



IMF INSTITUTE
FOR CAPACITY DEVELOPMENT



Revenue Fundamentals, Fiscal Forecasting, and the Effective Tax Rate Approach

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Outline

- I. Fundamentals of Revenues
- II. Preliminaries for Revenue Forecasting
 - a) Basic approach
 - b) Macroeconomic assumptions
- III. Techniques of Revenue Forecasting I: Effective Tax Rate (ETR) approach
 - a) Effective tax rate
 - b) Proxy tax base
 - c) Forecasting revenues using the ETR

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I. Revenue Fundamentals

- Countries use a combination of revenue sources
 - Tax revenues
 - Non-tax revenues
 - Fees and charges; royalties and rents from public property
 - Profits from state-owned enterprises and central bank
 - Grants

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Tax Revenues: Main Kinds of Taxes

- Direct taxes
 - Taxes on income and profits
 - Payroll taxes (mainly advanced economies)
 - Taxes on property (land, real estate, movable)
- Indirect taxes
 - Sales and value added taxes
 - Excise taxes
 - Export and import duties

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Direct Taxes: Corporate Taxes

- Tax imposed on corporate income (profit)
- Definition of corporate income: Receipts MINUS Expenses
 - Receipts
 - Sales proceeds
 - Profit on any asset sales
 - Expenses
 - Raw materials; cost of goods sold
 - Wages and salaries
 - Rent and maintenance
 - Supplies
 - Depreciation of long-lived assets
 - Interest paid on loans

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Corporate Income Tax: Example

- Revenue: Sales = 1,000
- Expenses = 900
 - Cost of goods/ raw materials = 300
 - Wages and salaries = 300
 - Rent and maintenance = 200
 - Interest on bank loans = 50
 - Depreciation on plant, equipment = 50
- PROFIT = $1,000 - 900 = 100$
- Tax is imposed at a percentage of profit
 - If tax rate = 20%, tax = $20\% \times 100 = 20$

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Corporate Tax Issues

- How to calculate depreciation
 - Many countries assign a “fixed life” to assets
 - Assets are depreciated over that life period
 - Sometimes business may depreciate assets faster (“Accelerated depreciation”)
- Tax holidays: exempting firms from tax on new investments for a certain period
- What expenses can be claimed
 - Charitable contributions?
- Advance (estimated tax) payments

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Direct Taxes: Personal Income Tax

- Personal income tax is levied on “taxable” personal income less allowed expenses
- Taxable personal income usually includes
 - Wages and salaries
 - Proprietors’ income
- Taxable income may include
 - Interest, dividends
 - Capital gains on sales of property, stock

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Personal Income Tax: Example

- Income
 - Wages and salaries = 1,000
 - Interest on bank accounts = 100
- Deductible expenses
 - Interest on housing loan = 100
 - Charitable contributions = 50
- Taxable income = $1,100 - 150 = 950$
- Tax calculation:
 - 10% on income from 100 to 500
 - 20% on income from 501 to 1,000
 - Tax = $10\% \times 400 + 20\% \times 450 =$
 - $40 + 90 = 130$

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Personal Income Tax Issues

- What income to include and exclude
 - Interest, dividends, capital gains?
 - Pensions, overseas income?
- What expenses can be deducted
 - Large medical expenses, casualty losses?
 - Other tax payments
- How large is the "basic exemption"?
- What is the rate structure?

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Part II: Fiscal Forecasting

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General Considerations

- Fiscal forecasting must be based on a consistent set of macroeconomic assumptions – e.g., for GDP, BOP
- Revenues are affected by changes in the macroeconomic situation – for example, changes in real growth, inflation, and the exchange rate
- Revenues typically reflect the level of economic activity

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Preliminary Consideration: At What Level of Disaggregation to Forecast?

- Forecasters must decide on the level of aggregation to forecast
- Forecasting at too aggregate a level (e.g., total revenue, total expenditure) may be inaccurate and frustrate identifying budget problems
- Forecasting at too disaggregated a level may require data that are unavailable
- General approach: pick most disaggregated level data will allow

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Ways to Forecast Revenues

- Model-based approach (not used in this course)
- Effective Tax Rate (ETR) approach: This Lecture
- Tax elasticity (buoyancy) approach: Next Lecture
- Both the Effective Tax Rate and Tax Elasticity approaches are **CONDITIONAL METHODS**:
 - Use information on other variables to make revenue forecasts

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The “best” method depends on the data

It is advisable to check ...

- Variety of methods
- Variety of sources of data
- Qualitative information

And use

- Good judgment:
Experience, discussion, and reasoned guesses

Forecasting
Methods
+
Judgments

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Baseline projections

Baseline forecast reflects:

- Macroeconomic forecasts
- Current policy
- Confirmed policy changes

Example: Planned decrease in import tariffs after signing a trade agreement

Deviations from baseline projections:

- Policy changes
- Shocks
- Upward and downward risks

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Part III: Effective Tax Rate Approach to Forecasting

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Tax Revenue

$$\text{Tax Revenue} = \sum (\text{Statutory Tax Rate}) \cdot (\text{Tax Base})$$

Tax base for a given tax:

Event or condition that gives rise to taxation and is defined in the law

Examples:

Taxable event: Receipt of wages, sale of goods

Taxable condition: Owning a house

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Projection based on statutory tax rates

... requires a lot of information

Tax rates

Income brackets

	1	2	3
Income bracket	0 - 60	61 - 100	101 +
Statutory tax rate	15%	30%	50%

Income distribution

Deductions

	Person 1	Person 2	Person 3	Total
Income 2012	20	60	120	180
Marginal rate	15%	15%	50%	
Personal tax	3	9	31	43
	Person 1	Person 2	Person 3	Total
Income 2013	20	80	130	220
Marginal rate	15%	30%	50%	
Personal tax	3	15	36	54

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Effective tax rate (ETR)

Definition:

$$\text{Effective Tax Rate} = \frac{\text{Tax Revenues}}{\text{Proxy Tax Base}}$$

Tax revenues:

Observed tax revenue data

Proxy tax base:

Economic variable that is closely related to the actual tax base

Note: ETR can be defined for total revenue or a specific tax item

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Proxy tax base

Useful for forecasting and analysis

Why?

- Data are readily available
- Can be used to forecast various taxes
- Tractable
 - No need to project numerous specific tax bases
 - No need to collect information on statutory tax rates and exemptions for various tax items

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Using the ETR for Projection

$$\begin{aligned} \text{Revenue Forecast} &= \\ &= \text{Forecast of ETR} * \text{Forecast of} \\ &\quad \text{Proxy Tax Base} \quad (\otimes) \end{aligned}$$

Main steps:

- Select the proxy tax base
- Forecast the proxy tax base
- Forecast the ETR
- Obtain the revenue forecast using the above formula (\otimes)

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Selecting proxy tax base

Proxy tax base: Economic variable closely related to the actual tax base

- High correlation with the actual tax base
 - High correlation between observed tax revenue and the proxy tax base
- Justification
 - Information from the law
 - Economic reasoning

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Tax on value vs. quantity

Ad-valorem tax:

Based on the value of assets, income, or transaction

Example:

Income tax, value-added tax (VAT), etc.

Per unit tax (or specific tax):

Based on the quantity, regardless of its price; often used for excise taxes

Example:

Excise tax on liquor, stamp duty, etc.

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Proxy bases for income taxes

Personal income tax:

- Personal income, nominal
- GDP, nominal
- Other

Corporate income tax:

- Corporate profits, nominal
- GDP, nominal
- Other

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Proxy tax bases for taxes on goods and services

□ Value added tax (VAT):

- Private consumption expenditure, nominal
- GDP, nominal
- Imports of goods, nominal (for VAT on imports)
- If most of VAT is from tourism sector, consider using earnings from tourism

□ Excise taxes (taxes on selected goods and services):

- Consumption of selected goods, nominal
- Private consumption expenditure, nominal
- NB: If excise tax is "specific," i.e., fixed amount per unit, may need to forecast change using growth in "real" consumption of taxed items

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Proxy tax bases for international trade, other items

Customs duties:

- Imports of goods and services, nominal
- Exports of goods and services, nominal etc.

Other taxes:

- GDP, nominal
- Production of natural resources, etc.

Non-Tax revenue:

- GDP, nominal etc.

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Forecasts of proxy tax bases

- Forecasts of proxies are usually available
 - GDP and its components
 - Prepared by macro-forecasting unit in ministry or separate planning ministry
- Forecasts of macroeconomic variables must be:
 - Realistic
 - Consistent
- Examples:
 - Real GDP growth must be "reasonable"
 - Reflecting growth in components, recent history
 - Growth in GDP and imports should be consistent

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Projecting the ETR

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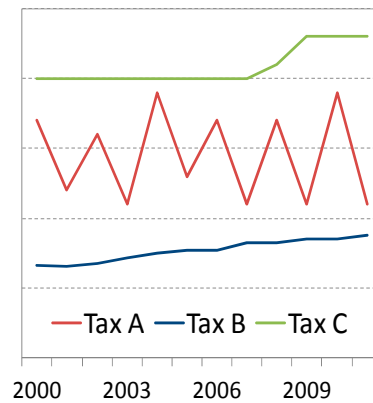
Projecting ETR (1)

Step 1: Compute historical ETR using the selected proxy tax base

$$\text{ETR} = \frac{\text{Tax Revenues}}{\text{Proxy Tax Base}}$$

Step 2: Analyze it

- Stable?
- Trend?
- Structural breaks?



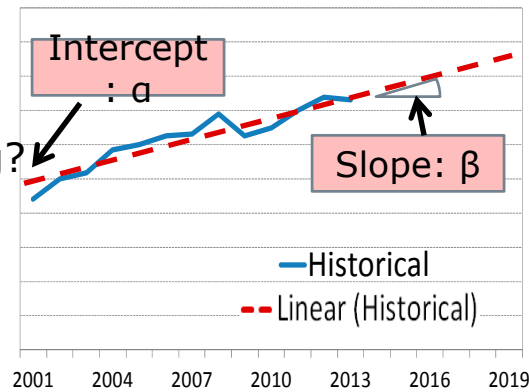
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Projecting ETR (2)

Step 3: Forecast ETR: Last year value; or

- Trend projection: $ETR_{\text{year}} = \alpha + \beta \cdot (\text{year})$

- Judgments
 - Period?
 - Ever-growing?
 - Ever-decreasing?
 - Constant?
- Other methods



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Factors affecting the ETR

$$ETR = \frac{\text{Tax Revenues}}{\text{Proxy Tax Base}}$$

$$\approx \frac{\sum (\text{Statutory Tax Rate}) \cdot (\text{Tax Base})}{\text{Proxy Tax Base}}$$

Factors affecting the ETR:

- Statutory tax rate
- Compliance rate
- Enforcement
- Any changes in base (e.g., exemptions from tax)

For example, what does constant ETR assume?

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Statutory tax rate and ETR

- **Statutory tax rate:**
 - Tax rate stated in the law
- **ETR** can differ from statutory rate
 - Proxy tax base differs from actual base
 - Exemptions, deductions, exclusions in law
 - Poor compliance or enforcement
 - Illegal, tax-free transactions

If the statutory rate **increases**,

- ETR would increase

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Compliance ratio and ETR

Compliance rate:

Gap between the actual revenue and the potential revenue

Compliance rate would reflect

- Effectiveness of tax administration
- Penalties, etc.

If **compliance increases** or **enforcement improves**,

- ETR would increase

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	Person 1	Person 2	Person 3	Total	ETR
Income 2013	20	80	130	220	24.5%
Marginal rate	15%	30%	50%		
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Projecting ETR -summary-

Constant ETR assumes

- Unchanged statutory tax rate (policy)
- Unchanged compliance rate (admin.)
- Unchanged tax base (exemptions, etc.)

Remember that ...

- ETR could rise if ...
 - Statutory rate increases
 - Administration improves
 - Exemptions, exclusions change

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Forecasting tax revenues using the ETR approach

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Projection using the ETR

$$\begin{aligned} \text{Revenue Forecast} \\ &= \text{ETR Forecast} * \text{Proxy Tax Base} \\ \text{Forecast} & \quad (\otimes) \end{aligned}$$

Example: Customs

	2009	2010	2011	2012	2013	2014p
Customs	768	950	1,225	1,680	2,030	
Imports	16,000	19,000	25,000	30,000	35,000	40,000
ETR (%)	4.8	5.0	4.9	5.6	5.8	6.0

What is the projection of customs in 2014?

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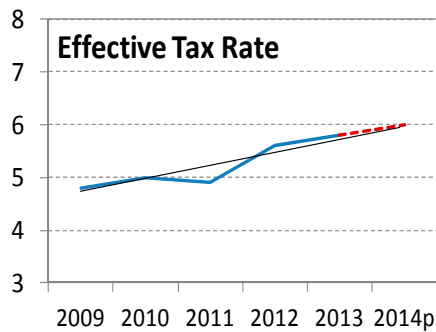
Example: Import duties

	2009	2010	2011	2012	2013	2014p
Customs	768	950	1,225	1,680	2,030	2,400
Imports	16,000	19,000	25,000	30,000	35,000	40,000
ETR (%)	4.8	5.0	4.9	5.6	5.8	6.0

6%: Trend ETR

Again, it's important to ask...

- What do we assume?
- Is the assumption reasonable?



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Pros and Cons of the ETR approach

□ Advantages

- Easy to use: ETR x forecast of proxy tax base
- Avoids need for detailed information on exemptions, statutory tax rates

□ Disadvantages

- Sensitive to assumptions about ETR
- ETR can change if policy (statutory rates, exemptions), administration, or compliance changes

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Summary

- Remember different kinds of taxes
- Decide on level of aggregation and forecasting approach
- Effective tax rate (ETR) approach
 - $ETR = (\text{tax revenue})/(\text{proxy tax base})$
 - Selection of the proxy tax base
 - Correlation of base with tax; knowledge of taxes and the economy
 - Projecting ETR
 - Policy, tax administration, and tax base structures
 - Forecasting revenues using the ETR