Education Finance and Reform in Korea: Achievements and New Challenges

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Organization of talk

1. Introduction
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3. Tertiary Education Finance
4. Allocation and effectiveness of Government Research Grants
   - Who Receive Gov't Research Grants?
   - Do Grants Improve Research Performance?
5. Recent government reform efforts on HRD
6. Summary and Reform Agenda

1. Introduction

- Rapid expansion of education in Korea
  - Primary and secondary education: Table 1
    - HS students tripled from 1970 to 1990
    - virtually 100% entrance rate to MS and HS
  - Tertiary education: Table 2
    - More rapid expansion
    - entrance rate to TS increased from 40% to 84%
      - 2002: 87%
    - quality of education did not improve.

Table 1. Expansion of Primary and Secondary Education in Korea, 1970~2000

	Elementary school		Middle school		High school	
	No. of students	Entrance rate	No. of students	Entrance rate	No. of students	Entrance rate
1970	5,749,301	66.1	1,318,808	70.1	590,382	40.2
1975	5,599,074	77.2	2,026,823	74.7	1,123,017	41.5
1980	5,658,002	95.8	2,471,997	84.5	1,696,792	39.2
1985	4,856,752	99.2	2,782,173	90.7	2,152,802	53.8
1990	4,868,520	99.8	2,275,751	95.7	2,283,806	47.2
1995	3,905,163	99.9	2,481,848	98.5	2,157,880	72.8
2000	4,019,991	99.9	1,860,539	99.5	2,071,468	83.9

Source: KEDI(2000)

Table 2. Expansion of Tertiary Education in Korea, 1970~2000

	No. of schools	Enrollment	No. of Teachers	Student-teacher ratio
1970	232	201,436	10,435	19
1975	286	238,719	13,981	17
1980	357	601,494	20,900	29
1985	456	1,277,825	33,895	38
1990	556	1,490,809	41,920	36
1995	754	2,343,984	58,977	40
2000	1,184	3,363,549	79,136	43

Source: Kim (2001).

1. Introduction - continued

- Rapid expansion implies larger spending
  - Educational Exp/GDP increased from 4.6% in 1977 to around 7% in 1998.
- Compared to other OECD countries, Korea spend more on education: Table 3
  - Public spending is smaller but private spending is larger mainly due to a large private expenditure in tertiary education
- Expenditure on private tutoring is very large and quadrupled from 0.7% to 2.9%

Table 3. Trend and Structure of Education Finance of Korea

Type of education	Level of education	Finance method	Korea							OECD Avg	USA	Japan
			1977	1985	1990	1994	1998	1998	2000	1998	1998	1998
Public	All levels		**4.60**	**5.73**	**4.86**	**5.14**	**6.84**	**7.03**	**7.1**	**5.66**	**6.43**	**4.72**
		Public	2.44	3.13	2.97	3.29	4.32	4.07	4.3	5.00	4.82	3.55
		Private	2.16	2.60	1.89	1.85	2.52	2.96	2.8	0.66	1.61	1.17
	Pre-primary		**0.00**	**0.07**	**0.09**	**0.12**	**0.15**	**0.10**	**0.5**	**0.40**	**0.40**	**0.75**
		Public	0.00	0.02	0.02	0.03	0.05					0.43
		Private	0.00	0.05	0.07	0.09	0.10					0.32
	Primary & secondary		**3.82**	**3.98**	**3.44**	**3.47**	**4.21**	**3.95**	**4.0**	**3.71**	**3.74**	**3.03**
		Public	2.22	2.59	2.47	2.73	3.37	3.15	3.3	3.47	3.40	2.78
		Private	1.60	1.39	0.97	0.74	0.84	0.80	0.7	0.35	0.35	0.25
	Tertiary		**0.78**	**1.68**	**1.33**	**1.55**	**2.48**	**2.51**	**2.5**	**1.33**	**2.29**	**1.03**
		Public	0.22	0.52	0.48	0.53	0.90	0.44	0.6	1.06	1.07	0.43
		Private	0.56	1.16	0.85	1.02	1.58	2.07	1.9	0.29	1.22	0.60
Private			**0.70**	**0.90**	**1.20**	**1.80**	**2.90**					

1. Introduction - continued

- Key characteristics of Korea's education system
  - Primary and secondary education
    - emphasis on equity: Korean are very egalitarian
    - centralized finance and management system
    - low autonomy and responsibility of school
    - very limited school choice
  - Tertiary education
    - small government grants + large private spending
    - rapid expansion since the early 1990s
    - heavy reliance on private schools

2. Primary and Secondary Education Finance

- The size of expenditure for primary and secondary education in Korea (3.95%) is similar to other OECD countries (3.71%).
  - Implying that reform is more important than increasing the amount
  - Private (public) spending is larger than other OECD
- The central government financed 84% in 2000 and 73% in 2001
  - General educational grants: equalizing grants 60%
    - Very weak incentive for local gov’ts to finance education
  - educational taxes 40%

Table 4. Finance for Primary and Secondary Education (unit: trillion won, %)

	2000	**2001**
Total Expenditure	19.0 (100%)	22.6 (100%)
Central Government	16.0 (84%)	16.6 (73%)
Grants	9.1	13.0
Educational taxes	5.9	3.6
Local Government	1.1 (6%)	4.9 (22%)
Grants	1.1	1.4
Educational taxes	-	3.5
Tuition and Local Gov't Bond	1.9 (10%)	1.1 (8%)
Tuition	0.8	0.8
Local Gov't Bond	1.1	0.3

Source: Ministry of Planning and Budget (2001).

2. Primary and Secondary Education Finance

- Decentralization is necessary:
  - Local educational units are closer to the central government than to local governments

    $\Rightarrow$ half of educational taxes delegated to local governments in 2001
  - Schools have very limited autonomy

    $\Rightarrow$ School budget system was introduced in 2001.
  - considering that education is a local public good, further and actual decentralization is necessary

3. Tertiary Education Finance

- Compared to US and UK, Korea … :
  - small government support to tertiary education
  - heavy reliance on private expenditure, i.e. tuition, (Table 5)
  - very small governmental scholarship and student loans
  - coordination mechanism among various ministries are lacking (Table 6)
  - Korea system is more closer to US system than to UK system

Table 5. Sources of Finance for Universities and Colleges

	Korea(1999)		USA(1995)		United Kingdom(1999)
	Public University	Private University	Public University	Private University	
Government funds	57.5	4.8	51.0	16.4	53.3
Education			37.6	0.6	48.5
Research			13.4	15.9	4.7
Tuition fees	42.5	66.8	18.8	43	11.9
Private gifts, grants, and contracts		9.0	4.1	9.1	10.7
Endowment income		11.2	0.6	5.2	
Sales and services		2.1	22.2	21.0	17.0
Other sources		6.1	3.3	5.3	7.0

Table 6. Financial Support to Tertiary Education from the Central Government, Korea and US

	Korea(2000)			USA(2000)	
	Amount	**Share**		**Amount**	**Share**
	(In 100 million won, %)			(In million dollar, %)	
Total	31,558	100%	Total	40,903	100%
M of Education & HRD	23,595	73%	Dept. of Education	16,524	40%
Operating costs for public U	12,747	36%	Student financial assistance	9,363	23%
Research and others	10,848	31%	Family Education Loan Program	4,031	10%
M of Science & Technology	3,030	9%	Dept. of Health and Human Services	10,210	25%
Operating costs for public U	885	3%	Dept. of Energy	3,945	10%
Research and others	2,145	6%	NSF	2,896	7%
M of Commerce, Ind & Ener	1,855	6%	Dept. of Defense	2,615	6%
Operating costs for public U.	30	0%	NASA	2,163	5%
Research and others	1,825	5%	Dept. of Veterans Affairs	1,143	3%
M of Labor	1,096	3%	Dept. of Agriculture	505	1%
Operating costs for public U	1,066	3%	Other agencies	902	2%
Research and others	30	0%			
Other agencies	1,982	6%			

Source: 1) Ministry of Planning and Budget, Budget, various issues.

2) US Dept. of Education, Federal Support for Education Fiscal Years 1980 To 2000.

3. Tertiary Education Finance - continued

- US system: market-based system
  - no general subsidy to private schools + research grants to individual researchers $\Rightarrow$ efficiency in correcting externality
  - states schools, governmental scholarship $\Rightarrow$ equity
  - heavy reliance on sales and services
- UK system: less market-based system
  - HEFC: general subsidy to schools
  - research grants to institutions (not directly to researchers)

3. Tertiary Education Finance - continued

- Lee and Woo (2001) estimate that the Korean government invested around 3.3 trillion won (2.5 billion dollars)
  - M of Education and HRD: 2.4 trillion won = 1.3 for operating cost of public schools + 1.1 for research grants and related expense
  - Other ministries: 0.9 trillion won = 0.34 + 0.53

4.1. Who Receive Gov't Research Grants?

- Co-variates / determinants of government research grants using school-level data
  - dependent variables: total outside research grants, government research grants (total, M of Edu, other ministries)
  - independent variables: public school dummy, Seoul metropolitan area, no. of students, no. of professor, no. of years since establishment, no. of SCI article per professor
  - 128 universities, figures in 2000.

Table 7. Summary Statistics, n=128.

Description of variable	Notation	mean	st. dev	min	max
Research grant received per professor (including private and public sources)	TT/PF	14.98	26.19	0	264.17
Government research grants and related subsidies per professor	Gv/Pf	14.08	17.25	1.08	123.39
Research grants and related subsidies from ministry of education and HRD per professor	Ed/Pf	10.99	14.84	0.58	119.45
Among them, general programs	EdG/Pf	7.65	10.32	0.58	95.53
Among them, special programs	EdS/Pf	3.34	7.36	0	65.99
Research grants and related subsidies from ministries other than ministry of education and HRD per professor	OT/Pf	3.09	4.49	0	34.56
Dummy for public college/universities	State	0.20	0.40	0	1
Dummy for Seoul metropolitan area	Met	0.41	0.49	0	1
Number of student enrollment	StEnr	10,175	7,816	122	33,472
Number of professor	Pf	362	281	15	1482
Number of years since establishment	Year	29	18	4	99
Number of SCI article per professor	SCI	0.12	0.21	0	1.97

4.1. Who Receive Gov't Research Grants?

- Regression results
  - research grants from M of Edu is more concentrated on public schools than that from other ministries and that from the private sector
  - the location of university in metro area is not significant
  - large universities received larger grants
  - SCI is very strongly correlated with research grants: research grants from the private sector> that from other ministries > that from special programs from M of Edu > that from general programs from M of Edu

Table 8. Co-variates of Government Research Grants, 2000, OLS

	(1) ln(TT/Pf)	(2) ln(Gv/Pf)	(3) ln(Ed/Pf)	(4) ln(EdG/Pf)	(5) ln(EdS/Pf)	(6) ln(OT/Pf)
Public university	0.510	1.059	1.117	0.962	1.182	0.529
	(0.167)**	(0.115)**	(0.112)**	(0.102)**	(0.157)**	(0.131)**
Metropolitan area	0.076	0.003	-0.021	0.063	-0.190	0.045
	(0.139)	(0.096)	(0.094)	(0.085)	(0.131)	(0.109)
Established year	-0.005	-0.001	0.000	0.000	0.001	0.000
	(0.005)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
Log (no. of student)	0.655	0.195	0.088	0.046	0.199	0.377
	(0.077)**	(0.053)**	(0.052)+	(0.047)	(0.072)**	(0.060)**
SCI	2.349	1.524	1.237	0.516	1.877	1.980
	(0.306)**	(0.209)**	(0.205)**	(0.186)**	(0.287)**	(0.239)**
Constant	-3.898	0.283	1.012	1.247	-1.250	-2.696
	(0.618)**	(0.423)	(0.415)*	(0.375)**	(0.579)*	(0.482)**
Observations	128	128	128	128	128	128
Adjusted R-squared	0.648	0.638	0.600	0.487	0.571	0.630

Standard errors in parentheses
+ significant at 10%; * significant at 5%; ** significant at 1%

4.2. Do Research Grants Improve Performance?

- Performance Measure: NCR per professor
  - NCR=SCI+SSCI+AHCI
  - Looking at Changes in NCR from 1998 (or 1995) to 2002
- Sample: 172 universities in Korea
  - NCR: 0.08->0.18->0.29
- First Look
  - Universities in the Seoul Met area improve more
  - Universities with better research environment perform better: students per professor
  - Public universities perform better: only sig at 10% level

Table 9. Summary statistics for performance regressions

Variable	Notation	sum	mean	St. dev.	min	max
NCR per professor, 2002	NCR02R	-	0.29	0.70	0	6.72
NCR per professor, 1999	NCR99R	-	0.18	0.46	0	4.14
NCR per professor, 1995	NCR95R	-	0.08	0.28	0	3.14
Change in NCR per professor	NCR0299	-	0.11	0.35	-0.11	4.35
Dummy for public university	D_State	35	0.20	0.40	0	1
Dummy for Seoul	D_Met	61	0.35	0.48	0	1
Dummy for general	D_Gen	154	0.90	0.31	0	1
Dummy for industry university	D_Ind	18	0.10	0.31	0	1
No. of students	StEnr	1,406,344	8,176	7,527	28	33,479
Student per professor	StuProf		29.59	10.42	1.44	52.15
No. of professor	NoProf	47,427	275	278	7	1,660
Fraction of professor, natural science	NoProfA	-	13.91	12.74	0	81.82
Fraction of professor, engineering	NoProfB	-	23.11	22.91	0	100
Fraction of professor, social science	NoProfC	-	43.90	24.52	0	100
Fraction of professor, art and athlete	NoProfD	-	12.29	16.51	0	100
Fraction of professor, medical	NoProfE		6.78	15.07	0	97.87

4.2 Do Research Grants Improve Performance? – cont.

- Programs positively correlated with performance
  - Dept of Education: Sci & Tec from BK 21
  - Other Department research grants
  - KRF research grants
- But general institution-based research grants and other programs are not correlated with performance
- Implying researcher-based financing better than institution-based financing

Table 11. Regressions for research performance regressions, for each program

	(1)	(2)	(3)	(4)
	'02 NCR -'99NCR	'99 NCR	'02NCR	'02 NCR -'95NCR
M of Edu BK21 total, 2000	0.009	0.034	0.025	0.020
	(0.002)**	(0.006)**	(0.005)**	(0.004)**
M of Edu BK21 total, 2001	0.011	0.038	0.027	0.023
	(0.002)**	(0.006)**	(0.005)**	(0.004)**
M of Edu BK21 total, 2002	0.011	0.038	0.027	0.023
	(0.002)**	(0.006)**	(0.005)**	(0.004)**
BK21- natural science, 2000	0.013	0.073	0.059	0.039
	(0.003)**	(0.006)**	(0.005)**	(0.005)**
BK21-social and humanity, 2000	0.008	0.029	0.021	0.017
	(0.004)+	(0.010)**	(0.009)*	(0.008)*
BK21-regional university, 2000	0.002	-0.018	-0.020	-0.007
	(0.003)	(0.007)*	(0.006)**	(0.005)
BK21-core, 2000	0.007	0.036	0.029	0.014
	(0.003)*	(0.007)**	(0.006)**	(0.005)**
BK21-specialization, 2000	0.005	0.009	0.004	0.007
	(0.004)	(0.010)	(0.008)	(0.007)

BK21-core, 2000	0.007	0.036	0.029	0.014
	(0.003)*	(0.007)**	(0.006)**	(0.005)**
BK21-specialization, 2000	0.005	0.009	0.004	0.007
	(0.004)	(0.010)	(0.008)	(0.007)
KRF-general+specialization, 2000	0.008	0.023	0.014	0.016
	(0.003)**	(0.008)**	(0.007)*	(0.006)**
KRF-general+specialization, 2001	0.008	0.015	0.007	0.013
	(0.003)*	(0.009)+	(0.007)	(0.006)*
KRF-general+specialization, 2002	0.007	0.023	0.016	0.017
	(0.003)*	(0.008)**	(0.006)*	(0.006)**
Excellent researcher	0.013	0.028	0.016	0.023
	(0.003)**	(0.008)**	(0.007)*	(0.006)**
Joint research projects	0.012	0.026	0.013	0.021
	(0.003)**	(0.007)**	(0.006)*	(0.005)**
Base science	0.004	0.024	0.021	0.015
	(0.003)	(0.007)**	(0.006)**	(0.005)**
Protected science	0.003	0.009	0.007	0.005
	(0.003)	(0.008)	(0.007)	(0.006)
Regional university	-0.004	-0.035	-0.030	-0.016

Graduate school	0.005	0.008	0.003	0.007
	(0.004)	(0.010)	(0.008)	(0.007)
M of Edu -Diversity and specialization, 2000	-0.008	-0.066	-0.059	-0.036
	(0.005)	(0.012)**	(0.010)**	(0.009)**
M of Edu –facility for private universities, 2000	-0.007	0.003	0.009	0.000
	(0.004)	(0.010)	(0.009)	(0.008)
M of Edu – experiment facility for national uni	-0.011	-0.070	-0.059	-0.039
	(0.005)*	(0.012)**	(0.010)**	(0.009)**
M of Edu – research institute, 2001	0.004	0.016	0.012	0.008
2001	(0.003)	(0.007)*	(0.006)*	(0.005)+
M of Edu – performance pay to national uni, 2000	-0.013	-0.086	-0.073	-0.047
	(0.006)*	(0.015)**	(0.012)**	(0.011)**
M of Edu – specialization for regional uni, 2000	-0.002	-0.010	-0.008	-0.004
	(0.003)	(0.007)	(0.006)	(0.005)
M of Edu – educational reform, 2000	0.002	0.016	0.013	0.007
	(0.003)	(0.007)*	(0.006)*	(0.005)

Table 11. Regressions for research performance regressions, for each program

	(1)	(2)	(3)	(4)
	'02 NCR -'99NCR	'99 NCR	'02NCR	'02 NCR -'95NCR
MoST, designated research institute, 2000	0.007	0.031	0.024	0.016
	(0.003)*	(0.008)**	(0.007)**	(0.006)**
MoST, designated research institute, 2001	0.009	0.035	0.026	0.020
	(0.003)**	(0.008)**	(0.007)**	(0.006)**
MoST, designated research institute, 2002	0.006	0.030	0.024	0.016
	(0.003)+	(0.008)**	(0.007)**	(0.006)**
MoIC, research support, 2001	0.004	0.005	0.001	0.004
	(0.002)+	(0.005)	(0.004)	(0.004)
M of Health – research support, 2000	0.012	0.036	0.024	0.022
	(0.004)**	(0.009)**	(0.008)**	(0.007)**
M of Health – research support, 2001	0.010	0.033	0.023	0.019
	(0.004)**	(0.009)**	(0.007)**	(0.007)**
M of Health – research support, 2002	0.009	0.019	0.010	0.012
	(0.003)**	(0.008)*	(0.006)	(0.006)*

5. Recent government reform efforts on HRD

- committee for human resource development
  - Chaired by minister of M of education and HRD
  - Consists of minister of 8 HRD-related ministries
  - Eventually responsible for budget allocation
- Closely tied to public finance reform
  - Three main reforms in public finance in process
    - Performance-based budgeting
    - Multi-year budget
    - Top-down system: autonomy + responsibility of ministries
  - Committee for HRD becomes key budget coordination mechanism for HRD budget under new top-down system

6. Summary and Reform Agenda

- Knowledge-based economy needs
  - primary and secondary education focusing more on excellence, creativity, and diversity than on generality
  - tertiary education that can provide competitive high-quality education and research
- The paper
  - documents education finance in Korea
  - conducts comparative study among Korea, US, and UK tertiary education finance system
  - investigates allocation and effectiveness of government research grants using school-level data

6. Summary and Reform Agenda - continued

- Primary and secondary education system needs
  - further decentralization to school and local educational units
  - strengthening accountability of school to students/parents (not to department of Education)
    - Overhauling equalization policy
    - (weak) school choice + school board of directors + new school type with more autonomy

6. Summary and Reform Agenda - continued

- Tertiary education system needs
  - Larger budget!
  - [demand-side financing for tertiary education I] scholarship and student loans instead of general grants to private universities
  - [demand-side financing for tertiary education II] research grants to individual researcher or research team
  - coordination mechanisms for grants from various ministries [committee for HRD]
  - improving institutional arrangements for research in colleges/universities: peer-group review process
    - indirect-cost system