Public Expenditure Analysis in Education

Elizabeth M. King
DECRG
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Outline: Key questions

• How much does government spend and for what?
• Should government finance?
• Who else pays?
• What is the distributinal impact of public spending?
• Is spending effective?
How much governments spend for education (as % of GNP)

<table>
<thead>
<tr>
<th>Country</th>
<th>% of GNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>2.3</td>
</tr>
<tr>
<td>India</td>
<td>3.2</td>
</tr>
<tr>
<td>Brazil</td>
<td>5.1</td>
</tr>
<tr>
<td>United States</td>
<td>5.4</td>
</tr>
<tr>
<td>Denmark</td>
<td>8.1</td>
</tr>
<tr>
<td>France</td>
<td>6.0</td>
</tr>
<tr>
<td>World</td>
<td>4.8</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>4.1</td>
</tr>
</tbody>
</table>
## How much governments spend for education (as % of total spending)

<table>
<thead>
<tr>
<th>Country</th>
<th>% of Total Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>7.8</td>
</tr>
<tr>
<td>Japan</td>
<td>9.9</td>
</tr>
<tr>
<td>Argentina</td>
<td>12.6</td>
</tr>
<tr>
<td>Canada</td>
<td>13.5</td>
</tr>
<tr>
<td>Chile</td>
<td>14.8</td>
</tr>
<tr>
<td>Peru</td>
<td>19.2</td>
</tr>
<tr>
<td>Thailand</td>
<td>20.1</td>
</tr>
<tr>
<td>Mexico</td>
<td>23.0</td>
</tr>
</tbody>
</table>

Data source: UNESCO 2000; data pertain to 1996
How public resources are spent

% of total current education expenditure for teachers’ compensation, 1997

<table>
<thead>
<tr>
<th>Income Level</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-income</td>
<td>67.5</td>
</tr>
<tr>
<td>Lower middle-income</td>
<td>64.1</td>
</tr>
<tr>
<td>Upper middle-income</td>
<td>47.8</td>
</tr>
<tr>
<td>Higher-income</td>
<td>57.3</td>
</tr>
</tbody>
</table>

Source: World Development Indicators, 2001
Should government intervene?
Market failures in education

• Externalities
  • Productivity
  • Social outcomes
  • Nation-building
Education, children’s growth and mortality

Mother’s health
Mother’s education
Food security
Health care services
Healthy environment

Dietary intake
Disease

Child’s growth & mortality
Mothers with more schooling tend to adopt health-promoting behaviors, such as having young children immunized. Children more likely to be immunized the higher is mother’s education.
Enrollment in tertiary education means better political processes

% increase in probability with 1% increase in tertiary enrollment rate (from probit estimates)

Source: King & Basu 2001
Market for education

- Private MC
- Social MB
- Private MB

Price

Quantity

Q*

Q**
Market failures in education

• Externalities
• Capital market failures & information asymmetries
  – Education is long-term investment process, financial institutions unwilling to take risk
  – Difficult for providers to borrow against future revenue stream
  – Difficult for students to borrow against future income stream
  – Providers have more information than students so students may end up in worse institutions than they want
Should government finance?

• Public intervention through finance is different from direct provision
• If there is a private sector, then the government has an important regulatory role.
• Finance, provision and regulation must be set to meet central mandates of access, equity and quality goals
Government functions and central mandates

<table>
<thead>
<tr>
<th>Access</th>
<th>Financing</th>
<th>Provision &amp; regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Options for state intervention

Degree of public financing

100%

Voucher schools; regulated private schools (Chile basic, Netherlands, Belgium)

Public schools with little/no cost recovery (many)

Unsubsidized private sector (Philippine, tertiary level)

Public facilities with cost recovery (US, Korea, Chile universities)

0%

Degree of public provision

100%
Outline: Key questions

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• Is spending effective?
Private expenditure as % of total education expenditure

Per-child family expenditure for education, Indonesia

Relative to family expenditures for public primary schools

Source: King 1997
Outline: Key questions

• How much does government spend and for what?
• Should government finance?
• Who else pays?
• What is the distributional impact of public spending?
• Is spending effective?
Education inequalities

Cote d'Ivoire 1994-95

Proportion Completing Grade

Grade Level

Rich/Male
Rich/Female
Poor/Male
Poor/Female

Source: Filmer 2000

Indonesia 1997

Proportion Completing Grade

Grade Level

Egypt 1995-96

Proportion Completing Grade

Grade Level

Pakistan 1990-91

Proportion Completing Grade

Grade Level

Rich/Male
Rich/Female
Poor/Male
Poor/Female

Source: Filmer 2000
Proportion of public subsidy received by poorest quintile

Colombia: 92; Kenya: 92/3; Ghana 91/2; Indonesia, Malaysia 89
Benefit-incidence analysis

• Now-standard methodology for assessing the distributional impact of public spending; based on
  – Distribution of spending by type of service or program
  – Average utilization by income groups

• But how about when participation rates of income groups change over time or across areas (unequal capture)?
  – Understand political economy of capture
Urban Pakistan: Girls’ Fellowship Program

• In Feb 1995, Quetta in Balochistan
• Subsidies paid directly to private schools for 3 years:
  – Initial: Rs.100 ({$3})/mo/girl to limit of Rs10K plus Rs.200/girl
  – Reduced in 2nd and 3rd years; then zero.
  – Unsubsidized boys to be no more than 1/2 of enrollment
• Randomized selection of neighborhoods
Pakistan: Encouraging private schools to meet social goals

Source: J. Kim, H. Alderman and P. Orazem, 1998
Colombia’s national voucher program

- Established in late 1991 to expand secondary school capacity
- Cost-sharing between central and local governments (80-20)
- Municipal and school participation voluntary
- Targeted using poverty mapping
- Grade 5 graduates qualify. Vouchers renewable yearly up to grade 11
- Variable value of voucher up to ceiling, with annual inflation adjustment
Colombia: Expanding supply to the poor through vouchers

<table>
<thead>
<tr>
<th>Outcome indicators</th>
<th>Losers</th>
<th>Winners</th>
<th>% Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently in school*</td>
<td>0.831</td>
<td>0.850</td>
<td>2.3</td>
</tr>
<tr>
<td>Currently in private school</td>
<td>0.539</td>
<td>0.699</td>
<td>29.7</td>
</tr>
<tr>
<td>Finished 8th grade</td>
<td>0.632</td>
<td>0.744</td>
<td>17.7</td>
</tr>
<tr>
<td>Highest grade completed</td>
<td>7.5</td>
<td>7.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Ever repeated after lottery</td>
<td>0.224</td>
<td>0.164</td>
<td>-26.8</td>
</tr>
<tr>
<td>Total repetitions since lottery</td>
<td>0.254</td>
<td>0.181</td>
<td>-28.7</td>
</tr>
</tbody>
</table>

| Sample size                               | 562    | 1147    |

Note: *Not statistically significant, with or without controls.
Source: Angrist and others (2001)
Colombia: Expanding supply to the poor through vouchers

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<th>Outcome indicators</th>
<th>Losers</th>
<th>Winners</th>
<th>% Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married or living with companion</td>
<td>.016</td>
<td>.007</td>
<td>-56.2(^a)</td>
</tr>
<tr>
<td>Has child</td>
<td>.034</td>
<td>.024</td>
<td>-29.4</td>
</tr>
<tr>
<td>Working</td>
<td>.169</td>
<td>.139</td>
<td>-17.8</td>
</tr>
<tr>
<td>Number of hours worked</td>
<td>4.88</td>
<td>3.66</td>
<td>-25.0(^b)</td>
</tr>
<tr>
<td>Sample size</td>
<td>562</td>
<td>1147</td>
<td></td>
</tr>
</tbody>
</table>

Note: \(^a\)--Statistically significant for probit estimates with basic controls
\(^b\)—Statistically significant for linear probability model with basic controls
Source: Angrist and others (2001)
Outline: Key questions

• How much does government spend and for what?
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• What is the distributional impact of public spending?
• Is spending effective?
Is public spending effective?

• Measuring educational outcomes
Education spending and outcomes are NOT correlated.
Education expenditure and learning

**TIMSS Ranking**

<table>
<thead>
<tr>
<th>Country</th>
<th>Maths</th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>28</td>
<td>17</td>
</tr>
<tr>
<td>Switzerland</td>
<td>8</td>
<td>25</td>
</tr>
<tr>
<td>Austria</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Canada</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Norway</td>
<td>26</td>
<td>20</td>
</tr>
<tr>
<td>Denmark</td>
<td>27</td>
<td>34</td>
</tr>
<tr>
<td>Japan</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Netherlands</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>New Zealand</td>
<td>24</td>
<td>22</td>
</tr>
<tr>
<td>Spain</td>
<td>31</td>
<td>27</td>
</tr>
<tr>
<td>Czech Rep.</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Korea</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Hungary</td>
<td>14</td>
<td>9</td>
</tr>
</tbody>
</table>

**Expenditure/student**

0 2,000 4,000 6,000 8,000
Is public spending effective?

- Measuring educational outcomes
- Improving quality of public spending –
  - Spending on the right thing
    - Correcting for market failures
    - Demand vs supply side interventions
When resources are scarce, the question is

From this:

Central government

How to get this:

Real outcomes
- Enrollment
- Completion
- Learning
<table>
<thead>
<tr>
<th>Government functions and tools</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Access</strong></td>
</tr>
<tr>
<td><strong>Equity</strong></td>
</tr>
<tr>
<td><strong>Quality</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Financing</th>
<th>Provision &amp; regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invest ... plus</td>
<td></td>
</tr>
</tbody>
</table>
# Government functions and tools

<table>
<thead>
<tr>
<th></th>
<th>Financing</th>
<th>Provision &amp; regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access</td>
<td></td>
<td>... Incentives:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Set rules &amp; standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stimulate competition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Establish accountability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reward performance</td>
</tr>
<tr>
<td>Equity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Public and private provision

- Public schools
- Private schools
- Household behavior

Central government
Local governments

Real outcomes
- Enrollment
- Completion
- Learning
Models of decentralized public schools

More participation

Less participation

Less autonomy

More autonomy
El Salvador’s community-managed schools or EDUCO

- Educacion con Participacion de la Comunidad, 1991
  - Community education associations (ACEs): parents and community members
  - Legally responsible for operating EDUCO schools
  - ACEs hire, fire, supervise teachers, administer fund transfers from central government, raise additional resources
Community participation improves schools

Student performance, El Salvador

Jimenez & Sawada 1999
Community participation improves schools

Jimenez & Sawada 1999
Public and private provision

- Public schools
- Private schools
- Central government
- Household behavior

Real outcomes
- Enrollment
- Completion
- Learning
Private enrollment as % of total school enrollment

0%  50%  100%

Mexico  USA  Niger  Cyprus  Kuwait  France  Australia  Korea  Chile  Belgium  Netherlands  Mauritius
Private schools deliver better education at lower cost

Ratio of private to public cost and achievement

Colombia  Dom Rep  Phil  Tanzania

Cost  Achievement
## Cost-effectiveness analysis of inputs for achievement, Brazil

<table>
<thead>
<tr>
<th>Input</th>
<th>Cost (US$)</th>
<th>Achievement change by input (coefficients)</th>
<th>Achievement gains per US$ spent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>1.81</td>
<td>3.513</td>
<td>1.94</td>
</tr>
<tr>
<td>School furniture</td>
<td>5.45</td>
<td>-5.650</td>
<td></td>
</tr>
<tr>
<td>School facilities</td>
<td>8.80</td>
<td>7.228</td>
<td>0.82</td>
</tr>
<tr>
<td>Hardware</td>
<td>16.06</td>
<td>8.969</td>
<td>0.56</td>
</tr>
<tr>
<td>Textbook usage</td>
<td>1.65</td>
<td>6.403</td>
<td>3.88</td>
</tr>
<tr>
<td>Writing materials</td>
<td>1.76</td>
<td>4.703</td>
<td>2.67</td>
</tr>
<tr>
<td>Software</td>
<td>3.41</td>
<td>4.864</td>
<td>1.43</td>
</tr>
<tr>
<td>Teacher salary</td>
<td>0.39</td>
<td>0.055</td>
<td>0.14</td>
</tr>
<tr>
<td>Training</td>
<td>2.50</td>
<td>-0.160*</td>
<td></td>
</tr>
</tbody>
</table>
Is public spending effective?

- Measuring educational outcomes
- Improving quality of public spending –
  - Spending on the right thing
    - Correcting for market failures
    - Demand vs supply side interventions
  - Spending things right
    - Absorptive capacity
    - Leakages & need for M&E
Sources of school revenues

• In Uganda’s government-aided primary schools:
  - PTA levies collected from parents
  - Central government transfers and PTA contributions for teacher salaries
  - Government funding for capital expenditures and capitation grants
  - Retained tuition fees (36% of fees in 1995)
Share of government subsidies in school budgets, Indonesia

Source: King 1997
Data requirements

- Measures of outcomes: existence of assessment system, household surveys
- Measures of inputs & costs: school and household surveys with expenditure data, program data, administrative data on budget allocations and spending
- Impact evaluation data to estimate program effectiveness