

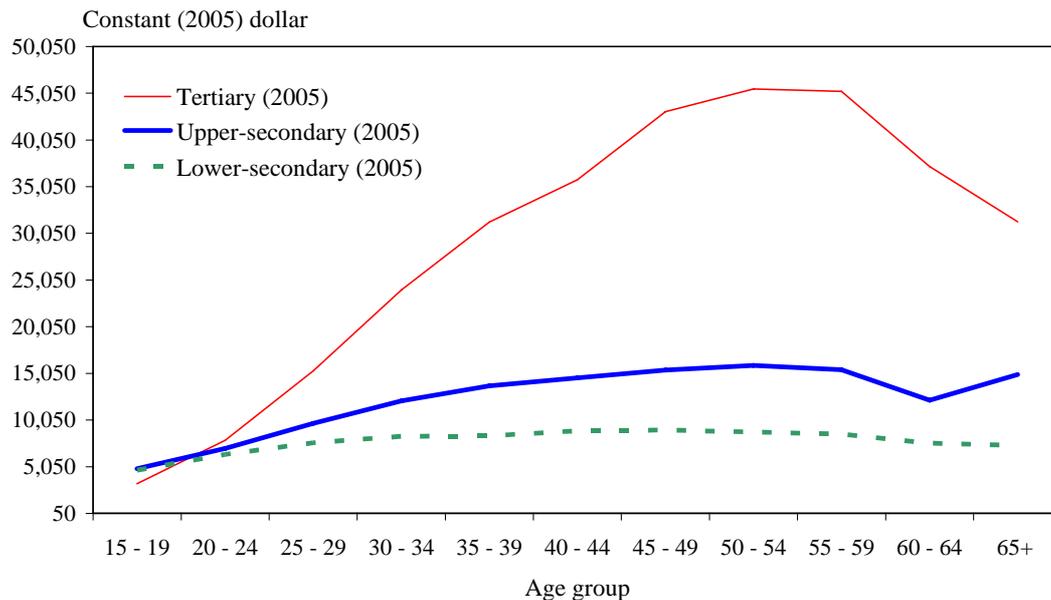
**Box 1.2****Accumulation of human capital stock through education and experience upgrading**

The quality of the workforce as a key determinant of an economy's growth potential is widely discussed in economic literature. Similar to amassing physical capital (stock of housing, plant and machinery, for example), an accumulation of human capital stock, i.e. the production capacity in the labour force, can also play an important role in driving economic growth. This article intends to quantify such a production capacity in the workforce as a factor of production.

- *Education and experience are two key factors explaining the big gaps in earning potentials between workers*

Productivity can vary greatly across individual workers. With the help of the data from the General Household Survey, the labour earnings of workers in different age-groups and with various educational attainment levels are illustrated in *Chart 1*.

**Chart 1: Earning potential of workers vary significantly across age and education attainment<sup>(1)</sup>**

**Average monthly labour earnings (2005)**

Three salient features can be observed: -

- 1) Within the same education attainment group, the difference in earnings power widens as workers become more mature, essentially a manifestation of the effects of experience accumulation. For example, the average income for a worker aged 45-49 with upper secondary school education is about 1.2 times higher than a young entrant aged 20-24. For tertiary-educated workers, the respective income gap between the age group 45-49 and that of 20-24 is considerably higher, at around 4.5 times.

(1)The three classes of education refer to (i) lower secondary and below; (ii) upper secondary and matriculation; and (iii) degrees and other diplomas. In the article, they will be referred as “lower secondary”, “upper secondary”, and “tertiary” respectively.

**Box 1.2 (Cont'd)**

- 2) The earnings of workers with lower education tend to peak at an earlier period, at around 40-44 for the “lower secondary” group and around 45-49 for the “upper secondary” group, whereas the earnings of workers with higher education will continue to rise until 50-54. Again this highlights the differential effects from experience accumulation for different levels of education attainment.
- 3) Comparing tertiary-educated workers and other workers of the same age group, the earnings difference widens even more significantly as workers become more mature and gain in exposure and experience. Presumably, at the start of the career when a worker is in his early 20s, the difference in earning power of a tertiary-educated worker may not be that huge as against his peers who are with other educational attainments. Significant earnings gap only shows up in the more mature stage of his working life. For example, an average university graduate in his early 30s can earn around two times more than his contemporaries who have received only lower-secondary education. The gap widens all the way until 50+, effectively the end of full-time working for many ordinary workers, with an average degree holder earning four times more than an average worker with lower-secondary education.

- *Construction of human capital series*

A number of human capital stock series have been constructed for the Hong Kong economy, in order to take stock of the huge gaps in productivity and earnings potentials amongst workers with different education and demographic profiles. These series measure human resources in the “output value” sense, that is, in terms of the income or earning ability of the workforce, instead of the conventional approach of focusing on the input cost, i.e. the amount of education and post-education training that have been invested in the workforce. Both formal education and on-the-job-learning would also show up in the human capital stock in this case, to the extent that they are effective in enhancing the earnings potential of workers. Essentially, the construction of the human capital stock series involves adjusting the headcount numbers of workers of different age profiles and at different education attainment by their productivity ratios as proxied by their income ratios<sup>(2)</sup>, setting the numeraire to the income of an average worker in 2005<sup>(3)</sup>.

Following this methodology, human capital series which take into account the productivity differences amongst various segments of the workforce are constructed for each of the following population aggregates:

- 1) Population aged 15+ (population of working age);
- 2) Labour force; and
- 3) Total employment.

<sup>(2)</sup> Here it is assumed that the differences in labour earnings between workers reflect the relativities in their productivity. It should be a reasonable assumption given the general consensus that Hong Kong has a highly efficient labour market.

<sup>(3)</sup> 2005 is taken as the base year for benchmarking productivity/income ratios, for two reasons: (i) 2005 is a year when the economy has by and large fully recovered from the previous downturn (which started in late 1997 and ended in 2003). This was the first year in which the economy recorded mild inflation after 68 months of deflation. So 2005 can be regarded as the year when the economy is largely at a cyclically neutral position. This is important as the earnings ratios for weighing up the headcount workforce have to be distilled from cyclical fluctuation. (ii) 2005 is the most recent period that satisfies condition (i). This property of being up-to-date is also significant as the latest distribution of earnings should be used as weighting to reflect the productivity difference across various groupings of workers.

**Box 1.2 (Cont'd)**

- *Human capital embedded in the total population*

**Chart 2** shows the movements of human capital embedded in the total population aged 15+ over the years 1996-2006. What it represents is the total human capital in Hong Kong's population that can be mobilized to yield income for the economy, including not only people who are working but also those who are now out of the workforce but can re-join the labour market any time. From the chart, it is clear that the growth in total human capital stock persistently exceeds the growth in headcount population aged 15+, suggesting rapid accumulation of human capital in the working age population, in tandem with the significant job upgrading and rise in education standards in aggregate terms.

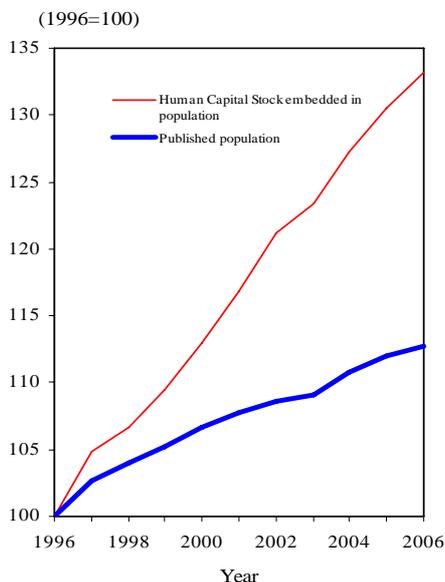
- *Human capital embedded in the labour force*

**Chart 3** compares the human capital embedded in the labour force and its headcount counterpart over the past 10 years. This covers the active portion of total human capital stock, covering only those workers who are in the workforce. The non-active portion corresponds to that part of the human capital stock for economically inactive people who choose to stay out of the workforce, e.g. full-time students aged 15+, non-working housewives, and retirees. Again the published headcount labour force series is consistently outgrown by the human capital stock embedded in it. While the labour force suffered a dent in 2003 due to the negative impact on economic activities from SARS which discouraged some people to leave the workforce, the human capital embedded in it was still growing, albeit at a slower rate. This divergence shows the resilience in the accumulation of human capital even in face of sudden shock in the economy. Also, the rapid growth in human capital stock accumulation embedded in the labour force quickly resumed once the negative shock from SARS in 2003 waned. This shows Hong Kong's strength and depth in its pool of human capital, which in turn underlined the economy's resilience against external shocks.

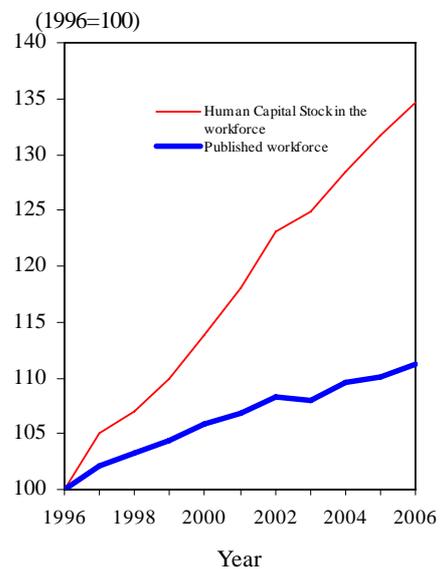
**Chart 2: Human capital stock embedded in population aged 15+ persistently growing faster than the headcount population.**

**Chart 3: Active portion of human capital stock based on the productivity augmented labour force series keeps growing faster than headcount labour force**

**Human Capital Stock in population vs published population**



**Human Capital Stock in labour force vs published labour force**



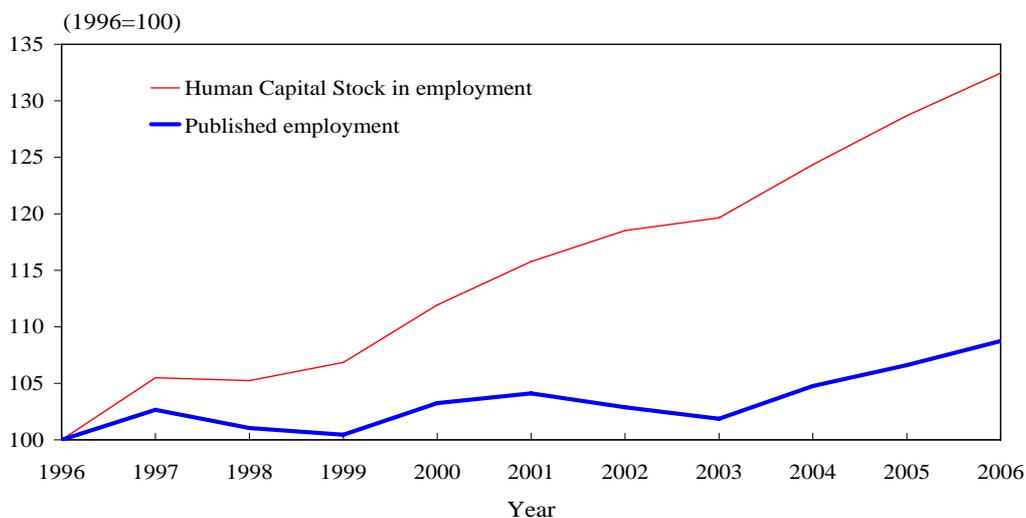
**Box 1.2 (Cont'd)**

- *Human capital embedded in employment*

Another way of looking at how well labour force is being deployed or utilized is to construct a human capital stock series on employment. **Chart 4** shows the movements of human capital stock constructed based on employment series, versus that of the published employment series. The difference between the population sets involved in **Chart 3** and **Chart 4** is that the population in **Chart 3** includes the unemployed, where **Chart 4** does not. The resilience in the actually utilized human capital is even more pronounced here. Even during the economic downturns in the periods 1997-1999 and 2001-2003, when the total employment was actually falling, the human capital stock being deployed or utilized was still on the rise. It is also worthy to note that the growth in the utilized human capital stock has accelerated over the past few years, presumably reflecting the rapid evolution of the workforce in adapting to the “knowledge economy”, where the source of economic growth is more determined by the ability to generate intangible assets (ideas, skills and networks that channel flows of ideas, knowledge and funds) rather than amassing a large number of “blue-collar” workers with investment in machinery and physical assets oriented to produce tangible goods.

**Chart 4: Human capital stock in employment still grew during the years of economic downturn when employment fell**

**Human Capital Stock in employment vs published employment**



- *Education and experience are the two main factors in human capital stock accumulation*

The foregoing paragraphs suggest that education upgrading and experience accumulation are important in driving the growth of human capital stock in Hong Kong. The vibrant growth in human capital stock has in turn contributed to sustained labour productivity growth and hence economic growth in Hong Kong in the past decade, as will be analysed in greater details in a sequel to this article to be included in the next issue of the Quarterly Economic Report. It is likely that the continuous improvement in education attainment and sustained experience accumulation of the workforce will remain a major source of productivity and income growth for Hong Kong in the future. In this regard, continued hefty investment in education and fostering life-time learning are important strategies to enhance the competitiveness and productivity of our economy for sustained growth and development in the long term.