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INCOME DISTRIBUTION AND THE MACROECONOMY: SOME CONCEPTUAL AND MEASUREMENT ISSUES

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INTRODUCTION

Interest among economists in the dynamics of the functional and size distributions of income during the process of economic development is longstanding, going back at least to David Ricardo. More recently, Kuznets (1955) suggested that during the early stages of the process of economic growth there would be a tendency for inequality in the size distribution of income to increase, reach a maximum and then to decrease at the later stages. This so-called Kuznets hypothesis has been tested statistically largely with data from a cross-section of countries and to a limited extent with time-series data for individual countries. The results have been mixed (see Fields 1991). Most of these tests are based on relating a measure of income inequality (e.g., Gini ratio) with the level (or rate of growth) of per capita real income of the economy, and they should be viewed as rather simple tests of the relation between income distribution and the macroeconomy.

A distinct but related issue is the dynamics of "poverty" during the process of economic development. While *inequality* is primarily a measure of the *relative* position of individuals or households in the income distribution, *poverty* is an *absolute* measure. It characterizes those individuals or households whose incomes fall below some absolute income level defined as the poverty line. The extent of poverty (suitably defined) in an economy would clearly depend both

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on its average income per individual (or household) as well as on the inequality in the distribution. Neither high average income (relative to the poverty line) nor low inequality in the distribution per se would ensure low poverty levels. As such, the issue of the relation between trends in poverty and of the macroeconomy is of interest in itself, particularly though not exclusively, in developing countries. Indeed, the concern that the stabilization and structural adjustment policies implemented during the unfavorable environment for foreign trade and capital inflows of the 1980s might have adversely affected the poor in developing countries has spawned a large number of empirical studies of structural adjustment and the poor. Although many of these studies appear too simplistic methodologically and flawed econometrically (e.g., Cornia et al. 1987) there are also some (e.g., Bourguignon et al. 1992) which break new analytical ground.

There is some evidence that even in the developed countries (particularly in the United States) poverty and inequality increased in the 1980s. A study by Smeeding et al. (1990) looks at poverty and income distribution in 1979 in seven countries, all but one of them (Israel) being high income countries.

Empirical analyses of income distribution are mostly based on either aggregate data usually from national income accounts or disaggregated data, primarily from household income and expenditure surveys, or from population censuses. Of course, disaggregated data are essential for estimating the size distribution of income. Both types of data could, in principle, be useful in studying functional, sectoral or similar distributions of income. A combination of survey-based distributional measures and national accounts-based average income levels *at a point in time for a cross-section of countries* is used in some comparative analyses to draw inferences about *processes over time* of the interaction between income growth and income inequality. Since few countries undertake annual, let alone more frequent, household surveys, and since regular population censuses are rarely taken more frequently than once in a decade — while annual, and even biannual or quarterly, national accounts data are available — a satisfactory methodology for combining data from relatively infrequent cross-sectional survey and more frequent aggregate time series for the analyses of distributional issues is essential.

In developing a satisfactory analytical methodology, two crucial measurement or data problems have to be recognized. First, it is important not only to define a theoretically sound concept of income

but also to find suitable empirical analogues or proxies for it in the available data. Second, survey and national accounts-based data on income for the same country and periods are rarely mutually consistent. Further, intertemporal comparability of concepts and definitions, coverage, methods of sampling, imputation for missing or unavailable information, deflators used for conversion of nominal to real incomes, etc., in surveys and national accounts is not assured even for data for individual countries, particularly over long periods. International comparability is much more problematic.

Positive analyses of the trends and determinants of income distribution describe the evolution of the distribution over time or space. Such descriptions are the essential first steps towards understanding the interaction between public policy and income distribution and the *normative* use of such understanding in designing new policies or effecting changes in existing policies to shift the income distribution to desired directions. A comprehensive normative analysis would evaluate the incidence of the costs and benefits of *all* public policies, not just *fiscal policies* as is usually done, across the relevant units in society. However, it is virtually impossible to be so comprehensive, and even if one confines the analysis only to fiscal policies their proximate and ultimate incidence could be quite different, depending on the nature of economic organization of the society, in particular on the structure of markets for commodities and factors. The efficiency of the fiscal system and the supply of public goods and services would influence the value of the net benefit accruing to different individuals from public expenditures and their financing. Since the cost of expenditures financed by accumulation of public debt is borne in effect by future generations who service the debt through their tax payments, an intergenerational analysis is essential for evaluating the incidence of debt-financed expenditure. Since cuts that are often part of stabilization programs in public expenditures affect not only public investment but also expenditures on health and education at a point in time, they have effects on future income distribution. As such, an intertemporal analysis would be most appropriate for this reason as well. Unfortunately such intertemporal analysis is often unfeasible given the available data.

The primary purposes of this paper are expository and pedagogic. It is intended for students of the dynamics of the interaction of the macroeconomy, income distributions and poverty who are *users* of data and econometric models, and not for national income and survey statisticians and model builders. The paper therefore highlights some

of the conceptual weaknesses, measurement errors and biases of national accounts and household survey data commonly used in distributional analyses. It then selectively reviews the literature on the methodology of linking income distribution to the macroeconomy, including some recent contributions to econometric and applied general equilibrium modeling of such linkage.

Section 2 is devoted to the concept of income used in surveys and national accounts, the choice of units (individuals, households, extended families) for distributional analysis, measures of inequality and their interpretations, the relevance (or otherwise) of income inequality for public policy and, finally, the problems with stochastic models of income distribution. Section 3 discusses in some details issues of coverage, bias and measurement errors in national accounts and survey data. Section 4 addresses methodologies (and their empirical implementation) for linking income distribution and the macroeconomy by first distinguishing the various processes of income generation and distribution and their interaction with macroeconomic policies and processes in an economy and then reviewing in some detail three theoretical, econometric and applied general equilibrium models. Section 5 summarizes and concludes the paper.

INCOME AND ITS DISTRIBUTION: SOME CONCEPTUAL ISSUES

Concept of Income in Economic Theory, National Accounts and Household Surveys

The concept of *income flow* during a period of time that underlies the aggregate national income statistics is the *value of all* payments received by (or accruing to) factors of production supplied by the residents (not necessarily, but usually, citizens) of a country either prior to the provision for the services of durable goods used up in the production process, i.e., gross national income or product (GNP), or after such provision, i.e., net national income or product (NNP). The use of the words income and product interchangeably signifies the identity that corresponding to payments to factors of production (including residual claimants such as landlords and enterprise owners) is a flow of goods and services of equal value. The distinctions between GNP and GDP (gross domestic product), namely, the flow of factor payments from abroad on the one hand and between GNP and gross material product (GMP), namely, the

exclusion of the value of certain services, on the other, would be ignored in what follows.

In *principle* all activities to which residents supply factors, legal or illegal, are to be covered, and this total supply is to be valued appropriately and not just that part of the supply which flows through markets. However, income from illegal activities (e.g., smuggling or drug dealing or trading in black markets) is excluded, and coverage of perfectly legal activities in the so-called informal sector is often incomplete. The coverage and valuation of factor flows are often based on conventions. For example, rents are imputed to owner-occupied dwellings but a vastly more important flow such as factors supplied by housewives for household activities such as cooking and childcare are excluded. On the other hand, the value of housewives' work on the family farm is included even if the household does not sell any of its output in the market.

Traditionally, the national income of a country is viewed as a measure of its productive capacity and as an indicator of the welfare of its residents. Underlying both these interpretations is that the set of prices used in valuing inputs and outputs in national income accounting reflects their true opportunity costs. In a market economy, under appropriate assumptions about technology of production and consumer preferences, *competitive equilibrium prices* would indeed reflect opportunity costs since they reflect the *common marginal rates of substitution* of consumers and the *common marginal rates of transformation* of producers. Further, the equilibrium distribution of consumption is *Pareto optimal* and the allocation of resources is *efficient*. It is the twin characterization of a competitive equilibrium, namely, that it is productively efficient and results in a Pareto optimal distribution of consumption, which provides the analytical basis for the traditional interpretations of national income. In reality of course, the market structure is often noncompetitive (at least in some markets). The realized prices in any period are unlikely to be market-clearing equilibrium prices. Besides, prices used for the imputation of values to some flows (e.g., rent of owner-occupied dwellings) may not correspond to their opportunity costs. Under these circumstances, the analytical basis for the traditional interpretation of national income becomes irrelevant.

In traditional national income accounting, economic depreciation, i.e., the cost of resources needed to keep the productive capacity intact from one period to the next, is subtracted from the value of goods and services produced to arrive at income. The concept of

capacity covers only physical capital, mainly equipment and structures, normally excluding consumer durables, but does not include human capital. Although expenditures on health maintenance and the cost of lost productive capacity due to aging are no different from economic depreciation of physical capital, such expenditures are not subtracted from the value of output, presumably because there is no generally accepted convention covering it. In practice, of course, the data on depreciation that are a part of national accounts statistics are unlikely to match the economic depreciation. A discussion of alternative concepts of income, economic depreciation and interpretation of national accounts is available in Bradford (1990), Eisner (1988, 1989, 1990), Scott (1990) and Sen (1979).

Survey-based estimates could be compared with the household (or private) sector component of national accounts statistics (NAS), provide that the sampling frame of the survey is the same as that of the household sector of NAS. Also, the period for which the comparison is being made, and above all the concept of income and consumption, should be the same for both. As discussed in Section 3, serious problems arise in practice from differences on all three counts. In developing countries where subsistence and household production are very important, the respondents to a survey questionnaire are unlikely to (a) value their entire output whether or not it is sold in the market, (b) subtract the value of inputs including an allowance for economic depreciation of any durable goods used in production, and (c) report their net income. However, obtaining detailed information on inputs and outputs might alleviate, though not eliminate, the noncomparability of the concept of income between survey estimates and NAS.

Income Fluctuations, Recipient Units and Distributional Analysis

Aggregate income as reported in NAS in any given year is likely to be influenced by the business cycle effects. For an individual or household possible life cycle effects are important. Another important source of annual variation in incomes in poor agricultural societies is the weather. Poor weather would adversely affect the incomes of cultivators, tenants and others dependent on agriculture for their employment.

In analyzing poverty and inequality, the distinction between those who have low or high incomes in a given year because of cyclical and

random factors and those who would have low or high incomes regardless of such shocks is important since temporary and reversible poverty due to random shocks, as contrasted with chronic poverty, might not call for public policy intervention. A distributional analysis based on average incomes over the business cycle or over a sufficiently large number of years would be less likely to bias the estimate of chronic poverty. However, for such an analysis one would need annual data for several years. However, if the conditions of the validity of the permanent hypothesis were to hold, in particular if opportunities for borrowing and lending as well as insurance were available, individuals would smooth their consumption over time and across states of nature in spite of the variations in income. As such, consumption expenditure, even if it be only for a year, would give a more accurate picture of an individual's economic well-being than his income. However, the extent of consumption smoothing achieved in poor societies might vary because of absent or imperfect credit and insurance markets and substantial variation in terms of access to such markets among income groups.

The primary objective of distributional analysis is to trace the process of distribution of the *command* over goods and services in an economy, since such goods and services are the economic inputs into well-being. In all societies, units, such as an extended family, consisting of more than one individual pool their incomes, at least partially, spend the pooled income on various goods and services and allocate them among their members. Clearly, such units, rather than individuals , would be the appropriate units for the study of income distribution. In surveys, the unit of observation is usually a household, variously defined as a unit consisting of one or more persons (whether related or unrelated) who share common living quarters or as a unit consisting of one or more persons eating out of the same kitchen, etc. From the perspective of income pooling and spending a more appropriate unit is likely to be a family, i.e., individuals related by blood, marriage or adoption.

In rural areas of many Asian countries, multigenerational extended families pool incomes. The role played by a family, unitary or extended, goes beyond pooling since pooling is only one aspect of intrafamily provision of insurance and credit. For example, a family might support its members who migrate by extending credit during their job search. Once they are employed, the migrants repay the loan by remittances to their family. Family members who are temporarily without sufficient income due to illness or unemployment also receive

support. With no socially provided means of income support and health care for the aged, children in many poor societies are expected to take care of their elderly retired parents and grandparents. The insurance and old age support roles of the family could indeed influence the childbearing decisions of couples. While the most appropriate unit for income distribution is perhaps the (extended) family, the available data almost always relate to households.

Households and families differ in size and the age-sex composition of their members. For analytical purposes, the fiction that a family is an infinitely-lived entity which pools and allocates income and consumption among its constituent members at each point in time and over time so as to maximize an intertemporal family welfare function is useful. But its empirical implementation is unfeasible. In practice, there are essentially three alternatives. First, such differences could be ignored altogether, and total income or expenditure of the family for interfamily comparisons could be used. Second, all members of a family, regardless of their age or sex, could be treated as identical, and income or consumption per person for such comparisons could be used. And third, one should allow for differences among households in size, age, sex, etc., in some fashion to arrive at a comparable adult-equivalent size of each household. For interhousehold comparison, income or consumption per adult equivalent unit could then be used.

There are a number of procedures available in the literature of varying economic and econometric sophistication for deriving adult-equivalent sizes (Deaton et al. 1989). Given a measure for interunit comparisons, such as total income or income per person or per adult-equivalent unit, there arise two distributions in each case: distribution of *units* (i.e., households or families) and distribution of *persons* (or adult-equivalents). Inferences can be radically different according to which distribution is used. For example, if units differ in their size but all units have the same per person income, then both distributions according to per person income will obviously be degenerate ones with a single mass point at the common per person income so that there is no inequality. On the other hand, if total income is used for interunit comparison, both the associated distributions will show inequality according to any standard measure of inequality.

While adjusting for unit size and composition might seem attractive, there is a deeper issue. Whether or not to live as a nuclear or extended family, whether to stay single, how many children and

how many of each sex to have, are matters of choice. The size and composition of a unit then become choice or endogenous variables. Adjusting for differences in endogenous variables makes the interpretation of the adjusted distribution problematic. For example, a household with a lower adjusted income per adult-equivalent unit compared to another may yet be enjoying the same level of welfare if its lower income reflects its conscious choice of trading-off of a larger family size against lower income.

Measures of Inequality and their Interpretation

Given a distribution of individual (household or family) characteristic such as income, certain unit-free measures such as the Gini concentration ratio, variance of logarithms (for positive-valued variables), ratios of quantiles, etc. are often used for purposes of quantifying the inequality among individuals (households, families) with respect to that characteristics. Since an inequality measure is meant to summarize the society's evaluation of the inequality, it is natural to specify certain desiderata that any such measure should satisfy. For example, it is reasonable to require that interchanging the incomes of any two individuals should leave the inequality measure unchanged and that the transfer of a unit of income from one individual to another with a higher income should increase it. The literature on inequality measures is vast and still growing. Among the many contributors to this literature, Atkinson (1983) and Sen (1973) are noteworthy.

Interpretation of measured inequality depends on the process generating it. For example, if all individuals have the same income stream over their lifetime and the observed inequality at a point in time is solely due to individuals differing in the stage of the life cycle at which they happen to be, then, clearly, the level of inequality at that point in time, however large, is of no social significance. Indeed, if the income stream is discounted and summed into a wealth measure, all individuals would have the same wealth and the *wealth distribution* would show no inequality in such an economy. If individuals could borrow or lend at the same interest rate and use that opportunity to smooth their consumption completely, all individuals would have the same consumption in each period of time so that the *consumption distribution* would show no inequality either.

Income Inequality and Public Policy

The observed distribution of income is the outcome of a process which involves individual behavior, intergenerational transfers, as well as socio-economic processes exogenous to the individual, some of which could be stochastic. It could be argued that what ought to be of public policy concern is the fairness of the processes and not equality in the outcomes. For example, if a set of identical individuals has the same opportunity to augment their income stream but a few avail themselves of it and many do not, should the fact that the success of the few made them rich so that inequality emerged where none existed before call for redistributive public policy? The late Harry Johnson did not think it did:

> These misinterpretations of the problem lead to an exaggerated and naive conception of the importance of, and urgent need to correct, inequality . . . the essential point is the assertion that the observed inequality in income distribution is, to a large extent, a by-product of the modern economic system . . . Efforts to prevent this outcome, or to cancel it out by post facto income redistribution, run the serious risk of denying the citizen of the benefits of freedom of choice and self-fulfillment and eventually requiring a reversion to a more authoritative, or totalitarian, structure of society and the state (Harry Johnson 1973: 55-56, as quoted in Reynolds and Smolensky 1977).

One could disagree with Harry Johnson and still recognize some positive incentive aspects of inequality. However, the line between a socially desirable level of inequality from an incentive perspective and a gratuitously high and social tension causing level is not easy to draw.

Stochastic Models of Income Distribution

In his celebrated paper, Professor Dagum (1977: 413) remarks that "Since V. Pareto . . . started the exploration of the field and proposed his celebrated models . . . a variety of probability functions have been suggested as suitable in describing the distribution of income by size (personal income distribution)." The apparent stability over time of fitted income distributions (such as Dagum, lognormal and Pareto distributions) led to the search of stochastic processes of

income generation whose steady state solution would yield the fitted distribution. An early contribution is by Gibrat (1931) who derived the lognormal distribution from a first-order Markov process based on the "law of proportional effect," i.e., income at any period is a random proportion of income at the previous period. The proportionality factor was assumed to be independently distributed over time and independent of the level of income in any period.

Blinder observes that "assuming a stochastic mechanism, no matter how complex, to be the sole determinant of income inequality is to give up before one starts. It is anti-thetical to be mainstream of economic theory which seeks to explain complex phenomena as the end result of deliberate choices by decision makers" (Blinder 1974: 7). It does not have to be antithetical. For example, in the work of Tinbergen (1971) both stochastic mechanisms and choices are involved in determining the income distribution. He postulates an exogenous distribution of inherent abilities or characteristics of workers and requirements in terms of the same set of characteristics of jobs. Each worker maximizes his earnings through his choice of a job, given the wage structure for all jobs. This structure adjusts to clear the job market and yields the income distribution as the outcome.

Yet Blinder is surely right in pointing out that most such models make rather simplistic assumptions primarily to deduce a closed analytical form for the income distribution. Given today's simulation capabilities, a closed analytical form should no longer be a desideratum.

INCOMPLETE COVERAGE, BIAS AND MEASUREMENT ERRORS

The sample frame of most household surveys is a listing of dwellings. In such a listing individuals who have no dwellings, other than those living in institutions such as prisons or hospitals, would not be included. Thus many of the urban poor who are homeless or live in slums which are not included in any municipal listing would automatically be excluded from the sample frame. The incomes earned by those excluded from the sample frame would not be included in the survey-based income estimates. To the extent that such individuals are engaged in activities that are within the data gathering net of national accounts, such as, for example, employment in organized industry or government service, their contribution would

be included in NAS. On the other hand, if they are engaged in illegal activities or in informal production not adequately covered in NAS, obviously some or all of their incomes would escape NAS.

The nonresponse and understatement of income could be significant in surveys. It is likely that nonrespondents and those who understate their incomes are concentrated on the upper tail of the income distribution. Few survey publications give full information on the extent of nonresponse and how it was addressed, whether by replacing a nonresponding household by a similar household from the sample frame or by substituting for information that would have been provided by the nonresponding household from elsewhere. Smeeding and Schmaus (1990) refer to "hot-decking" imputation in the U.S. where a record nearest by several criteria (age, sex, etc.) is used to replace the information from the missing record. In "cold-decking," the information for the nonrespondent is imputed as the average of households similar to the nonrespondent with respect to age, sex, family size and other relevant characteristics.

Household surveys and NAS or administrative data often produce very different estimates for the same categories of income or expenditure (Table 1). Such systematic differences indicate the existence of *bias* and not just *measurement errors* in NAS and surveys.

Table 1
SURVEY ESTIMATES AS PERCENT OF ADJUSTED ADMINISTRATION DATA

Income Category	Canada (1981)	UK (1977)	US (1979)
Wages and Salaries	102	93	97
Self-Employment Income	78	76	84
Property Income	61	55	45
Pension Income	85	84	82
Government Transfers	78	96	83
All Income	92	90	89

Source: Smeeding *et al.* (1990), Table 1.5.

The reference periods for different items of expenditure or sources of income are often different in survey, ranging all the way from one week prior to the day of inquiry to a year, the longer period being set for items of infrequent purchase. Clearly, the longer the reference period, the greater is the likely recall lapse, although it is possible that infrequent purchases of high priced items are less likely to be forgotten. Even if there are no recall lapses, if the survey is staggered throughout the year with different households being canvassed on different days in the year, the estimated annual income or expenditure of each household, put together from expenditure for a week, month, or a year, as the case may be, for different items, would relate to different years for different households. Because of this, survey and NAS estimates could in fact refer to different periods and hence could differ.

Both income and expenditures are likely to be measured with error in a survey, and such measurement errors affect estimates of poverty and inequality. If true income and measurement error are uncorrelated, then the inequality of the distribution of measured income as indicated by, say, variance of logarithms, would overstate inequalities in the distribution of true income. With an independent additive measurement error, the true extent of poverty (i.e., the proportion of the population with *true* incomes below the poverty income) could exceed or fall short of the measured extent of poverty (i.e., the proportion with measured incomes below the poverty line). And if measured income (or consumption) is used as an explanatory variable in regression analysis, the estimated coefficients will be biased.

In many developing countries NAS are based on estimating outputs and inputs and valuing them rather than on records of enterprises. The valuation is often done using some average of price quotations obtained through a market survey. However, in household surveys, respondents are likely to use the actual prices they received for their outputs and paid for their inputs. Thus, differences in prices used for valuation could be another reason for survey estimates and NAS to differ.

The average prices used in the valuation procedures of NAS are very unlikely to be averages of prices weighted by the volumes of transactions at each price. As such, the product of, say, the estimated output and the average price will not provide an unbiased estimate of the value of output. In contrast, in a household survey, the value of inputs bought from the market and outputs sold would be estimated

without bias. However, in most surveys nonmarketed inputs are likely to be only partially covered. Although surveys often take care to impute value to such quantities using prices that are likely to be close approximations to the opportunity costs to the household, needless to say the degree of closeness of the approximation is difficult to determine.

INCOME DISTRIBUTION AND THE MACROECONOMY: LINKAGES AND METHODOLOGIES

Income Generation and Redistribution Processes and Macroeconomy

Two basic sets of processes are of analytical and policy interest: the set of processes *describing the income generation* at a point in time and over time, and the set of processes of *income redistribution* among individuals or households in different generations. In the first set, we find processes of evolution of the distribution of income earning assets and of the returns to such assets, or, more succinctly, the evolution of claims to income streams. Clearly, asset accumulation processes will be in this set. In the second set, we find redistributive processes such as private and public transfers, and the redistributive features of the fiscal system other than transfers.

The transfer and fiscal processes not only redistribute at a point in time but also over time. The income generation and redistribution processes are interdependent. For example, in a world where Ricardian Equivalence obtains, any attempt by the government to redistribute among generations — by borrowing from the present generation to provide them additional service and service the debt through taxes on future generations — would be exactly offset by the present generation through the increase in their savings so that the tax obligations of their descendants, i.e., the future generations, are met. Thus, total consumption of the present and future generations would be unaffected: for the present generation, a reduction in private consumption (corresponding to their increased savings) would be matched by an increase in public consumption. For the future generation, resources for additional taxes would be generated from the return to additional savings bequeathed to them by the present generation. The interaction between private savings and provision for old age and public social security schemes is another example of such interdependence.

Much of economic theorizing about income generation and distribution processes from old-fashioned business cycle theories to recent theories of chaos is deterministic. However, as Lucas (1992) points out, uncertainty, risk, and insurance or lack thereof are the major factors in determining income distribution in the long run. While realism demands that uncertainty be incorporated in modeling the dynamics of income generation and distribution in an economy, there is a trade-off between the incorporation of uncertainty and a sharper focus on other relevant aspects.

Income earning assets in most economies would include financial assets. The literature on financial repression and development emphasizes the important role which the financial sector could play in the development process. Credit and finance were major variables in traditional models of cyclical fluctuations in economic activity. Recent theories suggest that financial markets need not be driven only by economic fundamentals, and that speculative bubbles could occur even in a world where all agents have rational expectations and behave rationally. Unfortunately, a satisfactory general theory of money and finance, without artificial ad hoc assumptions such as a cash-in-advance requirement, in which fiat money will have nonzero value in equilibrium, does not seem to exist.

The channels through which the macroeconomy influences income distribution have attracted greater analytical attention than those going in the opposite direction. Clearly, macroeconomic factors such as inflation, unemployment, capacity underutilization, overvalued exchange rates, nominal interest rates, public expenditures, etc., could affect income distribution through their differential effects on various production sectors and socioeconomic groups. Policies meant to correct a macroeconomic disequilibrium, such as nominal exchange rate changes, monetary and fiscal expansions and contractions also have differential effects. Blejer and Guerrero (1990: 414) correctly point out that "the channels through which macroeconomic policies affect income distribution are indeed intricate, with complexities arising from the fact that the impact of individual variables may differ depending on the composition of aggregate policy packages and the nature of the initial shock."

The channels of transmission from income distribution to the macroeconomy include savings, aggregate and sectoral composition of demand (in particular, demand for traded versus nontraded goods), and demand for financial assets. Batra (1987) became famous by predicting a depression in the 1990s because of the growing

concentration of wealth. For Satya Das (1992), inequality, and the interaction between aggregate activity and distributional changes, are central to the analysis of business cycles.

There are two broad approaches in the literature for empirically linking distribution with the macroeconomy. The first postulates and estimates a relationship between some characteristics of the size distribution of income and macroeconomic variables such as inflation, unemployment, growth rates, and so on. In a variant of this approach, the linkage is intermediated by functional income distribution, through a relationship between macroeconomy and functional income shares, and another between functional distribution and size distribution through the shares of different functional categories of income in each household's total income. Yap (1992) reviews some of the econometric models following this broad approach. Most such models are best as reduced-form representations of some unspecified structural model. But even this view needs to be qualified since many of them include arguably endogenous variables that have no place as explanatory variables in a reduced form.

The second broad approach is that of Applied General Equilibrium (AGE). The theoretical foundations of AGE models of the Walrasian genre are much stronger than the ad hoc econometric approach: demands and supplies are derived from optimizing behaviors of consumers and producers respectively, and prices emerge from market clearance. By distinguishing different income claimants in the economy and specifying their ownership of claims to income, an equilibrium distribution of income could be associated with each combination of the values of exogenous variables of the model. These variables would include levels at which government policy instruments such as taxes, subsidies and transfers are set, and world prices for internationally-traded commodities. Most of the dynamic AGE models in the literature are recursive and not truly intertemporal. They do not solve for a temporal sequence of equilibrium prices and quantities given forward looking, fully rational intertemporal behaviors by consumers and producers.

AGE models are simulators and not forecasting tools. Putting together a functioning AGE is a complex task. Even the simplest of them usually involve a large number of parameters, and yet the available data of the country modeled would be adequate for the econometric estimation of only a subset. The rest of the parameters have to be "imported" from the econometric literature or from studies of other countries or "calibrated" to ensure that the base year data are

consistent with being an equilibrium data set. Yet the AGE models are valuable tools for policy analysis, not just because of their firmer foundation in economic theory but more importantly because the full general equilibrium impacts of several simultaneous policy changes could be easily computed from such models.

In Walrasian AGE models, pure competition reigns supreme, only relative prices matter and money is simply irrelevant since it is neutral. However, some brave souls have "contaminated" Walrasian AGE's by introducing imperfect competition, money and structural macroeconomics! A number of AGE models for developing countries (pure and contaminated) are discussed in Jean Mercenier and T.N. Srinivasan (1992). Taylor (1990) presents structuralist AGE models. Before discussing in Section 4 two income distributions and the macroeconomy, one econometric (Das 1992) and the other AGE (Bourguignon et al. 1992), a brief discussion of a recent contribution of Robert Lucas (1992) is appropriate.

Lucas Model of Efficiency and Distribution

Lucas correctly argues that

> If the children of Noah had been able and willing to pool risks, Arrow-Debreu style, among themselves and their descendants, then the vast inequality we see today, within and across societies, would not exist, and those whose ancestors had the talent and luck to participate most fully in the industrial revolution would be remitting a good part of their return to those who did not. The study of distribution is, over a long enough time period, the study of social mobility, and one cannot discuss social mobility without reference to uninsured risks. (Lucas 1992: 246).

Lucas postulates a continuum of households, all infinitely lived, and all with the same *ex ante* preferences over time paths of the consumption of a single nonstorable good of which there is a constant perpetual flow. Each of the households is subject to shocks to its preferences, unpredictable even to itself, that give it a high urgency to consume in some periods and a low urgency to consume in other periods. These shocks are independent from household to household, so that, given the continuum of households, they average out in any firm period, with urgent consumers just balanced out by the less urgent. Clearly, in this setup, income allocation simply means allocating the given constant endowment of the nonstorable good

across households at each point in time. The crucial assumption is that individual shocks are purely private information. The only way to find out about the shock experienced by a consumer is to ask him, but as Lucas points out, in the model there is no way to audit or verify his answer. As such, any allocation mechanism has to be such that it is in the interest of each consumer not to misrepresent his shock.

Lucas considers several mechanisms ranging from a beneficent planner who distributes the consumption goods so as to maximize social welfare given various assumptions about the information available to him. In another mechanism, individuals trade property rights assigned to them on the endowment stream under alternative trading possibilities. Thus, given an initial distribution of claims on the endowments stream, each specific mechanism and method of allocation implies a complete description of the society's wealth distribution. The striking result of the Lucas model is that in a society of essentially identical individuals, free of issues of class or race, etc., starting from a position of *ex ante* equality, depending on the mechanism, everything is possible, ranging from perfect equality in perpetuity, to convergence in a stationary distribution, and even to inequality (e.g., variance of the wealth distribution) increasing without bound.

The richness of the *ex post* distributional outcomes that arise starting from *ex ante* equality depending on the allocation mechanism in a context of insurable risks, implies that any robust assertion about long-run distributions is impossible in real societies, in which, in contrast to the *ex ante* homogeneity of individuals in the Lucas model, not only the processes of resource allocation vary over time, but also other factors that add heterogeneity are present. At best, one can hope to illuminate the short-run impacts of policies and shocks on the income distribution using a macroeconomic model, and the medium-term impacts using an AGE model.

Two Models of Linkage Between Income Distribution and the Macroeconomy

Satya Das (1992) addresses the relation between income inequality and heterogeneity of individuals, on the one hand, and business cycles, on the other, from analytical and econometric perspectives. Several channels of linkage in both directions are considered, arising from differences among individuals in the propensity to save and accumulate, in demands for equities, bonds

and money, differences among firms in their discount rates, and from the functioning and stability of the banking sector. Das estimates a standard vector autoregression model for the United States in the annual data on changes in Gini Ratio of the income distribution, changes in unemployment rate, growth rates of real GNP and money stock and proxies for the changes in short and long-term interest rates. Causality tests applied to the estimated model suggest that while the link between changes in income inequality (i.e., changes in the Gini ratio) and other macroeconomic variables runs in both directions to a statistically significant extent, still innovations in inequality explain only a relatively small part of the unanticipated variations in other variables. Since the results are sensitive to model specification and there are well known econometric issues in causality tests, these results have to be viewed with extreme caution. However, the result that the linkage between inequality and the macroeconomy is significant in both directions is likely to be robust. Whether Das's model could be applied in other countries would depend in part on the economic structure of individual countries and on the availability of data on inequality. For example, in the Philippines, survey-based inequality data are available only for very few years, precluding the use of Das's model.

The micro-macro model of Bourguignon *et al.* (1992) is interesting, particularly since it quantifies the effects of alternative stabilization and adjustment policies on the distribution of income and wealth. Although the economy modeled is intended to be representative of a middle income semi-industrial economy, the framework is adaptable for economies with characteristics such as those of the Philippines. Because they assume that households can freely invest in foreign bonds (i.e., there are no impediments to capital flight abroad) while firms can borrow abroad except when exchange controls are imposed, the authors suggest that their application would be more representative of adjustment in a Latin American than in an East Asian country.

The model distinguishes six socioeconomic groups according to their sources of income:

(1) landless rural laborers with income earned entirely from their labor supply to the primary export and agricultural sectors;
(2) small farmers with income from land and their labor supply;
(3) urban workers in the informal sector;
(4) modern or formal sector workers and civil servants;

(5) big farmers whose primary source of income is land; and
(6) capitalists.

Only capitalists and big farmers hold financial assets. The first three socioeconomic groups are deemed to be poor. This framework does not of course generate a size distribution of income, and, as the authors recognize, the fact that different socioeconomic groups receive income from several sources mitigates the effects of adjustment policies.

The authors disarmingly confess, "as is typical of such simulation exercises, the elasticities reflect a combination of averages of borrowed econometric estimates ... and guesstimates" (Bourguignon et al. 1992: 28). Since their model is for illustrative purposes and does not portray a specific country, this mode of choice of parameters is innocuous. But for an application to a specific country, the parameters have to be grounded more firmly on the data and estimates from that country.

A base run (BR) is contrasted with four simulations describing how an economy might be expected to react to an external shock, each simulation corresponding to a particular program of adjustment. All simulations are over a seven-year period, with the external shock in the form of a rise in world prices of imports by 10 percent and in the world interest rate from 7 to 12 percent being introduced in the second year and maintained thereafter. The four adjustment packages are:

(1) Massive exchange rate devaluation with an accommodating monetary policy; while real wages and profit margins are assumed to be fixed in the modern sector. Exchange controls impose foreign borrowing constraints on all agents except households. This package named SR for structural rigidity is meant to represent an economy which is unable to adjust in most sectors.
(2) The package SN is the same as SR but with nonaccommodating monetary policy;
(3) Package SF is the same as SR but with fiscal tightening;
(4) Package SC is the same as SR with a credit squeeze in the form of a 50 percent cut in the growth of monetary base and wage indexation confined to 50 percent of inflation (as against 100%) as compared to SR;

(5) Package SH, the so-called adjustment with a human face, is the same as SR with employment generating public works, food subsidies and increased protection added.

The results are best summarized in the words of the authors:

> Of the packages considered, adjustment by real exchange rate depreciation was found to dominate adjustment package with contractionist monetary policy, and would probably dominate packages with fiscal contraction if one took into account the likely redistributive cost of foregone current public expenditures. The predicted distributional shifts are likely to endanger the sustainability of any adjustment package even though the simulations suggest that the distribution of income becomes more equal when normal policies are resumed upon completion of the required adjustment to the shocks. Furthermore, alternative packages appear to have small effects on distributional indicators . . . (presumably because of) the relatively mild external shock imposed on the simulations. (Bourguignon et al. 1992: 34)

Interestingly, earlier on on the same page they say that while adjustment package with a human face mitigates the effects of the shock in the second year, *"This relief, crucial as it may be for the long term sustainability of any adjustment package is short-lived. By the end of the seven period simulation, poverty and distributional indicators have values similar to those under SR"* (emphasis added). In fact the simulation indicates that poverty gap and the head count ratio under SR in period 7 are not different as compared to the adjustment package SC with fiscal contraction as well, although as is to be expected in the immediate aftermath of the shock in period 2, SH does better than SC and Sr. While there are some reasons to suggest that the model might overstate the short-run superiority and understate the long-run inferiority of the SH package, it is nevertheless clear that a model such as that of the authors is needed to analyze the trade-offs that might be involved in any adjustment package: between the short-run and the long-run distributional effects; between real side policies to improve the efficiency of resource allocation, incentives for factor accumulation and resource productivity raising technical progress, on the one hand, and nominal side policies to reduce inflation rates and to change inflation expectations in the appropriate directions, on the other.

SUMMARY AND CONCLUSIONS

1. The primary sources of data for modeling the linkage between income distribution and the macroeconomy, namely, household surveys and national accounts statistics, usually differ in their estimates of the same categories of income and expenditure for a number of reasons arising from differences in concepts and methods of measurement. Modeling exercises should therefore attempt a reconciliation of the two sets of data at each point in time. This could be done with careful and detailed examination of concepts, coverage, methods of imputation of values, benchmark norms and ratios, etc., used in censuses, surveys as well as national statistics, and above all, of the changes in all these over time.

2. Intra- and intergenerational transfer of income and wealth are extremely important for the analysis of poverty and inequality. However, most surveys use the household rather than the family as the unit of data collection. Distributional analysis based on them would not capture these and other important channels of transmission of inequality and poverty over time and space.

3. Measurement errors which could be in either direction as well as unidirectional biases affect most data to some extent and income data to a significant extent. Household income as measured in surveys are also affected by life cycle, business cycle and weather effects besides reporting biases. Measures of inequality and poverty based on income data unadjusted for measurement errors, biases and cyclical effects could be significantly biased as estimates from the true extent of inequality and poverty in a society. A number of analytical and measurement suggest that the errors and biases in consumption expenditures might be less serious; as such, distributional analyses based on consumption expenditures are likely to be better founded.

4. Summarizing the data on the size distribution of income or wealth with a well-fitting probability distribution is useful. However, its usefulness to distributional analysis is limited

unless thee is a satisfactory link between the fitted theoretical distributions and the economic and social processes that determine the generation and distribution of income and wealth.

5. Empirically linking income distribution and the macroeconomy is again useful, particularly for predicting trends in inequality or poverty in countries where data on macroeconomic variables are available at a much greater frequency than survey data. However, such predictive exercises have to be viewed with extreme caution. *First,* although the relation between inequality, poverty and the macroeconomy run in both directions, barring a few exceptions such as Das (1992) and Balke and Slottje (1989), in most contributions to the literature [e.g., Schultz (1969) and later Beach (1976, 1977), Blinder and Esaki (1978), Blejer and Guerrero (1990), Haslag et al. (1989), Metcalf (1972), and Nolan (1987)], macroeconomic variables are assumed to affect inequality and not vice versa. *Second,* several of them in effect estimate a single equation of a set of equations or a reduced form equation of an unspecified structural model, most often using methods of estimation that do not take into account the possible endogeneity of some of the explanatory variables.

   The predictive utility of the estimated relationships depends on the stability of the parameters of the model. Unless the parameters happened to be the so-called "deep" parameters describing individual preferences and technologies of production which can be reasonably assumed to be stable, all other parameters would be stable only in the unlikely event of unchanging policies and other relevant variables exogenous to the decisions of individual agents. For example, structural adjustment and stabilization packages are meant to bring about major changes in the policy regime in a country. In theory the relationship between inequality and the macroeconomy as estimated from data of the prestabilization and adjustment period will not be relevant for predicting the effects of the stabilization package. In practice, parameters might be fairly insensitive to policy changes, and as such, the econometric approach could still be useful provided it is used with caution and judgment and supplemented with results

using other methodologies. In any case, whatever may be its merit for short-run predictions, it is extremely unlikely to be useful for medium- to longer-term analysis.

6. The basic equations of applied general equilibrium (AGE) models follow from the optimizing behavior of consumer and producers, given preferences and technology respectively. As such they are indeed based on "deep" parameters. Unfortunately, the models involve many other parameters, and relatively few of the parameters used in the model are derived from econometric analysis of the data from the country being modeled. Besides, a pure Walrasian AGE model does not incorporate the fundamental monetary and financial variables of the macroeconomics of stabilization and structural adjustment policies. Eclectic models that combine macroeconomics with Walrasian microeconomics, such as Bourguignon et al. (1992), appear promising for distributional analysis. However, it is essential, though not simple, to incorporate the "political-economy" of structural adjustment and stabilization in a credible way in such models.

7. The process of income distribution in the long run would have to incorporate, once again in a meaningful way, social, economic, demographic, political, technological and environmental processes, all of which are stochastic and interdependent in nonlinear ways, with the pace of each differing substantially. A methodology for such an exercise is not yet in sight.

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