REFERENCES

Ahmad S. (1991). Capital in economic theory: Neo-classical, Cambridge and chaos. England: Edwar Elgar.

Barro, Robert J. and Sala-i-Martin, Savier. (1995). Economic growth. New York :McGraw – Hill.

Beckman M. and Sato R. (1969). Aggregate producton functions and types of technical progress: A statistical analysis. American Economic Reviews59: 82-100.

Benhabib, J., and Spiegel M. M. (1994). The role of human capital in economic development evidence from aggregate cross-economy data. Journal of Monetary Economics 34: 143-173.

Bernard, A. B., and Jones, C. L. (1996). Productivity across industries and countries: Time series theory and evidence, The Review of Economics and Statistics 78, 1-2: 135-146.

Bland, S., and Will, L. (2001) .Resource movements and labor productivity, an Australian illustration: 1994 – 98 to 1997– 98, Productivity Commission Staff Research Paper, AusInfo, Canberra.

Board for Vocational Training and Skill Promotion. (1994). The first developing labor skill plan during 1995- 1996 and 1997- 2001(in Thai), Paper presented to Thai cabinet in 1994.

Busabokkeaw, Kanokwan. (1997). Technology transfer in the automobile assembly: A case study of Japanese and German firms. Master's thesis, Department of Economics, Chulalongkorn University.

Costa, Jose da Silva, Richard W. Ellson, and Martin, Randolph C. (1987). Pubilc capital, regional output, and development: Some empirical evidence. Journal of Regional Science27. (August):419-37.

Evans, Paul and Karras, Georgios. (1994). Are government activities productive? Evidence from a panel of U.S. States. The Review of Economic and Statistics. (Feb):1-11.

Haskel J.,and Martin C. (1993). Do skill shortages reduce productivity theory and evidence from the United Kingdom. The Economic Journal 103: 386-394.

Holz-Eakin, Douglas. (1988). Private output, governmetn capital, and the infrastructure 'Crisis'. Discussion Paper Series No.394. Columbia University.

Holtz-Eakin, Douglas. (1992). Pubilc sector capital and the productivity puzzle. NBER Working Paper 4122 (July).

Howard Pack Consultant. (1980). Macroeconomic implication of factor substitution in industrial process. Staff Working Paper No. 377, World Bank.

International Consultancy Network. (1999). Study project on the evaluation of development strategy on competitiveness. Final Report to Office of Agricultural Economics.

Jirachaiyabhas, Chaiyawat. (1991). Real money balance in aggregate production function of Thailand. Master's thesis, Department of Economics, Thammasart University.

Kocherlakota R. Narayana and Kei-Mu Yi. (1996). A simple time series test of endogenous VS. exogenous growth models: An application to the United states. The Review of Economics and Statistics 78,1-2: 126-134.

Kraipornsak, Paitoon. (1995). Sources of eonomic growth in Thailand 1970-1089. Doctoral dissertation, Australian National University, Australia.

Kraipornsak, Paitoon. (1996). Total factor productivity growth in Thailand: An econometric approach. Chulalongkorn Journal of Economics 8(3):295-339.

Kraipornsak, Paitoon. (2000). What different is the production function estimated by different methods? : An empirical estimation comparison. Chulalongkorn Journal of Economics 12(2): 185-204.

Kubo, Yuji and Kim, Hong-dall. (1996). Human capital, imported technology and economic growth :A comparative study of Korea and Japan.(Draft paper).

Kumar, Subodh and Russell, R. Robert. (2002). Technological change, technological catch-up, and capital deepening: Relative contributions to growth and convergence. The American Economic Review 92, 3:527-548 .

Landue, Daniel. (1986). Government and economic growth in the Less Developed Countries: An Empirical Study for 1960 – 1980. Economic Development and Cultural Change 35: 35-75.

Lawrence, J. L.; Dean, T. J., and Frederic, F. L. (1991). Education and the productivity in the developing countries. World Development Report: Working papers WPS 612.

Lynde C., and Richmond J. (1993). Public capital and long run costs in U.K. manufacturing. The Economic Journal 103: 880-893.

Ministry of Labor. (1968). The problem of Thai labor. Paper presented to Prime Minister.

Milà G. T., McGuire J. T., and Porter H. R. (1996). The effect of public capital in state-level production functions reconsidered. The Review of Economics and Statistics 78, 1-2: 177-180.

Munnell, Alicia H. (1990). Why has productivity declined? Productivity and public investment. New England Economic Review. Federal reserve bank of Boston. January/February: 3-22.

Munnell, Alicia H. (1992). Policy watch, infrastructure investment and economic growth. Journal of Economic Perspectives 6, 4: 189-198.

Nakajima, Akiko. (1997). Total labor inputs and value added productivity of direct labor in economic development. Chulalongkorn Journal of Economics 9(1): 51-106.

National Statistical Office. (1970-2002). Labor Force Survey.(in Thai). 98 vols. Bangkok.

Nelson R. and Phelps, E.(1966). Investment in humans, technological diffusion, and economic growth. American Economic Review 56: 69-75.

Panitchpakdi, Supachai. (2001). The role of Thailand in the world economic theatre: Guideline for creating bargaining power and competitive capability. Ministry of commerce, Bangkok. 1st edition.

Patmasiriwat, D. (1992). Public sector and the transition during 1971-1990: Government consumption and investment expenditure. Kwamroo Naksetthasart Thai 2535(in Thai). The Economics Association of Thailand. Bangkok.

Porter, Michael E. (2003). Thailand's competitiveness: creating the foundations for higher productivity [Presentation to NESDB in May 2003], Institute for Strategy and Competitiveness, Harvard Business School.

Pritchett, L. (1996). Where has all the education gone? World Bank policy Reserch Department working paper no.1581.

Puapongsakorn, Nibhond and Suzuki, Patthamawadi. (1992). The change of labor market to the condition of labor shortage(in Thai). TDRI Year-End conference "Thailand's Economic Structure: Towards Balanced Development?". Bangkok.

Ratner, Jonathan B. (1983). Government capital and the production function for U.S. private output. Economic Letters: 213-217.

Samridsab, Somchai. (2535). Objective and implication of Economic and Social Development Plan. (in Thai) Krung Thai Bank. Bangkok.

Seabsai Prayon. (1998). Role of skilled labor in economic sectural growth in Thailand. Master's thesis Kasertsart University.

Sivaranon, Tomrat. (1970). labor productivity, labor and Industry(in Thai): 9-17.

Suwanrada, Worawet. (1999). The role of public capital in Thai economy, Chulalongkorn Journal of Economics 11(3): 273 – 320.

Tatom, John A. (1991). Public capital and private sector performance. The Federal Reserve Bank of ST. Louis 73 (May/June): 3-15.

Trakulroong, Siriluk. (2001). Role of human capital on economic development of Thailand(in Thai). Master's thesis, Department of Economics, Kasetsart University.

Wangudom, Apipat. (2001). Human capital and development in Thailand. Master's thesis, Faculty of Economics, Thammasat University.

APPENDICES

APPENDIX A

For those 3 functional forms of Cobb-Douglas Production Function, this mean that each point on the expansion path must satisfy the following table.

			Result
Hicks neutrality	K,G	$\frac{P_K}{P_G}=\frac{Y_K}{Y_G}=\frac{A(H_t)\beta_K K_i^{\beta_K-1}G_i^{\beta_G}L_i^{\beta_L}}{A(H_t)K_i^{\beta_K}\beta_G G_i^{\beta_G-1}L_i^{\beta_L}}$	$\frac{\beta_K G_i}{\beta_G K_i}$
	K,L	$\frac{P_K}{P_L}=\frac{Y_K}{Y_L}=\frac{A(H_t)\beta_K K_i^{\beta_K-1}G_i^{\beta_G}L_i^{\beta_L}}{A(H_t)K_i^{\beta_K}G_i^{\beta_G}\beta_L L_i^{\beta_L-1}}$	$\frac{\beta_K L_i}{\beta_L K_i}$
	G,L	$\frac{P_G}{P_L}=\frac{Y_G}{Y_L}=\frac{A(H_t)\beta_G K_i^{\beta_K}\beta_G G_i^{\beta_G-1}L_i^{\beta_L}}{A(H_t)K_i^{\beta_K}G_i^{\beta_G}\beta_L L_i^{\beta_L-1}}$	$\frac{\beta_G L_i}{\beta_L G_i}$
Harrod neutrality	K,G	$\frac{P_K}{P_G}=\frac{Y_K}{Y_G}=\frac{\beta_K K_i^{\beta_K-1}G_i^{\beta_G}(A(H_t)L_i)^{\beta_L}}{K_i^{\beta_K}\beta_G G_i^{\beta_G-1}(A(H_t)L_i)^{\beta_L}}$	$\frac{\beta_K G_i}{\beta_G K_i}$
	K,L	$\frac{P_K}{P_L}=\frac{Y_K}{Y_L}=\frac{\beta_K K_i^{\beta_K-1}G_i^{\beta_G}(A(H_t)L_i)^{\beta_L}}{K_i^{\beta_K}G_i^{\beta_G}\beta_L(A(H_t)L_i)^{\beta_L-1}}$	$\frac{\beta_K A(H_t)L_i}{\beta_L K_i}$
	G,L	$\frac{P_G}{P_L}=\frac{Y_G}{Y_L}=\frac{\beta_G K_i^{\beta_K}\beta_G G_i^{\beta_G-1}(A(H_t)L_i)^{\beta_L}}{K_i^{\beta_K}G_i^{\beta_G}\beta_L(A(H_t)L_i)^{\beta_L-1}}$	$\frac{\beta_G A(H_t)L_i}{\beta_L G_i}$
Solow neutrality	K,G	$\frac{P_K}{P_G}=\frac{Y_K}{Y_G}=\frac{\beta_K(A(H_t)K_i)^{\beta_K-1}(A(H_t)G_i)^{\beta_G}L_i^{\beta_L}}{(A(H_t)K_i)^{\beta_K}\beta_G(A(H_t)G_i)^{\beta_G-1}L_i^{\beta_L}}$	$\frac{\beta_K G_i}{\beta_G K_i}$
	K,L	$\frac{P_K}{P_L}=\frac{Y_K}{Y_L}=\frac{\beta_K(A(H_t)K_i)^{\beta_K-1}(A(H_t)G_i)^{\beta_G}L_i^{\beta_L}}{(A(H_t)K_i)^{\beta_K}(A(H_t)G_i)^{\beta_G}\beta_L L_i^{\beta_L-1}}$	$\frac{\beta_K L_i}{\beta_L A(H_t)K_i}$
	G,L	$\frac{P_G}{P_L}=\frac{Y_G}{Y_L}=\frac{\beta_G(A(H_t)K_i)^{\beta_K}\beta_G(A(H_t)G_i)^{\beta_G-1}L_i^{\beta_L}}{(A(H_t)K_i)^{\beta_K}(A(H_t)G_i)^{\beta_G}\beta_L L_i^{\beta_L-1}}$	$\frac{\beta_G L_i}{\beta_L A(H_t)G_i}$

Notice that those function of the least-cost input combination is in the form y=ax, which dy/dx and y/x are both equal to the constant value, thus, those elasticity of substitution is constant. For example, the proportion relationship between K and G is written as the least-cost input combination:

$$\frac{K_i}{G_i}=\frac{P_G}{P_K}\frac{\beta_K}{\beta_G}$$

$$\frac{d\left(\dfrac{K_i}{G_i}\right)}{d\left(\dfrac{P_G}{P_K}\right)}=\frac{\beta_K}{\beta_G} and \frac{\left(\dfrac{K_i}{G_i}\right)}{\left(\dfrac{P_G}{P_K}\right)}=\frac{\beta_K}{\beta_G}$$

Substituting the value, the σ is immediately equal to 1. The conclusion that, no matter α+β=1 or not, the generalized Cobb-Douglas Production Function is characterized by a constant, unitary elasticity of substitution.

APPENDIX B

The estimated equations are eliminated time trend by the following equations. Note that the t-statistics of every variable is accepted at 99% significance.

Whole economy

$$Y=382484.334+40741.137*trend+1756.883*trend^2$$

(3.911) (2.881) (4.113)

$$K=1243888.196-73198.581*trend+10962.987*trend^2$$

(7.746) (-2.658) (11.126)

$$G=309947.950-19608.754*trend+3690.239*trend^2$$

(6.455) (-2.381) (12.525)

$$L=12372.109+880.601*trend-7.305*trend^2$$

(18.291) (9.001) (-2.472)

Agriculture

$$Y=123995.948+6992.172*trend$$

(29.795) (31.283)

$$G=38289.024-3655.258*trend+473.448*trend^2$$

(6.870) (-4.109) (15.972)

$$L=8858.039+620.926*trend-15.074*trend^2$$

(11.694) (5.668) (-4.556)

$$LAND=103549395.2+2162287.606*trend-40058.435*trend^2$$

(109.931) (16.431) (-10.354)

Industry

$$Y=140693.3+1400.681*trend$$

(5.906) (27.550)

$$K=243653.8-43654.51*trend+3663.276*trend^2$$

(5.762) (-6.467) (16.287)

$$G=58695.92-7423.472*trend+1111.672*trend^2$$

(5.181) (-4.105) (18.451)

$$L=1044.813+122.249*trend+2.897*trend^2$$

(3.505) (2.835) (2.224)

Service

$Y=168401.3+*25026.73trend+612.787*trend^2$

(3.418) (3.512) (2.847)

$K=787817.6-49739.08*trend+6628.384*trend^2$

(7.228) (-2.859) (11.434)

$G=194548.7-13699.88*trend+1837.270*trend^2$

(6.160) (-2.717) (10.937)

$L=2469.208+137.417*trend+4.873*trend^2$

(18.947) (7.290) (8.560)

APPENDIX C

Agricultural sector estimations with rainfall, estimated by dummy variable are shown below. It is set as flood when rainfall is over 15% of annual average, and set as the draught when rainfall is less than 15% of average. The figures are drawn from Thai Meteorological Department during 1970-2003.

1. Cobb-Douglas Production Function

1) The Hicks Neutrality with *A(H)* as a Factor

$$Y = 41,050,957,591F^{0.009}\ A(H)^{-0.115}K^{-0.062}\ G^{-0.031}\ L^{-0.493}\ Land^{-0.515}$$

(1.364)(2.683)(-0.669) (-2.378)*(-1.692)** (-0.544)(0.391)

$$(D_{flood} = 1.057, D_{draught} = 1.027,\ D_{crisis} = 1.137)$$

(1.112) (0.613) (2.268)*

Adjusted R-squared	0.422	Durbin-Watson stat	2.231
AK	-2.663	SC	-2.235

* significance at 95% .

** significance at 90% .

2) The Hicks Neutrality without *A(H)*

$$Y = 18,108,911,462F^{-0.001}\ \ (K^{0.634}\ \ G^{-0.078}\ \ \ L^{0.023}\ Land^{0.887})$$

(0.729) (1.251)(4.095)*(-1.928)**(0.347)(1.068)

$$(D_{flood} = 1.051, D_{draught} = 1.028,\ D_{crisis} = 1.139)$$

(1.038) (0.654) (2.370)*

Adjusted R-squared	0.440	Durbin-Watson stat	2.190
AK	-2.750	SC	-2.373

* significance at 95% .

** significance at 93% .

3) The Hicks Neutrality

$$Y= 1151746.449\ A(H)(K^{0.536}\ \ G^{-.0106}\ \ L^{0.006}\ Land^{-0.427})$$

(7.318)* (3.861)*(-2.781)*(0.071)(-2.230)*

$$(D_{flood}=1.062, D_{draught}=1.026,\ D_{crisis}=1.111)$$

(1.192) (0.578) (1.936)**

Adjusted R-squared	0.405	Durbin-Watson stat	2.114
AK	-2.654	SC	-2.274

* significance at 95% .

** significance at 93% .

4) The Harrod Neutrality

$$Y= 0.00037\ \ (K^{0.631}\ \ G^{-0.084}\ \ (A(H)L)^{0.00008}Land^{0.690})$$

(-0.454) (4.131)*(-2.155)* (-0.003) (0.767)

$$(D_{flood}=1.059,\ D_{draught}=1.027,\ \ D_{crisis}=1.136)$$

(1.169) (0.623) (2.306)*

Adjusted R-squared	0.449	Durbin-Watson stat	2.218
AK	-2.731	SC	-2.349

* significance at 95% .

5) The Solow Neutrality

$$Y= 0.00037\ (A(H)K)^{0.631}(A(H)G)^{-0.084}\ L^{0.00008}Land^{0.690}$$

(-0.454) (4.131)*(-2.155)* (-0.003) (0.767)

$$(D_{flood}=1.059,\ D_{draught}=1.027,\ \ D_{crisis}=1.136)$$

(1.169) (0.623) (2.306)*

Adjusted R-squared	0.449	Durbin-Watson stat	2.218
AK	-2.731	SC	-2.349

* significance at 95% .

2. Constant Elasticity of Substitution Production Function

The dummy of rainfall in this sector is set as the definition in the earlier part. The CES Production Functions are run by linear and simplified in the common form of CES.

1) The Hicks Neutrality with *A(H)* as a Factor

$$Y=0.0012(-0.005A(H)^{-0.096}0.344K^{-0.096}-0.036G^{-0.096}0.008L^{-0.096}0.688Land^{-0.096})^{1.286/-0.096}$$

$$(D_{flood}=1.058, D_{draught}=1.027, D_{crisis}=1.137)$$

(0.043) (-0.076) (0.921)

Adjusted R-squared	0.390	Durbin-Watson stat	2.234
AK	-2.592	SC	-2.116

2) The Hicks Neutrality without *A(H)*

$$Y=1201402.281(2032.698K^{-0.437}-133.313\,G^{-0.437}30.10121L^{-0.437}-1928.486Land^{-0.437})^{0.482/-0.437}$$

$$(D_{flood}=1.057, D_{draught}=1.023, D_{crisis}=1.111)$$

(1.054) (0.496) (1.588)

Adjusted R-squared	0.372	Durbin-Watson stat	2.084
AK	-2.616	SC	-2.192

3) The Hicks Neutrality

$$Y= 393147.372A(H)^{0.010}(492.222K^{-0.003}-95.881G^{-0.003}3.099\,L^{-0.003}-398.439\,Land^{-0.003})^{0.010/-0.003}$$

$$(D_{flood}=1.061, D_{draught}=1.026, D_{crisis}=1.108)$$

(1.050) (0.564) (1.390)

Adjusted R-squared	0.376	Durbin-Watson stat	2.111
AK	-2.587	SC	-2.159

4) The Harrod neutrality

$$Y=0.0009(0.962K^{0.242}-0.200G^{0.242}-0.00004(A(H)L)^{0.242}\ 0.247Land^{0.242})^{1.251/0.242}$$

$$(D_{flood}=1.056, D_{draught}=1.028,\ D_{crisis}=1.136)$$

(0.936) (0.590) (2.265)*

Adjusted R-squared	0.420	Durbin-Watson stat	2.211
AK	-2.660	SC	-2.232

5) The Solow neutrality

$$Y=609.820(411.47(A(H)K)^{0.02}-366.912(A(H)G)^{0.02}-248.0799L^{0.02}\ 204.520Land^{0.02})^{0.00240.02}$$

$$(D_{flood}=1.017, D_{draught}=1.051,\ D_{crisis}=1.061)$$

(0.263) (0.948) (0.740)

Adjusted R-squared	0.122	Durbin-Watson stat	1.627
AK	-2.246	SC	-1.817

As can be seen from above estimations, the dummy variable concerning rainfall is not significant to agricultural output. It might be caused by the reason claimed by Puapongsakorn and Suzuki(1992) that the influence of rainfall or seasonal affect has tended to decrease due to the increase in machines, and the better understanding of agriculturists about rotational cropping.

APPENDIX D

Data used in the study are shown in the following tables. Note that the definition is decribed in section 1.4.

Agriculture

	GDP (MB) at 1988P	Annual Average Employed Person	Public Capital at 1988P	Private Capital at 1988P	Human Capital and Catch-up Technology	Land
Symbol used in this study	*Y*	*L*	*G*	*K*	*A(H)*	*Land*
Unit	Million Bath	1,000 persons	Million Bath	Million Bath		1,000 Rais
1970	130702	11090.8	25318	206020		
1971	136171	11991.6	27510	208912		109,000
1972	134105	10496.3	29524	209884	110675.0	110,000
1973	145311	11031.1	30484	211272	73597.1	111,000
1974	149889	8898.9	31484	225881	101914.6	111,000
1975	156094	7224.2	33682	236016	80932.1	112,000
1976	164885	10774.1	37514	231584	97468.2	113,000
1977	169319	12014.2	41213	229683	141086.8	114,000
1978	187355	12840.3	45524	236737	107537.1	116,000
1979	183106	12037.4	49859	230823	122620.1	118,000
1980	184576	15351.3	56856	225629	132601.9	119,000
1981	194023	12978.5	64750	223302	157539.2	121,000
1982	198825	13048.1	73170	218502	202892.4	124,000
1983	208312	13937.9	80755	217674	201745.9	124,000
1984	217518	14936.9	89080	211524	247005.7	125,000
1985	227324	14824.5	97619	210170	230338.0	129,000
1986	228191	15473.0	106194	215489	176395.4	130,000
1987	228346	15120.1	111628	213787	216893.9	131,000
1988	252346	16764.1	118354	214699	195417.3	132,000

	GDP (MB) at 1988P	Annual Average Employed Person	Public Capital at 1988P	Private Capital at 1988P	Human Capital and Catch-up Technology	Land
1989	276569	16528.4	125450	216173	206871.7	132,000
1990	263607	19158.1	135349	221503	228874.1	132,000
1991	282740	15301.3	148634	231563	158194.7	133,000
1992	296277	15608.6	167936	236311	188141.5	132,000
1993	289065	16015.1	189167	250465	141098.2	131,000
1994	303376	14138.9	216214	263507	165909.4	132,000
1995	313855	14258.1	245037	276609	126294.2	132,000
1996	326836	13586.3	272155	277336	155574.4	132,000
1997	323884	13438.4	300037	247524	150447.8	132,000
1998	318953	13454.5	318284	202931	144507.3	132,000
1999	325491	13878.1	340199	164687	121555.8	132,000
2000	341551	13893.0				
2001	307346	13585.3				
2002	317785	14041.8				
2003(Q1-3)	238428	13605.6				

Industry

	GDP (MB) at 1988P	Annual Average Employed Person	Public Capital at 1988P	Private Capital at 1988P	Human Capital and Catch-up Technology
Symbol used in this study	*Y*	*L*	*G*	*K*	*A(H)*
Unit	**Million Bath**	**1,000 persons**	**Million Bath**	**Million Bath**	
1970	114,569	896	38,055	119,669	
1971	125,028	1,071	41,364	127,657	
1972	136,633	1,741	45,479	137,617	1,048,327
1973	152,883	1,699	47,219	151,916	1,373,324
1974	159,359	2,227	47,945	157,790	2,036,988

	GDP (MB) at 1988P	Annual Average Employed Person	Public Capital at 1988P	Private Capital at 1988P	Human Capital and Catch-up Technology
1975	168,209	1,858	49,929	159,973	1,272,408
1976	195,574	1,634	54,828	180,247	894,911
1977	225,472	2,041	61,979	196,233	1,032,481
1978	249,282	2,001	73,388	212,777	934,730
1979	265,937	2,496	84,308	234,775	1,114,449
1980	275,388	2,235	104,799	250,768	1,279,685
1981	294,836	2,594	129,615	271,306	1,582,895
1982	309,997	2,931	149,345	289,761	1,386,083
1983	342,597	2,876	175,452	323,122	1,419,546
1984	370,642	3,034	202,695	354,422	1,532,268
1985	375,914	3,025	224,234	374,555	1,550,562
1986	406,060	3,034	242,482	401,520	1,280,392
1987	463,432	3,605	255,200	446,174	1,120,031
1988	539,380	3,474	271,883	526,798	1,180,274
1989	633,672	3,891	293,103	620,262	1,229,113
1990	735,432	4,197	318,766	737,485	1,356,212
1991	824,666	5,450	354,673	874,976	1,362,455
1992	906,410	5,878	394,334	1,017,916	1,250,379
1993	1,001,799	5,904	442,068	1,171,445	1,121,473
1994	1,104,276	6,685	501,662	1,339,217	1,023,062
1995	1,228,511	7,028	568,537	1,539,307	1,005,449
1996	1,314,817	7,513	620,601	1,700,379	1,105,989
1997	1,291,917	7,330	679,323	1,874,099	1,161,147
1998	1,119,851	6,435	762,930	1,918,905	1,068,530
1999	1,230,460	6,218	805,823	1,948,155	865,284
2000	1,294,844	6,708			
2001	1,351,554	7,483			
2002	1,457,271	6,972			
2003(Q1-3)	1,173,515	7,332			

Service

	GDP (MB) at 1988P	Annual Average Employed Person	Public Capital at 1988P	Private Capital at 1988P	Human Capital and Catch-up Technology
Symbol used in this study	*Y*	*L*	*G*	*K*	*A(H)*
Unit	Million Bath	1,000 persons	Million Bath	Million Bath	
1970	232770	2182.7	132205	657927	
1971	240004	2567.0	141617	675787	
1972	251606	2883.2	150668	697620	4250002.2
1973	276220	3104.1	159409	724761	4146356.5
1974	290907	3778.6	165525	751531	5346880.0
1975	305555	3255.6	175995	784780	4932205.2
1976	327148	2960.6	192259	819436	4498709.8
1977	360623	3631.3	213846	867726	4960771.2
1978	393388	3784.5	237460	902978	4180040.0
1979	424465	4005.2	265627	953994	4648173.9
1980	453769	4101.1	297528	1022762	5274152.0
1981	478847	4638.1	327395	1093252	5430148.6
1982	510679	5232.0	351380	1169106	6241466.9
1983	525523	5262.5	374686	1253925	6980176.0
1984	550193	5237.1	403331	1350542	6345076.2
1985	588017	5497.2	441717	1426744	5549483.1
1986	622926	5774.2	468416	1496204	4851857.0
1987	685069	6546.7	493325	1614525	4345204.2
1988	768078	6506.8	512263	1771710	3879849.5
1989	839711	6628.8	532463	1997873	3921290.4
1990	946333	6600.2	569553	2316144	3996359.4
1991	1004456	7581.0	619687	2648227	4026020.7
1992	1079885	7775.2	691171	2972747	3752250.5
1993	1180044	8280.6	760220	3313693	3470828.4

	GDP (MB) at 1988P	Annual Average Employed Person	Public Capital at 1988P	Private Capital at 1988P	Human Capital and Catch-up Technology
1994	1285321	8595.8	842496	3685376	3063046.4
1995	1399370	9250.8	936940	4072482	2857956.4
1996	1473685	9592.2	1105826	4409489	3413454.2
1997	1456814	9961.9	1277354	4514538	3446261.7
1998	1310880	10202.0	1334796	4418580	3460826.1
1999	1315570	10549.7	1419705	4319393	3713207.4
2000	1364200	10681.0			
2001	1391081	11104.2			
2002	1448506	12031.5			
2003(Q1-3)	1123815	12597.0			

BIOGRAPHY

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Fields of Interest

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- Public finance
- Macroeconomics
- Human development, management, and Training