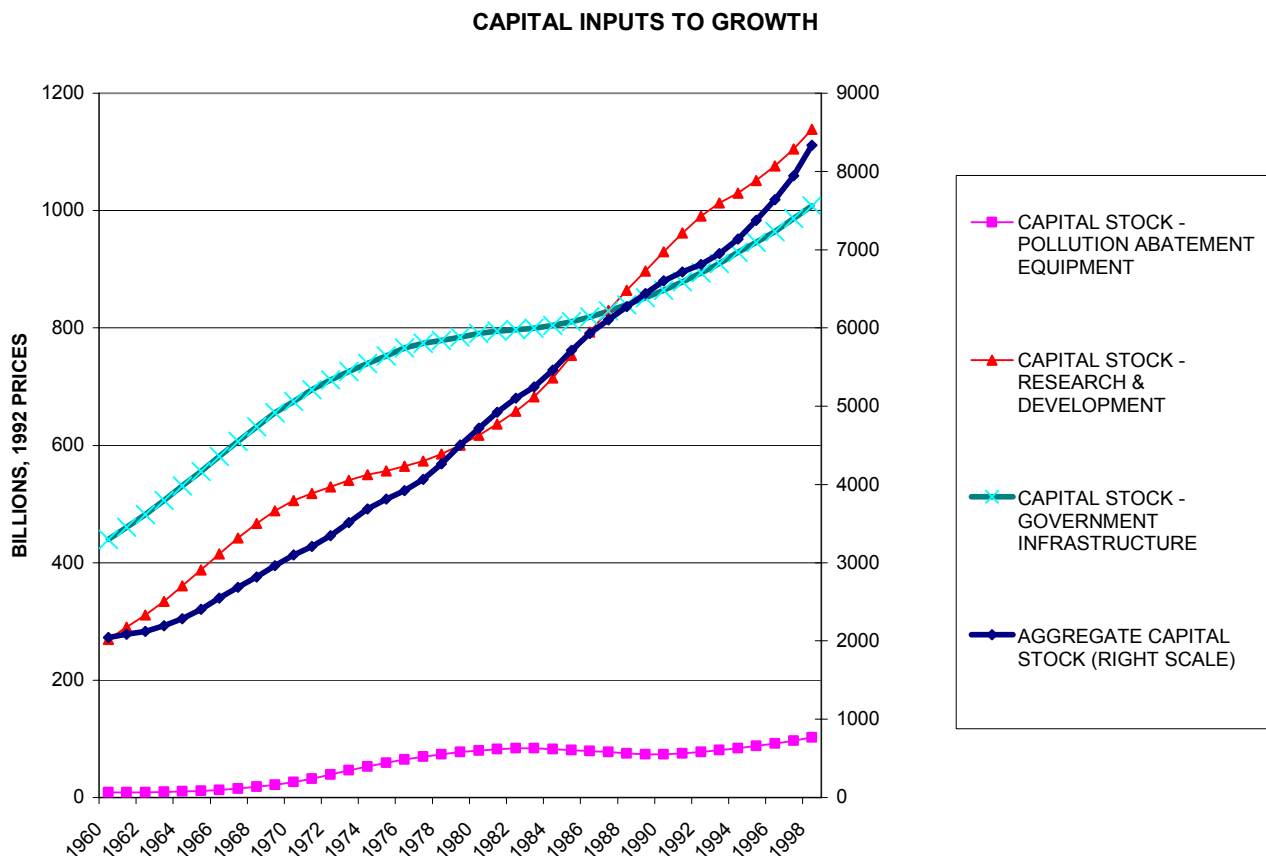
- **I**: is all domestic gross accumulated durable productive goods (like machines, hardware and software) and knowledge (R&D and human capital) by the producers/firms.
- Sometime it includes private new houses (residential investment), as well. Hereby, we would like to analyze only the **business investment**.
- It does **NOT** include “*financial investment*”.
- **D**: is the depreciation- the using up of capital accumulated created in earlier periods through wear, tear, loss, obsolescence and displacement– a.k.a. “Capital Consumption Allowance” (**CCA**).

Capital:	$K_t \equiv K_{t-1} + I_t$ $\equiv K_{t-1} + I_t - D_t$ $\equiv K_{t-n-1} + \sum_{j=t-n}^t I_j - \sum_{j=t-n}^t D_j$
----------	--

- Investing also “means” **forfeiting current consumption** (saving) for higher future consumption. Therefore, investments must be equal to savings. Investing in education may also mean lower current production for higher future production
- The **capacity** created by I is flexible (through variation in shifts, maintenance schedules, etc) so purchase can be *delayed in tough times*.

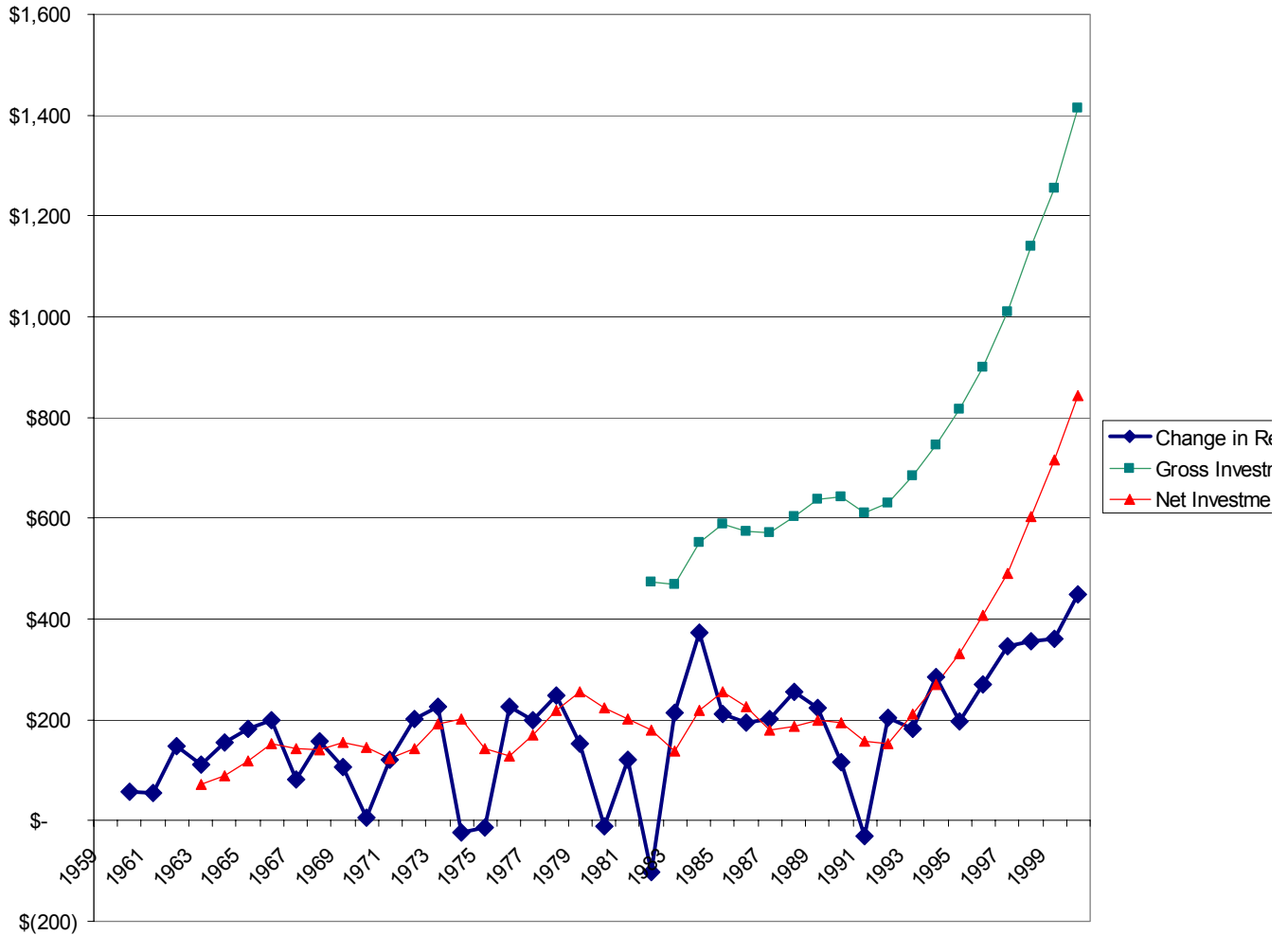
## • Types of Capital

- **Tangible** equipment and structures (narrow definition- such as equipment, buildings and highways).
- **Human**, from brains through brawn (human capital).
- **Technological** (accumulated R&D).
- **Infrastructure**, i.e. tangible goods not owned by one enterprise.



- $K_{US} = GDP_{US}$ ,  $I^N_{US} = dK_{US} = 10\%Y_{US}$ , and that variations in  $Y$  get amplified in variations in  $I$  (unlike consumption, which is smoothed and vary less than the income).

Accelerator Data: Change in Output vs Gross &amp; Net Investment



- Note: Net Investment roughly matches the US change in GDP.
- Recent shift to even higher investment relative to GDP is due to new technology opportunities.
- Variations in  $Y$  get amplified in variations in  $I$  (unlike consumption, which is smoothed and vary less than the income).

## 10.2. A Simple Model of Investment

Assume:

• Optimal capital $\propto$ GNP	$K_t^* = Y_t$
• Depreciation (CCA)	$D_t = d_1 K_t = d_1 Y_t$
Net Investment	$I_{Nt} \equiv d_2 (Y_{t+1} - Y_t)$
• Gross Investment:	$I_t \equiv I_{Nt} + D_t$ $\equiv d_1 Y_t + d_2 (Y_{t+1} - Y_t)$

- **Note:**

- The level of investment is a function of the change (the first derivative) in output;
- The growth of investment (the first derivative) is a function of the acceleration (the **second derivative**) in output (Hence the name- **Accelerator Model of Investment**).
- This simple model assumes  $d_1$  and  $d_2$  are constant.
- $d_2$  is affected by the relative prices and productivity for capital, output and labor determine.  $d_2 < 1$  since capital adjusts gradually (The same reasoning for Okun's law).

### *10.3. The Accelerator Model of Investment*

- Extensions:

1. Assumes  $d_1$  and  $d_2$  are not constant: The production can temporarily rise without adding  $K$  by adding a shift or overtime or delaying maintenance, thus  $d_1$  is not fixed, and new capital- or labor saving technology can be introduced so  $d_2$  is also not fixed.
2. Assuming Cobb- Douglas production function:

$$Y = A K^{\delta} L^{(1-\delta)}$$

$$Y/L = A (K/L)^{\delta}$$

$$\ln Y = \ln A + \delta \ln K + (1-\delta) \ln L$$

- By definition:  $y = A (k)^{\delta}$
- Note:  $0 < \delta < 1$  and “A” may be affected by changing in the technology.
- The functions comply with both properties:
  1. Constant return to scale (the some of the elasticities is one); and
  2. Diminishing return to factors (the coefficients are smaller than one).

- What is the optimal  $K^*$ , and how do we get to there?
- The **real** marginal production of capital (MPK):

$$\text{MPK} \equiv \partial Y / \partial K = \delta A K^{(\delta-1)} L^{(1-\delta)} = \delta * Y/K$$

- The **value** of the marginal production of capital (VMPK)

$$\text{VMPK} \equiv P_Y \partial Y / \partial K = P_Y * \delta * Y/K$$

- The **real** marginal cost of renting capital (MCK):

$$\text{MCK} = R \equiv P_K / P_Y = r + d + \pi,$$

Where:  $r$  is the real interest rate,  $d$  is the depreciation rate, and  $\pi$  is the expected capital value loss.

- The **nominal** marginal cost of capital (VMCK):

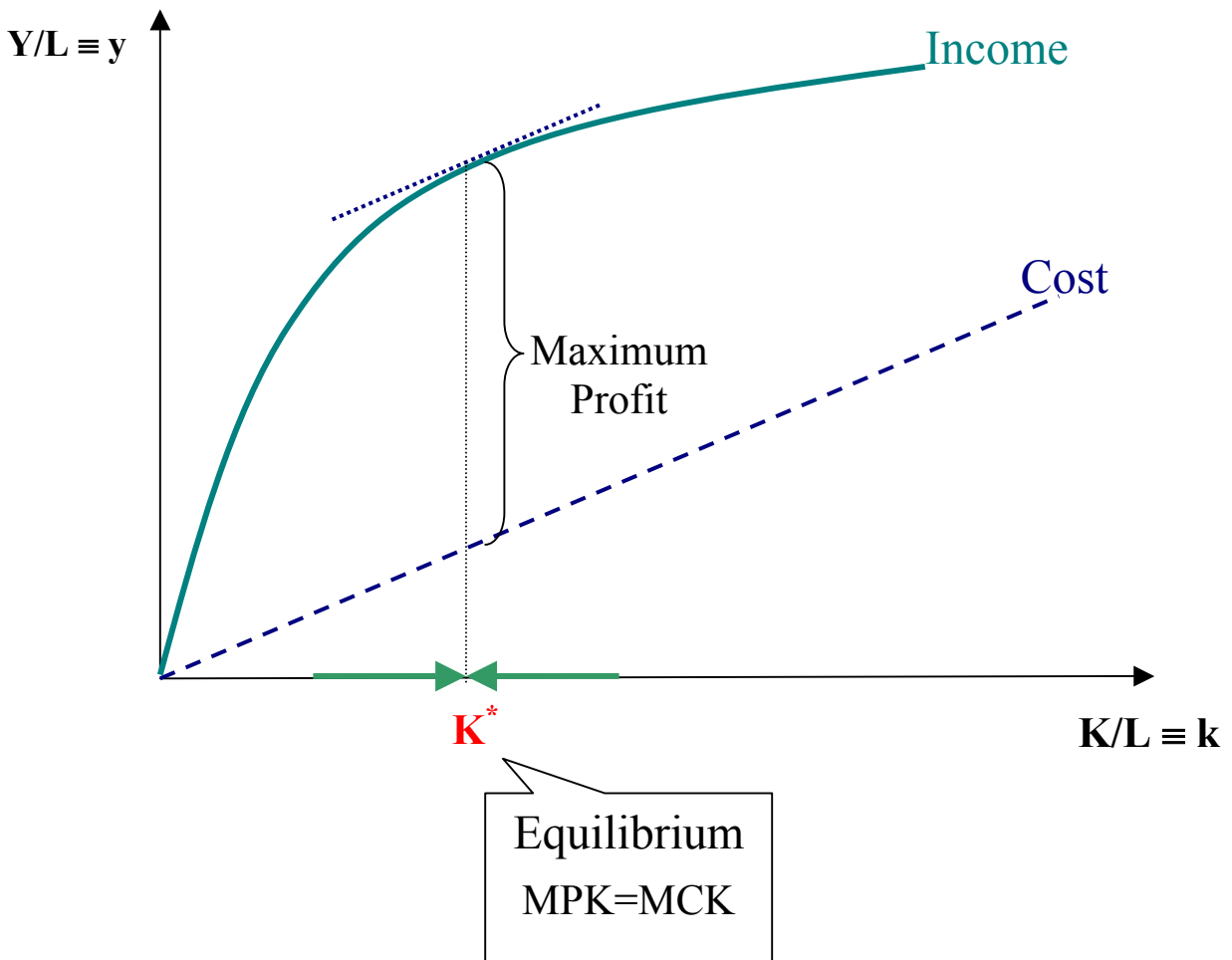
$$\text{VMCK} = P_K$$

- In equilibrium:

$\text{MPK} = \text{MCK}$	Equivalently	$\text{VMPK} = \text{VMCK}$
$\delta * Y/K^* = R$		$P_Y Y/K^* = P_K$
$K^* = (\delta/R) * Y$		$K^* = (\delta P_Y / P_K) * Y$
$k^* = (\delta/R) * y$		$k^* = (\delta A P_Y / P_K)^{1/(1-\delta)}$

- Therefore, we get just like the simple constant coefficient model, except the ratio relates to price.
- $K^*$  is **positively** correlated with productivity, elasticity of output w.r.t. capital, and **negatively** correlated with the real marginal cost of capital, therefore, **negatively** correlated with the real interest rate, depreciation rate and expected capital real value loss.

- What is the optimal  $K^*$ , and how do we get to there?
  - In equilibrium:
    - $MPL = MCL = W$ ; Solve as a function of  $Y, W, R$  and  $\delta, P_y$
  - What is  $\delta$ ?
- $\delta = R K/Y = \text{Capital real income/Total real income.}$
- A graphical exhibition:



# 11. Foreign Trade and Exchange Rates

## 11.1. Openness in Financial Markets

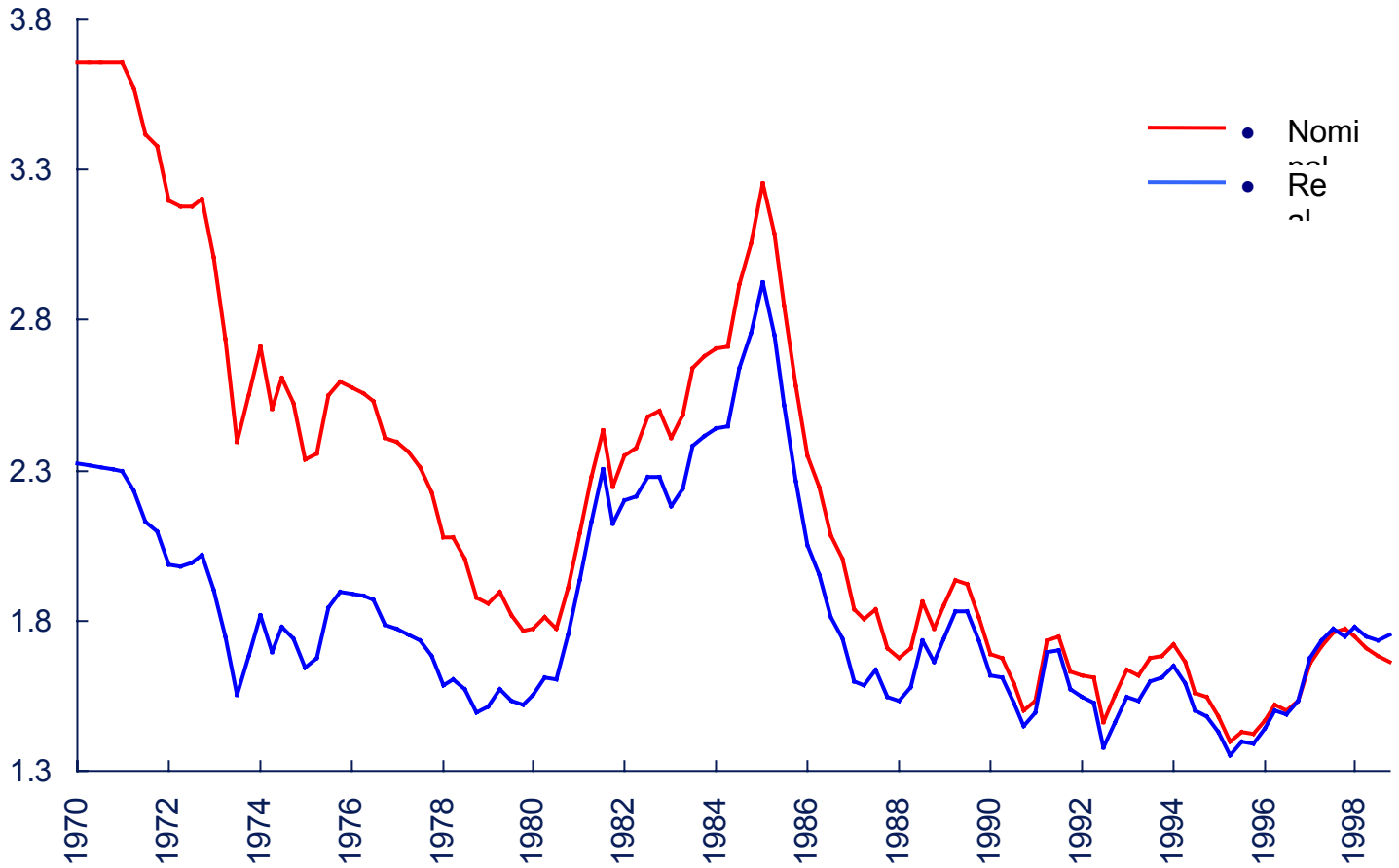
### ● Core Definitions of Exchange Rate

- **Nominal exchange rate (E)** is the price of foreign currency in term of the domestic currency. If the DM1 is equal \$0.5, then the exchange rate is 0.5.
- A **depreciation** of the domestic currency is a decrease in the price of the domestic currency in terms of the foreign currency; which corresponds to an *increase* in the exchange rate ( $E \uparrow$ ). **Appreciation** is the opposite.
- **Real exchange rate (e)** is the price of foreign goods in term of the domestic goods  $\equiv P^*E/P$ .
- Due to *differences in inflation rates* across countries, real and nominal exchange rates can move quite differently ( $E \uparrow \not\Rightarrow e \uparrow$ ). See figure below.

### ● Purchasing Power Parity

- Our domestic products cannot continue to be cheaper than foreign products for very long period (otherwise, foreigners will be move to import all their goods from us), and vice a versa. In other words, in the long run, our GDP purchasing power should be equal to the foreigners' GDP purchasing power. This is what is called the **Purchasing Power Parity (PPP)** condition.
- Biases due to uncertainty or irrationality or lack of information also can break up the basic simple relationship of the PPP.

## Real and Nominal Exchange Rates



- ➔ **Much of the Historic DM Appreciation Has Been an Adjustment for Price Levels**

• **The Interest Rate Parity**

- Therefore, the following arbitrage relation must hold:

$$(1+i_t) = (1+i_t^*) (E_{t+1}^e/E_t)$$

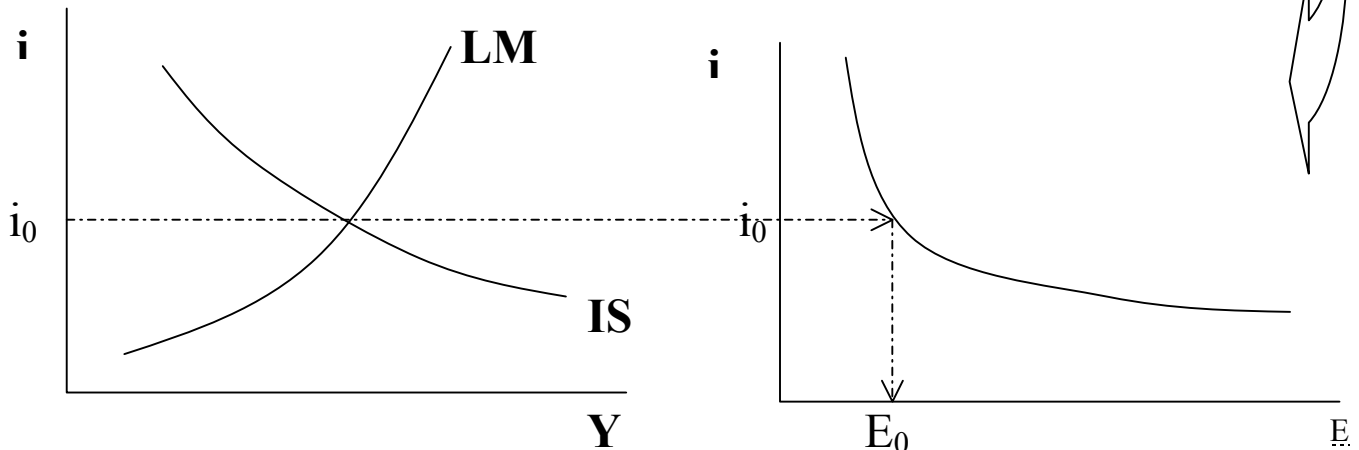
$$\Rightarrow i_t \approx i_t^* + (E_{t+1}^e - E_t)/ E_t$$

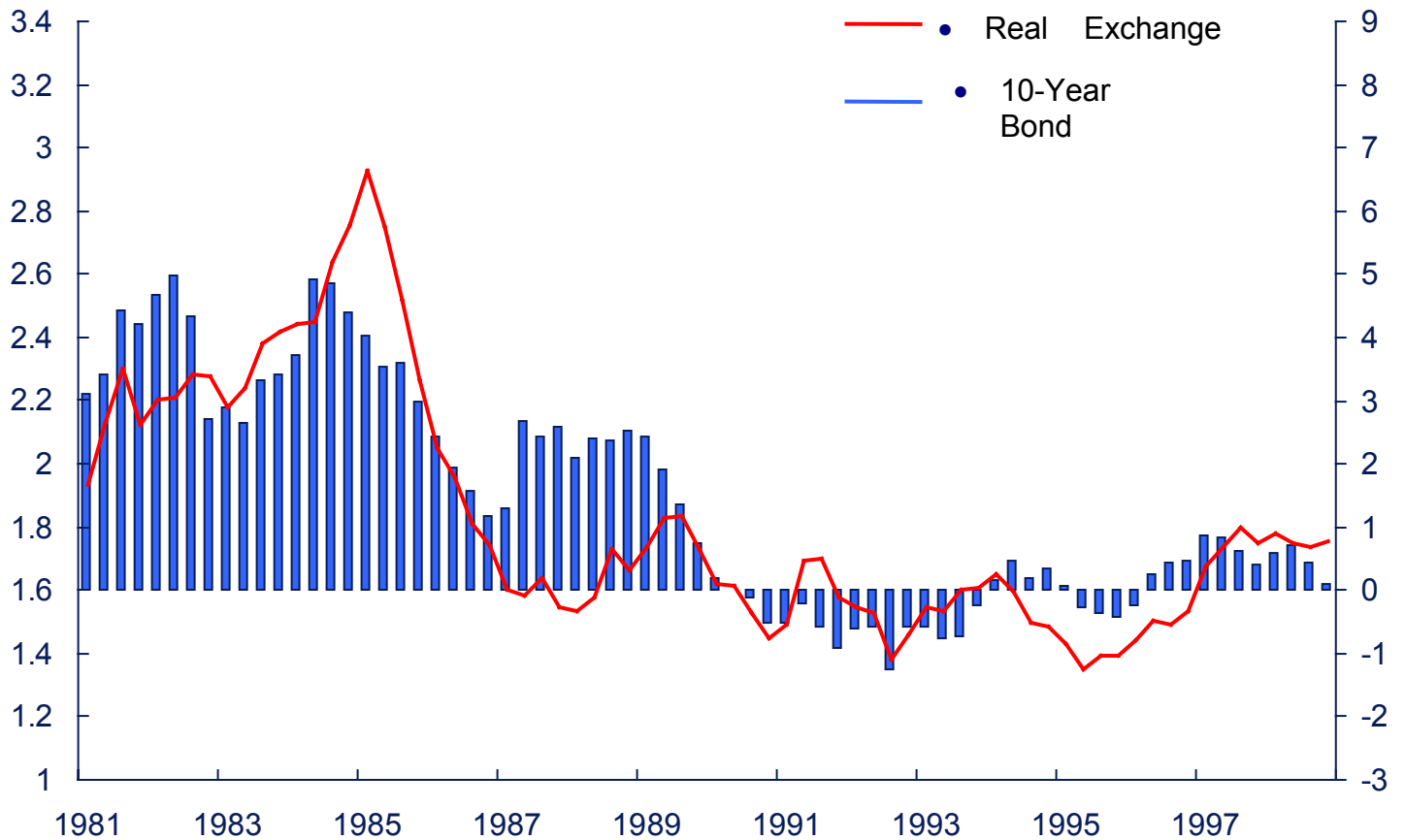
- **The uncovered interest parity:** the domestic interest rate must be (approximately) equal to the foreign interest rate plus the expected depreciation rate of the domestic currency.
- Note, in a **fixed exchange rate** ( $E$  is given), then because exchange rate is not expected to change, interest rate must equal foreign rate, and money supply adjusts to money demand:  $\Rightarrow$  **Fixed exchange rate  $\Rightarrow$  no independent monetary policy affect.**

- The uncovered interest parity also means:  $(i-i^*)=(r-r^*)+(\Pi-\Pi^*)$

$$\Rightarrow E \approx E_{t+1}^e / [1 + i - i_t^*]$$

- In words: given the foreign interest rate and the expected future exchange rate, the equilibrium interest rate from the IS-LM model determines the equilibrium current exchange rate.





**→ Rises / Falls with the Bond Yield Spread (US minus German).**

- **Stronger vs. Weaker Currency**

- *What does it mean “a strong currency”?*
  - ✓ *It means  $\downarrow E$  or  $\uparrow 1/E$ , which means it buys more foreign currency.*
- A strong exchange rate does have some positive effects in the short- and the long-run:
  - It does mean a country can buy other countries goods, services, and assets more cheaply, raising its own relative and absolute standard of living.
  - Depreciating payments to foreigners’ debt.
- However, the fundamental premise is pretty strong: the higher a country pushes its interest rates today, the stronger will be that country’s exchange rate today:
  - The stronger the exchange rate is, the weaker its export quantities and the stronger its import quantities, hence the weaker its real (inflation-adjusted) net exports and the weaker is the economy (*in contract with what would be guessed*)
  - It may also mean a temporarily higher nominal (non-inflation-adjusted) trade deficit.
  - Your assets and products are more expensive; therefore, you are less competitive (e.g., the Argentina case).

## ***11.2. Openness in Goods Markets***

- **Basic Definitions:**
  - **Export (EX)** means physically transferring products (goods and services) to another country. The other direction means **import (IM)**.
  - Opening the goods market has two contradicting effects on our GDP:
    - Increases the demand for our GDP through the **export**.
    - Decreases the demand for our GDP through the **import** (increases **leakage**).
  - **Imported products go for** household consumption (C), government consumption (G), firms' investment (I) and even for later export (EX).
  - The share of any country's C, I, G and EX grabbed by import depends on relative prices, tastes, quotas, and other market restrictions.

### 11.3. Aggregate Demand and Equilibrium

#### Close economy:

$$Y = C + G + I$$

$$Y^* = \frac{1}{\{1 - [(1-t)c_1 + b_1]\}} * \{[c_0 + b_0 - c_1T + G] - [c_2 + b_2] i\}$$

$$Y^* = 1/(1-\beta_c) * A_c$$

Interest rate affects aggregate demand through the E as well

#### Open economy:

$$Y = C + G + I + (EX - M)$$

NX: Net Trade Surplus

$$Y^* = \frac{1}{[1 - (1-t)c_1 + b_1 - m_1]} * \{[c_0 + b_0 + (x_0 - m_0) - c_1T + G] - [c_2 + b_2] i\}$$

$$Y^* = 1/(1-\beta_o) * A_o$$

$$Y^* = 1/(1-[\beta_c - m_1]) * [A_c + (x_0 - m_0)]$$

#### → Therefore:

$\beta_o < \beta_c$  → the AD is flatter.

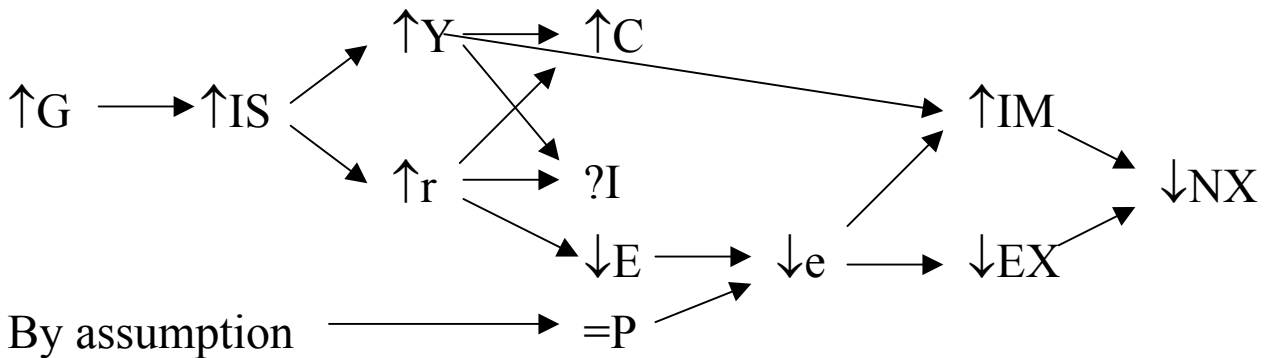
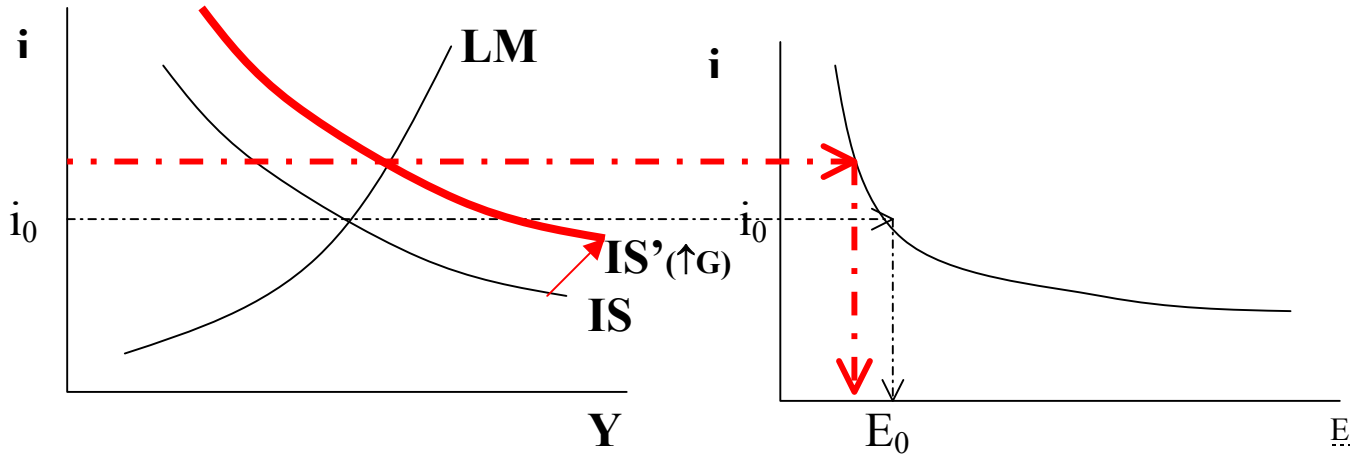
$1/(1-\beta_o) < 1/(1-\beta_c)$  → the multiplier is smaller.

$A_o > A_c$  → the intercept usually is higher.

- *What factors do directly affect export, import and net export in the short and medium run?*
  - $EX = EX(e, Y^W)$
  - $IM = IM(e, Y) = e Q(Y, e)$
  - $NX(e, Y^W, Y) = EX(e, Y^W) - e Q(Y, e)$
- *How does an increase in the export demand (e.g.,  $Y^W \uparrow$ ) affect the NX?*
  - $NX(e, Y^W, Y) = EX(e, Y^W) - IM(e, Y)$
- *How does a fiscal expansion (i.e.,  $G \uparrow$  and or  $T \downarrow$ ) affect the NX?*
  - $NX(e, Y^W, Y) = EX(e, Y^W) - IM(e, Y)$
  - Therefore, starting from trade balance, a fiscal expansion generates, along with the fiscal deficit, a trade deficit => **The twin deficit.**
- *Starting from trade deficit, how can the government reduce trade deficit without reducing output?*
- *Graphical explanations follow from Blanchard, figures 19-1 to 19-4, pp. 362-369.*
- *Why trade deficit is not desirable by governments?*
  - Trade deficit leads to higher future interest rate payment to the rest of the world, since it is financed by foreign debt.

### 11.4. Fiscal, Monetary & Exchange Policies

- What is the effect of a fiscal expansion on the equilibrium  $Y, C, G, I, EX, IM, NX, r$  and  $E$ ?



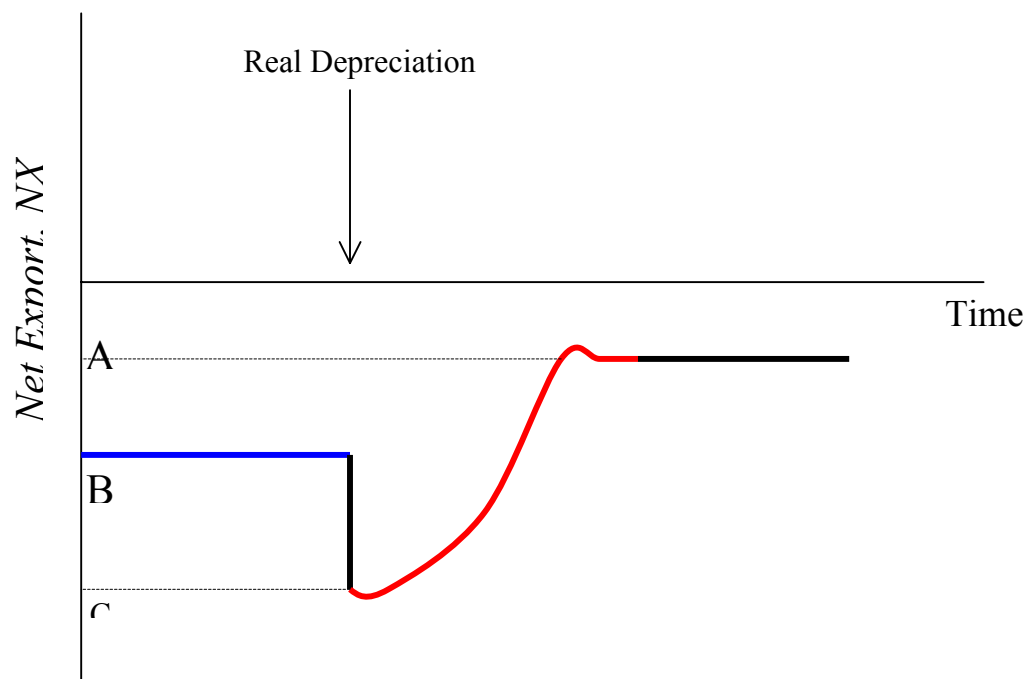
\* In general, we don't know the final effect on C. Here, we assumed that the effect of the GDP dominates the effect of interest rate on the consumption.

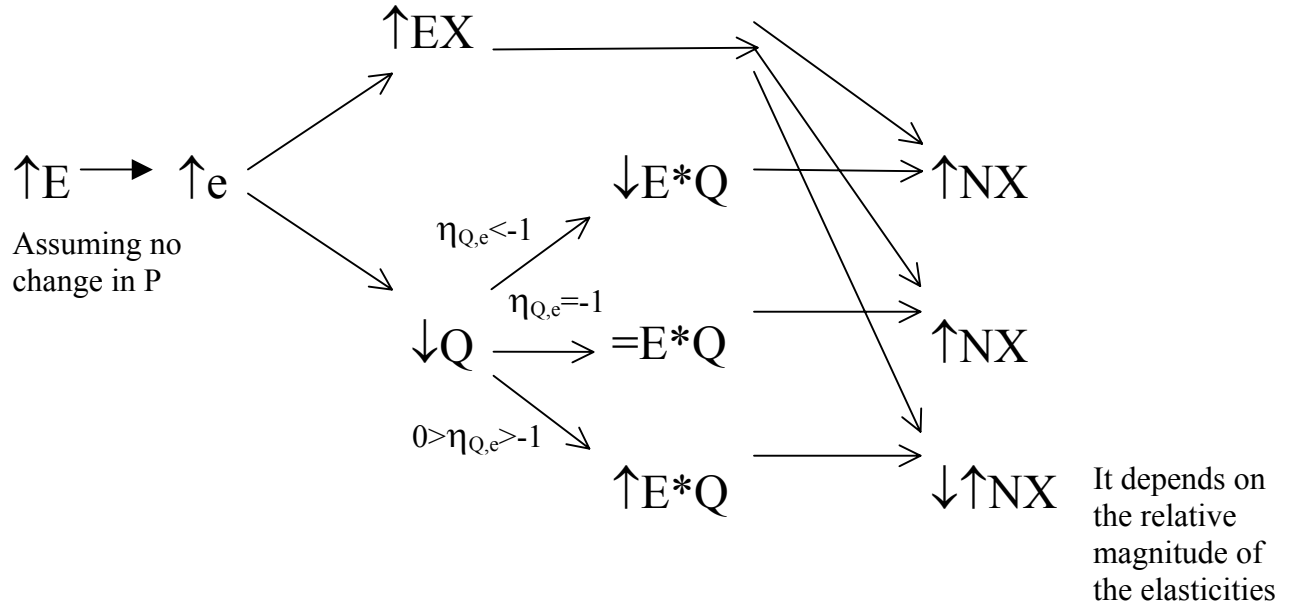
- To summarize:  $\uparrow G \Rightarrow \uparrow Y, \uparrow C, \uparrow G, ?I, \downarrow EX, \uparrow IM, \downarrow NX, \uparrow r, \downarrow E$ .
- What is the effect of a monetary contraction on the equilibrium  $Y, C, G, I, EX, IM, NX, r, E$  and  $e$ ?

$$\downarrow M \Rightarrow \downarrow Y, \downarrow C, =G, \downarrow I, \downarrow EX, \downarrow IM, \uparrow NX, \uparrow r, \downarrow E, \downarrow e.$$

## 11.5. Looking at Dynamic: the J-Curve

- Noting that the quantities of exported and imported goods (EX and IM) adjust slowly over time to changes in the real exchange rate.
- Hence, a real depreciation leads initially to deterioration in the  $NX \equiv EX - eQ(Y, e)$ , then to an improvement of the trade balance, and eventually (under some assumptions) to a net improvement in total (the *J-curve*).
- *What is the implicit condition to eventually get a net improvement? [Hint: see examples with different elasticities] This condition is called the **Marshall-Lerner condition**.*





## 12. Inflation-Unemployment tradeoff: IS-LM in the Long Run

### *12.1. The Link Between Unemployment and Real Output*

- In general, we can state the **Okun's law**:

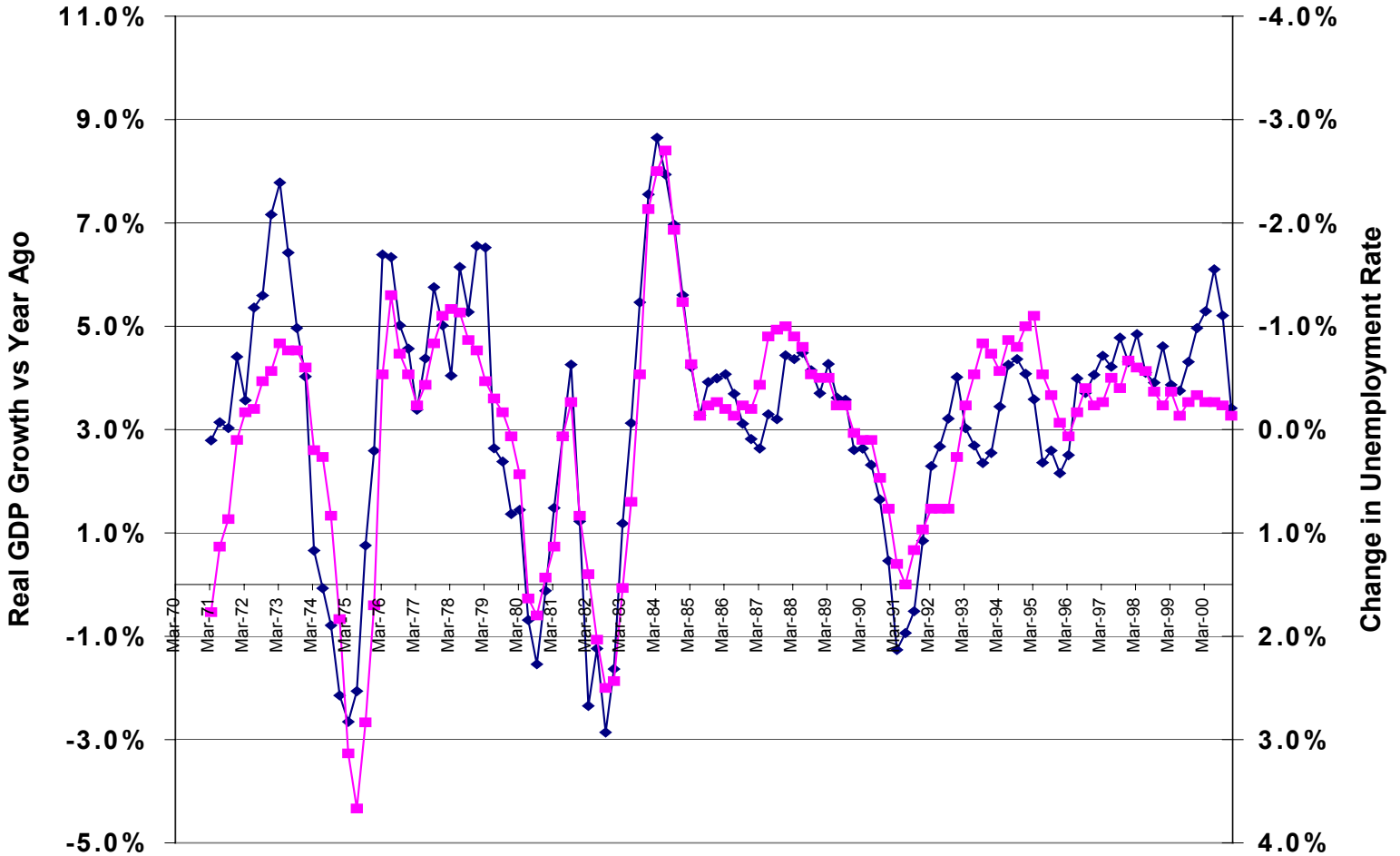
$$RU_t = -\beta [RY_t - (RY)_{avg}]$$

- - There is a cyclical relation between unemployment and real growth: The change in the unemployment is half the growth rate difference between potential and actual GDP growth. Or, the level of unemployment is half the % gap of the potential and actual GDP.
- Next graph provide an evidence as well as an estimate of the above relation:

$$dU = 0.5 (dY - 3\%)$$

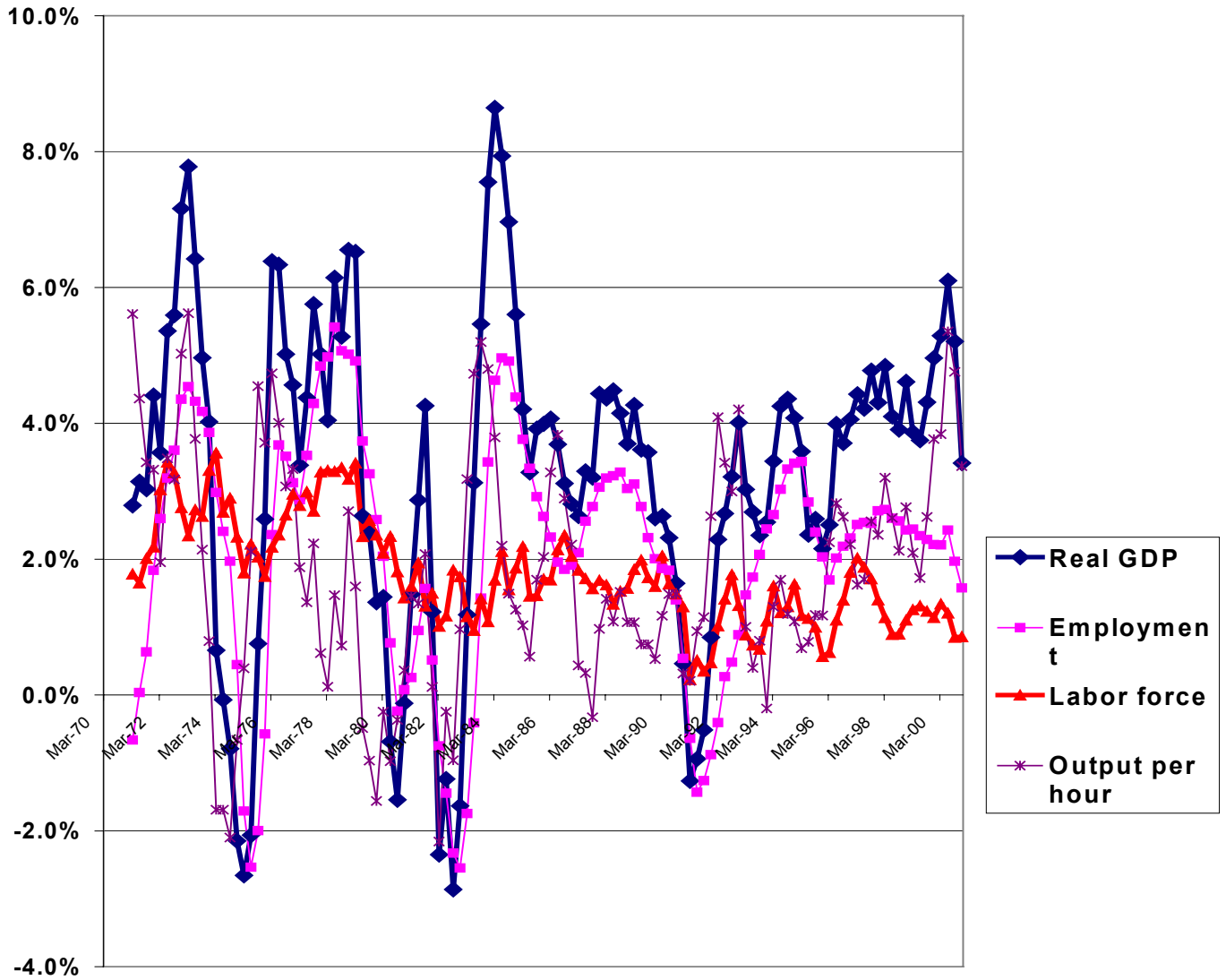
- This means that, GDP growth has to be at least 3% to prevent the unemployment rate from rising. This is because of two factors- both labor force and productivity are growing over time.
- Also,  $\beta < 1$  due to the *partial* adjustment of unemployment to the GDP growth.

### Cyclical Relationships



Note: 3% GDP Growth => No U Rate Change, and Each Extra 1% Growth => 1/2% U Rate Drop

### Cyclical Relationships: Output, Employment, Labor Force



- Note: 1% GDP Growth => Fractionally Higher :
  - Labor Force Growth
  - Employment Growth
  - Productivity Growth

## ***12.2. The Link Between Full Employment, NAIRU and Real Output***

- The unemployment rate reflects the difference between the demand for and the supply of labor.
- The demand for labor is the number of employees (N) needed, with a given productivity (A) (based on the given technology) to produce a given output (GDP).
- or,  $N = \text{GDP} / A$
- The supply of labor is the number of workers (L) actively seeking to work at a given real wage.
- The potential output, given technology, they can produce in a “**Fully Employed Economy**” = when an economy operating at the “NAIRU”, then its output is called “**Potential GDP**” ( $\text{GDP}_{\text{FE}}$ )
- $\text{GDP}_{\text{FE}} = L * (1 - \text{NAIRU}) * A$
- Note that *the NAIRU is a function of different structural factors of the economy*: women participation, technology, subsidy for employers, unemployment benefits, and cultural behavior.

## 13. The Full Links Among: Inflation, Unemployment and Real Output

- The critical and solid relationships are:
  - **Accelerationist Philips curve**: The change in inflation responds (with a negative derivative) to the unemployment rate:

$$RP - RP_{-1} = f(U), \quad f' < 0.$$

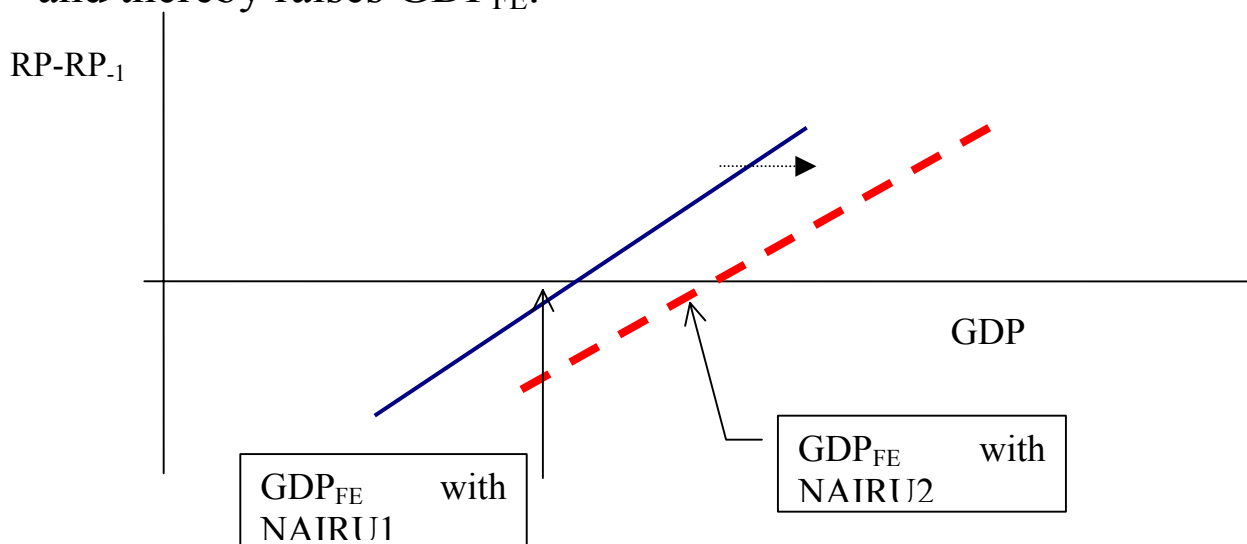
- **Okun's Law**: The unemployment rate responds (with a negative derivative) to the GDP level, given  $GDP_{FE}$ :

$$U = g(Y - Y_{FE}), \quad g' < 0.$$

- Therefore,
  - The change in inflation responds (with a positive derivative) to the GDP level, given  $GDP_{FE}$ :

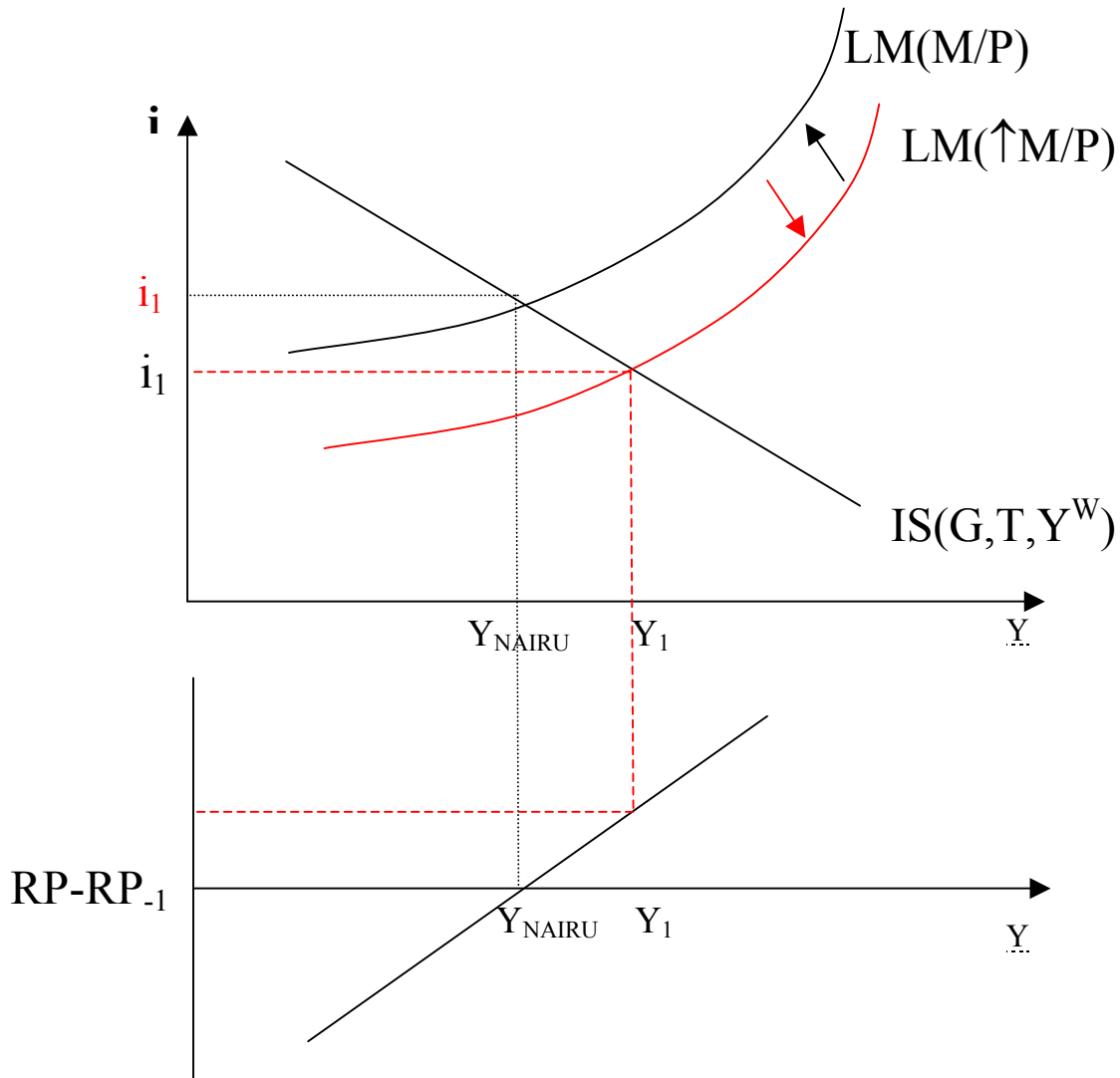
$$RP - RP_{-1} = h(Y - Y_{FE}), \quad h' > 0.$$

- A favorable external shock, such as a drop in oil prices or imported goods prices, effectively reduces the NAIRU and thereby raises  $GDP_{FE}$ .



- **What is the effect of a monetary expansion?**

⇒ Long run money neutrality



- **What is the effect of a fiscal expansion ( $\uparrow G$  or/and  $T \downarrow$ ) in the short and long run?**

## 14. The Bond and Stock Markets

### 14.1. Core definitions

- A bond or a share of stock is an ownership right to a stream of future income
- A **bond** offers a fixed set of **interest** payments and a fixed **principal** repayment at its **maturity**. The credit worthiness of the borrower is critical.
- A **share of stock** is literally a proportional ownership of a corporation. But it **does not guarantee payment** of any **dividend** (the optional, stock equivalent of a regular interest payment) or repayment of the original purchase price, ever. A corporation generates income but may opt not to pay any dividends, reinvesting instead in new corporate projects. Therefore, the only return a shareholder may receive is the price received from another buyer.
- The **yield on a bond** is the interest payment relative to the purchase price. This yield is paid in cash regularly (e.g. annually) and the investor must independently reinvest the cash.
- The “**yield**” **on stock** is less well-defined. The corporation’s board of directors has the right to choose any dividend and to change this payment at any time. Like a bond interest payment, a dividend must be reinvested by the investor. Any current income of the corporation that is not paid as a dividend is retained earnings; these retained earnings are reinvested by the firm in new equipment or product development.

## 14.2. Valuation

- Since, a bond or a share of stock is an ownership right to a stream of future income (cash flow), its value stems from the present value of the expected cash flow (F):

$$S_t = F_t + \frac{F_{t+1}}{(r_{t+1}+1)} + \frac{F_{t+2}}{(r_{t+2}+1)^2} + \dots + \frac{F_T}{(r_T+1)^T}$$

$$B_t = F_t + \frac{F_{t+1}}{(r_{t+1}+1)} + \frac{F_{t+2}}{(r_{t+2}+1)^2} + \dots + \frac{F_T}{(r_T+1)^T}$$

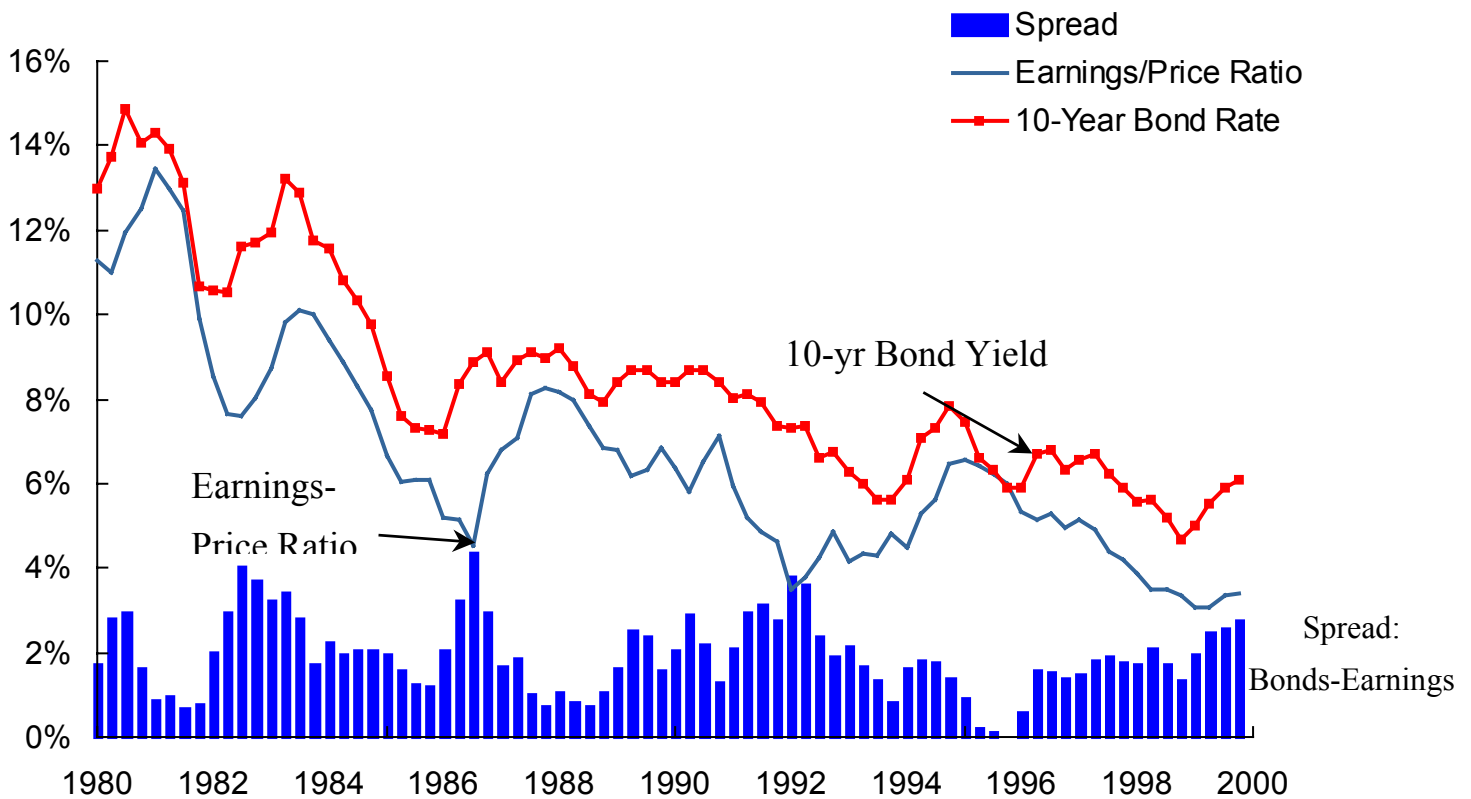
### ***14.3. P-E ratios are now driven by the bond market***

- Given the explosion of interest rates during the 1970s, bonds are no longer viewed as being significantly less risky than stocks:
- Bonds have a *double* inflation risk, while equity investment buys ownership of real assets producing earnings that rise with inflation
  - This change of attitude, plus greater arbitrage, has produced a new, consistent pattern: the E-P ratio tends to trade just under two percentage points below the 10-year US Treasury bond yield.
  - *Expected inflation should be added to the “earnings yield” or E-P ratio to get a comparable return relative to the bond yield. This expected inflation is greater than the observed differential of 1.7% on average, thus a small risk premium is still demanded of stock*
  - A warning: this rule-of-thumb is now widely used, but not widely understood. Permanently lower inflation should narrow the spread between nominal bond yields and earnings-price ratios.

## 14.4. S&P500 Earnings Yields vs Interest Rates

The E/P ratio = the equity yield to be compared to the bond interest rate or yield.

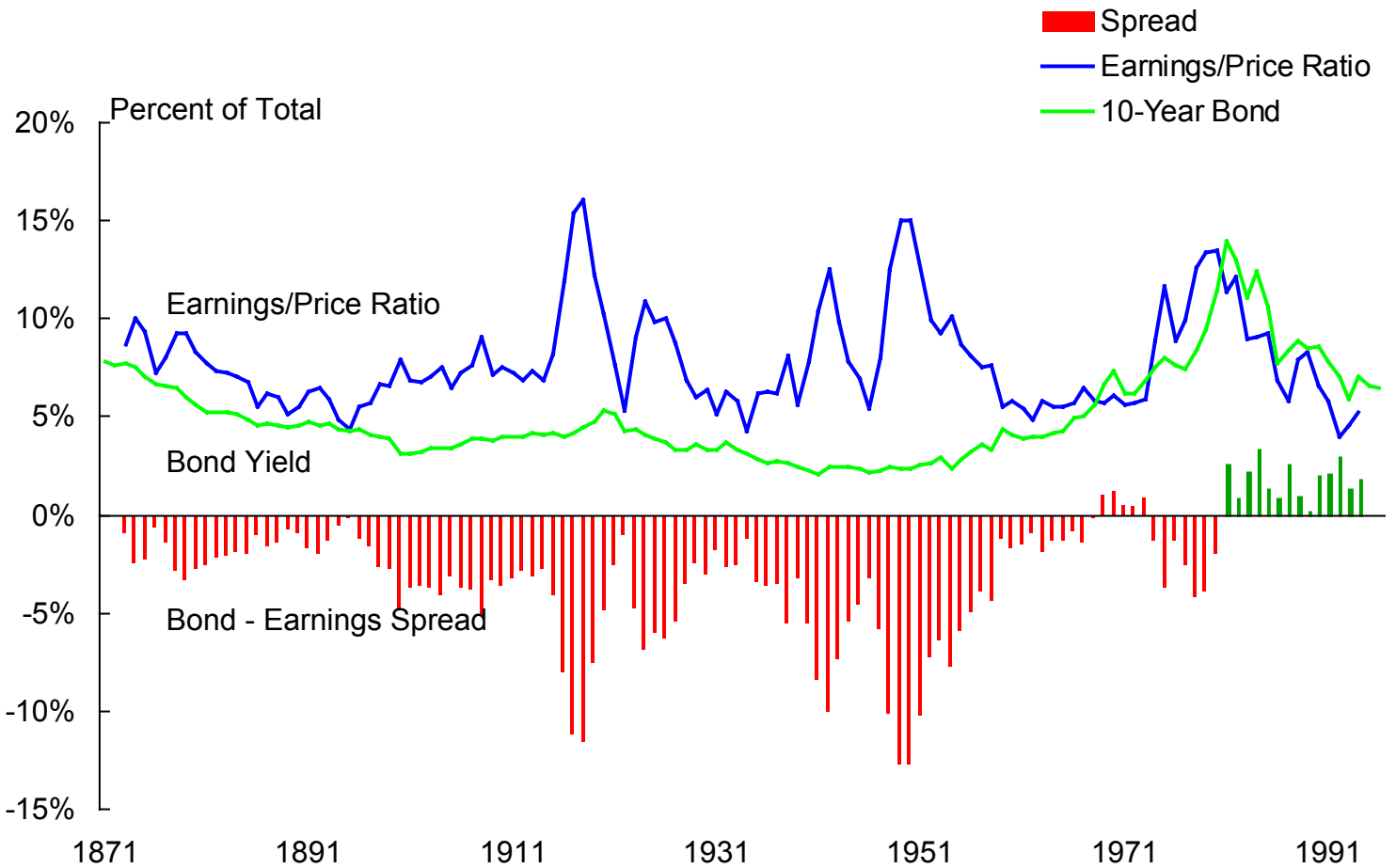
Investors have come to recognize that bonds and stocks are both risky investments, and their competing yields should have a normal spread. Therefore, the equity bull market of the last two decades has been powerfully driven by declining bond yields.



**The earnings-price ratio tracks the bond yield**  
*The bond yield averages 1.75% above the earnings-price yield*

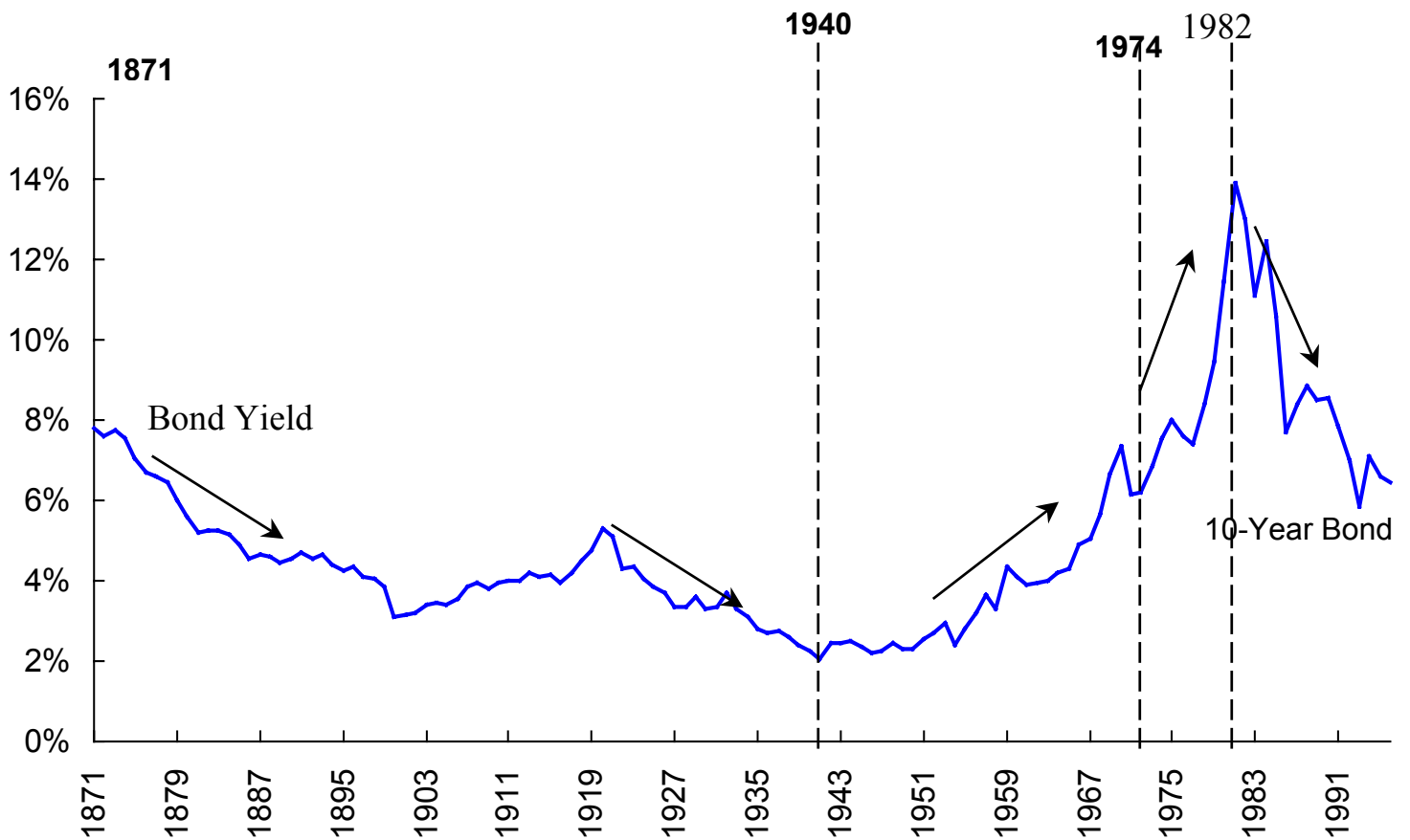
## 14.5. Competing investment yields over 125y

- Competing investment yields over the past 125 years reveal a “sea-change” in 1980-81.



## 14.6. *The Risk of Owning Bonds*

- The Risk of Owning Bonds: An Increasingly Different View After 1940

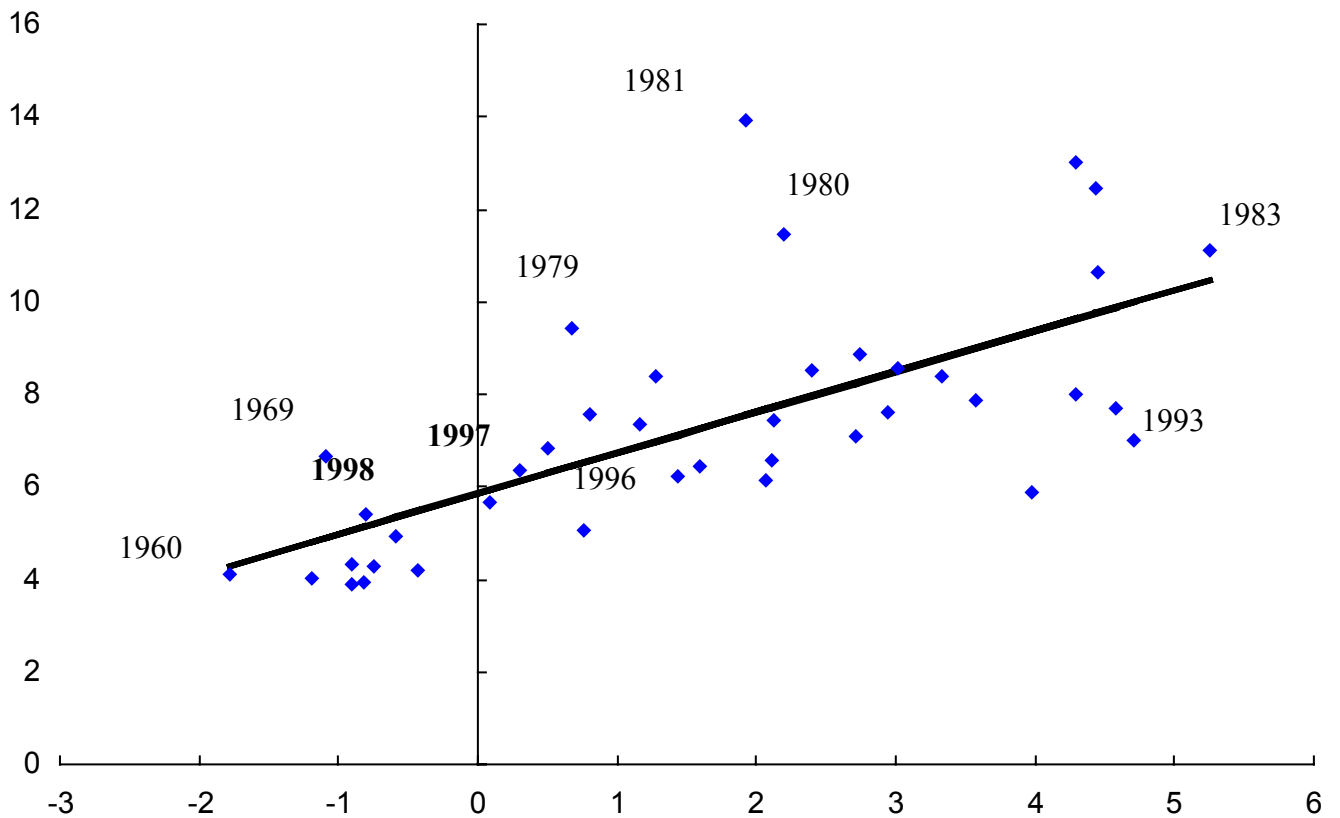


## 14.7. What Drives Bond Yields

- In the Longer-Term, Lower Federal Deficits Bring Lower Bond Yields

**10-Year Government Bond Yield**

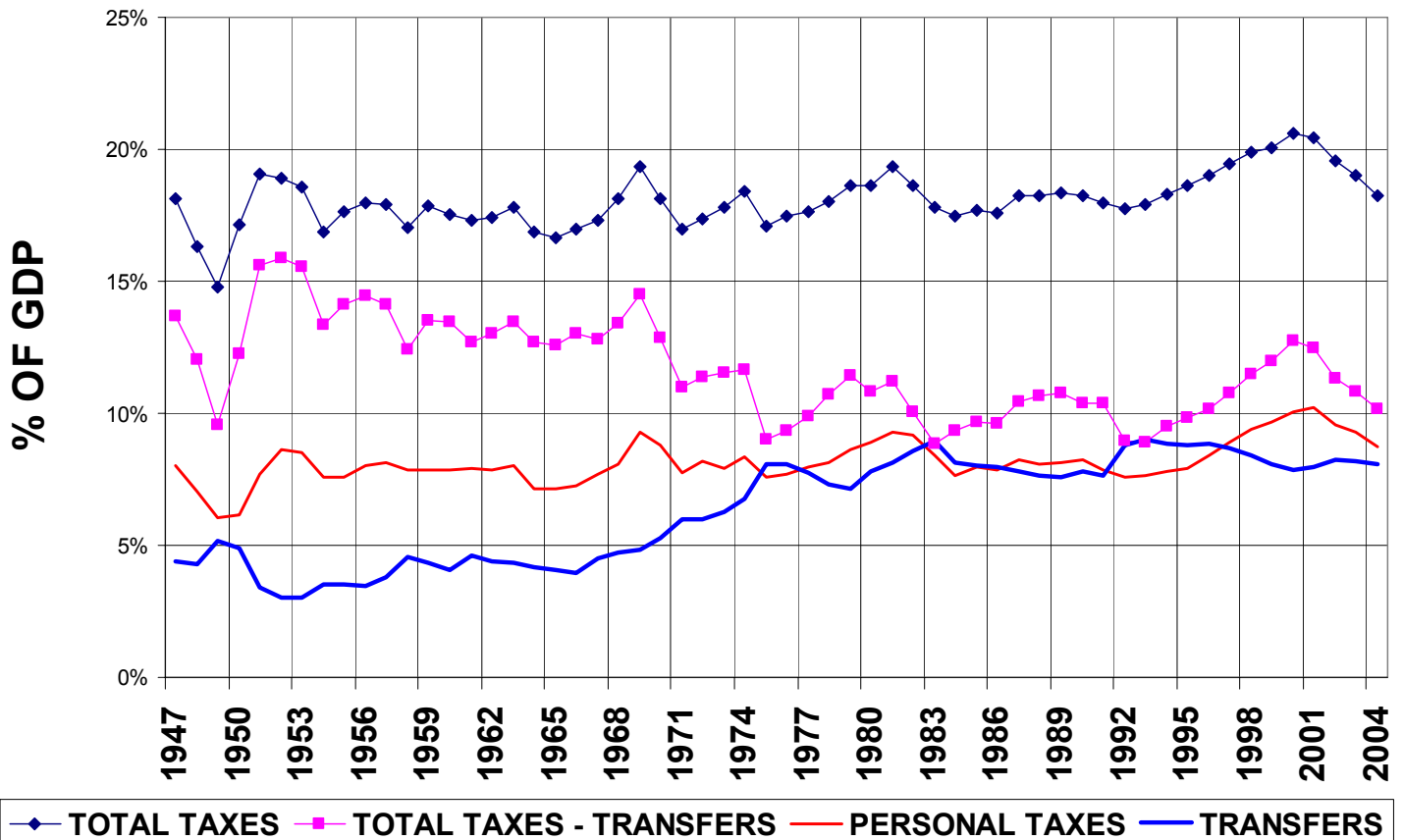
The line is the 1959-96 fitted relationship between yields and deficits



**Federal Deficit as a Percent of GDP**

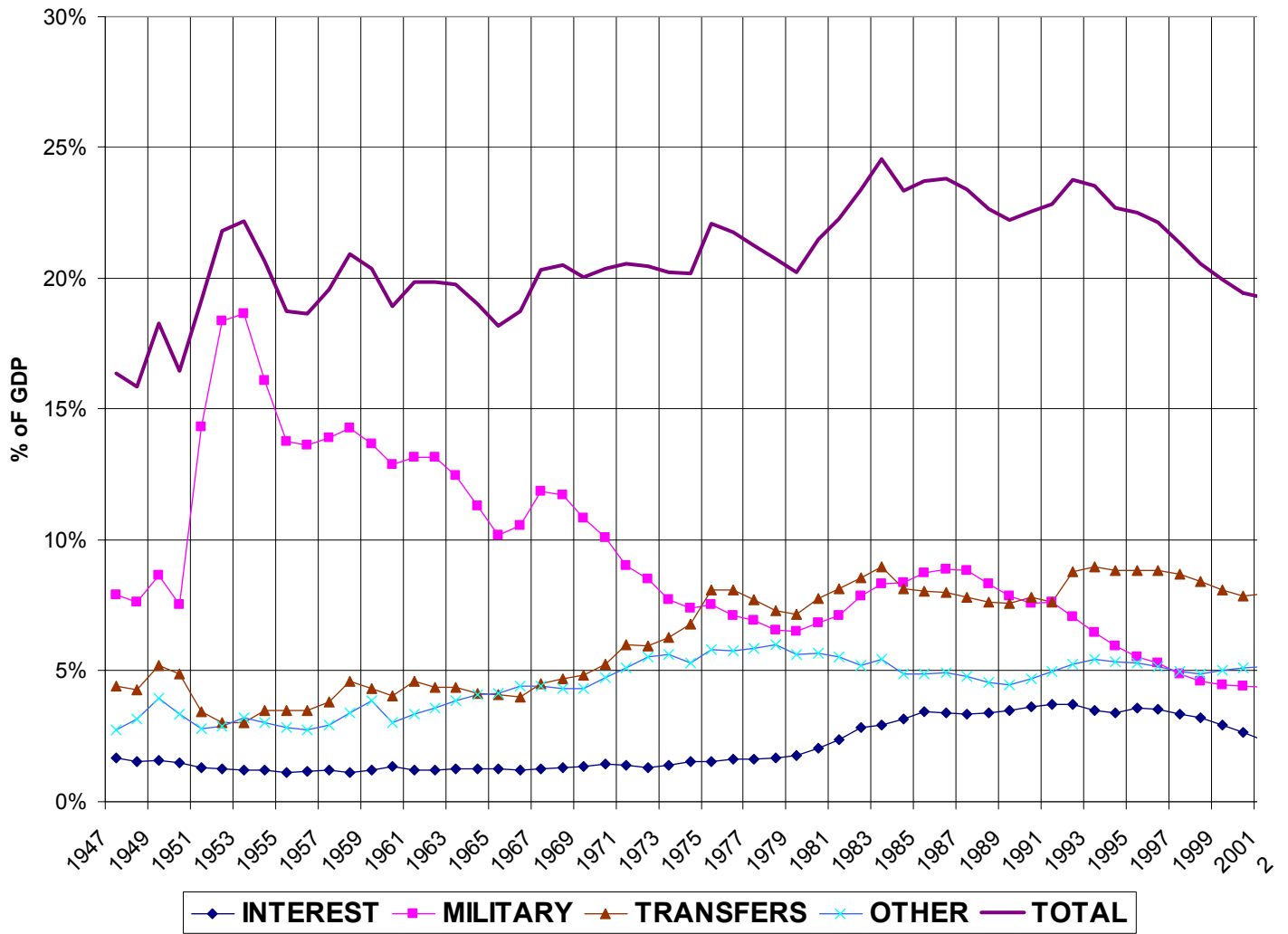
## 15. The Fiscal Policy during the 1990s

### FEDERAL TAXES (NIA BASIS)

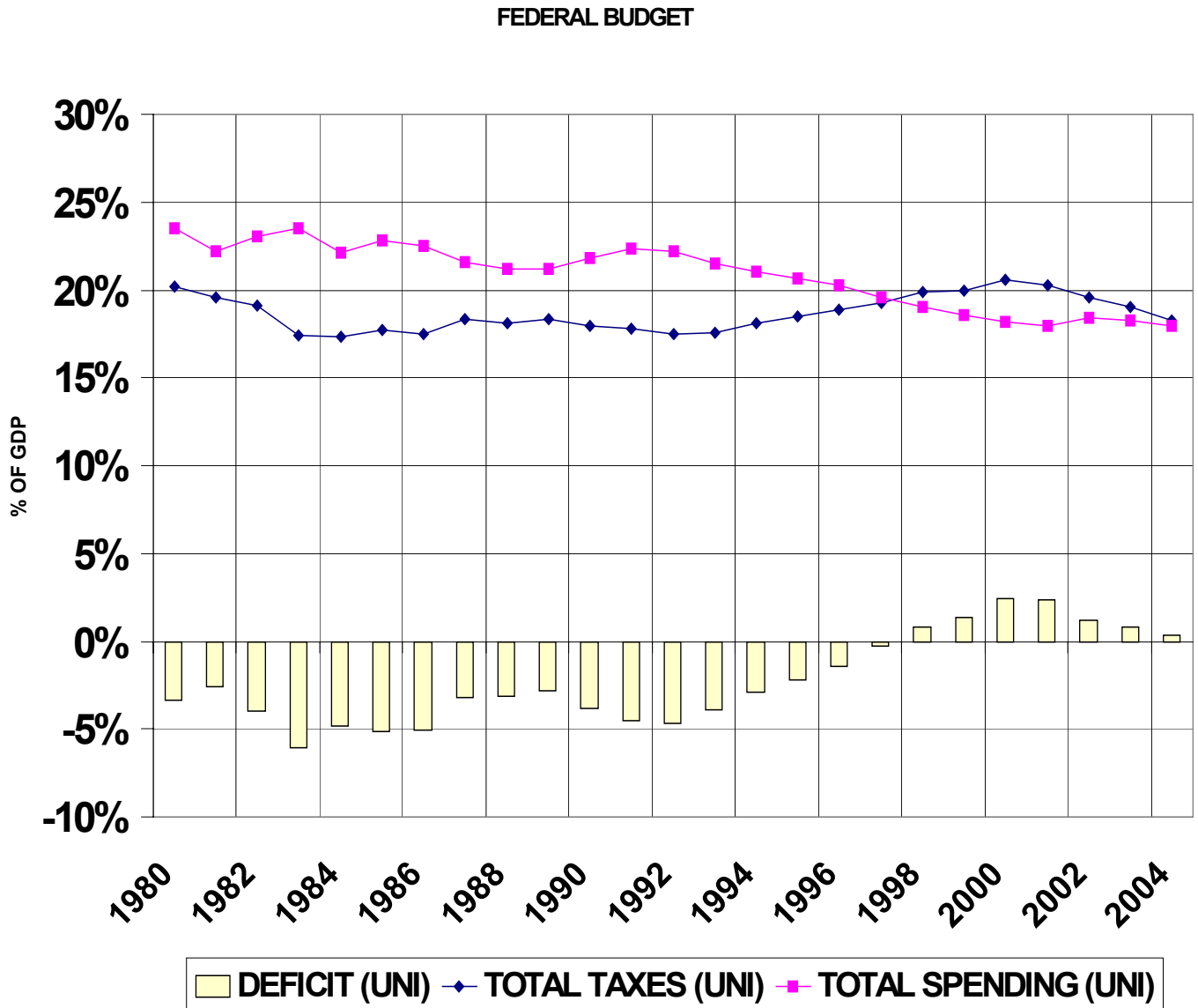


- Taxes have trended up largely to pay for greater entitlements (transfers)
- Taxes less transfers were reduced in the 1970s to prepare for baby-boom retirement
- **The Carter (77-80) and Clinton (92-00) terms saw increased taxes to reduce inherited deficits**

## FEDERAL SPENDING (NIA BASIS)



- **Military spending is now below pre-WWII %'s**
- **Transfers have surged**
- **Other categories rose in the 1960s**
- **Under Reagan, spending rose to a peak of 25%**
- **Military spending surged**
- **The huge deficits raised interest payments**
- **Other categories were cut**



- Note the similar efforts to close the deficit under Carter and under Clinton, by raising taxes and cutting spending
- Note how unusual a surplus is
- The Federal budget tended to absorb 20% of GDP, with a clear upward trend

- After a decade of extreme deficit spending, all three presidential candidates in 1992 promised to move toward a balanced budget in five years
  - Ross Perot promised a blend of tax increases and budget cuts
  - George Bush offered spending cuts but, under pressure from the Republican Party, promised new tax cuts
  - Bill Clinton promised higher taxes and spending cuts in existing programs, but added new spending on education and infrastructure, thereby retaining a deficit
- Clinton, the victor, proposed his campaign program in 1993 but Congress rejected it, favoring more aggressive action to balance the budget
  - The Democrats controlled Congress, but yielded to public opinion to reject delays in balancing the budget beyond a 5-year plan
- In the campaign for the 1994 Congress, the Republicans offered a strict plan they called “The Contract for America”
  - This promised budget balance, welfare reform, and select new tax incentives
  - They won control of the House and Senate and implemented the basics of their fiscal strategy

- During this debate, research groups such as DRI analyzed the impacts
  - The exhibits that follow were produced in late 1994 and early 1995.
  - They reveal the expected outcomes, presenting the mainstream macro-economics position on this debate
  - The exceptional boom of the late 1990s met and often exceeded these expectations:
  - The actual 1995-1998 data and current forecasts through 2002 are added to a few of the slides to precisely compare results with expectations

- Lower Interest Rates Are an Absolutely Logical Impact of Budget Balancing
  - **Interest rates are the “price” of national savings;** when savings are scarce, rates are high, and when savings are plentiful, rates are low.
  - **Scarcity, thus rates, reflect both demand and supply. Budget balancing improves both, creating a double downward pressure on interest rates.**
  - **Obviously, if the federal government is borrowing less, the demand for savings is lower by definition.** The drive toward a balanced budget reduces the annual borrowing (the deficit) and the accumulated borrowing (the debt). The demand for savings is lower, hence rates must be lower too.
  - **If taxes have not been raised to reduce the federal deficit, then private sector saving (supply) will be unchanged, or higher** to the extent that gross income is higher and thus supports more saving.
  - **The Federal Reserve should be expected to expand the supply of funds, without creating any additional inflationary pressure.** First, short-term credit stimulus is needed to offset fiscal restraint so as to keep unemployment from rising. Second, the investment and other genuine supply side stimulants allow the Fed to target more rapid real growth in the economy. Higher real growth in the nation’s supply potential justifies greater liquidity without fear of extra inflation.

- **WE CAN DO BETTER BY:**
  - Diligent pursuit of budget balance can boost real growth rates significantly, adding 2% to national output by 2002.
  - Eliminating the deficit need not cause a recession if the Federal Reserve provides moderately greater liquidity.
  - A virtuous cycle of lower interest rates and lower federal debts ease the challenge of balancing the budget.
  - Welfare reform and tax changes can motivate more citizens to work, contributing to their prosperity and the nation's.
  - Increase capital formation through diligent pursuit of budget balance and lower capital gain taxation.
  - Motivate, not penalize, work effort through tax changes and workfare.
  - Education reform and training efforts can boost productivity of workers who might otherwise face stagnating living standards.

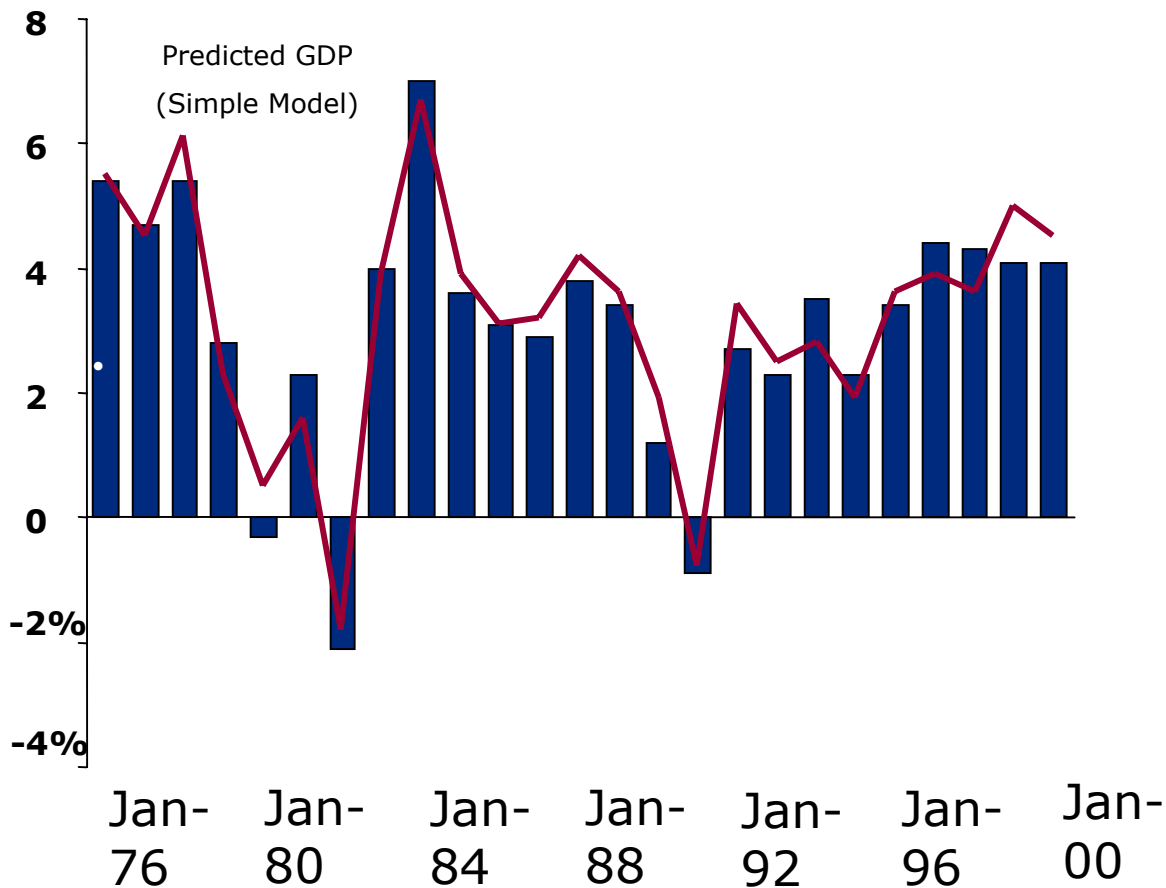
## **16. US Business Cycles: Theory & Practice**

- What Forces Create Major Business Cycles in the United States?
- Generally, do recessions emanate from government policies or private sector decisions?

- The Economic Factors Controlling Growth are Understood:

<b>Simple Model of Real GDP Growth</b>					
Real GDP Growth		Dependent Variable: @PCH(GDP96C)			
		Method: Least Squares			
		Date: 09/24/01 Time: 11:27			
		Sample(adjusted): 1976 2000			
		Included observations: 25 after adjusting endpoints			
Variable	timing	math expression	Coefficient	Std. Error	t-Statistic
		C	<b>0.064</b>	0.021	3.05
Potential Labor Force Growth	lag 1	@PCH(LCFE+LCFE(-1))	<b>0.577</b>	0.504	1.15
Bond Yield	lag 1	RMGFCM10NS(-1)	<b>(0.006)</b>	0.002	(3.30)
Real Oil Price Inflation	current	PCOF/CPI-PCOF(-1)/CPI(-1)	<b>(0.002)</b>	0.001	(2.30)
" " " "	lag 1	PCOF(-1)/CPI(-1)-PCOF(-2)/CPI(-2)	<b>(0.001)</b>	0.001	(1.13)
Real Exchange Rate Apprec.	lag 1	@PCH(REALEXCHIND(-1))	<b>(0.093)</b>	0.062	(1.50)
Real Export Growth		@PCH(EX96C)	<b>0.122</b>	0.073	1.67
Real "G" Growth		@PCH(GF/CPI)	<b>0.401</b>	0.132	3.04
% Point Change in Tax Rate	lag 1	TGF(-1)/GDP(-1)-TGF(-2)/GDP(-2)	<b>(1.583)</b>	0.453	(3.50)
Real Stock Mkt Growth	lag 1	@PCH(JSAPNS(-1)/CPI)	<b>0.035</b>	0.025	1.37
special shock: tax reform		DTAXREFORM	<b>-5%</b>	0.018	(2.87)
special shock: Gulf War		DGULFWAR	<b>-4%</b>	0.012	(3.29)
		R-squared	0.84772	Mean dependent var	
		Adjusted R-squared	0.718868	S.D. dependent var	
		S.E. of regression	1.1%		

## Real GDP Growth



### 10 Key Forces Controlling GDP Growth

- Supply "potential"
  - Growth in labor force and working age population
  - Growth in productivity due to technological advances
- Government budgets
  - Growth in purchases
  - Changes in tax rates
- Financial markets
  - Federal Reserve rates
  - Stock and bond market reactions
- International events and policies
  - Export growth
  - Changes in manipulated commodity prices (e.g. oil)

Each of these factors has a statistically (90%) significant effect on the GDP ( $t_{\text{statistics}} > 1.2$ ), though not fully explains the changes in the GDP alone ( $R^2$  is no close to 1).

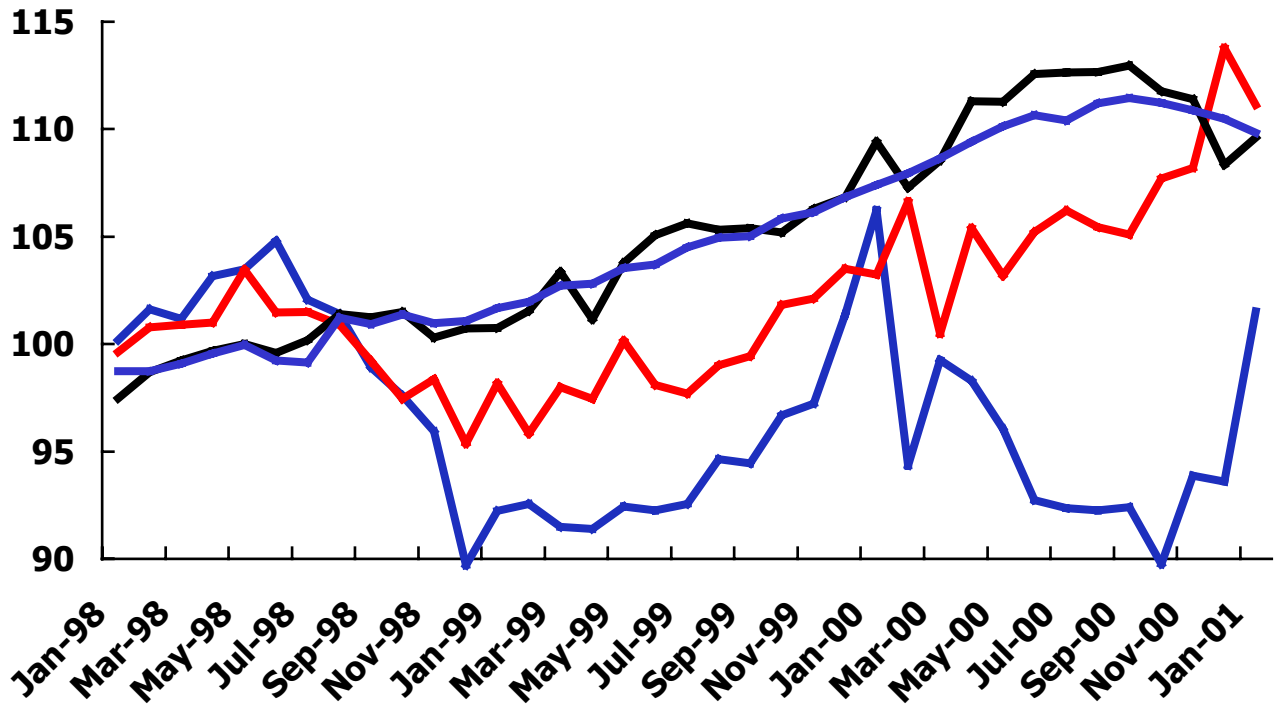
- Before 2001, some observers thought the business cycle was dead.
- It wasn't dead, it was just fitfully sleeping
- The “nirvana” or “goldilocks” economy of recent years was due to:
  - Unusually stable federal government and Federal Reserve policies.
  - A serendipitous balance of international forces
- The private sector follows the wave-makers; it does not lead or cause the cycles.
- Whenever the “wave makers” once again create coincident forces, a major business cycle does re-appear.

# 17. International Growth and Crises: Focus Argentina

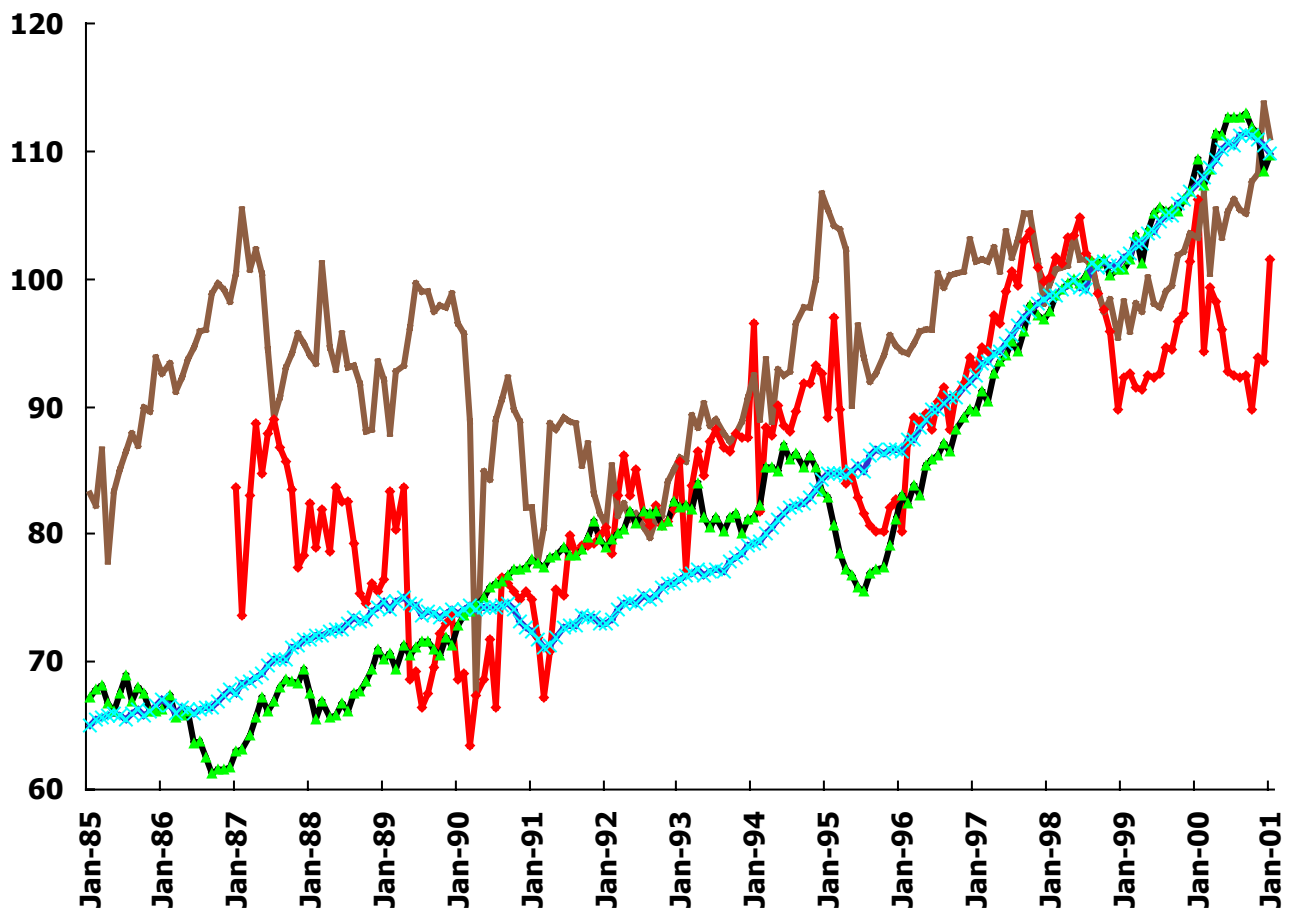
## 17.1. Background

- Fixed the exchange rate at parity with US dollar in 91
- Argentina reformed its institutions in early 90's
- Reforms were successful at
  - ■ Stopping Hyperinflation
  - ■ Restoring International Confidence
  - ■ Cutting the cost of capital
  - ■ Supporting economic growth
    - ■ During 1991-94, Argentina's GDP grew at an average rate of 7%
- But,
  - ■ Reduced the ability of the central bank to respond to business cycles
  - ■ Growth radically stopped in 1999
  - ■ Argentina defaulted on its foreign debt
  - ■ The banking system was critically weakened
  - ■ Social unrest and political instability followed.

- For the past two years, Brazil has largely matched the exceptional US and Mexican performance
- Argentina's output is being suppressed by its uncompetitive currency

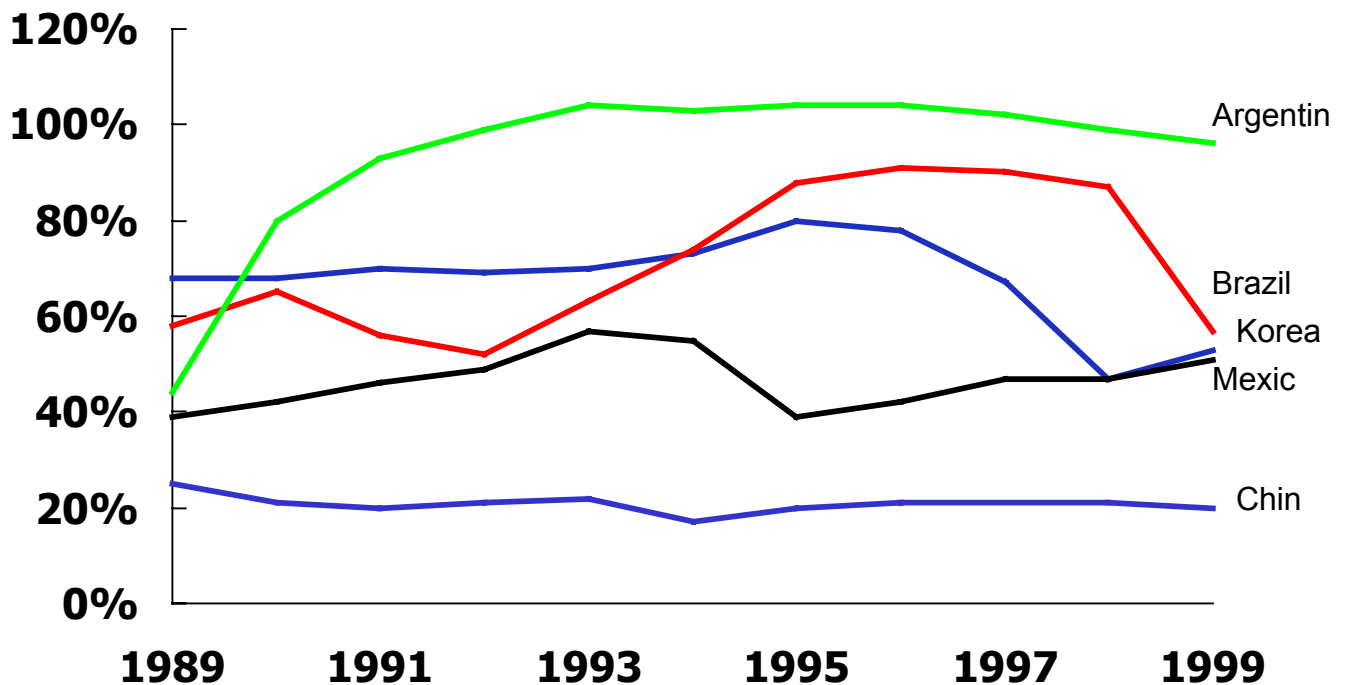


- Latin American growth is heavily dictated by the health of its primary trading partners
  - US recessions are painful
  - Trouble in any major Latin economy creates a burden



## Increased Risk of Devaluation

- China's costs of production are only 20% of those in industrial nations, and 40% of those in large developing nations
- Brazil's long over-valued currency is clearly evident, as is the competitive benefit of the 1999 devaluation. Brazil's exchange rate now implies costs similar to Korea and Mexico. The 1999 Brazil devaluation was devastating for Argentina's competitiveness, and eventually pushed the economy into a deeper recession.
- Argentina's currency, linked exactly to the United States dollar, is at an insurmountable disadvantage. The resultant recession has eliminated inflation in Argentina, but this makes only a meager contribution to competitiveness



## *17.2. Tempering Risks to be Addressed*

- **Brazil and Argentina: Tempering Risks to Be Addressed**
  - Uncertain prospects for local currency values
    - Low domestic saving rates heighten exposure to fickle foreign capital
    - Intense competition among developing nations breeds abrupt and contagious devaluations
    - Argentinean businesses struggle with the currency pegged to the dollar; some flee to Brazil
    - Hedging and borrowing in local currency must be shrewdly pursued
    - However, increasingly modern government practices should build investor confidence over the medium term, supporting eventual appreciation
  - Cyclical risks due to externally-sourced disruptions
    - Unlike the situation for major nations, exchange rate crises can precipitate balance sheet crises, that in turn create domestic recessions
    - The current round of US Federal Reserve-led interest rate increases will curb short-run growth
  - Potential for capital controls and tax changes
    - Global policy makers, in mature and developing nations, now acknowledge a stabilizing role for limited capital controls
    - The need to push for government budget balance may require higher taxes on wages and profits
    - However, these initiatives can build a stronger foundation for sustainable rapid growth

### ***17.3. Main Factors for the Failure***

- **An overvalued fixed exchange rate:** Exchange rate was fixed at too high a level, Argentina exported too little and imported too much. This trade imbalance made it impossible for Argentina to earn the foreign exchange needed to pay the interest on its foreign debt
- **An excessive amount of foreign debt:** Argentina had to borrow to meet interest payments, causing the debt to grow ever larger. The central and provincial governments accumulated mainly foreign debt, eventually reaching 50 percent of GDP.
- **Credibility Reasons:** Policy officials feared that breaking the link to the dollar would send Argentina back to hyperinflation, an erosion of taxes and a widespread bankruptcy due to the dollarization of domestic and foreign debt.
- **Institution reasons:** Unemployment rates went up to 15 percent, but wages did not decline and competitiveness was not achieved because of the resistance of unions to lower wages.
  - This prevented the fall in production costs that could have achieved the same real devaluation without a change in the exchange rate
- **Loss control the fiscal spending and money:** Due to the political situation and the dollarization.

## 18. Conducting Monetary Policy: Overview

### *18.1. The Fed's Mandate*

- Low inflation
- Stabilize economic activity

### *18.2. The right strategies to meet this mandate*

- As a general guideline, it is importance to maintain credibility and consistent vigilance against inflation, because of the importance of expectations:

$$\text{Actual inflation} = \text{expected inflation} - a(u - u_n)$$

### *18.3. The optimal inflation rate*

- **Arguments for eliminating inflation:**
  - Shoe-leather/Menu costs (only with hyperinflation)
  - Tax distortions (e.g., capital gains)
  - “Money illusion”; i.e., people don't understand real v. nominal
  - Inflation variability—higher inflation usually associated with higher variability of inflation, which creates uncertainty
  - Most credible target for central bank
- **Arguments for positive (but small) rate of inflation:**
  - Seignorage (but only with hyperinflation)
  - Option of negative real interest rates
  - Money illusion can help, if wages cuts needed

## 19. The Social Security

### 19.1. How is Social Security Financed

- Pay-as-you-go “**Pay-go**” financing:
  - Today’s retirees benefits are paid for by today’s workers (and employers) via a 12.4% payroll (FICA) tax
- This is not saving!
- Remember: Saving = Private Saving + Public Saving

### 19.2. The “Pay-Go” System’s Problems

- The “Pay-Go” social security system has negative effects on Savings and Capital Accumulation:
  - In any given year, workers are being taxed to finance current retirees. This reduces disposable income that could be used for savings
  - If workers expect they will receive benefits when they retire, then why save?
  - Lower savings leads to lower capital accumulation
  - lower capital accumulation leads to lower output in long-run
- The “Pay-Go” social security system is vulnerable to demographic shifts and may have negative distributional effects across generations.
  - Aging boomers, longer life expectancy spells shortfall
  - Substantial tax increases or benefits cuts would be needed to maintain current system

### ***19.3. The US “Pay-Go” System’s Problems***

- The current US “Pay-Go” social security system is **pending insolvency** due to the expected demographic shifts that will increase the dependency ratio (partly, because of the baby boom).

### ***19.4. Reforming the Social Security***

- The government has to initiate taxes increase and/or benefits cuts and/or shift to “Funded” system.
- Shift to “Funded” system financed (each generation saves for itself) by actual savings dominates in steady-state:
  - Fixes solvency problem—allow/force people to save what they need for their own retirement, and eliminate vulnerability to demographic shifts
  - Can build in re-distributional components to help poor/unlucky
  - Raise savings rate, and therefore output in long-run
- **But transition is costly:**
  - Change to a fully-funded system requires generation(s) of workers to pay not only for current retirees benefits, but also for their own
  - The ability to borrow is limited by concerns about impact on interest rates.
- **We can ease the transition:**
  - i.e., shift some costs to future generations that will enjoy benefits of the new steady-state.