Resource Pack for the Economics Curriculum (Secondary 4-6)

Economic Analysis and Evaluation of Government Policies

Inequality

Personal, Social and Humanities Education Section
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1. Introduction: the trend of rising inequality

In recent years, income inequality has been rising sharply in literally every part of the world. The growing income gap between the rich and the poor has become a major concern for policy makers, academics, and the general public for fear that it would cause serious social and economic problems.

How undesirable has the income dispersion become? Asian Development Bank (2012) found that the income inequality in 11 of 28 Asian economies was worsening in the last two decades, with the quickest growth in income gap going to China and Indonesia. OECD (2011) identified a similar trend in the U.S. and Europe. In a large majority of OECD countries, the household incomes of the richest 10 percent consistently grew faster than those of the poorest 10 percent over the two decades prior to the 2008 Global Financial Crisis. The growth in income inequality was particularly obvious in some English-speaking countries and Nordic countries. The United Kingdom, the U.S., Israel, Italy and Mexico, among all, performed the worst in income distribution.

Influential leaders like Pope Francis and the U.S. President Barack Obama have repeatedly voiced their concern over the growing gap between the rich and the poor.¹ Robert J. Shriller, the 2013 Nobel Laureate in Economics, said that rising inequality in the U.S. and elsewhere “is the most important problem we are facing now” (“Robert Shriller”, 2013). In his best-selling book on inequality, the renowned French economist Thomas Piketty (2014) warned that the increasing income inequality around the world would stir social discontent and undermine democratic values.

¹ For example, see “Obama to meet Pope”, 2014.
Income distribution refers to how the total income of an economy is distributed among its population. The incomes can be distributed across individuals, households, industries, regions, factors of production, and such.

The rising income inequality is widely believed to be harmful as it causes social problems and hurts any long-run economic growth. Poverty, unemployment, and reduced investment (especially in human capital) are likely to be the consequences. Besides, health and social problems, social instability and even social unrest will arise as a result of income disparity. However, inequality is not always an unwanted good in the eyes of an individual and a society. To a certain extent, inequality offers an incentive for lower-income people to climb up the social ladder. The hunger for success can drive them to work harder, innovate and take risks, thereby creating wealth for themselves and society.²

Populist sentiment and concerns about inequality are rising with the increasing income gap. Important policy concerns include poverty, social welfare, taxation, education, investment, crimes, and such. This article is intended to provide a better understanding of income inequality and to shed some light on this issue. The structure of this article is as follows. Section 1 gives a brief introduction of the concept of income inequality. Sections 2 and 3 illustrate two common ways to measure income dispersion.³ Section 4 discusses various sources of income inequality. Section 5 shows what policies the government can initiate, and what the concerns are before these policies are employed. And at last, Section 6 offers a policy evaluation exercise for income redistribution.

² Benabou (1996) gave a comprehensive review of the relationship between inequality and growth, be it positive or negative.
³ The terms “income dispersion” and “income inequality” are essentially synonymous, but the latter seems to carry some negative connotation of unfairness these days.
2. Measuring income inequality: Household income distribution

The distribution of income across households can be represented by an income distribution table, or by the Lorenz curve. The Lorenz curve, in turn, is closely associated with measures of income inequality such as the Gini coefficient. These concepts will be introduced one by one in this section and the next.

2.1. Deciles and percentiles

To construct the income distribution table, all households are ranked by household incomes in an ascending order. They are then divided into 10 equal groups. Thus, 10 percent of households are found in each decile. The first decile consists of the 10 percent of households with the lowest income, with the second decile being the next 10 percent and such.

Alternatively, all households can be divided into 100 equal groups. The values that divide the groups are called “percentiles”. The first decile is equivalent to the 10th percentile, which is denoted by “P10”. The second decile is, in other words, the 20th percentile. In a hypothetical society where all households have equal incomes, the household incomes at all percentiles would be the same.

Deciles and percentiles are measures of position and rank. They tell us where a data value is located in a set of data distribution. For example, if your SAT test score is 600 and the percentile for this score is 58, then you perform better than 58 percent of all test-takers.
Besides serving as a measure of position, deciles and percentiles are useful in analyzing dispersion of a data set. For instance, the extent of income dispersion can be studied by comparing the income at different percentiles at a certain point of time. To study the trend of income dispersion, changes of the household income distribution at selected percentiles are to be analyzed.

2.2. Household income distribution

Table 1 shows the monthly household income distribution at selected percentiles in years 2001, 2006 and 2011. These are family incomes adjusted for changes in price level over time. They are valued at June 2011 constant prices. Furthermore, these incomes are the original ones, meaning that the effects of taxation and welfare transfers are not considered. Lastly, the incomes of foreign domestic helpers are excluded.

**Table 1: Monthly household income distribution (at June 2011 constant prices)**

<table>
<thead>
<tr>
<th>Percentile</th>
<th>2001</th>
<th>2006</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>P10</td>
<td>5,480</td>
<td>4,680</td>
<td>4,030</td>
</tr>
<tr>
<td>P20</td>
<td>9,390</td>
<td>8,690</td>
<td>8,300</td>
</tr>
<tr>
<td>P30</td>
<td>12,610</td>
<td>11,590</td>
<td>12,000</td>
</tr>
<tr>
<td>P40</td>
<td>16,880</td>
<td>15,650</td>
<td>16,000</td>
</tr>
<tr>
<td>P50</td>
<td>20,810</td>
<td>19,820</td>
<td>20,200</td>
</tr>
<tr>
<td>P60</td>
<td>25,650</td>
<td>24,630</td>
<td>26,000</td>
</tr>
<tr>
<td>P70</td>
<td>32,340</td>
<td>31,290</td>
<td>32,700</td>
</tr>
<tr>
<td>P80</td>
<td>41,630</td>
<td>41,090</td>
<td>43,340</td>
</tr>
<tr>
<td>P90</td>
<td>61,880</td>
<td>61,430</td>
<td>65,000</td>
</tr>
</tbody>
</table>

Source: Census and Statistics Department
In 2011, 10 percent of households had real incomes (in June 2011 prices) lower than $4,030, which is represented in the lower end of the household income distribution. On the upper end of the income spectrum, 10 percent of households had real incomes over $65,000.

During the 10-year span from 2001 to 2011, P10 and P20 show a decreasing trend. On the one hand, low-income households (defined here as households within the first two deciles) had their real incomes falling consistently in this period. On the other hand, there was a fall in all other percentiles in 2006, followed by an upward-rebound in 2011. At the percentiles of P60, P70, P80 and P90, the 2011 real incomes were higher than those of a decade ago.

In a nutshell, income inequality was on a rise during this period. The top 20 percent owned higher real incomes. The middle one remained largely the same while the lower 20 percent did not remain stable. They had a trend of decrease in real incomes. The income gap was widening between the two ends. The richer the rich was getting, the poorer the poor became.

2.3. Percentile ratios

Another way to show the widening income disparity is to compute the ratios of high-income and low-income households. Based on Table 1, the ratios of household incomes at different percentiles can be used to reflect the difference between two points on the income distribution. For example, the P90/P10 ratio shows the income gap near both ends of the income distribution whereas the P80/P20 ratio illustrates the income disparity of the majority of the households. These two ratios are shown in Table 2 below.
Both percentile ratios of P90/P10 and P80/P20 increased during the period from 2001 to 2011. In 2001, the household income at P90 was 11.3 times larger than that at P10. The ratio rose by 42.5% to 16.1 times a decade later.

The P80/P20 ratio, which reflects the income disparity of the majority of the households, also increased during this period although the magnitude is not as big as the P90/P10 ratio. The P80/P20 ratio rose by 18.2%, demonstrating a change from 4.4 times in 2001 to 5.2 times in 2011.

### 2.4. Income share

The income disparity can also be illustrated by the change in income shares in different decile groups. Table 3 illustrates the percentage of total income shared by the households belonging to a particular income group. Shares are computed by dividing the total income of households into the respective decile groups by the total income of all households. In a hypothetical world where all households have identical incomes, each decile group would have an equal income share of 10%.
## Income Inequality

Table 3: Shares of original monthly household income (in %), 2001, 2006 and 2011

<table>
<thead>
<tr>
<th>Decile</th>
<th>2001</th>
<th>2006</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st (lowest)</td>
<td>0.9</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>2nd</td>
<td>2.3</td>
<td>2.1</td>
<td>2.0</td>
</tr>
<tr>
<td>3rd</td>
<td>3.4</td>
<td>3.2</td>
<td>3.1</td>
</tr>
<tr>
<td>4th</td>
<td>4.5</td>
<td>4.3</td>
<td>4.3</td>
</tr>
<tr>
<td>5th</td>
<td>5.7</td>
<td>5.6</td>
<td>5.6</td>
</tr>
<tr>
<td>6th</td>
<td>7.0</td>
<td>7.0</td>
<td>7.0</td>
</tr>
<tr>
<td>7th</td>
<td>8.8</td>
<td>8.8</td>
<td>8.9</td>
</tr>
<tr>
<td>8th</td>
<td>11.1</td>
<td>11.3</td>
<td>11.5</td>
</tr>
<tr>
<td>9th</td>
<td>15.3</td>
<td>15.6</td>
<td>16.1</td>
</tr>
<tr>
<td>10th (highest)</td>
<td>41.1</td>
<td>41.4</td>
<td>41.0</td>
</tr>
<tr>
<td>Overall</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Census and Statistics Department

Remark: The above numbers may not add to 100 percent after rounding up.
Take the figures from 2001 as an example, the total incomes earned by the lowest 10 percent (in terms of household income) accounted for a mere 0.9% of the total income in Hong Kong. On the contrary, the percentage share of the highest decile group was 41.1%. Ten years later, the income share of the lowest decile dropped to 0.6% of the total income while the top 10% remained relatively stable at 41.0%.

A widening income gap was evident in Table 3. During this 10-year span, the income shares of the first, second and third deciles were all decreasing. The shares of the middle decile groups were stable while the share of the top 20 percent kept increasing.

Using the income share data in Table 3, the ratios of income shares of selected decile group(s) are computed and listed in Table 4.

<table>
<thead>
<tr>
<th>Ratio</th>
<th>2001</th>
<th>2006</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top 10 / Lowest 10</td>
<td>45.7</td>
<td>51.8</td>
<td>68.3</td>
</tr>
<tr>
<td>Top 20 / Lowest 20</td>
<td>17.6</td>
<td>19.7</td>
<td>22.0</td>
</tr>
</tbody>
</table>

Remark: Ratios are cited from Table 2.

In 2001, households from the top 10 percent earned approximately 45.7 times more than that of the lowest 10 percent. This income gap did not narrow down afterwards but it rose to 68.3 times a decade later.
The income gap between the top 20 percent and the lowest 20 percent households also pointed out a similar trend. In 2001, the top 20 percent households earned approximately 17.6 times of that of the lowest 20 percent. The figure increased to 22.0 times in 2011.

To analyze the statistics from different angles, let us compare the income dispersion in Hong Kong to that of OECD (Organisation for Economic Co-operation and Development). On average, across the OECD countries, incomes of the richest 10 percent of people were nearly nine times of that of the poorest 10 percent in 2005. The income gap did vary across the member countries. The ratios for the United Kingdom and the United States were higher than the OECD’s average. They reached 10 to 1, and 14 to 1 respectively. In Mexico, the richest had incomes of more than 27 times than those of the poorest ones (OECD, 2011).

Though the idea of “income” is defined differently in OECD and in Hong Kong (for example, OECD incomes are disposable incomes but Hong Kong incomes are original incomes), the OECD countries still had significantly lower income ratios between the rich and the poor.

Whether we look at the income inequality from the household income distribution table, percentile ratios, or income shares, we reach the same conclusion that the income gap between the rich and the poor was getting wider and wider from 2001 to 2011. While the rich was getting richer, the poor could not keep track with the rise in earnings. The problem of inequality has been worsening.
3. Measuring income inequality: Lorenz curve and Gini coefficient

3.1. Lorenz curve

The Gini coefficient (GC), developed by an Italian statistician Corrado Gini, is a simple numerical measure of income dispersion. It is the most widely used summary measure of income inequality. The GC can be illustrated by the Lorenz curve (LC). The LC is a curve that shows the cumulative percentages of household incomes against cumulative percentages of the population, starting from households with the lowest income to the highest.

Table 5: Cumulative percentage of income distribution in 2011

<table>
<thead>
<tr>
<th>Decile</th>
<th>Income share (%)</th>
<th>Cumulative income share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st (lowest)</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>2nd</td>
<td>2.0</td>
<td>2.6</td>
</tr>
<tr>
<td>3rd</td>
<td>3.1</td>
<td>5.7</td>
</tr>
<tr>
<td>4th</td>
<td>4.3</td>
<td>10.0</td>
</tr>
<tr>
<td>5th</td>
<td>5.6</td>
<td>15.6</td>
</tr>
<tr>
<td>6th</td>
<td>7.0</td>
<td>22.6</td>
</tr>
<tr>
<td>7th</td>
<td>8.9</td>
<td>31.5</td>
</tr>
<tr>
<td>8th</td>
<td>11.5</td>
<td>43.0</td>
</tr>
<tr>
<td>9th</td>
<td>16.1</td>
<td>59.1</td>
</tr>
<tr>
<td>10th (highest)</td>
<td>41.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Remark: Ratios are computed from Table 3. Numbers do not add exactly to 100 percent after rounding up.
Table 5 shows the cumulative percentage of income distribution in Hong Kong in 2011. The Lorenz curve is then constructed by plotting the cumulative percentage of income earned against the cumulative percentage of households. It is shown as the curve OBA in Figure 1 below.

![Lorenz curve in Hong Kong in 2011](image)

The horizontal axis is the cumulative percentage of households and the vertical axis is the cumulative percentage of income. In a hypothetical world of identical incomes for all households, the cumulative percentage of income for the first decile is exactly 10%. The second decile is where a 20% of cumulative percentage of income is found and the figures go on in the same pattern. Thus, the diagonal OA, which is also known as the “45° line”, stands for perfect equality, meaning that every household has the same income.
The Gini coefficient is calculated by taking the ratio of the area between the line of equality and the Lorenz curve (the crescent-shaped area OBA) and the triangular area OCA under the line of equality. The bigger the crescent-shaped area OBA is, the higher the Gini coefficient becomes.

As a ratio related to two areas, the Gini coefficient always takes a value between zero and one. The bigger the GC is, the greater the income dispersion grows. The smaller the GC is, the more even the income is distributed among the households. Under extreme circumstances, a zero GC suggests perfect income equality. Every household has the same income. The LC simply overlaps with the 45° line. On the other extreme, a unitary GC means one single household owns all the income of society.

Figure 2: Lorenz curve, 2001 and 2011
Figure 2 shows the Lorenz curve for Hong Kong in 2001 and 2011. During this ten-year span, the curve moved further away from the diagonal, indicating a bigger income dispersion.\footnote{More specifically, the Gini coefficient rose from 0.525 in 2001 to 0.537 in 2011 (see Table 6).}

### 3.2. Gini coefficient

The GC data series in Hong Kong started in 1971. It was based on the original household income. Therefore, the redistributive effects of taxes and transfer payments are not taken into account. Nevertheless, the GC movement over time is still very useful in depicting how the income dispersion situation has been evolving.

Figure 3 below shows that the GC was stable at around 0.430 in the 1970s. It began to go up sharply since the 1980s, especially between 1986 and 1996. These were the years when the GC increased greatly from 0.453 to 0.518. In other words, the household income disparity in Hong Kong was deepening speedily from the mid-80s to the mid-90s. The upward movement continued afterwards, but the rise was more moderate. Its latest increase in 2011 has actually been the smallest since 1986.
Many factors, economic or not, combined together to contribute to the rising GC over the past four decades. For example, the significant increase in GC between the 1980s and 1990s was mainly due to the rapid transformation of the Hong Kong economy toward a service-based center. This created a drastic change in the labour market and earnings structure, leading to a bigger income disparity in this period. In recent years, however, the impact of socio-demographic factors has been more apparent. An ageing population with a persistent decrease in household size has dragged the income distribution more to the lower end.
3.3. Limitations and interpretations of GC

As the GC takes the value between zero and one, it is a simple measure of income disparity and the coefficient is easy to understand. Besides, GC is not particularly sensitive to extreme values, and is commonly known to the public. However, the following two limitations are worth being noticed as the coefficient is based on the original household income.

(1) Income redistribution policies: GC does not take into account the redistributive effects of taxes and transfer payments.

(2) Demographic factors: GC is affected by income distribution as well as demographic changes. A change in GC may not necessarily reflect a change in the underlying income disparity situation.

Income can be redistributed from the higher-income earners to the lower-income households through taxation and social welfare policies. These government policies may help narrow the income gap between the rich and the poor. In Table 6, Row (A) gives the Gini coefficients based on the original household income. Row (B) shows GCs based on post-tax post-social transfer household incomes. Comparing (A) and (B) can offer a better understanding of income disparity in Hong Kong before and after the implementation of redistributive policies. It can also be viewed as a measure of how effective government’s policies are in reducing income disparity.
In Table 6, post-tax post-social transfer GCs in Row (B) are smaller than their counterparts in Row (A), indicating that income redistribution measures did help narrow income disparity between 1996 and 2011. In addition, the GCs in Row (B) were largely stable from 1996 to 2011. It remained unchanged at 0.475 in 2011.

Changes in socio-economic and demographic factors can also result in a higher Gini coefficient and household income disparity over time even if the individual income distribution remains largely the same. Demographic changes such as the emergence of nuclear families, higher divorce rate, and ageing population all lead to a faster growth of smaller-sized and elderly households. Some of these are single-parent or retirees’ households, who enjoy little or even zero employment income. As such, these households would tend to drag the household income distribution towards the lower end.\textsuperscript{5}

\textsuperscript{5} For example, see Kwok (n.d.), Lui (2014), Wong (2013) and Wong (2014).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All households</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A) Original household income</td>
<td>0.518</td>
<td>0.525</td>
<td>0.533</td>
<td>0.537</td>
</tr>
<tr>
<td>(B) Post-tax post-social transfer</td>
<td>0.466</td>
<td>0.470</td>
<td>0.475</td>
<td>0.475</td>
</tr>
<tr>
<td><strong>Economically active households</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(C) Original household income</td>
<td>/</td>
<td>0.488</td>
<td>0.490</td>
<td>0.489</td>
</tr>
<tr>
<td>(D) Post-tax post-social transfer</td>
<td>/</td>
<td>0.436</td>
<td>0.436</td>
<td>0.430</td>
</tr>
</tbody>
</table>

Source: Census and Statistics Department
In order to mitigate the effect of ageing population, Rows (C) and (D) focus only on economically active households, which are defined as “families with at least one member working or looking for a job”. Conversely, economically inactive households (EIHs) are families comprising members without jobs. Home-makers, retirees and young people (aged below 15) are typically seen in an EIH.

The population in Hong Kong is ageing fast, resulting in more EIHs with elderly retirees. The number of EIHs grew by an astonishing 48.3% between 2001 and 2011. In percentage terms, EIHs increased from 13.9% in 2001 to 17.9% of all households in 2011. About half (43.6%) of these households were elderly households with all members aged 65 and over as seen from the figures of 2011.

Rather unsurprisingly, merely focusing only on the economically active households, the income distribution became more even. The GC in Row (C) had a smaller value than those in Row (A). It remained stable at about 0.490 from 2001 to 2011.

Notice that the post-tax post-social GC for the economically active households, as shown in Row (D), illustrated the smallest values compared to Rows (A) to (C). Moreover, the situation of income inequality improved as the Gini coefficient dropped from 0.436 in 2006 to 0.430 in 2011.
Seemingly, incomes become more evenly distributed when the effects of ageing population and redistributive policies are taken into account. However, it is far from a definite conclusion because EIH is not always the result of ageing.\(^6\) Nevertheless removing EIHs does serve as the first attempt to identifying the effect of ageing population on income disparity.

Apart from the Gini coefficient, there are many measures to study income distribution and to measure the extent of income disparity. Other alternatives include taking into consideration the mean logarithmic deviation, Atkinson index and coefficient of variation. Census and Statistics Department (2012) compared these four measures. Three of them showed that the income distribution became more dispersed in the past ten years to slightly different extents.

\(^6\) Taking all EIHs away is actually a bit problematic for two reasons. First, EIHs consist not only of elderly retirees, but also single parents who have difficulty securing a job. Second, elderly joblessness may reflect some underlying changes in labour market and income disparity.
4. **Sources of income inequality**

Why are household incomes different? Variation in household incomes has its roots in wages and salaries, which account for the majority of household incomes for adults at working-age. This is where the labour market comes to play. In fact, understanding labour market changes is the key to explaining income inequality.7

This section begins with a discussion of factors that alter labour demand or supply (hence equilibrium wages). Other “non-labour-market” factors that affect wages (such as individual preferences and luck) will be discussed afterwards.

Many factors add together to vary the workers’ wage rates. In particular, unequal labour market outcomes can be explained by

- Human capital
- Technology
- Globalization
- Discrimination
- Superstar contests / The “Winner-Takes-All” Phenomenon

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7 In OECD countries, 75% of household income comes from wages and salaries. The ratio is even higher in Hong Kong. It amounts to around 85%.
4.1. Human capital

Generally speaking, the market mechanism rewards individuals based on the contribution they make. Workers producing more output naturally get higher wages in the labour market. Therefore, a considerable degree of income inequality is “rooted” in the market system. The more factors of production an individual possesses, and the more productive those factors are, the higher the individual’s income will be.

For example, basketball superstar LeBron James will earn more than US$20 million in 2014-15 because he is very productive and is a successful figure in marketing. His team can sell tickets and television rights at a high price. On the other end of the income spectrum, NBA players can make only (only!) half a million a year. The difference is nearly 20 times.8

Workers with more human capital generally produce more and earn more than those with less human capital.

Economists use the term “human capital” to refer to the skills, knowledge, experiences, or other intangible assets of individuals that can be used to create economic value. The concept of human capital recognizes that workers are not identical. Instead, the quality of workers matters. It can be improved by investing in human capital and accumulating more human capital in this process.

Human capital can come from education, training, experiences, health, social network, and such. These are investments on workers themselves. It is well documented that the return on schooling increases with the level of education, and globalization can widen the income gap between the better-educated and the less-educated workers (Goldin & Katz, 2008).

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8 There may be other factors in effect here, such as the superstar contest (to be discussed). NBA players salary can be found, for example, from http://espn.go.com/nba/salaries
Another major source of human capital is simply ones’ gifted abilities or endowments. Human beings are distinctive. People have different talents in different areas. Some are blessed with exceptional mental qualities who are capable of being high income-earning professionals like doctors and lawyers. Some own excellent physical strengths to be professional athletes, or possess outward beauty to be a top model. On the other hand, workers with weaker endowments are likely to settle with low-paying jobs.

Human capital is believed to be a critical determinant that boosts economic activity and enhances economic growth. It is particularly important to an economy like Hong Kong where natural resources are lacking.

### 4.2. Technology

Technology has advanced at an unprecedented pace for the past few decades. In particular, information and communication technologies (ICT) bring profound impact on our society and our lives, with an increased income inequality being one of them. Take the U.S. labour market as an example, the wage dispersion in the U.S. saw a substantial increase during the 1980s. It turned naturally into a pronounced rise in both household income inequality and living standard disparities. Some economists suggested that technological change, especially the popularization of computers, was the key drive of the difference in earnings in the U.S. labour market.

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9 Murphy and Welch (1992) found that wage differentials by education, by age and experience group, and by occupation all rose substantially during the 1980s. A primary exception to the growing U.S. wage inequality is the narrowing of gender wage gap.
What is the effect of technological change (say, ICT) on the labour market?

Suppose the labour market consists of both low-skilled and high-skilled workers (usually defined by education attainment). Better technology and ICT tend to benefit high-skilled workers by raising their incomes. Low-skilled workers, on the contrary, would tend to be worse-off. There are two reasons for this increased wage gap between high- and low-skilled workers:

a. ICT replaces low-skilled workers by acting as a substitute. More high-skilled workers are needed at the same time.

b. ICT can be difficult to use. High-skilled workers are more suitable in terms of better utilizing ICT, which is said to be skill-biased.

Both theories (a) and (b) point to a stronger demand for skilled workers. If the supply of skilled workers failed to keep up with the demand, these workers will get higher wages, worsening the income inequality.¹⁰

Now, let us illustrate (a) and (b) with more details using labour demand and supply curves. Consider a labour market with low-skilled and high-skilled workers – according to theory (a), ICT can be a substitute for a wide range of manual and routine processes in a workplace, thus minimizing the employment opportunity of low-skilled workers. For instance, automatic teller machines have taken over tellers’ jobs. Answering machines have also displaced customer service representatives. The introduction of these technologies has decreased the demand for low-skilled workers. On the other hand, the design and maintenance of these technologies require high-skilled workers. The demand for high-skilled workers will be stronger as a result.

¹⁰ Goldin and Katz (2008) studied the U.S. wage data in the 20th century and found that technology and education attainment were the most critical factors in explaining income inequality.
Figure 4: The impact of technology on high- and low-skilled workers

Panel (a): Technology substitutes for low-skilled workers

Panel (b): Technology creates more demand for high-skilled workers
Figure 4 shows the impact of technology change on low-skilled workers (Panel (a)) and high-skilled workers (Panel (b)). Better technology substitutes for low-skilled workers, so that there is a decrease in the demand for low-skilled workers in Panel (a). On the contrary, technology creates a bigger demand for high-skilled workers as shown in Panel (b). The demand for low- and high-skilled workers move in opposite directions, generating an income disparity between these two groups.

Next, theory (b) reveals that technology tends to be more useful for high-skilled workers. If this is true, ICT will trigger a bigger demand for high-skilled and educated workers that in turn leads to a rise in income inequality.

Traditionally speaking, technical change is believed to benefit all workers by enhancing productivity (or to hurt all workers by replacing them). However, the idea that technological progress benefits only a sub-group of workers (i.e., theory (b)) is appealing to many economists for two reasons. First, wage inequality began to kick off in the early 1980s, seemingly following the invention and popularization of personalized computers. Second, new technologies like ICT can be rather sophisticated and difficult to use. Skilled workers are more likely to use ICT on their jobs, because it may require certain knowledge or skills before workers can master these technologies. As such, workers who can overcome these “threshold” of better technology can take advantage of and raise their productivity accordingly. These are typically skilled and educated workers. On the contrary, low-skilled workers lack the information or capacity to make good use of ICT and advanced technologies.
New technologies that benefit only a sub-group of workers are “skill-biased”. “Skill-biased Technical Change” (SBTC) is widely believed to be the key reason for income inequality in the U.S. Some remain skeptical because SBTC fails to explain some essential fact of income inequality such as narrowing down the income gap between male and female workers.

In sum, a new & skill-biased technology increases the demand for high-skilled workers via channels (a) and (b). The wage rate of high-skilled workers will go up, leading to a rise in income inequality.

4.3. Globalization

From an economic point of view, globalization is the process in which the markets for many goods and services are becoming increasingly international. Economies are more integrated and interdependent on one another, with more mobility and international movements on

- Goods and services
- Capital
- Technology
- Production relocation
- Labour migration

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11 For example, see Autor, Katz and Kearney (2008).
12 The most notable challenge comes from Card and DiNardo (2002).
13 Middle-wage jobs tend to disappear as technology progresses. As such, polarization occurs in the labour market as employment shifts into high- and low-wage jobs at the expense of the middle-wage ones.
Trade over long distances is nothing new in the history of mankind. For instance, the Silk Road linked up the East and the West more than 2,000 years ago. Globalization, however, has been taking place at an unprecedented pace since the 1980s. Two powerful and perhaps historical driving forces have been in play. The first is technology, especially information and communications technology (ICT). Thanks to technological advances, businesses enjoy lower costs and higher productivity. In particular, ICT creates new forms of communication like internet and mobile networks. Nowadays international trade includes not only low-skilled goods and services such as manufacturing products, but has also extended to software development, engineering services, accounting, and a lot more middle- and high-skilled services.

The second driving force for globalization is the significant policy change that allows some countries to open up to international economic cooperation. For example, China, India, and the former Soviet Union used to isolate themselves from the global economy. Now these populous regions are embracing an open-door policy and actively trading with the rest of the world. As a result, the global economy (say, trade volume, foreign investment, and world output) has been growing and expanding at an exceptionally fast pace.

Globalization has brought forth significant changes to our societies. Many people believe that liberalization in trade and investment causes income inequality. Is it true?

Advocates of globalization argue that “a rising tide lifts all boats.” Trade and economic growth benefit both high- and low- income groups as the size of the economic pie gets bigger. Even if income inequality deteriorates, there will be no big deal.
The opposition camp, however, alleges that trade increases income inequality. The argument is based on the concept of comparative advantage. Suppose that shoe production requires relatively fewer skills from the workers, and Vietnam has comparative advantages due to the abundance of low-skilled workers. Furthermore, if we assume the US possesses comparative advantages on financial services, hence it would export financial services to Vietnam while importing Vietnam-made shoes.

What is the impact of trade to the low-skilled (shoe) workers in the U.S.? As U.S. consumers switch to imports, the price of domestic shoes falls, lowering the productivity (in terms of products with marginal revenues) of U.S. shoe workers. The manufacturers decrease their demand for workers so they will get reduced wages and employment opportunity because of international competition.

Next, what is the impact of trade to high-skilled workers in the U.S.? When trade is possible, the U.S. exports financial services to Vietnam. The demand for workers in the finance industry increases. Wages and employment go up as a result. As this export industry is of a high-skilled nature, the benefit of higher wages is unavailable to the U.S. low-skilled workers. Thus, an increased income gap between high- and low-skilled workers will arise.

Note that both globalization and technology deliver a similar effect to the labour market. There will be a bigger demand for skilled workers, who enjoy higher wages and better employment opportunities. Low-skilled workers face a decreased demand and lower wages. Employment again shifts into high-wage jobs (usually low-wage jobs too) at the expense of the middle-wage ones. Rising income inequality is inevitable.¹⁴

¹⁴ Globalization often goes hand-in-hand with the adoption of new technologies. It is not easy to break down the different effects of these forces. Quite a number of economists believe that the effects of trade on income inequality in rich countries are fairly minor. Education, technological progresses, weaker labour unions, credit cycle from monetary policies and such may have more explanatory power in this case. See Brad DeLong (2007) as an instance.
4.4. Discrimination

Discrimination in hiring, training, and promotion can cast an impact on income distribution. If discrimination based on gender, race, age and religion, to name but a few, restricts racial minorities (or other less privileged groups) to low-paying occupations, excessive labour supply may be resulted. Wages and incomes in those occupations decrease accordingly. On the other hand, if discrimination reduces the competition faced by the favored groups of workers, the labour supply is manually limited, causing higher wages and incomes.

On top of psychological and sociological factors, discrimination in workplace may have economic reasons behind. For example, sharing similar languages and cultures in an office can improve communication and productivity. Therefore, it is hard to detect discrimination in objective ways, and it is even harder to quantify its impact.

4.5. Superstar contest

Earnings differences can be really large. While Ms. Rowling, the author of the Harry Potter series, has been among the highest paid persons in Britain, many authors are struggling to make ends meet. Even a thoughtful professor equipped with all the capacities above (human capital, great skills, and such) may find it hard to explain the large income gap. So, why is it possible that in some markets such as professional sports and the show business, top performers (“superstars”) are able to capture a very large share of the rewards, leaving the remaining pool of competitors with very little?
A popular explanation is the “winners-take-all” property of certain markets, in which the highly talented winners capture most of the market share, if not all. Steve Jobs is a typical example. He invented iPhone, and the product has attracted a great pool of fans. Steve Jobs earned a good deal from it not because of a huge price difference of iPhone with its competing brands. His greater earnings came primarily from selling larger quantities than from charging higher prices.

Note that “quantities” is the keyword. Superstars like J.K. Rowling and Jobs perform outstandingly in a winner-takes-all market and thus possess a large chuck of the rewards, thereby separating themselves from other competitors in terms of income.

Is it unfair for a superstar to get so much? After all, other competitors have put in lots of efforts too, and the difference in talent is sometimes too subjective to be judged. Indeed, putting the question of fairness aside, a considerable difference in prizes can be justified by the fact that it serves as an incentive for contestants to put in their efforts. Otherwise the quality of performance may not reach the required standard from ticket-buyers or consumers.

Many economists like Krueger (2005) believe that the winner-takes-all property is more and more prevalent in modern economies. It can be seen in a variety of markets and in the rise of large multinational firms. Firms have greatly extended their market reach from technological advances, globalization, and changing norms in recent decades. Winner’s prize is skyrocketing as the market expands beyond national borders. Soaring CEO pay and the super-rich in businesses are seen in many industries, perhaps most notably in finance and real estates. No matter what, while the market is getting bigger, the gap separating the winner and the runners-up is also growing.

15 Mankiw (2013) made a controversial argument that the ultra-high income is the reward to innovation and entrepreneurship. Critics argue that besides fairness, there are concerns over deteriorating social mobility, hollowing out of the middle class, rousing low morale and wasting the efforts of non-winners.
4.6. Individual preferences

The factors above affect wages and earnings by changing labour demand or supply. There are some other “non-labour-market” factors that are capable of creating income gap as well.

Income differences can come naturally from individuals’ different values and preferences. Some workers put more emphasis on leisure, family life, and such. They don’t mind making less money by choosing a part-time job or retiring earlier. Conversely, those who are willing to take more “unpleasant” jobs (for example, working under great stress or in a poor environment, taking night shifts, and such) or assume higher risks are more likely to earn bigger incomes.

4.7. Wealth

Income comprises both wage and capital income. Capital is income-generating assets such as machinery, land, stocks and bonds, and savings. They are parts of your wealth. Capital owners get rental, interest, and dividend incomes. Thus, an unequal distribution of capital and wealth (perhaps because of inheritance, which is beyond control of most people) contributes to an unequal distribution of income.

Piketty, a French economist, goes further to claim that wealth differences are the key to income inequality in the long run (Piketty, 2014). He argues that the rate of return on capital often exceeds the rate of economic growth, meaning that capital tends to grow faster than the economy. If this is the case, rising income inequality is inevitable.\textsuperscript{16}

\textsuperscript{16} Piketty believes that the increasing income inequality will create serious political and social disruption eventually. He recommends a global tax on wealth to tackle this problem.
4.8. Luck

Income differences may simply be a result of luck or randomness. For instance, one may be getting into a booming industry at the right time, encountering a price hike from his/her stocks because of some unpredictable policy changes, or knowing some business gurus from school days. Conversely, misfortunes such as car accident or serious illness can seriously affect your ability to earn. Income can fluctuate a lot as a result of these “luck” factors.

Economists generally believe that skill-biased technical change is the main drive for income inequality in the U.S., and perhaps for the industrialized economies as well. Yet they are far from reaching a consensus. For example, Krugman (2002) found that the three popular theories of technology, globalization, and superstar were “increasingly inadequate” in explaining income inequality.\(^\text{17}\) Therefore, interested readers must be aware that the search for fundamental cause(s) of income inequality is an ongoing crusade. Hopefully we can get a better and deeper understanding as more researches and pieces of evidence emerge.

\(^{17}\text{Krugman (2002) found that globalization alone cannot explain the skyrocketing CEO incomes. Technology cannot explain the huge increase in inequality among the middle-to-top managers with similar education attainments. The superstar theory works for celebrities, but not for many of the top 1% of the super-rich.}\)
5. **Redistributive policies and concerns**

Redistributive policies for a smaller income gap can be found in any countries or economies around the world. They can be classified into the following categories:

- **Taxes**
- **Transfer payments**
- **Subsidized services**
- **Minimum wage**

In Hong Kong, salary tax is progressive and increases with income to a certain point.¹⁸ The design is intended to alleviate the gap between the rich and the poor. At the same time, it raises revenue for social services. It is widely believed that tax and transfer payments reduce income inequality in most economies though the effectiveness varies across countries.¹⁹ But income taxes and cash transfers became less effective in reducing high levels of market income inequality in many OECD countries, particularly during the late 1990s and the early 2000s (OECD, 2011).

Subsidized social services can also help to reduce income inequality. In Hong Kong, subsidized services mainly appear in three areas, namely education, housing, and health care. Recipients typically have to fulfill certain eligibility requirements based on their income and asset levels. For example, applicants for public rental housing have to fulfill a list of stringent eligibility requirements so that these subsidized flats are assigned to people with genuine needs. Thus, these services are more concentrated among lower-income families and help reduce income inequality.

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¹⁸ As of August 2014, marginal tax rates start at 2% and then go up to 17%. Taxpayers can also opt for a standard rate of 15%, if it gives a lower salary tax payable.

¹⁹ For the case of Hong Kong, see the earlier discussion on Table 6.
Income redistribution has always been a highly controversial issue. Supporters say it promotes fairness, allowing people to feel a sense of fairness. Redistribution helps to lift poverty and inequality and thereby promotes harmony and stability.\(^{20}\) It also works well for the rich, because it mitigates economic inefficiencies that often come with a large income gap.

However, there are some valid concerns of redistribution policies. First, redistribution through government spending and subsidized services poses a long-term pressure on the government budget. Whether the increased government spending is sustainable or not depends not only on the careful design of redistribution policies, but also on the changing economic and political environments. The latter, however, is often beyond the control of policy makers.

Second, society has to agree on the policy goal, be it equalizing income or equalizing opportunity. This is not an easy task. For instance, taxation is an example of equalizing income. It is a good policy if the goal is to reduce the income differences between the rich and the poor. However, if society prefers greater equalizing opportunities instead, education will be a better tool.

Another concern is the incentive distortion that may be created by redistribution. Taxes and transfers weaken incentives to work and reduce production. It may work against investment and hurt long-term economic growth as well. Also, government intervention in the economy usually leads to lower efficiency. If so, redistribution will lead to a fairer and more “balanced” environment at the expense of economic efficiency. Society and the government need a clearer position in terms of the trade-off of equity versus efficiency. Yet, it is costly to reach consensus in such a modern and diversifying society.

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\(^{20}\) Protests such as Occupy Wall Street in 2011 were triggered by income inequality. The popular slogan “We are the 99%” referred to the disparity between the richest 1% and the other 99%.
6. Policy evaluation: Can education reduce income inequality?

Life moves faster and faster in an age of information. Education definitely becomes more and more important. For an individual, education is a crucial way to acquire knowledge and skills, which are very useful in making sense of a fast-changing world, mastering new technologies and hence, getting a well-paid job. For society, education contributes to long-term economic growth by providing skilled workers and professionals. It helps attract more investment, especially those creating high-end jobs that require more skills and education. Besides, it spurs more innovation and new ideas.

Though education promotes economic growth, does it reduce income inequality in the labour market?

Let us evaluate the policy of increasing subsidized university places in the age of information. A simple application of demand and supply in the labour market will help us explain the impact of such a policy.
Labour market: Two types of workers

From a microeconomic perspective, the more productive a worker is, the higher wage he or she will get from the labour market. If technology enhances workers' productivity, the demand for their services will increase as well.

Let us consider a labour market with two groups of workers, one with more human capital (called “high-skilled” workers, or university graduates), the other with less human capital (called “low-skilled” workers, or DSE graduates).

University graduates earn more than DSE graduates for two reasons. First, their productivity is higher. Second, university graduates incur an opportunity cost of acquiring their skills such as university tuition fees. Thus, they are willing to provide workforce only when the wage rates can make up for those costs. As shown in Figure 5a below, the income gap between university and DSE graduates is indicated by \( W_1 - W_0 \).

Figure 5a: A labour market with two types of workers
Case 1: Demand for university graduates changes as technology advances

What is the impact of popularization of computers? It is likely to help university graduates more than DSE graduates, because the technology is sophisticated and not easy to use. In other words, technology is skill-biased, meaning that it benefits high-skilled workers more.

On the demand side of the labour market, the popularization of computers and information technology (assumed to be skill-biased) generates a larger demand for high-skilled workers. Employers are looking for more skills at workplace and are willing to pay a higher wage rate for university graduates. The demand for university graduates increases. A higher equilibrium wage $W_2$ results if there is no change on the supply side. The new equilibrium for university graduates is $E_2$ in Figure 5b.

Figure 5b: Demand for university graduates increases as technology advances

If the government does not increase the number of places of subsidized university, income inequality will indeed worsen with better technology. The income gap between university graduates and DSE graduates will increase from $(W_1-W_0)$ to $(W_2-W_0)$.
Case 2: An increase in subsidized university places

If the government increases subsidized university places, the supply of university graduates will increase, from $S_1$ to $S_2$ in Figure 5c. The equilibrium for high-skilled graduates is at $E_3$. The income gap between university and DSE graduates will reduce from $(W_2 - W_0)$ to $(W_3 - W_0)$. Besides, there will be better employment opportunities for university graduates. More skilled workers are available to employers at a more affordable wage. Employers are more likely to adopt new technologies, which in turn can boost economic growth.

Figure 5c: Wage gap reduced as the government increases subsidized places

What can we learn from this policy evaluation exercise? Technology is always said to be the engine of economic growth. Yet it may create income inequality and bring about demerits to some workers in the process. If the government invests more on education, the supply of skilled workers will then keep up with the increasing demand. Eventually, economic growth can be achieved without enlarging the income gap and causing further social and economic problems.
7. References


8. Discussion Questions

1. Section 2 shows that the income gap between the rich and the poor has widened in recent years. Give an example of income inequality from your daily life. Briefly explain why such an inequality exists.

2. Based on the data of income share from Table 3, plot the 2006 Lorenz curve. Compare the Lorenz curves in 2006 and 2011. Which year has a higher income inequality?

3. Assuming that information and communications technology (ICT) is skill-biased, use the labour demand and supply to illustrate its effect on high-skilled workers and low-skilled workers. Present your answer with appropriate graphs.

4. Give an example of a market that exhibits the winner-takes-all property.

Answer

1. If you work in a chain fast-food shop as a part-time worker, you will probably earn, per hour, the present minimum wage ($32.5 as of August 2015), or a bit more, depending on your experience and labour market conditions at that moment. If you are a swimming coach, you can get 5 or 6 times more.

The wage difference is mainly due to a difference in skill requirements and human capital. Workers at fast-food shops usually perform some relatively simpler tasks with a repetitive nature because of the division of labour. A swimming coach, however, requires knowledge on swimming and effective teaching. He/she needs more skills and human capital investment, hence receiving a higher reward in wages.
2. Using the income shares from Table 3, the cumulative percentages of income distribution in 2006 and 2011 are computed and tabulated below:

<table>
<thead>
<tr>
<th>Decile</th>
<th>Income share (%)</th>
<th>Cumulative income share (%)</th>
<th>Income share (%)</th>
<th>Cumulative income share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>0.8</td>
<td>0.8</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>2nd</td>
<td>2.1</td>
<td>2.9</td>
<td>2.0</td>
<td>2.6</td>
</tr>
<tr>
<td>3rd</td>
<td>3.2</td>
<td>6.1</td>
<td>3.1</td>
<td>5.7</td>
</tr>
<tr>
<td>4th</td>
<td>4.3</td>
<td>10.4</td>
<td>4.3</td>
<td>10.0</td>
</tr>
<tr>
<td>5th</td>
<td>5.6</td>
<td>16.0</td>
<td>5.6</td>
<td>15.6</td>
</tr>
<tr>
<td>6th</td>
<td>7.0</td>
<td>23.0</td>
<td>7.0</td>
<td>22.6</td>
</tr>
<tr>
<td>7th</td>
<td>8.8</td>
<td>31.8</td>
<td>8.9</td>
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</tr>
<tr>
<td>8th</td>
<td>11.3</td>
<td>43.1</td>
<td>11.5</td>
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</tr>
<tr>
<td>9th</td>
<td>15.6</td>
<td>58.7</td>
<td>16.1</td>
<td>59.1</td>
</tr>
<tr>
<td>10th</td>
<td>41.4</td>
<td>100.0</td>
<td>41.0</td>
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</tr>
</tbody>
</table>

Remark: Ratios are computed from Table 3. Numbers do not add exactly to 100 percent after rounding up.
The Lorenz curve in 2011 is further away from the diagonal. Therefore, the income inequality is higher in 2011.
3. If ICT is skill-biased, it is more useful for high-skilled workers, who will raise their productivity as a result. Hence, ICT will trigger a bigger demand for high-skilled and educated workers which will in turn lead to a rise in the inequality in earnings.

Figure A2: The impact of technology on high- and low-skilled workers

Panel (a): Technology substitutes for low-skilled workers
Panels (a) and (b) above show the impact of technology change on low-skilled and high-skilled workers respectively. Better technology is a substitute for low-skilled workers. Hence, there is a decrease in the demand for low-skilled workers in Panel (a). On the other hand, technology creates a bigger demand for high-skilled workers as shown in Panel (b). The demand for low- and high-skilled workers move in opposite directions, generating an income disparity between these two groups.
4. The market of tutorial classes in Hong Kong has the “winner-take-all” property. Thanks to the increasing use of multimedia like video feed and advertising, the market is getting bigger and bigger. The “star tutors” are able to capture a very large share of it while the remaining competitors are left with a significantly smaller one.