Economic Analysis and Evaluation of Government Policies

Health and Healthcare in Hong Kong
# Contents

1. Prologue  
2. Health, Healthcare, Health and Healthcare System  
   2.1. Health and Health System  
   2.2. Healthcare and Healthcare System  
3. An Economic View of Health and Healthcare  
   3.1. Microeconomics of Healthcare  
   3.2. Macroeconomics of Healthcare  
   3.2.1. Contribution of Healthcare Sector  
4. Financing and Provision of Healthcare  
5. Evaluation of Healthcare System  
6. Economics of Dual Track Healthcare System in Hong Kong  
   6.1. Outpatient Healthcare  
   6.2. Inpatient Healthcare  
7. Policy Impact Analysis  
8. Future Challenges  
9. References  
10. Discussion Questions  

I. Increase Public Hospitals Capacity  
II. Diseases Prevention – Colorectal Cancer Screening
List of Tables

Table 1. Selected Lifestyle and Health Status of Person Aged 18 to 64 3
Table 2. Percentage of Adult Reporting in Good Health (2011 or the Nearest Year) 5
Table 3. Fee and Charges for Selected Hospitals (as of Feb 2014) 11
Table 4. Age-adjusted Death Rates by Leading Causes of Death, 2003 and 2013 17

List of Figures

Figure 1. Self-Reported Health in Hong Kong 4
Figure 2. Food Pyramid 6
Figure 3. Health System 7
Figure 4. Healthcare System 9
Figure 5. Movement Along and Shift in Supply or Demand 10
Figure 6. Monthly Median Household Income (Excluding Foreign Domestic Helpers) 12
Figure 7. Percentage of Individuals Entitled to Medical Benefit by Age Groups 13
Figure 8. Changing Demography from 2011 to 2041 14
Figure 9. Rising Elderly Dependence Ratio in Hong Kong 15
Figure 10. Hospitalization Rates and Average Length of Stay 16
Figure 11. The Rising Self-Reported Cases of Diabetes and Hypertension in Hong Kong 18
Figure 12. Supply of Doctors, Nurses, and Beds per 1000 Population in Selected Countries in 2003 -13
Figure 13. Total Health Expenditure: Hong Kong vs OECD Countries  
Figure 14. Determinants for the Value-Added to a Cup of Coffee  
Figure 15. Indeterminacy of Value-Added to a Cup of Coffee  
Figure 16. Private Supply versus Public Supply under Subsidization without Capacity Constraint  
Figure 17. The Effect of Healthcare on Productivity of Labour Force and Income  
Figure 18. The Effect of Healthcare on Life Expectancy, Savings, Investment and Income  
Figure 19. Total Health Expenditure Across Countries in 2007  
Figure 20. GDP per capita, Population and Life Expectancy by Countries  
Figure 21. Dual-Track System  
Figure 22. Public and Private Share of Total Health Expenditure in Hong Kong in 1989/90 - 2010/11  
Figure 23. Market Share in Dual Track Healthcare System in Hong Kong  
Figure 24. Provision and Funding of Dual Track Healthcare System in Hong Kong  
Figure 25. Percentage Share of Expenditure by Policy Area Group Recurrent Government Expenditure in Hong Kong: 2014-15 Estimates  
Figure 26. Flow of Funds from the General Public to the Public Sector  
Figure 27. Towards Universal Coverage  
Figure 28. Evaluation of Healthcare System  
Figure 29. Patient Choice and Pathways to Healthcare
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 30.</td>
<td>Key Economic Concepts Involved in Dual Track Healthcare System</td>
<td>39</td>
</tr>
<tr>
<td>Figure 31.</td>
<td>Supply and Demand for Public Outpatient Healthcare</td>
<td>42</td>
</tr>
<tr>
<td>Figure 32.</td>
<td>Supply and Demand for Private Outpatient Healthcare</td>
<td>43</td>
</tr>
<tr>
<td>Figure 33.</td>
<td>Supply and Demand for Public Inpatient Healthcare</td>
<td>45</td>
</tr>
<tr>
<td>Figure 34.</td>
<td>Supply and Demand for Private Inpatient Healthcare</td>
<td>46</td>
</tr>
<tr>
<td>Figure 35.</td>
<td>The Effect of Elderly Healthcare Voucher System</td>
<td>50</td>
</tr>
<tr>
<td>Figure 36.</td>
<td>Government Projection of Spending on Health in 2041-42</td>
<td>51</td>
</tr>
</tbody>
</table>
1. Prologue

When thinking of a topic in health and healthcare, what would be the first thing that comes to your mind? Perhaps you may have a picture of a group of happy, colorful, energetic and lively people in a garden with a background of green grass and a blue sky coming to your mind. Or you may envision a happy grandpa with a family and friends waving their hands in laughter. These heavenly angelic images may represent an ideal health condition and lifestyle of humans that can ever reach. However, a gloomier image may come to many people's mind. For historians, they might think of a picture of the Chinese people in Hong Kong in 1894 living under the shadow of a life-frightening widespread rat pandemic, known as the black-death in Europe. The dramatic event eventually shaped the outlook of Sheung Wan today. Some may think of more contemporary issues. For example, a mother of a newborn baby may worry about the contaminated milk powder incident in the mainland that would eventually turn into her personal problem in Hong Kong. A social worker may fear the problems faced by their clients living in poor conditions would lead to their poor health and quality of life. On the contrary, a clever and hardworking teenage student may think of a bright future enlightened by the successful stories and careers of world famous medical doctors and scientists. No matter what you think of, health and healthcare seem to be a big topic. Think about SARS in 2003 as an example. Our objective is to overview some basic elements concerning the topic of the economics of health and healthcare. I wish this set of materials would enrich your understanding and arouse your interests in this topic.
2. Health, Healthcare, Health and Healthcare System

2.1. Health and Health System

Before we formally enter into the discussion of the economics of health and healthcare, we need to clarify what is the meaning of “health.” To do so, we follow the definition of health put forward by the World Health Organization (WHO) more than half of a century ago. In 1948 WHO defined health as “a state of complete physical, mental, social well-being and not merely the absence of disease or infirmity.” This definition remains unchanged today. Health therefore is defined over multidimensional conditions of a person and it is not difficult to see that all these dimensions are interrelated, that is, the body, mind, and social well-being are closely linked to one another. A person with a lot of stress in school or at work cannot be truly healthy; but so is a kid who is severely overweight. A person who has a healthy relationship with friends and family tends to be healthier than those who do not. However, it is criticized by the medical profession today that being healthy in all these dimensions in a complete sense is very hard to obtain, rendering this definition impractical. Hube, Knottnerus and Green (2011) proposed that a more contemporary definition that health shall lean towards one’s ability to adapt and self-manage in a world of uncertainty and changes that constantly challenge our physical, social, and emotional health.

What shapes our health? It may be our lifestyle, our living environment and the genes in our DNA. However, air pollution that is certainly bad for our lungs remains a growing challenge. Likewise, middle-aged man shall bear his own risk of injury if he decides to ski for three days in a row as a challenge to his physical condition.

1 Thanks to the Human Genome Project (HGP), the mystery of how cancer is developed has now been uncovered scientifically.
Why do people report their health status? In 2013, the Department of Health of Hong Kong published a list of interesting behavioral risks of Hongkongers. For example, by WHO standard, only 40% of our population has sufficient physical activities, i.e. 60% of the population does not have enough exercise in 2012. More than 80% of the population does not take enough vegetable, i.e. there are possibly many excessive meat lovers in the population. A quarter of the population is overweight or obese in Hong Kong (see Table 1).

Table 1. Selected Lifestyle and Health Status of Person Aged 18 to 64 (April 2012)

<table>
<thead>
<tr>
<th>Lifestyle Practices and Health Status</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Daily smoking</td>
<td>18.7%</td>
</tr>
<tr>
<td>Daily alcohol drinking</td>
<td>3.2%</td>
</tr>
<tr>
<td>Inadequate physical activity (by WHO's recommendations)</td>
<td>53%</td>
</tr>
<tr>
<td>Inadequate daily fruit and vegetable intake (less than 5 servings per day)</td>
<td>87%</td>
</tr>
<tr>
<td>Overweight and obesity</td>
<td>47.2%</td>
</tr>
</tbody>
</table>

Source: Health Facts of Hong Kong 2013, Department of Health, HKSAR Government
No wonder when Hongkongers are asked the question “How do you rank your health as compared to others similar to your age?” Only 63.1% of the respondents, aged 15-24, would report health status as good, very good or excellent according to the Thematic Household Survey in 2013 (Figure 1). This proportion fell with age. Meanwhile, only 30% of the adult would report in good health in Japan according to an OECD research (Table 2). To deeply understand the meaning of self-reported health status would go beyond our coverage here, but it would be educational for you to find it out.

Figure 1. Self-Reported Health in Hong Kong

Sources: Thematic Household Survey Report No 45 to 50, C&SD, HKSAR Government
### Table 2. Percentage of Adult Reporting in Good Health (2011 or the Nearest Year)

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage of Population aged 15 and over</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>89.50%</td>
</tr>
<tr>
<td>Australia</td>
<td>85.40%</td>
</tr>
<tr>
<td>Sweden</td>
<td>79.90%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>77.50%</td>
</tr>
<tr>
<td>Germany</td>
<td>64.80%</td>
</tr>
<tr>
<td>Italy</td>
<td>64.70%</td>
</tr>
<tr>
<td>Japan</td>
<td>30%</td>
</tr>
<tr>
<td>OECD 34</td>
<td>69%</td>
</tr>
</tbody>
</table>

Source: Health at a Glance 2013, OECD indicators

Note: Japan is in demographic crisis with her aging population and falling fertility rate.
A simple take home message up to this point is warranted. The keys to good health perhaps are to exercise, sleep and relax adequately, to eat according to food pyramid (Figure 2) to consult a doctor when needed, and to build a harmonious family life.

Figure 2. Food Pyramid
Having clarified the meaning of health as defined by the medical professional, we now define a health system. A health system (Figure 3), according to WHO, is the sum total of all the organizations, institutions and resources whose primary purpose is to improve health. The ultimate responsibility for the overall performance of a country’s health system lies with government and individual health institutions. A mother obtaining a reminder letter that her baby is due for immunization, a family in a rural region finally access to clean water because of a government sponsored sanitation project or a person suffering from HIV/AIDS receives antiretroviral medicine all benefit from a health system. This definition of health system is thus beyond a system that solely provides curative healthcare. One can think of a healthcare system, to be explained below, as part of a health system.

**Figure 3. Health System**
2.2. Healthcare and Healthcare System

Healthcare is defined as goods and services that provide diagnosis, treatment as well as prevention of disease, illness, injury, and other physical and mental impairments. For example, practical advices may be provided to help elder patients before being discharged from hospitals to organize their home environment to prevent the potential danger of accidental falls. This is also counted as healthcare. A healthcare system (Figure 4) is therefore a system that includes

1) Public health
2) Primary care
3) Secondary care
4) Tertiary care

Public health refers to all organized measures (whether public or private organizations) to prevent disease, promote health, and prolong life among the population as a whole. Primary care refers to the work of healthcare professionals who have the FIRST point of contact with all patients. A primary care provider may work in hospitals or clinics. Secondary care is the healthcare services provided by specialists or other healthcare professionals who generally do not have the first contact with patients. In the context of Hong Kong healthcare, secondary care providers may also work in hospitals or clinics. Tertiary care refers to specialized consultative healthcare usually for inpatients receiving hospital healthcare and on referral from a primary or secondary healthcare professional.
Figure 4. Healthcare System

- Healthcare System
  - Public Health (i.e. education and prevention)
  - Primary Care (First-point of contact)
  - Secondary Care (i.e. specialists)
  - Tertiary Care (i.e. specialized treatment)
3. An Economic View of Health and Healthcare

Obviously, health is an outcome of multiple factors such as lifestyle, environment, and biology, as discussed above. But poor health is also a reason or cause of the demand for healthcare. Hence, the (underlying) primary reason for an individual to demand healthcare is the demand for health. We are now ready to consider the economist’s view of health and healthcare.

3.1. Microeconomics of Healthcare

In this subsection, we consider the supply and demand for healthcare in a general setting. In the later section, we will consider the application of the demand and supply theory under a more specific institutional environment in Hong Kong. In the following, the factors that trigger a movement along a supply or demand curve, or an increase in demand or supply will be discussed. Figure 5 shows an example of the meaning of a movement versus a shift in demand or supply.

**Figure 5. Movement Along and Shift in Supply or Demand**

![Diagram showing movement along and shift in supply or demand curves](image-url)
Concerning the demand for healthcare, there are five factors at work:

**D1. Medical prices**

By the Law of Demand, assuming all other factors are kept constant, an increase in medical price has a negative effect on the quantity demanded for healthcare – a movement along the demand curve. Table 3 lists some of the prices charged in the public hospitals and private hospitals for reference. Year-on-year change in medical prices is called medical inflation. It is generally argued that medical prices in private sector increase faster than prices charged in the public sector. Medical inflation also exceeds general price inflation.

**Table 3. Fee and Charges for Selected Hospitals (as of Feb 2014)**

<table>
<thead>
<tr>
<th>Hospital District (Hospital not under Hospital Authority)</th>
<th>In-patient Service (In HK$)</th>
<th>Out-patient (In HK$)</th>
<th>Specialist Out-Patient (In HK$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Private Room</td>
<td>Semi-Private Room</td>
<td>Ward Beds</td>
</tr>
<tr>
<td>Hong Kong island</td>
<td>2280-3560</td>
<td>1200-2430</td>
<td>672-1430</td>
</tr>
<tr>
<td>Kowloon</td>
<td>980-2950</td>
<td>760-1380</td>
<td>450-700</td>
</tr>
<tr>
<td>New Territories</td>
<td>1600-3900</td>
<td>900-1100</td>
<td>480-720</td>
</tr>
<tr>
<td>Hospital under Hospital Authority</td>
<td>5610-5640</td>
<td>3740-3760</td>
<td>68-100</td>
</tr>
</tbody>
</table>

Source: Hospital Authority
D2. Income

As income increases, healthcare would become more affordable and the quantity demanded for healthcare will increase at every price charged – a rightward shift in the demand curve. Figure 6 shows that the median household income across households living in different housing arrangements in Hong Kong has steadily increased over time, leading to an increase in the purchasing power of households. In particular, if prices of healthcare remain the same, private healthcare will become more affordable for higher income households. For lower income households with a median income of HK$14,300 per month, public healthcare seems to be their only option because of their low purchasing power to begin with. But since the increase in fee and charges in public hospitals tends to be smaller and less frequent, public hospital services become more affordable to them over time.

Figure 6. Monthly Median Household Income
(Excluding Foreign Domestic Helpers)

D3. Insurance coverage

Insurance is an important arrangement in the overall health system, making healthcare more accessible to the general public. Increased insurance coverage has a positive effect on the demand of healthcare – a shift in the demand curve. Figure 7 shows that there has been a rise of the proportion of individuals covered by medical insurance over time.

Figure 7. Percentage of Individuals Entitled to Medical Benefit by Age Groups (Provided by Employers / Companies and /or Covered by Medical Insurance)

Source: Thematic Household Survey No. 45 and 50, C&SD, HKSAR Government
D4. Demography

Changing demography also leads to an increase in the demand for healthcare, especially in the face of an aging population (Figure 8). The dependence ratio in Hong Kong is predicted to increase in a rapid pace after 2009 (Figure 9).

Figure 8. Changing Demography from 2011 to 2041

Source: Hong Kong Population Projection, 2011-2041, C&SD, HKSAR Government
Figure 9. Rising Elderly Dependence Ratio in Hong Kong

Furthermore, elderly tends to use more costly healthcare and stay longer in hospitals (Figure 10). Hence, aging population has a positive effect on demand for healthcare – a shift in the demand curve.
D5. Epidemiology

An increase in the number of illness episodes and their composition has a positive effect on demand for healthcare – a shift in the demand curve. An increase in the population along with an aging population would lead to more illness episodes and the rise of non-communicable diseases. Table 4 shows that about 68% of the leading (or top 10) causes of death in 2013 are due to non-communicable disease, such as cancer, heart diseases, stoke, dementia and diabetes mellitus. Figure 11 shows that the rising self-reported cases of diabetes and hypertension from 2001 to 2008 according to Thematic Household Surveys in Hong Kong.

Table 4. Age-adjusted Death Rates by Leading Causes of Death, 2003 and 2013

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>2003</th>
<th>2013*</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cancer</td>
<td>125.8</td>
<td>104.0</td>
<td>-17.3</td>
</tr>
<tr>
<td>2. Pneumonia</td>
<td>37.6</td>
<td>38.6</td>
<td>2.7</td>
</tr>
<tr>
<td>3. Heart Diseases</td>
<td>53.7</td>
<td>38.4</td>
<td>-28.5</td>
</tr>
<tr>
<td>4. Stoke</td>
<td>34.8</td>
<td>21.3</td>
<td>-38.8</td>
</tr>
<tr>
<td>5. Chronic lung diseases</td>
<td>20.8</td>
<td>11.0</td>
<td>-47.1</td>
</tr>
<tr>
<td>6. External causes of morbidity and mortality</td>
<td>25.1</td>
<td>17.1</td>
<td>-31.9</td>
</tr>
<tr>
<td>7. Kidney Diseases</td>
<td>12.1</td>
<td>10.5</td>
<td>-13.2</td>
</tr>
<tr>
<td>8. Dementia</td>
<td>2.4</td>
<td>5.1</td>
<td>112.5</td>
</tr>
<tr>
<td>9. Septicaemia</td>
<td>5.9</td>
<td>5.6</td>
<td>-5.1</td>
</tr>
<tr>
<td>10. Diabetes mellitus</td>
<td>8</td>
<td>2.5</td>
<td>-68.8</td>
</tr>
<tr>
<td>All other causes</td>
<td>58.3</td>
<td>48.2</td>
<td>-17.3</td>
</tr>
<tr>
<td>All causes</td>
<td>384.5</td>
<td>302.2</td>
<td>-21.4</td>
</tr>
<tr>
<td>Proportion of noncommunicable diseases</td>
<td>68.9%</td>
<td>67.4%</td>
<td></td>
</tr>
</tbody>
</table>

*Provisional data

Source: Centre for Health Protection, Department of Health, HKSAR Government
Actions undertaken by the Hong Kong Government to monitor non-communicable diseases

The Centre for Health Protection (CHP) of the Department of Health (DH) has set up the Behavioural Risk Factor Surveillance System which is useful to the formulation of health promotion programmes and prevention of non-communicable diseases (NCD).

CHP’s Senior Medical Officer of Surveillance and Epidemiology Branch, Dr Caroline Tsang said that NCD were major causes of mortality in Hong Kong. “The four major NCD (cancer, heart diseases, stroke and chronic lower respiratory diseases) account for 61.5% of all deaths in 2003,” Dr Tsang said.

“Risk of NCD is closely related to lifestyle and behaviour. Behavioural risk factors such as inadequate consumption of vegetables and fruit, lack of exercise, overweight and smoking can increase the risk of developing NCD.”
On the supply side of healthcare, there are three factors at work:

S1. Medical prices

S2. Total number of registered healthcare professionals

S3. Total number of health facilities (institutions and beds)

S1. Medical prices. According to the Law of Supply, assuming other things remain constant, an increase in the level of medical price will increase the quantity supplied of healthcare – a movement along the supply curve. Medical prices were reported above in Table 3.

S2. Total number of doctors, nurses, beds and institutions. An increase in the number of registered doctors and nurses will certainly increase the supply of healthcare. Increase in physical capacity will also raise supply – a shift in supply.

S3. Total number of health facilities. An increase in the number of hospitals and beds will certainly increase the supply of healthcare, but constrained by the workforce and land available. If these constraints can be relaxed, then an increase in physical capacity will also raise supply – a shift in supply.
Figure 12 shows that the supply of doctors and nurses in Hong Kong is about 1.8 and 6.1 per 1000 population in 2013, which is low compared to western countries such as the UK and the US.
3.2. Macroeconomics of Healthcare

As shown in Figure 13, the Total Health Expenditure (THE) as % of GDP in Hong Kong remains low as compared to the OECD countries. Interestingly, we have the third-highest average life expectancy in the world. The US, though spending much more in healthcare than we do, only ranks 35th in the WHO (2013) list. In fact, our healthcare system is very efficient when it is evaluated based on broad health indicators, such as life expectancy and infant mortality rates.

Figure 13. Total Health Expenditure: Hong Kong vs OECD Countries

Source: Hong Kong Domestic Health Accounts and OECD Health Statistics
3.2.1. Contribution of Healthcare Sector

One important question to be addressed in macroeconomic analysis is to assess the economic contribution of a business sector to GDP. Two approaches are considered below: a) value-added approach, and b) multiplier approach.

a) Value-added approach

The value-added of a sector is equal to the net value of sales income minus the value of intermediate goods and services (including the value of imported goods and services) used in the production. The value-added approach is a static approach in a sense that it only considers the contribution of healthcare expenditure to GDP, following the GDP accounting method. To illustrate the concept, let us consider an example. Suppose the market price of a cup of coffee is $10 and its direct cost is $4. The cost of the intermediate goods used in production is $2. The value-added is then $8 and the coffee shop owner earns $4 surplus. The direct contribution of a cup of coffee to GDP is therefore $8. At a market price of $10, now suppose 10 million cups are sold. Then the contribution of coffee to GDP is $80 million.

---

2 The total sales income of a sector equals to the prices changed and quantity of goods and services traded the sector. Normally, the market price of a good exceeds its unit cost in the market. Hence, the value-added of a unit of goods is the surplus gained by the business owners plus the value of the direct non-intermediate goods and services used in the production process, such as labour cost. If market price falls short of the unit cost of the goods produced, then the product shall vanish in the market eventually. Hence, a valued-added approach should produce a positive value if and only if a good and service is profitable.
Now suppose the government steps in and subsidizes each cup of coffee its cost of production at $6 and consumers do not have to pay. What is the economic contribution of a cup of coffee to GDP?

Figure 14. Determinants for the Value-Added to a Cup of Coffee

Market price = 
Value of a cup of coffee = $10 
Value-added to coffee = $8

Cost of direct inputs from the coffee shop to a cup of coffee = $4

Cost of intermediate inputs = $2

Figure 15. Indeterminacy of Value-Added to a Cup of Coffee

Subsidized price = $0
Market value unknown

Cost of direct inputs from the coffee shop to a cup of coffee = $4

Intermediate inputs cost = $2
One should immediately realize that without the market price, there is no objective assessment of the value of a cup of coffee, i.e. no one can be sure of the value of the cup of coffee to the last consumer who decides to pay. Hence, one can only use the subsidy per cup of coffee paid by the government to approximate its value, which is $6. Then, the value-added of the cup of coffee to GDP is $6 minus $2 equals $4. Since the quantity supplied of coffee is a decision of the government, then the public supply will determine the contribution of coffee to GDP. Suppose X is the quantity supplied of coffee, then the contribution of a cup of coffee is $4X. Hence, the contribution of coffee under government subsidization may be smaller or larger than that if the market supplies coffee. It means that the value-added approach for estimation of the contribution of a sector to GDP would depend on whether the good is supplied in the public or private sector.

Figure 16 below provides two examples for the illustration that consists of a set of cost functions of a hypothetical treatment. First, when demand is low, the market price charged at $150 per unit. This is below the average total cost of production, and therefore, the market would not supply the treatment. However, under government subsidization, there would be a public supply of 300 units per month and yet the last unit to be consumed only worth $50 to the last patient. Replacing the unknown market price with the average total cost at the last unit of treatment produced (300th unit) to calculate the value-added of treatments would yield a positive value, but in fact, market value of the last treatment is way below its production cost. Second, when demand is high, the market supply would be 500 units at a market price of $350 per treatment and the value-added of the treatment to GDP is depicted as the green area, following the usual method. However, under government subsidies, the public supply would be 1000 units. Using the average total cost at 1000th unit as “market price” to calculate the value-added of treatments to GDP, it would be the red area.
One can easily see that whether the treatment is provided in the public sector under subsidization or in the private sector in a free market will determine the value-added of a treatment, and hence the resulting “contribution” of treatment to GDP. Hence, the value-added approach to the estimation of the contribution of a sector to GDP should be used with caution when government intervention is involved.

Figure 16. Private Supply versus Public Supply under Subsidization without Capacity Constraint

Case 1. Treatment with high value-added to intermediate inputs
Case 2. Treatment with low value-added to intermediate inputs

As explained above, when applying the value-added approach to estimate the contribution of the healthcare sector in Hong Kong, one can conclude:

- The approach tends to estimate correctly the contribution of private healthcare sector to GDP because market price tends to correctly reflect the market value of healthcare services.

- The approach may overestimate or underestimate the contribution of the public healthcare sector to GDP, as its transactions unlike in the private sector are not recorded in market prices.

To further illustrate the second point above, consider Table 3. Public hospitals in Hong Kong also offer private rooms to the general public. The prices charged for these rooms are often higher than the prices charged in the private sector due to limited supply.
b) Multiplier approach

Another approach to the estimation of the contribution to GDP is to assess theoretically what a healthcare sector really does in an economy. In essence, it is a dynamic feedback approach, which can be called a multiplier effect approach. The approach essentially considers the full contributions of the production of a healthcare sector such as improved productivity and prolonged life to GDP. This approach links up the following parameters: health capital, healthcare, life expectancy, productivity and GDP.

Health capital is a key economic concept of health. Similar to financial capital that yields interests, health capital yields health services that enhance one’s life by raising her productivity and enjoyment from consumption. Simply put, a healthy person enjoys life more. And the building block for healthiness is the amount of health capital that a person has. Furthermore, depleted health capital must be reproduced by inputs, such as exercises and healthcare when illness attacks. Hence, the demand for health capital drives the demand for healthcare. Furthermore, health capital is a normal good for which demand increases with income. The concept of health capital first appeared in Michael Grossman’s paper in 1972, which idea was inspired by the concept of human capital developed by the late Noble Prize Winner, Gary S. Becker, see Grossman (2004).

The key tool involved in this multiplier approach for the estimation of the contribution of healthcare sector to GDP is the aggregate production function. An economy outputs are produced mainly by two factor inputs: labour and physical capital. Both health and healthcare have an effect on these inputs. Figure 17 shows the relationship among income, healthcare, health capital, and productivity of the labour force.
Figure 17. The Effect of Healthcare on Productivity of Labour Force and Income

Figure 18. The Effect of Healthcare on Life Expectancy, Savings, Investment and Income
Figure 17 shows that an increase in income due to say better technology will make healthcare more affordable when needed. An individual suffering from a disease can regain the lost health capital by consuming healthcare, thereby restoring the lost productivity or even enhancing labour productivity and subsequently increasing income. Exactly opposite conclusion could be reached if the story begins with a decrease in income.

Figure 18 shows that life expectancy will also be increased by an increase in health capital. Individuals will then have to increase their planned savings for retirement, making available more resources for investment. Higher investment will in turn lead to higher GDP and make healthcare more affordable.

In short, a virtuous circle is at work. International evidence (Figure 19) does show that spending on healthcare tends to increase with income, which in turn has a positive relation with life expectancy (Figure 20).

Figure 19. Total Health Expenditure Across Countries in 2007

Primary source: OECD health statistics and Domestic Health Account, HKU
Figure 20. GDP per capita, Population and Life Expectancy by Countries

Source: Gapminder
Many countries have a dual-tracked medical economy. The dual system is particularly common in post-colonial economies in which health services are mainly provided and funded by the government through taxation income, according to Gauld (1998). As emphasized by Dr. Ko Wing Man, Secretary for Food & Health, the Hong Kong healthcare system “...runs on a dual-track basis encompassing the public and the private sectors. Public healthcare is the cornerstone of our healthcare system, acting as the safety net for the whole community, while the private healthcare sector provides personalised choices and more accessible services to those who are willing and may afford to pay for private healthcare services.” In fact, the mission statement of the public healthcare sector is to ensure that “no one is denied adequate medical treatment due to lack of means.”

A dual track healthcare system can be defined in terms of the funding and provision of services (Figure 21). The proportion of public versus private involvement in dual track healthcare systems can differ across countries. (A dual track healthcare system can be defined in terms of the proportion of public versus private sector involvement in the funding and provision of service, which can differ significantly across countries.)

In terms of total health expenditure (THE), the Hong Kong healthcare financing system is running almost a 50-50 dual track system (Figure 22). However, in terms of provision, the public sector provides 90% of inpatient services and the private sector only provides 10% of inpatient services. Hence, the Hong Kong healthcare provision system is running a 90-10 dual track system. Meanwhile, the private sector serves 70% of the outpatient clinic attendance and the public sector only serves 30% (Figure 23).
Figure 21. Dual-Track System

Figure 22. Public and Private Share of Total Health Expenditure in Hong Kong (1989/90 to 2010/11)

Source: Hong Kong Domestic Health Accounts, FHB website
Figure 23. Market Share in Dual Track Healthcare System in Hong Kong

Public Sector
(51% of THE)

Private Sector
(49% of THE)

Private Hospitals

Private Clinics

Inpatient (bed-days): 90%
Inpatient admission: 80%
Overall outpatient incl. Traditional Chinese Medicine (TCM): 30%

Inpatient (bed-days): 10%
Inpatient admission: 20%
Overall outpatient incl. TCM: 70%

Number of bed-days supplied per year: The number of beds x 365 days per year

Source: C&SD and Hospital Authority

Figure 24. Provision and Funding of Dual Track Healthcare System in Hong Kong

Funding sources

Government general revenue
User fees

DH and CHP
Child Clinic
Child Assessment Centres
Clinical Genetic Service Centres
Dental Clinics with General Public Sessions
Clinics provide Dermatological Services
Medicine
Elderly Health Centre
Integrated Treatment Centre (Special Preventive Programme)
Maternal and Child Health Centres (MCHCs)
Methadone Clinics
Red Ribbon Centre
School Dental Clinics

HA
42 hospitals & institutions (2012: 27,153 beds)
73 GOPCs
48 SOPCs
17 Chinese Medicine Clinics

Employers
Individually

Private insurers

Private providers
11 Private hospitals
(2012: 4,033 beds)
7,000+ Private doctors / clinics
6,700+ Private Chinese medical practitioners
Other private healthcare providers

Western medicine (73%)
Chinese medicine (14%)
Dental medicine (10%)
Laboratories (3%)

Source: C&SD and Hospital Authority
In 2014-15, the public finance policy area of health is the third largest among all policy areas in Hong Kong, which is estimated to cover 17% of the recurrent government expenditure (Figure 25).

**Figure 25. Percentage Share of Expenditure by Policy Area Group**

*Recurrent Government Expenditure in Hong Kong: 2014-15 Estimates*

Source: The 2014-15 Budget, HKSAR Government
Figure 26 shows the flow of funds from the general public to the ultimate use of funds on each treatment. In allocating the government funding assigned to the public healthcare sector, the Hospital Authority and Department of Health play a critical role. The HA, running 42 hospitals and institutions, allocates resources based on the performance in each treatment area. The healthcare sector in Hong Kong is guided by the goal of achieving universal coverage. Today, basically all citizens in Hong Kong can access even the most sophisticated medical procedures at minimum out-of-pocket user fees. In terms of population, services and cost sharing, the public healthcare sector in Hong Kong has achieved the goal of universal coverage (Figure 27). By the same measure, however, the private healthcare sector in Hong Kong has a lot more of work to do before such goal can be achieved.
Figure 27. Towards Universal Coverage

5. Evaluation of Healthcare System

In evaluating the performance of a healthcare system, three goals should be examined (Figure 28):

1) Access - Whether all citizens can utilize healthcare when needed? Is it fairly distributed?

2) Quality - Are treatment outcomes satisfactory? Are patients satisfied with the treatment progress?

3) Cost - Are treatments provided in the most cost efficient manner?

Figure 28. Evaluation of Healthcare System

Source: TehWei Hu, Healthcare Financing Option for Hong Kong, HA Convention 2006 presentation slides
6. **Economics of Dual Track Healthcare System**

How do patients decide where they would obtain healthcare in a dual track healthcare system? Individuals may consider the following factors:

- Out-of-pocket medical cost
- Cost of wait time
- Travel cost
- Subjective severity

The journey of healthcare utilization begins with the first point of contact, namely, primary care (Figure 29).

**Figure 29. Patient Choice and Pathways to Healthcare**
There are two levels of service provision. The first level of provision is primary care and the second level is hospital-based healthcare. Normally, patients first visit primary care doctor for a diagnosis. If needed, a patient will be recommended for further healthcare in a hospital. Figure 29 shows patients’ possible pathways to healthcare in the private and public sectors.

In each level, we use the theory of supply and demand to analyze the situation. Figure 30 shows the relevant concepts involved in the analysis.

**Figure 30. Key Economic Concepts Involved in Dual Track Healthcare System**

<table>
<thead>
<tr>
<th>Supply</th>
<th>Demand</th>
<th>Price</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum price accepted</td>
<td>Willingness to pay</td>
<td>Market price</td>
<td>Equilibrium quantity</td>
</tr>
<tr>
<td>Annual capacity</td>
<td>Affordability</td>
<td>Administrative price / Subsidized price</td>
<td>Excess quantity demanded</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Effective price</td>
<td>Rationed quantity</td>
</tr>
</tbody>
</table>
Supply and demand

This part involves some basic economic concepts. The concept “annual capacity” will be explained in detail in the later part.

Price

It is important to note that the administrative price, a user-fee, is a subsidized price raised by the government, should be well below the unknown market price in the public sector. If a patient decides to visit the private sector for healthcare, then the “effective” price paid by the patient for the public healthcare services received must be larger than the market price in the private sector.

Effective price for public healthcare = Administrative price + cost of wait time
Cost of wait time = individual’s shadow price of time × average wait time
A shadow price of time is the opportunity cost spent per unit of time (e.g., every hour) on activity. Here, it is waiting. Both the opportunity cost of time and the effective price are individual specific.

Quantity

Excess demand occurs when the quantity demanded for a commodity is greater than the quantity supplied at the transaction price. In the public healthcare sector, it is a consequence of the “low” administrative price at work. The user fee charged in a public hospital in Hong Kong is $100 per day. Excess demand also implies that a patient must wait for the treatment. The professional judgment by
doctors becomes the key to decide which patients should receive healthcare first based on urgency – hence explicit rationing of service is in force in the public sector.

Let us now consider outpatient and inpatient healthcare using the theory of supply and demand.

6.1. Outpatient Healthcare

Consider a hypothetical case with the following characteristics:

a. Market share: public clinics = 30%, private clinics = 70%

b. Total number of attendance served in the whole market = 16.7 million

c. Number of attendance served in public clinics = 5 million

d. Number of attendance served in the private clinics = 11.7 million

Using the information above, one can plot the demand and supply curves for the public and private outpatient healthcare, Figure 31 and Figure 32.
Figure 31. Supply and Demand for Public Outpatient Healthcare

Features in Figure 31 to note:

- Inverse L-shape supply (i.e. unlimited supply at the subsidized user fee but quantity supplied is capped at capacity)
- Elastic demand (i.e. the willingness to pay for healthcare by patients is sorted from the highest to the lowest)
- Administrative price (i.e. user fee) \(<\) Unrealized market price
- Excess demand (i.e. quantity demanded exceeded the quantity supplied at the user fee)
- Rationing (i.e. patients who tend to have low opportunity cost of waiting time will obtain healthcare)
- Consumer surplus is directly created by the subsidy of government
Features in Figure 32 to note:

- Elastic demand

- Supply:
  - Elastic supply below capacity
  - Inelastic supply above capacity
  - Market-clearing price
  - Equilibrium Quantity (no. of attendances per year observed)

Equilibrium in the dual track outpatient healthcare system requires that no public patients will change their choices given the market price in the private sector and the user fee in the public sector.
6.2. Inpatient Healthcare

Consider a hypothetical case with the following numerical assumptions:

Market share: public = 90%, private = 10%

Total number of beds in public hospitals = 100

Total number of beds in private hospitals = 25

Total capacity of bed-days in public hospitals = 36500 (assume fully utilised)

Total capacity of bed-days in private hospitals = 25 x 365 = 9125

Private hospitals: 80% of capacity of beds used

Total bed-days served in the market = 36500 + (9125 * 80%) = 43,800

Using the information above, one can plot the demand and supply curves for the public and private outpatient healthcare, Figure 33 and Figure 34.
Features in Figure 33 to note:

- Inverse L-shape supply (i.e. unlimited supply at the subsidized user fee but quantity supplied is capped at capacity)

- Elastic demand (i.e. the willingness to pay for healthcare by patients is sorted from the highest to the lowest)

- Administrative price (i.e. user fee) < Unrealized market price

- Excess demand (i.e. quantity demanded exceeded the quantity supplied at the user fee)

- Rationing (i.e. due to excess demand, professional judgments are needed to decide who shall get healthcare first)

- Consumer surplus is directly created by the subsidy of government (C+D)
Figure 34. Supply and Demand for Private Inpatient Healthcare

Features in Figure 34 to note:

- Elastic demand
- Supply:
  - Elastic supply below capacity
  - Perfectly inelastic supply above capacity
- Market-clearing price
Equilibrium quantity

Equilibrium in the dual track inpatient healthcare system requires that no public patients will change their choices given the market price in the private sector and the user fee in the public sector.

The dual track healthcare system is faced with constant challenges, including

- Changing demography – aging population
- Changing epidemiology – rise of non-communicable diseases (e.g. hypertension, diabetes (DM))
- New technologies often being more expensive
- Medical inflation and financial sustainability
7. Policy Impact Analysis

This section employs the theory of supply and demand to assess the impact of a selection of health policies. Healthcare sector has been subject to reforms in the last two decades. The Government has published consultation documents suggesting ways to improve the healthcare sector. For example, the Chief Executive of the HKSAR, Leung Chun Ying announced the following policies in his 2014 Policy Address:

“para 71. … To ease the elderly’s demand for public out-patient services and to enhance their awareness of the importance of primary care, we propose to further double the annual (healthcare) voucher amount to $2,000 within this year, while incorporating the pilot scheme into the regular assistance programme.”

“para 173. The Government will continue to enhance the quality of public healthcare services, including construction of new hospitals and expansion and redevelopment of existing hospitals. Strategic studies on the planned acute general hospital in the Kai Tak Development are underway.”

“para 175. Due to an ageing population and lifestyle changes, the incidence rate of colorectal cancer has continued to increase. It became the most common cancer in Hong Kong in 2011. Therefore, the Government will subsidise colorectal cancer screening for higher risk groups.”
In fact, healthcare policy can be broadly grouped into the following:

- **Capacity Management**
  - *Building new hospitals and increasing manpower*

- **Demand Management**
  - *Public health measurements: disease control and prevention*
  - *Public-Private Partnership: elderly healthcare vouchers*

- **Financing**
  - *Government regulated supplementary private health insurance (Health Protection Scheme)*
Here we consider the effect of elderly Healthcare Voucher

1) **Elderly Healthcare Voucher**

Ideally, with the voucher system, some of the public outpatients would shift to the private sector, thereby lessening the burden in the public sector and possibly raising the price charged in the private sector. However, vouchers may be considered government’s gifts from the point of view of the elderly. As a result, they may spend them on occasional private outpatient healthcare such as seasonal flu vaccine injections rather than changing their patterns of public outpatient utilization decision (Figure 35).

**Figure 35. The Effect of Elderly Healthcare Voucher System**

Conclusion: It is not sure that the elderly healthcare voucher system can effectively shorten the waiting time for public outpatient healthcare. However, it is a welcomed government policy because it increases the total resources available and opens up choices of healthcare for the elder patients.
8. **Future Challenges**

Aging and population growth both present great challenges to the healthcare system in Hong Kong, particularly to the public healthcare system. Although Hong Kong’s population is predicted to increase from 7.4 million in 2014-15 to 8.5 million in 2041-42, the corresponding public healthcare spending will have to be doubled if service quality is to be maintained (Figure 36).

**Figure 36. Government Projection of Spending on Health in 2041-42**

“Based on current projections, our 2041/42 recurrent financial resource requirement will be an estimated HK$169 billion – 3.8 times more than in 2013/14. Some 18,000 new beds, 6,200 extra doctors, 24,000 more nurses and 7,700 new allied health professionals are among the more important of the many additional resources that will be necessary to maintain a level of service that is comparable with that of today,” according to the speech by the Chief Executive of Hospital Authority Leung Pak-yin in HA convention 2014.

To conclude, the economics of health and healthcare as a social issue will likely remain in years to come.
9. References


Census and Statistics Department. (2007 and 2013). *Hong Kong Annual Digest of Statistics*. Hong Kong: Census and Statistics Department, HKSAR.


Consider a stylized dual-tracked hospital healthcare system, as depicted in Figure I.

**Figure I. Dual Track Hospital Healthcare**

1) **Increase Public Hospitals Capacity**

   Using Figure I, discuss the impacts of an increase in the public hospital capacity on

   a) the excess demand in the public sector,
   b) the waiting time for hospital healthcare, and
   c) the effect of the market price and demand for private hospital healthcare.
Suggested Answer:

Increase in public hospital capacity will decrease the excess demand and therefore reduce the waiting time for public hospital beds. It MAY also reduce the demand for private hospital healthcare and hence the market price.

Figure 2. The Effect of Increased Public Hospitals Capacity
2) Diseases Prevention – Colorectal Cancer Screening

Using Figure I, discuss the impacts of diseases prevention, such as a colorectal cancer screening programme, on the

a) the excess demand in the public sector,

b) the waiting time for hospital healthcare, and

c) the effect of the market price and demand for private hospital healthcare.

Suggested Answer:

Diseases prevention in general helps reduce hospitalizations. Therefore, it would decrease the demand of healthcare in both sectors. Excess demand in the public sector will be reduced, thereby lowering the waiting time. Market price for hospital healthcare in the private sector will be lowered.

Figure 3. The Effect of Disease Prevention