Chapter 7
Summary and Recommendations

1. The significance of the Study

The ADB in her publication on the "Infrastructure for a Seamless Asia" in 2009[1] has pointed out high investment demand for Asia's economic infrastructure (power, water, and sanitation, transport, and telecommunication) from 2010 to 2020. The costs of hard and technical infrastructure for Asia are estimated to be 8 trillion USD approximately. Following the Sustainable Development Goals (SDGs) and updates on the social and economic environment of the region, the ADB has extended the estimate for the period from 2016 to 2030. An updated figure on the demand for hard and technical infrastructure needs in a report *"Bridging the Gap: Infrastructure Needs in Asia"* in February 2017, has pointed large gap of infrastructure needs. It has provided strong policy recommendations as a basis for financial needs for investment.

JICA has started in consultation with the ADB to conduct a research on *Asia's social infrastructure demand* from 2016 to 2030 to complement ADB's demand estimate for economic infrastructure. Social infrastructure, such as school and hospital, is a key capital investment to maintain social services and secure economic development of the region where the population is expected a rise. The domestic public financial gap of these public investments in each Asian country would be enormous.

The problem of finding out *the financial source* for infrastructure renovation would be crucial to developing country where domestic saving is still lower than needs. Besides, some countries such as Thailand are facing with aging trend following Japan. Thailand will be facing population aging in the next decades. Thailand is ahead of other Asian countries, Thailand has declining birth rates owing to declining total fertility rates and declining death rate owing to health standard improvement in the last decades. The longevity of population was owing to better public health services.

Approaching aging society, Thailand may need a new type of social infrastructure. Not only the housing and health services and facilities for the aged citizens but also Thailand would need a new supply of skilled labor supply via capable human resource investment to compensate for the declining saving capacity of the household. This

[1] ADB cited the methodology by Fay and Yepes "Investing in infrastructure: what is needed from 2000 to 2010?" World Bank Policy Research Working Paper 3102, July 2003.
http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-3102

comprehensive social infrastructure investment would be a crucial policy of Thailand as well.

The purpose of our research is to estimate the investment demand of social infrastructure in Thailand up to 2030. This is to find appropriate research methodology on social infrastructure demand estimation and forecasting to be learned by other Asian countries.

The scope of research thus covers mainly the social infrastructure for education and health system in Thailand. In addition, we would also estimate the demand for low-income housing needs and affordability to serve for the long-term urbanization in Thailand. In our research, we have intention to add estimation on the demand for government facilities alongside with the urbanization and decentralization in Thailand as well. This is to serve for the decentralization of service provision from the central and regional government to local government in the coming decades.

We have followed the guideline of JICA and ADB for the "micro" and "macro" approaches and make it suitable for Thailand's economic and social context. For macro approach, we have learned from ADB[2], applying multiple regression models by Fay and Yepes[3] (2003). We have linked the equations with human development's hypothetical target noted by the UNDP (2016) for our macro approach in Chapter 3.

We have described the economic development and growth of Thailand as a basis for estimation and report. Thereafter, we have estimated the demand for social infrastructure if the Human Development Index's target of 'years of schooling and expected years of schooling', 'life-expectancy' as well as Gross National Income per capita is set to obtain the target level of HDI. With model simulation, we have applied the projected social investment need to evaluate Thailand's macroeconomic impact.

Chapter 3 describes Social Infrastructure Needs and Its Determinants at the macro level. A regression analysis together with a counterfactual macro-economic model simulation and forecasting will be used to project the gross investment needed for total social infrastructure for human capital development and welfare improvement for low-income housing. This is a methodology developed by this study.

For social infrastructure demand for physical space to conduct education, health services, and government services we have applied 'micro' approach. The social infrastructure needs in the education system and their facilities have been benchmarked

[2] ADB (2009), Seamless Asia

[3] Fay and Yepes "Investing in infrastructure: what is needed from 2000 to 2010?" World Bank Policy Research Working Paper 3102, July 2003 http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-3102

with international standard i.e., PISA report. We later come up with a projection for social infrastructure need as well its 'cost saving'. This is owing to shifting of the importance from physical alone towards human capital investment. We have added the similar demand and its cost saving in the case of public services by applying data from the Office of Civil Servant Commission (OCSC).

We have applied data from the health service system in Thailand, known as the 'Universal Coverage Scheme' (UCS). It is the demand side approach to the health services. It may be one of the successful implementations in the world. The projection of social infrastructure need is projected from the supply provision

Finally, we have constructed our own micro model with a spreadsheet-based on 'Low Income Housing Needs and Affordability' model for Thailand. We are interested in the low-income households' demand for housing. Their demand projection is to qualify the level of needs for future urbanization and communities' welfare improvement.

In this chapter, we would make an overall conclusion of projection result as a sample of our methodology. This may be a basis for a further application for other Asian countries.

2. Findings of the Study on the Social Investment Cost of Infrastructure

2.1 Macro Approach

The macro approach shown in Table 7.1 below has concentrated in the construction of residential investment. The amount of social infrastructure of this category will cost 333.8 billion baht in 2020 and tend to increase substantially to 386.9 billion baht in 2025 and 444.7 billion baht in 2030 respectively. Schools and hospital are lower in their investment cost as far as construction is concerned. However, we have found that the non-construction social investments are still needed to be fulfilled in the schooling and hospital system services. The modern classrooms, laboratory, and modern medical types of equipment are needed in our simulation for schools and hospital. This will be allocated from the public source of non-construction investment in capital formation. The magnitude of non-construction for schooling system would be 10.25 billion baht in 2525 and 20.98 billion baht in 2030 respectively. This is what we have termed it as social infrastructure investment in knowledge for human capital built up towards 21st Century Skills.

Table 7.1: Macro Approach to Social Infrastructure Investment Need 2020-2-30, measured in current price (Billion baht)

Description	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Gross fixed capital formation: Construction (scenario1)	**1,318.15**	**1,358.48**	**1,399.70**	**1,441.63**	**1,484.30**	**1,527.79**	**1,572.05**	**1,617.04**	**1,662.74**	**1,709.10**	**1,756.07**
Social Infrastructure RESIDENTIAL	333.8	344.0	354.4	365.1	375.9	386.9	398.1	409.5	421.0	432.8	444.7
Social Infrastructure SCHOOL	36.3	37.4	38.5	39.7	40.9	42.1	43.3	44.5	45.8	47.1	48.4
Social Infrastructure HOSPITAL	20.1	20.7	21.3	21.9	22.6	23.3	23.9	24.6	25.3	26.0	26.7
OTHER building	32.0	32.9	33.9	35.0	36.0	37.1	38.1	39.2	40.3	41.5	42.6
Other Non-Building	896.0	923.5	951.5	980.0	1,009.0	1,038.5	1,068.6	1,099.2	1,130.3	1,161.8	1,193.7
Change in Gross fixed capital formation: Construction Changed from baseline	18.84	39.00	61.70	86.18	110.77	135.81	162.11	189.69	218.24	247.62	277.84
Social Infrastructure RESIDENTIAL	4.77	9.88	15.62	21.82	28.05	34.39	41.05	48.03	55.26	62.70	70.36
Social Infrastructure SCHOOL	0.52	1.07	1.70	2.37	3.05	3.74	4.46	5.22	6.01	6.82	7.65
Social Infrastructure HOSPITAL	0.29	0.59	0.94	1.31	1.69	2.07	2.47	2.89	3.32	3.77	4.23
OTHER building	0.46	0.95	1.50	2.09	2.69	3.29	3.93	4.60	5.29	6.01	6.74
Other Non-Building	12.81	26.51	41.94	58.58	75.30	92.32	110.20	128.95	148.35	168.33	188.87
Social Infrastructure Investment Need, (scenario 1)	**1,244.07**	**1,282.14**	**1,321.05**	**1,360.62**	**1,400.89**	**1,441.94**	**1,483.71**	**1,526.18**	**1,569.30**	**1,613.05**	**1,657.39**
Non-construction											

Public	**248.81**	**256.43**	**264.21**	**272.12**	**280.18**	**288.39**	**296.74**	**305.24**	**313.86**	**322.61**	**331.48**
Education	99.53	102.57	105.68	108.85	112.07	115.35	118.70	122.09	125.54	129.04	132.59
Health	119.43	123.09	126.82	130.62	134.49	138.43	142.44	146.51	150.65	154.85	159.11
Residential	4.98	5.13	5.28	5.44	5.60	5.77	5.93	6.10	6.28	6.45	6.63
Social Infrastructure Investment Need, Additional	**17.78**	**36.81**	**58.23**	**81.34**	**104.54**	**128.17**	**153.00**	**179.03**	**205.97**	**233.71**	**262.23**
Non-construction,											
Public	**3.56**	**7.36**	**11.65**	**16.27**	**20.91**	**25.63**	**30.60**	**35.81**	**41.19**	**46.74**	**52.45**
Education	1.42	2.94	4.66	6.51	8.36	10.25	12.24	14.32	16.48	18.70	20.98
Health	1.71	3.53	5.59	7.81	10.04	12.30	14.69	17.19	19.77	22.44	25.17
Residential	0.07	0.15	0.23	0.33	0.42	0.51	0.61	0.72	0.82	0.93	1.05

Source: Model simulation in this study; see system model and applying national accounts of Thailand

2.2 Micro Approach

2.2.1 Human capital investment in a schooling system

We have followed the guideline in micro approach as well as schooling space needed in basic education and vocational education in Thailand. We have found that the space requirement is projected to be 197.56 million square meters in 2020. The declining population and school intake in Thailand are foreseeable to have less demand for space. It would decline to 81.05 million square meters in 2040 respectively. This is very clear for a general stream of education except for the vocational education. The spacious laboratory, workshops, as well real-world situation of training on modern industrial machinery, mechanical cum electronic, applied electronics, powers, motors vehicles and etc. are very important to raise the labor productivity for the industry. More importantly, the pneumatics and robotics etc would be new to Thailand to make a serious investment. The rail system engineer and technicians are badly needed in Thailand for her drive to be center of communications and transportation of the CLMV and Thailand.

Table 7.2: Hypothetical Physical Space Required by Basic and Vocational Education (Square Meters)

Year	Primary Education (sq. Meters)	Lower Secondary (sq. Meters)	Upper Secondary Vocational Stream (sq. Meters)	Upper Secondary General Stream (sq. Meters)	Total space requirement for Basic and Vocational Education (sq. Meters)
2020	46,252,969	30,818,899	6,726,308	17,335,569	197,565,688
2025	44,266,449	29,064,720	7,421,938	15,678,836	188,613,278
2030	41,625,217	27,753,771	7,705,040	15,097,307	179,080,810
2035	38,439,874	26,005,036	8,098,959	14,355,606	167,956,767
2040	35,044,823	23,962,662	8,700,233	13,349,574	81,057,292

In such situation, we can conclude that the cost of construction investment in building and facilities as physical periphery would have to be reduced. Instead, the construction investment for new building and facilities should gear towards the modern building which serves for the grooming of skills for the 21st Century for every class from pre-primary up to the higher education.

The model simulation result in Table 7.3 has indicated that Thailand can re-allocate the cost saving in construction investment in building and facilities if properly managed. Cost of investment can be used for maintenance of some building but most of the aged buildings more than 40 years may have to be dismantled. New building with modern technology as well computer system would be needed for both BMR and provincial areas. This is after some reconciliation of consolidation of unusable building and classrooms. The schools within the same district in a reachable distance may need to be replaced by new and modern building and facilities after consolidations of assets and management system.

The consolidating source of funds is in consultation with the Treasury Department, Ministry of Finance. Land asset after consolidation would be returned to the kingdom for other purposes. In exchange for that consolidation willingness, the ministry of finance would issue the long-term bond for an investment fund. The fund is collateralized by the benefit of return assets to the Ministry. Below is the cost saving estimate if the consolidation of the asset is assumed (negative investment) while vocational education would still need the investment of 16,501 million baht in modernizing school systems.

Table 7.3: Hypothetical Cost and Saving of Investment in Physical Investment (Million Baht)

Year	Primary Education (Million Baht)	Lower Secondary (Million Baht)	Upper Secondary Vocational Stream (Million Baht)	Upper Secondary General Stream (Million Baht)
2016-2040	-99,726	-65,724	16,501	-34,989

2.2.2 Space needed for Public Services

In this analysis, we have tested the hypothesis of the human capital model. That is to say, the return on human capital investment in education and training of Thai civil servants personnel are normal and well defined. This is to use the model to project the declining civil servants workforce under the trend of aging population. The model of human capital was refutable and solid for further projection. We finally arrive at the

conclusion that civil service personnel who are providing public services from various ministries are subjected to aging fragility as well if no recruitment of young ones. The demand for qualified manpower from the private labor market is also a severe constraint to new recruitment with current salary and fringe benefit. We foresee a further brain drain of civil servants in central and regional governments. The local government cannot, however, create significant job opportunities for the young personnel either. We, therefore, foresee the declining need for space for working and conducting services for the people at large. Table 7.4 depicts the scenario of declining needs for space in the face of declining employment in the public administration in general. We further project the office space requirement for service tasking. It is found that the magnitude of space needed is 22.078 in 2020; 23.203 and 24.388 million square meters by end of 2025 and 2030. This implies that we would have a cost saving of 58.00 billion baht owing to declining civil servants and public personnel in 2020. We, however, would need to invest in office space of 9.135 billion and 1.401 billion baht that would be needed in excess of previous periods as shown below.

Table 7.4: The Scenario of Public Employment Reduction and Cost Saving of Public Need of Social Infrastructure

Scenario	**At end of 2020**	**At end of 2025**	**At end of 2030**
employment in Public Admin 1,000 persons	1,577 reduced from a baseline of 2,087	1,657	1,742
(Year % change.)	-3.1	1.0	1.0
Office space requirement, (1,000) sq. Meter.	22,078	23,204 or + 1,126 from 2020	24,388 or + 1,184 from 2025
Construction investment needed in million baht	-58,001.69 (negative sign is *cost saving)owing to reduction in*	valuation at 8,113 baht per sq. meter = + 9,135 million baht of investment	valuation at 8,113 baht per sq. meter = +1,401 million baht of investment cost

Note: construction *cost saving* = base line office space need (1) minus the scenarios (2)

2.2.3 Social Infrastructure Needed For Health Services

In this study, we propose the projection model of healthcare services in Thailand. We base our data on the 'Universal Coverage Scheme' (UCS). It is a well known medical service program most of developing countries are dreaming for it. Thailand is one of few countries that could possibly overcome resistance from the ministry of health who are the main health provider in Thailand. Rather, during some years till now, the UCS has acted as a representative of demanders or patients whiles the ministry of health would be acting as the main suppliers to the system. The capitation of cost upon patients' headcount has turned health system in Thailand to be demand-oriented system. The budgetary system has been shifted from supply side where ministerial request yearly budget upon the size of hospital or beds numbers to be patients numbers realized by actual services. Table 7.5 and 7.6 depict the size of social infrastructure need in this scheme in the coming decades. The clear methodology and database have transparent such that health budget is 233.096 billion baht in 2020 and 366.559 billion baht in 2030 respectively. Here, the capital investment is projected to be 36.52 and 54.07 billion baht in two mentioned periods. In fact, the UCS budget of 147.233 billion baht is, in fact, the demand side investment in human health. They compose of payment in lump sum amount for patients. The amount of payment is finally paid to cost medicines, treatments in the hospital and etc. The supply side salary and compensation are prepared for medical staffs in the public hospital many positions. The figure of capital investment seems at first glance to be the lowest amount, in fact, with proper management and consolidation types of equipment usage etc, the total cost of health investment can be covered by the capitation from the demand side. Currently, there is missed management between demand and supply provision in health care system in Thailand. The UCS is accused to be an obstruction of the capital insufficiency of a hospital. Medical personnel of public hospital complain of hard burden and not sufficient payment like before. However, to increase capitation budget per patients is also an alarming bell to the budget bureau and government despite blessing from international community's especially the WHO. It is beyond this report and needs further study.

Table 7.5: Projected Total Budgets for Healthcare (unit: million baht)

	Universal Healthcare	Salary and Compensation	Capital Investment	Total
2020	147,233.61	49,333.43	36,529.52	233,096.56
2025	185,017.60	63,731.83	44,443.74	293,193.18
2030	230,154.16	82,332.53	54,072.61	366,559.30

Source: Authors 'calculation

Table 7.6: Projected Total Budget for Healthcare (unit: million US Dollar)

	Universal Healthcare	Salary and Compensation	Capital Investment	Total
2020	4,680.03	1,568.13	1,161.14	7,409.30
2025	5,881.04	2,025.81	1,412.71	9,319.55
2030	7,315.77	2,617.05	1,718.77	11,651.60

Note: 1) The projected budget covers new capital investment and maintenance as well. 2) This is a minimum demand for health services under UCS. It can be inflated further with international wage of medical doctor and personnel to represent its shadow rate of return to human capital investment in par with international price. Services of the medical doctor and nurse are 'tradable services' in part with developed countries. It can be adjusted by a 'PPP' weight to arrive at the 'true cost' of medical personnel's wage in foreign currency and bath respectively. This is left for further analysis.

Source: Authors 'calculation

2.2.4 Urban Low Income Housing

The excess demand for a house in the urban area (95 percent of total excess demand) during 2020-2037 amounts to 2,157.07 thousand units. With the assumption of poor households shares 30 percent of the demand (based on our model forecast), the low-income housing need would be 647.121thousand units over the mentioned period. In other words, excess demand for low-income housing is 38,065.94 units per year on average. It is an extension of the NHA's long-term plan for low-income housing during 2019 which is 44,000 units. Assuming low-income townhouse price of 600,000 baht a unit we would require an investment cost of 22,839.56 million baht per year.

Table 7.7: Total Households, Housing Inventory and Housing Start 2009-2037

	2020	2025	2030	2035	2037
Total household (1,000 units)	**22,535**	**23,599**	**23,603**	**23,882**	**23,991**
1. Intact household share	100.03%	103.90%	90.28%	74.96%	70.10%
2. one person household share	23.60%	25.56%	34.09%	42.25%	45.04%
3. single head household share	39.06%	40.90%	46.02%	55.19%	58.04%
4. others household share	0.06%	0.06%	0.06%	0.06%	0.06%
Urban household (1,000 units)	**8,648**	**9,839**	**10,671**	**11,649**	**12,045**
Rural household (1,000 units)	**13,887**	**13,761**	**12,932**	**12,233**	**11,945**
Housing start (HS) :Total = 1+2+3+4 (1,000 units)	**463.94**	**(253.79)**	**1,149.23**	**569.51**	**323.91**
Housing start (HS) :*urban* = 1+2+3+4 (urban) (1,000 units)	**415.53**	**264.20**	**503.57**	**547.64**	**426.13**

Note: (...) indicates negative numbers. Housing inventory is stock adjustment annually,
While housing start is regarded as the changing of inventory each period after taking into account
The housing withdrawal owing to dismantle or causing fire etc. and has to be cleared from the inventory.

Table7.8: Estimated Social Investment Cost of Low Income Housing

Cost of Social Investment (1,000 Million Baht)

Year	Urban Housing Start (Units)	Unit Cost (Million Baht)	Value of Urban House (thousand Million Baht)	Assumptions on Poor Household Proportion					
				poor 40%	poor 30%	poor 25%	poor 20%	poor 15%	poor 16%
2020	415.53	0.99	409.85	163.94	122.96	102.46	81.97	61.48	65.58
2025	264.2	1.24	327.61	131.04	98.28	81.90	65.52	49.14	52.42
2030	503.57	1.55	780.53	312.21	234.16	195.13	156.11	117.08	124.89
2035	547.64	1.86	1,018.61	407.44	305.58	254.65	203.72	152.79	162.98
2037	426.13	2.23	951.12	380.45	285.34	237.78	190.22	142.67	152.18
All	2,157.07	1.57	3,487.73	1,395.09	1,046.32	871.93	697.55	523.16	558.04

Note: 1) unit cost is extrapolated from Table 6.9; 2) Urban housing start is from our model; 3) value of urban house is (3)=(1)x(2); 4) value of urban house by proportion of poor (4)= proportion x (3) respectively.

In order to estimate the cost of social investment from our micro-analysis low

income housing needs in urban area during 2020-2037, we estimate the unit value of house price by extrapolating from Table 7.8, it assumes government's unit cost of house on average is 0.99 million baht in 2020. It increases to 1.86 and 2.23 million baht per unit in 2035 and 2037 respectively. Total cost of investment during 2020-2037 is in sum 3.487.7e billion baht for all urban households. Now, if we assume proportion of poor urban households to be 30 percent, we arrive at the cost of investment for low income housing in urban area of 1,046.32 billion baht. If the proportion of low income households is 16 percent, the social cost of investment is 558.04 billion baht.

3. Consolidation of Social Investment Cost

The final consolidation of social infrastructure investment's cost is shown below to be at the 5-6 percent of GDP in the case of construction. We have estimated the non-construction elements like modern technology facilities for schooling system at all level, the high technology of health equipment and machinery, the modern housing facilities for aged citizen and modern office machinery and human facilitation etc. Besides, as we have noted in the study, the human capital built-up in Thailand would desperately need the non-physical capital but rather to raise the skills of our human resource towards the 21st Century Skills. Thus, the total investment would amount to 1-2 percent in addition to the physical building and facilities. This amounts to a social cost of the infrastructure of 6-7 percent of GDP on average 2020-2030.

Table 7.9: Consolidation of Social Infrastructure Investment, Thailand 2020-2030

(measured in current prices, billion baht)						
Descriptions	2020	2021	2022	2023	2024	2025
(1)Gross domestic product	18,933.31	19,953.09	21,037.56	22,169.57	23,346.01	24,600.05
(2) Social Investment (construction)	**1,318.15**	**1,358.48**	**1,399.70**	**1,441.63**	**1,484.30**	**1,527.79**
as % of GDP	6.96	6.81	6.65	6.50	6.36	6.21
(3) Social investment (non construction)	**248.81**	**256.43**	**264.21**	**272.12**	**280.18**	**288.39**
as % of GDP	1.31	1.29	1.26	1.23	1.20	1.17
(4) Total social investment	1,566.96	1,614.91	1,663.91	1,713.75	1,764.48	1,816.18
as % of GDP	8.28	8.09	7.91	7.73	7.56	7.38
	2026	2027	2028	2029	2030	

(1)Gross domestic product	25,897.94	27,256.47	28,676.89	30,139.08	31,643.02	
(2) Social Investment (construction)	**1,572.05**	**1,617.04**	**1,662.74**	**1,709.10**	**1,756.07**	
as % of GDP	6.07	5.93	5.80	5.67	5.55	
(3) Social investment (non construction)	**296.74**	**305.24**	**313.86**	**322.61**	**331.48**	
as % of GDP	1.15	1.12	1.09	1.07	1.05	
(4) Total social investment	1,868.79	1,922.28	1,976.60	2,031.71	2,087.55	
as % of GDP	7.22	7.05	6.89	6.74	6.60	

4. Macroeconomic Impacts of Investment in Social Infrastructure

We have applied the CGE model showing the macroeconomic impact of the hypothetical investment in social infrastructure on Thai Macro Economy 2020-2030. In model simulation, the growth of HDI's component is estimated to raise the Total Factor Productivity or a shift parameter in the production function in the model.

In addition, the labor productivity is assumed to grow as HDI component like mean years of schooling, expected years of schooling, life expectancy is assumed to grow and will drive the productivity shift in the production. The HDI target will give rise to the solution to replace the unskilled labor from neighboring countries in the long-run. *The physical capital investment in couple with human capital investment will hypothetically raise the labor productivity towards sustained growth in the long-run 2020-2030. The investment in social infrastructure has positive impacts on the Thai macroeconomic growth.*

Table 7.10: Impact of Hypothetical Investment in Social Infrastructure on Thai Macro Economy 2020-2030

Macro Variables (measured in billion baht)					
Descriptions	2020	2021	2022	2023	2024
Change in Real Gross Domestic Product	8.6	17.8	28.7	41.0	54.9
Change in Real Export	3.2	6.8	11.2	16.3	22.2
Change in Real Government Expenditure	1.7	3.3	5.1	7.0	9.0
Change in Gross Fixed Capital Formation	2.4	5.0	8.1	11.8	16.1
Change in Real Import	2.8	6.0	9.8	14.3	19.5
Change in Private Consumption Expenditure	3.8	8.0	12.9	18.6	25.1
	2025	2026	2027	2028	2029

Change in Real Gross Domestic Product	70.4	87.9	107.7	129.9	155.0
Change in Real Export	28.9	36.7	45.8	56.2	68.2
Change in Real Government Expenditure	11.1	13.3	15.6	18.0	20.7
Change in Gross Fixed Capital Formation	20.9	26.5	32.9	40.2	48.6
Change in Real Import	25.5	32.5	40.5	49.8	60.6
Change in Private Consumption Expenditure	32.3	40.5	49.8	60.4	72.3
	2030				
Change in Real Gross Domestic Product	183.1				
Change in Real Export	82.0				
Change in Real Government Expenditure	23.5				
Change in Gross Fixed Capital Formation	58.1				
Change in Real Import	72.9				
Change in Private Consumption Expenditure	85.7				

Note: Direct summation of right -hand real expenditure change is not matched to change in real GDP owing to the study did not add the change in investment in the table. Besides, the change has to be weighted by GDP share.

5. Methodological Notes for Further Analysis by Other Asian Countries

We have our final notes for further applications of these proposed methodologies by other Asians fellows as follows:

(1) The study should start with clearing all data at the macroeconomic level. Especially, researchers have to request the time series data on capital stock and gross fixed capital formation (GFCF) or investment by construction types. What we need is the GFCF on social investment especially the school, hospital, resident construction value in current prices. If this is not available, the researcher may try to use published data from developing countries that have a higher epoch of development and re-estimate as a proxy.

(2) It is recommended that estimation would be started from the Investment demand function as done in our study and by ADB. The simultaneous equation system can be tried to link the investment with HDI. The scenarios can be tried to estimate the social infrastructure. See Chapter 3 in this study.

(3) The micro approach can be benchmarked with an international study such as PISA for the education. The health system study researcher has to study the

current supply-side oriented first. The researcher can try to estimate the demand-side approach following the experience of the Universal Health Coverage in Thailand as a case study.

(4) Data on population forecast can be obtained from the international organization like the WPF, IMF, and WB etc. Most of developing Asians have their own projections. The data on household types would be needed as well. Data on income growth can be estimated from national level using the National accounts data and translating it to the household level at a monthly frequency. The data at micro level on housing stock, inventory, schools building by types and age is not easy to find in developing countries. However, the ratio method can be a guess using projection number of students by level.

(5) This study does not require high-level econometric knowledge. On some skills to manage the readymade econometric software is sufficient to do the task. In the low-income housing need and affordability, it runs on MS Excel or any spreadsheet just to understand the notation and get ready for data inputs. In fact, all micro approach can be managed on spreadsheets without difficulty. Only some impact analysis using the counterfactual as 'what if we need HDI to reach this target level, then what will be the macroeconomic impact?' this can be done easily with any macroeconomic model where the current state of the art is easily done and explained by and 'tube' lesson in the standard media or even hand telephone.

(6) Only some researchers who are really serious to get through with full strength, they can consult with us to decide whether to go on with such modeling to get a result from the large-scale macro-econometric model and/or the Dynamic General Equilibrium Model (CGE). It has been used in part of this study. But not knowing techniques and complications will not depress the willingness to do simple estimate and projection of the social infrastructure by any Asian's countries.