

Recent Advances in Empirical Microeconomic Research in Poor Countries

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This brief annotated bibliography is intended to inform nonspecialists of recent empirical research on individual and household economic activity in poor countries. I am greatly aided in this task by the fact that there exists a set of quite recent review papers and books on the subject. Most importantly, a new third volume to the Handbook of Development Economics (Behrman and Srinivasan, 1995) has appeared. It includes a number of chapters which are cited below. In addition, Deaton (1995a) provides a useful survey of essential econometric issues facing development economics, with an emphasis on practical problems of concern to applied economists. Dasgupta's recent (1993) book includes an up to date bibliography of literature which is particularly comprehensive in its coverage of literature related to rural poverty. There is a wealth of information in these reviews, and they will prove to be essential references for anyone seeking to begin research on any of the topics discussed below.

With this set of balanced and thorough literature reviews available, the task of this paper is to draw from this broad literature a few strands of research which serve to illustrate two dominant characteristics of the current state of the field. First, applied microeconomic research in poor countries is engaged in a healthy and vigorous interaction with applied economics in general. Tools and ideas are borrowed from and contributed to the rest of the discipline on a regular basis. If it was ever the case the development economics was a ghetto, the walls are now gone.

Second, this subfield retains its particular interest in and sensitivity to the importance of institutional diversity. Schultz' notion of "poor, but efficient" has surely carried the day in development economics, but recent research would add the qualification that this does not

imply unconstrained efficiency. Institutions matter, and they matter in ways that lead optimizing individuals to act in ways not necessarily consistent with simple models.

I have chosen six areas of research with which to try and illustrate these points: household economics; labor markets; saving, credit and risk; health/nutrition and income; poverty measurement, analysis and structural adjustment; and agrarian technological change.

I. Household Economics

The workhorse of applied microeconomic research in developing countries remains the agricultural household model (Singh, Squire and Strauss [1986]). The model in its canonical form states that a household maximizes a utility function subject to a budget constraint which incorporates production on the household farm and which permits trade on a full set of markets (including complete insurance and intertemporal markets). When markets are complete, the household makes production decisions which maximize the profit in each period on its farm. This property is known as the *separation theorem*, and it simplifies the analysis of agricultural production tremendously. The only determinants of agricultural activity, this theorem implies, are input and output prices and the production function. Farmer preferences, wealth, or risk aversion, for example, will not affect production decisions. This conclusion, of course, depends upon the assumption of a complete set of markets.¹ Subsection A briefly reviews studies which examine the usefulness of such a

¹Separation is assumed, generally without comment, in most analyses of production (even for small enterprises) in rich countries. It might be argued that it is more plausible to assume the existence of complete markets in advanced economies than in poor countries. However, it should be noted that the assumption of complete markets is quite strong and might not be fulfilled in many cases of interest, even in the richest nations.

dramatic assumption. Subsections B and C briefly review the rapidly expanding literature which calls into question the notion that “households” can simply be treated as if they were individuals, ignoring issues of intrahousehold distribution and the legitimacy of aggregating the diverse preferences of several household members into a single utility function.

A. Tests of Separation/Complete Markets

Benjamin (1992) finds no evidence that changes in household composition affect labor demand on farms in Indonesia, and thus cannot reject the separation theorem. Similarly, Pitt and Rosenzweig (1986) cannot reject separation. Using the same Indonesian data, they find no effect of illness of either the household head or the wife on farm profits. On the other hand, there are other contexts in which the nearly complete absence of a set of factor markets makes the separation hypothesis untenable. Fafchamps (1993) finds that there are severe seasonal labor constraints in rural Burkina Faso. Production plans are developed in order to work around these constraints. Production decisions, therefore, are no longer as simple as is the case when separation is valid. Fafchamps estimates the non-stationary stochastic control problem which the farmers face. This is the first such estimation procedure which uses continuous decision variables to appear in the economics literature. Jacoby (1993) estimates an agricultural production function for households in the Peruvian Sierra. The households’ labor supply decisions are then estimated using the shadow wages which can be inferred from the production function. Jacoby finds that the market wage does not equal the estimated marginal product of labor, violating the separation theorem. Behrman, Foster and Rosenzweig (1996) and Foster and Rosenzweig (1994a, 1994b) find that the productivity of a

worker is affected by his or her nutritional status, but that wages do not fully reflect the increased productivity resulting from improved nutrition, violating the separation hypothesis (see section IV.B below).

B. Intrahousehold Distribution

There has been a good deal of recent research concerned with the issue of the distribution of resources within households in both rich and poor countries. An important motivating factor for some of this work has been the demographic evidence of “missing women” in many South and East Asian countries. For example, Drèze and Sen (1989) provide dramatic figures indicating that the ratio of females to males living in China, India, Bangladesh and Pakistan is far lower than the comparable ratio in Sub-Saharan Africa or South-east Asia. Drèze and Sen argue that this demographic outcome is a reflection of systematic discrimination against girls and women within households in South and East Asia. Development economists have contributed several of the most interesting analyses in the literature because of the availability of particularly suitable data, because the existence of joint production and consumption decisions exposes issues of intrahousehold distribution particularly clearly, and because of the particular importance of the issue in certain poor countries.

Pitt, Rosenzweig and Hassan (1990) examine this issue using data from Bangladesh on individual food consumption. They find that adult men eat much more than adult women, and that girls under six eat somewhat less than boys under six. They link the adult consumption patterns to activity patterns - men eat more because they are engaged in heavier, higher return

labor activities. In the more usual case where data on individual consumption is not available, Deaton, Ruiz-Castillo and Thomas (1989), Deaton (1989) and Haddad and Reardon (1993) each use a similar method to explore intra-household allocation. The idea is to measure the cost of boys and girls by quantifying the reduction in the consumption of adult goods associated with the presence of additional boy or girl children. Does expenditure on adult goods decline by more when there is an additional boy than when there is an additional girl in the household? In these papers, little evidence is found that more resources are spent on boys than girls in data from Spain, Côte d'Ivoire, Thailand, or Burkina Faso. Ahmad and Morduch (1993), using the same method, find no evidence that girls receive fewer resources than boys in Bangladesh, despite the striking demographic evidence of significant discrimination in that country. They offer a number of possible ways to reconcile this striking difference, including suggestions that girls might have higher needs than boys; that critical interventions might not be made for girls when they are for boys; or that the discrimination takes forms that are more subtle than the allocation of food and other material resources. One likely explanation is econometric: these tests compare household expenditure on adult goods across households with different numbers of boy and girl children. If the effect of discrimination against girl children is to increase the infant mortality of girls, then the test will miss much of the discrimination because the girls have died and thus are missing from the sample.

C. The Theory of the Household

Economic theory is based on individual choice, but most of the data used in empirical work is collected on the basis of households. Virtually all empirical work in economics

simply ignores this distinction, and treats the household as if it were an individual. Becker (1981) and Samuelson (1956) provide conditions under which this simplification (which I will call the “unitary household” model) is valid, but the conditions are quite restrictive. Manser and Brown (1980) and McElroy and Horney (1981) provided generalizations to a Nash bargaining framework, and recent work has pushed the exploration of the economics of the household away from the simple unitary household model. One assumption of the unitary household model is that income is pooled - household demand patterns do not depend upon who earns the income. Thomas (1990) is a good example of the recent work which tests this assumption. He finds that unearned income controlled by mothers has a much larger effect on family health than unearned income of the father, contradicting the unitary model. I find these results persuasive, but it must be noted that it is based on estimates income elasticities of demand and thus is subject, like much research in this area, to the caveats associated with such estimates. In particular, it is necessary to purge the estimates of income elasticities of the simultaneity of labor supply and commodity demand. Thomas, like others, uses the unearned income of wives and husbands as instruments for their individual incomes. This method is subject to the warning that unearned income is (generally) interest on accumulated labor income and thus might depend on unobserved individual characteristics which affect both labor supply and commodity demand. Furthermore, if the time-series properties of the unearned income of women and men are different, the income elasticities of demand associated with these income sources will differ even if the household pools income.

A rejection of the unitary model does not imply that household resource allocation is determined by a Nash bargaining process. In an important series of papers, Chiappori (1988,

1992), Browning, Bourguignon, Chiappori and Lechene (1994) and Browning and Chiappori (1994) suggest that empirical research begin only with the assumption that intra-household resource allocation is Pareto efficient (an assumption which is necessary, but not sufficient for the unitary household model). These papers show that this assumption has testable empirical implications: in particular, the ratio of the effect of an increase in the wife's income on the demand for a good to the effect of an increase in the husband's income on demand for that good should be constant across goods. Thomas and Chen (1994) implement this test on data from Taiwan and reject the unitary household model, but cannot reject the Pareto efficiency of intra-household resource allocation.

Jones (1986) and von Braun and Webb (1989) look at intra-household resource allocation in production, rather than consumption. In West Africa, husbands and wives often farm separate plots. The descriptions in these papers of conflict between husbands and wives in West Africa over resources for their plots casts doubt on the notion of intra-household efficiency. Udry (1994) formalizes their arguments, and provides evidence that factors of production are not allocated efficiently across the plots controlled by men and women in the same household. Research on households provides a good example of the exchange of ideas and tools between development economics and the rest of the discipline. The literature arose first in studies of developed countries, but particular institutional arrangements in some poor countries provide the opportunity for uniquely powerful tests of the general theory.

II. Labor Markets

A. Education and Wages/Income.

There is substantial interest in the effect of education on productivity and income in both rich and poor countries. In particular, it is often argued that there are large private returns to schooling, and large social returns from investment in education. Current research in development economics is aimed at sorting out the difficult econometric issues which arise in any attempt to estimate these returns. Strauss and Thomas (1995) is an excellent review of the literature.

1. Selection

A basic problem is that not everyone works for a wage, thus introducing the possibility of selection bias in any attempt to estimate the effect of education on wages. This problem is exacerbated in poor countries by the possibility that labor markets are segmented, thus introducing further possibilities of selection bias. Vijverberg (1990) provides an example of an attempt to address the multiple selection issues which arise in Côte d'Ivoire. He takes into account selection as a result of decisions with respect to both migration (identified by childhood background variables) and work status (identified by marital status and the value of assets). The approach is to estimate the wage equation simultaneously with the structural selection equations, and the results indicate that the correction for work status selection is more important than that for migration selection in Côte d'Ivoire. Shafner (1994) takes a different approach. In her analysis of the determinants of wages in Peru, she argues that the

exclusion restrictions generally imposed in selection models are difficult to justify. She leans more heavily on functional form assumptions, but is careful to examine the sensitivity of her results to variation in these assumptions. The selection correction reduces estimated returns to education, but they remain high in Peru. The current state of the literature in development economics reflects that in the discipline more generally in that researchers are wrestling with the question: to what extent can economic theory provide sufficient restrictions to identify econometrically the relationship of interest (here, the determinants of wages)? If economic theory does not provide rich enough information, to what extent is it valid to rely on further, essentially arbitrary assumptions regarding functional form and the distributions of random errors?

2. Ability and Family Background Bias

A classic issue in estimating wage equations is the possibility that there are unobserved individual characteristics (either omitted background variables, or “ability”) that are correlated with both schooling and wages. If unobserved “ability” is positively correlated with both schooling and wages, the estimate of the returns to schooling would be biased up. It would seem that a comparison of the wages of identical twins with varying levels of education would provide a convincing method of eliminating the possibility of this type of bias. Ashenfelter and Krueger (1994) and Behrman, Rosenzweig and Taubman (1994) use different samples of identical twins to do just that. Unfortunately, the two studies obtain widely different estimates of the returns to education; Ashenfelter and Krueger find quite high returns of around 15 percent, while Behrman, Rosenzweig and Taubman conclude that the

returns are around 4 or 5 percent. The main cause of this difference is fact that the studies obtain strikingly different estimates of the strength of the correlation between unobserved ability and education. The root cause of this difference between the two studies, unfortunately, is not clear.

In the absence of samples of identical twins, evidence from poor countries is unlikely to contribute soon to this particular debate. Efforts to control for ability bias in studies in poor countries have centered on the use of aptitude tests. Boissiere, Knight and Sabot (1985) use the Raven's test as a measure of ability in a sample in Kenya and Tanzania. They find very high private returns to education even after controlling for the Raven's test score. Glewwe (1994) recognizes the endogeneity of aptitude test scores (test scores are likely to be affected by exposure to formal education), and uses a household fixed effect as an instrument for the Raven's test in his study of Ghanaian children. The main contribution of this study, however, is the major effort it makes to control of school quality, and thus to estimate the returns to government investment in school quality. Behrman and Deolalikar (1993) use household fixed effects to control for a variety of unobserved family effects which might be correlated with both education and wages. They find that the estimated private returns to education fall by about 50 percent when household fixed effects are incorporated in the model. This result is consistent with the Behrman-Deolalikar hypothesis that unobserved household effects are correlated with both education and wages, in which case the fixed effect estimates are consistent. It is important to note, however, that these results are also consistent with the hypothesis that there are no such unobserved effects, but that there is measurement error in reported education. If there is measurement error, both OLS and fixed effect estimates of the

return to education are biased down, but the fixed effect estimates are *more* biased.

B. Information in Labor Markets

Moral hazard and adverse selection are thought to be present in many labor markets, but to be particularly important in those of poor countries. For example, information asymmetries are fundamental to most explanations of the existence of sharecropping. Bell (1977) and Shaban (1987) use data on input use on sharecropped versus owned land to provide some evidence of the importance of information asymmetries in some parts of India. Laffont and Matoussi (1995) use production function estimates to argue that similar asymmetries are important in Tunisia. Bell, Raha and Srinivasan (1994) replicate the now standard finding that productivity is lower on sharecropped than on own land in India. They also find a “dilution” effect, in which increases in cultivated land reduce cultivation intensity. An interesting matching problem emerges, with landlords looking for tenants with particularly low endowments of land relative to labor.

Foster and Rosenzweig (1994b) contains a simple idea: if people shirk when they work for others, they won't lose as much weight (controlling for food intakes). Using data from the Philippines, the authors find that individuals indeed do lose less weight when they work for time-rate wages than when they work for piece-rates or on their own farm, controlling for food intakes. Foster and Rosenzweig (1994a) examines the problem of adverse selection. Employers don't observe workers' productivity, so they sort them into various tasks based on their observable characteristics. Statistical discrimination occurs: equally productive individuals are sorted into different tasks. Women, as a result, predominately work in

weeding in the Philippines, while men are sorted into heavier activities. The key identifying assumption in this study is that worker earnings in piece-rate tasks provide information to the researcher (but not to employers) about that worker's true productivity.

III. Saving, Credit and Risk

A. Risk, Saving, and Credit Constraints

Here, I group together a set of papers which examine, more or less explicitly, saving and credit transactions as a mechanism for dealing with risk. The underlying model for most of these papers is the permanent income hypothesis (PIH). The PIH, of course, is of interest to economists working on all countries. Several important tests of the hypothesis have been introduced which take advantage of particular institutions or production technologies in poor countries. In an important paper, Paxson (1992) introduced a method which has since been used by a number of authors (e.g., Alderman (1994)). She uses fluctuations in rainfall to identify an exogenous component of transitory income.² This permits the consistent estimation of the marginal propensity to save transitory income. She finds that the marginal propensity to save transitory income in Thailand is quite high: households do save to smooth annual fluctuations in income. The PIH, however, is rejected because the marginal propensity to save out of permanent income is found to be larger than zero. Morduch (1990) looks more explicitly at the intertemporal decision. He examines the pattern of consumption and income

²This method is the converse of an idea introduced earlier by Wolpin (1982). Wolpin uses cross-sectional variation across India in long-run weather patterns as an instrument to identify variation in permanent income. In an earlier study, Bhalla (1980) used averages of annual income, and alternatively fixed effects estimates of earnings functions to obtain measures of the permanent income of Indian households.

over time of the farmers in the ICRISAT panel study in India.³ He finds evidence that liquidity constraints are important for some farmers - the growth of their consumption is significantly affected by current income. Moreover, these same farmers undertake more diversified, lower return production plans. Similarly, Binswanger and Rosenzweig (1993) report that there is a significant trade-off between the riskiness and the profitability of asset portfolios in the ICRISAT sample, and that poorer households choose portfolios with lower risk than those of wealthier households. Chaudhuri (1993), again using the ICRISAT sample, finds that current cash holdings affect production decisions, contradicting the separation hypothesis and providing evidence of significant liquidity constraints. Deaton (1992) uses the method proposed by Campbell (1987) to test the PIH. He tests the hypothesis that households in Côte d'Ivoire save in anticipation of future shocks. He finds evidence that households save when they expect income to fall, but that the amount saved does not correspond to that predicted by the PIH. Rosenzweig and Wolpin (1993) examine the consequences of liquidity constraints in the ICRISAT India villages. They find that productive assets - in particular, bullocks - are sold when households are subject to adverse weather shocks. The use of a productive asset to smooth consumption is striking evidence of the importance of risk aversion along with binding credit constraints and incomplete insurance markets.

B. Insurance

Another series of papers tests the hypothesis that there exist important village-level

³ICRISAT is the International Crop Research Institute for the Semi-Arid Tropics. Its panel study of farmers for up to ten years in India is one of the most important and well-used datasets in development economics.

informal insurance arrangements. Townsend (1994) examines consumption and income in the ICRISAT India villages. He shows that there is a high degree of co-movement in consumption across households, despite the fact that there is a substantial amount of idiosyncratic income variation. The most striking results presented in his paper are a variety of regressions which indicate that after controlling for average village consumption, household income, crop output and other household level shocks have little or no effect on movements in household consumption. Townsend concludes that a fully Pareto efficient allocation of risk is not achieved in these villages, but that the rejection is weak. The simple model of Pareto efficiency provides a remarkably good approximation to the allocation of risk in these villages. Lim (1991), Morduch (1991, 1992), Ligon (1994) and Ravallion and Chaudhuri (1991) have each built on Townsend's work using the same data. They concur that Pareto efficiency is not achieved, though they differ in their conclusions regarding the amount of risk pooling short of Pareto efficiency. Deaton and Paxson (1994) examine the evolution of the distribution of consumption and income over 14 years within cohorts in (among other countries) Taiwan. The PIH implies that the spread of the distribution widens over time, as the accumulation of shocks to permanent income disperses consumption. Full consumption insurance, on the other hand, implies no such increase in dispersion.⁴ Deaton and Paxson find that that within-cohort consumption inequality does increase with age.

Jacoby and Skoufias (1992), Foster (1995) and Rose (1994) are similar in that they look at the effect of risk on other outcome variables (school attendance in the ICRISAT India

⁴This is almost true. A full insurance model can imply increasing consumption dispersion if there is increasing dispersion in the marginal product of labor across individuals - the optimal allocation would have high productivity workers working longer and consuming more.

villages, child growth in Bangladesh, and child mortality in India). In each instance, they find important evidence of incomplete insurance, in that income shocks significantly affect schooling, child growth, and child mortality. Cox and Jimenez (1992) and Udry (1994) examine the mechanisms through which informal insurance occurs. Cox and Jimenez show that private transfers flow from the relatively rich to the relatively poor in Peru. Udry shows that there exist state-contingent loan transactions in northern Nigeria. While these loan transactions serve to pool risk between borrowers and lenders, a fully efficient risk pooling equilibrium is not achieved in these villages.

C. Credit Markets

There has been little work on structural supply and demand models of credit markets in developing countries. Two papers, by Kochar (1993) and Bell, Srinivasan and Udry (1994), show the difficulties of such modeling. Government regulations in the formal sector, and incomplete information in the informal sector make the determination of equilibrium complex. Both papers rely on controversial exclusion and distributional assumptions in order to identify supply and demand functions in the credit market. Kochar argues that earlier studies have often overestimated the extent of rationing in the formal market. Bell, Srinivasan and Udry find significant formal sector rationing, and a dramatic effect of credit-product market interlinkages in the informal sector.

D. Seasonality

There has long been concern about seasonal patterns of hunger in many rural

communities in poor countries. See, for example, Watts (1983) and Sahn (1989). Paxson (1993) examines seasonal consumption patterns across groups with very different seasonal income patterns in Thailand. She finds that the seasonal consumption patterns are quite similar - evidence that the seasonality in consumption is a reflection of price movements or seasonal variation in demand rather than credit constraints. Behrman, Foster and Rosenzweig (1996), in contrast, find evidence that income variation is not smoothed across seasons. They find very different income elasticities of demand for calories in different seasons in Pakistan. There is a very high elasticity in during the planting season, and a low elasticity of demand during the harvest season

IV. Health/Nutrition and Income

A. Income Elasticity of Demand for Calories

The magnitude of the income elasticity of demand for calories in poor countries is of considerable interest.⁵ This interest is generated by the fact that improved health and nutrition is often taken to be a central goal of the development process. If the income elasticity of demand for calories is high, then (well-distributed) economic growth will rapidly alleviate hunger. However, if the elasticity is low, then a stark conflict can emerge between the goals of rapid growth and better nutrition. In a recent series of papers, Behrman and Deolalikar (1987), Bouis and Haddad (1992) and Bouis (1994) have argued that conventional estimates of the income elasticity are too high. They cite three particularly important causes of the upward bias: (1) many estimates of the calorie-income relationship are calculated from

⁵In a selective review, Strauss and Thomas (1995) list 20 published studies since 1979.

nutrition tables from underlying estimates of the elasticity of demand for particular food groups. If the food groups are defined broadly (say, “grains”) then as income rises people may be demanding higher quality (and thus more expensive) calories *within* these groups. As a result, the calculated income elasticity of demand for calories is overstated; (2) measurement error in *autoconsumption* (consumption of food produced on the household’s own farm) contributes a common error to both calories consumed and income, thus biasing the estimated income elasticity up. Similarly, if calorie consumption is calculated from expenditure data and expenditure is used to instrument income (to avoid bias from transitory income shocks), then measurement error in expenditure contributes a common error to both calories and expenditure, biasing estimated elasticities up ; and (3) unrecorded gifts most often flow from rich to poor, so measured consumption is understated for the poor and overstated for the rich, biasing the estimated elasticity upwards. This series of papers concludes that the income elasticity of demand for calories is quite low, perhaps even zero. That conclusion is probably overstated. Subramanian and Deaton (1992) solve problem (2) by instrumenting expenditure with non-food expenditures and produce a lower bound estimate of the elasticity of demand for calories in Maharashtra state in India of about one third. Strauss and Thomas (1990) use a rich data set from Brazil and find striking non-linearities in the demand for calories. The demand for calories by the poor is more elastic than is the demand by richer households. Sahn (1994) finds that income significantly effects long-run nutritional status (height for age) but that the affects are insignificant in the short run (weight for height) in Côte d’Ivoire. Behrman, Foster and Rosenzweig (1996) examine within-season elasticities in Pakistan, and find very high elasticities (near one) for poor households during the planting season (harvest

season elasticities are near zero).

B. Joint Causation of Income and Nutrition

The possibility that nutritional status is an important determinant of productivity has sparked some of the most interesting work in theoretical development economics over the past 40 years (from Leibenstein (1957) through Dasgupta (1993)). Until recently, however, there had been little formal empirical investigation of the hypothesis. However, since Strauss' (1986) paper explicitly incorporated this effect into a farm production function in Sierra Leone, evidence has grown of an important link between nutritional status and worker productivity. Bhargava (1996) uses panel data from Rwanda (and very strong identifying assumptions with respect to the exogeneity of cultivated land and predetermination of consumption) to estimate a dynamic health production function jointly with a time allocation model. He finds that those who are poorly fed have to choose more sedentary (and less well-paid) activities. Pitt, Rosenzweig and Hassan (1990) find a similar result in Bangladesh. Thomas and Strauss (1992) find that measures of body mass, calorie intake and protein consumption (all instrumented with prices) affect wages in Brazil; moreover, height (an indicator of long-run nutritional status) has a dramatic effect on wages. Foster and Rosenzweig (1994a) hypothesize that only observable health will be rewarded in time-wage payments, while piece-rate earnings will be affected by all aspects of health. They find that in the Philippines, observable body mass does affect both time- and piece- rate wages, while calorie consumption (conditional on body mass) raises only the piece-rate wage. It is now clearly established that nutritional status is an important determinant of productivity and thus

earnings. The strong assumptions which underlie much of the theoretical work on nutrition efficiency wages, however, seem not to be met in most areas of the world - calories are simply too cheap for the efficiency wage hypothesis (see, e.g., Swamy (1993)).

V. Poverty Measurement and Structural Adjustment

Substantial progress has been made in recent years in the development and empirical implementation of theoretically consistent measures of poverty. Ravallion (1994) provides a concise and very valuable overview. The most useful of these measures for development economists has been the class of additively decomposable poverty measures, which make it possible to examine the sectoral, geographic or demographic components of changes in overall poverty.⁶ Similarly, Ravallion and Huppi (1991) focus on methods which can be used to decompose changes in poverty indices into components due to overall growth and changes in the distribution of income. These theoretical developments have been complemented by rapid growth in the number and quality of surveys designed to measure the extent and incidence of poverty.⁷ Thus it is possible to answer questions such as, over a given period of time, is the overall change in poverty in a particular country attributable to changes in rural poverty, urban poverty, or to the distribution of poverty between the two?⁸

The question of the effect of macroeconomic stabilization and structural adjustment on

⁶Atkinson and Bourguignon (1982) discuss the formulation of poverty measures for multi-dimensional welfare functions.

⁷The most obvious example is the World Bank Living Standards Measurement Survey program, but there are complementary efforts by many national statistical programs.

⁸However, see Chaudhuri and Ravallion (1994) for a useful discussion of the difficulties of identifying long-term poverty from cross-sectional data.

poverty is crucially important, and unfortunately quite difficult to answer. The problem is that one needs to be able to answer the counterfactual: how would the *lack* of adjustment affect poverty? This requires a model, typically a computable general equilibrium model, which embodies a series of strong and usually untested assumptions. As a result, I find it difficult to be confident of the results. A thorough treatment of this issue can be found in Gunning and Keyzer (1995). More believable are simple accounts of poverty during the adjustment process. Who becomes poor? Who gets less poor? There has been some good work, guided by good data collected for precisely this purpose and by the theoretically consistent measures of poverty discussed above.

Huppi and Ravallion (1991) and Datt and Ravallion (1992) use the methods discussed in Ravallion and Huppi (1991) to argue that poverty has diminished during Indonesian adjustment, while in Brazil distributional changes have increased poverty. In India, changes in the distribution of income have aggravated the problem of poverty. Glewwe and de Tray (1991) examine the potential impact of adjustment on the poor in Peru. They look at the participation of the poor in various markets and calculate how they would be affected by the relative price changes which accompany adjustment. Behrman and Deolalikar (1991) ask a simple question: did indices of education and nutritional status deviate from their time path during adjustment in Jamaica? Using relatively poor data, they find no evidence of a change in the evolution of these indicators during the adjustment process. Sahn and Sarris (1991) offer an intermediate step between simple description and a full-blown CGE model. They look at price changes and infer welfare changes for a set of representative households, based on structural parameters estimated from survey data or taken from social accounting matrices.

Examples of more ambitious CGE modeling can be found in Thorbecke (1991), Demery and Demery (1991) and Bourguignon, de Melo and Suwa (1991).

VI. Agrarian Technology

A series of four recent papers offers perhaps the best examples of recent work in empirical microeconomics in poor countries which are likely to have an important impact on other fields of economics. Much of the modern growth literature appeals to externalities in developing or learning new technologies as a source of long run growth. This literature, however, has virtually no empirical microeconomic foundation. What is the source of the externalities which play a central role in this literature? Recent work in the adoption of new agricultural technology in poor countries is beginning to tackle the issue of learning externalities. Two recent papers advance a traditional literature on the adoption of technology. Burger (1994) puts a reduced form learning process (in which the probability that one farmer adopts a new technology depends on the use of the technology by her neighbors) into a correctly specified logit framework. For coffee in Kenya, the feedback effects are strong and statistically significant. The results depend on the particular functional form assumed in the study, and on some important assumptions with respect to serial correlation. Munshi (1994) also takes a new look at the standard diffusion model, and tries to permit non-parametric learning by farmers. The idea is that the residuals from acreage allocation decisions in another district last year provide information about what farmers in that district know that we don't, and thus affect our decisions this year (e.g., if our neighbors planted more than we would predict they would, that must mean they know something we

don't). He finds learning effects, but they are not very strong. There is an identification problem because this learning process cannot be distinguished from other unobserved factors which are both spatially and serially correlated. Two other papers go an additional step, and explicitly model the learning externality. Besley and Case (1994) posit that farmers in the ICRIAT India villages are unsure of the quality of new technology suggested by extension agents. Foster and Rosenzweig (1995) model uncertainty about how a new technology can best be used (using the all-India ARIS data). In each case, the authors model the decision process of the farmers in the presence of a learning externality - all farmers know that they can learn from the decisions of other farmers, and thus may have an incentive to wait and see. Each paper finds evidence that learning from other farmers is important. Foster and Rosenzweig provide evidence that the external effect is not internalized, so that there is under investment in experimentation, while Besley and Case provide some (weak) evidence that the learning process is close to socially optimal.

VI. Conclusion

This has been a partial and idiosyncratic review of an extremely active area of research. I have ignored important areas of research: industrial policy, trade and development, land reform, and infrastructure investment just to name a few. Nor have I addressed the enormous progress which has been made in understanding a variety of human resource issues: the dynamic processes which underlie patterns of fertility and mortality, marriage, migration and child health (see Rosenzweig and Stark (1996), Strauss and Thomas (1995)). Two other crucial topics have not been addressed, in this case because little progress

has been made in formal empirical work. They are among the most promising areas for future research in this field.

The first is the issue of environmental externalities. The problem is similar in spirit to the learning externalities discussed above, but the effects are more difficult to measure. Dasgupta and Mäler (1994) provide a discussion, but to date there is little convincing evidence on the extent of environmental externalities in particular contexts in poor countries, or on the existence or effectiveness of formal or informal mechanisms to cope with the effects of these externalities.

Second, very little progress has been made in the quantitative study of institutional change. Stiglitz (1988), Banerjee and Newman (1993) and Kandori (1992) provide promising theoretical treatments. Lin and Nugent (1994) provide a thorough review of the existing mostly descriptive and historical empirical studies of the process of institutional change (see also de Janvry, Sadoulet and Thorbecke (1993)). There is a great deal of knowledge, therefore, about overall patterns of institutional change, and a set of sophisticated theoretical tools to begin analysis. However, examples of formal hypothesis testing concerning the evolution of institutions remain quite rare (an exception is Besley (1994)) and this remains a promising area for future research.

Appendix: Data for Development Analysis

This is a brief and idiosyncratic listing of some of the more commonly used microeconomic datasets which are available for development economists. See Srinivasan (1994) for a relevant discussion.

A major failing of our field is that many datasets are not publicly available - the World Bank LSMS datasets, for example, have often been very difficult to acquire unless a researcher has an inside track at the World Bank or at the relevant government agency in the developing country (it should be noted that efforts are being made to improve access - the Tanzanian Human Resources Development Survey can be downloaded from the World Bank's home page on the WWW). The freely available datasets collected by RAND and the openness of ICRISAT to external researchers provide welcome counter examples. Except in extraordinary circumstances, all authors should make available the data used in published papers to any interested researchers. I think that it is an important strike against the credibility of our field that this is not yet standard in development economics research.

RAND: Malaysia Family Life Surveys (See DeVanzo 1988) Indonesian Family Life Survey (ongoing). Guatemala survey (with the Institute for Nutrition in Central America and Panama) (see Strauss and Thomas (1994)).

World Bank LSMS surveys have been conducted, or are ongoing in: Cote d'Ivoire, Peru, Ghana, Mauritania, Bolivia, Jamaica, Morocco, Pakistan, Peru, Venezuela, Viet Nam, Nicaragua, Guyana, Tanzania, Mozambique, Guinea, Russia, Mongolia, South Africa and Kyrgystan.

ICRISAT village level surveys in India and Burkina Faso. See Ryan and Walker (1990); Fafchamps (1993).

NCAER Panel data and India Additional Rural Incomes Survey (ARIS) by the National Council of Applied Economic Research (NCAER) (Rosenzweig 1980, Foster and Rosenzweig 1995)

Taiwan Surveys of Personal Income Distribution (Deaton and Paxson 1994)

The Washington-based International Food Policy Research Institute (IFPRI) has collected several detailed household and agronomic datasets from around the developing world. Two notable examples are the Philippines Bukidnon nutrition survey (Foster and Rosenzweig 1994a); Pakistan Food Security Study (Behrman, Foster and Rosenzweig 1994)

Philippines Laguna household survey (Evenson 1978).

Cebu Study Team longitudinal survey of infant health (Cebu Study Team 1992).

Indonesian SUSENAS household survey - Benjamin (1992).

Brazilian ENDEF household survey - Thomas and Strauss (1992).

Thailand Socioeconomic Survey for various years - For example, Government of Thailand. 1983. Report of the 1981 Socio-economic Survey. Bangkok: National Statistical Office.

Behrman-Wolf Nicaragua national survey (1977-78) - Behrman and Wolf (1987)

The Centre for the Study of African Economies at Oxford is carrying out panel surveys in a number of African countries, including Ethiopia and Namibia.

The World Bank Africa Technical division is carrying out a Research Program in Enterprise Development, a panel survey of firms in a number of African countries, including Ghana, Zimbabwe, Cameroon, Kenya, Tanzania, Zambia, and Burundi.

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