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INCOME DISTRIBUTION IN AUSTRALIA 1986

By MARY GRAHAM,
(BEc, DipEd (Monash), GradDipEc (NE))

A Major Thesis submitted in fulfillment of the requirements for the Degree of Master of Commerce

School of Economics, Faculty of Commerce, Deakin University

DEAKIN UNIVERSITY

CANDIDATE’S CERTIFICATE

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Date ......26 June 1992......
ACKNOWLEDGEMENT

I am indebted to the efforts Dr Binh TranNam, and Mr. Alwyn Richardson for their encouragement and assistance with completing this thesis.
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SUMMARY

INCOME DISTRIBUTION IN AUSTRALIA 1986.

This thesis focuses on the distribution of income across income units, as defined by the Australian Bureau of Statistics, in Australia in 1986.

An examination of the conceptual issues involved in analysing income distribution is followed by a description of the various statistical and normative inequality measures that may be used to determine the level of inequality. Previous Australian studies is reported on before analysing the 1986 Income Distribution Survey.

The analysis focusses on the summary statistical measures of the Gini coefficient, the coefficient of variation and the percentile shares. In addition, the contribution of income of various population sub-groups to overall inequality is examined to provide insight into the sources of inequality. To this end, the Cini coefficient is decomposed using a method developed by Podder (1991), whereby the population is divided into a number of sub-groups based on one socio-demographic characteristic at a time.

The exact effects of a percentage change in income for a particular sub-group to overall inequality, as well as the elasticity of the Gini coefficient with respect to a sub-group can be computed. The decomposition is undertaken using both the unadjusted and the equivalent gross weekly income.
Policy considerations and conclusions regarding the level of inequality as existed in 1986 are suggested in the final chapter.
CHAPTER 1
INTRODUCTION

1.1. WHY STUDY INCOME DISTRIBUTION?

Income distribution and inequality is of social, political and economic significance. As Langmore (1988) highlights, inequities matter not only because they are unjust, but also because they destroy the confidence in the fairness of our society. As part of a general revival of interest in the area of equality, income distribution and redistribution over the past two decades has had a renewed focus. Trends in income distribution, the causal factors involved, and the impact of government measures to redistribute income are issues of concern today.

Inequality relates to the distribution of power - power to create and have command over resources. Equality as a fundamental human right, has both a social and an economic aspect. Economic equality is but one aspect of total equality.

The distribution of income can be examined as one measure of economic equality. Analysis of income surveys conducted in Australia, and citing income from various sources, including pensions and welfare payments, can be analyzed to determine both the level of and changes in the level of inequality.
Beginning in 1969, the Australian Bureau of Statistics (ABS), has conducted national surveys of income distribution, which have been repeated in 1974, 1978/9, 1982, 1986, with the latest, 1990, having just been completed. Household income and expenditure surveys have also been relatively abundant since the late 1960's, and the census data, collected every five years, contains a question on income. ABS data has thus provided a valuable source from which the distribution of income can be analyzed. The data can be used to provide a static analysis or to compare income and income distribution over time to determine both the degree of, and changes in, the level of inequality. Income inequality is then a subject for factual investigation.

There are problems involved in the measurement of income arising from the fact that their conceptual meaning of income differs from the definition used, for example, for taxation purposes. For some groups this presents no real problem, but for others, such as the self employed, survey data may reflect income as reported for taxation which differs markedly from the true economic position of that person.

Despite this drawback, it is felt that some important insights into the equality or inequality of the distribution can be gained by analyzing the income statistics collected.

Bradbury (1990) claims that estimating the degree of income inequality is interesting because it allows one to draw conclusions about the distribution of economic welfare. A comprehensive measure of welfare is difficult to achieve. Money income, which is readily available, is widely used and has the advantage
of being easy to analyze and interpret at both the micro and macro levels. It is claimed to correspond to the "lay" meaning of welfare, even though it excludes many factors contributing to economic welfare. Consumption of goods and services is essentially the basis for economic welfare and this is not always represented by income. Income data would need to be manipulated to give a measure of the consumption value to the income unit. However, to keep the analysis free of value judgements, the material presented here will focus on positive aspects of income distribution.

The pattern of income distribution in Australia is of concern to a wide range of people/groups. Government, welfare agencies and individuals are all concerned or affected by the distribution of income and the reasons behind the distribution pattern. There is also much concern about measures for redistribution and the adequacies of redistributive policies. To evaluate the effects of such policies it is necessary to understand the extent and nature of income inequality. The government's taxation and social welfare policies obviously have an impact on distribution and a knowledge of the existing pre-policy pattern is needed so that appropriate policies can be implemented to achieve the goals desired, and to conduct an evaluation of the policies.

1.2. OBJECTIVES OF THESIS

It has become increasingly common to relate judgments about the importance of various influences on income inequality to summary indices of inequality and to attempt to decompose the aggregate inequality value into the relevant component contributions. The components of income received from different
sources and their impact on the level of inequality, has been an important area of study since the 1960's. To isolate the sources of inequality, statistical decomposition of income, in terms of the different components, such as wages, property income, and government income, is undertaken. Appropriate transfer payments can be then implemented to change the level of inequality if deemed appropriate.

The measure of inequality focussed on in this thesis is the Gini coefficient. Links with the Lorenz curve make this coefficient an attractive one and probably the most widely used measure of inequality. It is also a measure which can be decomposed to examine the extent to which observed inequality is due to particular factors or characteristics of a population. Recent contributions by Podder and TranNam (1990) and Podder (1991) to the literature on the Gini coefficient have been informative to further an understanding of its properties and characteristics.

Decomposition refers to dividing the population into a number of component groups according to their disposition towards a chosen characteristic, for example, age, sex. Then using a measure such as the Gini coefficient, the amount of inequality in the income distribution for the component groups is calculated. Inequality for the whole population is decomposed into contributions from inequality within each component group and from inequality between the groups. Thus, not only can the change in inequality over time, but more importantly, the source of the change, be determined.

Decomposition of the Gini index by Theil (1967) and extended by Shorrocks (1980) showed inequality due to differences in group mean incomes, inequality
within groups, and the overlap in income between groups. The present paper
studies the effect of various socio-economic groups on the inequality of income
in Australia, in 1986, using a method of decomposition of the Gini index
recently developed by Podder (1991).\(^1\) This method of decomposition of the
Gini index differs from earlier methods in that when the population is divided
into a number of mutually exclusive groups then each person will belong to
only one group. The conventional method of decomposition as used by, for
example, Theil (1967), when applied to the Gini index, leads to an additional
term explained by the overlapping of income that occurs when groups are not
hierarchical, that is, the highest income of any person in the lowest group is not
lower than the lowest income of the next group. The method to be used in this
thesis avoids this overlapping term and can be easier and simpler to use to
answer questions regarding income inequality.

The population is divided into a number of subgroups based on one socio-
demographic characteristic at a time. The change in overall inequality as a
result of a change in income of a particular group, depends, among other
things, on the share of the income component in total income. The exact
effects of a percentage change in income for a particular subgroup to overall
inequality, as well as the elasticity of the overall Gini coefficient with respect to
a particular subgroup, can then be computed. This method, by addressing the
issue of inequality caused by subgroups of the population, can have
considerable policy application, in that the effects of increased income to a target
group on the overall level of inequality as well as the elasticity of the overall
Gini coefficient with respect to a particular subgroup, can be determined.

\(^1\) Decomposition of the Gini index is discussed in detail in section 3.2
Saunders (1990) claims that there are at least four key questions that need to be addressed when analysing income distribution and income inequality. These are:

1. What is the extent of income inequality at a particular point in time?

2. Is the trend over time towards greater or less inequality?

3. What are the causal factors explaining the observed degree in inequality and changes in equality over time?

4. What is the redistributive effect of government policies, and what options are available to pursue more egalitarian policies?

The aim of this thesis is essentially to focus on these key issues with the exception of issue 2, the trend over time. The extent of inequality in 1986, taking into consideration the effect of the government's income tax and redistributive policies, will be the major focus. To examine the inequality, income units will be grouped according to a single dimension, such as the age of the income unit head, the place of birth of the income unit head, etc. A precise indication of the contribution of incomes of various subgroups of the population to overall inequality will then be determined by decomposing the Gini index, applying Podder's (1991) method.

Trends over time will not be studied in any depth, as it is difficult to base a comparison using previous studies. Both the income concept (e.g. gross or net;
equivalent or per capita), and the income units, (e.g. household, individual or family), used for analysis can differ from one study to another. For a detailed comparison to be possible, analysis of previous unit record data would have to be undertaken. Such a task will not be undertaken in this study, thus the only comparison over time will be in general terms.

The thesis thus has two main objectives. One, essentially a descriptive analysis, is to examine the 1986 ABS data to provide further insights into the extent of inequality between income units. In addition, a second and major objective, and one that makes this analysis different to others on this subject, is to study the contribution of income of various subgroups within the population to overall inequality, to provide insight into the sources of inequality so that policies to change this inequality can be evaluated and appropriate ones implemented.

1.3. OUTLINE OF THESIS

Following a convention established in much of the Australian literature, the distribution of income is analyzed across income units as defined by the ABS. Income units comprise either married (including de facto) couples, couples with dependents, sole parents with dependents, and single adults.²

² Dependents are defined as persons “aged under 15 or aged 15-20 years and a full-time student who has a parent/guardian in the income unit and is neither a spouse nor a income units even if still living with parents.” (ABS 6545.0)
Chapter 2 examines the various conceptual issues involved in an analysis of income distribution. Just what is meant by income and how this relates to welfare, will be considered in detail.

Chapter 3 examines the different measures of income inequality, acknowledging both the statistical and normative measures that may be used. Emphasis is however given to the statistical measures, in particular the Gini coefficient and the decomposition of this index, as this is the main measure used in the analysis to follow.

Chapter 4 introduces and comments on the data sources used in previous studies and then focuses on the analysis and findings of these major Australian studies.

Chapter 5 essentially is a descriptive analysis of the data base used, namely the ABS's 1986 income distribution survey. The characteristics of, and parameters for the present study are set out before applying the basic measures of income inequality to the gross weekly income for the income unit. In particular, the Gini coefficient and the coefficient of variation provide indicators of inequality in the population as a whole, while use will be made of the percentile shares of income, to comment on the experience of smaller groups of the population. Contrary to much empirical research on income distribution, weekly income rather than annual income has been selected. Justification for this choice is given in chapter 5.2.

The distribution of gross weekly income will also be examined according to its principal source, and various characteristics of the income unit, such as the
number of, and marital status of, the persons in the unit, the age and place of birth of the head. This will be followed with, in Chapter 6, a more detailed analysis and decomposition of the Gini index, as an inequality measure, to highlight the contribution of incomes of various subgroups of population, as well as the contribution of different income types, for example, transfer income, labour and non-labour income, to the overall inequality of the nation. This decomposition will focus not only on gross weekly income, but also on "equivalent" income. Variations in income will obviously occur between income units of different size and compositions. Equivalent income takes these differences into consideration and thus it can be argued that to analyze and decompose the level of inequality according to this income concept can be more realistic than just using the gross unadjusted weekly income.

Finally, Chapter 7 brings forth conclusions and policy considerations regarding the level of inequality between income units as existed in 1986. Changed economic circumstances in the late 1980s and early 1990s, for example, rising unemployment, means that the present situation may be different, but hopefully the analysis will provide material for thought as to appropriate policy for particular circumstances.
CHAPTER 2
CONCEPTUAL ISSUES IN THE MEASUREMENT OF INCOME DISTRIBUTION

2.1 INTRODUCTION

An examination of the distribution of income involves a number of conceptual difficulties. The first is to define the income concept that is to be examined, and then to select the appropriate income recipient unit. Since income is largely earned by individuals, it would seem natural to use this as a basis for analysis. However from a welfare point of view, the use of the individual as the recipient raises a number of problems which will be discussed below. Family or household income are alternatives which will be considered.

The distribution of income also raises the question of just how income is generated and how the distribution can be represented. This will be examined in Section 2.4, followed by a discussion on the use of income and income distribution as indicators of welfare in Section 2.5.
2.2. THE INCOME CONCEPT

Income is an indicator of power or command over economic resources. It gives us utility or happiness, as well as prestige and power. It is though, a difficult concept to define. The definition used for income tax purposes is different to the conceptual meaning of income. Lazear and Michael (1988) identify four distinct concepts of income. These concepts are:

2.2.1 Money Income:

This refers to the flow of dollars into the income recipient unit from all sources including wage earnings from employment or self-employment, returns on financial capital in the form of interest, dividends, capital gains etc. and private and government transfers payments. Thus, apart from transfer payments, money income is the payment for productive services (labour and capital) provided by the income recipient unit. In principle, fringe benefits, in the form of free or subsidized goods and services by employers, and welfare services not involving direct cash payments should also be included in money income.

2.2.2 Monetized Income:

This refers to money income plus the money value of the flow of services provided by household durables such as car, house, electrical appliances,
plus the money value of the use of social stock, such as public roads, sewers, plus less tangible assets, such as the money value of the laws governing social behaviour.

2.2.3 Full Income:

This is monetized income plus the money value of the household member's nonmarket time. This would reflect money income if all members devoted all their time and resources to maximizing income. It is then the aggregate money value of all sources of material well-being.

2.2.4 Real Income:

This is full income adjusted by the households level of skill and knowledge, (i.e. household technology), by which money resources are transferred into desirable, consumable products within the income unit. Thus, differences in economies of scale according to income unit size affect real full incomes as much as differences in wage earnings. Access to services, many currently provided by the government, also has an effect on real income.

Most studies on income distribution focus on money income. This is perhaps because the income data typically available from private or government surveys mainly covers money income. For example, the ABS Income Distribution and Income and Housing Surveys since 1978/79 report on gross income from all sources (business, labour, professions, superannuation, interest, government social services etc.). All receipts received regularly and of
a recurring nature are included. With taxation data also being reported, net income can be calculated.

Despite becoming more comprehensive in coverage, income as recorded in such surveys is obviously deficient from an economic point of view. Kakwani (1981) lists many of these, notably, gifts, donations, and employment benefits not involving direct cash payments, the value of home production, imputed income, capital gains and voluntary leisure. Some of these could increase inequality, for example employment benefits, while others, such as home production, could reduce inequality.

O'Loughlin and Cass (1984) claim it has been argued convincingly in the literature that the exclusion from income of the imputed income from home-produced goods and services, results in an under-estimation of the economic resources available to the income unit when one spouse is engaged in unpaid non-market work and an over-estimation when both partners are employed. They quote Edwards (1980) as explaining the argument as:

"Working for oneself or one's family does generate goods and services and so generates income. In other words, the economic status of a family depends on more than just money income......when a person spends time cooking a meal, home decoration, hunting for food specials.......that person (or his/her family) derives imputed income. Time has been used to save money. It follows that when a family or person uses money to purchase a meal, to obtain home decoration services,.......money is being substituted for time."
The sum of money and imputed income, "full income" is a better measure of the economic well-being or status of a person or family than is money income alone. Some people will find it preferable to use money income to save on time while others will prefer to use their time to save money.  

Owner-occupied housing raises the issue of the equivalent value of the dwelling since it could be used for letting to a tenant. Trying to impute a value for home-ownership raises problems, particularly in estimating the cost incurred in owning a home.

Capital gains, defined by Stark (1972), and cited in Kakwani (1981), as the net increase in the value of personal wealth, could increase an individual's purchasing power and therefore should be included in income distribution studies. However this may not be possible for Australia because the ABS income definition does not include any form of capital gains. The alternative is to assume that they are proportional to asset holdings, although such an assumption requires an analysis of disaggregated data on asset holdings, which is not available for Australia.

Because of data limitations, this study will focus on money income, realizing its limitations as a complete measure of income inequality.

One possible construct of money income could be as follows.

---

Factor income, the return to labour and capital in the form of wages, salaries, self-employed income, interest, rent, and dividends. With the addition of superannuation, market income is derived. Market plus government cash transfers, and other cash income, produces gross income. Disposable income is gross income minus personal direct tax. Final income is disposable income plus social benefits, private benefits, capital gains, imputed income of assets, and the value of home produced activity minus indirect taxes. This broad income concept is taken to reflect living standards, although disposable income is probably the most significant single component of overall living standards for most families.

As stated in the introductory chapter, a purpose of the present study is to isolate the sources of income inequality, and to assist with this objective, the following four concepts of income will be distinguished:

(a) Labour Income
(b) Gross Private Income
(c) Gross Income
(d) Net Income

Labour income comprises wages and salaries, plus income received from operating a non-limited liability business or trust. Income received is then a function of the probability of being employed in various categories and the wage rate in the relevant category. Any loss suffered as a result of business activity has to be deducted. Gross private income refers to original income plus income from all private sources, both labour and non-labour, for example, superannuation, and personal investments. If
transfer income, both from the government and private sources, is included, total (or aggregated) gross income can be derived. Net income is total gross income net of personal direct taxes.\(^4\)

2.3. THE INCOME RECIPIENT UNIT

The income recipient unit to be examined is the group of people who live together and form a single spending unit. Thus income units or income recipients could be individuals, families or households. Decisions have to be made then as to the unit whose income is to be considered.

Kuznets (1978) proposed three criteria to be satisfied by the income recipient unit:\(^5\)

1. the income unit must be identifiable
2. the income unit must be independent
3. the income unit must include the total population.

Individuals would seem to be the natural choice to use in any study on income distribution since it is the individual who earns income, but as a recipient unit it is too narrow because it ignores dependency relationships and thus violates Kuznets' second criteria. In families and households, not only may income be

\(^4\) These income concepts are derived by the author using the data available on the ABS (1986) Sample File on Magnetic Tape, Catalogue No.6543.0

\(^5\) Kakwani (1981,p2-16) discusses the different income recipient units in relation to Kuznets' criteria.
pooled or shared, but the decision as to whether or not to earn income may well be a family decision.

The family then may be a more appropriate income unit, where family refers to a nuclear family consisting either of a single person or a couple with or without children. The appropriateness of this unit relies on the assumption that the method of income sharing is such that each member derives the same welfare. This then raises the question as to how to achieve the appropriate level of welfare, that is, equal distribution (necessary if needs are the same) or unequal distribution (when needs are different).

Household is the unit where production and consumption decisions are made and thus could be a more appropriate income unit to study. Household, as defined by the ABS, is a group of people living together as a single unit, that is, they share common housekeeping arrangements. This may comprise only unrelated persons or a family plus other persons, and thus may vary from a single individual to multiple families. But if members of the household do not have long term ties, it is unlikely income will be pooled and disposed of in such a way that welfare is equalised. Family may then be a more appropriate unit, but this would then exclude all households which by definition are not families, violating Kuznets' inclusion principle. Kakwani (1981) examined the population coverage offered by the different income recipient units. The total population coverage varied but essentially the most appropriate unit for analysis depends on both the aim of the study and the data source to be used, that is the household expenditure surveys or the income distribution surveys which cover income units and individual persons.
Two types of income distribution are then of interest. First the distribution of income within members of households, and second, the distribution between households.

The traditional approach treats households as homogeneous and assumes the distribution of income within a household is egalitarian and that household income is pooled and spent for the benefit of its members. The welfare of any member can be ascertained by reference to household income so that the only relevant question is to study the distribution between household units.

Recent studies, for example Edwards (1984) and Lazear and Michael (1988) have suggested that the allocation of resources within the household is not equal. Lazear and Michael claim that there is no rationale (as well as no evidence), for assuming that it is in fact distributed evenly. However, the issue of intrahousehold allocation of resources is well beyond the scope of this study.

Even if we assume that the income is equally distributed within households, families are not homogeneous in size and composition and other demographic characteristics. Descriptive analysis of income distribution takes no account of differences in non-income characteristics. Thus it can be argued that it is necessary to adjust for such differences between households.

Many factors will determine needs - size, age and composition - with some more easily quantifiable than others. Household size is an obvious one with large households having greater needs than smaller ones. Per capita household income is the most straightforward method to overcome this difference, whereby household income is divided by the size of household (or family).
Let: $y_i$ = income of household
$n_i$ = size of household (i.e. the number of people)

thus $\frac{y_i}{n_i}$ = per capita income. \hspace{1cm} (2.1)

This assumes all persons have the same needs, irrespective of age and sex, and no economies of scale such as bulk buying, or the sharing of household durables, apply for any consumer item. There is then a strong consensus that per capita income results in an overadjustment of household income.

The alternative method of adjustment would seem to lie somewhere between no adjustment and per capita adjustment, where each person is counted as equivalent. This approach is known as the equivalent scale approach and dates back to the pioneering work of Engel (1895) and includes major contributions by Prais and Houthakker (1955) and Barten (1964) among others. In the context of Australian work, refer to Tran Nam and Whiteford (1990) for a recent discussion of equivalence scales.

The computation of equivalence scales from empirical data requires the imposition of some artificial condition for indentifying individual scales. As a result, there is no universal consensus on a valid scale. The Luxembourg Income Study (LIS) allocated a value of 0.5 to the first individual in any income unit, a value of 0.25 to each individual from the second to the ninth individual, and set the scale to 3.0 for all units with ten or more members.\footnote{P. Saunders, G. Hobbes, and H. Stott (1989, p6).} However as Saunders et.al. (1989) point out, these scales do not distinguish between adult
and non-adult members of the income unit. If needs of children are less than adults, then the scales will understate the true equivalent income of units with a large number of children.

In Australia, three main groups of scales have been developed. First administrative scales, for use in the social security and tax systems. Second, budgetary, based on the minimum costs of basic necessities required by households of different sizes, and thirdly, utility theory scales, derived from the expenditure behaviour of households aiming to maximize utility.

To derive an equivalence scale, a simple way could be to let

\[ s_i = \text{equivalence scale of the } i^{th} \text{ household} \]

\[ a_i = \text{number of adults in the } i^{th} \text{ household} \]

\[ k_i = \text{number of children in the } i^{th} \text{ household}. \]

Lazear and Michael (1988) devise the following simple equivalence scale:

\[ s_i = a_i + \frac{c_k k_i}{c_a} \tag{2.2} \]

where \( c_k \) and \( c_a \) are average expenditure per child and per adult, respectively.

If we take \( \frac{c_k}{c_a} = 1 \), then \( s_i = n_i \) (household size). We would expect though \( c_k < c_a \), thus \( s_i < n_i \). The equivalent income \( (e_i) \), can be calculated by dividing the observed income \( (Y_i) \), by the adjustment factor \( (s_i) \).

\[ c_i = \frac{Y_i}{s_i} \tag{2.3} \]
Since \( a_i \leq a_i \), it is clear that equivalent income \( c_i \) is greater than per capita income, \( y_i / n_i \).

Thus, equivalent income scales have been developed to measure the income required by families of differing size and composition to achieve similar standards of living. The scales measure the additional money required by a household with children in order for the adults to be as well off as in a household with no children. Such scales thus reflect both the characteristics of individuals in the household (children need less than adults), and economies of scales from sharing.

Equivalent income is a single measure of the money value of an individual's welfare in terms of consumption possibilities. The resulting overall income distribution better reflects well-being, or at least money purchasing power, but problems do arise when specifying income tax. The government taxes money income and gives benefits in cash and can't operate directly in terms of equivalent income - though the effects of taxes/benefits on the distribution of equivalent income is of great importance.

The key issue with equivalence scales is how to define "well-being". Value judgements, reflecting personal perception, are thus involved in making adjustments to income prior to analysis. Conversion to equivalent income scales can then present problems, such as deciding when households in different circumstances share the same standard of living. Should we look only at goods and services consumed by families or should we consider the family composition as contributing to well-being? For example, Tran Nam and Whiteford (1990) acknowledge equivalence scales ignore the fact that children
can be a source of satisfaction to families. Alternatively, living alone may be preferred despite the extra costs involved. Thus "true equivalence scales" should take this into consideration.

The desirability of the use of equivalence scales to define household equivalence income depends on one's confidence in the equivalence scale used. Cox (1982) claims that because any equivalence scale depends on assumptions made, and results can vary depending on the techniques used, some scepticism is justified. But despite this, the equivalence scales adopted in the literature do not differ by large amounts. Lazear and Michael (1988) used 1.00 and 1.20 for a two adult and a two adult and one child household respectively, while the Barten (1964) model adopted 1.00 and 1.09 or 1.22, depending on the age of the child, for a two adult, and a two adult, one child household.  

Referring to Australian studies, Agrawal (1987) derived the number of equivalent adults by using a scale adopted by Kakwani (1983) whereby the first adult is given the weighting of 1.0, the second adult 0.7, and each child 0.4. Nevile et. al. (1988) also adopted Kakwani's scale which can be further divided into allotting different weights depending on the age of the children. Thus Nevile et.al. gave children aged 15-19 a weight of 0.6, children aged between 5 and 14, 0.4, while those under 5 were given a weight of 0.2. Grouping these three categories together, gives a weighting of 0.4, the weight used by Agrawal.

Overall, equivalent income scales appear to be useful in comparing changes through time in a more meaningful way than if income was unadjusted. They can also indicate roughly where relative needs may be greatest and thus in my

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7 Lazear and Michael (1988, 2, p194 ), discuss various scales and refer to the Barten model.
analysis, particularly for analyzing the contributions of incomes of the different population subgroups to overall inequality, I will apply Kakwani's scale as reported and used by Agrawal (1987). That is, the first adult will be weighted 1, the second 0.7 and each child, regardless of age, will be given a weight of 0.4.

2.4. THE DISTRIBUTION OF INCOME.

2.4.1 The Generation of Income

By combining land, labour, capital and entrepreneurship, the production process creates income. The distribution pattern that emerges has been found to be stable over time and space, and a number of theories attempt to explain the generation of income.

Income distribution can be concerned with the distribution among the factors of production, that is, the factor price and share, or it can focus on the size distribution, that is, the personal distribution. It is this latter aspect that will be the concern of this study.

As far as income distribution among individuals is concerned, there are two schools of thought. Since income distribution is fairly constant over time and space, the distribution can be represented as a random process in the form of a population density distribution. Gibrat (1931) developed the earliest and basic version of the stochastic model, whereby due to luck or chance, an individual's income could increase or decrease, but overtime, the distribution will approach normality. The Pareto distribution is the
most frequently used analytical distribution and Champernowne (1953) demonstrated that a stationary income distribution must approach a Pareto distribution regardless of the initial distribution. He claimed current income depends on the income of the last period plus random influences. The stochastic models are criticised though for only providing a partial explanation - the chance factor - of how income is generated, and it is claimed, they contribute nothing to the distribution process. In addition, the models are opposed to mainstream economic theory which tries to explain phenomena as the result of deliberate choices by decision makers.

Friedman (1953) developed a more statistical approach. The income distribution generated is drawn from a random process, and thus grouped with the stochastic models, but individual choices with regard to risk determine the shape of the distribution. Because some individuals are more risk adverse than others, the resulting distribution will be positively skewed with an elongated upper tail.

By contrast, the deterministic school of thought, argues that income distribution can be explained by economic and institutional factors, such as age, education, occupation etc. Within this school, three groups can be identified. First, the human capital approach, initiated by Mincer (1958) and developed by Becker (1962, 1967) and Husen (1968) among others, whereby income is seen as the return for both human and capital investment. There is a definite causal relationship between income received and the level of education and training for human investment, and the amount of non-labour investment and income received. There is
nothing random about the relationship, but rather it is a deterministic approach.

The second group, the *education planning school* view the demand for labour being derived from production functions, while the third group, the *supply and demand school*, see income distribution as depending on the supply and demand for different kinds of labour. Tinbergen (1975) is a major contributor to this school, while Bowles (1969) and Dougherty (1971) are representative of the second school.

### 2.4.2 Income Distribution Functions

To describe an income distribution all incomes could simply be listed from smallest to largest. However, a more preferable mathematical approach might be to use its frequency density function $f(x)$ and the cumulative distribution function $F(x)$. Thus the distribution of income can be represented by a frequency distribution or a distribution function. Let income $(X)$ be a continuous, random variable in the interval $(0, \infty)$. Its cumulative distribution function, $F(x)$, measures the proportion of income recipients with an income of $x$ or less.

The main difficulty in describing the frequency distribution for income has been specifying the density function $f(x)$, i.e. just how a large number of points (here income levels) behave, or alternatively the density of income units at each income level.
A typical empirical income distribution would be positively skewed with a single mode and long tail. It is graphically illustrated as follows:

![Income Frequency Distribution](image)

**Figure 2.1: An Income Frequency Distribution**

- $x^0$ = modal income
- $x^m$ = median income
- $\mu$ = mean

If the shape of income distributions is stable over time and space, a general functional form of income distribution, using the stochastic process, can be developed. Some of the well known income distributions proposed in the literature are: the Pareto distribution, the weak Pareto distribution, the Lognormal distribution and Champernowne's rule. The reader is referred to Kakwani (1980) for a full discussion on each of these distributions.
2.4.3 The Lorenz Curve

Income distribution can also be represented graphically by a Lorenz curve, showing the relationship between the cumulative proportion of income units and the cumulative income share, when units are arranged in ascending order of income. It captures graphically all the information given by the quintile or decile levels for a given income distribution. Essentially it describes the share of income held by different shares of the population. It can be derived from the income density function.

The following variables may be defined:

\[ p = F(x) = \int_0^x f(X)dX, \]  
the cumulative distribution function, representing the proportion of income units having income up to x.

\[ q = F_1(x) = \mu \int_0^x Xf(X)dX, \]  
represents the cumulative proportion of income possessed by those units having an income up to x, where \( \mu \) is the expected value of X.

\[ q = L(p). \]  
The function L(p) is interpreted as the fraction of total income received by the lowest \( p^{th} \) fraction of income units. The graph of q as a function of p is said to be the Lorenz curve of income distribution. The curve satisfies the following conditions:
(i) the curve lies in the unit square
(ii) \( L(0) = 0 \)
(iii) \( L(1) = 1 \)
(iv) \( L'(p) = \frac{x}{\mu} > 0 \), i.e. as the number of people increase, income is increasing. \( L''(p) \geq 0 \) (i.e. the second derivative) is also positive. The curve is therefore positively sloped and convex to the \( p \) axis.
(v) \( L(p) \leq p \), so the Lorenz curve must lie below the 45 degree line (the diagonal line), joining the points \( O \) and \( B \), (see Figure 2.2). The top quintile/decile group receives more than the population share of total income, while the lower group receives less than the population share.

If the Lorenz curve coincides with the 45 degree line, then each unit receives the same income. \( L(p) = p \) is the egalitarian line. If it coincides with the axis (i.e., \( OAB \), all income is received by one unit. The curve shows the deviation from perfect equality, (OB). The closer it is to OB, the greater the equality.
Two different income distributions (A and B) can be compared by plotting the Lorenz curves for the two distributions on the same graph.
Figure 2.3: The Lorenz Curve for Two Distributions

A distribution with a higher Lorenz curve over the whole range, for example, distribution A in figure 2.3, would be described as more equal than distribution B. This applies only if we are concerned with relative differentials, not absolute differences. No information is given with regard to the total income available. Rather, it illustrates only how the given income is spread. If, for example, there were two identical distributions, only one is double the other, Lambert (1989) doubts that we would agree with the Lorenz curve analysis that they were both as equal. When two distributions have different means, no judgement can be made, since the graphical distribution says nothing about the size of the income shares. Non-income characteristics are also not considered.
The Lorenz ranking is only partial, that is, only some pairs of the distribution can be compared. If one curve is inside another, it can be determined which is more equal, but if the two curves intersect it cannot be determined which is more equal.

![Lorenz Curve: Partial Ranking](image)

**Figure 2.4: Lorenz Curve: Partial Ranking**

Kakwani and Podder (1973) proposed the functional form for the Lorenz curve be specified directly as a way of estimating the Lorenz curve from grouped data.

\[ L(p) = pe^{-\tau(1-p)} \quad (2.4) \]

where \( \tau \) is a parameter.

Thus if \( \tau > 0 \), the curve lies below the egalitarian line; if \( \tau = 0 \), the curve coincides with the egalitarian line.
Differentiating $L(p)$ yields
\[ L'(p) = e^{-\tau (1-p)(1+p\tau)} \] \hspace{1cm} (2.5)
\[ L''(p) = 2\tau e^{-\tau (1-p)(2+p\tau)} \] \hspace{1cm} (2.6)

If $\tau > 0$, both derivatives $L'(p)$ & $L''(p)$ are positive, that is, the curve is sloping upward and increasing. The curve is not necessary symmetrical about the diagonal OB. It can be skewed towards O or B, depending on the value of the parameter $\tau$.

If the Lorenz curves for two distributions cross, or if the dominating Lorenz curve has a lower mean income, the generalized Lorenz curve can be used to determine which distribution is preferred from a welfare point of view. The generalized Lorenz curve cumulates income per capita upwards from $p=0$ to $p=1$. If the mean income is multiplied by the ordinary Lorenz curve values, the resulting values can be plotted to determine which distribution is preferred from a welfare point of view.

For populations of equal size, Bradbury (1990) claims comparisons of the generalized Lorenz curve are equivalent to comparing the total income of cumulative shares of the population. When the generalized Lorenz curve of one distribution compared to another is higher, for each cumulative population share, the distribution will reflect a higher level of social welfare, as is the case with distribution $f$ compared to distribution $g$ in Figure 2.5.
Figure 2.5: Generalized Lorenz Curves
2.4.4 Concentration Curves

Income \((X)\), can be derived from many sources.
For example, let
\[
X_1 = \text{salary} \\
X_2 = \text{interest} \\
X_3 = \text{dividends etc.} \\
X = (X_1 + X_2 + X_3) \\
\sum_{i=1}^{3} x_i
\]
define
\[q_i = \frac{1}{\mu_i} \int x_i f(x) dx\]
where \(\mu\) is the expected value of \(X_i\).

The graph of \(q_i = L_i(p)\) is said to be the concentration curve for the \(i^{th}\) factor income. The curve shows the cumulative factor income share of each income group. The concentration curve plots the share of income against quantile or decile groups of the population when the cumulative sums are formed by taking the income unit in the order indicated by the total income, not factor income.

A concentration curve satisfies the following conditions:

(i) It lies on the unit square

(ii) \(L_i(0) = 0\)

(iii) \(L_i(1) = 1\)

(iv) \(L_i'(p) > 0\), i.e. the concentration curve is upward sloping.

An essential difference between a Lorenz curve and a concentration curve is that while the Lorenz curve lies entirely below the 45 degree line, the
concentration curve may lie above or below or cross over the 45 degree line, as illustrated in Figure 2.6 below.

(a)

(b)

Figure 2.6: Concentration Curves
To draw a Lorenz curve, the population is ranked according to the size of income with the proportion of population being plotted against their cumulative share of income, starting with the lowest income. The curve lies below the 45 degree line because the top quintile (decile) group receives more than its population share of total income and the lower group receives less. Concentration curves, however, plot the level of income, whatever type, for example, post-tax, pre-tax, or government benefits, received by each income recipient group, with the income units being ranked according to total income. The concentration ratio is obtained from a concentration curve. The ratio is defined as one minus the area under the concentration curve.

If, for example, a concentration curve for government benefits was drawn, and since government benefits are likely to constitute a large proportion of income for low income groups, the concentration curve could be as shown in Figure 2.6(c). Wages and salaries are likely to be important for middle income groups, and thus the concentration curve could be as in Figure 2.6(d). By contrast, to draw the Lorenz curve for government benefits, income groups would first be ranked according to the size of total income and the proportion of population would then be plotted against the proportion of income.

When non-income characteristics are considered, income ranking can change. Take, for example, post-tax and pre-tax income. The tax paid by a single person is more than that paid by a married person with dependents and therefore post-tax distribution for a married income earner may be a reversal of the pre-tax distribution. That is, the married person may have
greater post-tax income than a single person. This would require a reranking of the income units before drawing the Lorenz curve. Without reranking, the concentration curve for post-tax income would not be the same as the Lorenz curve post-tax. The Lorenz curve therefore, is not the same as a concentration curve, but rather, the Lorenz curve is a special concentration curve.

2.5 INCOME AND WELFARE

2.5.1 Using Income as an Indicator of Welfare

The focus in this paper is on income as measured in empirical studies. Income, real income, and per capita income, are measures of potential buying power and correspond with welfare in lay terms, but income and welfare are two separate concepts and there are a number of problems if income is equated with welfare. As discussed earlier, income as measured in household surveys is typically deficient from an economic or welfare point of view.

Consumption - that is the use of goods and services - determines standard of living and is therefore the basis for economic welfare. This measure can be based on the consumer's own tastes with a preference ordering for different bundles of goods and services represented by a utility function. Thus, the welfare measure will increase only if the consumer moves from a less to a more preferred position. A consumer's lifetime utility is a function of real consumption for total life. Life-time welfare can be represented by consumption at different ages, plus the utility generated
from bequests. The constraints would be prices, assets, and discounted future incomes. However, future prices and incomes can only be estimated on a subjective basis.

An alternative approach is to use current prices and current utility to measure current welfare, but has the disadvantage of not reflecting the true economic well-being for all, since needs may differ over an individual's life cycle, thus welfare may not be spread evenly. Current expenditure could also be financed from income received in a previous period or from borrowings based on projected future earnings. However, models such as the permanent income or life-cycle hypothesis, see below, assume consumption and therefore welfare is evenly spread.

The period of time over which income is to be measured has then to be decided and clearly specified. The choice in much of the literature seems to be a year, for anything shorter involves adjusting for seasonal or transitory fluctuations, which may not be a relevant influence on spending decisions, while anything longer may not be practical and have no basis in the planning of the consumer. However, Travers and Richardson (1991) claim that even annual income, as a measure of standard of living and welfare, is flawed because it ignores saving and dissaving, the services of assets, the value of time not spent in the market, and goods and services received from the employer, government or family.

Taussig (1976) argues that annual income is a reasonable measure of welfare but highlights that it does ignore any current earnings that could be used to invest in human capital and thus increase future income, as well
as ignoring savings and dissavings. Lifetime income is thus attractive, but obtaining the required data and the uncertainty associated with borrowing against future income, raises problems. In addition, the recipient unit, for example, the household, may change over time.

To overcome short-run fluctuations in observed income, Friedman (1957) introduced the concept of permanent income to include transitory income. Permanent income refers to income from all sources, i.e. income from non-human and human wealth plus random fluctuations, both past and present.

\[ Y = Y_p + Y_t \]

Consumption depends on expected normal income, that is, permanent income. Transitory income will be devoted to savings to offset any negative component that may occur in the future. As the period of time increases, the transitory component would decrease.

The life cycle hypothesis sees all income spent over a lifetime, so that the present value of consumption depends on net worth (wealth). Assets as well as current income from all sources, that is, labour and capital assets/property, are included.

Both the life cycle hypothesis and the permanent income hypothesis seek to even out consumption over a person's life cycle. The relationship between consumption, asset accumulation and income is the outcome of household planning over a long time.
Welfare depends also on the ability to transform consumption into utility and there is no reason to believe that all households or income units possess the same production function (or utility function). Apps and Savage (1986) claim that using household income as a basis for analysis relies on the neoclassical household utility function, whereby the household is responsible for allocating resources to achieve optimal distribution of welfare among members. This distribution is assumed to be egalitarian and that inequalities which exist in the market place between male and females do not carry over to the household to create inequalities. Edwards (1984) sees the neglect of decision making in the household as a glaring deficiency in social policy literature.

As a measure of welfare, income data could be supplemented with data on wealth since wealth adds to the potential consumption of individuals. But unless wealth is easily marketed, it can't be used to satisfy consumption.

Economic welfare could be argued to also depend not only on income but also leisure. Voluntary leisure could be argued to give enjoyment to individuals and should therefore be included. Some income units may decrease their money income but increase their standard of living by substituting leisure and household services for marketed goods and services. Consumption of goods and leisure time may then be a more correct measure of welfare, but caution would be needed in imputing correct values.
Welfare is a normative concept and assumptions are necessary with regard to the welfare of income units. There does exist a positive correlation, if not a causal relationship, between welfare and income, holding other variables, such as, demographic characteristics, constant.

Our definition of well-being will however be limited to income and thus it will only be a partial measure of welfare. Income though, provides the means of consumption and as Deaton (1980) claims, survey results on sources of income are a vital ingredient in the analysis of the level and distribution of consumption. Prices, needs and publicly provided facilities interact with income in the generation and distribution of welfare.

2.5.2 Income Distribution and Social Welfare.

Information regarding income distribution can give some idea about the level of social welfare but in doing so, it requires the imposition of a value judgement. In the literature, the welfare function which corresponds to the distribution \( F(x) \), is given by:

\[
W_F = \int U(x)f(x)dx
\]

(2.7)

\( U(x) \) quantifies the income unit's well-being and is averaged across income units to represent "social welfare". It is assumed to be strictly increasing and concave which implies diminishing marginal utility of income. The higher a recipient's income, the less is the pleasure derived from receiving
and spending an extra dollar. Total pleasure is what matters, thus greater equality is preferred.

The Lorenz curve provides the means to assess inequality in an income distribution visually and hence compare distributions. It shows though, only how income is divided; it does not tell anything about the population size nor the mean income.

The generalized Lorenz curve, (the ordinary Lorenz curve multiplied by the mean income, i.e. \(GL(p)=\mu^*L(p)\)), is used to compare populations of equal size. This is equivalent to comparing the total income of cumulative shares of the population. When the generalized Lorenz curve of one distribution is higher for each cumulative population share, we conclude the distribution reflects a higher level of social welfare. If the generalized Lorenz curves do not cross, welfare is higher in the dominating distribution. If they do cross, the variance can help to provide a weaker welfare prescription.

Atkinson (1970) was the first to introduce normative concepts in using the Lorenz curve to compare welfare. His theorem can be expressed as follows:

Let \(F(x)\) and \(G(x)\) be two income distributions with equal means, \(\mu_F = \mu_G\). Then:

\[
L_{F(p)} \geq L_{G(p)} \text{ for all } p \in [0,1] \Leftrightarrow \int U(x)f(x)dx \geq \int U(x)g(x)dx
\]

for every function \(U(x)\) such that \(U'_x > 0\) and \(U'_x < 0\)
The average utility, \( \int U(x)f(x)dx \), can be thought of as "social welfare", corresponding to the income distribution \( F(x) \). When considering only income, the theorem tells us that provided the utility function is increasing and concave, and where distributions have the same mean, the distribution with the dominating Lorenz curve will be preferred, provided they do not cross. The symbol, \( \leftrightarrow \) shows that unanimous preference is both necessary and sufficient to ensure that the most equal division of the total available income is preferred.

If the two distributions are such that \( \mu_F > \mu_G \) and \( L_F(p) > L_G(p) \), the \( F \) distribution of incomes is clearly preferred to those of \( G \). But the question is raised as to what happens if the Lorenz curves cross, or if the dominating curve has a lower mean income? The generalized Lorenz curve, defined by Shorrocks (1983a) is appropriate here.

The generalized Lorenz curve for distribution \( F(x) \) is defined as:

\[
p = F(y) \Rightarrow GL_F(p) = \int_y^1 xf(x)dx = \mu_F L_F(p)
\]

(2.9)

Shorrocks theorem for two income distributions, \( F(x) \) and \( G(x) \), is that

\[
\int U(x)f(x)dx \geq \int U(x)g(x)dx
\]

(2.10)

for all increasing, strictly concave \( U(x) \leftrightarrow GL_F(p) \geq GL_G(p) \) for all \( p \in [0,1] \).
For any two income distributions, the mean income multiplied by the ordinary Lorenz curve values, gives new curves that can be used to determine which is preferred from a welfare point of view. If income distributions have equal means, then the Lorenz curve or the generalized Lorenz curve will give the same result. For unequal mean comparisons, where the distribution with the higher mean also has the dominating Lorenz curve, Shorrocks's theorem adds nothing more to that of Atkinson.

Lambert (1989) claims the contribution of the Shorrocks theorem is when the Lorenz curves cross or when the Lorenz curve is dominant but the total income to be distributed is less. Some comparison as to which distribution is to be preferred is now possible.
CHAPTER 3

THE MEASUREMENT OF INCOME DISTRIBUTION

3.1. Introduction

There are many different inequality measures, each emphasizing different parts of the distribution and therefore ranking differently. Champernowne (1974) studied the merits of the various measures and concluded that there can be no single "best" measure: the choice really depends on what aspect one is interested in. Alternatively, the purpose of the income survey could be viewed as the main determinant in selecting the appropriate measure of inequality.

Dalton (1920) pioneered an attack on conventional inequality measures and others followed his lead in arguing that the measures are statistical devices measuring dispersion without reference to the notion of social welfare. Measures proposed by Dalton (1920) and Atkinson (1970) rely on value judgments represented by the selected social welfare function, and are called normative measures. By contrast, the conventional measures making no reference to social welfare, are called positive measures. Both types of measures will be examined in this chapter. In addition, alternative approaches
that have been used, or proposed to be used in the measurement of income ineqality, will be discussed in Section 3.4.

Kakwani (1980) discussed six principles that an inequality measure should satisfy. First, the measure should remain unaffected if each income is altered by the same proportion, that is, it should be independent of the scale of measurement. Second, equal additions to income should diminish inequality, while equal subtractions should increase it. Third, inequality should be unaffected if a proportionate number of persons are added at all income levels, and fourth, the measure should be sensitive to transfers at all levels of income. If a transfer of income takes place from a person with income \( x \), to a person with income less than \( x \), then inequality is reduced. The new distribution will be Lorenz superior, provided that the transfer is not so large as to reverse the relative positions of the individuals. Fifth, the frequency distribution of income and not the ranking of individuals should influence inequality and lastly, the value should lie in the range 0, (individuals have equal income) to 1 (one individual receives all the income).

3.2 Statistical (Positive) Measures of Income Inequality

Both the total and the spread are two important aspects of income distribution which can be determined by examining three measures; namely the mean, median and mode. Typically, the mode is less than the median, which is less than the mean, accounted for by the positive skewness of the distribution cited in Section 2.4.2.
A simple measure of inequality is to examine the relative range, that is, to compare the highest and the lowest income and express this difference as a ratio of the mean income.

\[ E = \frac{\text{Max} (x_i) - \text{Min} (x_i)}{\mu} \] (3.1)

This measure has the obvious limitation of ignoring the distribution between the extremes, an important limitation if a measure of total inequality is desired.

A more exact measure is the relative mean deviation (R) in that it can indicate the average degree to which individual incomes differ from the population mean income. Each income level is compared to the mean income, differences summed and then taken as a proportion of total income. It is defined as:

\[ R = \frac{1}{2\mu} \frac{1}{n} \sum_{i=1}^{n} |x_i - \mu| \] (3.2)

where \( x_i \) = income of the \( i^{th} \) unit, varying from 1 to \( n \).

\( n \) = total number of units.

This can be interpreted as being the proportion of total income that needs to be transferred from those above the mean income to those below to achieve equality. If every unit receives the same income, \( R = 0 \), while if one individual receives all the income, \( R \) approaches unity as \( n \) approaches infinity.

\[ \text{Kakwani (1980, ch.5) cites and discusses in full this and subsequent equations referred to in this section.} \]
However such a measure is insensitive to transfers of income between individuals on the same side of the mean, and thus if someone was made poorer as income was transferred to someone richer, the measure would not change. R then fails the principle of transfers.

A number of statistical measures can indicate the spread of the distribution. For example, the variance can be used, but this brings the disadvantage of the measure varying with the mean. A distribution with a lower mean income but a greater relative variation compared to another, would end up with a lower variance. The fact that the measure is not scale invariant, means that it can't be used as an index of relative inequality.

The coefficient of variation can however overcome this limitation. Concentrating on relative variation, it is "scale independent" and is defined to be the ratio of the standard deviation to the mean of the distribution.

\[
CV = \frac{\sigma}{\mu} \tag{3.3}
\]

where \( \sigma \) is the standard deviation. The lower limit is zero, with the upper limit, when one individual receives all the income, being \( \sqrt{n-1} \). This upper limit approaches infinity as the number of persons increase. Since it is insensitive to the unit of measurement, it is useful when examining different sets of income data, such as for international comparisons of income distributions. It is also an appropriate measure if one is interested in absolute differences in income. A transfer from a richer to a poorer person will decrease the coefficient. It is though, sensitive to changes in the shape of the frequency
distribution of income. Relying so much on the means, Podder (1972) claims it may not be a useful measure, particularly for comparisons, for two distributions with the same standard deviation, but different means, will yield different results.

Kakwani (1980) also claims that the coefficient is equally sensitive to transfers at all income levels and preference may lie for measures that attach greater importance to income transfers at the lower end of the distribution. One such measure is the standard deviation of the log of income expressed as:

$$\sigma_{log} = \left[ \int_{0}^{\infty} (\log x - \log G)^2 f(x) d(x) \right]^{1/2}$$

where $G$=the geometric mean.

A logarithm measure is useful if one is interested in percentage differences rather than absolute differences. The lower limit of this measure is zero, indicating complete equality. The upper limit is $\sqrt{n-1} \log G$, which as $n$ increases, approaches infinity and as Kakwani (1980) explains, violates Dalton’s principle of transfers when income exceeds the geometric mean. That is, any transfer of income from rich to poor, when income is greater than the mean, will increase inequality rather than decrease it.

All the above measures are defined relative to the mean, thus they are unaffected by equal proportional increases in all incomes.
A descriptive method of emphasizing income shares within a particular population, is to present quantile information, summarized in the form of quintiles, deciles or percentiles. The population is divided into groups of equal size (5, 10 and 100 groups, corresponding to quintiles, deciles and percentiles respectively) after they are ranked according to income. The proportion of income is then given for each equal size group and so the groupings can indicate inequality of smaller groups. They can be used to look at shares of total income held by various groups and how the shares have changed over time. They can also be used to compare different distributions in different places.

The disadvantage claimed of this method is that by examining any one quintile or decile, any influencing item outside of this range is omitted and thus some analysts, for example Meagher & Dixon (1986) claim they are not convenient for comparing inequality across distributions, or for determining the contribution of inequality in particular sub-populations to total inequality.

To portray the above information graphically, and to provide indicators of inequality in the population as a whole, the Lorenz curve, discussed in Section 2.4.3, is widely used.

Again for comparative purposes, it is often desired to have one single index number summarizing inequality. If we are concerned mainly with relative income differences, Lambert (1989) notes that two useful measures, both derived from the Lorenz curve, are the Gini and the Schutz coefficients. Each quantifies - in a different manner - how "far" a given distribution is from the perfectly equal distribution whose Lorenz curve is the 45 degree line. Both
have a single value ranging from 0, representing perfect equality, to 1 for maximum inequality.

Schutz (1951) suggested an inequality measure based on comparing the slope of the Lorenz curve at different points. Schutz's coefficient is a length measure equaling the maximum vertical distance between the 45 degree line and the Lorenz curve. However Kakwani (1980) showed that this measure can be integrated to be reduced to the relative mean deviation.\(^9\)

The *Gini ratio* or *concentration ratio*, proposed by Gini (1912) was based on the relative mean difference. The coefficient is exactly half the relative mean difference, which Kakwani (1980) shows is defined as the arithmetic average of the absolute value of the difference between all pairs of income.

\[
G = \frac{\Delta}{2\mu}
\]

where \(\Delta = \frac{1}{n(n-1)} \sum_{i=1}^{n} \sum_{j=1}^{n} |x_i - x_j|\)

\[ (3.5) \]

\(\Delta\) = arithmetic average of all income differences
\(\mu\) = mean income
\(x_i\) = income of \(i^{th}\) unit
\(n\) = total number of units.

The maximum value of \(G\) is \(2\mu\), (i.e. 1), whereby, one unit receives all the income, while the minimum value is 0, when every individual receives equal

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\(^9\) Full details of the Schutz coefficient can be found in P. Lambert (1989).
income. Pyatt (1976) claimed the Gini index can be interpreted as showing the expected gain by an individual when able to choose to be someone else divided by average income.

Sen (1973) suggested that the Gini index, in a pairwise comparison of incomes, shows the average of all depressions experienced by those individuals with lower income, with the depression being proportional to the differences in income. Thus Sen claims that the Gini coefficient, by taking note of differences between every pair of incomes, is a very direct measure of income differences. It takes differences over all pairs of incomes and is not based solely on differences relative to the mean. A transfer from a richer to a poorer person will reduce the estimated Gini coefficient.

![Proportion of Income](image)

**Figure 3.1: The Gini Coefficient**

Gini (1914) proposed an alternative measure derived from the Lorenz curve by using the formula $G = 1 - 2A$, where $A$ is the area under the Lorenz curve.
Fig 3.1 above). It is essentially the ratio of the area between the Lorenz curve and the line of equality (Area A above), to the area of the triangle below the egalitarian line (Area A and Area B). This was shown to be the same as his measure based on the relative mean difference.

If one income distribution is Lorenz superior (inferior) to another, the Gini ratio will be less (greater) provided the two curves do not cross.

Podder (1972) computed the Gini ratio using the formula

\[ G = \sum_{i=2}^{k} \frac{p_{i-1}q_{i}}{\sum_{i=2}^{k} p_{i}q_{i-1}} \]  

(3.6)

where \( p_{i} \) is the cumulative proportion of income units receiving income within or below the \( i^{th} \) range and \( q_{i} \) is the cumulative proportion of income received by those income units. Income units are indexed according to their income rank, so that \( q_{1} \leq q_{2} \leq q_{3} \ldots \leq q_{n} \). Podder (1972) claims that although this is only an approximate formula, with a sufficiently large number of income groups, the above formula is highly accurate.

Criticism of the index lies more with its insensitivity to redistribution of income at the lower end of the scale. It assumes equal importance to equal differences of income even though one difference could be between very low income while another could be between very high incomes. Podder (1972) also noted the criticism of the ratio being misleading to the extent that two distributions with the same mean, but one distribution being highly concentrated, will give a more equal dispersion. Kakwani (1980) and Atkinson
(1970) note that the Gini ratio is most sensitive to income transfers near to the average income. If inequality is paramount, then the measure must give maximum weight to the poorest member with the weight declining as income increases. Kakwani (1980a) proposed that the $i^{th}$ person's sense of deprivation depends on the actual income level plus the number of persons who enjoy the same income. Generalizing these proposals gives the generalized Gini index, referred to in Kakwani (1986).

$$G(k) = \frac{n-1}{n[\mathcal{Q}_n(k) - n]} \sum_{i=1}^{n} \frac{1}{i} (\mu_i)(n + 1 - i)^k$$

(3.7)

where $\mathcal{Q}_n(k) = \sum_{i=1}^{n} i^k$

The sensitivity of the index will depend on the value of $k$. If $k=0$, it would imply that society did not care about inequality. As $k$ increases, greater importance is attached to the lower end of the distribution and less to the top. If $k=1$, the generalized index becomes the Gini index. The value chosen should reflect society's preference for the sensitivity of this measure. Kakwani (1986) claims that measures based on the length of the Lorenz curve and not the area would be more sensitive at lower income levels.  

To provide further insight into sources of inequality, many investigators have used decompositions. Murray (1978) explains decompositions eliminate that part of inequality due to acceptable factors such as income difference associated with age or skill and it provides a basis for comparisons over time, of

---

10 Kakwani's measure, (1980a, 1986), the arithmetic mean of income, is sensitive to all transfers, particularly those at lower levels of income. It could thus be more useful for measuring poverty as distinct from income distribution.
inequality, as workforce changes occur. If data is then available for different periods, decomposition allows a consideration not just of the change in inequality, but also the source of change. But by identifying the source of the inequality, decomposition also assists in defining acceptable and unacceptable inequality. Part of the inequality may be acceptable on the grounds of efficiency, for example, higher skills receiving higher payment. Part may also be acceptable on grounds of equity, as for example, when effort devoted to earning income differs.

Decomposition is possible provided the population can be classified and split into distinct subgroups with each member of the population placed in only one subgroup. Income would then be disaggregated according to these subgroups. Alternatively, income could be disaggregated according to the different components of total income. Either way, decomposition allows comparison of between or within subgroups, that is, between dissimilar or similar people.

To illustrate, assume we wish to examine the contribution of wage and salary (labour income) inequality to that of total income. Income is then disaggregated into different factor components and the overall inequality value is decomposed into the corresponding component contributions. A concentration index can then be derived for each factor component. This is different to the Gini value, since the weights attached correspond to the rank of the income unit in the total income distribution which need not be the same as the unit's rank in the factor component. Pyatt et. al. (1980) claim decomposition is a product of the share of each factor in total income, the rank correlation ratio, (i.e. the ranking of income units according to factor income
and total income), and the Gini coefficient for the distribution of income of the given factor type.

The Gini index of total income can be expressed as the weighted average of the concentration indices of each factor income component, with the weights being proportional to the mean of each factor income. (i.e. the weighted sum of the concentration ratios, with the weights being the share of the components in total income.) The Gini ratio is just a special case of the more general concentration ratio. However the interpretation given to the concentration ratios needs explanation.

If income units are arranged according to total income, the Gini can be written as

\[ G = \frac{1}{\mu} \sum_{i=1}^{n} \mu_i C_i \]  

(3.8)

where \( C_i \) is the concentration index for the \( i^{th} \) factor income

\( \mu_i \) is the mean of the \( i^{th} \) factor income

and \( 1/\mu \) is the adjusted mean of total income

This is the natural decomposition of the Gini index by factor component, and was first developed by Rao (1969) and subsequently used for empirical research by numerous authors including Kakwani (1980,1986) Shorrocks (1983) and Podder and Tran-Nam (1990). To determine the percent contribution of the \( i^{th} \) factor in total inequality, \( D_i \), it was natural to consider
\[ D_i = \frac{\mu_i C_i}{\mu} \times \frac{100}{G} \]

Total inequality would be reduced by \( D_i \) if the \( i \)th factor was absent.

Podder and Tran Nam (1990) argue that this interpretation is incorrect. For example, if a constant amount of income (\( m \)), was added to all income levels, \( \mu_m C_m / \mu G = 0 \) indicating that the \( m \) component added nothing to inequality. However, equal additions to all income levels must reduce inequality. Likewise, if the same proportion of income (\( y_m \)), is added to all income levels, inequality does not change but the above ratio would give \( \mu_m / \mu \) as the contribution to total inequality.

Podder and Tran Nam (1990) suggest that the only interpretation that can be given for the effect of a change in an income component depends on the elasticity and the share of the component in to total income. If elasticity is less than, or more than, or unitary, then the individual component decreases, increases, or has no effect on overall inequality. What is important is \( C_i - G \), rather than the ratio \( C_i / G \). The concentration ratio for a factor component can be interpreted only in relation to the Gini of total income reflected through the elasticity of the component with respect to total income.

Murray (1979) adopting the work of Paglin (1975) and Pyatt (1976) decomposed the Gini coefficient into 3 elements.

\[
G = \sum_i \sum_j \pi_i E_{ij} p_j + \sum_i \pi_i^2 E_i p_i + \sum_i \sum_{j \neq i} \pi_i E_{ij} p_j
\]  \tag{3.9}
where \( \pi_i \) is the proportion of population income accruing to group \( i \) and \( P_j \) the proportion of the population in group \( j \). Murray explains the term \( E_{ij} \) as the difference, if positive, in mean incomes of groups \( j \) and \( i \) expressed as a proportion of the mean income of group \( i \). The first part of the above equation refers to that part of the Gini coefficient due to differences in group mean incomes, i.e. the difference between sub-groups. Thus we need to know only the mean income and the number in each subgroup. The term \( E_i^2 \) is the Gini coefficient of inequality within group \( i \). The final term, \( E_i^3 \) is the minimum of the values of \( E_{ij} \) and \( E_{ji} \) and can be interpreted as that part of the coefficient due to the overlapping of incomes in groups.

Podder (1991) in an extension of his earlier work, uses a method of decomposition of the Gini index which is different from these studies and studies by Theil (1967) and later Shorrocks (1980). Applying Podder's method, income is split into two vectors, depending on whether or not the income unit possesses the particular characteristic under examination. For example, if we examine the sex of the head of the income unit, the income of those units with a male head will be given their value, while those with a female head will be valued at zero. A second vector will then be developed, whereby the income of the female units will be valued while those units with a male head will be zero. The concentration coefficient for each vector will then be calculated. The difference between each concentration coefficient and the overall Gini index is used to determine the contribution to overall inequality of a particular characteristic. Podder's method avoids any confusion that may arise from an overlapping term and can be used to answer important questions regarding inequality caused by particular subgroups of the population.
Intuition can often tell us the general direction of change in inequality as the income of one group or another is changed. However, the exact magnitude of the change can't be determined. It is this aspect that is the strength of Podder's method.

Subgroups based on various socio-economic, demographic and regional characteristics, can be selected and the concentration coefficient computed when all units are arranged in ascending order of their total income.

If the income for a selected subgroup is represented by $X_r$, with $X$ being the total income for the population, then the groups income share, $(S_r)$, will be $X_r/X$. If the concentration coefficient for the $r^{th}$ group is $C_r$, then $(C_r - G)$, where $G$ is the Gini coefficient for the whole population, will indicate if the income of this group increases or decreases total inequality. If it is negative, the income received by this group decreases total inequality; if it is positive, total inequality increases. Podder and Tran Nam (1991) argue against attributing various segments of total inequality to specific groups. But what is important for Podder's method is a result derived by Larman and Yitzhiki (1985), namely

$$\frac{\partial G}{\partial e} = S_r(C_r - G)$$

where $e$ is a small percentage of income of each unit in the $r^{th}$ group.

This then gives the exact change in the Gini coefficient and thus total inequality, due to a small percentage change in the income of the $r^{th}$ group. It is the change in the Gini coefficient due to a marginal proportionate change in
the income of the $r^{th}$ group. If all groups have the same percentage increase in income, then total inequality will be unaffected. Gini will only be affected if some group(s) experience a change.

The magnitude of reduction (increase) in overall inequality will depend both on the elasticity and the share of the $r^{th}$ component in total income.

Podder (1991) then computes the elasticity of the Gini using the formula

$$\eta = \frac{1}{G} \frac{\partial G}{\partial c} = \frac{1}{G} \cdot S_r(C_r-G)$$

(3.11)

The elasticity will show a similar pattern to the derivative of the Gini coefficient, since the elasticity measures the proportionate change in the overall inequality as a result of a proportionate change in the income of a population subgroup. A negative sign, indicates inequality will be reduced, while a positive sign shows it will increase. The extent of the change in equality will depend on the numerical value attached to the elasticity. For example, if the elasticity for a group is .05, it means that a one percent change in the income of all members of this group will result in a .05 percent change in the Gini coefficient for the whole community.

The Gini coefficient can then be decomposed to look at the effects of variables, such as age, education, employment status, on the level of inequality.

Although the Gini index is subject to many criticisms, it is by far the most popular measure of income inequality, due perhaps to its close relationship to the Lorenz curve.
3.3 Normative Measures of Income Inequality\(^\text{11}\)

A criticism of the above measures is that they are statistical devices that measure the dispersion of a distribution with no reference to the normative notion of social welfare. Dalton (1920) and Atkinson (1970) developed normative measures, to determine the effect of the income distribution upon both the distribution and amount of economic welfare derived from income. Value judgements with regard to the social welfare function chosen are thus used.

Let \( x \) be an income distribution, with utility \((u)\), and \( u(x_i) \) is the utility derived from income \( x_i \). Dalton's measure, representing the welfare loss from income inequality is

\[
D = 1 - \sum_{i=1}^{n} \frac{u(x_i)}{nu(\mu)}
\]

The measure will be zero when all incomes are equal and will become

\[
1 - \frac{(n-1)u(0) + u(\eta u)}{nu(\mu)}
\]

when one individual receives all the income.

\(^{11}\) The material and equations presented in this section is based on Kakwani (1980, p90-95), and N. Kakwani (1986, p69-70).
Social welfare is the sum of individual utilities, which depend on income. Total utility is maximized when income is equally distributed. As income becomes less equal, welfare will decrease. Dalton's measure is given by the proportional loss of utility resulting from the actual and not the equal distribution of income.

Atkinson (1970) proposed a measure, derived from the equally distributed equivalent level of income, $x^*$, or the level of income per head, which if equally distributed would give the same level of social welfare as the present distribution. It measures the proportional loss of income resulting from having the actual not the equal distribution of income.

The inequality measure is

$$A = 1 - \frac{x^*}{\mu}$$  \hspace{1cm} (3.14)

where

$$x^* = \text{equally distributed equivalent income, given by}$$

$$u(x^*) = \frac{1}{n} \sum_{i=1}^{n} u(x_i)$$

Any measure of inequality involves judgements about social welfare and Atkinson assumes welfare can be expressed as a function of two variables: total income, and a measure of inequality, $(A)$. Thus,

$$W = nu[\mu(1 - A)]$$  \hspace{1cm} (3.15)
where \( n \) is the number of persons in the population. Accordingly, social welfare is an increasing function of \( H \) and a decreasing function of \( A \) (the measure of inequality). The definition of the equally distributed equivalent level of income, implies that the social welfare, \( W \), is equal to \( n u(x^*) \).

Because both Dalton's and Atkinson's index measure the loss of welfare caused through maldistribution, Kakwani (1986) argues that they are not a measure of inequality, since welfare loss is a "distributional waste", [see Meade (1976)] but rather a measure of ineficiency or loss of utility from a less than optimal distribution of available income. As a result, Kakwani, among others, called for a rejection of these "normative" measures if the aim is to measure inequality.

In addition, Atkinson's index is aggregative but not additively decomposable. An index is "aggregative" if it can be expressed solely in terms of numbers, mean incomes and inequalities within disjoint population subgroups. For an aggregative index, the inequality that remains if group inequality is zero, is a measure of the inequality between groups. There is however, no guarantee that the difference between this value and the overall inequality is a measure of within group inequality. To be able to measure this, an index that is additively decomposable, that is, where the difference is equal to the weighted sum of the internal inequalities, is needed.

Shorrocks (1980) established an inequality index, \( I_0 \), satisfying the principles discussed earlier, plus the principle of additively decomposable. That is, the index can be decomposed into measures of the contributions to total inequality of "between groups" inequality and "within groups" inequality. Thus if
inequality within groups were eliminated, the between group inequality would show. This method of decomposition is contrary to Podder's method in that it has an overlap between the groups.

The Shorrocks $I_0$ index measures inequality according to a formula which takes account of the ratio of each person's income to the mean income of the population.

In particular,

$$I_0 = \frac{1}{n} \sum_{i=1}^{n} \ln\left(\frac{u_i}{y_i}\right)$$

(3.16)

where $n$ is the number of persons in the population, and $y_i$ is the income of person $i$.\(^{12}\)

If there is no inequality, that is, the ratio is one, the $I_0$ has a zero value. Higher positive values indicates increasing inequality.

The Theil coefficient\(^{13}\) of income inequality is given mathematically by:

$$I = \sum_{i=1}^{n} y_i \log y_i$$

(3.17)

where $y_i$ = the income share of the $i^{th}$ individual and there are $n$ such individuals. The coefficient can range from zero (identical income) to log $n$

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\(^{12}\) A.F. Shorrocks (1982, p193-211). A detailed account of the technical properties of this index can also be found in the appendix to Meagher and Dixon (1986, p439-441).

\(^{13}\) For full details on the coefficient, see Theil (1967, ch.4.).
(one individual has all the income). This coefficient, like the Shorrocks index, is additively decomposable.

3.4 Alternative Measures of Income Inequality

3.4.1 Paglin Coefficient

Paglin (1975) proposed a measure based on a more careful and explicit definition of perfect equality. He developed a P reference line to show equal lifetime income and this was used rather than the 45 degree equality line to compare the Lorenz curve for actual income distribution.

He argued that the 45 degree line overspecifies the conditions of equality, for it requires both equal lifetime incomes and all families, regardless of stage of child rearing, to have the same income. Paglin saw income varying over life-cycle but every family at certain stages would have the same income as others at that stage, (i.e. equal age-income profiles).
Figure 3.2 Age-Income Profile

For example, family, or the income unit income, by age of head is shown by AB. The line CD represents the mean income specified by the Lorenz 45 degree equality line. Equality can still be defined as a situation where all families have equal lifetime incomes but this can be achieved via AB. For example, when we invest in education and training, our income tends to increase more slowly than if we had just commenced work immediately we finished compulsory schooling, but it peaks at a higher level before it decreases with age.
In addition, the 45 degree equality line does not allow income unit's income to be increasing as additional members enter the workforce.

Paglin's new reference line - the P reference line - tries to take account of such factors and give a more explicit definition of equality. It is derived by taking average income in each group (measured by age of the head of the group) and ranking these by their mean income (not ages). It is assumed each member of a group has the same income. The young and the very old income units are at the bottom of the income scale. The P reference line (similar to the Lorenz curve), can be constructed by using the percentage each group represents in the total population of income units.
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<th>Age Group</th>
<th>Mean Income</th>
<th>No. of Units ('000)</th>
<th>Income of Group</th>
<th>% of Total Units</th>
<th>% of Total Income</th>
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</tbody>
</table>

Table 3.1: 1986 All Income Units - Age of Reference Person

A.B.S.1986 Income Distribution Survey: Income Units Australia
Catalogue No.: 6523.0.

![Proportion of Income](image)

Figure 3.4 P-Reference Line
The limitation of the P egalitarian line is that it is not unique but depends on the choice of the age group. Since such a choice is arbitrary, the construction of the curve can be claimed to be arbitrary.

To avoid the exaggerated income inequality shown with the traditional Lorenz curve measure, use of lifetime income has been suggested. Paglin however rejected this on the grounds that in a dynamic economy with increasing labour force participation, and annual growth in real per capita income, lifetime income equality is not workable. The advantage of the P reference line is that it defines equality as equal incomes for all income units at the same stage of their life cycle, not equal income between different age groups. Members of a generation would have the same lifetime income and differences in lifetime income between generations would be due to increases in real income.

The difference between the P-reference line and the 45 degree line represents acceptable inequality due to the relationship between age and income. The divergence of the Lorenz curve for observed income from this P reference line represents unacceptable inequality. If an age-Gini coefficient (reflecting the need to vary income over life and also productivity, investments, and work-leisure preferences) is deducted from the standard Gini, the Paglin-Gini, reflecting unacceptable inequality, is determined.

Paglin Coefficient = Gini Coefficient - GR (inequality which exists if all members of the group had equal income)
There has been much debate as to whether the Paglin-Gini index is an appropriate alternative to the conventional Gini index. The reader is referred to Kakwani (1986) for a further discussion of the measure as it is not intended to use the measure in examining the distribution of income in 1986 in Australia.

3.4.2 Norm Income Approach

Jenkins and O'Higgins (1988) suggest the norm income approach, ("norm" referring to the "authoritative standard", not the most frequent), be used to force analysts to think explicitly about differences between income units. They claim the literature focuses on income differences in a homogeneous population, but they feel there is more to inequality. More discussion is required of the characteristics that should be used to discriminate between income units and secondly, the scale relativities between unit types.

The norm distribution \((z)\) is what is needed by each income unit given the aggregate income available, to minimize inequality. Variations across units will exist since differences exist in equity relevant characteristics, but a given group should display the same characteristics. Inequality can then be measured by comparing the observed income \((y)\) with the norm income \((z)\).

\[
z = \theta r + \lambda
\]  
\[(3.18)\]

and in the special case where \(\lambda\), (the translation factor) equals 0, the income relativity scale, \(r\), is the same as the equivalence scale.
The observed income and the income unit characteristics are used, as in the equivalent scale approach discussed in Section 2.3, but this time they are used to "construct the socially desirable minimum degree of inequality distribution \((z)\)". Inequality can then be determined by comparing observed income with its norm distribution. Comparisons are with the "actual" and not the "equivalent income," thus Jenkins and O'Higgins (1988) claim the ordering of income units is important. Income pairs for each unit are used to draw concentration curves showing the cumulative income shares of norm income where income units are ranked in ascending order of income. The concentration curves may be above or below the Lorenz curve for \(z\) and only if the two curves coincide does perfect equality occur.

Jenkins and O'Higgins (1988) claim that this approach can be compared to Paglin's work (cited above), in that inequality is determined by a comparison to "a standard of normal or justifiable concentration", although the idea was first developed by Garvy (1952).
CHAPTER 4
PREVIOUS AUSTRALIAN STUDIES

4.1 Introduction

Having discussed the various conceptual problems associated with analyzing the distribution of income in any one time period, it is intended in this chapter to focus on some of the major studies undertaken in the general area of income distribution and redistribution and indicate the findings of these studies so that an overall picture with regard to income distribution in Australia at least prior to 1986, is obtained.

The range of inequality measures, combined with the possibility of applying these measures to different income concepts and different income units, gives rise to a wide range of possible analysis and research.

However, before listing and then examining in more detail, some of the important studies that have been undertaken with the Australian data, it is necessary to outline the data sources that have existed in the past and also those that are currently available for research purposes.
4.2 Data Sources

Until the late 1960s, the amount of survey information available on either income or wealth was limited. An income question was included in the special 1915 wartime survey of private wealth holding (see Knibbs 1918) but there were a number of problems with this census. The coverage was limited to those over 18 years of age with the onus placed on the individual to file the return. The statistics relate to the individual and cannot be compared with statistics relating to family or household units. However, according to Ingles (1981) the published data refers only to net income with some suggestion that under-reporting took place because of the fear that the Census returns would be used to levy a new Commonwealth income tax.

The 1933 population census was the first to include a question on income but this was not repeated again until the 1976 and 1981 censuses. The income question referred to income from wages and salaries, business, plus any income from property or other sources. Data was however tabulated separately for male and female breadwinners and dependents and thus household or family income is difficult to derive. The question asked only for income within specified ranges. Thus data from this source is not easily comparable with other sources and the accuracy is perhaps likely to be less than a survey containing specific and detailed questions.

Prior to 1968, income tax data was the main official source of income statistics. A major problem with using income tax statistics for this type of analysis is that many individuals with income below the tax threshold do not file a return. In addition, a major Australian study using this type of

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14 McLean & Richardson (1986) cite many of the sources listed here. The reader is also referred to Ingles (1981) and Richardson (1979), for more details. Maddock et. al. (1984) and Encel (1990) provide a bibliographic guide to sources.
data, Lydall (1965, 1968) found that for some forms of income - notably wages and salaries - only taxable income was recorded, that is, the amount remaining after all allowable deductions were made. Concessional deductions were a significant factor prior to the mid 70's in Australia. In addition, tax statistics lump together income from all sources whether it be from full-time or part-time or casual employment, employment for part of the year, or income from property. Thus an increase in part-time employment could increase the number of individual low income earners and thus the dispersion of income. Other deficiencies of income tax statistics include understatement of income, exclusion of certain types of income such as capital gains, and the effect of avoidance measures such as income splitting.

In 1967, an unofficial Australian wide survey of consumer finances and expenditure was conducted jointly by the Macquarie and Queensland Universities. This was the first of its kind in Australia, collecting information on household expenditure and gross family income and taxes.

In 1974/75, the first official household expenditure survey, covering the 6 State capital cities and Canberra, was conducted by the ABS, and along with further nationwide surveys in 1975/76, 1984 and 1988/89, it was designed to determine expenditure patterns of households, that is, the expenditure patterns of people sharing common housekeeping arrangements.

Household expenditure surveys are relevant to income distribution analysis for not only do they provide, although limited, income data, they also provide the perspective of expenditure as a command over goods and services. While the ABS 1975/76 survey, with a response rate of 73.2%, covered the whole of Australia except the remote and sparsely populated
areas, the earlier private survey was limited to 5,500 families in urban areas only with a low response rate of 50%. Thus a high non-random element is introduced. Doubt is also cast on reliability in that one person households comprised only 9% of the total surveyed, whereas in the larger and more comprehensive ABS Household Expenditure Survey of 1975/76, they comprised about twice that percentage.¹⁵

The ABS definition of family includes only those having a relationship to each other by blood, marriage (including legal and de facto relationships), or adoption, whereas the Macquarie/Queensland survey included all those living in the same dwelling and using the same dwelling and using common cooking facilities.

In addition, the income concept used in the two is different. The 1967/68 survey examined gross income, with no breakdown of the components - for example, the functional distribution, whether full-time or part-time and no imputed rent from home ownership. By contrast, the ABS now disaggregates gross weekly income into five main components: wages and salaries; own business, trade or profession (including share in partnership); government pensions and benefits; superannuation; interest, rent, and dividends; and other sources such as maintenance or alimony.

Beginning in 1968/69, and repeated in 1973/74, 1978/79, 1981/82, and 1986, the ABS has conducted surveys on income to obtain information on individual and family income plus other characteristics such as age, education, labour force participation, source of income, family size and type.

¹⁵ Richardson (1979, p22-23) documents these and other problems associated with the Macquarie Survey.
The ABS Income Distribution Surveys for 1968-69 and the 1970s covered approximately one half of one per cent of the population aged over fifteen years of age except persons in institutions, members of the armed forces, and certain diplomatic personnel usually excluded from such surveys. The 1981-82 Income and Housing survey covered about one third of one per cent of the population aged fourteen years and over, while the 1986 Income Distribution Survey covered one-sixth of one per cent of the population aged fifteen years and over, in both urban and rural areas. Both excluded people in the categories listed for exclusion in the earlier surveys. 

However, the two types of surveys conducted by the ABS, namely income distribution and household expenditure, are not strictly comparable. The HES data are based on the 'household' as the reference unit. A 'household' is defined as a group of people who live together as a single unit in the sense that they share common housekeeping arrangements; that is, they have some common provision for food and other essentials of living. This definition is wide enough to encompass group houses or houses with a boarder, where incomes are not shared even though living arrangements are. Thus when households comprise more than a single family or income unit, comparisons with the income distribution surveys are not valid.

The income data up to 1980 is presented as group data in closed intervals with the mid-point being used as income for individuals in a given range. For the open-ended terminal group, the mean was estimated to be one and a half times the lower level of the group. However, since the 1981-2 survey, results of income surveys are released on unit record data tapes for public use. More precise calculations are therefore possible. Post sample expansion

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16 ABS Catalogues No. 6545.0, 17.17, 6523.0,
factors are also available to adjust the sample for over and under representation of certain types of persons or households.

Since the late 1960s there is then abundant evidence on income distribution relative to that available earlier. For this reason, Census data acquires great significance for the earlier period, while observations on distribution of income today is based on the ABS data.

4.3 Major Australian Studies

The first private Australia wide Survey of Consumer Expenditure and Finances was used by Podder (1972) to examine individual differences in family income, while the ABS expenditure survey of 1975/76 was used by Kakwani (1983, 1986) to analyze pre and post transfer distribution of income for various socio-economic groups.

The 1933 Census data was used in conjunction with the 1979 Income Distribution Survey by McLean and Richardson (1986) to compare and analyze changes over the period 1933 and 1980. Other ABS Income Distribution Surveys have been used by Murray (1978, 1979 and 1981), Meagher and Dixon (1986), Neville and Warren (1984) and Cass (1986) to examine various aspects of income distribution over the 1968-1981 period.

Nevile et.al. (1988) added data from the 1984 Household Expenditure Survey to the 1978/79 Income Distribution Survey data, to determine the effects of anti-inflationary policy on income distribution.
Apps and Savage (1986) used the 1981/82 Housing and Income Survey to measure inequality based on welfare compared to income. Meagher and Agrawal (1986) also used this survey to examine the effect of a change in the tax mix on the distribution of personal income and then later (1988) to examine the economic and distributional effects of the government's macroeconomic policies of wage moderation and fiscal management adopted for structural reform of the economy.

The Social Policy Research Centre, (SPRC), at the University of New South Wales, uses the ABS data on both income and household expenditure to analyze changes and trends in disposable income, taxation, unemployment, family incomes, the level of social welfare payments, or other aspects relevant to social policy.


Marc Lombard (1991) uses the official taxation statistics on personal taxable income over a six year period from 1982-83 and 1988-89 to determine the impact of government policy changes on income distribution.
The income concepts first developed by Podder and used in many of the other studies, for example Murray (1979,1981), were individual income, family income, and income per family member. Podder (1971) was the first to attempt to estimate an equivalent income scale for Australia, whereby to obtain some idea of the relative economic position of a family, the family income distribution is deflated for the difference in family composition and then equality measures computed. Podder assumed welfare or standard of living was determined by the percentage of income spent on food. Kakwani (1977) used the same data, that is the Survey of Consumer Finances and Expenditure 1966-68, but allowed for economies of scale with the scale varying with the level of income. This was subject to criticism, because it could only be used for a broad range of consumer goods and could give a biased estimate, but it does point to the need for alternative income scales.\\

Agrawal (1987) claimed that for the purpose of measuring welfare, it is important to have as comprehensive a definition of income as possible and thus all factors affecting well-being, both directly and indirectly, should be included. Agrawal argued that, given data limitations, in addition to using household or income unit income, rather than individual income, equivalent-adult income is a more appropriate indicator of welfare and should be used to analyse the distributional consequences of any economic change in the economy. Using the 1981-82 Income and Housing Survey data, and the Taxation Statistics for 1981-82, the distribution using equivalent-adult disposable income, adopting the scale used by Kakwani (1986), was compared to one constructed using disposable income, to highlight the significance of the adjustment, and its use in analysing the distributional consequences of any economic change.

\textsuperscript{17} Refer to Section 2.2 for a full discussion of equivalent scales.
4.4 The Findings of These Studies

Podder (1972) found some empirical grounds for the belief that Australia had a more egalitarian income distribution structure than many other Western economies. Also he found that income per capita was more unequal than family disposable income, which is more unequal than the composite income-expenditure variable (where expenditure replaces income when it is greater than income), whether reference is to family numbers, that is, per member, or to the equivalent income scale where only husband and wife are considered. This latter distribution though was found to be slightly more unequal than that on a per capita basis.

Podder also examined income distribution within different socio-demographic groups, and found the age, and hence experience on the job, of the head of the family was one of the most significant factors accounting for inequality. The level of education was important for inter-group differences in income, but not for inequalities within a group. Similarly with family size (excluding one member families), and occupation of head (excluding families where the head was not in the workforce), the distribution of income within the groups was more equitable.

Murray (1981) in examining data for 1968/9 and 1973/74 concluded that the level of household income inequality had been understated in the past and also that the level of inequality had not changed over the period unless families were classified according to the number of income earners. Families with different numbers of earners experienced increased inequality, while those with the same number of earners experienced greater equality.
Using the combined distribution of families and non-family individuals, Murray also challenged some of Podder's conclusions. By international comparison, he found Australia did not have a low level of inequality of household income, while nationally, not one of the income concepts considered (family income, equivalent income, or income/member) indicated any more or less inequality than any other. He argues against claiming a change in the level of inequality following adjustments for family size or equivalent income.

Concentrating on inequality in Australia for 1968-69 only, Murray (1978) decomposed the Gini and Theil coefficients as well as referring to the Paglin coefficient to measure inequality once allowance has been made for differences in earnings associated with particular attributes of the population. These values may be used to eliminate that part of inequality due to "acceptable" factors, such as income differences due to age, or may be used to evaluate the importance of different attributes causing inequality. Murray found a large part of the inequality could be explained by differences in specific attributes of the population - in particular, education, age and sex (in that order). The three variables together had greater explanatory power than any one or two although the difference due to sex, while having some significance, was not a major factor. Murray's (1978) main conclusion was that "the fairly simple-minded use of age and education as classificatory variables explains large amounts of total inequality". However, even allowing for these factors, the male/female classification still has some explanatory power.

In examining the two time periods of 1986/9 and 1973/74, Murray (1979) found a redistribution of income had occurred. He decomposed the
inequality coefficients, to provide insight into the nature of the changes. Murray showed that the decreased inequality was as a result of decreased differences between people with different attributes, rather than decreased differences between people with the same attributes.

The general increase in mean income was inversely related to the level of income. Female and younger income receivers experienced the greatest relative gains, while those in receipt of government social services benefits experienced the higher percentage increase in mean income. These changes can be explained in part by government policies and the state of the economy, that is, increased unemployment accompanied by increased benefits; and also in part by the implementation of policies of equal pay for equal work, and anti-discrimination legislation. In addition, a reduction in wage differentials helped decrease income inequality.

Cass (1986) also found these policies important for increasing the women’s share of individual income over the 13 year period, 1968/69 to 1981/82. Using the ABS Income Distribution Surveys conducted over this period, Cass found women continued to receive an annual income from all sources which was half that received by men, due to their greater reliance on government transfer payments. Cass concluded that women were in a disadvantaged position in the overall income distribution and this factor is an important consideration when devising other social policies.

Nevile and Warren (1984) found inflation had little significant effect on income distribution in the 1970’s regardless of which income grouping - family, income units or individuals - was used. The Gini coefficient for gross family income did not change between 1968/69, 1973/74 and 1978/79, although income distribution after tax became more equal. They
acknowledged that this may have been due to the contribution of social factors - family allowance, equal pay etc. - to increase equality and counter any negative effect of inflation.

Comparing 1973-74 data with 1978-79, they did find the lower 40% of families and multiple income units relatively worse off. However, the overall Gini coefficient did not change, due to increased unemployment which may have resulted from inflation and anti-inflationary policies. The tax system and inflation was found to penalize the "better off" wage earners more than the lower wage earners. Thus Nevile and Warren concluded that inflation, if anything, made the after tax personal income distribution more equal, especially for PAYE taxpayers.

However, in a later paper, Nevile et.al. (1988) found that the anti-inflationary policy in the second half of the seventies and early eighties had significantly increased income inequality, regardless which income income concept - family, household or equivalent - was used. Inflation may have many undesirable consequences on for example, wealth distribution, and the efficiency of the economic system, but as far as income distribution is concerned, Nevile et.al. concluded that "the efforts to combat inflation are more deleterious than inflation itself."

McLean and Richardson (1986) reported on income trends between 1915, 1933 and 1981. Their primary aim was to estimate the 1933 distribution in a way that comparisons with later years would be possible. Thus they attempted to estimate the degree of inequality that might have existed had not the depression occurred.
They found male income inequality declined over the period 1915 to 1981. Removing the effects of the depression, still gave a distribution that was less equal than in 1981 where the income of the top 40% was a higher proportion of the median income. The bulk of the recipients moved into the 2nd-8th. decile, that is, the top income class decreased its share while the bottom class increased. Inequality in aggregate household per capita income (which can be argued to be a better indicator of material well-being than individual or even family income) declined while the well-being of different decomposed households remained unchanged with some gain to female headed and large households.

Meagher and Dixon (1986) concluded that a major determinant of the mean income of groups, is the extent of labour force involvement. Males, with higher participation levels, have higher incomes than females, but even if a comparison is limited to male and female workers with the same labour force involvement, differences still exist.

Decomposition according to age, birthplace, occupation, or qualification did not highlight any one as a major contributor to inequality. One-parent income units, particular those with a female head, was found to be the poorest group. Between 1973/4 and 1978/79, income inequality did decline, but this was found to be due to increased welfare payments particularly for females, (as Nevile and Warren acknowledged), rather than any change in the structure of income equality. From 1978/9 to 1981/2, no further decline occurred in income inequality, just as there was no marked change in the social security system. Post tax income was found to be more equal than gross income (again a similar finding to Nevile and Warren), with gross income allowing for social services benefits, being more equal than earned gross income.
Meagher and Dixon also concluded that by international standards, Australia is not highly egalitarian.

Meagher and Agrawal (1986) addressed the effects of tax reform on the distribution of personal incomes, using results from the Orani-Naga model. Decomposing the Shorrocks \(^{10}\) Index, the authors found inequality amongst males accounted for 26.4\% of total inequality, inequality among females 60.2\%, while inequality between the sexes explained only 13.4\% of the total inequality. Further characteristics, namely principal source of income, employment status, and labour force participation were then nominated to decompose the inequality within the subpopulations of male and female income recipients. A further decomposition for male and female full-time, full-year workers according to occupation was also undertaken. According to the analysts, these characteristics were chosen to highlight likely changes in the importance of various sources of inequality as a result of a change in the tax mix, and all apart from occupation were found to be significant sources of inequality for both males and females. In addition, any change to the tax mix was not likely to change the size or importance of the above sources of inequality. The study concluded that any implications of tax reform, such as pre-tax prices and incomes, tend to impinge uniformly on the incomes of groups that already contain inequalities. However, as Agrawal (1987) claims, the aggregative nature of the index makes it inadequate for capturing distributional changes resulting from economy wide changes.

Agrawal's (1987) study found that using family rather than individual incomes, and adjusting for household size and composition, made an important difference to the inequality in the individual distribution of
income. The pre- and post-adjustment distributions were broken down across seven demographic groups. The decrease in inequality was reflected in a lower Gini index value, (the index fell from 38.3 to 29.3), and a change in the decile distribution with the first five deciles increasing and the remainder decreasing as a result of the adjustment.

A further study by Agrawal and Meagher (1988), although concerned with examining the economic and distributional effects of government macroeconomic policies, did highlight the importance of labour income for income distribution, since with the exception of the highest decile, which received a higher proportion of income from other sources, the proportion of total income received as wages and salaries increased with average income.

Kakwani (1983) using the 1975/76 Household Expenditure Survey, tried to measure the impact of personal income tax and government cash transfers on the distribution of household income. The study tried to improve on earlier studies using household income, by adjusting for household composition and size to allow for differing needs. It also attempted to quantify the effects of horizontal and vertical equity, that is, tax progressivity, on income redistribution, but made no attempt to adjust for non-cash and indirect benefits and taxes.

Kakwani found household income more unequal than per capita or adjusted household income. In addition, original income, regardless of which income concept is used, is much more unequal than gross income (defined by Kakwani as original income plus direct cash benefits). Thus both income tax and cash benefits reduce inequality in household incomes, with government cash benefits having a greater impact than tax. Kakwani
(1983) found inequality was reduced 15.4% as a result of cash benefits, compared to 6.3% from the progressive tax system.

Comparing this study with some of his and Podder's earlier work (1975a), he found both factors had greater redistributive effects in 1975/76 than in 1966/67. The greater equality that occurred was found to be mainly due to government transfers. Income inequality did though increase over the period.

Kakwani (1986) also reported on the contribution of wages and salaries and investment income to inequality. Contrary to the commonly held belief, wages and salaries was found to increase inequality, while investment income had an equalizing effect. Per capita household income was not any more equal than total household income, but adjusted household income whether applied to original, gross or disposable income, was more equal than either of the others. This was an important finding, because previous studies with no adjustments for household size and composition, could have overestimated the degree of inequality.

Lombard (1991) found there had been a significant widening of the income gap in Australia during the period 1983-89. The top 1% of income earners earned as much as 21.19% of the bottom earners in 1989, compared to 11.09% in 1982/3. The suggested causes for this change, included the relative decrease of wages and salaries as a percentage of national income and the increase of the non-wage component, for example, dividends and fees, the gap between wages and non-award earnings, and factors such as the rate of inflation and high interest rates. The taxation policy, via reduced progressivity, lower company tax and the discrepancy this created with the top marginal income rate, was also thought to have contributed.
Lombard also found the female share of national income had not improved and had in fact performed worse than their male counterparts, due in part to part-time employment, and in part to the nature of their occupations.

From the many analysis undertaken by the SPRC to assess the impact of changes in tax rates, unemployment, family break-ups and the value of pensions and other welfare payments, it was generally found that the very poor - particularly the sole parents - and the top 1% of families had the gains, while the losers of the 1980's have been the "middle Australian", with singles and couples with no children, experiencing the biggest declines.

Bradbury, Doyle and Whiteford (1990) in assessing trends in disposable income, found medium family incomes to have increased around 6.5 per cent between 1982-83 and 1989-90, although this was reduced to 3.3 per cent if farming families were excluded. Single people and couples with young children experienced the smallest income growth. Their results are based on the 1985-86 Income Distribution Survey adjusted by micro-analytic simulation techniques to reflect changes in income levels, employment, taxation and social security payments.

Castle (1987) in comparing data for Australia/Sweden and Australia/United States, found substantial differences in the distribution of household incomes. Australia was found to be less equal than Sweden but more equal than the United States. Major differences between the countries in the degree of concentration or dispersion of household incomes, both in the aggregate and for groups of households which were relatively homogeneous in terms of family composition and employment status was found to exist. Cash transfers had an important impact on the distribution,
but differences in the degree of dispersion of private incomes had a larger influence.

The work of Saunders and Hobbes (1988) support this finding, in that they found the distribution of income in Australia less equal than in four of the other six countries studied as part of the Luxembourg study. Market income, that is, the return to labour and capital, plays a major role in shaping the overall income distribution in Australia. Transfer income is much less significant, accounting for only 10% of gross income, but taken with taxation data, an indication of the impact government may have on income distribution is obtainable. Thus, although Australia ranks in the middle in terms of inequality at the bottom of the income distribution, it is characterized by considerable inequality at higher income levels.

Saunders, Hobbes and Stott (1989) extends this analysis by presenting comparative data on tax and income support expenditures in Australia and New Zealand, and describing major changes in income inequality in these two countries over the period 1981 to 1986. Comparisons of gross family income, equivalent income, equivalent net income, were made and pointed to the diversity that results from using equivalence scales and weighting procedures. This is important in examining the extent of the inequality that exists in a country, more so than its ranking in inequality. On the basis of equivalent net family income, although neither country ranked as highly egalitarian, New Zealand did have greater equality in 1981-82 than Australia.

Inequality in both countries increased over the period 1981-82 to 1985-86, mainly as a result of the increased share of the top quintile. Since the analysis was conducted before tax reforms in both countries, the authors feel inequality may have increased even more since 1986. Property income was also found to have increased in significance, reflecting greater stock market activity and rising interest rates. Wages and salaries also increased in significance to the top quintile, particularly in Australia.

Apps and Savage (1986) used both the individual and the household as the unit of analysis, to determine both the extent and source of inequality, and then to compare individual and household income with those of individual and household welfare. Their study highlighted the extent to which inequality measures, based on household income, can understate the degree of inequality on an individual basis and also give misleading information as to the source on inequalities. For example Apps (1984), found women made up 95% of the bottom decile, which had an equivalent income of $7567, while if household had been the basis of analysis, the bottom income decile would have been 50% higher. Comparing full income and adjusted income highlights the degree to which full income overstates the degree of inequality, although the difference between equivalent and full income inequality does depend on the coefficient on the wage and full income variables for heads and spouses. Apps and Savage concluded that observed income is an unreliable measure of inequality.
4.5 Conclusions

Comparing Australia's income distribution with those of other developed countries, results in Australia not being as egalitarian as many of the others. This is contrary to Podder's (1972) findings but can perhaps be explained by differences in the definition of income and the income receiving unit, or more likely (as Podder notes), by the fact that the Australian data was for 1967/8 period, while the data for the other countries were for the early 1950s. Linking this to McLean and Richardson's study on income inequalities in Australia over the period 1933 to 1981, the decline in inequality can be attributed to before 1969. Thus if a comparison was made with other countries for the same time period, Australia would not have performed so well.

Results based on the 1967/8 Survey on Consumer Finances and Expenditure, however, have tended to be shown by subsequent analysts to be unreliable. Kakwani (1983) sees this as perhaps being due to the non-random element of the 1967/8 survey, and with a very low response rate of 50% the results can't be claimed to be reliable. Murray also felt that this data source was undersampled and thus understated inequality in the family income of single persons.

McLean and Richardson's findings of a decline in equality from 1915 to 1981 or 1933 to 1981 can be reconciled with other studies which report no decline in equality (see, for example, Kakwani 1983 ). These studies are looking at changes in the 70s and as McLean and Richardson acknowledge, most of the measured decrease probably occurred before 1969, which is used as the base year in the other studies examined here.
The changes in inequality that occurred in the 70s was due predominantly to increased social benefits rather than any fundamental change in society. Kakwani (1983) also found the progressive nature of taxation, contributed to a lesser extent to reduce inequality.

Income received does appear to depend on the extent of labour force involvement, with educational level and age being important factors, more so than the sex of the participant.

Results obtainable also appear to depend on the unit of analysis and whether original or adjusted income is used. The study by Apps and Savage (1986) and Agrawal (1987) point out the variations possible, with the results being influenced greatly by the choices made. Equivalent income, income per capita, or per family or household member, can be used to gauge inequality more exactly. Agrawal claims equivalent adult income is the unit of analysis to be used when examining economy wide effects of any economic change.

In addition, decomposition of the population, to try to explain both the sources of inequality and the changes in inequality, is possible.

Thus when surveying all the available literature on income distribution, care has to taken as to just exactly what is being measured, both in terms of income and the unit of analysis. In addition, the data source needs to be comprehensive and reliable. Thus the ABS data is now the main source of data for analysis.
From the literature we have examined here, the general conclusion appears to be that income distribution has not become any more equal if it were not for the effect of the government's redistribution policies. Over the 1970s, increased social welfare payments helped, in particular, those on the lower income levels, while over the 1980s a widening of the income gap appears to have occurred, with the losers appearing to be the "middle" Australians.
CHAPTER 5

DESCRIPTIVE ANALYSIS OF THE DATA BASE

5.1 Introduction

The purpose of this chapter is to examine the size distribution of income among Australian income units as reported by the ABS in their 1986 Income Distribution Survey. Kakwani (1986) claims that from a welfare point of view, distribution by size of income is more relevant than the way income is shared by the factors of production, that is, the functional distribution.

This study follows a convention established in much of the Australian literature by analysing the distribution of incomes across income units, as defined by the ABS. The choice of this unit is largely dictated by data availability considerations. Data on individual income earners can be insufficient, in that it obscures the significance of two income families, any income splitting arrangements, as well as the number of dependents supported by the income. If we are to be concerned with economic inequality as represented by the distribution of income, family, or household, or income unit would be the appropriate unit of analysis.

An income unit is defined as a group of people who live together and form a single spending unit. This concept is a close approximate to the family as a spending unit, and, according to Bradbury (1990) has the advantage of being similar to the concepts used in the income tax and social security systems.
For the present study, the ABS classification of income units is adopted as the appropriate one. Income units belong to one of the following types:

(1) married couple income units, which consist of a husband, wife and dependent children (if any).\textsuperscript{19} De facto relationships are included.

(2) one-parent income units, which consist of a parent and at least one dependent child.

(3) one person income units, which consist of persons not included in (1) and (2) above. Non-dependent children living with their parents are classed as one-person units.

Thus every individual in the database must be classified as belonging to one of the above income unit types.

In addition to determining the degree of inequality within the total population, the income units will be subdivided into homogeneous groups on the basis of the socio-demographic characteristics generally thought to have some influence on the level of inequality experienced within a community. The distribution of income within each of these groups will be examined.

\textsuperscript{19} Dependent children refer to all persons living with their parent(s) and either less than 15 years or 15-20 years and a full time student, who has a parent/guardian in the income unit and is neither a spouse nor parent of anyone in the income unit. Any income received by dependent children is not included, thus, as Bradbury (1990) points out, the maximum number of income recipients is two.
As defined by the ABS\textsuperscript{20} current income refers to gross weekly income defined as the sum of amounts usually received per week (before tax or any other deductions) at the time of interview. It includes moneys received from wages or salary, government pensions and benefits and other regular payments such as superannuation, maintenance, educational scholarships, annuity etc. It also includes derived weekly equivalent amounts of income received annually from own business, partnerships, interest, rent, dividends, etc. during 1985-86.

Wages and salaries includes income from all wages and salaries jobs and limited liability companies. Payments in kind, for example, employer contributions to rent or any gratuities are excluded. Income from own business, trade or profession (including partnerships), is a derived weekly equivalent amount from these sources in 1985-86. Income from the above sources are collectively referred to as earned income, or labour income.

Superannuation comprises gross income from regular payments by former employer, either directly or indirectly through a superannuation fund or insurance company. Lump sum payments received on retirement are excluded. Superannuation, together with interest, dividends and rent, is collectively referred to, by the ABS as private non-labour income.

Income from other sources comprises income from private educational scholarships, maintenance or annuities. Moneys received at regular intervals is included, while lump sum payments are not regarded as income. Government pensions and benefits includes income received through programs of assistance to aged, handicapped, sick, unemployed,

\textsuperscript{20} ABS Catalogue No. 6523.0
single parents and families. Income from government sources, combined with income from other sources, can be referred to as transfer income.

In analyzing gross weekly income, labour income, gross private income, (i.e. labour plus non-labour income), plus transfers, both private and public, will be examined.

The gross income for income units will be the main focus of the analysis. In addition, data on tax is available thus enabling analysis of net income and an examination of the effect government has on changing the distribution. The tax data is presented as annual data, thus a simple arithmetic calculation is necessary to derive weekly tax payments.\(^{21}\) The tax figures are based on the amount paid the previous financial year. The net figure is then an approximate one only. In addition, problems arise when applying tax data to those income units, such as, the self-employed, farmers and others, who derived negative tax for the 1985-86 financial year. Such groups can offset many and varied expenses against the income they have earned so that their tax liability is zero. To avoid problems created in determining the income of such groups, income units with zero tax could be eliminated. Using this approach the effect of government tax policy on equality could be more easily determined. However the analysis to follow will examine both situations, that is, excluding and including income units with zero tax as it is felt that those units who have zero or negative tax have still earned income and thus need to be considered.

This is however, a fairly elementary treatment of the tax data. It does not for example, represent disposable income. A more comprehensive study of taxation would entail identifying and separating taxable and non-taxable

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\(^{21}\) Annual tax is divided by 52, to accurately derive the weekly payment.
income components, applying the tax scales to estimate tax liabilities, and allocating tax deductions and rebates to eligible families, as attempted for example, by Saunders and Hobbes (1988). Such a comprehensive tax analysis is beyond the scope of this study.

A progressive income taxation policy is expected to redistribute income away from the high income groups towards the lower groups. These groups should have a greater share of income after tax has been levied. The temptation to argue for increased tax progressivity to further decrease inequality needs to be resisted though, because of the effects on gross income of tax changes. For example, as Meagher and Dixon (1986) explain, if tax changes were to affect wage demands, some workers could face unemployment and thus decreased income. Thus a thorough analysis of the effects of policy changes would require a framework accounting for the links between these policies and social security payments, taxes etc. This is clearly beyond the scope of the present study.

In addition to examining gross and net income, the impact of government can be examined in terms of its transfer policies. Government social service and taxation policies should narrow the differences in income received by the different income units. In particular, we would expect to find low income units in Australia in 1986, to have their position improved as a result of government action, particularly as a result of the transfer payments. The middle income groups we would expect to exhibit the least benefit, since the "common" belief is that neither the progressive taxation policy nor the transfer payments, really target these groups. The full impact of the governments redistributive policies will not however be measured in this analysis. As Kerry Schott (1987) claims, it is not via earnings that the present government has sought to redistribute, but rather through "social
wage" increases, that is with the provision of education, health and housing. Analysis of such data is also beyond the scope of this study.

The distribution will however be examined to show the importance of different types of income. The contribution of each type to total inequality is of utmost importance for public policy. Labour services account for 75.33% of gross weekly income received. It is expected that this source will have a significant impact on the level of inequality, since the amount received will reflect differing levels of skills, education, age and experience offered by the income units. Income from capital, (investment income), although only comprising 4.95% of total income, is expected to be of much greater significance to higher income groups and thus contribute to the level of income inequality experienced within the population. Income from self-employment and non incorporated business activities, representing 8.11% of total gross weekly income, is expected to be important in improving the middle income groups. Income from other sources, particularly government, will be important for the lower income units.

Computations of the data on the ABS' unit record file, Table 5.5, cites income from wages and salaries, as being the principal source of income for 57.4% income units, with business and capital investments representing 6.6% and 4.6%, respectively, of all income. Where there is a heavy reliance on government, for example, single units with dependents, or income units with an elderly head, the income level is expected to be low. Government transfers are important for 27.1% of all income units, but make up only 9.82% of total income received.

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22 Author's calculations from the ABS unit record file. Zero incomes have been included in the calculations of total incomes.
Individual characteristics of members of income units (education, labour force participation etc.) will influence the amount of income received by an income unit. However, the emphasis here is on "family group" factors that could affect the amount of income received, for example, the size of the unit, the type of unit and the number of earners. Income units will differ greatly in terms of these characteristics and these will be important in determining the income received.

Units with two income earners and no dependents are likely to have greater income than those with a number of dependents. As the size of the unit increases, income is expected to be reduced, although this may depend on the age of the dependents.

Units with older dependents may have two income earners, and thus increase the possibility of a higher income. Single parent units with dependents are expected to have a much smaller income than married income units with dependents, primarily because single parent units are likely to rely largely on government transfers.

Particular socio-economic characteristics of the income unit head could also have an effect of the level of inequality. The age, sex, and the country of birth of the unit head are all expected to contribute to the level of inequality.

Age is expected to exhibit the life cycle effect on income, increasing with age up to the mid forties or to fifty years, and then decreasing. Income units, whose head is a male, is expected to have a higher income than those with a female head, as a result of their reliance on different principal sources of income and also the fact that females tend to have periods away from earning income. Likewise with the country of birth of the income unit
head. Many Asian and European born heads, are expected to rely on business as the principal source of their income. Income from business is expected to be highly unequal, although perhaps not as much as labour income. However, the exact impact of business income will be difficult to determine as the income recorded from business is net of business expenses and thus does not always reflect the true significance of this source of income.

5.2 The Data Base

The 1986 survey covered about one-sixth of one per cent of the population in both rural and urban areas in all States and Territories. To derive estimates from the unit record file, it is necessary to add the "weights" of the persons in each category, not just count the number of persons falling in each category. A feature of the 1981-82 and the 1986 Surveys, is the availability of post-sample expansion factors which can be used to adjust the sample for under- or over-representation of certain types of persons or households. The "weights" take account of a person's probability of selection in the sample from his/her region, with an adjustment to account for under enumeration at the age, sex and metropolitan/rest of state level. If each person were to be counted only once then no account would be taken of the fact that a person's chance of being selected in the survey varied from region to region and the resulting estimates may be seriously biased. The use of "weights" (expansion factors), enable the data provided by the sample to be expanded to obtain estimates for the defined population. In the 1986 Income Distribution Survey, 10 815 observations were made, which when expansion factors were applied, represents the total population of 7 634 114.
Although this is the fifth in a series of such surveys, results were released for the first time as a unit record data tape for public use in 1981-2. These unit record tapes are superior to any previous publications, in that much more detailed information on a number of variables sometimes omitted in the past, is now available. As King (1987) explains, unit record data provides data for each individual unit within the sample. The only loss of information from the raw data may result from the reduced classification for some variables to maintain confidentiality. New insights and analysis are now possible. Some data is available in precise values, for example, current earnings, while others are given in grouped form. For example, the age variable is recorded in five year intervals starting from 20 years. Others may have to be constructed, as for example, total market income.\textsuperscript{23}

The income data collected is based on income received over the previous financial year as well as current income. That is, information is available for both total annual income and total current income. In this study, as indicated in Section 5.1, use will be made of current income to avoid as many distortions as possible. Current income avoids the need to rely on memory and thus avoids understatements being made with regard to estimating income due to imperfect recall/misunderstanding. In addition, income received over a financial year may incorrectly represent those as poor if they are spending via depletion of large accumulated assets and others as well off despite living in poverty for part of the year. Current weekly income, when applied to the income unit also avoids the need for adjustments if the income unit changes, as it might when a longer time period is examined.

\textsuperscript{23} Refer to Section 2.3 for the definition and construction of income types.
5.3 Data Limitations

As with any sample survey, the data is based on information obtained for occupants from a sample of dwellings and therefore is subject to sampling variability - that is, they differ from the figures that would have been produced if all dwellings had been included in the survey. Measures used to indicate this are the standard error and the relative standard error, (standard error expressed as a percentage of the estimate), with the size of the standard error increasing with the level of the estimate but decreasing with the error in percentage terms. Only estimates with relative standard errors less than 30\% are considered reliable and used by the ABS\(^{24}\).

Non sampling errors may also occur. That is, errors are possible even if the whole population was interviewed. For example, the data for all the persons included may not be comprehensible or errors may have developed in the reporting either by the respondents and/or the interviewers or in the processing of the survey data. However the ABS aims to minimize these errors by careful questionnaire design, training of interviewers and encouraging respondents to use records/receipts where possible. Data processing is subject to quality control checking.

There are inevitable problems involved in the measurement of income, particularly for groups such as the self employed, where reported income, (often a reflection of income as defined for tax purposes), is often claimed not to be a good guide to their true economic position.

Income data may be subject to systematic error or downward bias due to understatement of income. Podder (1972) claims this downward bias could

\(^{24}\)  A.B.S.Catalogue No. 6523.0
be due to a number of factors, such as, the ignorance or an unwillingness to disclose income fully or to the bias of the interviewer. The ABS acknowledges some understatement may occur due to imperfect recall or misunderstanding, particularly for minor and irregular income, but by respondents being asked to refer to personal tax assessments or group certificates, an attempt is made to minimize the understatement.

Full and accurate disclosure of income is a difficult goal to achieve. Income recorded for taxation purposes is the most commonly quoted. Lump sum payments, benefits in kind, gratuities etc. are excluded. Thus the income concept under examination does not reflect true disposable income, but rather all monies received in cash and on a regular basis. Business income poses a problem to the extent that income is defined net of business expenses. If income (net of expenses), had not been received during 1985-86, or a loss had been made, income from these sources was recorded as nil. Many business expenses may be incorporated into an owner's lifestyle and thus it could be argued that such income as recorded, is misleading. However, zero income may not necessarily mean no income had been received. It is just that the income received takes the "value" of zero. If the analysis aims to examine the distribution of all incomes, then incomes recorded as zero can be justifiably included.

In the 1986 survey, 4.6% of the observations, which when weights are applied is equivalent to 2.2% of the population, had zero income. This study incorporates these units.25

25 A.B.S. Documentation file for the 1986 Income Distribution Survey
5.4 The Total Population

Since there is no single statistical measure to describe the whole income distribution adequately, Table 5.1 presents the more widely used measures of inequality of income distributions and applies the measures to the gross weekly income received by all income units. With gross income ranging from $0 to $5960, the distribution appears to have the characteristics normally associated with income distributions, that is, a high concentration of units at relatively low income levels. With the mode ($102 per week) being less than the median ($320 per week) and both being less than the mean of $400.83 per week, the distribution is positively skewed, with a relatively long tail of the frequency curve at high income levels.

Table 5.1 also contains information about the income share of particular segments of the population. Income shares within the different income groups is presented via deciles to highlight the share of total income held by different income units. The percentage of income received by the deciles of income units is computed by arranging the incomes in ascending order. This does not indicate the contribution of any one group to total inequality, but some comment about the spread of income is possible. The bottom 50% of the population receive only 20.74% of gross weekly income, with the bottom 10% receiving only 1.28%. The top 20% has 45.95% of total weekly income, while the top 10% receive 28.48%.

The coefficient of variation, and the Gini coefficient, provide an indicator of inequality in the population as a whole. The Gini ratio, the most commonly used single, summary measure of inequality, will be derived using Podder's (1972) formula cited in Section 3.2.
Table 5.1

Statistical Measures of Inequality
Weekly Income: Gross and Net Income

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Gross Income</th>
<th>Net Income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Tax &gt;0</td>
</tr>
<tr>
<td>Mean</td>
<td>$400.83</td>
<td>$370.43</td>
</tr>
<tr>
<td>Median</td>
<td>$320.0</td>
<td>$323.96</td>
</tr>
<tr>
<td>Mode</td>
<td>$102.0</td>
<td>$308.39</td>
</tr>
<tr>
<td>Coefficient of Variation</td>
<td>0.88144</td>
<td>.76411</td>
</tr>
<tr>
<td>Gini Index</td>
<td>0.42014</td>
<td>.3393</td>
</tr>
</tbody>
</table>

Deciles (Gross Income)

<table>
<thead>
<tr>
<th>Income Share</th>
<th>Income Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>(%)</td>
<td>($/wk.)</td>
</tr>
<tr>
<td>first 10% (0-$102)</td>
<td>1.28</td>
</tr>
<tr>
<td>second 10%($103-$136)</td>
<td>2.87</td>
</tr>
<tr>
<td>third 10%($137-$188)</td>
<td>4.13</td>
</tr>
<tr>
<td>fourth 10%($189-$249)</td>
<td>5.39</td>
</tr>
<tr>
<td>fifth 10%($249-$320)</td>
<td>7.07</td>
</tr>
<tr>
<td>sixth 10%($321-$392)</td>
<td>8.86</td>
</tr>
<tr>
<td>seventh 10%($393-$487)</td>
<td>10.85</td>
</tr>
<tr>
<td>eighth 10%($488-$507)</td>
<td>13.57</td>
</tr>
<tr>
<td>ninth 10%($508-$807)</td>
<td>17.47</td>
</tr>
<tr>
<td>top 10%($&gt;807)</td>
<td>28.48</td>
</tr>
<tr>
<td>TOTAL POPULATION</td>
<td>100%</td>
</tr>
</tbody>
</table>
In 1986, the Gini index for gross weekly income, (including zero incomes), was found to be .42014.

Table 5.2 condenses the description of the income distribution by concentrating on quintile characteristics only. There is a slight variation (ranging from .01 to 0.515) in the mean income for each quintile compared to the mean for each decile. This discrepancy is due to the rounding off process involved in the calculation.

The bottom 20% of income units have a gross weekly mean income of $83.31 with the average income per person in this range $79.47, compared to the top quintile with a mean income of $921.4 and income per person of $387.24. The average number of members in each income unit increases as income increases. Income units in the bottom quintile have only 1.22 members while those in the top group have 2.94 members. From this it may be inferred that many low income units are one person units, possibly pensioners, but at the moment our main concern is with the absolute differences in income between income units. Subsequently, income units will be subdivided by the age of the head, number of dependents, etc.

The effect of government on income distribution can be examined both in terms of being a source of income in the form of social security payments, and as a receiver of some income earned through the income tax it levies. Firstly, as far as the government being a source of income, Table 5.3 illustrates that wages and salaries or government social services are the major source of all income received, with the former being important for the top three quintiles, while government sources are predominant in the bottom two quintiles. This is then as expected, with government transfers being important for the low income groups.
Table 5.2
The Quintile Distribution of Gross Weekly Income

<table>
<thead>
<tr>
<th>Income Range ($ per wk.)</th>
<th>Mean Income of Inc.Unit ($ per wk.)</th>
<th>Average No. of Persons</th>
<th>Inc. per Person ($ per wk.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0 to less than $136.00</td>
<td>$83.31</td>
<td>1.22</td>
<td>$79.47</td>
</tr>
<tr>
<td>136.00 to less than 248.00</td>
<td>$191.08</td>
<td>1.86</td>
<td>$128.20</td>
</tr>
<tr>
<td>248.00 to less than 392.00</td>
<td>$319.26</td>
<td>1.91</td>
<td>$231.96</td>
</tr>
<tr>
<td>392.00 to less than 607.00</td>
<td>$489.53</td>
<td>2.52</td>
<td>$276.72</td>
</tr>
<tr>
<td>more than $607.00</td>
<td>$921.40</td>
<td>2.94</td>
<td>$387.24</td>
</tr>
</tbody>
</table>

Table 5.3
Principal Source Of Income
(%) of total income received in each quintile from each source

<table>
<thead>
<tr>
<th>Income Range ($/ wk.)</th>
<th>Wages &amp; Salaries</th>
<th>Business Income</th>
<th>Government</th>
<th>Super.</th>
<th>Investment Income</th>
<th>Other.</th>
<th>No Regular Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0 &lt;136</td>
<td>7.00</td>
<td>2.50</td>
<td>72.10</td>
<td>0.30</td>
<td>6.50</td>
<td>0.50</td>
<td>11.00</td>
</tr>
<tr>
<td>136.00 &lt;248</td>
<td>30.70</td>
<td>6.10</td>
<td>56.00</td>
<td>2.00</td>
<td>4.60</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td>248.00 &lt;392</td>
<td>75.40</td>
<td>9.00</td>
<td>6.50</td>
<td>3.80</td>
<td>4.40</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>392.00 &lt;607</td>
<td>86.80</td>
<td>7.90</td>
<td>0.40</td>
<td>1.60</td>
<td>2.80</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>&gt;$607.00</td>
<td>87.10</td>
<td>7.70</td>
<td>0.10</td>
<td>0.50</td>
<td>4.50</td>
<td>0.10</td>
<td></td>
</tr>
</tbody>
</table>
Government pensions and benefits, as noted previously, are the principal source of weekly income for 27.1% of the income units, although 56% of the total units receive some percentage of the income from the government. Of the total units, 14.7% rely completely on the government for their income (Table 5.4).

Of all the income received by the bottom 20% of income units, 72.1% comes from government social services, while only 7% and 6.5% comes from wages and salaries and interest and dividends respectively. Over half, 56%, of the total income received by the next quintile also comes from the government, but wages and salaries have increased greatly to 30.7% of total income. Income from business/trust at 6.1%, is also more significant compared to the bottom quintile (Table 5.3).

Interest and dividend income is of greatest significance to the lowest quintile with 6.5% of the income received by this group coming from this source. This again could reflect the age group contained in this decile. As wages and salaries and income from business/trusts increase in importance in the higher quintile groups, income from interest and dividends decrease.

Wages and salaries continue to represent an increasing proportion of total income received as income increases, reaching a peak of 87.1% of all income for the top quintile. Income from business/trust reaches a peak of 9% with the middle quintile, as does income from superannuation although at the low level of 3.8%.

For those income units where wages and salaries are the principal source of income, the mean income is $526,042, compared to units relying principally
### Table 5.4
Reliance on Government

<table>
<thead>
<tr>
<th>Reliance on Government as a Principal Source of Income.</th>
<th>% of Income Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>44.0</td>
</tr>
<tr>
<td>1-20%</td>
<td>24.9</td>
</tr>
<tr>
<td>20-49%</td>
<td>2.4</td>
</tr>
<tr>
<td>50-89%</td>
<td>6.6</td>
</tr>
<tr>
<td>90-99%</td>
<td>5.8</td>
</tr>
<tr>
<td>100%</td>
<td>14.7</td>
</tr>
<tr>
<td>No Income</td>
<td>1.7</td>
</tr>
</tbody>
</table>

### Table 5.5
Summary Statistics for each Principal Source of Income ($ per wk.)

<table>
<thead>
<tr>
<th>Wages &amp; Salaries</th>
<th>Business Income</th>
<th>Government Income</th>
<th>Super. Income</th>
<th>Investment Income</th>
<th>Other Income</th>
<th>No Regular Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>$526.04</td>
<td>$490.25</td>
<td>$145.40</td>
<td>$341.74</td>
<td>$435.92</td>
<td>$297.48</td>
</tr>
<tr>
<td>Median</td>
<td>$453.00</td>
<td>$378.00</td>
<td>$127.00</td>
<td>$302.00</td>
<td>$257.00</td>
<td>$265.00</td>
</tr>
</tbody>
</table>

% Inc. Units: 57.4 6.6 27.1 1.6 4.6 0.5 2.2
on government social security benefits/pensions who have a with a mean income of $145,402 (Table 5.5).

Superannuation, applicable to only 1.6% of the income units as the principal source, produces a mean income of $341.74, while the 6.6% of the income units relying on private business as their principal source, derive a mean income of $490.25. For those units relying on investments, in the form of interest, dividends, as their principal source of income, a mean income of $435.92 is received, while for those relying on principally income from other sources have a mean income of $297.48.

The above data is a reflection of the data contained in Table 5.3, whereby the middle and upper percentile groups, (those with income of more than $248 per week), rely mainly on wages and salaries and private businesses and trusts, while the bottom two percentiles rely heavily on government sources. Wages and salaries are then a major factor in determining the level of income received and thus the level of overall inequality. Income from a person’s own business and from capital investments, tends to be of greater significance to the middle and even the lower income groups and thus does not appear to contribute to the level of inequality as much as expected.

The effect of taxation on reducing the spread of income and thus the level of inequality can also be determined. The data in Table 5.1 illustrates the effect of taxation on gross weekly income, although as noted in Section 5.1, the net figure is an approximate figure only. Nevertheless, the general pattern rather than the absolute figures is the main interest here. The data for net income is also presented when only the income units paying tax is considered, as well as for all income units, that is, those with zero or negative tax.
The distribution of net weekly income, when tax paid is more than zero, retains the positively skewed shape, with a reduced mean and median income compared to gross weekly income. The Gini index is significantly reduced, (.3393) compared with (.42014), as is the coefficient of variation, .76411 compared to .88144. The coefficient of variation, expressing the standard deviation as a ratio of the populations' mean income, decreases, since both the mean and the standard deviation is reduced as a result of taxation.

However a closer examination of the income shares of different groups reveals more details on the impact of taxation. If only income units whose tax is positive is considered, the lower decile and the top quintile are penalized in that their income share after tax is less than before tax, while the middle groups are compensated. The top quintile has 5.02 percentage points less income after tax, while the bottom decile has 1.24 percentage points less. The second bottom quintile gains the most, with a 3.55 percentage point increase in their share of income after tax, while the middle quintile has a smaller gain of 1.63 percentage points.

If the total income units are examined, that is, all units, including those with zero or negative tax, Table 5.7, the results are not greatly altered. The reduction in the Gini index is less, .39961, while the coefficient of variation is slightly greater, .89045, reflecting the variability that still exists when negative tax is considered. Again it is the lower income group that fair worse as a result of taxation. Both the bottom decile and more generally, the bottom quintile have a reduced income share after tax compared to before tax, 1.14 and 0.65 percentage points respectively. The middle quintiles, in particular the second bottom quintile, are better off, 1.06 and .26 percentage
### Table 5.6

The Impact of Income Tax (1)

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Gross Mean Income ($/wk.)</th>
<th>Gross Inc. Share (%)</th>
<th>Net Mean Income ($/wk.)</th>
<th>Net Inc. Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom 10%</td>
<td>51.2</td>
<td>1.28</td>
<td>1.54</td>
<td>0.04</td>
</tr>
<tr>
<td>Bottom 20%</td>
<td>83.31</td>
<td>4.16</td>
<td>81.6</td>
<td>4.41</td>
</tr>
<tr>
<td>20 -40%</td>
<td>191.08</td>
<td>9.53</td>
<td>242.32</td>
<td>13.08</td>
</tr>
<tr>
<td>40 -60%</td>
<td>319.26</td>
<td>15.93</td>
<td>325.17</td>
<td>17.56</td>
</tr>
<tr>
<td>60 -80%</td>
<td>489.53</td>
<td>24.43</td>
<td>444.84</td>
<td>24.02</td>
</tr>
<tr>
<td>Top 20%</td>
<td>921.4</td>
<td>45.98</td>
<td>758.58</td>
<td>40.96</td>
</tr>
<tr>
<td>Top 10%</td>
<td>1141.66</td>
<td>28.48</td>
<td>920.78</td>
<td>24.86</td>
</tr>
</tbody>
</table>

(1) Gross Weekly Income, as derived by the ABS, is used.
Net Income is the ABS Gross Income figure minus tax paid 1985-86,
(where tax paid >0).

### Table 5.7

The Impact of Income Tax (1)

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Gross Mean Income ($/wk.)</th>
<th>Gross Income Share (%)</th>
<th>Net Mean Income ($/wk.)</th>
<th>Net Income Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom 10%</td>
<td>51.2</td>
<td>1.28</td>
<td>4.46</td>
<td>0.14</td>
</tr>
<tr>
<td>Bottom 20%</td>
<td>83.31</td>
<td>4.16</td>
<td>57.74</td>
<td>3.51</td>
</tr>
<tr>
<td>20 -40%</td>
<td>191.08</td>
<td>9.53</td>
<td>174.35</td>
<td>10.59</td>
</tr>
<tr>
<td>40 -60%</td>
<td>319.26</td>
<td>15.93</td>
<td>266.46</td>
<td>16.19</td>
</tr>
<tr>
<td>60 -80%</td>
<td>489.53</td>
<td>24.43</td>
<td>397.27</td>
<td>24.13</td>
</tr>
<tr>
<td>Top 20%</td>
<td>921.40</td>
<td>45.98</td>
<td>750.20</td>
<td>45.57</td>
</tr>
<tr>
<td>Top 10%</td>
<td>1141.66</td>
<td>28.48</td>
<td>931.33</td>
<td>28.29</td>
</tr>
</tbody>
</table>

(1) Gross Weekly Income, as derived by the ABS, is used.
Net Income is the ABS Gross Income figure minus tax paid 1985-86,
(where tax paid includes zero and/or negative tax.)
points more income, while the top two quintiles have 0.4 and 0.3 percentage points less.

The more equitable after tax income as revealed by the change in the Gini coefficients, is then a reflection of the gains made by the middle income ranges, that is, the second and third quintiles, and the loss experienced by the top quintile. This differs from my expectations to the extent that the middle income groups do benefit from the government’s action, while the lowest 10% fairs poorly, regardless of whether zero and negative taxes are considered. To determine the full impact of taxation, a much more detailed analysis of taxation statistics would be necessary. This is however beyond the scope of the present analysis.

In addition to viewing income according to its principal source, income, as outlined in the Section 2.2, can be broken into its various components.

Table 5.8 illustrates the distribution of the different types of income. Income derived from labour - either wages and salaries or business, has a mean of $316.69. The bottom quintile of income units receives no income from this source, while the top quintile receives a mean weekly income of $834.75, with the top 10% having an income of $1019.86. If income from superannuation and personal investments is added, the range of income is even greater, extending from a negative income of $8.12 in the bottom quintile, to $904.3 in the top 20 percent of income units.

The addition of transfer income, both government and other private

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26 Taxable and non-taxable income components need to be identified and separated with tax scales then being used to estimate tax liability. Tax deductions and rebates also need to be allocated to eligible families. See Saunders & Hobbes (1988) for a full discussion of the complexities involved.
Table 5.8

Income Distribution According to Income Type

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Lowest 10%</th>
<th>Lowest 20%</th>
<th>Lowest 40%</th>
<th>Lowest 60%</th>
<th>Lowest 80%</th>
<th>Top 20%</th>
<th>Top 10%</th>
<th>Concentration Ratio</th>
<th>Co-efficient of Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour Income</td>
<td>316.69</td>
<td>-</td>
<td>-</td>
<td>12.51</td>
<td>276.26</td>
<td>447.73</td>
<td>834.75</td>
<td>1019.66</td>
<td>0.53</td>
<td>1.09</td>
</tr>
<tr>
<td>Gross Private</td>
<td>351.79</td>
<td>-</td>
<td>-8.12</td>
<td>89.47</td>
<td>302.13</td>
<td>474.40</td>
<td>904.30</td>
<td>1124.54</td>
<td>0.52</td>
<td>1.09</td>
</tr>
<tr>
<td>Total Gross</td>
<td>397.85</td>
<td>34.09</td>
<td>74.44</td>
<td>183.61</td>
<td>317.75</td>
<td>488.25</td>
<td>919.43</td>
<td>1139.17</td>
<td>0.4328</td>
<td>0.90</td>
</tr>
<tr>
<td>Net Income</td>
<td>326.26</td>
<td>-11.26</td>
<td>48.67</td>
<td>173.37</td>
<td>265.42</td>
<td>395.72</td>
<td>748.28</td>
<td>928.90</td>
<td>0.41</td>
<td>0.89</td>
</tr>
</tbody>
</table>

27 Figures for each income type are aggregated by the writer from the data contained in the unit record file. Because of the large volume of observations, gross weekly income figures varies slightly from the ABS gross weekly income figure.

28 This is the Gini coefficient.
transfers, increases the gross weekly mean income to $397.85. The bottom
20% of the population has a mean income of $74.44 compared to the top
quintile with a mean of $919.43.

To highlight the effect of the different income types, concentration ratios, of
which the Gini ratio is a special case, can be used. To derive a concentration
index, cases are sorted by, that is, ranked in ascending order of gross weekly
income. As highlighted in Section 3.2, the concentration index for each
factor component will be different to the Gini value since the rank of the
income unit in the total distribution need not be the same as the income
unit's rank in the factor component. The Gini ratio is a special case of the
more general concentration ratios.

Referring to table 5.8, both labour and gross private income contribute
greatly to income inequality. Both have a concentration ratio in excess of
.52\(^{29}\). It is only when government distributes transfers payments or collects
taxes, that the level of inequality is altered significantly. In this instance, the
concentration ratios - or Gini ratios - are reduced to .43 and .41 respectively,
and the coefficients of variation decrease from 1.09 to .90 and .89, reflecting
both the reduction in the standard deviation and the increased mean as a
result of the government's redistributive efforts.

Overall, the general picture is much as was expected. The overall level of
inequality between income units, as given in the Gini ratio, is .42 when zero
incomes are included. Wages and salaries are an important source of

\(^{29}\) Cases were sorted by (i.e. ranked in ascending order) gross weekly income, before calculating
the concentration index for each income type. The Gini index for the aggregated gross weekly
income (i.e. all the different sources of income are added together to give a total income figure
and then the cases are sorted according to this total figure) is also calculated. Because of the large
volume of data, (7 634 114 income units), aggregating gross weekly income gives a mean
income slightly different to that obtained by just using the figure for total gross weekly income
derived by the ABS. As a result, the Gini indices do vary.
income and give rise to much of the inequality experienced. Business and trust income is a small component, as is interest and rent income, and do not contribute to inequality as much was expected.

Government social services are important for low income groups and the payments do improve the position of these income units. Taxation also increases overall equality, with some groups, including the middle income ranges, benefitting more than others. The overall impact is to reduce the overall level of inequality as shown by the reduction in the Gini index from .42 to .40, when all units are considered, or a reduction to .34 if only those units paying tax are considered.

5.5 Socio-Demographic Characteristics

To examine the income distribution within the different socio demographic groups, the income units can be divided into a number of sub-groups.

5.5.1 Income Unit Type (Tables 5.9, 5.10 and 5.11)

Just under one half of all units, 46.2%, are one person units, with just under another quarter, 23.7%, married and just over another quarter, 25.9%, married with dependents. Single income units with dependents comprise only 4.2% of all units, but they have the lowest mean income and the smallest range. It is only the top quintile of single units with dependents who receive a mean income slightly more than the overall mean for married units and slightly less than the overall mean for married couples with dependents. Married units with dependents have the highest mean income and the greatest income range.
### Table 5.9

**Unit Type and Gross Weekly Income ($ per week)**

<table>
<thead>
<tr>
<th>% of Income Units</th>
<th>Mean Income</th>
<th>Income Range</th>
<th>Income of Lowest 20%</th>
<th>Income of Highest 20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married no Dep.</td>
<td>23.70</td>
<td>484.41</td>
<td>0-4,865</td>
<td>142.53</td>
</tr>
<tr>
<td>Married with Dep.</td>
<td>25.90</td>
<td>610.08</td>
<td>0-5,960</td>
<td>216.38</td>
</tr>
<tr>
<td>Single with Dep.</td>
<td>4.20</td>
<td>249.53</td>
<td>0-1,269</td>
<td>106.13</td>
</tr>
<tr>
<td>One Person</td>
<td>46.20</td>
<td>245.17</td>
<td>0-3,140</td>
<td>56.06</td>
</tr>
</tbody>
</table>

### Table 5.10

**Unit Type and Age of Head (% in each age group)**

<table>
<thead>
<tr>
<th></th>
<th>&lt;20</th>
<th>21-29</th>
<th>30-39</th>
<th>40-49</th>
<th>50-59</th>
<th>60-69</th>
<th>&gt;70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>0.5</td>
<td>13.2</td>
<td>8.5</td>
<td>11.2</td>
<td>23.6</td>
<td>26.1</td>
<td>16.8</td>
</tr>
<tr>
<td>Married with Dep.</td>
<td>0.3</td>
<td>13.7</td>
<td>43.3</td>
<td>31.7</td>
<td>9.1</td>
<td>1.5</td>
<td>0.2</td>
</tr>
<tr>
<td>Single with Dep.</td>
<td>4.6</td>
<td>26.7</td>
<td>36.6</td>
<td>26.0</td>
<td>5.1</td>
<td>1.1</td>
<td>0.2</td>
</tr>
<tr>
<td>One Person</td>
<td>22.7</td>
<td>30.8</td>
<td>10.0</td>
<td>5.5</td>
<td>7.7</td>
<td>9.6</td>
<td>11.8</td>
</tr>
</tbody>
</table>
Married income units generally have wages and salaries as their principal source of income. Government is however the principal source of income for just under one-third, 31.2%, of income of married units, a majority of which have a head aged over 50 years. Married units with dependents tend to be younger, with a head aged 30-50 years and thus wages and salaries are the important source of income, at 75.3%. The high mean and big range of income associated with this income unit type, is a reflection of the reliance on wages and salaries which was shown in Table 5.8 to be a major factor contributing to inequality.

Single units with dependents, whose age of head ranges mainly from 20 years to 50 years, rely heavily on government as their source of income. More than 60 percent of single person unit's income is received from the government.

Over one half of one person units, 54.3%, have wages and salaries as their principal source, with just under another third, 32%, relying on the government as their principal source.

5.5.2 Size of Income Units (Tables 5.12, 5.13 and 5.14)

Just under one half of all income units 46.2%, are one person units, with just over another quarter being two person units, when units are grouped according to size. Three and four person units comprise 10% and 11.2% of all income units. Very large units, more than 6 persons, are only .4% of all income units.
Table 5.11

Unit Type and Principal Source of Income
(\% of total income received from each source)

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>Wages &amp; Salaries</th>
<th>Business Income</th>
<th>Government</th>
<th>Super.</th>
<th>Investment Income</th>
<th>Other</th>
<th>No Regular Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married no Dep.</td>
<td>48.70</td>
<td>6.90</td>
<td>31.20</td>
<td>3.60</td>
<td>8.10</td>
<td>0.30</td>
<td>1.20</td>
</tr>
<tr>
<td>Married with Dep.</td>
<td>75.30</td>
<td>12.60</td>
<td>8.50</td>
<td>0.30</td>
<td>2.30</td>
<td>0.70</td>
<td>0.40</td>
</tr>
<tr>
<td>Single with Dep.</td>
<td>30.40</td>
<td>2.10</td>
<td>64.20</td>
<td>0.60</td>
<td>1.20</td>
<td>0.90</td>
<td>0.50</td>
</tr>
<tr>
<td>One Person</td>
<td>54.30</td>
<td>3.60</td>
<td>32.00</td>
<td>1.50</td>
<td>4.30</td>
<td>0.50</td>
<td>3.90</td>
</tr>
</tbody>
</table>

Table 5.12

Income Received According to Number of Persons in Income Unit
($ per week)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>&gt;6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Income</td>
<td>$254.17</td>
<td>$165.07</td>
<td>$562.53</td>
<td>$612.00</td>
<td>$569.93</td>
<td>$563.32</td>
<td>$570.25</td>
</tr>
<tr>
<td>Lowest 20%</td>
<td>$56.06</td>
<td>$135.42</td>
<td>$153.11</td>
<td>$221.34</td>
<td>$202.25</td>
<td>$206.31</td>
<td>$226.26</td>
</tr>
<tr>
<td>Highest 20%</td>
<td>$556.72</td>
<td>$1032.65</td>
<td>$1155.75</td>
<td>$1166.98</td>
<td>$1115.77</td>
<td>$1041.24</td>
<td>$1218.10</td>
</tr>
<tr>
<td>%Total Units</td>
<td>46.20</td>
<td>25.90</td>
<td>10.00</td>
<td>11.20</td>
<td>4.90</td>
<td>1.40</td>
<td>0.40</td>
</tr>
</tbody>
</table>
### Table 5.13

**Principal Source of Income According to Number of Persons in Income Unit**  
(\% of gross weekly income)

<table>
<thead>
<tr>
<th>Unit Size</th>
<th>Wages &amp; Salaries</th>
<th>Business Income</th>
<th>Government</th>
<th>Super.</th>
<th>Invest. Income</th>
<th>Other Income</th>
<th>No Regular Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>54.3</td>
<td>3.6</td>
<td>32.0</td>
<td>1.5</td>
<td>4.3</td>
<td>0.5</td>
<td>3.9</td>
</tr>
<tr>
<td>2</td>
<td>47.7</td>
<td>6.5</td>
<td>33.5</td>
<td>3.3</td>
<td>7.6</td>
<td>0.3</td>
<td>1.1</td>
</tr>
<tr>
<td>3</td>
<td>68.2</td>
<td>10.5</td>
<td>16.7</td>
<td>1.0</td>
<td>2.1</td>
<td>0.9</td>
<td>0.8</td>
</tr>
<tr>
<td>4</td>
<td>76.2</td>
<td>10.8</td>
<td>9.9</td>
<td>0.0</td>
<td>2.4</td>
<td>0.5</td>
<td>0.2</td>
</tr>
<tr>
<td>5</td>
<td>68.6</td>
<td>16.1</td>
<td>11.8</td>
<td>0.2</td>
<td>2.0</td>
<td>1.0</td>
<td>0.3</td>
</tr>
<tr>
<td>6</td>
<td>69.4</td>
<td>15.6</td>
<td>13.4</td>
<td>-</td>
<td>0.2</td>
<td>0.6</td>
<td>0.9</td>
</tr>
<tr>
<td>&gt;6</td>
<td>71.5</td>
<td>9.4</td>
<td>14.9</td>
<td>-</td>
<td>2.3</td>
<td>1.9</td>
<td>-</td>
</tr>
</tbody>
</table>

### Table 5.14

**Gross Weekly Income According to Age and Number of Persons in Income Unit**  
\( ($) \) per week

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$344.65</td>
<td>$182.77</td>
<td>$438.17</td>
</tr>
<tr>
<td>1</td>
<td>$558.82</td>
<td>$277.58</td>
<td>$177.64</td>
</tr>
<tr>
<td>2</td>
<td>$563.03</td>
<td>$579.89</td>
<td>$257.14</td>
</tr>
<tr>
<td>3</td>
<td>$537.05</td>
<td>$627.04</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>$543.70</td>
<td>$710.31</td>
<td>-</td>
</tr>
</tbody>
</table>
Mean income increases as the number of persons in the income unit increases up to a four person unit. It decreases with 5 and 6 people and then increases with more than 6. The income received by the lowest 20% in each unit type follows a similar pattern. The peaks in the mean income both occur when income units receive more than three-quarters of the income from wages and salaries, 76.2% and 75.8% respectively.

The lower mean incomes received by the one and two person units, are where there is greater reliance on government, with approximately one third of income received by these units coming from this source. As unit size increases, wages and salaries become a larger source of income.

Mean income tends to increase as the age of the persons in the unit increase, being highest when there are 3 or 4 people in the unit between the age of 15-64 years and lowest when there is no-one in this age group, reflecting possibly the older pensioner income group.

Table 5.14 illustrates how the mean gross weekly income of units varies according to the age and number of persons in the unit. Zero persons in the 0-14 years means that there are no dependents in the income unit. Thus such units, either elderly or very young workers have a low mean income. When there are very young people, 0-14 years, in the unit, the mean decreases as the number increases, reflecting perhaps the reliance on one income. The mean income received by units with one or two people over 65 years is also low, reflecting their reliance on government transfers.
5.5.3 Number of Dependents (Tables 5.15 and 5.16)

Seventy percent of all income units in Australia have no dependents and with a mean weekly income of $332.3, they rank the lowest. Many of these units may be single person units, which Table 5.9 illustrated, have low means. However, as the number of dependents increase, the mean income does not follow any general pattern. It has two main peaks; one at $582.2 with two dependents, and the other at $624.61 with five dependents.

The spread of income contains no general pattern either. The mean income of the top 20% in the units is highest for those units with five dependents, followed by those with one and two dependents. This reflects the reliance on wages and salaries as their principal source of income. In Table 5.16, income units with five dependents rely on 75% of their income from wages and salaries. Units with one and two dependents also rely principally on wages and salaries, with each receiving 67% and 72% of their income, respectively, from this source.

The mean income for the bottom 20% of units in each category is lowest for those with 0 dependents, and gradually increases as the number of dependents increases. This could reflect the age of the income unit head and the principal source of income. That is, the units with no dependents are young and just in their early years of earning with no government support, or older and rely on government pensions. Of the total income received from government, 82% is
Table 5.15
Gross Weekly Income and Number of Dependents
($ per week)

<table>
<thead>
<tr>
<th>% Income Units</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>&gt;5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Income</td>
<td>332.30</td>
<td>543.14</td>
<td>582.20</td>
<td>546.86</td>
<td>548.88</td>
<td>624.61</td>
<td>462.60</td>
</tr>
<tr>
<td>Lowest 20%</td>
<td>73.84</td>
<td>134.24</td>
<td>183.23</td>
<td>163.76</td>
<td>182.91</td>
<td>233.81</td>
<td>213.65</td>
</tr>
<tr>
<td>Top 20%</td>
<td>786.21</td>
<td>1138.29</td>
<td>1136.99</td>
<td>1092.29</td>
<td>1025.37</td>
<td>1356.42</td>
<td>815.84</td>
</tr>
<tr>
<td>No. of Dep.</td>
<td>Wages &amp; Salaries</td>
<td>Business Income</td>
<td>Government Income</td>
<td>Super.</td>
<td>Investment Income</td>
<td>Other</td>
<td>No Regular Income</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------</td>
<td>-----------------</td>
<td>-------------------</td>
<td>--------</td>
<td>-------------------</td>
<td>-------</td>
<td>-------------------</td>
</tr>
<tr>
<td>0</td>
<td>52.4</td>
<td>31.7</td>
<td>2.2</td>
<td>5.6</td>
<td>0.5</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[63.8]</td>
<td>[82.0]</td>
<td>[93.1]</td>
<td>[86.0]</td>
<td>[59.1]</td>
<td>[94.3]</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>67.4</td>
<td>18.7</td>
<td>0.7</td>
<td>2.4</td>
<td>0.6</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[12.5]</td>
<td>[7.3]</td>
<td>[4.3]</td>
<td>[5.7]</td>
<td>[11.2]</td>
<td>[2.4]</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>72.4</td>
<td>13.8</td>
<td>0.2</td>
<td>2.2</td>
<td>0.8</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[15.4]</td>
<td>[6.2]</td>
<td>[1.8]</td>
<td>[5.9]</td>
<td>[17.5]</td>
<td>[2.0]</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>65.4</td>
<td>16.4</td>
<td>0.2</td>
<td>1.8</td>
<td>0.9</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[6.0]</td>
<td>[3.2]</td>
<td>[0.7]</td>
<td>[2.1]</td>
<td>[9.2]</td>
<td>[0.7]</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>66.1</td>
<td>17.1</td>
<td>-</td>
<td>0.2</td>
<td>0.5</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[1.7]</td>
<td>[0.9]</td>
<td>-</td>
<td>[0.1]</td>
<td>[1.5]</td>
<td>[0.5]</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>75.3</td>
<td>7.9</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[0.4]</td>
<td>[0.1]</td>
<td>-</td>
<td>-</td>
<td>[1.7]</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;5</td>
<td>61.4</td>
<td>31.1</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[0.2]</td>
<td>[0.2]</td>
<td>-</td>
<td>[0.2]</td>
<td></td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.16
Principal Source of Income and Number of Dependents
% income received from each source
[] shows % of each income type received by the different sized income units.
received by these income units. As the number of dependents increase, income units rely more on wages and salaries, which we have seen have greater inequality, and higher means. More than 65% of income received by units with 1-5 dependents is from wages and salaries.

5.5.4 Age of Head of Income Unit (Tables 5.17 and 5.18)

The data in Table 5.17, illustrates that the distribution of income according to age, reflects life cycle effects. Mean income increases with age, peaking at 40-44 years, before declining as age increases further. The income units with a head aged between 25 and 60 years, have an income greater than the mean income for the population.

Wages and salaries, as expected, are the most important source of income for all age groups up to 60 years, when government pensions take precedence. In addition to government pensions, many retired people, between 11 and 13%, rely on interest and dividends as their principal source of income (Table 5.18). This reflects the life cycle effect whereby young income earners, invest to give an income flow in retirement.

Superannuation, the smallest identifiable source of income for the population overall at 1.6%, is also important in these older groups and also in the 50-54 and 55-59 age groups.

In addition, government pensions are an important source of income for some income units in the younger age groups, peaking at 19.3% with the 21-24 year olds, then declining before rising again in the 50+ groups. Many of the very young income units, particularly those with a
<table>
<thead>
<tr>
<th>Age</th>
<th>&lt;15</th>
<th>16-17</th>
<th>18-20</th>
<th>21-24</th>
<th>25-29</th>
<th>30-34</th>
<th>35-39</th>
<th>40-44</th>
<th>45-49</th>
<th>50-54</th>
<th>55-59</th>
<th>60-64</th>
<th>65-69</th>
<th>70-74</th>
<th>75+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>0.3</td>
<td>2.9</td>
<td>7.7</td>
<td>11.2</td>
<td>10.8</td>
<td>9.9</td>
<td>9.4</td>
<td>8</td>
<td>6.5</td>
<td>5.8</td>
<td>5.9</td>
<td>6.1</td>
<td>5</td>
<td>4.7</td>
<td>5.7</td>
</tr>
<tr>
<td>Mean</td>
<td>74.24</td>
<td>127.73</td>
<td>215.26</td>
<td>317.87</td>
<td>452.6</td>
<td>522.99</td>
<td>576.35</td>
<td>599.72</td>
<td>554.57</td>
<td>520.05</td>
<td>427.45</td>
<td>319.82</td>
<td>221.14</td>
<td>194.19</td>
<td>180.06</td>
</tr>
</tbody>
</table>
Table 5.18

Age of Head and Principal Source of Income

% of income received each source
[
] shows %income type received by the different aged income units

<table>
<thead>
<tr>
<th>Age (yrs.)</th>
<th>Wages and Salaries</th>
<th>Business Income</th>
<th>Government</th>
<th>Super</th>
<th>Investment Income</th>
<th>Other</th>
<th>No Reg. Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15</td>
<td>55.9 [0.3]</td>
<td>0 [0]</td>
<td>7.2 [0.1]</td>
<td>0 [0]</td>
<td>0 [0]</td>
<td>4.6 [2.3]</td>
<td>32.4 [4.1]</td>
</tr>
<tr>
<td>16-17</td>
<td>70.8 [3.60]</td>
<td>1 [0.5]</td>
<td>16.2 [1.7]</td>
<td>0 [0]</td>
<td>0 [0.4]</td>
<td>0.6 [0]</td>
<td>11.4 [0.2]</td>
</tr>
<tr>
<td>18-20</td>
<td>74.1 [9.90]</td>
<td>1.2 [1.4]</td>
<td>18.5 [5.3]</td>
<td>0 [0]</td>
<td>0.8 [1.3]</td>
<td>0.2 [3.4]</td>
<td>5.1 [0]</td>
</tr>
<tr>
<td>21-24</td>
<td>71.5 [13.9]</td>
<td>3.9 [6.6]</td>
<td>19.3 [8.0]</td>
<td>0 [0]</td>
<td>1.7 [4.2]</td>
<td>0.4 [7.4]</td>
<td>3.2 [18.1]</td>
</tr>
<tr>
<td>30-34</td>
<td>76.1 [13.2]</td>
<td>9.9 [14.8]</td>
<td>11 [4.0]</td>
<td>0.1</td>
<td>1.0 [0.7]</td>
<td>0.5 [2.2]</td>
<td>1.4 [8.7]</td>
</tr>
<tr>
<td>40-44</td>
<td>72.4 [10.1]</td>
<td>11.7 [14.1]</td>
<td>11.3 [3.4]</td>
<td>0.2</td>
<td>2.8 [0.9]</td>
<td>0.4 [2.8]</td>
<td>1.2 [2.6]</td>
</tr>
<tr>
<td>45-49</td>
<td>69.8 [7.9]</td>
<td>11.4 [11.2]</td>
<td>13.3 [3.2]</td>
<td>0.3</td>
<td>3.2 [1.2]</td>
<td>0.5 [4.5]</td>
<td>1.4 [5.8]</td>
</tr>
<tr>
<td>50-54</td>
<td>64.4 [6.5]</td>
<td>10.4 [9.0]</td>
<td>16.9 [3.6]</td>
<td>1.0</td>
<td>5.3 [3.7]</td>
<td>0.7 [6.7]</td>
<td>1.3 [6.0]</td>
</tr>
<tr>
<td>55-59</td>
<td>50.6 [5.2]</td>
<td>10 [9.0]</td>
<td>26.3 [5.8]</td>
<td>4.1</td>
<td>7.2 [3.7]</td>
<td>0.9 [2.2]</td>
<td>0.9 [7.9]</td>
</tr>
<tr>
<td>60-64</td>
<td>23.7 [2.5]</td>
<td>5.5 [5.0]</td>
<td>48.7 [10.9]</td>
<td>6.2</td>
<td>13.6 [15.0]</td>
<td>0.9 [5.0]</td>
<td>1.5 [9.4]</td>
</tr>
<tr>
<td>65-69</td>
<td>3.4 [0.3]</td>
<td>2.4 [1.8]</td>
<td>34.9 [13.9]</td>
<td>5.9</td>
<td>18.1 [18.9]</td>
<td>0.6 [12.9]</td>
<td>1.1 [2.2]</td>
</tr>
<tr>
<td>70-74</td>
<td>1.9 [0.2]</td>
<td>1.1 [0.8]</td>
<td>79.1 [13.8]</td>
<td>5.5</td>
<td>11.2 [16.1]</td>
<td>0 [0]</td>
<td>1.2 [2.2]</td>
</tr>
<tr>
<td>75+</td>
<td>0.2 [0]</td>
<td>0.7 [0.6]</td>
<td>79.6 [16.8]</td>
<td>5.8</td>
<td>12.6 [20.1]</td>
<td>0 [0]</td>
<td>1 [2.7]</td>
</tr>
</tbody>
</table>

% Total Income: 57.4  6.6  27.1  1.6  4.6  0.5  2.2
head less than 15 years, have no regular income, but as age increases, wages and salaries and pensions increase in importance.

Business and trust income reflect life-cycle effects also in that business income becomes an important source as age rises, peaking at around 40-44 years, before slowly declining in the 50's and then being much less significant in the retired years. The income units with a head aged 30-34 years, receives the largest share at just under 15%, of all income from this source.

5.5.5  Sex of Income Unit Head (Tables 5.19 and 5.20)

Almost three-quarters of all income units, 73.9%, are headed by a male, whose range of income is almost double that of units headed by females. Female headed units, with a mean income of $212.06, is less than half the mean income of male headed units with $467.65, which is just slightly greater than the population mean income of $400.73. The bottom 20% of male headed units have a mean income of $109.85 compared with $54.70 for female units, while the top 20% enjoy a mean income of $1006.13, which is more than double that of the top 20% of female units at $456.2.

The low level of income received by the female headed units is a reflection of the principal source of their income compared to that of male headed units. For female units, 46.5% of their income comes from the government and we have already examined the low level of income received from this source. Less than half of their income, 42.3%, is from wages and salaries compared with 62.7% of male income from this source. Of all the wages and salaries received, male headed
Table 5.19
Gross Weekly Income and Sex of Income Unit Head
($ per week)

<table>
<thead>
<tr>
<th>Sex</th>
<th>%Income Units</th>
<th>Income Range</th>
<th>Mean Income</th>
<th>Lowest 20% Mean Income</th>
<th>Top 20% Mean Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>73.9</td>
<td>0-5960</td>
<td>467.65</td>
<td>109.85</td>
<td>1010.76</td>
</tr>
<tr>
<td>Female</td>
<td>26.1</td>
<td>0-3003</td>
<td>212.06</td>
<td>54.7</td>
<td>456.2</td>
</tr>
</tbody>
</table>

Table 5.20
Sex of Income Unit Head and Principal Source of Income
% of total income received from each source
[] shows % of each income type received by different types of income units.

<table>
<thead>
<tr>
<th>Sex</th>
<th>Wages and Salaries</th>
<th>Business Income</th>
<th>Government</th>
<th>Super.</th>
<th>Investment Income</th>
<th>Other</th>
<th>No Regular Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>62.7</td>
<td>8.7</td>
<td>20.2</td>
<td>1.6</td>
<td>4.5</td>
<td>0.6</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>[80.7]</td>
<td>[97.0]</td>
<td>[55.1]</td>
<td>[70.4]</td>
<td>[73.7]</td>
<td>[82.2]</td>
<td>[57.0]</td>
</tr>
<tr>
<td>Female</td>
<td>42.3</td>
<td>0.8</td>
<td>46.5</td>
<td>1.8</td>
<td>4.6</td>
<td>0.4</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td>[19.3]</td>
<td>[3.0]</td>
<td>[44.9]</td>
<td>[29.6]</td>
<td>[26.3]</td>
<td>[17.8]</td>
<td>[43.0]</td>
</tr>
</tbody>
</table>
units receive 80.7%, and this form of income, as we have seen, has a much higher mean than the others.

5.5.6 Country of Birth of Income Unit Head (Tables 5.21 and 5.22)

Income units whose head was born in America, although only a small group, 0.7% of all income units, have the highest mean gross weekly income at $443.61, followed by those with a head born in the United Kingdom, and then those with a head born in Africa.

This high mean weekly income is a reflection of wages and salaries comprising 65.2% of the total income received by income units with an American born head. Table 5.5 illustrated that wages and salaries, followed by income received from business/trusts and then interest and dividends, have the higher mean incomes. The United Kingdom and African units only received 57.1% and 52.1% respectively from wages and salaries. Government, contributing 29.2 and 28.4%, was the next most important source for these two groups.

For Australian born income units, wages and salaries, at 58.4% of total income, was the most important source, followed by government at 26.6%, and then business/trust income at 6.6%.

The lowest mean weekly incomes were received by Asian and Italian born income units, with $372.66 and $384.71 respectively. This low income reflects the reliance the units have on particular sources of income. For example, only just over one half of the Asian group had wages and salaries as their principal source, with just under one third
Table 5.21
Mean Income and Country of Birth of Income Unit Head
($) per week

<table>
<thead>
<tr>
<th></th>
<th>Australia</th>
<th>U.K.</th>
<th>Italy</th>
<th>Other Europe</th>
<th>Asia</th>
<th>America</th>
<th>Africa</th>
<th>Oceania</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Income Units</td>
<td>74.3</td>
<td>9.3</td>
<td>2.4</td>
<td>6.9</td>
<td>3.8</td>
<td>0.7</td>
<td>0.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Mean Inc.</td>
<td>398.11</td>
<td>433.35</td>
<td>384.71</td>
<td>400.00</td>
<td>372.66</td>
<td>443.61</td>
<td>413.55</td>
<td>407.55</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Country</th>
<th>Wages &amp; Salaries</th>
<th>Business Income</th>
<th>Government</th>
<th>Super.</th>
<th>Investment Income</th>
<th>Other</th>
<th>No Regular Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>58.4 (75.6)</td>
<td>6.6 (73.6)</td>
<td>26.6 (73)</td>
<td>1.8 (81.3)</td>
<td>4.5 (73.2)</td>
<td>0.4 (54.1)</td>
<td>1.8 (61.5)</td>
</tr>
<tr>
<td>U. K.</td>
<td>57.1 (9.3)</td>
<td>5.1 (7.1)</td>
<td>29.2 (10.1)</td>
<td>1.8 (10.3)</td>
<td>4 (8.2)</td>
<td>0.4 (6.6)</td>
<td>2.5 (10.5)</td>
</tr>
<tr>
<td>Italy</td>
<td>44.8 (1.9)</td>
<td>14 (5.1)</td>
<td>30.5 (2.7)</td>
<td>0.3 (4)</td>
<td>8.3 (4.4)</td>
<td>1.4 (6.2)</td>
<td>0.8 (9)</td>
</tr>
<tr>
<td>Other Europe</td>
<td>52.1 (6.3)</td>
<td>7 (7.3)</td>
<td>29.8 (7.6)</td>
<td>1 (4.1)</td>
<td>6.4 (9.7)</td>
<td>1.8 (23.0)</td>
<td>2.1 (6.5)</td>
</tr>
<tr>
<td>Asia</td>
<td>52.5 (3.5)</td>
<td>7.3 (4.2)</td>
<td>29.7 (4.2)</td>
<td>0.6 (1.5)</td>
<td>2.1 (1.8)</td>
<td>0.6 (4.6)</td>
<td>7.1 (12.4)</td>
</tr>
<tr>
<td>America</td>
<td>65.2 (.7)</td>
<td>1.6 (.2)</td>
<td>20.2 (.5)</td>
<td>-</td>
<td>2.8 (.4)</td>
<td>1.7 (2.1)</td>
<td>8.5 (2.6)</td>
</tr>
<tr>
<td>Africa</td>
<td>58 (.8)</td>
<td>3 (.3)</td>
<td>28.4 (.8)</td>
<td>-</td>
<td>7.5 (.4)</td>
<td>-</td>
<td>3.1 (.1)</td>
</tr>
<tr>
<td>Oceania</td>
<td>62.9 (1.9)</td>
<td>8.5 (2.3)</td>
<td>17.1 (1.1)</td>
<td>2.2 (2.4)</td>
<td>2.7 (1.1)</td>
<td>1 (3.3)</td>
<td>5.6 (4.5)</td>
</tr>
<tr>
<td>Total Income</td>
<td>57.4 (1.9)</td>
<td>6.6 (2.3)</td>
<td>27.1 (1.1)</td>
<td>1.6 (2.4)</td>
<td>4.6 (1.1)</td>
<td>0.5 (3.3)</td>
<td>2.2 (4.5)</td>
</tr>
</tbody>
</table>
relying on government. The income units with an Italian born head, relied on wages and salaries even less, 44.8%, but slightly more on government, at 30.5% compared to 29.7%.

However, a significant source of income, 14%, for the Italian headed units, is income from business or trusts, followed by 8.3% from dividends and/or interest. Both of these sources are much more significant for the Italian units than for any of the others. Of all the income units, the Italians have a greater reliance on government, interest/dividend and business/trust, as a source of income than any other income unit. These sources, particularly government and interest/dividend income as we saw in Table 5.5, have a low mean.

5.6 Conclusion

The extent to which various socio demographic factors influence the pattern of income distribution can be gauged from the above analysis. The age, sex, and country of birth of the income unit head are all important in determining both the source and size of income received and thus the overall level of inequality. In addition, the size and the type of income unit, that is, whether married or single, with or without dependents, also has an impact. The descriptive analysis essentially confirms much of the expected patterns.

A weakness with this analysis, however, is the lack of any adjustment for the size and composition of the income unit. As discussed in Section 2.3, and as the findings of previous studies discussed in Section 4.3 illustrate, results can vary significantly when equivalent scales are used to adjust the
income required by families of different size and composition to achieve similar standards of living.

No adjustments have been made in this analysis as the intention is solely to describe the data base and determine its main characteristics. In the following chapter, when an attempt is made to determine the degree to which each of the factors discussed above contribute to the overall level of inequality some adjustment will be necessary. In particular, an analysis will be made using the equivalent income approach to highlight the different results that can be obtained when consideration is given to the different needs of income units.
CHAPTER 6

THE CONTRIBUTION OF SOCIO-ECONOMIC FACTORS TO INCOME INEQUALITY IN AUSTRALIA

6.1 Introduction

The analysis in this section applies a method of decomposition of the Gini coefficient recently proposed by Podder (1991). The decomposition is used to analyze the contributions of incomes of the different population subgroups described in the previous chapter, to the overall inequality level in Australia.

There is however, also much justification in adjusting the level of gross income to take into consideration the size and composition of the income unit, to determine in a more meaningful way the level of inequality and how it best can be altered. As noted in Section 2.3, the needs of income units will vary depending on their particular demographic characteristics. To make some allowance for this variation, equivalence scales are used. The following analysis adopts such a scale and applies this adjustment along with the unadjusted gross weekly income to decompose the different population sub-groups examined previously.

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30 This method is discussed fully in Section 3.2. Appendix B contains details of the computer programme used.

31 Section 2.3 contains a full discussion of equivalence scales in terms of their use and appropriate scales. In this analysis, a scale of 1 for the first adult, .7 for each person over 15 years of age and .4 for each child up to 15 years is adopted. This is based on a scale developed by Kakwani
The sub-groups have been chosen to reflect the various socio-economic and demographic characteristics that is generally regarded in the literature as having some influence on income inequality and ones that are relevant from a policy point of view. The analysis is undertaken on the basis of the data available from the unit record data, from a sample 10 815 income units surveyed by the ABS.

Intuition or casual observation can tell us the general direction of the change to overall inequality as a result of a particular subgroup's income changing. For example, if a group is concentrated at the lower end of the income distribution, such as single income units with a female head and dependents, it would be expected that a proportional increase in their incomes would decrease overall inequality. Similarly, a proportionate increase in the income of large income units, particularly those with a number of young dependents, would be expected to reduce inequality. However, the exact magnitude of the change can't be determined from intuition, or a priori statements. But by applying Podder's method to the surveyed sample, the exact effect of a proportionate change in income within a subgroup can be quantified. The change in the overall Gini coefficient, the most widely used measure of inequality, can be calculated to determine ways of changing the level of total inequality. This can be useful for policy recommendations.

The Gini index for gross weekly income, as computed and reported in Chapter 5, is .42014. Applying an equivalence scale to the gross income

(1986) and later applied by Agrawal (1987). The division between adult and child is determined on the basis of the age divisions used in the data base, whereby 15-65 year olds are grouped together.
figure for each income unit, the gross equivalent income can be computed. This figure is then used to calculate a new Gini index, the Gini index for the equivalent income of income units. This is computed to be .37451. Appendix C contains details of the computer programme used to calculate the Gini index for the gross equivalent income.

6.2 Gini Decomposition by Groups

If a population is divided into a number of subgroups there will be some inequality within each group and some between the group. It is common for socio-demographic groupings to have some overlap, that is, the highest income of one group may not be lower than the lowest income of another group. This type of decomposition is then not useful for analysis based on the Gini coefficient.

Podder (1991) extended the Gini decomposition to decomposition by groups with no overlapping factor, to determine if a particular group's income results in increasing or decreasing overall inequality.\textsuperscript{32} The exact change of the Gini coefficient with respect to a small percentage change to the income of all members of a group can be determined. In addition, the elasticity of the Gini coefficient with respect to the income of a specific group can be computed.

From a population of size $N$, suppose each member belongs to one group, $r$, the size of which is represented as $n_r$ The groups could be based on, for

\textsuperscript{32} For a detailed discussion of the method see Podder (1991).
example, the sex of the income unit head or the size of the income unit. If the income of the entire population is arranged in ascending order, $x_1, x_2, \ldots, x_N$, various vectors can be constructed each relating to a specific group. The size of the vector, $n_r$, will be the income of the members of the $r^{th}$ group. Each vector will be the same length because the members not receiving income from the particular source under examination will be given a value of 0. The sum of all the vectors is then the vector of total income in ascending order and can be used to estimate the Gini coefficient. The other vectors can be used to estimate the concentration ratio for each group.

If $G$ represents the Gini coefficient of total income ($X$), and $C_r$ the concentration index of income from the vector $X_r$ then

$$G = \sum_{r=1}^{R} \frac{X_r}{X} C_r$$

(6.1)

which can be rewritten as

$$0 = \sum_{r=1}^{R} \frac{X_r}{X} (C_r - G)$$

(6.2)

that is, the weighted sum of deviations, (where the weights are the respective income shares of the groups), of concentration ratios from the Gini index is 0.

The sign of the component $C_r - G$ indicates if the presence of income of the members of the $r^{th}$ group increases or decreases inequality. For example, a
positive, (negative), sign indicates the income of the group increases, (decreases), overall inequality.

If the income for this group is allowed to change then the exact marginal change in Gini as a result of a small proportional change in the income of each member can be determined using:

\[ x_r \frac{dG}{dx_r} \frac{X_r(C_r - G)}{X} = S_r(C_r - G) \]

where \( S_r = \frac{X}{X_r} = \) income share of the \( r^{th} \) group. \( (6.3) \)

This is a powerful tool for policy decisions as to the effects of, for example, a percentage change in income of particular groups such as pensioners groups.

The zero elements in the vector will not be changed when there is a percentage change in the incomes of this group, thus the income within other groups will also not be affected.

Using the equation above, the elasticity of the Gini coefficient can be derived.

\[ \eta_r = \frac{X_r \frac{dG}{dX_r}}{G} \]

\[ = \frac{1}{G} \left[ \frac{X_r(C_r - G)}{X} \right] \]

\[ = \frac{X_r(C_r - 1)}{G} \]

\[ = \frac{1}{G} S_r(C_r - G) \]

\( (6.4) \)
6.3 Income Unit Type

Income units, as in the previous chapter, are grouped into four types: married with no dependents, married with dependents, one-parent with dependents and one person units. As highlighted earlier, and as now reported in Table 6.1, the mean unadjusted weekly income for married couples, both with and without dependents, is much higher than for the single one-parent and one person units. However our interest is in the possible change to overall inequality if the income of specific income unit types is changed. Thus the concentration indices for each unit type is calculated with the Gini index then being subtracted. In this instance, using gross weekly income, one parent and one person income units have a negative effect on inequality meaning that a proportionate increase (reduction) in the income to any one of the units will result in lower (higher) overall inequality. The column, \( S_r(C - G) \), presents the derivatives of the overall Gini index with respect to a percentage change in income of the \( r \)th group. The exact effect of a small proportionate change in the income of a specific group on the Gini index is indicated. Table 6.1 shows that the maximum decrease in inequality can be achieved by a small proportionate change to the income of one person income units. An increase to the incomes of one parent units will also reduce, although to a lesser extent, the Gini index. In the former case the Gini index changes from \( .42014 \) to \( .32501 \), that is, a \( -.09513 \) decrease, as shown by the negative derivative, while in the latter the negative derivative of \( -.01171 \), results in a change from \( .42014 \) to \( .40843 \).
The elasticity column shows the relative importance of the groups with respect to increasing or decreasing total inequality. Table 6.1 indicates that a change in the income of one person income units will have the greatest influence on overall inequality, followed by the married couple units with dependents, although the two respond in the opposite direction. The income of married couples with dependents has a positive elasticity of 0.19827 compared with the negative elasticity of -0.22642 for one person income units, and with approximately 40 per cent of the total income it could be argued that a change in the incomes of married couples with dependents must have a significant impact on the overall level of inequality. If members of this group received a one percent increase in their income, the Gini coefficient would increase by 0.19827 per cent. By contrast, the one person units, with a smaller share of approximately 28 per cent of total income, have a quite different impact on inequality in that a one percent increase in their income will decrease the level of inequality by 0.22642 per cent.

Adjusting for the age and number of persons in the income unit makes some difference both to the inequality levels experienced, and the share of total income held by the different unit types. Table 6.2 records the effects of the adjustment. Married couple income units without dependents, now have the highest equivalent income level, with $282.89 being the mean income, and are followed by the one person income units, with a mean of $249.86 being just a little higher than the mean income of married couples with dependents at $239.64. The one person units, with 44.48 per cent of the total income, now hold the largest share of income, followed by married couples without dependents, with 27.8 per cent, and married couples with
### Table 6.1
**Gross Weekly Income by Income Unit Type**

<table>
<thead>
<tr>
<th>Income Unit Type</th>
<th>No. of Income Units</th>
<th>Mean Income ($/wk.)</th>
<th>% Income Share</th>
<th>$C_r$</th>
<th>$C_r - G$</th>
<th>$S_r(C_r - G)$</th>
<th>Elasticity $\eta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married Couple no Dep.</td>
<td>2667</td>
<td>480.92</td>
<td>29.59</td>
<td>0.52065</td>
<td>0.10051</td>
<td>0.02974</td>
<td>0.07080</td>
</tr>
<tr>
<td>Married Couple with Dep.</td>
<td>2849</td>
<td>606.44</td>
<td>39.87</td>
<td>0.62909</td>
<td>0.20895</td>
<td>0.08330</td>
<td>0.19827</td>
</tr>
<tr>
<td>One Parent with Dep.</td>
<td>469</td>
<td>248.87</td>
<td>2.69</td>
<td>-0.01451</td>
<td>-0.43465</td>
<td>-0.01171</td>
<td>-0.02786</td>
</tr>
<tr>
<td>One Person</td>
<td>4830</td>
<td>249.86</td>
<td>27.85</td>
<td>0.07853</td>
<td>-0.34161</td>
<td>-0.09513</td>
<td>-0.22642</td>
</tr>
</tbody>
</table>

### Table 6.2
**Equivalent Income by Income Unit Type**

<table>
<thead>
<tr>
<th>Income Unit Type</th>
<th>No. of Income Units</th>
<th>Mean Income ($/wk.)</th>
<th>% Income Share</th>
<th>$C_r$</th>
<th>$C_r - G$</th>
<th>$S_r(C_r - G)$</th>
<th>Elasticity $\eta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married Couple no Dep.</td>
<td>2667</td>
<td>282.89</td>
<td>27.81</td>
<td>0.48716</td>
<td>0.11265</td>
<td>0.03133</td>
<td>0.08365</td>
</tr>
<tr>
<td>Married Couple with Dep.</td>
<td>2849</td>
<td>239.64</td>
<td>25.17</td>
<td>0.29034</td>
<td>-0.08417</td>
<td>-0.02118</td>
<td>-0.05656</td>
</tr>
<tr>
<td>One Parent with Dep.</td>
<td>469</td>
<td>147.02</td>
<td>2.54</td>
<td>-0.14504</td>
<td>-0.51955</td>
<td>-0.01320</td>
<td>-0.03526</td>
</tr>
<tr>
<td>One Person</td>
<td>4830</td>
<td>249.86</td>
<td>44.48</td>
<td>0.42332</td>
<td>0.04881</td>
<td>0.02171</td>
<td>0.05798</td>
</tr>
</tbody>
</table>
dependents with 25.17 per cent, leaving only 2.54 per cent for the one parent with dependents income unit.

In contrast to the analysis of the gross unadjusted weekly income, the derivatives for equivalent income indicate that a proportionate change to the income of all units with dependents will reduce inequality. However, since married couples with dependents have a much larger share of total income, compared to the one parent income units, a proportionate change to the income level of this group will have a greater effect of the overall level of inequality, as measured by the Gini index, than will the same change to the income of one parent income units. In this case, derivatives show that the Gini index would be reduced from .37451 to .35333, a reduction of .02118, compared to a reduction of .0132 if the increased income was given to the one parent income units.

The responsiveness to a change in income, as shown by the elasticity column, is about the same in magnitude, but not direction, for married couples with dependents as for the one person income units. An even greater responsiveness would however be generated from married income units with no dependents, but the response would have a positive effect on the level of inequality, that is the Gini index would be increased.

Applying an equivalence scale to the data, highlights the importance of dependents in contributing to the level of inequality experienced and confirms more closely a priori expectations. Increasing the income received by either or both of the units with dependents, would result in a decreased level of inequality, whereas the analysis using the gross, unadjusted income figure, gave prominence to the one parent and one person income units with their smaller mean income.
6.4 Size of Income Unit

Tables 6.3 and 6.4 classify income units according to their size. Table 6.3 shows the mean for gross unadjusted weekly income increases with income unit size up to four persons, then steadily decreases. Two and one persons units are shown to have the greatest percentage share of income.

Decomposing using the unadjusted gross income figure, shows all units, apart from the one person units, having a positive effect on inequality. The derivatives with respect to a percentage change in a group's income shows the greatest improvement in inequality can be achieved by increasing the income of all one person units. A proportionate increase in the income of this group will decrease the Gini index to .32501, as was also highlighted in Table 6.1, while the same proportionate increase in the incomes of the other units, will increase the Gini index and thus the overall level of inequality. The derivatives show the Gini index could increase from .42014 to .45715 or .44467 with a small proportionate increase to the incomes of four and three person income units respectively. A proportionate change to the income of very large units (six or more), will only have a very small impact on the overall level of inequality. The derivatives show that the Gini will be affected only to the third place and therefore any change to the income of this group will have no significant impact on inequality.

The elasticity column indicates the four person unit will have the most positive response to a change in income. A small proportionate increase to the income of these units would increase the level of inequality. However, the elasticity of a change to the income of one person units is greater and
Table 6.3
Gross Weekly Income by Size of Income Unit

<table>
<thead>
<tr>
<th>Size of Income Unit</th>
<th>No. of Income Units</th>
<th>% Income Share</th>
<th>Mean Income ($/wk.)</th>
<th>( C_t )</th>
<th>( C_t - G )</th>
<th>( S_t(C_t - G) )</th>
<th>Elasticity ( \eta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4830</td>
<td>27.85</td>
<td>249.86</td>
<td>0.07853</td>
<td>-0.34161</td>
<td>-0.09513</td>
<td>-0.22642</td>
</tr>
<tr>
<td>2</td>
<td>2812</td>
<td>30.99</td>
<td>461.27</td>
<td>0.49864</td>
<td>0.07850</td>
<td>0.02433</td>
<td>0.05791</td>
</tr>
<tr>
<td>3</td>
<td>1078</td>
<td>13.86</td>
<td>557.24</td>
<td>0.59711</td>
<td>0.17697</td>
<td>0.02453</td>
<td>0.05838</td>
</tr>
<tr>
<td>4</td>
<td>1250</td>
<td>17.67</td>
<td>612.72</td>
<td>0.62959</td>
<td>0.20945</td>
<td>0.03701</td>
<td>0.08810</td>
</tr>
<tr>
<td>5</td>
<td>540</td>
<td>7.03</td>
<td>564.11</td>
<td>0.58810</td>
<td>0.16796</td>
<td>0.01181</td>
<td>0.02810</td>
</tr>
<tr>
<td>6</td>
<td>150</td>
<td>1.91</td>
<td>552.91</td>
<td>0.58634</td>
<td>0.16620</td>
<td>0.00318</td>
<td>0.00757</td>
</tr>
<tr>
<td>&gt;6</td>
<td>55</td>
<td>0.69</td>
<td>540.20</td>
<td>0.56636</td>
<td>0.14622</td>
<td>0.00100</td>
<td>0.00239</td>
</tr>
</tbody>
</table>

Table 6.4
Equivalent Income by Size of Income Unit

<table>
<thead>
<tr>
<th>Size of Income Unit</th>
<th>No. of Income Units</th>
<th>% Income Share</th>
<th>Mean Income ($/wk.)</th>
<th>( C_t )</th>
<th>( C_t - G )</th>
<th>( S_t(C_t - G) )</th>
<th>Elasticity ( \eta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4830</td>
<td>44.48</td>
<td>249.86</td>
<td>0.42332</td>
<td>0.04881</td>
<td>0.02171</td>
<td>0.05798</td>
</tr>
<tr>
<td>2</td>
<td>2912</td>
<td>29.33</td>
<td>273.24</td>
<td>0.46697</td>
<td>0.09246</td>
<td>0.02712</td>
<td>0.07240</td>
</tr>
<tr>
<td>3</td>
<td>1078</td>
<td>10.28</td>
<td>258.68</td>
<td>0.39815</td>
<td>0.02364</td>
<td>0.00243</td>
<td>0.00649</td>
</tr>
<tr>
<td>4</td>
<td>1250</td>
<td>10.97</td>
<td>238.12</td>
<td>0.28479</td>
<td>-0.08972</td>
<td>-0.00984</td>
<td>-0.02628</td>
</tr>
<tr>
<td>5</td>
<td>540</td>
<td>3.75</td>
<td>188.50</td>
<td>0.10344</td>
<td>-0.27108</td>
<td>0.01017</td>
<td>-0.02716</td>
</tr>
<tr>
<td>6</td>
<td>150</td>
<td>0.89</td>
<td>161.67</td>
<td>-0.03828</td>
<td>-0.41280</td>
<td>-0.00369</td>
<td>-0.00985</td>
</tr>
<tr>
<td>&gt;6</td>
<td>55</td>
<td>0.29</td>
<td>144.45</td>
<td>-0.09087</td>
<td>-0.46538</td>
<td>0.00136</td>
<td>-0.00364</td>
</tr>
</tbody>
</table>
more significant at -0.22642, with the negative sign indicating a one percent increase in the income of this group would reduce the inequality level overall by 0.22644 per cent.

To decompose according to this characteristic is however not very meaningful since a higher income does not automatically indicate higher welfare. Obviously the number of people in the unit is important. Adjusting for the number and age of persons gives not only a more accurate, but also a more plausible claim as to how inequality can be reduced.

Using equivalent income, (Table 6.4), income units with four or more persons have a negative contribution to the level of inequality, with the greatest reduction in the Gini index being achieved by a small proportionate increase to the income of units comprising of five persons, followed by the units with four persons. The elasticity to an income change is almost the same for these two groups at 0.027 and 0.026 respectively. By contrast, a proportionate increase to the income of the units with one - three persons will increase the overall level of inequality. The one and two person units have the greatest, although positive, elasticity.

A priori expectations would tell us that those units with more persons are more likely to benefit from an increase to their income than a single person unit. However, by applying the decomposition method to the different sized income units, the exact magnitude of the change can now be quantified. The analysis shows that the larger units are the ones that need to be given increased income if the level of inequality is to be reduced.
6.5 Number of Dependents in the Income Unit

To be more specific with regard to income unit characteristics, Tables 6.5 and 6.6 classify income units according to the number of dependents. The ABS (1986) defines dependents as a person under 15 years or 15-20 years and a full time student who has a parent/guardian in the income unit and is neither a spouse nor a parent of anyone in the income unit. Thus units with 0 dependents include both married couples with no dependents and one person units.

Table 6.5 reports on the unadjusted weekly income and shows that only for those units with no dependents, or those with a large number of dependents, will an increase in their gross unadjusted income reduce the level of overall inequality. The elasticity column shows that the greatest response to decreasing inequality will come from an increase to the income of those units with no dependents.

All income units with dependents have a positive effect on total inequality. The income unit with two dependents, which has the greatest share of income and as we saw earlier, has the highest mean income, is where a small change in the total income will have the greatest impact on inequality. A proportionate increase in the income of this unit will change the Gini index by .03427, that is, from .42014 to .45441. The elasticity of an income change for this group is also the greatest. As the number of dependents increase beyond two, the effect of a proportionate change in income has a smaller effect on changing the Gini index. The derivatives show that they will affect the overall Gini index only in the third place and thus it can be concluded that a small change to the units with a large number of dependents does not have a significant effect on overall inequality.
Table 6.5
Gross Weekly Income by the Number of Dependents

<table>
<thead>
<tr>
<th>No. of Dep.</th>
<th>No. of Income Units</th>
<th>% Income Share</th>
<th>Mean Income ($/wk.)</th>
<th>C_r</th>
<th>C_r - G</th>
<th>S_r(C_r - G)</th>
<th>Elasticity  11</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7497</td>
<td>57.44</td>
<td>332.06</td>
<td>0.29725</td>
<td>-0.1229</td>
<td>-0.07059</td>
<td>-0.16802</td>
</tr>
<tr>
<td>1</td>
<td>1165</td>
<td>14.37</td>
<td>534.45</td>
<td>0.58352</td>
<td>0.16338</td>
<td>0.02348</td>
<td>0.05588</td>
</tr>
<tr>
<td>2</td>
<td>1359</td>
<td>18.29</td>
<td>583.35</td>
<td>0.60753</td>
<td>0.18739</td>
<td>0.03427</td>
<td>0.08158</td>
</tr>
<tr>
<td>3</td>
<td>575</td>
<td>7.19</td>
<td>542.05</td>
<td>0.56644</td>
<td>0.1463</td>
<td>0.01052</td>
<td>0.02504</td>
</tr>
<tr>
<td>4</td>
<td>163</td>
<td>2.02</td>
<td>536.24</td>
<td>0.57065</td>
<td>0.15051</td>
<td>0.00304</td>
<td>0.00724</td>
</tr>
<tr>
<td>5</td>
<td>34</td>
<td>0.45</td>
<td>576.15</td>
<td>0.62559</td>
<td>0.20545</td>
<td>0.00092</td>
<td>0.00220</td>
</tr>
<tr>
<td>6</td>
<td>22</td>
<td>0.24</td>
<td>472.41</td>
<td>0.40964</td>
<td>-0.0105</td>
<td>-0.00003</td>
<td>-0.00006</td>
</tr>
</tbody>
</table>

Table 6.6
Equivalent Income by the Number of Dependents

<table>
<thead>
<tr>
<th>No. of Dep.</th>
<th>No. of Income Units</th>
<th>% Income Share</th>
<th>Mean Income ($/wk.)</th>
<th>C_r</th>
<th>C_r - G</th>
<th>S_r(C_r - G)</th>
<th>Elasticity  11</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7497</td>
<td>72.29</td>
<td>261.61</td>
<td>0.45491</td>
<td>0.08039</td>
<td>0.05812</td>
<td>0.15518</td>
</tr>
<tr>
<td>1</td>
<td>1165</td>
<td>11.03</td>
<td>256.96</td>
<td>0.40379</td>
<td>0.02928</td>
<td>0.00323</td>
<td>0.00863</td>
</tr>
<tr>
<td>2</td>
<td>1359</td>
<td>11.55</td>
<td>230.54</td>
<td>0.27081</td>
<td>-0.10371</td>
<td>-0.01198</td>
<td>-0.03200</td>
</tr>
<tr>
<td>3</td>
<td>575</td>
<td>3.87</td>
<td>182.78</td>
<td>0.08472</td>
<td>-0.28979</td>
<td>-0.01123</td>
<td>-0.03000</td>
</tr>
<tr>
<td>4</td>
<td>163</td>
<td>0.96</td>
<td>158.97</td>
<td>-0.0483</td>
<td>-0.42281</td>
<td>-0.00404</td>
<td>-0.01080</td>
</tr>
<tr>
<td>5</td>
<td>34</td>
<td>0.19</td>
<td>155.16</td>
<td>0.02675</td>
<td>-0.34777</td>
<td>-0.00068</td>
<td>-0.00180</td>
</tr>
<tr>
<td>6</td>
<td>22</td>
<td>0.10</td>
<td>124.76</td>
<td>-0.38334</td>
<td>-0.75785</td>
<td>-0.00077</td>
<td>-0.00200</td>
</tr>
</tbody>
</table>
However, examining the income units using equivalent income, Table 6.6, shows that as the number of persons in the income unit increases, a proportionate increase to the income received will decrease the level of inequality, with the income units with two or three dependents having the greatest impact. As the number of dependents increase beyond three, the proportion of units and therefore their share of income decreases, and thus their effect on decreasing the overall level of inequality is less. Where there are four or more dependents, the derivatives show that the Gini index will only be affected in the third or fourth decimal place, whereas the units with two or three dependents have an impact in the second decimal place. This is contrary to the analysis using the unadjusted income referred to in Table 6.5, but is more in line with a priori expectations.

From the preceding analysis, that is, according to income unit size, type, and number of dependents, and using gross weekly income, it could be concluded that a proportionate increase to the income of all married couple income units with two dependents is most likely to have the greatest impact on increasing the overall level of inequality, while the same increase to the one person income units would reduce the inequality levels.

Adopting the equivalent gross weekly income however produces different conclusions, in that the married income units, and to a lesser extent the single parent units, with two or three dependents, that is, income units with four or five persons, will have the greatest impact on reducing the level of inequality.
6.6 Age of Income Unit Head

When income is related to the age of the income unit head, the average gross unadjusted income of income units, Table 6.7, follows the normal pattern of an inverted U-shaped curve, peaking at the 40-44 age group. The mean weekly income for this age group is $593.98, with most income being received by units with a head aged between 25 and 45 years.

The life cycle effect rates strong in this analysis since the focus is on the income unit, with no adjustment for size or age of the members. The mean income of the units with a head aged 35 to 50 needs to increase as many of these units could have a number of dependents and may or may not have two incomes. The analysis conducted here examines gross weekly income of the income unit and does not therefore distinguish between one and two income earners in any income unit. The focus is on total weekly income of the income unit.

The derivatives of the 35-39 and 40-44 year old units show that a proportionate increase in their income will increase the overall level of inequality to .44731 and .44804, that is an increase of .02717 and .0279 respectively. The elasticity of their income to a change is .065 and .066 respectively.

The greatest improvement in inequality resulting from a small percentage change to income will occur with the very young, i.e. under 25 years, and the very old income units, i.e. those over 60 years. In particular, the derivatives show that the Gini index can be reduced from .42014 to .39846 for
Table 6.7
Gross Weekly Income by Age of Income Unit Head

<table>
<thead>
<tr>
<th>Age of Unit Head</th>
<th>No. of Income Units</th>
<th>Mean Income ($/wk.)</th>
<th>% Income Share</th>
<th>$\gamma$</th>
<th>$C_t$ - $G$</th>
<th>$S_t(C_t - G)$</th>
<th>Elasticity $\eta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>30</td>
<td>69.87</td>
<td>0.05</td>
<td>-0.62215</td>
<td>-1.04229</td>
<td>-0.00050</td>
<td>-0.00120</td>
</tr>
<tr>
<td>16 - 17</td>
<td>324</td>
<td>125.71</td>
<td>0.94</td>
<td>-0.46088</td>
<td>-0.88102</td>
<td>-0.00828</td>
<td>-0.01971</td>
</tr>
<tr>
<td>18 - 20</td>
<td>790</td>
<td>212.31</td>
<td>3.87</td>
<td>-0.14011</td>
<td>-0.56025</td>
<td>-0.02168</td>
<td>-0.05161</td>
</tr>
<tr>
<td>21-24</td>
<td>1115</td>
<td>319.78</td>
<td>8.23</td>
<td>0.19658</td>
<td>-0.22356</td>
<td>-0.01839</td>
<td>-0.04378</td>
</tr>
<tr>
<td>25-29</td>
<td>1125</td>
<td>448.12</td>
<td>11.63</td>
<td>0.46286</td>
<td>0.04272</td>
<td>0.00497</td>
<td>0.01183</td>
</tr>
<tr>
<td>30-34</td>
<td>1112</td>
<td>517.71</td>
<td>13.28</td>
<td>0.54745</td>
<td>0.12731</td>
<td>0.01691</td>
<td>0.04025</td>
</tr>
<tr>
<td>35-39</td>
<td>1073</td>
<td>574.86</td>
<td>14.23</td>
<td>0.61103</td>
<td>0.19089</td>
<td>0.02717</td>
<td>0.06466</td>
</tr>
<tr>
<td>40-44</td>
<td>909</td>
<td>593.98</td>
<td>12.46</td>
<td>0.64411</td>
<td>0.22397</td>
<td>0.02790</td>
<td>0.06641</td>
</tr>
<tr>
<td>45-49</td>
<td>689</td>
<td>553.97</td>
<td>8.81</td>
<td>0.59920</td>
<td>0.17906</td>
<td>0.01577</td>
<td>0.03753</td>
</tr>
<tr>
<td>50-54</td>
<td>615</td>
<td>515.07</td>
<td>7.31</td>
<td>0.56067</td>
<td>0.14053</td>
<td>0.01027</td>
<td>0.02445</td>
</tr>
<tr>
<td>55-59</td>
<td>637</td>
<td>420.55</td>
<td>6.18</td>
<td>0.45080</td>
<td>0.03066</td>
<td>0.00189</td>
<td>0.00451</td>
</tr>
<tr>
<td>60-64</td>
<td>714</td>
<td>316.70</td>
<td>5.22</td>
<td>0.27104</td>
<td>-0.14910</td>
<td>-0.00778</td>
<td>-0.01852</td>
</tr>
<tr>
<td>65-69</td>
<td>560</td>
<td>223.05</td>
<td>2.88</td>
<td>-0.06819</td>
<td>-0.48833</td>
<td>-0.01407</td>
<td>-0.03350</td>
</tr>
<tr>
<td>70-74</td>
<td>513</td>
<td>202.94</td>
<td>2.38</td>
<td>-0.17194</td>
<td>-0.59208</td>
<td>-0.01408</td>
<td>-0.03352</td>
</tr>
<tr>
<td>75+</td>
<td>609</td>
<td>180.25</td>
<td>2.53</td>
<td>-0.24632</td>
<td>-0.66646</td>
<td>-0.01688</td>
<td>-0.04018</td>
</tr>
</tbody>
</table>
the 18-19 year olds, or to .40175 if all the 20-24 year olds were to have a proportionate increase in their income. The derivatives for the very young school leavers, namely those under 17, show that an income change will have a much less significant impact on inequality. Here the Gini index will only be affected in the third decimal place. Likewise with the 60-64 year olds.

However with the older income units, those with a head aged between 65 and 75 and over 75, a proportionate increase in their incomes could reduce the overall Gini index to .40606 and .40326 respectively. Likewise the elasticities show the greatest improvement in the level of overall inequality will result from a change in income for the 18-19, 20-24 and 75+ aged groups.

Adjusting for the age and number of persons in the income unit, Table 6.8, still shows the units with the younger and older heads as the ones that will produce a smaller level of overall inequality if their incomes were to be increased, although the Gini index will only be affected in the second, and more often in the third decimal place. In particular, a proportionate increase to the income of units with a head aged 18-20 years, or at the other end of the age scale, to those units with a head aged over 75 years, will reduce the Gini index from .37451 to .36423 and .35720 respectively.

By contrast, the derivatives show a similar change in income levels for the income units with a head aged 25-29 years would be of the same magnitude but the direction of change would be the opposite. That is, the level of inequality will be increased by .017 rather than reduced by this amount if a small proportionate increase in the income of this group was to occur. Income units with a head aged 20 to 30 years, or 45-49 years, will have the greatest impact on increasing the overall level of inequality. This reflects life cycle effects to the extent that such units are likely not to have
### Table 6.8
Equivalent Income by Age of Income Unit Head

<table>
<thead>
<tr>
<th>Age of Unit Head</th>
<th>No. of Income Units</th>
<th>Mean Income ($/wk.)</th>
<th>% Income Share</th>
<th>Cᵣ</th>
<th>Cᵣ - G</th>
<th>Sᵣ(Cᵣ - G)</th>
<th>Elasticity η</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>30</td>
<td>69.87</td>
<td>0.08</td>
<td>-0.39795</td>
<td>-0.77247</td>
<td>-0.00060</td>
<td>-0.00159</td>
</tr>
<tr>
<td>16-17</td>
<td>324</td>
<td>125.44</td>
<td>1.50</td>
<td>-0.17623</td>
<td>-0.55074</td>
<td>-0.00825</td>
<td>-0.02203</td>
</tr>
<tr>
<td>18-20</td>
<td>790</td>
<td>206.49</td>
<td>6.01</td>
<td>0.20357</td>
<td>-0.17095</td>
<td>-0.01028</td>
<td>-0.02745</td>
</tr>
<tr>
<td>21-24</td>
<td>1115</td>
<td>275.95</td>
<td>11.34</td>
<td>0.45540</td>
<td>0.08088</td>
<td>0.00917</td>
<td>0.02449</td>
</tr>
<tr>
<td>25-29</td>
<td>1125</td>
<td>310.19</td>
<td>12.86</td>
<td>0.50618</td>
<td>0.13167</td>
<td>0.01694</td>
<td>0.04522</td>
</tr>
<tr>
<td>30-34</td>
<td>1112</td>
<td>293.69</td>
<td>12.04</td>
<td>0.41710</td>
<td>0.04258</td>
<td>0.00513</td>
<td>0.01369</td>
</tr>
<tr>
<td>35-39</td>
<td>1073</td>
<td>284.19</td>
<td>11.24</td>
<td>0.38833</td>
<td>0.01381</td>
<td>0.00155</td>
<td>0.00415</td>
</tr>
<tr>
<td>40-44</td>
<td>909</td>
<td>284.29</td>
<td>9.53</td>
<td>0.41174</td>
<td>0.03723</td>
<td>0.00355</td>
<td>0.00947</td>
</tr>
<tr>
<td>45-49</td>
<td>689</td>
<td>289.85</td>
<td>7.36</td>
<td>0.44799</td>
<td>0.07348</td>
<td>0.00541</td>
<td>0.01444</td>
</tr>
<tr>
<td>50-54</td>
<td>615</td>
<td>304.50</td>
<td>6.90</td>
<td>0.51640</td>
<td>0.14188</td>
<td>0.00979</td>
<td>0.02615</td>
</tr>
<tr>
<td>55-59</td>
<td>637</td>
<td>270.87</td>
<td>6.36</td>
<td>0.52497</td>
<td>0.15046</td>
<td>0.00957</td>
<td>0.02555</td>
</tr>
<tr>
<td>60-64</td>
<td>714</td>
<td>210.58</td>
<td>5.54</td>
<td>0.43274</td>
<td>0.05822</td>
<td>0.00323</td>
<td>0.00862</td>
</tr>
<tr>
<td>65-69</td>
<td>560</td>
<td>154.60</td>
<td>3.19</td>
<td>-0.00119</td>
<td>-0.37571</td>
<td>-0.01199</td>
<td>-0.03201</td>
</tr>
<tr>
<td>70-74</td>
<td>513</td>
<td>149.23</td>
<td>2.82</td>
<td>0.09038</td>
<td>-0.28413</td>
<td>-0.00802</td>
<td>-0.02141</td>
</tr>
<tr>
<td>75+</td>
<td>609</td>
<td>143.78</td>
<td>3.23</td>
<td>-0.16185</td>
<td>-0.53636</td>
<td>-0.01731</td>
<td>-0.04622</td>
</tr>
</tbody>
</table>
dependents, with the age of the head being either before or after the main child rearing ages. There is also the possibility of two incomes in the income unit as mentioned above.

6.7 Country of Birth of Head of Income Unit

Just over one quarter of all income units have heads born outside of Australia, with most being of European origin. The average unadjusted gross weekly income, as reported in Table 6.9, is the highest for units with a head born in the United Kingdom and lowest for those with an Asian born head. But, by the number of units, and thus the proportion of income received, the income units with Australian born heads dominate. The concentration ratio for this group does not therefore vary greatly from the Gini index.

The derivatives for all groups show that the Gini index will only be changed in the third or fourth decimal place. Thus the place of birth of the income unit head does not appear to have any significant impact on the level of inequality. For example, the groups titled United Kingdom, "Other" and "Asian", have some small but positive effect on inequality. A proportionate decrease to income in these groups will decrease overall inequality. Others all have a negative, although also a very small effect, thus any proportionate decrease to their income will result in overall inequality increasing.

The elasticities are the strongest for the units with a head born in the United Kingdom and Australia, but neither are very strong. For example, a one percent increase in the income of income units whose head was born in the
Table 6.9
Gross Weekly Income by Country of Birth

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of Income Units</th>
<th>Mean Income ($/wk.)</th>
<th>% Income Share</th>
<th>C_t</th>
<th>C_t - G</th>
<th>S_t(C_t - G)</th>
<th>Elasticity η</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>8030</td>
<td>397.93</td>
<td>73.73</td>
<td>0.41279</td>
<td>-0.00735</td>
<td>-0.00542</td>
<td>-0.01290</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1102</td>
<td>432.07</td>
<td>10.99</td>
<td>0.47359</td>
<td>0.05345</td>
<td>0.00687</td>
<td>0.01398</td>
</tr>
<tr>
<td>Italy</td>
<td>249</td>
<td>378.17</td>
<td>2.17</td>
<td>0.35984</td>
<td>-0.06030</td>
<td>-0.00131</td>
<td>-0.00312</td>
</tr>
<tr>
<td>Other Europe</td>
<td>716</td>
<td>397.79</td>
<td>6.57</td>
<td>0.41016</td>
<td>-0.00998</td>
<td>-0.00086</td>
<td>-0.00156</td>
</tr>
<tr>
<td>Asia</td>
<td>379</td>
<td>372.83</td>
<td>3.26</td>
<td>0.43105</td>
<td>0.01091</td>
<td>0.00036</td>
<td>0.00085</td>
</tr>
<tr>
<td>Other</td>
<td>339</td>
<td>419.17</td>
<td>3.28</td>
<td>0.47187</td>
<td>0.05173</td>
<td>0.0016966</td>
<td>0.00404</td>
</tr>
</tbody>
</table>

Table 6.10
Equivalent Income by Country of Birth

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of Income Units</th>
<th>Mean Income ($/wk.)</th>
<th>% Income Share</th>
<th>C_t</th>
<th>C_t - G</th>
<th>S_t(C_t - G)</th>
<th>Elasticity η</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>8030</td>
<td>253.38</td>
<td>74.99</td>
<td>0.38041</td>
<td>0.00590</td>
<td>0.00443</td>
<td>0.01182</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1102</td>
<td>267.99</td>
<td>10.89</td>
<td>0.43554</td>
<td>0.00610</td>
<td>0.00664</td>
<td>0.01774</td>
</tr>
<tr>
<td>Italy</td>
<td>249</td>
<td>203.62</td>
<td>1.87</td>
<td>0.20221</td>
<td>-0.17231</td>
<td>-0.00322</td>
<td>-0.00860</td>
</tr>
<tr>
<td>Other Europe</td>
<td>716</td>
<td>229.50</td>
<td>6.06</td>
<td>0.28200</td>
<td>-0.09251</td>
<td>-0.00560</td>
<td>-0.01496</td>
</tr>
<tr>
<td>Asia</td>
<td>379</td>
<td>218.11</td>
<td>3.047</td>
<td>0.33003</td>
<td>-0.04448</td>
<td>-0.00136</td>
<td>-0.00362</td>
</tr>
<tr>
<td>Other</td>
<td>339</td>
<td>251.89</td>
<td>3.15</td>
<td>0.41691</td>
<td>0.04240</td>
<td>0.00133</td>
<td>0.00356</td>
</tr>
</tbody>
</table>
United Kingdom would increase the Gini index by .01398 percent, whereas the same increase to those units with an Australian born head would result in the index decreasing by .0129 percent.

Adjusting for the needs of the income units, changes the general picture as to the dominance of the different income units, but still no group will have a particularly significant impact on changing the overall level of inequality.

The mean income for units with a Asian born head, Table 6.10, is now higher than those with an Italian born head. The units likely to reduce or increase the overall level of inequality is slightly altered, in that income units with an Australian born head, have a positive effect on inequality, while those with an Asian born head have a negative effect. In addition, the derivatives show that the Gini index will only be affected in the third decimal place and then only in a small way. For example, a proportionate change to the incomes of units with a head born in "Other Europe", will reduce the Gini index by .0056, that is from .3745 to .3689, while the same change would result in the Gini index increasing by .0066 to .381156 if given to the income units with a head born in the United Kingdom.

Seventy-five percent of the income units have an Australian born head, and as previously stated, the concentration ratio for this group is close to the overall Gini ratio. The elasticity to a one percent income change, if applied to equivalent income, is small, with any increase to the income of these groups resulting in increasing the overall level of inequality by .012 percent. A similar increase to those income units with a head born in the United Kingdom would have a greater impact on increasing inequality.
6.8 Sex of Income Unit Head

Seventy four percent of income units have a male head, and as we saw earlier, their mean income is more than double that of females. Male headed income units, Table 6.11, hold 86.3% of the gross unadjusted income, while the twenty-six percent of income units with a female head, hold 13.7% of all income.

The elasticity and derivatives show that a proportionate increase to the income of each group will be of similar magnitude but have the opposite impact on equality. A proportionate change to the incomes of male headed income units would change the Gini index by .07026, that is from .42014 to .49040, while the derivatives show a change to female headed income units would decrease the Gini index by -.06928, to .35086.

When decomposing according to the sex of the income unit head and an adjustment is made for the different needs of the income units, both the mean income levels and the percentage of total income received increases for those units with a female head. Table 6.12 reports on equivalent income when units are separated according to the sex of the head of the unit. The derivatives show that a proportionate increase in the income of female headed income units will reduce the Gini index but by a smaller amount than if there was no adjustment for the needs of the different units. Now the Gini index can be reduced by .04026, from .37451 to .334251.

A similar proportionate increase to the incomes of male headed units will increase the Gini index by .02533 to .39984. The size of the derivative is also
### Table 6.11
**Gross Weekly Income by Sex Head Income Unit**

<table>
<thead>
<tr>
<th>No. of Income Units</th>
<th>Mean Income ($/wk.)</th>
<th>% Income Share</th>
<th>$C_r$</th>
<th>$C_r - G$</th>
<th>$S_r(C_r - G)$</th>
<th>Elasticity $\eta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>8013</td>
<td>466.95</td>
<td>86.33</td>
<td>0.50153</td>
<td>0.08139</td>
<td>0.07026</td>
</tr>
<tr>
<td>Female</td>
<td>2802</td>
<td>211.37</td>
<td>13.67</td>
<td>-0.08681</td>
<td>-0.50695</td>
<td>-0.06928</td>
</tr>
</tbody>
</table>

### Table 6.12
**Equivalent Income by Sex Head Income Unit**

<table>
<thead>
<tr>
<th>No. of Income Units</th>
<th>Mean Income ($/wk.)</th>
<th>% Income Share</th>
<th>$C_r$</th>
<th>$C_r - G$</th>
<th>$S_r(C_r - G)$</th>
<th>Elasticity $\eta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>8013</td>
<td>269.75</td>
<td>79.67</td>
<td>0.40631</td>
<td>0.03179</td>
<td>0.02533</td>
</tr>
<tr>
<td>Female</td>
<td>2802</td>
<td>196.84</td>
<td>20.33</td>
<td>0.17646</td>
<td>-0.19805</td>
<td>-0.04026</td>
</tr>
</tbody>
</table>
smaller when the unadjusted gross weekly income is used as the basis for the decomposition. The elasticity to a change in income for the units with a male as head is of the same direction only the size of change is much less.

The use of equivalent income does not alter the direction of the change, rather just the size of the change when units are divided on the basis of the sex of their income unit head. The changes that could result from an income change are now very much in line with a priori expectations.

Applying the derivatives allows the exact magnitude of the change to be calculated and here we see equivalent income reduces the degree of change likely to be experienced as a result of a proportionate income change.

6.9 Income Types

The descriptive analysis contained in Chapter 5, highlighted the impact the different income types have on the level of overall inequality. This analysis showed wages and salaries giving rise to much inequality. Decomposing the gross income according to the different income types, a precise calculation of how each component affects the level of inequality will be possible. Wages and salaries will obviously have a big impact on the level of equality with over 70% of the total income. Business income, interest and rent income are only small components of the total gross weekly income, thus a change to any of these income levels would not add much to the overall level of inequality.
Decomposing according to the gross unadjusted weekly income, Table 6.13, highlights the importance of transfer income to decreasing inequality. Transfer income, referring to both private and government transfers, has the greatest elasticity of all the income types and responds negatively to the level of inequality. The derivatives of -0.0873 means that a proportionate increase to all transfer income, will result in the Gini index decreasing from .42014 to .33284. By contrast, labour income, referring to income from wages and salaries, or business, increases inequality. A proportionate addition to labour income will result in the Gini index increasing by .07979, that is, to .49993. If non-labour income is combined with labour income, gross private income is derived. The non-labour components, that is, superannuation and private investment income, have only a small but nevertheless a positive, impact on increasing inequality. The derivatives show the Gini index could increase by .0044, that is, to .42454.

Transfer income added to gross private income, gives us gross income and, as indicated above, transfer income, particularly government transfers are important in decreasing inequality. Private transfers, or "other" income, have only 1 percent share of income and will only decrease the Gini index by .0002 if there was to be a proportionate increase in these payments. Consequently, the elasticity is only significant in the fourth decimal place. Much greater reliance is placed on government transfers. With approximately 11 percent income share, a proportionate increase to government transfers can reduce the Gini index by .0869, that is, from .42014 to .33324. The elasticity, at .20695, indicates the strength of this component of gross income in decreasing inequality. A one percent increase in the income of all income units receiving government transfers will result in the Gini index decreasing .207 percent.
Table 6.13
Cross Weekly Income Profile by Type of Income

<table>
<thead>
<tr>
<th>Income Type</th>
<th>Mean Income ($/wk.)</th>
<th>% Income Share</th>
<th>$C_T$</th>
<th>$C_T - G$</th>
<th>$S_T(C_T - G)$</th>
<th>Elasticity $\eta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wages</td>
<td>286.36</td>
<td>71.46</td>
<td>0.52249</td>
<td>0.10235</td>
<td>0.07314</td>
<td>0.17408</td>
</tr>
<tr>
<td>Business</td>
<td>29.08</td>
<td>7.26</td>
<td>0.50052</td>
<td>0.06038</td>
<td>0.00584</td>
<td>0.01389</td>
</tr>
<tr>
<td>Gov. Transfers</td>
<td>43.33</td>
<td>10.81</td>
<td>-0.38421</td>
<td>-0.80430</td>
<td>-0.08690</td>
<td>-0.20695</td>
</tr>
<tr>
<td>Other Income</td>
<td>3.96</td>
<td>0.99</td>
<td>0.40373</td>
<td>-0.01640</td>
<td>-0.00020</td>
<td>-0.00039</td>
</tr>
<tr>
<td>Super.</td>
<td>5.86</td>
<td>1.462</td>
<td>0.25034</td>
<td>-0.16980</td>
<td>-0.00250</td>
<td>-0.00591</td>
</tr>
<tr>
<td>Private Investments</td>
<td>29.11</td>
<td>7.265</td>
<td>0.51256</td>
<td>0.09242</td>
<td>0.00671</td>
<td>0.01598</td>
</tr>
<tr>
<td>Labour Inc.</td>
<td>315.44</td>
<td>79.316</td>
<td>0.52074</td>
<td>0.10060</td>
<td>0.07979</td>
<td>0.18991</td>
</tr>
<tr>
<td>Non Labour Inc.</td>
<td>34.97</td>
<td>8.73</td>
<td>0.47049</td>
<td>0.05035</td>
<td>0.00440</td>
<td>0.01046</td>
</tr>
<tr>
<td>Transfer Inc.</td>
<td>47.29</td>
<td>11.89</td>
<td>-0.31369</td>
<td>-0.7338</td>
<td>-0.08730</td>
<td>-0.20767</td>
</tr>
</tbody>
</table>

Table 6.14
Equivalent Income Profile by Type of Income

<table>
<thead>
<tr>
<th>Income Type</th>
<th>No. of Income Units</th>
<th>Mean Income ($/wk.)</th>
<th>% Income Share</th>
<th>$C_T$</th>
<th>$C_T - G$</th>
<th>$S_T(C_T - G)$</th>
<th>Elasticity $\eta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour Inc.</td>
<td>10815</td>
<td>194.24</td>
<td>77.43</td>
<td>0.47885</td>
<td>0.10434</td>
<td>0.08079</td>
<td>0.21572</td>
</tr>
<tr>
<td>Non Labour Inc.</td>
<td>10815</td>
<td>22.42</td>
<td>8.94</td>
<td>0.46606</td>
<td>0.09154</td>
<td>0.00818</td>
<td>0.02185</td>
</tr>
<tr>
<td>Transfer Inc.</td>
<td>10815</td>
<td>32.62</td>
<td>13.01</td>
<td>-0.41082</td>
<td>-0.78533</td>
<td>-0.10217</td>
<td>-0.27281</td>
</tr>
<tr>
<td>Wages</td>
<td>10815</td>
<td>178.15</td>
<td>71.02</td>
<td>0.48910</td>
<td>0.11459</td>
<td>0.08138</td>
<td>0.21729</td>
</tr>
<tr>
<td>Business</td>
<td>10815</td>
<td>16.09</td>
<td>6.41</td>
<td>0.45571</td>
<td>0.08119</td>
<td>0.00520</td>
<td>0.01390</td>
</tr>
<tr>
<td>Gov. Transfers</td>
<td>10815</td>
<td>30.23</td>
<td>12.05</td>
<td>-0.48055</td>
<td>-0.85506</td>
<td>-0.10303</td>
<td>-0.27512</td>
</tr>
<tr>
<td>Other Income</td>
<td>10815</td>
<td>2.39</td>
<td>0.95</td>
<td>0.30078</td>
<td>-0.07374</td>
<td>-0.00070</td>
<td>-0.00187</td>
</tr>
<tr>
<td>Private Investments</td>
<td>10815</td>
<td>18.43</td>
<td>7.36</td>
<td>0.50169</td>
<td>0.12717</td>
<td>0.00936</td>
<td>0.02499</td>
</tr>
<tr>
<td>Super.</td>
<td>10815</td>
<td>4</td>
<td>1.59</td>
<td>0.27960</td>
<td>-0.09492</td>
<td>-0.00151</td>
<td>-0.00403</td>
</tr>
</tbody>
</table>
Decomposing according to equivalent income type, Table 6.14, produces responses in the same direction as the gross unadjusted weekly income but the magnitude of the change that could result from a small increase to any one of the income types is much stronger.

Labour income, particularly wages and salaries with their large share of total income, is still largely responsible for inequalities, but the elasticity of the equivalent labour income is .21572 compared to .18991 for the unadjusted gross income, and thus a one percent increase in equivalent labour income will result in a greater increase in inequality, .216 percent compared to .19 percent.

Transfer income, as shown by the derivative and elasticity, is again important for decreasing inequalities. Government transfers, however will have an even stronger impact on reducing inequalities when income is adjusted for different sizes and needs of income units. The derivative shows a proportionate increase in government transfers will reduce the Gini index by .10303, that is from .37451 to .27151, compared to a reduction of .0869 if unadjusted gross income. Private transfers are again not significant in changing the level of inequality, with the derivative and elasticity only significant in the fourth and third decimal places respectively.

Overall regardless of which income concept is used, it is an increase to government transfer income that will reduce inequality.
6.10 Conclusion

The above analysis of the effects of socio-economic factors on income inequality in Australia, show that all variables have some influence on the level of total income inequality, with some factors having a greater influence than others. In particular, the type and size of the income unit, together with the sex of the income unit head, appear to have the greatest impact.

If no adjustment is made for the different needs of income units, that is, no reference is made to equivalence scales, the one person, one parent unit, with smaller mean incomes dominate to the extent of being able to decrease overall inequality. However, when an equivalent scale is applied, a more accurate picture emerges and one that is more in line with a priori expectations. Income units, particularly married units with two or three dependents, that is, children less than fifteen years or students, 15-21 years in full time study, and also units with a female head, are likely to have the greatest impact on decreasing inequality.

Examining the different types of income received by the units, a priori expectations would signify the importance of transfer income, particularly government transfers. The above analysis confirmed these expectations, and also showed that it made little difference to the direction of change whether equivalent or unadjusted income was used. However, the size of the change was greater when applied to equivalent income. Equivalent income makes allowance for the different sizes and needs of income units and thus transfer income will have a significant impact.
Changing the income of income units according to the country of birth and age of the income unit head will not have any great significance in altering overall inequality, regardless of whether equivalent income or gross unadjusted income is used. When income is examined according to country of birth, the order of countries alters when gross unadjusted income is compared to equivalent income. However, the derivatives show the Gini index will only be affected in the third decimal place, therefore it can be concluded the country of birth is not significant in changing the level of inequality.

The age of the income unit head generally reflects life cycle effects, in that it is the units with younger or older heads that could result in decreasing inequality if they were to receive a small increase in their income. Any income change to either gross unadjusted income or equivalent income will have little impact on changing equality levels.

This method of decomposition highlights the importance of the size of the income share held by the particular group under analysis. Groups with a large proportion of the total income, regardless of whether it is equivalent or unadjusted income, are obviously influential in determining and altering the level of inequality. For example, when the income unit is used as a basis of analysis, with no adjustment for different sizes and needs, there are a great variety of income units with more than one person. There are married couples with and without dependents and single persons with dependents. The unit of analysis, the income unit, is too general to determine changes that could occur to the smaller groups in the sample. For example, one parent units with dependents hold only 2.7 percent of all income, and this is too small a share to register an impact on a likely change to inequality levels. By contrast, married couples with dependents hold approximately
40 percent of income, and therefore this group will dominate when the
sample is broken according to the income unit type.

As a further illustration, when income units were grouped according to the
number of dependents, it was the units with the large percentage income
share that was seen to be influential in increasing or decreasing the level of
overall inequality. Likewise, in Tables 6.9 and 6.10, income units with an
Australian born head, held approximately three quarters of the income and
consequently the elasticity of any income change was the strongest with this
group.

It could be argued that Podder’s method of decomposition does little more
than confirm our a priori expectations. However, a priori expectations can
only indicate the direction of the likely change, not the actual size of the
change. It must be stressed that the main advantage of Podder’s method of
decomposition is that it is a reasonably simple and comprehensive
technique to determine the exact size of a proportionate change in income
on the level of overall inequality. This can have useful policy applications.
However, appropriate policies to reduce income inequalities are not within
the scope of the present study. The intention here is to show how and to
what extent inequalities among the different income units might be
changed. To this end then I feel Podder’s method has great validity.

The method’s strongest claim is that it extends the decomposition analysis,
previously dominated by within and between group components to be
applicable to the Gini index. The Theil (1967) type of decomposition is not
appropriate to the Gini index and with this index being a popular measure of
inequality, Podder’s method tries to remedy this defect in existing income
inequality analysis.
CHAPTER 7

CONCLUSIONS

This thesis examines the pattern of income distribution among income units within Australia as existed at 1986. Using some of the common descriptive statistical measures of income inequality, a static analysis of the nature and extent of income inequality was conducted. This can be used to evaluate to some extent, the effects of government redistribution policies, and to propose some possible changes.

There are various statistical and normative measures of inequality with each focusing on and giving weight to different aspects of inequality. This thesis has focussed on the Gini index, which is the most widely used and easily understood measure of inequality. The value of this index may range from 0 to 1, indicating a range from perfect equality to perfect inequality. Using the gross weekly income of all income units in 1986, including those whose income had a zero value, the Gini index for Australia was computed to be .42014.

Over the eighties, the government, as part of its social justice strategy, restructured the income tax scale and its social services payments to try to increase equality. However if the Gini index is used as a measure of inequality, the objective of greater equality does not appear to have been achieved. The value of the index has tended to increase, despite the long-term trend of
decreasing inequality. The ABS report the Gini index to be .39 for both surveys conducted in the 1970's, increasing to .40 and .41 in the 1981/2 and 1985/86 surveys respectively. By international standards, as revealed in the Luxembourg study, and referred to extensively by Saunders and Hobbes (1988) Australia did not appear very egalitarian, ranking about middle among the OECD countries, with considerable inequality existing at the higher income levels.

If income is regarded as having a close correlation with social standing, the increase in the level of inequality over the 1980s and Australia's mediocre standing by international comparisons of income distribution and redistribution, points to the need for some policy action by the government.

The full impact of government transfers or social security policies cannot, however, be determined from the analysis conducted. To do so would require an examination of the "social wage" changes over the period. However, the analysis did confirm "a priori expectations" regarding the importance of social service payments to the low income groups, many of which are one person units. Taxation was also important in decreasing inequality, with middle income groups benefitting more than expected, but the full extent of the reduction depends on whether all income units are examined or only those units who pay tax. More detailed studies on both the social wage and the level of taxation are necessary. Some of the recent literature, for example, Schott (1987) and Lombard (1991) among others, have conducted such analyses and

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33 The 1986 value computed by the ABS differs from my computed value due to the ABS excluding income units with zero income.
reference to these and others would be necessary before definite policy changes could be suggested.

To provide a fuller analysis of the distribution pattern as existed in 1986, income was examined according to different types and also according to different characteristics of the income group. No objectively valid standards can be applied to determine an acceptable level of income inequality. However, the analysis indicated the level of inequality to be in line with a priori expectations. In particular, wages and salaries were a significant source of income, particularly for larger units and those with a head aged between 24 and 49 years, and contributed much to the level of inequality. Property and business income were much less significant. The mean income was the lowest for those units with either a young or an elderly head, female and single or units with dependents.

The significance of this thesis is not however, confined to the narrow realm of statistical description. In addition to knowing the level of inequality, it is important and useful to know the sources of inequality and to what extent the level can be reduced. To address the question of how to change the level of income inequality, an analysis based on decomposing the Gini index was undertaken.

This decomposition allowed the exact effect of a proportionate income change within a group to be quantified, thus enabling the change in the Gini index to be decomposed and quantified.
Decomposing the Gini index illuminates the wider issue of social policy. More specifically, by quantifying both the direction of change and the amount of change, the analysis has implications for social policy, particularly in the area of the government's redistribution policies. A thorough understanding of both the nature and the extent of income inequality is necessary before any evaluation of and appropriateness of redistributive policies can be undertaken. Determining the extent of income differences between different population sub-groups can indicate the general direction government policies might take. Decomposition however, allows a direct indication of how much the level of inequality could be changed if policies and action were directed at particular groups.

Decomposing using equivalent income confirmed a priori expectations in that the units with two dependents were the ones which, if given an increase in their income, would have the greatest impact on reducing inequality. Female headed income units, as might be expected, will also reduce inequality significantly if given an increased income.

If gross, unadjusted weekly income is used, a different picture is presented. That is, it is the one person units who, if given an increase in their income, will reduce the level of inequality. One person units, when no adjustment for differing needs is made, comprise the biggest proportion of income units, 44.6% of the total observations made in the survey, and thus will have the biggest impact on changing the level of inequality.
The decomposition, regardless of which income concept was used, highlighted the amount wages and salaries contribute to increasing inequality, while transfer income is obviously important in trying to reverse this trend.

This analysis is also significant in that it highlights the importance of adjusting the income concept to take consideration of the differences that exist in the needs of different income units.

Podder's (1991) method of decomposition of the Gini index implies that the size of the change in the index depends on the significance of the group in terms of its size in relation to the total population. When examining income units, it tends to confirm a priori expectations. A smaller unit of analysis, such as income per person, may produce different results, but in defence of using the income unit, it is at this level that most decisions regarding income are made.

In examining the pattern of income distribution and determining how the inequality could be changed, some limitations were incurred. The conceptual meaning of income differs to, for example, the income definition used for tax purposes. This presented some problem in dealing adequately with the income of those income units who derive their income from business and self employment, particularly where income reported for taxation purposes was zero. However only a relatively small proportion of units, 4.6% of the total observations, had zero income, thus the problem did not become too great. Such income units are not always included in studies, but for the present study, it was felt that since these units had some income, even if it did mean a value of zero, they should be included.
Analysing data collected by the ABS in their income distribution survey means that the sample size is large. The number of observations in 1986 was 10,815, which when weighted, expanded to represent the total population of 7,634,114. Sampling errors were minimized, with only those estimates with a small standard error being considered reliable to use.

Gross income was the main income concept analysed. This was adjusted to reflect different needs of income units, depending on the size and age of the members, to determine how and by how much, the level of inequality, as measured by the Gini index, could be changed. However no other income concept was analyzed due mainly to the lack of detailed information on any other concept. Information on tax was not detailed enough to allow a detailed and accurate analysis of net income. To be able to conduct such an analysis, another data base would have to be used such as Lombard (1991) did in his study of Income Distribution in Australia over the period 1983-89.

In addition, rather than adjusting income units for both the size and age of members to determine equivalent income, analysis could have been conducted using income per person. The analysis has also focused only on one year, 1986, to determine the level of inequality. If more detailed trends were to be determined it would be necessary to analyze other ABS data bases and then compare with the 1986 results.

Saunders (1990) highlighted four key areas of investigation or research in the area of income distribution and redistribution. This thesis has attempted to answer three of these but it leaves the fourth, the trends over time towards greater or less equality, to be the focus of another study. Studies have been
undertaken in this area but not using the 1986 data applied to the gross weekly income of the income unit. With the release in September 1991, of the unit record data for the 1990 income survey, it would be appropriate to update the present analysis to determine what, if any, changes have taken place. However, financial limitations prevent this thesis from analysing the more recent data.

There is always a time lag involved in being able to release income data and thus analysis can never be completely up to date. Surveys take time to collect, compile and release, and changes, both economic and political, may occur from the time of collecting the data to when it is released for analysis.

Since the 1986 survey, there have been important policy changes in the areas of taxation and the level of assistance to low income families with children. There has also been important economic changes; total employment increased and the unemployment rate fell towards the close of the 1980s, but has changed considerably in the 1990s.

However, the level and distribution of income cannot be assessed solely with the aid of existing surveys. Even if the results of the 1986 survey could be compared with the previous one in 1981-82, or the most recent survey of 1990, it would not be possible to disaggregate analysis of policy changes from broader economic trends, because the effects of the changes are incorporated into the observed results. That is, the effects of changes in the income tax system, changes in the social security system, trends in employment and unemployment cannot be disentangled.
To take account of such effects, would entail micro-analytic simulation, that is, to apply techniques specifically designed for policy analysis on the basis of unit record data. This method has been applied to Australian data by King (1987) to compare the tax reform options presented at the 1985 Tax Summit and also to estimate the extent of poverty in Australia 1985-86. Bradbury, Doyle and Whiteford (1990) also have used the technique to examine trends in disposable income.

The analysis of the distribution of money income is undertaken with the view of money income being an indicator only of economic well-being, not welfare. As already discussed, a wider analysis, incorporating changes to the social wage, taxation and information on net worth, would be necessary to analyze total welfare.

From the analysis, the main recommendations are for action to decrease the overall Gini index back towards the levels that existed in the 1970s. This could be achieved by a small increase in the income received by units with two or three dependents, and also units with a female head. However, a closer examination of the income units with two or three dependents could be beneficial in that it could reveal that inequality could be substantially reduced by increasing the income of only some of the units rather than all. For example, it may be that if the income of those units with dependents aged in their teen years was increased, the level of inequality could be substantially reduced.

Overall, an aim of the government needs to be to revert to the long-term trend towards greater equality. Social security payments by themselves will only
make a small contribution to reducing inequalities. A reduction of inequalities, of which income is one, needs to be an end in itself and this ultimately depends on individuals and their interaction with others.
APPENDIX A

Programme to produce the Gini index

program mary_g_factor(input, output);

const
  mx = 12000;  // The maximum data pairs

type vector = array[1..mx] of real;

var
  w, y : vector;
  s1, s2, s3, s4,
  t, p1, p2, q1, q2: real;
  i, j, k, n : integer;

begin
  n := 0;
  s1 := 0;
  s2 := 0;
  s3 := 0;
  s4 := 0;

  repeat
    n := n + 1;
    readln(w[n], y[n]);
    { writeln(w[n], y[n]); }
    s1 := s1 + w[n];
    s2 := s2 + w[n] * y[n];
    until eof;

  writeln(' Sum of Weights = ', s1);
  writeln(' Weighted sum of income = ', s2);

  p1 := w[1] / s1;
  q1 := w[1] * y[1] / s2;

  for i := 2 to mx do
    begin
      p2 := p1 + w[i] / s1;
      q2 := q1 + w[i] * y[i] / s2;
    end;

s3 := s3 + p1 * q2;
s4 := s4 + q1 * p2;

p1 := p2;
q1 := q2;
end;

writeln('Gini index = ', s3 - s4);

end.
APPENDIX B

Programme to produce percentage incomes for population sub-groups.

program mary2 (input, output, f);

var income: array [0..15] of real;
    i, count : integer;
    inc: real;
    total: real;  { Grand total of all income }

    f : text;

begin
    for i := 1 to 15 do
        income[i] := 0;

    total := 0;

    count := 0;

    reset(f, 'n_file');
    read(f, i);
    while i<> -99 do
        begin
            readln(f, inc);

            { count := count + 1;
            if (count mod 100 = 0) then writeln(count);
            }
            income[i] := income[i] + inc;
            total := total + inc;
            read(f, i);
            end;

    for i := 0 to 15 do
        writeln(i:3,chr(44), income[i]/total + '100.10:4');

end.
APPENDIX C

Programmes used to generate Gini index for gross equivalent income

1. SPSS System File:

```
data list file=income/persinc 553-558 businc 103-108 buslos 117-122
   other 411-416 wages 567-572 super 581-586 gov
   376-381 nopers 13-14 unitwght 713-720 agehd 33-34
   agesp 37-38 ctryBsp 39 ctryBhd 35 marital 32
   govperc 49 unitype 12 grwkinc 595-600 sexhd 31
   prsource 45 nodedp 23 agedepa 24 agedepb 25 agedepc
   26 agedepd 27 agedepc 28 nop 20 nope 21 noper 22
   antax 588-593
compute equivinc = grwkinc / (1 + 0.7*(nope + noper - 1) + 0.4*nop)
compute equivwt = unitwght * (1.0 + 0.7*(nope + noper - 1) + 0.4*nop)
sort cases by equivinc
save outfile = exttwo
```

2. SPSS Programme File:

```
get file = exttwo
select if (nopers > 0)
frequencies variables = equivinc
/statistics = mean sum
/format = notable
write outfile = testinc / equivwt (f8.0) equivinc (f10.0)
execute
```

The programme for the Gini index, as shown in Appendix A, was then applied to the outfile, "testinc".
REFERENCES


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Podder, N. and Tran Nam, B. (1990), "Uses and Abuses of the Disaggregation of Gini Index by Factor Components", *mimeographed*, University of New South Wales, Sydney.


