
Part

7

**Social
Welfare and
Income Re-
distribution**

Poverty and Inequality

*Annual income twenty pounds, annual expenditure nineteen nineteen six, result happiness.
Annual income twenty pounds, annual expenditure twenty pounds ought and sixpence, result misery.*

Charles Dickens, *David Copperfield*

Measurement of Income ♦ Distribution of Income and Wealth in Australia ♦ Measures of Poverty
♦ Measures of Inequality ♦ Trends in Poverty and Inequality ♦ Causes of Unequal Incomes

Reducing poverty and inequality in society are fundamental functions of government.¹ However, to develop appropriate welfare policies, we need first to establish the meaning, measures and causes of poverty and inequality. Therefore, in this chapter we start by discussing basic income concepts and describing the distribution of income and wealth in Australia. The next two sections discuss measures of poverty and inequality. The last two sections describe trends in poverty and inequality and their causes.

It should be noted that we focus in this chapter on income measures of poverty and inequality. Lack of income is the prime indicator of poverty and inequality of income is a major welfare and policy concern. There is also an extensive literature on both deprivation measures of poverty including poor health and vulnerability (Saunders and Naidoo, 2009) and on poverty as a lack of capabilities and freedoms (Sen, 1997). These issues are fundamentally important. We pick up on some of these related social issues in the following chapters.

Measurement of Income

Income is a common word but a complex concept. Issues include the components of private income, the period over which income is measured, the unit of observation, and the effects of government benefits and taxes.

Economists usually adopt the comprehensive Haig–Simons definition of personal income: this is the value of market goods that an individual could consume in any period without any change in their wealth. However, this definition does not include non-market goods, such as health or leisure, that may also contribute greatly to individual welfare.

The three basic sources of **private income** are labour, capital and gifts (see Box 20.1). The most important components of labour income are wages and salaries, employer supplements (mainly pensions and, to lesser extent, fringe benefits) and income from own business. These

¹ This statement reflects mainstream European and Australian cultures. It appears less supported in some other countries including in the United States.

Box 20.1 Sources of private income

<i>Income from labour</i>	<i>Income from capital</i>
Wages, salaries and cash supplements	Property rents net of costs
Own business enterprises, self-employment, partnerships, etc.	Interest and dividends
Other employment supplements, pension contributions and fringe benefits	Private pensions
The underground (cash) economy	Real capital gains and losses from investments
Household production of services	Imputed rents from physical capital
	<i>Other private income</i>
	Bequests, gifts, alimony, etc.

components usually make up about two-thirds of total income as shown by the national income accounts (ABS, Cat. No. 5206.0). Other labour income (usually unmeasured) includes income from the cash economy and household production of goods.

Income from capital includes some easily measurable elements, such as rental property income, interest income and dividends, and private pensions. Greater measurement difficulties arise with capital gains and imputed rents. Capital gains, whether realised by sale of assets or not, are part of the Haig–Simons definition of income because they contribute to changes in net worth and could be spent on consumption with no decline in net worth. Such gains should be measured in real terms, that is, after allowing for changes in prices. For example, if the value of an individual's assets rises from \$100 000 to \$106 000 and the inflation rate over this period is 4 per cent, the real increase in the value of the assets is \$1923.

$$\$106\,000/1.04 - \$100\,000 = \$1923 \quad (20.1)$$

On the other hand, losses in asset values should be deducted from income. In practice, most estimates of income exclude changes in asset values.

Imputed rent is the market value of services from consumer durables, such as houses, cars, household contents and so on. The imputed rent for housing services is the net rent (gross rent less expenses) that a homeowner would pay for a comparable dwelling unit. These net rents are included in national income statistics. In Australia, total income from dwellings owned by persons, rented and owner-occupied, accounts for about 8 per cent of national income. Half of all households in the lowest income quintile in Australia (mainly elderly households) own their housing outright and obtain significant imputed rent.

Thus, the economist's concept of income extends well beyond the narrow definition of income in the national accounts. However, most estimates of personal income fall well short of the comprehensive Haig–Simons definition. For example, imputed rents, cash payments and gifts are difficult to track and rarely included in estimates of personal income.

Income may be measured over any period. A common period is a year, but this is an artificial convenience. For interpersonal comparisons, there are strong arguments for using lifetime rather than annual income. Incomes often start low, rise, and then decline with age. People may have similar incomes over their lifetimes but very unequal incomes at any point in time. Hence inequality estimates based on annual income are generally higher than those based on lifetime incomes. However, lifetime incomes are difficult to measure. Also, a person with little income at any point in time may need assistance now because he or she cannot borrow against future prospects. For many needs, the relevant period is the short run.

The choice of income unit. This is another important issue. To measure needs, the household unit is generally preferred to the individual because resources are usually shared within households. Individual consumption usually depends more on household income than on

personal income. Suppose that two adults in a household earn \$100 000 and \$30 000 per annum respectively. Individually, one would be well off and the other poor. But a two-adult household with an income of \$130 000 would usually be regarded as well off (see Table 20.1).

To make comparisons of income between households of different size and composition we need to define an equivalised household unit (EHI). In 2009-10, of the then 8.4 million households in Australia, 26 per cent were couples with dependent children, 26 per cent were couples only, 25 per cent were lone persons and 23 per cent were other households. While larger families have greater expenditure needs, economies of scale mean that, as household size increases, the cost of maintaining a given standard of living per person falls. Larger households and households with children need less income per capita to achieve given consumption standards. The aim is therefore to estimate the expenditure that households of different size and composition will need to make to obtain a given level of welfare or its material equivalent (a given set of goods).

To estimate EHI, the Australian Bureau of Statistics (ABS) adopts the OECD scale. This allows 1.0 point for the first adult, 0.5 points for each additional person aged 15 and over, and 0.3 points for each child under 15. EHI is derived by dividing total household income by the sum of the equivalence points allocated to the household members. Thus, EHI is an indicator of capacity to consume, not a measure of actual income.

Including government benefits and taxes. Government benefits and taxes substantially affect the final distribution of income. Household income is reduced by personal income taxes and by indirect taxes that are passed on in higher prices to households. On the other hand, household income is increased by cash benefits such as age pensions and family payments. Some other forms of government expenditure provide an indirect benefit to households, for example expenditure on health and education benefits certain groups of households.

Figure 20.1 shows the main relationships between various measures of income. Gross income is the sum of private income and government cash benefits. Disposable income is gross income less direct tax. Final income includes indirect benefits, for example benefits due to public health expenditures, and excludes indirect tax.

Distribution of Income and Wealth in Australia

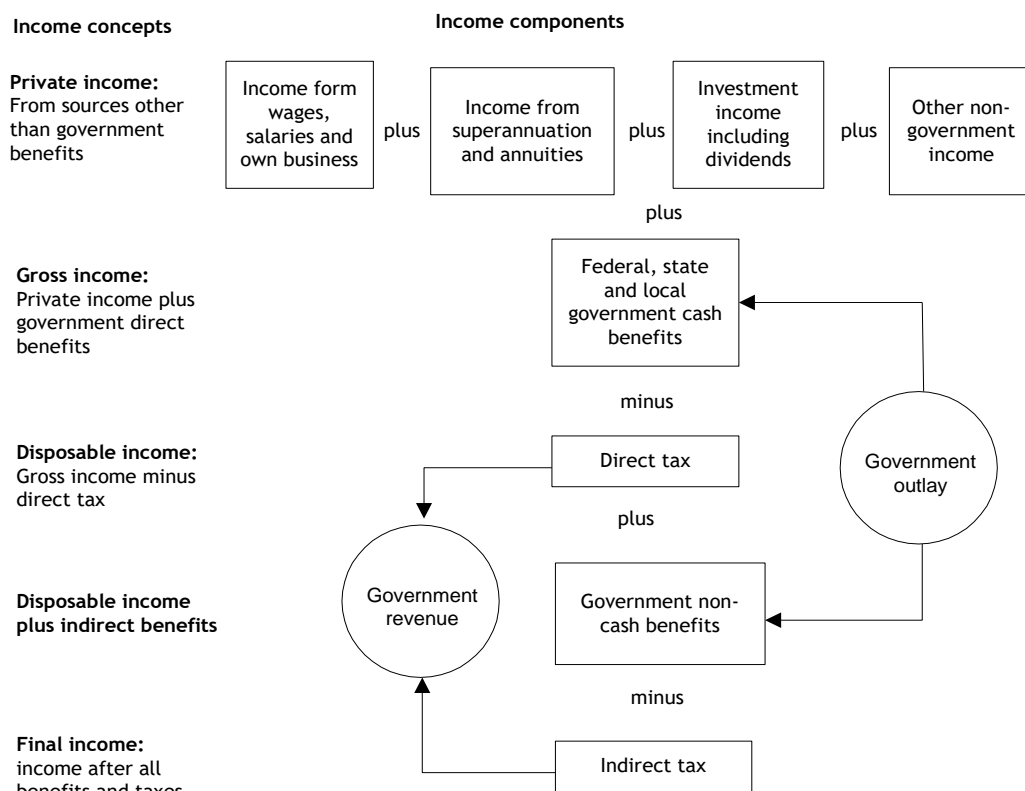
Table 20.1 shows gross household income per week of Australian households in 2015-16 and equivalised disposable household income on a weekly basis in 2013-14 and 2014-15.² Gross income is regular cash receipts before tax. This includes wages and salaries, earnings from own businesses, property income, interest and dividend payments, private pensions and government cash payments (including allowances, benefits and pensions). Thus, gross income is broader than private market income. Disposable income is gross income less income tax and Medicare levy.³

As shown in Table 20.1, in 2015-16, mean gross household income was \$2109 per week. Gross income at the 90-percentile level was 8.8 times income at the 10-percentile level. However, the 90/10 ratio for equivalised disposable household income was 3.9. This reflected the impacts of household size and taxation on household incomes.

We should also note that income here does not include imputed rents. The ABS (2011) estimated that the average value of imputed rents was \$57 per week per household and would add 7 per cent to mean equivalised income. Because many low-income elderly households own their houses, inclusion of imputed rents reduced the 2007-08 P90/P10 equivalised disposable household income ratio from 4.29 to 3.76.

² ABS 6523.0 does not provide a similar quintile breakdown of gross household income.

³ These results are based on samples of around 20,000 households.



Source: ABS (2005), *Household Expenditure Survey, Australia: Summary of Results, 2003-04*, Cat. No. 6530.0

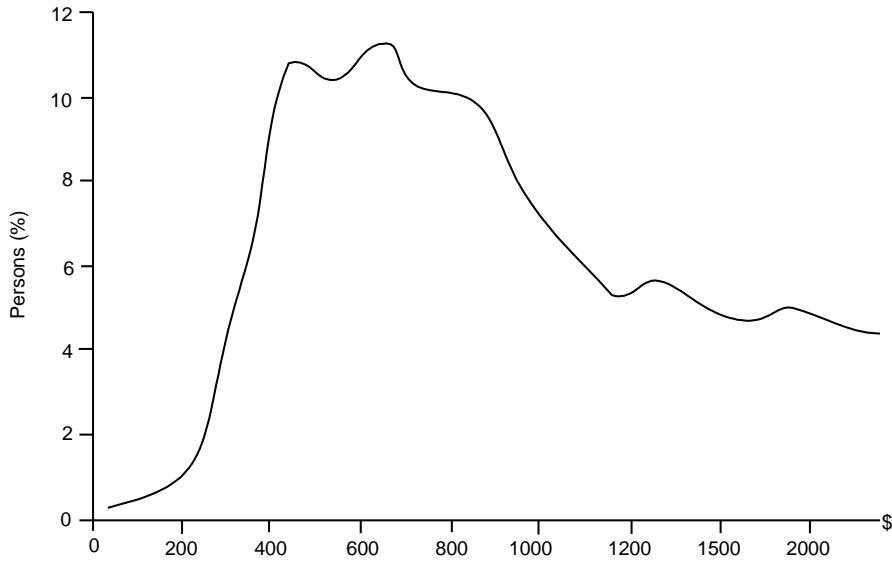
Figure 20.1 Income concepts and components

Table 20.1 Mean household income per week

<i>Percentile boundaries and ratios</i>	<i>Unit</i>	<i>Gross household income 2015-16</i>	<i>Equivalised disposable household income 2013-14</i>	<i>Equivalised disposable household income 2015-16</i>
P10	\$	471	415	436
P20	\$	701	511	523
P50	\$	1,616	844	853
P80	\$	3,097	1,308	1,371
P90	\$	4,171	1,688	1,705
P90/P10	Ratio	8.88	4.07	3.91
P80/P20	Ratio	4.42	2.56	2.62
<i>Means</i>				
All households	\$	2,109	998	1,009
Couple with children	\$	3,083	1,011	1,033
One parent with children	\$	1,427	687	705
Couple only	\$	1,986	1,113	1,097
Lone person under 44 ^a	\$	1,135	1,009	1,107
Lone person 65 and over	\$	661	607	629

Source: ABS (2017) *Household Income and Income Distribution, Australia, 2015-16* Cat. No. 6523.0 and ABS (2015) *ibid.*, 2013-14.

a) Gross household income is under 35, equivalised disposable household income is 25-44



Source: ABS (2009), *Household Income and Income Distribution, Australia, 2007-08*, Cat. No. 6523.0.

Figure 20.2 Distribution of equivalised disposable household incomes per week in Australia in 2007-08

Figure 20.2 shows an estimated full distribution of equivalised disposable household incomes per week in 2007–08. This illustrates the distribution of resources available to households after allowing for differences in household composition.

Wealth is distributed more unequally than income. ABS (2017) estimated that, in 2015-16, the wealthiest 20 per cent of households in Australia held 62 per cent of total household net wealth, with an average net worth of \$2.9 million. On the other hand, the 20 per cent of households with least wealth held only 0.8 per cent of total household net wealth, with an average net worth of \$39 000.

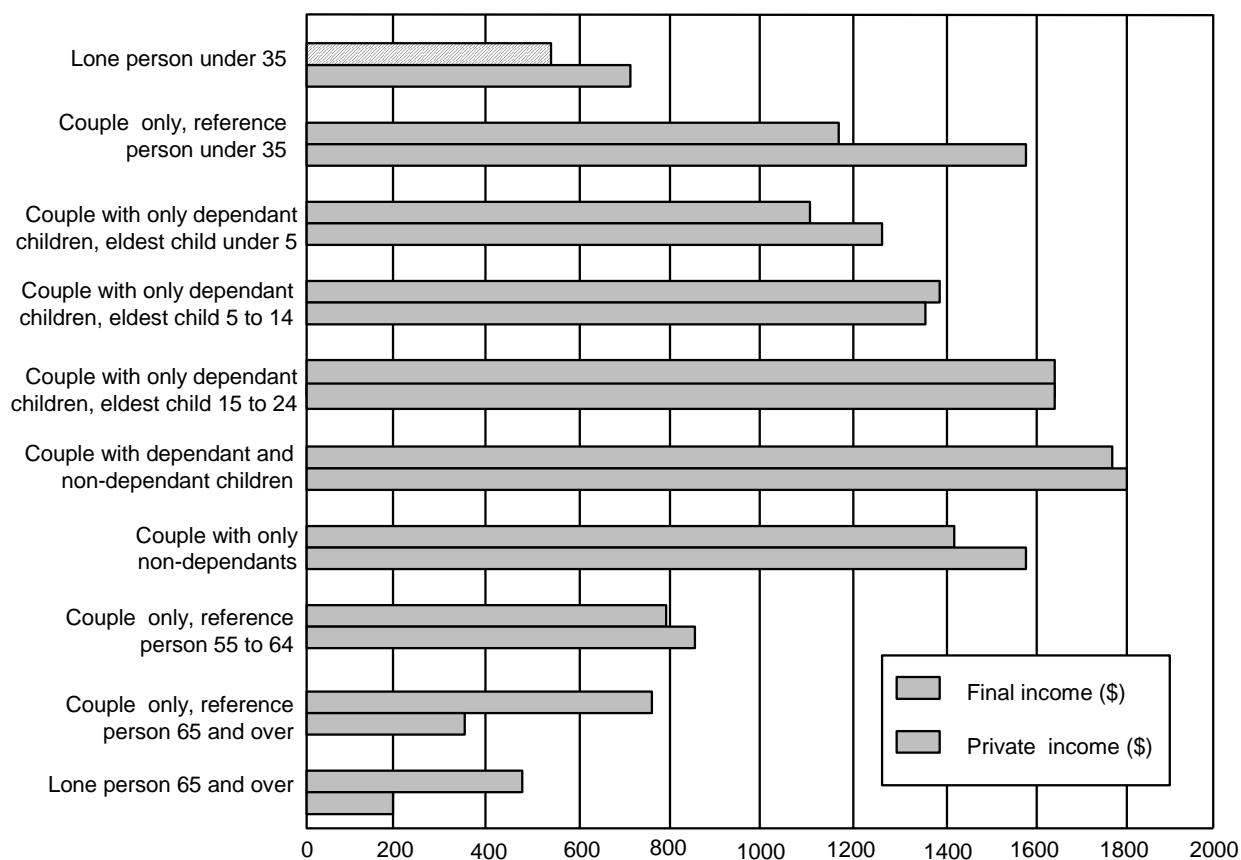
However, wealth is correlated with age as much as income. Because about half of all wealth is held in housing and another quarter in pension funds, many low-income households have significant wealth. Table 20.2 shows mean household net worth in relation to equivalised household disposable income. Households in the lowest EHI quintile held 75% of the average EHI net wealth. On the other hand, households in the highest EHI quintile held 43% more household wealth than the average EHI household.

The ABS (2007) has also estimated how government benefits and taxes affected the distribution of income in 2003-04. In this study, the ABS allocated 60 per cent of taxes on production and slightly more than 60 per cent of expenditure to households.

Table 20.2 The distribution of household income and wealth in 2015-16 (\$)

	<i>Equivalised disposable household income</i>					<i>All</i>
	<i>Lowest</i>	<i>Second</i>	<i>Third</i>	<i>Fourth</i>	<i>Highest</i>	
Mean disposable equivalised household income	694	898	909	1,018	1,446	1,009
Median disposable equivalised household income	601	803	808	930	1,223	853
Mean household wealth	601,000	803,000	808,000	930,000	1,223,000	853,000

Source: ABS (2017) *Household Income and Income Distribution, Australia, 2015-16* Cat. No. 6523.0



Source: ABS (2005), *Household Expenditure Survey, Australia: Summary of Results, 2003-04*, Cat. No. 6530.0

Figure 20.3 Life cycle groups: average weekly private and fixed income 2003-04

Table 26.3 (page 467) shows the effects by income quintiles for equivalised households. Government interventions greatly increased the shares of the three lowest quintiles and reduced the shares of the top two quintiles.⁴

ABS (2007) also showed the impacts of government benefits and taxes on the incomes of 10 household units in 2003–04. The mean results are shown in Figure 20.3. The largest recipients were singles and couples over 65. The major net taxpayers were singles and couples under 35 with no children.

Measures of Poverty

Poverty may be defined in absolute or relative terms. An **absolute definition of poverty** implies a fixed standard that does not change over time, which is independent of the general standard of living of the community. Such a definition of poverty typically focuses on the basic necessities for life and health. Rowntree's (1901) pioneering study of poverty in the UK based the poverty line (the income below which people were in poverty) on basic allowances for food, clothing, housing and heating. To make international comparisons, the World Bank

Absolute poverty standard
A fixed and unchanging level of poverty

⁴ The ABS estimates, like most such studies, take observed initial market incomes as given. However, fiscal arrangements affect behaviour and factor incomes and so influence initial market incomes. Some general equilibrium models allow for this (Cordes and Watson, 1998).

Relative poverty

Poverty is defined relative to the standard of the relevant society

has adopted an international poverty line of US\$1 a day per person in 1985 prices. According to this measure, in 2000, 49 per cent of people in sub-Saharan Africa, 32 per cent in South Asia and 15 per cent in East Asia and the Pacific were poor (World Bank, 2006). However, this is a measure of extreme poverty and higher dollar values are sometimes adopted.

A **relative definition of poverty** is based on the prevailing standards of society. As Adam Smith remarked, by the necessities of life ‘I understand not only the commodities which are indispensably necessary for the support of life but whatever the custom of the country renders is indecent for creditable people, even of the lowest order, to be without’.⁵ James Wolfensohn, a recent head of the World Bank, reportedly remarked that ‘anyone in the world who lacks access to the Internet is poor’. A relative measure of poverty is reasonable in that, as a community’s income rises, its capacity to raise the income of the poor increases. On the other hand, a relative definition of poverty presents a moving target. Some people who were rich yesterday are poor today.

The related concepts of needs and poverty have been defined and estimated in various ways (Piachaud, 1993). A common method is the budget standards (basket expenditure) method. Under this method, the analyst estimates the income required to purchase a basket of goods deemed necessary for a minimally adequate standard of living for households of different sizes. If the poverty line is regarded as an absolute standard, the poverty line should rise with a price index for goods purchased by very low-income households. More often it is viewed as a relative standard and rises with increases in the local standard of living.

To get round the the difficulty of establishing such baskets of goods, poverty is often defined simply in terms of relative income. OECD studies of poverty, such as OECD (2008), typically deem as poor anyone in an equivalised household with a disposable income of less than half of the median equivalised household disposable income (EHDI). In this case the poverty line simply moves over time with median EHDI. This means that if the distribution of income does not change, the proportion of persons in the population who are deemed to be poor does not change. *With a relative standard, poverty reduction can occur only with a more even distribution of income.*

There are two main societal measures of poverty. One is the headcount ratio. This is simply the proportion of the population below the designated poverty line. The second is the size of the poverty gap—the amount by which low incomes fall below the poverty line. One measure of the poverty gap is the sum of all individual poverty gaps as a proportion of total income. This indicates the amount of redistribution necessary to eliminate extreme poverty.

Household poverty lines in Australia

In his often-cited Harvester wage judgement (1907), Justice Higgins drew on a small sample of household budgets to determine that an amount of seven shillings per day was ‘appropriate to the normal needs of the average employee regarded as a human being living in a civilised society’. Likewise, the Royal Commission on the Basic Wage chaired by Justice Piddington (1920) tied the wage to ‘the cost of living according to reasonable standards of comfort for the typical family’.

In more recent times the main measure of poverty in Australia has been the Henderson Poverty Line (HPL) based on the Henderson Commission of Inquiry into Poverty (1975). The inquiry set the poverty line for a reference two-adult two-child household (with rental housing) at an after-tax income equal to the value of the basic wage plus child endowment (as it was then). This was equal to 56.5 per cent of seasonally adjusted average weekly earnings. Henderson observed that, as a proportion of average earnings, the HPL was similar to the poverty lines used in several other countries. Henderson described this poverty line as ‘an

⁵ Smith, A., 1776, p. 691.

austere low level' and considered that anyone below it would be 'very poor'. Those with an income less than 20 per cent above it would be 'rather poor'.

The Henderson Inquiry also applied equivalence factors to nine other household units to allow for variations in needs. To develop household equivalence scales, Henderson drew on a 1954 survey of household budgets in New York. Extra costs were allowed for households where the head was working to reflect commuting costs and loss of household output. Henderson also estimated lower poverty lines for home owners who do not pay housing rents. The Institute of Applied Economic and Social Research (Melbourne University) updates the poverty lines in line with movements in seasonally adjusted household disposable income per capita. Table 28.3 shows the poverty lines in the March quarter 2011.

The Henderson poverty lines have drawn criticism. This is inevitable in that they are based on value judgements. One criticism is the false appearance of precision. A few dollars above or below the HPL does not represent a real difference between poverty and non-poverty (as Henderson well knew). A more cogent criticism is the reliance on expenditure patterns in New York in 1954 to indicate equivalent family units in Australia many years later.

Partly in response to concern about the stringent nature of the HPL, the Social Policy Research Centre (University of New South Wales) estimated low-cost budget standards for a range of Australian households, with a low-cost budget standard defined as 'one designed to meet basic needs at a frugal level while still allowing social and economic participation consistent with community expectations'. The study found that most low-income households require an income that is 10 to 20 per cent higher than the equivalent HPL budget. This reflected the budget standards adopted by the study which related, as the authors recognised, to 'low-income' households rather than to a poverty standard (Saunders, 1999).

As a practical matter, the most common benchmark of poverty in Australia and elsewhere today is EDHI of less than half the median EHDI. This is a crude measure in that it generally does not account for home ownership or journey to work expenses.

Table 20.3 Henderson poverty lines in September quarter 2017 (\$ per week)^{a, b}

<i>Income unit type</i>	<i>Including housing costs</i>		<i>Excluding housing costs</i>	
	<i>Head in workforce</i>	<i>Not in workforce</i>	<i>Head in workforce</i>	<i>Not in workforce</i>
Couple	684.57	587.78	500.69	403.8
Couple, 1 child	822.89	726.1	622.38	525.59
Couple, 2 children	961.21	864.42	744.07	647.28
Couple, 3 children	1099.53	1002.73	865.76	768.97
Couple, 4 children	1237.85	1141.05	986.11	889.31
Single person	511.75	414.05	344.4	247.61
Single parent, 1 child	656.99	560.1	473.01	376.22
Single parent, 2 children	795.21	698.42	594.7	497.91
Single parent, 3 children	933.53	836.73	716.39	619.6
Single parent, 4 children	1071.85	975.05	838.08	741.29

(a) Based on seasonally adjusted household disposable income per head per week for the September quarter 2017 of \$819.09.

(b) All figures refer to income after tax.

Source: Melbourne Institute of Applied Economic and Social Research, *Poverty Lines: Australia, 2017*.

Measures of Inequality

Equality, like welfare, has many dimensions such as health and environmental goods as well as income. However, for most practical purposes, estimates of inequality are based on measures of the dispersion of incomes. These may be based on individual, household or equivalised household income and may be gross or disposable income.

Pictures of frequency distributions, like Figure 20.2, illustrate the dispersion but do not measure it. Here we discuss some descriptive measures of inequality.

As we have observed, a common practice is to divide the population into percentile groups, such as quintiles or deciles, and to show the proportion of income accruing to each group. But this does not provide an overall measure of income variance or inequality.

The variance (V) of a distribution provides a simple summary measure of dispersion:

$$V = \frac{1}{n} \sum_{i=1}^n (y_i - \bar{y})^2 \quad (20.3)$$

where y_i is the income of the i^{th} individual (or household), \bar{y} is average income and there are $i = 1 \dots n$ individuals. The variance takes into account the whole distribution. Any redistribution that brings an individual's income closer to the mean reduces V . However, the variance does not satisfy the principle of independence of scale. The level of inequality, as measured by the variance, changes when the scale in which income is measured changes. If everyone's income doubles, there is no change in inequality but V quadruples.⁶

The coefficient of variation (C) avoids this problem because it normalises the square root of variance on average income.

$$C = \frac{V^{0.5}}{\bar{y}} \quad (20.4)$$

Thus, C is independent of the level of income. However, this measure has the disadvantage that any transfer from a higher to a lower income individual has the same effect on C regardless of the income level of a recipient. Box 20.2 discusses inequality measures and two principles of transfer.

The variance of the logarithm of income (VL) avoids this issue because it gives greater weight to transfers to lower incomes.

$$VL = \frac{1}{n} \sum_{i=1}^n (\log y_i - \log \bar{y})^2 = \frac{1}{n} \sum_{i=1}^n \left[\log \left(\frac{y_i}{\bar{y}} \right) \right]^2 \quad (20.5)$$

VL also has the advantage that it is invariant to the absolute level of income (unlike V). However, like V and C , VL considers only differences in incomes from the mean and it squares those differences. Such procedures are arbitrary.

Much the most commonly cited measure of inequality is the Gini coefficient (GC). This is illustrated in Figure 20.4 on page 352. The Lorenz curve shown in the Figure shows the cumulative proportion of total income received against the cumulative proportion of the income recipients (individuals or households) from the poorest to the richest. In Figure 20.4 the dotted lines show that 40 per cent of the poorest in the society received 20 per cent of the total income. If incomes were completely equal, the Lorenz curve would follow the 45° line. If one person earned all income, the curve would follow the horizontal axis and then the vertical axis. The GC is defined as:

$$GC = \frac{\text{the area between the Lorenz curve and the diagonal}}{\text{the total area under the diagonal}} = \frac{A}{(A+B)} \quad (20.6)$$

⁶ These and following comments on measures of inequality draw on Barr (2004, Chapter 6).

Box 20.2 Inequality measures and two principles of transfer

A critical feature of an inequality measure is that its value should fall when income is transferred from a rich person to a poor person, without an interchange of their initial position on the income ladder. This is called the Pigou-Dalton condition of rank preserving transfer.

If $I(y)$ is an inequality measure and there is a small transfer of money from i (a rich person) to j (a poor one) then

$$\begin{aligned} dI(y) &= \frac{\partial I(y)}{\partial y_i} dy_i + \frac{\partial I(y)}{\partial y_j} dy_j \\ &= dy \left[\frac{\partial I(y)}{\partial y_i} - \frac{\partial I(y)}{\partial y_j} \right] < 0 \end{aligned}$$

where $dy = dy_i = dy_j$ (by construction).

This condition can be tested by differentiating the first four inequality measures (V , C , VL and GC) discussed in the text.

$$\frac{dV}{dy} = \frac{2}{n} [y_j - y_i]$$

$$\frac{dC}{dy} = \frac{y_j - y_i}{n\bar{y}\sqrt{V}}$$

$$\frac{dVL}{dy} = \frac{2}{n} \left[\frac{1}{y_j} \log\left(\frac{y_j}{\bar{y}}\right) - \frac{1}{y_i} \log\left(\frac{y_i}{\bar{y}}\right) \right]$$

$$\frac{dGC}{dy} = \frac{j-i}{n^2\bar{y}}$$

These equations show that all these inequality measures satisfy the Pigou-Dalton transfer principle. Because $y_i > y_j$, V , C and VL satisfy this condition.

Another commonly supported transfer principle is that the measure should be sensitive to the kind of transfer. Specifically a transfer from a richer to a poorer person deserves more weight at the lower end of the income scale than at the higher end. Although both gainers are poorer than

the losers, the gainer at the lower end is poorer than the gainer at the upper end.

Neither V nor C satisfies this principle: a transfer of a given amount of money from a high-income individual to a medium-income individual has the same effect as a transfer from a medium-income to low-income individual. Thus V and C are described as weakly sensitive to transfer.

On the other hand, VL can be strongly sensitive to transfer. That means a \$1 transfer from an individual with \$10 000 to someone with \$9900 would reduce VL by less than would a \$1 transfer amount from an individual with \$600 to someone with \$500. However, the sign of $\frac{dVL}{dy}$

function $\frac{1}{x} \log x$. The first differentiation of this function is

$(1 - \log x) / x^2$. This is positive if $x > e$ (i.e., 2.718)

and negative if $x < e$. If $\frac{y_j}{\bar{y}} \leq e$, a transfer from i to j will

decrease inequality. But if $\frac{y_i}{\bar{y}} > e$, the same transfer will

increase inequality. This means that, if the poorer of the two individuals has an income at least 2.718 times the mean income, VL will not satisfy the condition of transfer.

GC is calculated by arranging people in ascending order of income. A poorer person's rank is lower than the richer. Therefore, $j < i$. This implies that GC also satisfies the Pigou-Dalton transfer principle. However, the sensitivity depends on the relative ranking of the persons concerned. It does not depend on the income difference of the people who are affected by the transfer or on their position in the income ladder. Thus, for a given amount of money transfer, the Gini coefficient is most sensitive in the modal region.

where A is the area between the 45° degree line and the Lorenz curve and B is the area between the Lorenz curve and the x-axis. GC has two limiting values. If incomes are perfectly equal, A is zero and GC equals 0. If one person has all the income, B is zero and GC equals 1.0. Mathematically GC equals half of the arithmetic average of the absolute differences between all pairs of incomes, with the total normalised on mean income:

$$GC = \frac{1}{2n^2\bar{y}} \sum_{i=1}^n \sum_{j=1}^n |y_i - y_j| \quad (20.7)$$

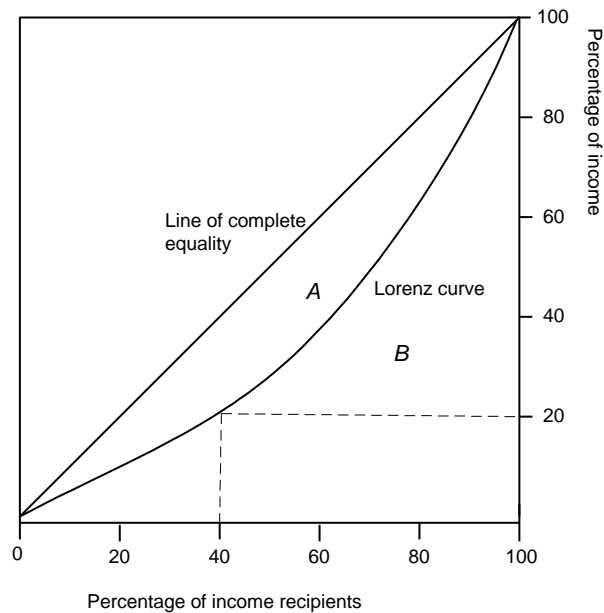


Figure 20.4 The Lorenz curve and the Gini coefficient

Sen (1997) provides an interpretation of the Gini formula as follows:

in a pair-wise comparison the man with the lower income can be thought to be suffering from some depression on finding his income to be lower. Let this depression be proportional to the difference in income. The sum total of all such depressions in all possible pair-wise comparisons takes us to the Gini coefficient.

The Gini coefficient has several advantages. It is independent of the absolute level of income (as are C and VL). It avoids arbitrary squaring procedures. Also, it compares each person's income with the income of each other person rather than with mean income. Thus, it is an indicator of aggregate relative deprivation.

On the other hand, the GC has the disadvantage that, when a transfer of income is made from a rich to a poor person, the change in GC depends upon the relative rank of the persons concerned (i.e. the number of people between them). Thus, a transfer of income from a person with \$80 000 to someone with \$50 000 may have the same effect on the GC as a transfer of income from a person with \$70 000 to someone with \$60 000.

Like other measures of inequality, there are implicit value judgements. This can be understood by considering what occurs when Lorenz curves cross. The GC may be the same for both distributions, but one distribution may be preferred to the other. The preferred distribution depends on a value judgement as to whether inequality at the bottom or top end of the income scale matters more. The GC can be shown to be a weighted sum of individuals' incomes with the weights determined by the rank order position of the person by income level (Sen, 1997, p. 32). These weights are arbitrary and not necessarily consistent with any preferred social welfare function.

Actually, most descriptive measures of inequality incorporate mathematical functions, such as means, squares or weights, which may not reflect social values. Ideally these functions would reflect normative values, such that a reduction in an inequality measure could always be interpreted as an increase in social welfare. To interpret inequality measures in terms of

social welfare, it is necessary to integrate the measure of inequality with value judgements. The Atkinson index of inequality (Atkinson, 1970) exemplifies this approach. It is an attempt to estimate the welfare loss associated with departures from equal incomes. Formally the Atkinson Index (AI) is presented in Equation 20.8.

$$AI = 1 - \left[\frac{1}{n} \sum_{i=1}^n \left(\frac{y_i}{\bar{y}} \right)^{1-\varepsilon} \right]^{\frac{1}{1-\varepsilon}}, \quad \varepsilon \neq 1 \quad (20.8)$$

$$AI = 1 - \exp\left(\frac{\sum_{i=1}^n \log_e \left(\frac{y_i}{\bar{y}} \right)}{n} \right), \quad \varepsilon = 1$$

In this formulation, ε may be taken as a measure of the concavity of the utility function (the diminishing marginal utility of income) or as an explicit measure of relative inequality aversion as in Chapter 7 (Equation 7.6).⁷ The other variables are as before. $AI = 0$ if incomes are equally distributed. The value of AI rises to 1 as individual incomes diverge from the mean or as ε increases. Given that the value of ε must be chosen, AI is a normative measure of loss of welfare due to poor distribution rather than a purely descriptive measure of inequality.

In summary, all the above inequality measures, including simple descriptive deciles or quintiles, have been used to show or measure inequality. For example, in the OECD (2008, 2009) studies of income distribution in 13 countries cited below the authors used the GC along with minor variations of V and VL to estimate income inequality. As can be seen, the choice of measure can affect the inequality ranking. The GC is the most commonly used measure of inequality. The Atkinson index has also been used, though in this case the analyst must determine the equity parameter (ε).

Trends in Poverty and Inequality

Using as a criterion of poverty an EDHI of less than half the *mean*, Table 20.1 shows that around one in five Australian households were living in poverty in 2013-14 and 2015-16. Typically, government pensions and allowances constitute 90 per cent or more of gross household income for some 15 per cent of households and are the main source of gross household income for about 25 per cent of all households (ABS, 2011).

Saunders and Bradbury (2006) provide a more comprehensive analysis of trends in poverty. They estimated that, in 1998-99, 8.4 per cent of Australian households experienced severe hardship and 12.2 per cent experienced some hardship. Using a poverty line of one-half of the *median* equivalised gross household income, they calculated that the proportion of individuals in poverty rose slightly in the second half of the 1990s to reach about 13 per cent in the early 2000s. Note that median income is less than the mean which reduces the percentage said to be in poverty.

Adopting a similar poverty line, Rodgers *et al.* (2009) estimated that the poverty rate rose from 10.3 per cent in 1995-96 to 13.3 per cent in 2004-05. Reflecting rising living standards, they also noted that, judged against the 1995-96 poverty line, there were only 7.4 per cent below the poverty line in 2004-05. The percentages of poor people are also very sensitive to the choice of poverty line at 40, 50 or 60 per cent of median income.

⁷ ε is the relative sensitivity to income transfers at different income levels. As ε rises, more weight is attached to transfers at the lower level of distribution and less weight to transfers at the top. This can be seen from

$$\frac{dAI}{dy} = \frac{y_i^{-\varepsilon} - y_j^{-\varepsilon}}{n\bar{y}^{1-\varepsilon} [1 - AI]^{-\varepsilon}}$$

The international picture on poverty trends in developed countries is not very clear (see Barr, 2004). Increases in wage dispersion and the rise in the retired elderly in the population in recent years have increased the proportion of people with relatively low gross incomes in many countries. However, to some extent, in the UK for example, this trend has been offset by increased government cash benefits.

Inequality

Findings on inequality are sensitive to the measure of income and the income unit, the period over which changes are estimated and the measure of inequality. Notwithstanding these issues, most studies of trends in inequality in Australia and elsewhere find that the dispersion of private earnings within countries has increased significantly over the last 30 to 40 years. However, the increased dispersion of private income has to some extent been offset by government taxes and grants as well as by social expenditures.

Many studies have confirmed the rise in market inequalities in Australia. Borland (1999) estimated that between 1975 and 1997 real weekly earnings of a male employee at the 25th percentile (ranked from the bottom) increased by 1.3 per cent, whereas earnings of an employee at the 75th per centile rose by 15.8 per cent. For female employees, the comparable figures were rises of 15.8 per cent and 31.2 per cent, respectively. Atkinson and Leigh (2007) found that the income share of the top 1 per cent and top 10 per cent of income earners was higher at the start of the 21st century than at any time over the past 50 years. The OECD (2011) reported that in 2008 the average income of the top 10 per cent of working-age Australians was 10 times higher than that of the bottom 10 per cent. This was up from a ratio of 8 to 1 in the mid-1990s.

Turning to disposable household income after transfers, the ABS (2011) reported that the P90/P10 and P80/P20 ratios for EDHI inclusive of government transfers rose significantly between 1994–95 and 2009–10. Over the same period, the estimated Gini Coefficient for EDHI income rose from 0.302 to 0.328. At 2016–16, the estimated GC was 0.323. This indicates that government taxes and transfer did not fully offset the increases in private income inequality that occurred. However, this does not take account of the distributional effects of government expenditures on goods and services.

Table 20.4 shows the share of disposable market income in 10 countries in 2000 and the changes between 2000 and 2014. In Australia in 2014, the top 20 per cent of individuals received just over 40 per cent of disposable market income whereas the poorest 20 per cent received only 7.5 per cent. These shares were broadly similar to those in the European countries (Germany, France, UK and Italy). In North America (the US, Canada and Mexico) inequalities were much larger. In the US, the top quintile obtained 50% of disposable market income and the lowest quintile a miserable 3.3%. In the Scandinavian countries (Norway and Finland) shares were a little less uneven. Table 20.4 also indicates that between 2000 and 2014, disposable market incomes became more unequal in Australia. They also became markedly more unequal in the US and Canada. In Italy, Norway and the UK, the incomes became less unequal.

Table 20.5 provides measures of inequality and poverty based on EHCI in 13 OECD countries between the mid-1990s and mid-2000s. The measures of inequality are the Gini coefficient (shown as 0 to 100), the squared coefficient of variation and the mean log variation (see notes to the table). Judged by the Gini coefficient, EDHI inequality rose in eight countries and fell in only five countries. Judged by the other two measures of inequality, inequality fell in only three and four of the 12 countries respectively (with no corresponding data available for the Netherlands).

The poverty level here is based on EDHI of less than 50 per cent of the mean. Using this measure, Australia has the third highest poverty rate after the United States and Japan. Of course, this poverty measure is in large part a reflection of inequality.

Table 20.4 Share of disposable income going to individuals by population quintiles

	Share of income by quintile, 2014					Change in share of income by quintile, 2000 to 2014				
	1st	2 nd	3rd	4th	5th	1st	2 nd	3rd	4th	5th
Australia	7.5	12.3	16.9	22.4	40.8	-0.2	-0.3	-0.7	-1.6	2.4
Canada ^a	4.1	9.6	15.3	23.8	47.2	-3.2	-3.1	-1.8	0.8	7.3
Finland	9.8	14.2	18.1	22.6	35.3	-0.2	0.1	0.5	0.6	-1.3
France	9.0	13.6	17.2	21.7	38.5	0.0	0.6	0.2	-1.3	1.5
Germany	7.5	13.5	17.6	23.0	38.3	-0.5	0.5	0.4	0.0	-0.5
Italy	6.8	13.0	17.6	23.2	39.3	0.5	1.2	0.8	0.2	-2.7
Mexico	4.5	8.7	12.8	19.3	54.8	1.1	1.5	1.0	0.3	-3.5
Norway	9.9	15.4	18.7	22.5	33.6	3.8	4.1	2.1	-1.5	-8.6
UK	7.8	12.8	17.1	23.0	39.3	0.4	0.7	0.8	1.0	-2.7
USA	3.3	9.0	14.8	22.9	50.0	-2.0	-1.8	-1.2	-0.1	4.9

Source: Aristei *et al.* (2009) and WIID (2016).

a) Canada is for 2011.

Table 20.5 Income inequality and poverty, mid-1990s to mid-2000s: equivalised household disposable income

Country/period	Income inequality				Poverty			
	Gini coefficient		SCV ^a		MLD ^b		Poverty rate	
	Final level	Change %	Final level	Change %	Final Level	Change %	Final level	Change %
Australia, 1993/94-2003/04	30	-2.0	39	4.0	17	-4.5	12.4	30.5
Belgium, 1995-2004	27	-9.7	30	-36.4	13	-51.7	8.8	-18.5
Canada, 1994-2005	32	12.7	59	90.9	18	25.9	12.0	34.8
Denmark, 1994-2005	23	6.0	60	162.0	10	13.6	5.3	6.0
Finland, 1995-2004	27	-10.3	81	233.3	13	44.4	7.3	49.0
France, 1990-2004	28	-3.8	37	-43.2	14	-52.5	7.1	4.4
Germany, 1994-2004	30	6.4	45	38.9	16	18.5	11.0	20.9
Italy, 1993-2004	35	1.4	110	88.4	24	0.0	11.4	-19.7
Japan, 1994-2004	32	20.8	41	38.5	20	58.7	14.9	84.0
Netherlands, 1994-2005	27	6.7	na	na	Na	na	7.7	-13.5
Norway, 1995-2004	28	9.4	46	50.8	16	22.1	6.8	-15.0
Sweden, 1995-2004	23	-23.3	65	199.5	10	-9.1	5.3	-17.2
United States, 1995-2005	38	10.5	81	83.7	29	32.4	17.1	0.0

(a) The SCV (squared coefficient of variation) index is the sum of the squared deviations of the income of each household from that of the population mean, divided by the square of mean income.

(b) The MLD (mean log deviation) index is the average of the log ratios of the income of each household to the mean income.

Sources: OECD, (2008, 2009).

Causes of Unequal Incomes

It is important to understand the causes of poverty and inequality as a basis for developing policies. Prevention of unequal incomes may well be regarded as preferable to the cure of income redistribution. Indeed, Australian governments have often intervened in factor markets with the aim of preventing or at least mitigating poverty and inequality. Accordingly, this chapter concludes with a brief review of the main causes of poverty and inequality.

Extreme poverty (lack of income) is explained principally by lack of earnings.⁸ This in turn nearly always arises from unemployment, limited part-time employment or non-participation in the labour force. Non-participation is recorded formally as the proportion of people of working age (defined as 16 to 65 years of age) who are not working. But, in practice, of course it includes all those outside this age bracket who are not working, and notably the numbers of aged people with low savings.

The causes of income differentials are also a function of labour earnings but more complex as they also depend to some extent on life cycle effects and wealth.⁹ Neville (1995) estimated that income changes over individual life cycles (from low to medium or high income and down again) account for a third of the inequality in disposable incomes and for a greater proportion of inequality in gross incomes.

Overall about two-thirds of private income derives from labour with the balance coming from capital including home ownership. Differences in income from capital may significantly exacerbate differences in earnings. However, as we have seen, in Australia the distribution of wealth is only weakly correlated with income at any point in time because wealth is correlated with age while earnings fall with age after a certain point. Therefore, we focus here on differences in earnings, which are in turn a major cause of differences in wealth.

Human capital and other individual factors. Individual earnings are a function of several interacting variables, notably ability (intelligence, health, strength and dexterity, and motivation), family background, education and training, and chance. Market structures and discrimination may also be important factors. Sorting out the impacts of these variables on earnings is complicated by the interactions between them.

As we saw in Chapter 12, human capital acquired by education, training and experience is a significant driver of earnings. Mincer (1974) estimated that educational capital accounts for between one-half and two-thirds of the variations in personal earnings. Much more recent studies, including those cited in Chapter 12, show that investment in a year of education at almost any level from Year 10 schooling to university graduation typically increases annual earnings by 7 to 12 per cent. Thus, three extra years of education increases earnings on average by between 25 and 30 per cent. Importantly, most recent studies (for example Card, 1999; Miller *et al.*, 2006; Leigh and Ryan, 2008a; Barrett, 2012) take considerable care to sort out the different effects of education, ability and family background, to estimate the impacts of additional education.

Other important determinants of earnings are effort and the disutility of work for which compensation is required. To some extent, earnings differentials reflect hours worked. Also, workers are compensated for dangerous, or less pleasant, occupations. Conversely, workers who choose attractive occupations (for instance, in the leisure industry) usually accept lower earnings than they could earn elsewhere. In so far as earnings differentials reflect compensation for work effort and disutility, the differentials may be regarded as justified.

Markets and earnings. Market earnings are also affected by the nature of markets. Industrial concentration, market power, firm size and unionisation can have important effects on industry wage differentials. Managers and other workers in protected or monopolistic occupations with restricted entry can gain economic rents. Several studies have shown that labour unions play an important role in wage determination. Freeman (1991) reported that

⁸ Addictive, excessive or indiscreet consumption may also cause poverty.

⁹ In the history of economic thought there are two approaches to explaining income distribution. One approach, originating with Ricardo and called the functional distribution of income, seeks to explain the income share of the major factors of production. The other approach, stemming from Pareto and called personal income distribution, deals with the distribution of income among a set of economic units (individuals or households).

less unionised countries had higher wage inequality in the 1980s. Glittleman and Wolff (1993) found that industrial wage inequalities increased most with a low level of unionisation. In Australia, Borland (1999) found that income dispersion was lower among union workers than among non-union workers.

Some commentators (such as Goos and Manning, 2007; Goos *et al.*, 2011) argue that labour markets are segmented into primary markets where skilled persons work and secondary markets where unskilled workers work. Workers in the primary market are said to enjoy high wages and fringe benefits, stability in employment, promotion possibilities and favourable (often regulated and protected) working conditions. By contrast, the less regulated secondary labour market offers low wages, few fringe benefits, little job security and little opportunity for promotion. Although some workers in the secondary market, such as students and mothers of young children, may eventually enter the primary labour force, other workers in this sector with little education, poor work history or a minority racial position may find exit is difficult. Minimum wage and other labour legislation may provide some base support in this sector.

Gender inequality is another important dimension of earning differences. Women working full time earned on average only 85 per cent of incomes of male workers in 2004 (National Institute of Labour Studies, 2006). Women were under-represented in full-time employment and over-represented in part-time employment, where they accounted for 38 per cent and 67 per cent, respectively, of the workforce. Explanations include lower educational attainment and work experience of women, partly due to interrupted career paths. Also, women may receive less on-the-job training than men because employers have less incentive to invest in female workers. In some markets, wage discrimination may be a significant factor.

Increasingly the openness of an economy's markets determines incomes. The **factor price equalisation theorem** (Samuelson, 1948) shows that, given unrestricted free trade, identical technology and no transport costs between countries, prices of factors of production will be equalised between trading partners.¹⁰ Countries export goods that make intensive use of their abundant factor(s) and import goods that are intensive in the use of their scarce factor. In the absence of transport costs, the trade in goods and services results in equal wages for equivalent labour even if factors of production cannot move between countries. Reduced commodity protection lowers the price of factors of production used intensively in production of that commodity. Therefore, wages in developed economies are influenced by the wages in the less developed countries with which they trade. This is mitigated when countries produce untraded goods, production technology differs between countries, and there are significant transport costs between markets. However, these constraints have been worn away by recent technical changes and the factor price equalisation theorem is a major explainer of recent changes in income distribution across and within countries.

In summary. Poverty is due primarily to non-participation in the workforce or to unemployment. Unequal earnings reflect many factors, including life-cycle position, ability, family background, investment in education, compensation for effort and the disutility of work, the nature of markets, and sometimes racial and gender discrimination. Unequal income from capital also contributes to income inequality.

Causes of changes in income differentials

Changes in income differentials *within countries* can be explained partly by an increased share of capital and a lower share of labour in the overall division of national income.¹¹ Atkinson (1997) showed that increases in real interest rates, dividends and share prices contributed significantly to increased inequality in the UK in the 1980s and 1990s. In

Factor price equalisation theorem

Given free trade and other conditions, prices of factors of production will be equalised between trading partners

¹⁰ This is also known as the Heckscher–Ohlin model of international trade.

¹¹ The global distribution of incomes is discussed in Chapter 34.

Australia, the share of gross operating profits (before tax) rose from 23 per cent of total factor income in 1997 to 28 per cent in 2010. Over the same period, the share of wages and salaries fell from 57 per cent of total factor income to 53 per cent (ABS, Cat. No. 5206.0).¹² In Australia, over the long run share market prices have tended to rise by more than labour incomes as profits increased faster than wages, but this depends partly on the period chosen for analysis. The significant rise in real residential property prices over the last 20 years has also been a factor in wealth and income distribution.

Turning to labour incomes, the increased dispersion reflects the demand and supply of labour. Earnings dispersion increases when demand for high-skilled workers increases relative to supply and/or demand for low-skilled workers falls relative to supply. This has occurred in the UK and the United States where labour demand has shifted towards skilled labour and away from unskilled labour (Atkinson, 1997). In Australia, the kind of work has also changed. Between 1981 and 1991, the ratio of professional workers to production workers in Australia increased by 92 per cent in manufacturing and by 52 per cent in all non-agricultural sectors (Tyers *et al.*, 1997). Concurrent with these changes, the supply of relatively unskilled female and youth workers in the labour market has increased.

However, changes in the labour market are complex. Workers with tertiary qualifications have experienced a decline (on average) in relative earnings in Australia, probably due in part to the large increase in university-educated workers (Borland, 1999). This may also reflect a (possibly related) decline in standards of undergraduate degrees. On the other hand, demand has increased for people in prime age groups, perhaps reflecting a demand for experience. There has also been increasing earnings dispersion within occupational groups. This is often attributed rather unsatisfactorily to unobserved skill characteristics.

However, we need to do more than attribute changes to shifts in demand and supply for individuals with various skills. What causes these shifts? The four main explanations are: technical change, increased trade, offshoring of production and domestic regulatory changes. To some extent these changes are inter-related and all are related in some degree with globalisation. Gaston and Rajaguru (2009) provide time series econometric analysis to support the hypothesis that globalisation has increased inequality within Australia.

Technical change, such as changes in information and communications technology (ICT), has increased the demand for high-skilled workers and their market reach. OECD (2011) cites several studies that consider technical change, especially in ICT, is the key driver of increased inequality within countries, but acknowledges that it is hard to distinguish technical change from other drivers, especially offshoring that is driven by digitalisation.

In the 30 years to 2007, the share of global trade in world GDP increased from one-third to one-half (IMF, 2007). The standard theory of international trade discussed above suggests that trade integration increases inequality in developed economies. In these economies, the income of skilled workers will increase because these workers are overall in low supply while the income of less skilled workers will fall as they compete with imports produced by a large supply of low-skilled workers in less developed economies. With limited trade, less-skilled developed economy workers can earn premium wages because they work with more equipment, better technology and more skilled co-workers than their counterparts in developing economies. As trade increases, they can no longer obtain this premium. In Australia, increased imports have reduced the demand for locally produced textiles, clothing and footwear, many household goods, motor vehicles, and chemical and petroleum products. However, OECD (2011) reports that empirical work finds that international trade has had small, if any, effects generally on income inequality within countries.

Outsourcing of production, via foreign direct investment or simply by managing part of the production process such as call centres or data management, has also grown greatly in the last

¹² In OECD countries overall, wages and salaries account for 75 per cent of household income of working-age adults (OECD, 2011).

20 years. OECD (2011) finds that this has probably contributed to unequal earnings in developed countries more than has trade in final goods.

Deregulatory policies, whether related to globalisation or independent of it, have also tended to increase earnings dispersion in Australia and elsewhere (OECD, 2011). In Australia, over the last 20 years there has been significant reduction in industry protection and in employment protection legislation, more decentralised enterprise bargaining and less industry-wide bargaining (though this has been reversed somewhat recently), de-unionisation of the labour market and real reductions in the minimum wage. Gaston and Rajaguru (2009) found that de-unionisation has increased labour income inequality in Australia. Elsewhere, earnings inequality has increased most in countries like Canada, the UK and the United States that have relatively deregulated labour markets. It has changed less in countries like Sweden and Germany with more regulated labour markets.

In summary. Increased income inequality within many countries reflects both increased inequality of earnings and an increased share of income from capital. The four main forces of increased inequality have been technical change, increased trade in goods and services, the internationalisation of production and deregulation of many economies. Education of less skilled workers is the main counteracting force and policy.

Driven by globalisation, many of the factors that have increased earnings dispersion within countries and created its related social problems are likely to continue. However, while globalisation may increase earnings inequality within countries, it may reduce worldwide inequalities (see Chapter 34).

Summary

- An individual's income is the sum of his or her consumption and change in net wealth in a given period.
- Private income is derived from labour and capital. Labour income includes wages and salaries, own business income, employment supplements, cash income and the value of household services.
- Income from capital includes property rents, interest and dividends, pensions, capital gains and imputed rents from physical assets. Direct and indirect government benefits and taxes are also components of final income.
- The household is the most commonly used income unit because households share consumption. To allow for differences between households, equivalent household units are required.
- The poverty line is the level of income required to provide a minimally adequate standard of living for an income unit. It is usually about half the median income of the equivalent household unit in the relevant economy.
- Measures of inequality include the Gini coefficient, the coefficient of variation and the variance of the logarithm of income. Each measure embodies normative assumptions and has advantages and disadvantages, so that welfare conclusions should be drawn carefully.
- The number of people described as in poverty is sensitive to the determination of a poverty line and the inclusion or exclusion of housing and journey to work costs.
- Using half the median equivalised household disposable income as a criterion of poverty, about 15 per cent of Australian households would be poor before receipt of any government benefits.
- In recent years, private income has become more unequal in many OECD countries, including the United States and Canada especially and to some extent in Australia.
- The most important cause of poverty is lack of employment. Inequality reflects major dispersions in both labour and capital income.
- Market earnings depend principally on education, but also on position in life cycle, ability, family background, and compensation for effort and the disutility of work. Market structures can also influence earnings.
- Increased income inequality within most OECD economies reflects an increased share of income from capital and greater inequality of earnings. The major drivers of earnings inequality have been technical change, increased trade, internationalisation of production and deregulation of economies.

Questions

1. Adam Smith defined the necessities of life as ‘not only the commodities which are indispensably necessary for the support of life but whatever the custom of the country renders is indecent for creditable people, even of the lowest order, to be without’. Discuss this statement with reference to the different notions of poverty.
2. How are household equivalence scales derived? What kinds of problems arise?
3. Are poverty lines useful? If not, then how can an economist usefully describe the amount of poverty in the community?
4. The Gini coefficient is the most commonly used measure of inequality. What advantages does this measure offer over other measures? What problems might arise in using this measure?
5. What is the evidence that incomes have become more unequal in Australia over the past twenty years?
6. How may the international movement of labour between a poor and a rich country affect income inequalities within and between the countries?
7. All definitions of (i) poverty and (ii) inequality involve value judgements. Discuss this statement giving examples.
8. Are racial minorities and women discriminated against in labour markets? What would be the definition of discrimination, possible reasons for discrimination and evidence for such discrimination?
9. Consider the data contained in the table below. For the three distributions of income, A, B and C, plot the corresponding Lorenz curves. Which distribution is the most equal? Which distribution is the least equal? In each case explain your answer.

<i>Proportion of total income going to each quartile</i>				
<i>Distribution</i>	<i>Lowest quartile</i>	<i>Second quartile</i>	<i>Third quartile</i>	<i>Highest quartile</i>
A	4	12	30	54
B	12	16	34	38
C	8	18	30	44

10. The table below lists the weekly gross incomes of the persons in two countries, A and B.
 - i. Determine the degree of inequality using the statistical measure of variance for countries A and B. Which country has a more equal distribution of income?
 - ii. Using the coefficient of variation approach, determine the degree of inequality for each country. Which country has a more equal distribution of income?
 - iii. Explain any differences that arise above. What do these differences suggest about inferences drawn from any measures of inequality?

<i>Person</i>	<i>Income (\$)</i>	<i>Income (\$)</i>
	<i>Country A</i>	<i>Country B</i>
1	120	40
2	430	800
3	40	350
4	620	160
5	86	860
6	1020	460
7	340	380
8	90	760
9	200	450
10	780	1200

11. Calculate the Gini coefficients of males and females separately living in Ballarat and Bendigo:

<i>Ballarat</i>		<i>Bendigo</i>	
<i>Male</i>	<i>Female</i>	<i>Male</i>	<i>Female</i>
\$60	\$60	\$30	\$10
\$70	\$60	\$30	\$60
\$80	\$90	\$130	\$120

Now calculate the Gini coefficient for all males and for all females in both cities. What do you observe?

12. What are the main causes of increased earnings inequalities in OECD countries?

Further Reading

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