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Working Paper

New Directions in the Analysis of Inequality and Poverty

DIW Discussion Papers, No. 700

Provided in Cooperation with:
German Institute for Economic Research (DIW Berlin)

Suggested Citation: Jenkins, Stephen P.; Micklewright, John (2007) : New Directions in the Analysis of Inequality and Poverty, DIW Discussion Papers, No. 700, Deutsches Institut für Wirtschaftsforschung (DIW), Berlin

This Version is available at:
https://hdl.handle.net/10419/18432

DIW Berlin

German Institute
for Economic Research

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700

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Opinions expressed in this paper are those of the author and do not necessarily reflect views of the institute.

IMPRESSUM

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ISSN print edition 1433-0210
ISSN electronic edition 1619-4535

Available for free downloading from the DIW Berlin website.

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New directions in the analysis of inequality and poverty

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Acknowledgements

We thank Tony Atkinson, Andrea Brandolini, Mark Bryan, Brian Nolan, and Lucinda Platt, for their comments on an earlier draft. A version of this paper will appear as chapter 1 of *Inequality and Poverty Re-Examined*, edited by Stephen P. Jenkins and John Micklewright, Oxford University Press, Oxford, 2007. (See the Appendix for a Table of Contents.)

Abstract

Over the last four decades, academic and wider public interest in inequality and poverty has grown substantially. In this paper we address the question: what have been the major new directions in the analysis of inequality and poverty over the last thirty to forty years? We draw attention to developments under seven headings: changes in the extent of inequality and poverty, changes in the policy environment, increased scrutiny of the concepts of 'poverty' and inequality' and the rise of multidimensional approaches, the use of longitudinal perspectives, an increase in availability of and access to data, developments in analytical methods of measurement, and developments in modelling.

JEL codes: D31, I32

Keywords: inequality, poverty, distribution of income

Non-technical summary

Over the last four decades, academic and wider public interest in inequality and poverty has grown substantially. In this paper we address the question: what have been the major new directions in the analysis of inequality and poverty over the last thirty to forty years? We draw attention to developments under seven headings.

First, analysis has changed because the context has changed. The picture of inequality and poverty in different parts of the world is not the same as it was in the 1970s. There were notable changes in the shape of the income distribution in many, but not all, western developed nations. A second development has been major changes in the policy environment in both industrialised and developing countries. Third, the concepts of inequality and poverty have themselves come under scrutiny. Dissatisfaction has been expressed with conventional approaches to inequality and poverty, and this has led to multidimensional approaches to measurement, in both rich and poor countries alike.

Fourth, forty years ago most perspectives on the income distribution were derived from cross-sectional data – whether a series of snapshots over time for a particular country or snapshots for a number of countries. But today this approach has been supplemented in a major way by longitudinal perspectives. A fifth development since the early 1970s, and one that underpins the developments cited so far, concerns data. The quantity and quality of data to analyse distributional issues have both increased substantially.

Sixth, there have been substantial developments in analytical methods of measurement: the stochastic dominance approach to analysis of income distributions that is now ubiquitous, and the systematic derivation of classes of parametric summary indices with explicit properties. Seventh, there has also been immense cross-fertilization between inequality measurement and the measurement of social welfare, poverty and mobility. Seventh, there have been significant developments in the modelling of income distribution, from theoretical and empirical perspectives, including microsimulation.

Contents

1 Introduction

Over the last four decades, academic and wider public interest in inequality and poverty has grown substantially. In this paper we address the question: what have been the major new directions in the analysis of inequality and poverty over the last thirty to forty years?

This time period coincides with a marked upsurge in interest in income distribution and related topics. If we go back thirty to forty years, a number of landmark publications about the personal income distribution had recently become available. *The Economics of Inequality* by Tony Atkinson appeared in 1975, a comprehensive and wide-ranging textbook on the subject of the title, referring to the 'relative neglect of the distribution of income and wealth' in mainstream economics (1975: 1). Many of the same topics were also covered by Jan Pen's (1971, 1974) engaging monograph on *Income Distribution* directed at students, fellow economists and the general public. Amartya Sen's conceptual tour de force *On Economic Inequality* was published in 1973. Harold Lydall (1968) combined data on more than 500 distributions of earnings covering 36 countries from 1890 onwards with a review of theories to explain the wage structures observed.

Much of the evidence about the income distribution that existed in the 1960s and 1970s was based upon statistics published by national statistical offices or similar agencies. Distributions were typically summarised in terms of the numbers of workers, persons or households falling within various earnings, income, or (less frequently) wealth ranges, or the shares of the same held by different quantile groups. A diversity of summary indices was employed, the most common of which was the Gini coefficient, and the extent of poverty was typically summarized in terms of the proportion of a population that was poor. The inadequacies of data were commonly remarked upon, though there were also major initiatives to improve the nature of evidence. In Britain, to take one example, these were led by the 1975–79 Royal Commission on the Distribution of Income and Wealth.

This was a period when it was perceived that the income distribution was not changing much in Britain. The Royal Commission's seventh report stated that 'if the decline in the share of the top 1 per cent is ignored, the shape of the distribution is not greatly different in 1976–77 from what it was in 1949. … The income distribution shows a remarkable stability from year to year' (1979: 17). International comparative studies involving many counties were uncom-

mon, with the studies by Sawyer (1976) and Stark (1977) relatively rare exceptions. The studies cited, and virtually all income distribution research and official statistics, were based on cross-sectional evidence, but some new evidence on income dynamics was beginning to emerge from the recently-established (1968) US Panel Study of Income Dynamics: see for example Morgan *et al*. (1974).

Models of the distribution of earnings, income and wealth took various forms. There was a long tradition of modelling based on stochastic processes that aimed to explain the distinctive skewed shape of empirical income distributions (for example Champernowne 1973). Another approach was regression modelling, especially of labour earnings, drawing on human capital theory developed by Mincer (1973) and others. The use of multivariate regression models to decompose differences in average earnings between population sub-groups, and hence assess the extent of discrimination, was pioneered by Blinder (1973) and Oaxaca (1973), and followed pioneering theoretical work on the same topic by Becker (1971). There were a number of contributions that had sought to provide a fully fledged theory for the distribution of income, such as the classic paper by Stiglitz (1969) extending the Solow growth model, and the analysis by Meade (1964). See also Conlisk's (1969) three-equation recursive model. In addition, there was a growing literature on the impact on the income distribution of macroeconomic phenomena such as unemployment and inflation, represented by for example Metcalf (1969), Thurow (1970), and Blinder and Easki (1978).

How then has the analysis of inequality and poverty changed in recent decades? We draw attention to developments under seven headings: changes in the extent of inequality and poverty, changes in the policy environment, increased scrutiny of the concepts of 'poverty' and inequality' and the rise of multidimensional approaches, the use of longitudinal perspectives, an increase in availability of and access to data, developments in analytical methods of measurement, and developments in modelling.

2 New directions and developments

2.1 Changes in inequality and poverty

First, analysis has changed because the context has changed. The picture of inequality and poverty in different parts of the world is not the same as it was in the 1970s. There were notable changes in the shape of the income distribution in many, but not all, western developed nations. By contrast with the Royal Commission's description of stability cited earlier, a second major inquiry into the income distribution, reporting in 1995, stated that

> inequality in the UK grew rapidly between 1977 and 1990, reaching a higher level than recorded since the war. ... [T]he pace at which inequality increased in the UK was faster than in any other [country], with the exception of New Zealand. (Barclay, 1995: 6.)

Atkinson also drew attention to the 'unparalleled rise in United Kingdom income inequality during the 1980s' (1997: 300), but took pains to stress that the rise was better described as a series of distinct episodes than a single secular trend and, moreover, that the particular British pattern of change was not shared by most other OECD countries. Atkinson's (2003*a*) study of the experience of nine OECD countries (Canada, the UK and the USA, Italy, the Netherlands, West Germany, Norway, Finland and Sweden) pointed not only to major changes in income distribution (with the exception of Canada), but also a great heterogeneity in the patterns and timing of change. Changes in real income levels were also heterogeneous across countries, though a notable feature of the US and UK experience was that the real income of the poorest groups remained almost unchanged over the 1980s; virtually all the income growth was experienced by middle-income and especially the richest groups (Danziger and Gottschalk 1995, Figure 3.3; Jenkins 2000*a*, Figure 3). In both the USA and UK, absolute poverty rates rose in the early 1980s, and then levelled off or fell (Danziger and Gottschalk 1995, Figure 3.8; Jenkins 2000*a*, Figure 5).[1]

Much of the responsibility for the distributional changes in household income in the UK and the USA during the 1980s has been attributed to widening dispersion in the distribution of wages, and it is this distribution – or, rather, the wage distribution for men – that has received

[1] The US estimates are based on the official US poverty line. The UK estimates cited use a low income cut-off of 60% of median 1991 income.

by far the greatest attention from economists. The predominant explanations refer to increases in the relative demand for higher-skilled workers arising because of either skill-biased technological change or globalization. However, as the survey by Katz and Autor (1999) points out, the relative importance of these factors compared to labour supply or institutions is likely to look different when considered from a longer-term perspective. Katz and Autor also point to the heterogeneity of experience across OECD countries: 'patterns of changes … in overall wage inequality are much more divergent in the 1980s and 1990s than in the 1970s' (1999: 1502).

Atkinson (2003*b*) also reminds us of the 'several steps between relative factor prices … and the distribution of disposable income among households' (2003*b*: 23), an argument developed in Atkinson (2003*c*). Household income depends on all income sources, not only wages, and the incomes of all household members, and the taxes paid and social transfers received. Atkinson (2003*a*) points to the impact of a rise in the net rate of return on capital, especially among those at the top of the distribution. There have been notable disequalizing changes in the distribution of self-employment income in Britain (Jenkins 1995). Johnson and Webb (1993) draw attention to the disequalizing impact of the cuts in UK income taxes during the 1980s. Daly and Valletta (2006) find that the rising inequality in US family income between 1969 and 1989 was driven most by the changes in the distribution of men's earnings, but the rising proportion of lone parent families also had a significant disequalizing impact. (The increasing female labour force participation rate had an offsetting impact.) These patterns contrast with Britain, where family structure changes had little impact on the rise in inequality over the 1980s (Jenkins 1995).

The end of communism in Eastern Europe and Central Asia has been accompanied by large increases in the dispersion of earnings and household income. This is particularly true in former Soviet republics. Inequality in per capita household income in Russia was well above the top of the OECD range by the mid-1990s (Flemming and Micklewright 2000: 903). When taken with the sharp falls in mean incomes in the early 1990s, again especially in the former Soviet Union, the result has been substantial rises in levels of absolute poverty (see, for example, Milanovic 1998).

Distributional changes in industrialised countries over the last few decades have occurred alongside widespread poverty and some marked changes in income inequality in developing nations. Chen and Ravallion's (2000) authoritative World Bank study found that, in 1998, 24

per cent of the population of the developing world were living on less than $1 per day, some four percentage points lower than 1987. Over this period, the total number of people who were poor according to this criterion changed little, about 1.2 billion. The authors emphasise that these global numbers hide differences in experiences across countries and regions and within subperiods. For example, growing affluence in China during the mid-1990s reduced the number of $1-a-day-poor people substantially, despite large increases in income inequality. (There is now a large literature on income distribution in China: see for example the survey in Benjamin *et al*. 2005.) In regions such as Latin America, there was no clear trend in the poverty rate. Chen and Ravallion suggest that there were

> two proximate causes of the low overall rate of poverty reduction in the 1990s, despite aggregate economic growth in the developing world. Firstly, too little of that economic growth was in the poorest countries. Secondly, persistent inequalities (in both income and non-income dimensions) within those countries and elsewhere prevented the poor from participating fully in the growth that did occur. (2000: 21)

Given the disparities in income between rich and poor countries, it is no surprise that the degree of inequality in the world as a whole is very substantial, with a Gini coefficient of between about 0.63 and 0.68 in the 1990s (Milanovic 2006: 14), i.e. almost twice the figure for Britain. These estimates relate to the 'world distribution', that is the distribution of income among all people in the world, taking account of the differences both within as well as between countries. The literature on this subject has grown considerably. However, there is little consensus about the trend in the world distribution between the 1980s and 1990s. Milanovic's own estimates point to a small increase between 1988 and 1993, followed by a small decline in the next five years, and then another small increase between 1998 and 2002 (2006: 15). Sala-i-Martin (2006) concluded that global inequality has fell during the 1980s and 1990s, though Dowrick and Akmal (2005) obtained divergent trends using different indices of purchasing power parities. For an analysis of changes over the very long term (1820–1992), see Bourguignon and Morrisson (1992).

2.2 Changes in the policy environment

A second and related development over the last few decades has been major changes in the policy environment in both industrialised and developing countries.

In the OECD countries, the 1990s saw national policy initiatives such as the UK Labour Government's pledge to eradicate child poverty and the Irish National Anti-Poverty Strategy, to take just two examples. The story has not necessarily been one of a steady growth in concern for distributional equity. In the case of the UK, the Conservative government that took power in 1979 abruptly discontinued the Royal Commission referred to earlier and pursued policies that contributed to widening the distribution of income. Similar changes, one way and then the other, can be seen in other countries, notably the USA. Policy shifts may be one of the causes of the episodic changes in income inequality noted by Atkinson (1997).

In Europe, the expansion of the European Union (EU) has had a major influence on concepts, statistics, and social monitoring, all of which have had direct or indirect effects on policy. The concept of poverty has been defined in terms of social exclusion, and encompasses more than conventional income-based measures of poverty and inequality (of which more below). The 2001 Laeken Council adopted a set of indicators to monitor progress in reducing social exclusion (see Atkinson *et al.* 2002 for details and discussion). The Statistical Office of the European Communities ('Eurostat') has also had a powerful influence on analysis by its adoption of particular practices, for example adjusting incomes for differences in needs using the 'modified OECD' equivalence scale and using 60 per cent of national median income as the principal low-income cut-off.[2] There have also been major coordinated data initiatives, for example the European Community Household Panel (ECHP) for 15 EU countries, and its replacement, the Statistics on Income and Living Conditions (EU-SILC) covering the EU-25.

There have also been global initiatives. The UN's Millennium Development Goals, endorsed by 189 countries at the 2000 Millennium Summit, include the aim to 'reduce by half the proportion of people living on less than a dollar a day' by 2015. The national Poverty Reduction Strategies fostered by the World Bank are tools to further this aim in developing countries.

[2] Britain, for instance, is changing the equivalence scale used to produce its official income distribution series (*Households Below Average Income*) from the 'McClements' scale to the 'modified OECD' scale. And it has switched from using 50% of mean income to 60% of median income as the main low income cut-off.

The World Bank has a major influence on the policy environment in developing countries. The Bank's stance on distributional issues over the last three decades has changed notably. As with national governments, the changes have not always been in one direction. Jolly (2005) cites Kapur, Lewis, and Webb (1997) as recording Robert McNamara's persistent highlighting of income and wealth disparities in the early 1970s when he was World Bank President – and the Bank's subsequent shift in emphasis away from concern with inequality towards a concern for absolute poverty. The *World Development Report 1990: Poverty* marked the Bank's commitment to the goal of poverty reduction. But, perhaps inevitably, this in turn has led in time to more interest in inequality as one driver of poverty. As a result, the *World Development Report 2006: Equity and Development* is another landmark. The emphasis is on equality of opportunity (starting at birth) rather than on inequalities in outcomes in terms of income or consumption.[3] The former is viewed as unambigously bad (or at least something to be reduced), in contrast to the latter. That emphasis, with its concern for education, health, gender, race and other determinants of economic outcomes, reflects in part the issues discussed under our next heading.

2.3 Scrutiny of 'inequality' and 'poverty' and the rise of multidimensional approaches

Third, the concepts of inequality and poverty have themselves come under scrutiny. Dissatisfaction has been expressed with conventional approaches to inequality and poverty, and this has led to multidimensional approaches to measurement, in both rich and poor countries alike. In part, these developments reflect the view that poverty is not only about not having enough money, and that inequality is not just about differences in money income.

In the European context in particular – and, interestingly, largely only in Europe rather than elsewhere in the OECD – there has been much discussion of 'social exclusion'.[4] Related to this, and building on Townsend's (1979) pioneering work, there has been a growing body of research that has examined poverty in terms of lack of access to a number of goods or services, rather than a lack of income *per se*. This has led to social monitoring based on summaries of a collection of indicators rather than simply income.

[3] The Report draws intellectual inspiration from work of John Roemer and others. Roemer (2006) offers a critique of the logical consistency of goals expounded in the Report, while supporting enthusiastically its general thrust.

[4] Micklewright (2002) discusses the possible penetration of the social exclusion concept in the USA.

Multidimensional approaches have also been prompted by the fundamental reconsideration of the concepts of poverty and inequality that was stimulated by the work of Nobel Prizewinner, Amartya Sen. In short, a person's ability to participate in society and to live a decent life (to be nourished, healthy, etc.) is summarised in terms of a number of key 'functionings', and poverty is conceptualised as a lack of various capabilities to achieve these functionings. In Sen's words,

> Concern with positive freedoms leads directly to valuing people's capabilities and instrumentally to valuing things that enhance these capabilities. The notion of capabilities relates closely to the functioning of a person. This has to be contrasted with the ownership of goods, the characteristics of the goods owned, and the utilities generated. (Sen 1984: 324.)

A thoughtful assessment of the operational content of this approach is provided by Brandolini and D'Alessio (1998). The UNDP Human Development Index, first published in 1990, is perhaps the most well-known measure that follows the spirit of Sen's approach. It combines indicators of longevity (measured by life expectancy at birth), knowledge (a weighted average of the adult literacy rate and school enrolment rates), and living standards (GDP per capita converted to US$ using PPPs). A recent development of this type of index is the Index of Economic Well-Being of Osberg and Sharpe (2005) that takes into account assessments of consumption, accumulation, distribution and security.

More fundamentally, an approach based on capabilities and functionings may also be viewed as a move away from the individual-based welfarist approach that has underpinned most of the measurement literature to date. That is, conventionally the welfare of individuals is related to their income (or consumption), and social welfare is assumed to be the sum of those individual welfares. Implicitly or explicitly, there is some money-metric utility function employed that maps the income (or expenditure) of an individual to his or her well-being. Atkinson has distinguished one approach to poverty measurement as being concerned with an 'individual's right to a minimum level of resources' rather than 'standards of living' (Atkinson 1989: 7), and has also suggested that meeting those rights may imply a concern about particular income sources. Similarly, although most welfare measures for an individual are based on the total income of the household or family within which that individual lives, a rights-based approach would emphasise the importance of knowing about the within-household distribution of that income (Jenkins 1991). The rights-based approach might also be used to interpret the US

Census Bureau decision in 1980 to eliminate any distinction between male- and female-headed households (of the same size and composition) when defining poverty thresholds – such differences had been criticized as contrary to sex discrimination legislation (Fisher 1997).[5]

Multidimensional approaches to distributional issues draw on non-monetary measures. Each of these measures has also come to be used extensively in its own right, with researchers employing a unidimensional perspective but applying the analytical methods typically applied to a monetary measure of well-being. There is a large literature in health economics examining equity issues built on borrowings of this kind: see *inter alia* Kakwani, Wagstaff, and van Doorslaer (1997) and Allison and Foster (2004). The measurement of the prevalence of literacy has also benefited from the approach in economics to inequality and poverty measurement: see for example Basu and Foster (1998).

There has also been continuing interest in measures of economic resources that complement the conventional money income measures. We refer, for instance, to studies of the distributional impacts of non-cash benefits of education and health services provided by governments in addition to cash benefits (for example Smeeding *et al*. 1993). One issue in the former communist economies in transition is how changes in non-cash benefits have altered the picture obtained from cash incomes alone (Flemming and Micklewright 2000: 905–9). Similarly, the accumulation of wealth, and other assets more generally, have recently started to receive growing attention alongside income. One factor has been the increases in investment income experienced by the very rich. Another has been the various initiatives around the world to try and increase the accumulation of financial resources for retirement. We return to analyses of the distribution of wealth below.

Even where it is agreed to use some monetary measure of resources to measure economic well-being, there remains disagreement about whether resources should be measured in terms of consumption expenditure or income. As an illustration of continuing differences in approach, we note the European Union emphasis on income rather than expenditure among financial indicators of poverty. This may be justified on a minimum rights basis (Atkinson *et al*. 2002: 82–3). By contrast, most analysis of developing countries emphasises the attraction of consumption expenditure, on the grounds that it is consumption rather than income that is

[5] We owe this example to Tony Atkinson.

the argument that enters the individual's utility function according to the conventional welfarist approach. Consumption expenditure is also less affected by transitory variation than income (Ravallion 1994: 15). Deaton states that 'all the difficulties of measuring consumption [in developing countries]… apply with greater force to the measurement of income, and a host of additional issues arise' (1997: 29). The problems of income measurement in poorer countries are an issue for EU-SILC, given the inclusion in the database of Accession countries where there is significant agricultural production for home consumption.

2.4 Longitudinal as well as cross-sectional perspectives

Fourth, forty years ago most perspectives on the income distribution were derived from cross-sectional data – whether a series of snapshots over time for a particular country or snapshots for a number of countries. But today this approach has been supplemented in a major way by longitudinal perspectives. (This reflects the growing availability of panel data on incomes: see below.) There is now much more information not only about how many people are poor at a given time, but also about how long individuals remain poor, and about the repetition of poverty spells.

Taking a longitudinal perspective has also become an essential ingredient in policy formulation and leads to different anti-poverty strategies. See the case made by Ellwood (1998) or the statements by the UK's HM Treasury (1999). In the USA, the longitudinal perspective led to a diverse set of programmes designed to help get welfare benefit recipients (mostly lone mothers) into jobs; it also led to the introduction of time limits on welfare benefit receipt. The dynamic perspective has been embraced elsewhere too. The New Deal policies for the unemployed and lone parents introduced in the UK by the Labour government are an example of this change in focus. And *Households Below Average Income* (Department for Work and Pensions 2006), the official UK publication on income distribution, now includes a chapter on income dynamics. International comparisons of income and poverty dynamics in industrialised countries have begun to appear: see for example Duncan *et al*. (1993), Bradbury, Jenkins, and Micklewright (2001) and Valletta (2006). And analyses of dynamics in developing countries have also started to be carried out: see the reviews by Baulch and Hoddinott (2000) and Fields (2001).

As for cross-sectional analysis of inequality, a good part of the work on dynamics has tended to be focused on men's earnings (although the references above are all to analyses of house-

hold income or consumption). Lillard and Willis's (1978) paper estimating the permanent and transitory components of earnings variability was an important early contribution. Atkinson, Bourguignon, and Morrisson (1992) survey some of the subsequent literature.

Interest in the longitudinal perspective has also extended to the association in incomes between parents and their children. In the extensive programme of research on 'transmitted deprivation' sponsored by the UK Economic and Social Research Council in the late-1970s and early 1980s, there was only one study of the inheritance of income (Atkinson, Maynard, and Trinder 1983). Even in the mid-1980s, the number of empirical studies cited by Becker and Tomes's (1986) influential study was fewer than ten. By the end of the 1990s, however, the number of studies in industrialised countries had expanded tremendously, illustrated for example by the collection of papers in Corak (2004).

2.5 Increases in the quantity and quality of data

A fifth development since the early 1970s, and one that underpins the developments cited so far, concerns data. The quantity and quality of data to analyse distributional issues have both increased substantially. So too has researchers' access to unit-record data on earnings, incomes and wealth. For example, in Britain in the 1970s, researchers had no access to the main income survey, the Family Expenditure Survey (FES), having to rely on grouped data from published reports. Today, researchers can download unit-record data from every FES for over thirty years within minutes. At the same time, historical series of tabulated data have been uncovered and used to shed much more light on long-term trends. Examples are the work on the income of the very rich across the twentieth century carried out by Atkinson and Piketty (2007) and colleagues for a range of industrialised countries, and the analysis of earnings and household incomes in the communist period in Eastern Europe by, for example, Atkinson and Micklewright (2001).

In the 1970s, cross-national comparisons of income distribution required skilful manipulation of the scanty and often non-comparable data available for a limited number of countries. Nowadays, there are the data contained in the Luxembourg Income Study (LIS, http://www.lisproject.org). Founded in 1983, this currently encompasses unit-record data on income from more than 30 industrialized countries, and from up to five time points for each country over three decades. From each national survey, the LIS project produces a dataset containing a common set of harmonized and standard variables on incomes and related con-

cepts. It provided the data used in major international comparative studies of income distribution such as Atkinson, Rainwater, and Smeeding (1995), and Gottschalk and Smeeding (1997). LIS project developments are discussed by Smeeding (2004) and Atkinson (2004).

The availability of data on wealth has lagged well behind that on household incomes, with consequent effects on the empirical analysis of wealth distributions. The new Luxembourg Wealth Study, modelled on the LIS, therefore represents an important advance. The project brings together data for an initial nine countries (Sierminska, Brandolini, and Smeeding 2006).

The growth in data availability has also occurred in the developing world, notably through the World Bank's sponsorship of Living Standards Measurement Surveys (LSMS). These have been carried out in over 40 countries since 1980. Much of the LSMS microdata can be downloaded from the Bank's website (http://www.worldbank.org/lsms) and tabulated summaries from these and other surveys together with software to analyse them are also available (http://iresearch.worldbank.org/povcalnet). The LSMS surveys are described in Angus Deaton's (1997) book, *The Analysis of Household Surveys*, an influential guide to research on distributional issues in developing countries. Mention should also be made of the Demographic and Health Surveys (DHS), which have been carried out in more than 70 developing countries since the mid-1980s with funding from USAID. As with the LSMS, DHS microdata are readily available through the internet (http://www.measuredhs.com). Although the surveys typically do not contain information about income or earnings, important work on distributional issues has been done with the data by constructing indices of household physical assets in the form of durable goods and housing amenities (Filmer and Pritchett 1999, Montgomery *et al.* 2000).

The physical assets data in the DHS represent one form of wealth measurement in developing countries. There are also household survey data on financial assets, and these have been collected in the three most populous countries, China, India and Indonesia. Financial asset data, from survey and other sources, for both developing and industrialised counties, have been used by Davies *et al*. (2006) to estimate the world distribution of wealth, thereby complementing the estimates for the world distribution of income referred to earlier.

Besides the greater availability of microdata, compendia of summary statistics of income inequality (typically Gini coefficients and quantile shares) for a range of countries and time periods have produced and made available by a number of authors and organisations. These

'secondary' datasets include the World Income Inequality Database (WIID) database at UNU-WIDER (http://www.wider.unu.edu/wiid/wiid.htm), which builds on an earlier World Bank initiative (Deininger and Squire 1996). The country panel data provided by these summary statistics have been heavily used in analyses of the relationship between inequality and growth (see below). However, there are significant issues of quality and comparability that arise in the construction and use of the data, as Atkinson and Brandolini (2001) have demonstrated with data on OECD countries in the Deininger-Squire dataset.

That caveat made, we need to recognise major initiatives aimed at improving the quality of data on income distribution. Just as there is a long-standing development of a consistent conceptual framework for the measurement of macro-economic activity in market economies (the System of National Accounts, sponsored by the United Nations), there have been developments directed specifically at income and expenditure surveys. An important role has been played by organisations such as the LIS, the World Bank, and Eurostat, together the group of international experts known as the Canberra Group. See, for example, Canberra Group (2001).

Studies of income dynamics have also been facilitated by the increase in the number of household panel surveys around the world. Since the advent of the PSID, there have been panel studies started in Sweden, the Netherlands, Germany, Britain, Russia and, more recently Australia and New Zealand, as well as the EU-wide ECHP referred to earlier. Several of the LSMS datasets on developing countries have panel elements. There have also been initiatives providing cross-nationally harmonized data such as the Cross National Equivalent File which covers the USA, Canada, Germany and Britain (Burkhauser *et al.* 2001).

2.6 Developments in analytical methods of measurement

Atkinson's (1970) paper 'On the measurement of inequality' was a pioneer of what became two major developments in analytical approaches to measurement. First, Atkinson, and also Kolm (1969), drew attention to the relationship between the non-intersection of Lorenz curves and clear cut orderings of income distributions according to complete classes of social evaluation functions. This is an example of the stochastic dominance approach to analysis of income distributions that is now ubiquitous, and that has been developed in many directions. The second major contribution of Atkinson's (1970) paper was to characterize a particular class of inequality indices, now known as the Atkinson family. This assumed that the increasing con-

cave social welfare function took a particular parametric functional form, with the key parameter representing how income differences in different ranges of the income distribution were treated (the degree of 'inequality aversion'). The key message was that the choice of a summary inequality index was not innocuous, but incorporated a particular set of normative assumptions. On this issue, see also Sen (1973) and Blackorby and Donaldson (1978).

Subsequent research extended these two aspects in a number of directions, and there has been immense cross-fertilization between inequality measurement and the measurement of social welfare, poverty and mobility.

For example, Shorrocks (1983*a*) considered comparisons of social welfare, and showed the correspondence between non-intersection of the generalized Lorenz curve (the Lorenz curve scaled up by mean income) and increasing concave social welfare functions. This has proved an important tool for distributional assessments that take account of real income levels as well as inequality. Generalized Lorenz dominance corresponds to second-order dominance of distributions. Other research showed the links between first-order dominance and non-crossing cumulative distribution functions (Saposnik 1981) – thus giving normative content to Pen's (1971) evocative Parade of Dwarves and a few Giants – and derived dominance results for the case in which Lorenz (and generalized Lorenz) curves intersect. See for example Dardanoni and Lambert (1988), Davies and Hoy (1995), and Foster and Shorrocks (1987).

In applications to poverty, graphical devices analogous to the Lorenz curve have been developed, including the normalized poverty deficit curve (Atkinson 1987) and the Three 'I's of Poverty curve (Jenkins and Lambert 1997). The choice of summary poverty measure is not the only aspect over which judgements may differ: there is also the choice of the poverty line itself. This has led to concepts of 'restricted' dominance in which the range of incomes over which comparisons are made becomes crucial: see for example Atkinson (1987) and Foster and Shorrocks (1988). Consideration of dominance for mobility extends dominance results from one dimension to two and potentially more dimensions. Many of the key results in multidimensional applications were developed by Atkinson and Bourguignon (1982), with the implications for comparisons of social mobility specifically drawn out by Atkinson (1983). The same multidimensional methods have also proved useful for welfare and poverty comparisons that allow for variations in social judgements concerning the treatment of differences in 'needs' between households: see for example Atkinson and Bourguignon (1987), Atkinson (1992), and Jenkins and Lambert (1993).

In parallel, the characterization of classes of inequality indices and the drawing out of their normative properties has undergone substantial development. By contrast with Atkinson's approach to index derivation that involved placing of assumptions on the social welfare functions, indices were also characterized using axioms placed on the inequality measure itself. Consideration of the property of decomposability by population subgroup has proved particularly fruitful and led to the generalized entropy class of inequality measures (Bourguignon 1979; Cowell 1980; Shorrocks 1980, 1984), with sensitivity to differences in income shares captured by a single parameter. Particularly useful for empirical work has been the property that total inequality can be expressed as the weighted sum of the inequality within each population subgroup plus the inequality between subgroups (the inequality arising were there no inequality within each group). This literature has also illuminated the properties of other inequality indices such as Gini coefficient, now known not to be additively decomposable in the same sense. Research has also shown how the decomposition of inequality by factor sources is an issue that is largely independent of the choice of inequality measure: see Shorrocks (1982, 1983*b*). For an extensive survey of recent developments in inequality measurement, see Cowell (2000).

The characterization of poverty indices has also benefited much from axiomatic approaches. Sen's (1976) paper was a pioneer in this respect, leading to a measure taking into account not only the proportion poor – the conventional summary measure – but also the depth of poverty and the inequality of income among the poor. The properties of the Sen index and related 'rank' based measures are reviewed by Osberg and Xu (2002). Similar motivations, but with attention given in addition to decomposability by population subgroup, led to the class of poverty indices that is most widely used in empirical work nowadays, the Foster, Greer, and Thorbecke (1987) class. A single parameter characterizes differences in aversion to poverty – the extent to which attention is focused on those with the very lowest incomes – and total poverty may be expressed as a population-weighted sum of the poverty within each population subgroup, thereby facilitating production of poverty 'profiles'. For extensive surveys of recent developments, including a large number of other poverty indices, see Seidl (1988) and Zheng (1997).

Development of mobility indices has not proceeded at the same pace as for inequality and poverty indices, in part because there are a multiplicity of 'mobility' concepts, illustrated by differing choices about whether to treat mobility as related to a lack of association between

incomes in two periods ('origin independence'), or as related to the degree of change between incomes ('income movement'). For a review of these issues and existing mobility measures, see for example Fields and Ok (1999).

Another major development in analytical methods concerns the treatment of sampling variability when estimating measures. Forty years ago, relatively little attention was given to these issues. In part, this was because non-sampling issues were viewed as more important. We referred, for instance, to issues of data quality and access earlier. Another example is the choice of particular equivalence scale with which to adjust household incomes to take account of differences in household size and composition, and there is now much greater awareness of the potential sensitivity of measures to different choices: see for example Buhmann *et al.* (1988) and Coulter, Cowell, and Jenkins (1992). Another reason for the neglect of sampling variability was the (often implicit) claim that sample sizes were sufficiently large to ensure that standard errors for estimates would be relatively trivial. This was typically an untested assertion, however, and overlooked the fact that many population subgroups of particular interest (for example lone parents) were to be found in only small numbers in sample surveys. A third constraint was that methods for deriving variance estimates were not well-developed and that, in any case, suitable software was not easily available to calculate them.

The situation has changed substantially in the last few decades. Beach and Davidson (1983) was a pioneering paper, establishing distribution-free variance formulae for Lorenz and generalized Lorenz curves. Davidson and Duclos (2000) provide an overview of developments, and derive general results for variance estimators of poverty and inequality measures and thence stochastic dominance. For applications, see *inter alia* Bishop, Formby and Smith (1991*a*, 1991*b*). In parallel, analytical formulae have been developed for distribution-free variance estimates of inequality and poverty indices, also taking account of the impact of complex survey design features such as clustering and stratification. See, *inter alia*, Binder and Kovačević (1995) and Biewen and Jenkins (2006) for inequality indices and, for poverty indices, Berger and Skinner (2003) and Howes and Lanjouw (1998). All the papers cited develop analytical formulae for the sampling variances of estimates. A parallel stream of work has shown how variance estimates may be derived using computationally intensive resampling methods such as the bootstrap. See for example Biewen (2002) and references therein.

Access to software for computing estimates and their sampling variances is now much less of a constraint. There are stand-alone packages that are free to researchers, of which the leading example is DAD (Duclos and Araar 2006). There are also freely available suites of programmes that can be used with general purpose statistical software packages such as Stata® (Jenkins 2006).

2.7 Developments in modelling

At the start of the paper we mentioned several approaches to modelling the income distribution that were in use in the 1970s. Of these, models based on stochastic processes have become less favoured. (Champernowne and Cowell 1999 provide a good overview of this area.) On the other hand, regression modelling as a route to explanation of empirical distributions of earnings and household income has developed considerably. The technique of quantile regression has provided a flexible approach for this. The Oaxaca-Blinder decomposition of differences in means has been extended to account for differences at different parts of the distribution and for changes in unobserved differences (Juhn, Murphy, and Pierce 1993). And there are a number of other regression-based decomposition methods: see for example Bourguignon, Fournier, and Gurgand (2001), Fields (2003), and Morduch and Sicular (2002). Developments in the modelling of poverty dynamics using household panel data are discussed by Jenkins (2000*a*).

There has also been a range of new developments in theoretical modelling. Atkinson and Bourguignon (2000: 3) note that new models of imperfect competition and informational asymmetries have helped explain why identical workers get paid different amounts and, in addition, call into question a crude view of an efficiency-equity trade-off. This idea is developed in the survey by Neal and Rosen (2000) of theories of the distribution of earnings. In addition to reviewing stochastic process models, selection models building on the original Roy (1951) paper, and human capital models, much of their chapter is given over to discussion of new models of sorting and agency and tournaments. They also point out how different models may be more appropriate for different parts of the distribution. An example of a model for the upper tail is Rosen's (1981), referring to 'superstars'.

Models that attempt to explain the capital market as well as the labour market, and thus provide an explanation of non-labour income as well as earnings, are less common. Atkinson (1997) outlines such a model, as well as referring to research since the Stiglitz (1969) paper

cited earlier. Atkinson (1999, 2000) draws attention to the importance of labour market institutions and the role of social norms in shaping income distributions. A recent example of a model in the Stiglitz tradition is Caselli and Ventura (2000), who introduce heterogeneity in consumers' tastes, skills, and initial wealth. Atkinson and Bourguignon (2000) review the various building blocks of a theory of income distribution, and emphasize that no unified theory yet exists.

There has been enormous interest in the relationship between economic growth and inequality, bringing greater links between macroeconomics, political economy and income distribution. On the one hand, this had led to the development of theoretical models to address the issues of whether income inequality helps or hinders economic growth. On the other hand, and in tandem, a large literature has addressed these issues empirically using aggregate-level regressions of growth, estimated with panels of growth rates and inequality indices. Examples include Persson and Tabellini (1994), Brandolini and Rossi (1998), Forbes (2000), and Bannerjee and Duflo (2003). There remains no consensus on whether inequality has an adverse impact on a country's growth rate, but this literature has increased interest in income distribution data and the measurement of income inequality. For overviews, see Bénabou (1996), Kanbur (2000), and Perotti (1996).

One area of modelling, microsimulation, is almost a complete newcomer to the scene since the early 1970s, and was made possible by a combination of better access to data and the significant advances in computer hardware and software. Microsimulation involves the characterization of the rules of a country's tax and state benefit rules within a computer program, enabling assessment of the tax liabilities and social security benefit entitlements for each household in a household sample survey. The impact on the distribution of household incomes of changes in tax and benefit rules can then be simulated. The use of microsimulation vastly increases the scope of analysis of tax and benefit systems from what was possible 40 years ago, as represented by the then innovative work of Atkinson (1969) on potential reforms to Britain's social security system. Microsimulation models are tools that enable policy-makers, journalists and the public to understand the distributive effects of different tax-benefits schedules.

The growth of and future prospects for microsimulation are discussed by Bourguignon and Spadaro (2006). Microsimulation models now exist for many OECD countries and in growing number of other countries. (For example, models for five African nations are available via

http://models.wider.unu.edu/africa_web/.) International comparisons are enabled by the EU-ROMOD project that has created a model for the EU-15 (see Atkinson *et al*. 2002).

3 Forty years of progress

The overview of developments indicates substantial progress in concepts, methods, models and data. There are a number of other indicators of the maturing of research on these topics. There are now three extensive 'handbooks' on income distribution, with expert authors surveying a range of topics.[6] See Atkinson and Bourguignon (2000), Silber (1999) and Salverda, Nolan, and Smeeding (forthcoming). There is also a 71-article two-volume compendium of landmark papers (Cowell 2003). A second edition of Atkinson's text, *The Economics of Inequality*, appeared in 1983, and has been joined by others, including Cowell (1995), Duclos and Araar (2006), Kakwani (1984), Lambert (three editions: 1989, 1993, 2001), and Ravallion (1998). Sen's 1973 monograph has been substantially extended by Sen (1997) in collaboration with Foster. The growth in research on income inequality and poverty is also illustrated by the increasing role of topics concerning the personal income distribution in long-standing scientific associations such as the International Association for Research in Income and Wealth (http://www.iariw.org). It is also reflected in the establishment of a new association, the Society for the Study of Economic Inequality (http://www.ecineq.org/).

Research on income distribution over the last few decades has of course been much more extensive than we have been able to communicate here. And the refinement of concepts, methods and models, and the availability of new data, is a continuing process. But what are the challenges for the future?

Perhaps the greatest challenge is to develop more comprehensive models of the household income distribution, incorporating not only models of labour market earnings but also reflecting income from other sources including social benefits and investment income, and the demographic factors affecting whom lives with whom. The demand for such models persists if only because policy-makers continue to be interested in the poverty and affluence of individuals and these depend on the household context in which individuals live. And yet, at the same time, perhaps we should recognize that development of such comprehensive models may be an unattainable Holy Grail. Each building block – for example individual earnings or household demography – itself reflects a complex sets of determinants, and may well differ

[6] We have said nothing about taxation and related public finance aspects of the income distribution, for example. See e.g. Atkinson and Stiglitz (1980).

for rich and poor people. We therefore conclude that modelling income distribution will continue to be a very heterogeneous research exercise, ranging from relatively abstract theoretical models to very empirical models that are inevitably less structural. Each has a role to play.

At the same time, we seek greater mainstreaming of income distribution topics within the discipline of economics, echoing the call by Atkinson (1997) to bring the study of the income distribution 'in from the cold'. As Atkinson and Bourguignon have pointed out, this is not a new idea. David Ricardo himself stated that '[t]o determine the laws which regulate this distribution is the principal problem in Political Economy' (cited by Atkinson and Bourguignon 2000: 2). We note, for example, that the large literature about the 'measurement' of inequality has remained rather separate from theoretical modelling of income determinants. And the substantial increase in the analysis of wage inequality in the 1980s by labour economists made little reference to the substantial literature on the measurement of household income inequality.

The literature on inequality and growth cited earlier is an example of the mainstreaming that we suggest should be the norm, and perhaps arose because of the development of theoretical models and empirical applications side by side. Another example is the Mincer-Becker tradition of human capital modelling and the huge empirical literature about determinants of earnings that it spawned in empirical labour economics. Perhaps the best contemporary example of integration has been in the study of income distribution in developing countries, well illustrated by the 2006 World Development Report (World Bank 2005). The report's subtitle is 'Equity and development', indicating how distributional issues in various forms are central to economic development. Its contents reflect the interplay of analysis of key concepts, modelling, empirical applications and data, and their policy applications.

The three to four decade window used to frame the discussion of the last section was chosen deliberately. We believe that there was a marked increase in interest in income distribution matters from around the start of the 1970s, and we have described the main developments thereafter. And, at the same time, and not unrelated, the beginning of the period broadly coincides with the start of Tony Atkinson's professional career – a career that continues to flourish.

Atkinson's direct impact on the analysis of inequality and poverty, right across the subject, has been enormous. This is reflected by the large number of references to his work in the review in the preceding section, even though we have not attempted to be comprehensive in

our coverage of his research, which of course has spanned several areas in economics alongside income distribution.[7] His research programme is an enviable model of how to integrate theoretical analysis of models and measurement, empirical analysis, and policy relevance. Tony Atkinson has also had indirect impacts through the research of the many people who have been influenced by him, in particular his research students and their collaborators. The book to which this paper forms part of the Introduction (see the Appendix) illustrates this impact: every chapter is authored or co-authored by one of his former doctoral students.[8]

Atkinson has worked on most of the issues that the chapters address. Two very different examples serve as illustrations. The world income distribution, the most extreme case of the supranational entities of Chapter 2, was the subject of a whole chapter in the first edition (1975) of *The Economics of Inequality*. And close attention was paid in the same book to issues of low pay and minimum wage policy, the subject of Chapters 11 and 12. Other examples are indicated by the references to his work in our review or in the chapters that appear in our book.

The rest of the book is divided into three Parts, each with four chapters. Part I deals with major conceptual issues that arise in analyses that are based on money-metric measures of inequality and poverty. Part II is also concerned to an extent with conceptual issues but its focus is on the consideration of concepts of inequality and poverty that include dimensions other than income (or expenditure). Part III considers selected examples of the impact of public policy on income distribution. The book therefore connects with many of the developments that we highlighted in the previous section, the main exceptions being theoretical modelling of the determinants of the income distribution, and the use of longitudinal data.

[7] Atkinson's publications up to December 2004 are listed at http://www.nuff.ox.ac.uk/economics/people/atkinson.htm.

[8] These students all did their doctoral research in the 1980s, reflecting just one period in Atkinson's career. As of October 2006, he had supervised some 40 completed doctoral theses.

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Appendix: Inequality and Poverty Re-Examined

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