Technology and Capital Formation in East Asia

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## Rates of Growth of Inputs & Outputs of the East Asian Developing & the G-7 Countries

Table 3.1: Average Annual Rates of Growth of Real GDP, Capital, Labor and Human Capital (percent)  
(Extended sample period)

<table>
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<tr>
<th>Country</th>
<th>Period</th>
<th>GDP</th>
<th>Capital Stock</th>
<th>Capital Utilized</th>
<th>Labor Hours</th>
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# Accounts of Growth: Kim & Lau (1992, 1994a, 1994b)

## Table 2.2: Relative Contributions of the Sources of Economic Growth (percent)

<table>
<thead>
<tr>
<th>Economy</th>
<th>Tangible</th>
<th>Labor</th>
<th>Technical Progress</th>
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<td>Capital</td>
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<td>Non-Asian G-5</td>
<td>36</td>
<td>6</td>
<td>59</td>
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Hypothetical Output Levels

Hypothetical Output Levels (Trillion US$ in 1980 prices)

USA, FRA, GER, UK, JPN, HON, KOR, SIN, TWN
Relative Productive Efficiency (U.S.=100%)
R&D Expenditure as a Percentage of GDP

Percentage of Total R&D Expenditure in GDP (Current Prices)

- USA
- FRA
- GER
- UK
- JPN
- HON
- KOR
- SIN
- TWN

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Human Capital

Figure 3.1 Human Capital

Average School Years per Working-Age Person


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Why is There No Measured Technical Progress in East Asian NIEs?

◆ (1) Low Level of Investment in Intangible Capital
◆ (2) The Distribution of "Innovation Rents"
  ◆ Fully priced capital goods and technology
  ◆ Monopolistic pricing of capital equipment, technology licenses and critical components
  ◆ Transfer pricing by foreign direct investors
  ◆ Monopsonistic pricing for OEM manufacturers
The Non-Uniqueness of the Postwar East Asian Experience

- Abramovitz and David (1973): U. S. economic growth in the 19th Century can be largely attributed to the growth of inputs
- Tostlebee (1956): The growth in U.S. agriculture in the 19th Century can be attributed to the growth of inputs, with a negative rate of growth of total factor productivity
- Hayami and Ogasawara (1999): Japanese economic growth between the Meiji Restoration and the World War I can be largely attributed to the growth of inputs, principally capital
- Godo and Hayami (1999): Confirms the lack of technical progress in prewar Japan (with human capital included)
Conclusions

- Different types of measured inputs play different roles at different stages of economic growth
- Tangible capital accumulation is the most important source of growth in the early stage of economic development
- But simply accumulating tangible capital is not enough--it must also be efficiently allocated
- Efficient tangible capital accumulation is the major accomplishment of the East Asian NIEs
  - Market-directed allocation of new investment, aided by export orientation, promotes efficiency
  - Private enterprises have the incentives for prompt self-correction
- Intangible capital accumulation becomes important only after a certain level of tangible capital per worker is achieved
Is East Asian Economic Growth Sustainable?

- Neither miracle nor a mere bubble
  - Economic growth experience replicated in different East Asian economies
  - Sustained economic growth over decades
  - Recent crisis due to many factors, of which “irrational exuberance” is only one
  - Economic fundamentals remain sound--high savings rates, investment in human capital, entrepreneurship
- Past economic growth attributable to growth in inputs, particularly the efficient and rapid accumulation of physical capital
- Considerable room for continuation of rapid tangible inputs-driven economic growth--tangible capital per unit labor still lags behind the developed economies
- Intangible capital per unit labor lags even further behind
- Because of its complementarity with tangible capital, investments in intangible capital can retard the decline in the marginal productivity of tangible capital
Figure 4.1 Tangible Capital Stock per Labor Hour

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R&D Capital Stock per Unit Labor

Figure 4.3 R&D Capital Stock per Labor Hour

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Quarterly Rates of Growth of Real GDP
Selected East Asian Economies

Quarterly Rates of Growth of Real GDP, Year-over-Year, Selected East Asian Economies

<table>
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<th>Quarter</th>
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