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| **Formula Name**  **Formula Sheet**  Schiller 13e | **Formula Equation** |
| Slope of any line | Vertical distance between two points  Horizontal distance between two points |
| Percent Change | New Value - Original Value  Original value |
| Mid-Point Formula for Percent Change | Change in Price  Average Price    or  P2 - P1  P1 + P2  2 |
| Economic Profit | Total revenue – Total implicit and explicit costs  or  Accounting Profit + Implicit costs |
| Accounting Profit | Total revenue – Total explicit costs  or  Economic Profit – Implicit costs |
| Total Revenue (TR) | Price × Quantity |
| Total Cost (TC) | Variable Cost + Fixed Cost |
| Marginal Revenue (MR) | Change in Total Revenue  Change in Quantity  In perfect competition, MR=Price |
| Marginal Cost (MC) | Change in Total Cost  Change in Quantity |
| Average Total Cost (ATC) | Total Cost  Quantity  or  AVC + AFC |
| Average Variable Cost (AVC) | Variable Cost  Quantity |
| Average Fixed Cost (AFC) | Fixed Cost  Quantity |
| Average Revenue (AR) | Total Revenue  Quantity |
| Per Capita GDP (Average GDP) | Gross Domestic Product  Population |
| Productivity | \_\_\_Output\_\_\_  Unit of Input |
| Market Price and Quantity | The price and quantity where Demanded = Supply |
| Market Shortage | Quantity Demanded – Quantity Supplied  (Qd ›Qs) |
| Market Surplus | Quantity Supplied – Quantity Demanded  (Qs ›Qd) |
| Social Demand | Market Demand ± Externalities |
| Gross Domestic Product (GDP)  or  Aggregate Demand | C + I + G + (X - M)  Where: C= Consumption  I= Gross Investment  G=Government Spending  X= Exports  M= Imports |
| Gross National Product (GNP) | Output produced within a nation’s borders in a given period |
| Nominal GDP | Final output in a given period, measured in the prices of that period  Real GDP ± Price Level |
| Real GDP in year *t* | Nominal GDP in year *t*  Price index  or  GDP Deflator in base year  ×  Nominal GDP  GDP Deflator in year *t*  or  Nominal GDP  ×  100  GDP deflator |
| Chain-weighted Real GDP  in year *t* | \_\_\_Nominal GDP in year *t\_\_\_*  Moving average of price levels |
| Real Value of Income | I0 / (1 + r)t  Where:  I0 = nominal income  r = interest rate  t = number of years |
| Net Domestic Product (NDP) | GDP - Depreciation |
| Gross Investment | Total Investment in a given period |
| Net Investment | Investment – Depreciation |
| National Income (NI) | NDP + Net foreign factor income |
| Total Income | Wages and salaries + Corporate profits + Proprietor’s income  + Taxes on output and imports + Depreciation + Rents |
| Personal Income (PI) | National Income  - Indirect business taxes  - Corporate profits  - Interest and miscellaneous payments  - Social Security taxes  + Transfer payments  + Capital income |
| Total Consumption | C = *a* + *b*YD  Where: C= current consumption  *a* = autonomous consumption  *b* = marginal propensity to consume  YD = disposable income |
| Disposable Income | Personal Income - Personal Taxes  or  Consumption + Savings |
| Labor Force | Employed + Unemployed |
| Labor Force Participation Rate | \_\_\_\_\_\_\_Labor Force\_\_\_\_\_\_  Working age population |
| Unemployment Rate | Number of unemployed people  Labor force |
| Employment Rate | Number of employed people  Working age population |
| Okun’s Law | 1% increase in unemployment = 2% decrease in output |
| Average Propensity to Consume (APC) | \_Total consumption\_\_\_\_  or 1- APS  Total disposable income |
| Average Propensity to Save (APS) | Total savings\_\_\_\_\_\_  or 1- APC  Total disposable income |
| Marginal Propensity to Consume (MPC) | Change in consumption\_\_  or 1- MPS  Change in disposable income |
| Marginal Propensity to Save (MPS) | Change in savings\_\_\_\_\_  or 1- MPC  Change in disposable income |
| Investment | Expenditures on production of new plants/equipment/ structure  +/- changes in business inventories |
| Net Exports | Exports - Imports |
| Equilibrium GDP | The value of total output where Aggregate Supply = Aggregate Demand |
| Item Weight | \_\_Item Total\_\_  Total Budget |
| Percentage Change in CPI/  Inflation Impact | Item weight × Percentage change in price of item |
| Cost-Push inflation | Percentage Increase in Price of an Essential Input (ex/oil)  × Percentage of Total Costs Spent on Essential Input |
| Price Stability | Rate of inflation of less than 3 percent |

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| Growth Recession | A period during which real GDP grows,  but at a rate below the long term trend of 3 percent. |
| Real value of savings at  year-end | Savings balance  Price level at year-end  Price level at year-start |
| Leakages | Consumer saving + imports + taxes + business saving |
| Injections | Business investment + government purchases of goods and services  + exports |
| Actual Investment | Desired Investment + Undesired Investment |
| Multiplier | 1­­­­  1-MPC |
| Total Change in Spending | ×  Multiplier Initial Change in Aggregate Spending  or  ×  Multiplier New Spending Injection |
| Cumulative increase (horizontal shift) in AD | +  New spending injection (fiscal stimulus)  Induced increase in consumption  or  ×  Multiplier Fiscal stimulus (new spending injection) |
| Initial increase in consumption | ×  MPC Tax Cut |
| Cumulative change in spending | ×  Multiplier Initial Change in Consumption |
| Initial fiscal stimulus (injection) | MPC × Increase in transfer payments |
| Desired Fiscal Stimulus | AD Shortfall  Multiplier |
| Desired Fiscal Restraint | AD Excess  Multiplier |
| Cumulative Reduction in Spending | Multiplier × Initial Budget Cut (fiscal restraint) |
| Desired Increase in Taxes/ Reduction in Transfer Payments | \_\_\_\_Desired Fiscal Restraint\_\_\_  MPC |
| Desired Cut in Taxes/ Increase in Transfer Payments | \_\_\_\_Desired Fiscal Stimulus\_\_\_  MPC |
| Budget Deficit | Government Spending – Tax Revenues >0 |
| Total Budget Balance | Cyclical balance + Structural balance |
| M1 (Money Supply) | Currency in circulation + Transaction account balances + Traveler’s checks |
| M2 (Money Supply) | M1 + Savings Accounts + CDs < $100,000 + Money market mutual funds |
| Reserve Ratio | Bank Reserves  Total Deposits |
| Required Reserves | Required Reserve Ratio × Total Deposits |
| Excess Reserves | Total Reserves – Required Reserves |
| Money Multiplier | 1  Required Reserve Ratio |
| Potential Deposit Creation/  Available Lending Capacity of Banking System/  Unused Lending Capacity | Excess Reserves of Banking System × Money Multiplier |
| Yield  (Rate of Return on a Bond) | Annual interest payment  Price paid for bond |
| Bernake’s Policy Guide | ¼ point reduction in long-term interest rate = $50 billion fiscal stimulus |
| Equation of Exchange | MV = PQ  Where:  M=Quantity of money in circulation  V= Velocity of money circulation  P= Average price of goods  Q= Quantity of goods sold in a period |
| Real Interest Rate | Nominal interest rate – Anticipated inflation rate |
| Tax Elasticity of Supply  (using midpoint formula) | % change in quantity supplied  % change in tax rate  q2 – q1  q1 + q2  2  t2 – t1  t1 + t2  2 |
| Labor Productivity | Total Output  Total Employment |
| Growth rate of total output | Growth rate of labor force + Growth rate of productivity |
| Structural Deficit | Federal revenues at full employment – Federal expenditures at full employment |
| Marginal Utility | Change in total utility  Change in quantity |
| Consumer Surplus | Maximum price willing to pay – Price actually paid |
| Utility-Maximizing Rule | Mux = MUy  Px = Py |
| Price Elasticity of Demand (E)  (using midpoint formula) | % change in quantity demanded  % change in price  or  q2 – q1  q1 + q2  2  p2 – p1  p1 + p2  2  If:  E>1 Elastic  E<1 Inelastic  E=1 Unitary Elastic |
| Cross-Price Elasticity of Demand  (using midpoint formula) | % change in quantity demanded of good X  % change in price of good Y  or  Xq2 – Xq1  Xq1 + Xq2  2  Yp2 – Yp1  Yp1 + Yp2  2  If:  E>0 Goods are substitutes  E<0 Goods are complements |
| Income Elasticity of Demand  (using midpoint formula) | % change in quantity demanded  % change in income  or  q2 – q1  q1 + q2  2  Income2 – Income1  Income1 + Income2  2  If:  E>0 Normal Good  E<0 Inferior Good |
| Price Elasticity of Supply  (using midpoint formula) | % change in quantity supplied  % change in price  or  Qs2 – Qs1  Qs1 + Qs2  2  p2 – p1  p1 + p2  2 |
| Marginal Physical Product (MPP) | Change in total output  Change in input quantity |
| Profit Maximization Rule | Operate where MR=MC |
| Profit per unit | p – ATC |
| Shut Down Point | P = Minimum AVC |
| Short-Run Competitive Equilibrium | p = MC |
| Long-Run Competitive Equilibrium | p = MC = Minimum ATC |
| Marginal Cost Pricing/  Price Efficiency | When P = MC |
| Concentration Ratio | Output produced by the largest firms (usually 4)  Total industry output  If over 60%, then the industry is an oligopoly |
| Market Share | Output produced by a single firm  Total market output |
| Expected Payoff of an Oligopolist’s Price Cut | [Probability of rivals matching × Size of loss from price cuts]  + [Probability of rivals not matching × Gain from lone price cute] |
| Herfindahl-Hirshman Index (HHI) | Share of  Firm 1  Share of  Firm 2  Share of  Firm *n*  2  2  2  +  +  *n*  **∑ =**  i=1 |
| Production Efficiency | P = Minimum of ATC |
| External Costs | Social Costs – Private Costs |
| Social Welfare Maximization Rule | Operate where Social Marginal Costs = Marginal Revenue (or Price) |
| Optimal Rate of Pollution | Marginal cost of pollution abatement  Marginal benefit of pollution abatement  = |
| Countercyclical Payment | (If Market Price < Comodity Price)  Target Price for Comodity - Market Price for Comodity |
| Elasticity of Labor Supply  (using midpoint formula) | % change in quantity of labor supplied  % change in wage rate  or  Ls2 – Ls1  Ls1 + Ls2  2  w2 – w1  w1 + w2  2 |
| Marginal Revenue Product (MRP)/  Firm’s Labor Demand | Change in total revenue  Change in quantity of labor  or  Marginal Physical Product × price |
| Cost Efficiency | Marginal physical product of an input  Cost of an input |
| Marginal Wage | Change in total wages paid  Change in quantity of labor employed |
| Union Wage Goal | Desired level employment is where:  Marginal Wage = Labor Supply |
| Marginal Factor Cost (MFC) | Change in total costs  Change in quantity of factors employed |
| Monopsonist Employment Decision | Will hire the quantity of laborers where:  Marginal Factor Cost (MFC) = Labor Demand |
| Profit Maximizing Level of Input Use | =  Marginal revenue product of input (MRP)  Marginal factor cost of input (MFC)  or  (for labor only)  MRP = Wage Rate |
| Risk Premium | Rate of return on safe investments - Rate of return on risky investments |
| Present Discounted Value (PDV) | Future payment N  N  (1 + Interest rate)  where N = number of years into the future when a payment is to be made |
| Expected Value | 1. Risk factor) × Present discounted value |
| Dividends | Corporate Profit – Retained Earnings |
| P/E Ratio | Price of stock share  Earnings (profit) per share |
| Implied Rate of Return | Dividend Paid per Share  Price of a Share |
| Current Yield | Annual interest payment  Market (resale) price of a bond |
| Income Share | Income received by a particular group  Total income |
| Taxable Income | Gross Income – Exemptions and Deductions |
| Nominal Tax Rate/  Average Tax Rate | Tax Paid  Taxable Income |
| Effective Tax Rate | Tax Paid  Total economic income |
| Marginal Tax Rate | Tax rate imposed on the last (marginal) dollar of income |
| Tax Revenue | Average tax rate × Tax base |
| Target Efficiency | Income transfers used by intended recipients for intended purposes  Total income transfers |
| Welfare Benefit | Maximum benefit – 2/3(wages) |
| Breakeven Level of Income | Basic benefits  Marginal tax rate |
| Social Security Earnings Test/ Benefit Amount | Maximum Award - .5(wages in excess of the ceiling) |
| Trade Balance | Exports – Imports  Exports > Imports = Trade Surplus  Exports < Imports = Trade Deficit |
| Dollar Price of Good X | Price of good X in foreign currency × Dollar price of foreign currency |
| Current Account Balance | Trade balance + Unilateral transfers |
| Capital Account Balance | Foreign purchase of U.S. assets – U.S. Purchase of foreign assets |
| Net Balance of Payments | Current account balance + Capital account balance = 0 |
| Poverty Rate | Amount of population counted as poor  Total population |
| U.N. Millennium Poverty Goal | Reduce global rate of extreme poverty to 15% |
| U.N. Millennium Aid Goal | Increase foreign aid levels to .7% of donor-country’s GDP |
| Investment Rate | Total Investment  Total Output (GDP) |
| Rule of 72 | Value doubles in:  Annual Percentage Change  72 |
| Future Value Compounding Formula | FV1 = P(1 + r), FV2 = P(1 + r)(1 + r), FV3 = P(1 + r)(1 + r)(1 + r)…  Where:  FV1 = Future Value year 1  FV2 = Future Value year 2  FV3 = Future Value year 3  P= Principal  r = rate  or  P × (1 + r)y  Where:  P= Principal  r = rate  Y= Number of years |
| Misery Index | Inflation Rate + Unemployment Rate |
| Compounding Growth Function | p0 x (1+ r)t  Where:  p0 = the principle value  r = the growth rate  t = number of years of growth |