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**The Framework for Assessing Tax Incentives:
A Cost-Benefit Analysis Approach (2)**

DEVISING THE METHODOLOGY

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Outline of Presentation

1. Conceptual Framework (Partial Recap)
2. A Step-by-Step Prototype Model
3. A Step-by-Step Numerical Illustration
4. Conclusion

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1.Conceptual Framework Assessing TIP Impact by Stage

➤ **IMPACT** – cost and benefit as measured by economic activities (increased investment, jobs, GDP, and personal income) and their revenue consequences.

➤ *Direct impact* - economic activities directly stimulated by TIP and their revenue consequences.

➤ *Indirect impact* - economic activities triggered by the "direct impact" and their revenue consequences.

➤ *Induced impact* – multiplier effect of personal income generated from both direct and indirect impacts and their revenue consequences.

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1. Conceptual Framework
The Toolkit

➢ Bookkeeping (Accounting Data) – *Recording Direct Impact*

➢ Micro-Simulation Model – *Estimating Indirect impact, in absence of input-output accounts and other economic models, by using taxpayers' accounting and tax information (i.e., firm-based financial statements and tax returns)*

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2. A Step-by-Step Prototype Model
An Overview

Step 1: Estimating the direct economic impact

Step 2: Estimating the indirect economic impact

Step 3: Estimating the induced economic impact

Step 4: Estimating the total revenue impact

Step 5: Summing up the economic and revenue
   impacts and drawing findings from sensitivity
   analysis.

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2. A Step-by-Step Prototype Model
A Technical Note

Theoretically, we should follow the three stages of TIP impact demonstrated in the framework to estimate both economic and revenue impacts within each of these three stages. But in my prototype model, I separate the revenue impact from the economic impact for an easier and clearer illustration.

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2. A Step-by-Step Prototype Model
Step 1: Estimating Direct Economic Impact

➢ *Input data:* Investment data (redundant vs. genuine additional) relevant to TIP target, capital to labor to material ratio, wage rate, and return to capital

➢ *Output:* GDP (labor income vs. return to investment) and number of jobs directly attributable to TIP

➢ *Sensitivity parameters*: Redundancy ratio, Displacement share, and Crowding-out probability.

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2. A Step-by-Step Prototype Model
Step 2: Estimating Indirect Economic Impact

➢ *Input data:* Total purchase of capital goods and material inputs for producing the forward-linking output and the split of these inputs between the imported and domestically produced, rate of return to capital and capital/labor/material allocation within each industry,

➢ *Output:* Increased GDP, pre-tax profits, jobs and personal income for each input producing industry required by its forward-linking industry

➢ *Sensitivity parameters*: the split of both capital and material inputs for the forward-linking industry between imported and domestically produced; and the pre-tax profit margin by industry.

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2. A Step-by-Step Prototype Model
Step 3: Estimating Induced Economic Impact

➢ *Input data:* total personal income resulting from Steps 1 and 2; and the national income multiplier

➢ *Output:* the induced impact = total personal income generated from direct and indirect impacts x (the multiplier -1)

➢ *Sensitivity parameters*: the national income multiplier

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2. A Step-by-Step Prototype Model
Step 4: Estimating Revenue Impact

➤ *Input data:* the tax incentive parameters for estimating revenue loss; and statutory tax rates that are applicable to the increased tax bases associated with the increased GDP (i.e., tax base) estimated in Steps 1-3.

➤ *Output: Net Revenue Impact*, as the sum of *revenue collection* and *revenue loss*.

➤ *Sensitivity parameters*: all the sensitivity parameters applicable in Steps 1-3 for estimating direct and indirect impacts.

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2. A Step-by-Step Prototype Model
Step 5: Summing up the Overall Impact

➤ *Quantitative Summary:*
1. *Total economic impact including increased GDP and increased jobs*
2. *Revenue impact.*

➤ *Main Findings:* to be drawn from both the quantitative summary and sensitivity analysis

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3. A Step-by-Step *Numerical* Illustration

A Recap:

➢ Step 1: Estimating Direct Impact

➢ Step 2: Estimating Indirect Impact

➢ Step 3: Estimating Induced Impact

➢ Step 4: Estimating Revenue Impact

➢ Step 5: Summing up the overall impact

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3. A Step-by-Step Numerical Illustration
General Assumptions

1. The tax Incentive Program (TIP)*: a 20% refundable investment tax credit for a designated industry*
2. Availability of financial and tax data at the firm level
3. Availability of itemized Customs records on imports by use and by importer.
5. Availability of national accounts, from which the economic multiplier (based on the share of consumption to national income) is readily obtainable
6. Single accounting period
7. Same annual wage rate across Industry
8. All other input data are *arbitrary* assumptions for simplicity purposes.

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3. A Step-by-Step Numerical Illustration
Step 1: Estimating Direct Impact

1. Numerical Assumptions:

   1) *Total investment within the TIP target: 200, of which*

   2) *Redundant investment: 100*

   3) *The* Capital/Labor/Material allocation is:1/2/2

   4) *The return to capital investment is: 10%*

   5) *The average annual wage rate = 2 (which is assumed for all industries in this illustration)*

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3. A Step-by-Step Numerical Illustration
Step 1: Estimating Direct Economic Impact

2. Direct economic impact

   1) Genuine additional investment = 200 – 100 = 100, *implying a purchase of 100-unit capital goods*

   2) Increased Labour Income = 100/(1/2) = 200, implying increased jobs = 100 (=200/2)

   3) *Increased purchase of materials = 100/(1/2) = 200*

   4) Pre-tax profit = 10% x 100 = 10

   5) **Increased GDP = 200 + 10 = 210**

3. A Step-by-Step Numerical Illustration
Step 2: Estimating Indirect Economic Impact

Implication from Step 1:

1. The genuine additional capital investors will purchase:
   a. 100 units of capital goods, and
   b. 200 units of materials as their business inputs.

2. Assume the *split* of both capital goods and materials as inputs to the genuine additional investor: 50:50.

Therefore -

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3. A Step-by-Step Numerical Illustration
Step 2: Estimating Indirect Economic Impact

Implication from Step 1 (cont'd):

3. The genuine additional investors will buy 50 units of domestically produced capital good and 100-units of domestically produced materials. Therefore,

4. The indirect economic impact of TIP is the increased economic activities undertaken by domestic firms that produce, respectively, the 50 units of capital goods and 100 units of materials as inputs for the genuine additional investors targeted by TIP.

3. A Step-by-Step Numerical Illustration
Step 2: Estimating Indirect Economic Impact

A. For domestic firms producing the 50-unit capital goods

1. Numerical assumptions:
   1) *The pre-tax profit = 10% of total output*
   2) *The capital/labor/material allocation is: 4:4:1*
2. Indirect economic impact:
   1) *The pre-tax profit = 50 x 10% = 5*
   2) *The capital investment =(50 – 5) x 4/9 = 20*
   3) *The labor income = (50 – 5) x 4/9 = 20, implying*
   4) *An increased number of jobs = 20/2 = 10, Therefore*
3. Increased GDP = profit + labor income = 25

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3. A Step-by-Step Numerical Illustration
Step 2: Estimating Indirect Economic Impact

B. For domestic firms producing the 100-units of materials:

1. Numerical assumptions:
   1) *The pre-tax profit = 10% of total output*
   2) *The Capital/Labor/Material allocation is: 2:4:3*
2. Indirect economic impact :
   1) *The pre-tax profit = 100 x 10% = 10*
   2) *The capital investment =(100 – 10) x 2/9 = 20*
   3) *The labor income = (100 – 10) x 4/9 = 40, implying*
   4) *An increased number of jobs = 40/2 = 20, Therefore*
3. Increased GDP = profit + labor income = 50

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3. A Step-by-Step Numerical Illustration
Step 2: Estimating Indirect Economic Impact

C. Summing up the indirect economic impact:

1. *A **technical note**: the estimating procedures illustrated in A and B can be repeated as **as many times as the industrial linkages indicate. Therefore, t**he sum of the results from Steps 2A and 2B is the minimum of total indirect economic impact.* That is:

2. The ***minimum*** indirect economic impact includes:

   1) ***The pre-tax profit = 15 (= 5 + 10)***

   2) *The increased capital investment = 40 (= 20+20)*

   3) ***The increased labor income = 60 (= 20+40)***

   4) *The increased number of jobs = 30 = (10 + 20)*

3. ***The minimum GDP increment = 75 (= 15 + 60)***

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3. A Step-by-Step Numerical Illustration
Step 3: Estimating Induced Economic Impact

1. **Implication from Steps 1 and 2:**

   1) The increased GDP $\geq$ 285 (including 210 from Step 1 and a minimum of 75 from Step 2), and

   2) The initial revenue loss of 20 due to a 20% investment tax credit claimed on "redundant" investment, which offsets the government spending as a part of national spending. Therefore,

   3) The increased national income that can have induced impact, through a national multiplier, is *equal to or greater* than 265 (= 285 – 20)

2. **Assumption**: a national consumption to income ratio = 80%, implying
   A national income **multiplier = 5** (=1/(1-80%))

3. **The *INDUCED* economic impact**
   = increased national income net of "government spending cut" multiplied by *(**multiplier -1**)*
   $\geq$ 1,060 = (265 x 4)

3. A Step-by-Step Numerical Illustration
Step 4: Estimating Revenue Impact

1. **Tax parameters derived from Steps 1 and 2:**
    1) Initial revenue loss due to ITC (20%) claimed on the redundant investment (100) = 20, similarly,
    2) ITC claimed on genuine additional investment = 20
    3) The increased pre-tax profit = 25, and
    4) The increased labor income = 260

2. **Numerical assumptions:**
    1) The corporate income tax (CIT) rate = 25%
    2) The personal income tax (PIT) rate applicable to labor income = 10%, and
    3) The basic exemption (in %) for labor income: 30%

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3. A Step-by-Step Numerical Illustration
Step 4: Estimating Revenue Impact

1. **Initial revenue loss**
    (due to investment tax credit claimed on the redundant investment)
    = - 20 (= 20% x 100)

1. **The income tax collection:**
    1) **CIT collection**
        = CIT rate x CIT taxable profits – ITC *(claimed on the genuine additional investment)*
        = (25% x 25) - 20 =**-13.75**, and
    1) **PIT collection** = 10% x 260 x (1 - 30%) = **18.2**

2. **Net Revenue Impact: - 15.55** = -20 -13.75 + 18.2

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3. A Step-by-Step Numerical Illustration
Step 5: Summary and Findings

➢ *Quantitative Summary:*
  1) *Total economic impact:*
     - *Increased GDP* $\geq$ *1,345 (= 210+75+1,060)*
     - *Increased jobs* $\geq$ *130*
  2) *Revenue impact = $\geq$ -15.55*

➢ *Main Finding: The greater the redundancy ratio, the smaller the economic impact and the greater the revenue loss from any well-intended tax incentives.*

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4. Conclusion

1.   Sophisticated economic models built upon the input-output accounts might be ideal, but a micro-simulation model based on companies' financial statements and tax returns can be an accessible replacement.

2.   Even from a purely analytical point of view, tax incentives are always inferior to nationwide tax reforms that tax all investment activities across all economic sectors indifferently.

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