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Microdata Panel Data and Public Policy: National and Cross-National Perspectives

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Abstract

This paper focuses on the movement of data-based social policy analysis from a single country cross-sectional frame to a multicountry panel frame. It provides examples of policy insights this movement to panel data has permitted, both with respect to economic well-being and behavior—using data from the PSID (Panel Study of Income Dynamics), the BHPS (British Household Panel Study), the GSOEP (German Socio-Economic Panel), and the HRS (Health and Retirement Study). It also suggests fruitful areas for future panel data-based policy research.

Introduction

Over the twentieth century, policymakers in modern industrialized nations have increasingly turned to the research community to track the consequences of regulations, as well as social insurance and social welfare programs, on marketplace outcomes and on the economic well-being and behavior of their citizens. The fielding of large random samples of the population at a moment in time on a regular basis in these countries has allowed researchers on a regular basis to take snapshots of the labor earnings, economic well-being, and work behavior of the overall population and of vulnerable subgroups within that population. Social success indicators—e.g., average wage rates, average income, poverty rates, wage and income dispersion, and unemployment rates—based on these data now play a major role in providing quantitative evidence for social policy discussion in every nation. And microsimulation models have been developed by researchers to allow them to estimate the consequences of policy changes on these indicators from a cross-national perspective (e.g., Immervoll, O'Donoghue, and Sutherland 1999).

However, while such data and the social indicators they generate are useful, cross-sectional data fail to capture the dynamic aspect of many of the variables they measure. For instance, while it is important to look at the wages of workers in a given period, it may be equally important to know each worker's wage path. The same is true for household income or poverty measures. Low income or even poverty in a given period is unfortunate, but a decade or a lifetime in such a state is far worse.

With respect to behavior, the development of life cycle modeling has made it clear that the full impact of a policy can only be discovered by following its outcome across multiple periods. Most recently, dynamic programming models and option value models have been used

to provide more realism to perfect certainty models by allowing new information to affect these decisions. Hence, researchers interested in providing either descriptive analysis of the labor earnings or economic well-being of populations, or in testing behavioral models that attempt to either predict or simulate economic behavior resulting from policies, need access to multiperiod data for the same persons.

This paper looks at the ways in which population-based microdata in general, and panel data in particular, have informed policy in the past and how they will do so in the future. We begin the next section with a brief history of data collection and use, and then provide an example of how cross-sectional and longitudinal data can give contrasting pictures of how economic well-being changes in old age. We then examine several examples of the use of longitudinal data to address policy issues. Following that we explore a set of related panel data issues that concern improvement in panel datasets to better address emerging policy issues. Finally, we spell out what we have learned from past national and cross-national analyses of household panel data and predict how those data will inform future policy analyses.

Data and Policy: The First 100 Years

To inform social policy, researchers must have population-based household data they can use to describe the social and economic situation or, more generally, the well-being of individuals. Such data allow policymakers to assess the ways that policy, the economy, the neighborhood, and particularly individual behavior affect well-being. Well-being can be measured in economic terms (income, consumption, wealth, earnings) or in health terms (health status, disability). Economic status and health status in turn affect and are affected by living arrangements, income pooling and sharing, and household composition.

Current Status

The essence of the modern panel dataset is that it follows a representative sample of the population over time. Its first task is to establish "baseline" measures of economic status (income, net worth), health status, and living arrangements. Embedded in these measures is a set of variables that measure the immediate impact of government taxes, transfers, and regulations in each of these domains. Income should be both gross and net of taxes and transfers to measure redistribution without behavioral change; generational transfers, health behaviors, health status, and health care access should be monitored; living arrangements that are affected by government policy (e.g., subsidized housing, care provision for the frail, etc.) can also be charted. In the best situation, the data are designed and used by a multidisciplinary team of researchers who understand the policy questions to be addressed *before* the survey goes into the field.

Over time, the survey follows individuals and records how these baseline measures of economic status, health status, and living arrangements change. Such data permit researchers to observe the way a given population changes and enable them to develop policy-relevant measures of these changes (e.g., the level and distribution of resources relative to needs—or poverty—income distribution, health status changes and their effect on programs, disability support, living arrangements, caregiving, and earnings, etc.). Modular data are then added to the baseline data on related policy-relevant topics (e.g., time use, wealth, expectations and their formation, etc.). And as the survey progresses, it naturally captures important life history events: divorce, single parenthood, retirement, birth of a child. These data can then be used to derive the effects of policy changes on outcomes and behavior. To the extent that similar information from panel data in other nations is available, it can be used to observe the ways in which countries react to similar challenges, with alternative policies and outcomes.

Nations begin with large scale "whole population" panels such as the British Household Panel Study (BHPS), the German Socio-Economic Panel (GSOEP), or the Panel Study of

Income Dynamics (PSID). But over time, as key particular social issues begin to emerge, nations create specific panel datasets with larger samples of the populations of interest to focus on their specific experiences, events, or situations. For instance, there are now special panels on retirement and old age; disability during working years; immigrant status; and parenthood and child development. And soon a few panel datasets will include information on the biomedical and physical characteristics of persons based on blood samples and other similar sources of health status measures.

From Humble Beginnings to Rapid Development

But this is not where data collection began 100 years ago. At the beginning of the twentieth century, sample surveys were in their infancy and researchers collected sample data on individual communities to create basic measures of poverty (e.g., Rowntree 1901). Some decades later, cross-sectional surveys of earnings and income were collected by government agencies to measure income distribution and low income. These measures were derived from labor force surveys or consumer expenditure surveys where the initial purpose was to measure aggregate social indicators such as unemployment or consumer price changes. The income supplements to the United States *Current Population Survey* (CPS) and the British *Family Expenditure Survey* (FES) were started for this purpose after World War II. There were no microdata available to academic researchers at that time, and access was limited to a few bureaucrats and researchers with adding machines and the patience of accountants (e.g., Miller 1955; Morgan et al. 1962).

Using these data, countries developed measures of income distribution and poverty, and identified households with below average incomes. Health data were collected in separate surveys by different public agencies. Demographic data in these income-based surveys were of interest mainly to describe the income-sharing unit, and income (or consumption) was assumed (and is still assumed) to be equally shared within benefit-recipient units. Over time, as

government tax and transfer programs grew with the welfare state, additional details were collected on the components of income, taxes, and transfers; measures of health status were added along with questions on access to health care and related measures of physical well-being.

These data were neither integrated nor comparable across countries. Many nations had only consumption surveys, or income tax data, or limited and periodic income surveys. It was not until 1968 that the PSID, the first large-scale panel dataset, was launched. Significantly, the PSID was funded by a government agency, the U.S. National Science Foundation, but was conducted by a university research center, the Institute for Social Research (ISR) at the University of Michigan. The change from government-run surveys to university-run surveys was noteworthy. It meant that the researchers who would ultimately use the data began to invest time and energy in its collection. The Level of Living Panel Survey, launched in Sweden at roughly the same time, had a similar design and nongovernmental leadership.

In the 1970s, United States-based researcher groups at the University of Wisconsin and Mathematica began to use these data to build and parameterize static cross-sectional microsimulation models that could be used to answer the "what happens if we follow one policy versus another?" questions posed by policymakers and policy analysts. The use of static microsimulation models has since expanded to many nations (Blackburn and Harding 1995).

By the 1980s, the Luxembourg Income Study (LIS) project had begun to harmonize cross-sectional household income survey data and make them available via electronic mail. Other groups shared questionnaires and began to build surveys that were comparable across nations (e.g., the International Social Survey Program). Also during the 1980s, the German Institute for Economic Research (DIW), the Economic Social Research Council (ESRC) at the University of Essex, and groups in Sweden, Luxembourg, and The Netherlands began their household panel surveys to collect data on income, living arrangements, and health status from a sample of representative households whose members were followed over time. It should be

noted that most of these efforts, like the PSID, were led by university-based researchers, rather than government agencies.

Finally, in the 1990s, a group at Syracuse University and a parallel group at the Centre for Population, Poverty, and Public Policy Studies/International Network for Studies in Technology, Environment, Alternatives, Development (CEPS/INSTEAD) in Luxembourg began to harmonize household panel data and to make it directly available to researchers. At the same time, tax-benefit microsimulation models moved from a national (e.g., POLIMOD in the United Kingdom) to cross-national (i.e., EUROMOD for the European Community) base under the direction of a team of international scholars (Immeroll, O'Donoghue, and Sutherland 1999). Practical dynamic microsimulation models are just now emerging—for example, the U.S. Social Security Administration MINT (Modeling Income in the Near Term) model (Iams and Butrica 1999).

By the end of the 1990s, researcher-led groups (as opposed to government agency-headed groups) had created specialized panels such as the Health and Retirement Survey (HRS) in the United States, which is equal parts income, work, health, and living arrangements, and which was cooperatively designed and is being used by multidisciplinary teams of researchers. Similar efforts regarding immigrants, children, and other specific policy-relevant groups are just beginning in other nations (e.g., the special immigrant subsample of the GSOEP).

Hence, it appears that panel data analysis and microsimulation, both domestic and cross-national, are now becoming more prevalent. With this as background, we now turn to some of the social policy questions on which researchers have focused, using household income microdata in general and comparable microdata in particular.

Cross-Sectional versus Longitudinal Comparisons of Economic Well-Being

In the ongoing debate in the United States over Social Security reform, it is inevitable that the economic well-being of older people comes to the forefront. For instance, one could

reduce the liability of the Social Security system by reducing benefits across-the-board or by targeting the reductions on newer aging cohorts. The answer to the question of who should bear the burden of benefit cuts might be influenced by how well the older population has fared over time. Burkhauser, Cutts, and Lillard (1999) show how compositional changes within the older population between two years of cross-sectional data yield a dramatically different view of how the average economic well-being of older people changed in the 1980s, compared to results obtained using longitudinal data to follow older individuals as they aged over the same time period.

Table 1, derived from Burkhauser, Cutts, and Lillard (1999) uses cross-sectional data from the Panel Study of Income Dynamic (PSID) to compare the mean household size-adjusted income of older people in 1983 and again in 1989. As can be seen in row 1, the mean household size-adjusted income of all people aged 65 and over in the United States was $18,462 (column 1) in 1983. This group can be divided into those who stayed in the sample through 1989 and had average income of $19,623 (column 2) in 1983, and those who did not and had income of $16,159 (column 3). A cross-sectional based comparison of those aged 65 and over in 1983 (column 1) with those aged 65 and over in 1989 (column 4) shows that the older population in 1989 is substantially better off than the older population in 1983—$19,231 in 1989 compared to $18,462 in 1983.

However, using the longitudinal aspect of the panel to actually follow those people who were aged 65 and over in 1983 and compare their 1983 average income with their income in 1989 tells quite a different story. Those aged 65 and over in 1983 who stayed in the sample had mean income of $19,623 (column 2) in 1983. By 1989 those people were aged 71 and over (row 7) and they had mean income of only $17,988 (column 5).[1]

A look at column 5 reveals the primary cause of the differences in these two data-driven views of changes in economic well-being. Those aged 65 through 70 in 1989, who are in the

older cross-sectional population in 1989 but were not in the older cross-sectional population in 1983, have a mean income of $21,228. This is far higher than the mean income of those aged 71 and over in 1989, who were old in 1983 and continued to be old in 1989. While new entrants into survey households since 1983 had even higher mean income, which explains part of the difference between the cross-sectional and longitudinal results, these new entrants are a very small part of the 1989 sample and hence have only a small impact on the overall difference.

It is the new cohort of older persons, those aged 65 through 70 in 1989 who are driving the difference between the cross-sectional and longitudinal comparisons. It is primarily because they were substantially better off than the older cross-sectional population in 1983, and continued to be so five years later, that the entire older cross-sectional population in 1989 has a higher level of economic well-being than the entire older cross-sectional population in 1983. The result is that such cross-sectional comparisons miss the fact that the mean older person in 1983 who survived is worse off in 1989.[2]

These straightforward findings show the value of panel data in providing evidence for public policy prescriptions. Using cross-sectional estimates of economic well-being to assert that across-the-board cuts in Social Security will not harm the average older person as much as they would have in previous decades, because the mean income of older people has risen over time, clearly misses the critical point that, while the income of *new* cohorts of older persons rose, on average, during the 1980s in the United States, people who were *already* old in the trough years of the business cycle saw their income fall, despite overall gains in the entire population.

While this example is focused on a cohort of older people, the problem is a generic one and applies to any attempt to use repeated cross-sectional data to make inferences about multiperiod outcomes of specific groups. Panel data provide more accurate information because they illustrate how a cohort of individuals' incomes change over time compared to other cohorts.

Dynamic Analysis of Labor Income and Economic Well-Being

A more sophisticated use of repeated cross-sectional data through a synthetic cohort approach could more closely parallel the true dynamic outcomes measured by longitudinal data (e.g., Smeeding and Sullivan 1998; Osberg 1999). However, such techniques do not enable researchers to follow the outcome of any *specific* individual within the cohort. Clearly policymakers interested in both the dynamic aspects of labor market (or other) behavior and economic well-being will want to follow mobility at the individual level.

While cross-sectional data are useful in measuring inequality at a moment in time, they are unsuitable for analyzing movements in an individual's earning or income over time. Such movements are of interest because a given pattern of cross-sectional inequality may be consistent with a wide variety of mobility patterns. For instance, greater cross-sectional inequality may be caused by an increase in the "spread" of a static distribution, or by an increase in the variability of income received by individuals who are perfectly mobile within the distribution. Thus, observed changes in the cross-sectional distribution may be the consequence of changes in the relative income of individuals, or the result of changes in the pattern of income mobility for individuals, or some combination of both. Of course, the lifetime welfare of each individual is determined both by his/her mobility among income levels and by the income levels themselves. Hence, in the same way that inequality alone cannot serve as a sufficient basis for welfare judgements, neither can a study of mobility alone settle issues of well-being.

Burkhauser, Holtz-Eakin, and Rhody (1997, 1998) for instance, used longitudinal data drawn from the PSID for the United States and the German Social-Economic Panel (GSOEP) for Germany to look at mobility by following the relative fortunes of individuals of working age over time, across the labor earnings distribution, and across the "before- and after-government" income distributions. Like others, they found cross-sectional inequality was substantially greater in the United States than in Germany in the 1980s regardless of whether the unit measure was

labor earnings, before-government income, or after-government income. Inequality in labor earnings grew modestly in both countries over the period, with a slightly greater increase in Germany. Despite this similarity, inequality in both before- and after-government income grew faster in the United States than in Germany.

But when they took full advantage of the longitudinal data they found remarkable similarities in mobility patterns for the two countries. To the extent that these patterns differed, they found suggestive evidence that the probability of changing quintiles in the labor earnings distributions is slightly greater in Germany than in the United States, but the probability of change in before- and after-government income quintiles is slightly larger in the United States than in Germany. This suggests that it was the spread in the relative economic well-being of quintiles in the United States, rather than differences in the individual dynamics of their members, that was responsible for the relative increases in inequality between the United States and Germany over the latter years of the 1980s. Most recently, building on this work, Burkhauser, Butler, and Houtenville (1999), using a "Shorrocks R" (Shorrocks 1978, 1981) measure of income stability, together with updated data from the PSID and GSOEP data through the mid-1990s, found that not only was inequality in both labor earnings and in post-government income on the rise in the western states of Germany since reunification but that the share of permanent (vs. transitory) inequality was increasing to levels similar to those in the United States.

Figure 1 from Burkhauser, Butler, and Houtenville (1999) shows the Shorrocks R for post-government income inequality in the United States and the western states of Germany for overlapping six-year periods between 1979 and 1996 for the United States and between 1983 and 1996 for Germany. In this case, the Shorrocks R is measuring the permanent component of inequality in the cross-sectional Theil measure of inequality. While it is well known that overall inequality is substantially higher in the United States than in Germany, Figure 1 shows that the

permanent component of inequality is not only significantly different but also substantially higher in Germany in recent years. This finding is similar to that of Burkhauser and Poupore (1997) for the sample period 1983 through 1988. However, the difference in the size of the permanent component of income inequality has narrowed in the 1990s, and the countries have actually reversed ranking on this basis (Figure 1).

Several other recent papers measuring mobility compare income and earnings mobility in Sweden, Finland, Denmark, Italy, France, the United Kingdom, and other nations (e.g., Bigard et al. 1995; Aaberge et al. 1999; Jarvis and Jenkins 1998; Fritzell 1996). And longer panels such as the PSID now allow researchers to study *changes* in earnings and income mobility over time, and to study the determinants of those changes (e.g., Gottschalk and Danziger 1997; Gittleman and Joyce 1999; Duncan, Smeeding, and Rodgers 1994; Duncan, Boisjoly, and Smeeding 1996).

In 1999, for the first time, OECD published a comparative study of income and household sized-adjusted income and poverty of its member countries (Oxley et al. 1999). The study made use of the new generation of panel studies that have been created in western industrialized countries over the last two decades. Clearly, mobility indices based on panel data will be an important social indicator in future policy debates about the economic social systems in these countries.

Poverty, Welfare, and Income Dynamics

With respect to poverty analysis, longitudinal data have allowed a more dynamic measure of hardship to complement measures of the prevalence of poverty in a given period and measures of changes in gross poverty population using repeated cross-sections of data. In the last decade, poverty research has focused much more on those factors that precipitate a drop into poverty or an exit from poverty and the duration of poverty spells, once they begin. (See Bane and Ellwood 1986 for the first serious attempt at this type of analysis.)

Following Bane and Ellwood (1986), dozens of studies of poverty duration appeared in the United States, almost all of them based on the PSID or a comparable panel dataset. Duration studies of welfare spells paralleled duration studies of poverty. In the United Kingdom, similar studies began to appear. Jarvis and Jenkins (1996, 1997a) completed the first studies using the BHPS. Others followed similar tacks on child poverty, duration of poverty (e.g., Ashworth, Hill, and Walker 1994), or welfare spells in Sweden (Fritzell 1996), Belgium (Deleeck et al. 1992), and other nations (Voges and Duncan 1995). The first cross-national studies appeared in the mid-1990s with papers based on poverty dynamics from eight countries (Duncan et al. 1993), four countries (Goodwin et al. 1997), and most recently for Canada, Germany, the United Kingdom, and the United States (Antolin, Dang, and Oxley 1999). A large multinational panel data-based study of the dynamics of child poverty in several nations is now in press (Bradbury, Jenkins, and Micklewright 2000).

These papers have reached several important policy-relevant conclusions, including:

- Mobility in and out of poverty is high in every nation.
- The population share of those staying poor for a long time is small, but poverty touches many more people over a longer period than is apparent from a one-year snapshot.
- Analyses of transitions into and out of poverty, and of completed spells of poverty have provided policymakers with insights concerning who is most likely to have a long vs. a short poverty spell and therefore which individuals are most in need of assistance.
- Reasons for exit and entry into spells of poverty differ widely by age group (e.g., children vs. older people) and somewhat by country. Employment status appears to be the main factor affecting transitions into and out of poverty as well as the duration of poverty.

With data and analyses such as these, policymakers are able to better pinpoint poverty problems and design effective and well-targeted interventions. In fact, the 1988 United States

Family Support Act explicitly recognized the targeting of active labor market policies on those who were likely to spend the longest time on welfare without such help. A similar interest in active labor market policy and behavioral changes as measured by panel data now exists in the United Kingdom (e.g., Leisering and Walker 1998).

The Influence of Policy on Individuals

Willis (1999) argues that the major advantage of longitudinal panel data like the United States Health and Retirement Study over repeated cross-sectional samples of large microdata sets like the United States Current Population Survey is in its ability to improve our understanding of the effects of period changes as well as to analyze life cycle dynamics. The new wave of panel studies that have spread throughout western industrialized countries will prove their worth by allowing researchers to develop and test models to both predict and simulate the consequences of future government policy. (See also Leisering and Walker 1998; Ashworth and Walker 1998.)

An emerging area of research where such techniques will become increasingly important with respect to both economic well-being and behavior is the transition of workers out of the labor force. The long debate in the literature with respect to the relative importance of economic incentives and to health as the primary cause of job exit is becoming even more important as the labor force ages.[3] The Social Security retirement and disability programs are the social programs that will be most clearly scrutinized in this regard, although in the United States, employee pension plans and how they are regulated are also likely to come under increased scrutiny as the baby boom population ages.

Dynamic Measure of Poverty in Old Age

The discrepancy between the economic well-being of older and younger people in the United States captured in the cross-sectional data of the 1960s and 1970s was, in part, responsible for providing policymakers with the information necessary to make the case for major increases in transfers to the older population through enhanced Social Security and private

pension benefits. Today in the United States and in many other western industrialized countries, cross-sectional data show that while the mean income of older people is still lower than the mean income of younger people, the poverty rate of older people has fallen dramatically and is lower than the poverty rate of younger people in most nations.[4]

More recently, researchers have focused on how the transition into retirement or the transition from being a wife to being a widow affects economic well-being. More generally, dynamic analysis permits one to separate out those older persons who are poor because they were young and poor and have simply became older, from those who drop into poverty following specific events.

Burkhauser and Duncan (1991) focused on possible economically threatening events—retirement, unemployment, disability, death of a spouse, divorce—using PSID data and found that for older women, only divorce and the death of a spouse substantially increased entry into poverty. Burkhauser, Butler, and Holden (1991), using hazard model analysis, found that there was no significant increase in the risk of poverty for married couples as the husband transitioned into retirement, but the death of a male spouse significantly increased the risk of poverty for his widow. Oxley et al. (1999) recently expanded this research in a dynamic comparative study, finding that the long-term elderly poor in each of the four nations studied (the United States, the United Kingdom, Canada, and Germany) are concentrated among older single persons, mainly women.

Behavioral Models of Retirement

Prior to 1990, most retirement models implicitly assumed a world of certainty in which people based decisions on their current situation and their best estimates of the future. In fact, however, there are probability distributions around these best estimates, and these distributions change over time. Health can vary and layoffs can occur. Labor market conditions can improve or deteriorate. Retirement benefits can differ from expectations, either because individuals did

not understand the details initially or because the rules changed after their initial expectations were formed.

Around 1990 a new generation of adaptive life cycle models was developed (e.g., Rust 1989; Stock and Wise 1990; Berkovec and Stern 1991) in which individuals recalculate their optimal behavior in each time period, using new information about their present status and their current best predictions about the future. The computational requirements of many of these models are extreme, so they are usually simplified in other ways. For example, in Rust's stochastic dynamic programming model, which allows individuals to optimize over age of retirement and future consumption simultaneously, he has no pension plan incentives and assumes that unobserved individual factors, such as health and work-leisure preferences, are uncorrelated over time—an unlikely prospect.

What makes these models interesting is that they do not assume that workers know their future wage rates and retirement benefits with certainty, and they allow comparisons of current retirement with retirement at all future dates. In the Stock and Wise (1990) model, for example, the worker decides whether to retire from the firm today by forecasting future wages and retirement benefits, and then estimating the present discounted value of total compensation (earnings plus pension and Social Security accruals) associated with each potential departure date in the future. If any future date looks better, given his labor-leisure preferences, he continues to work; he retains the option of leaving later, at a more advantageous age. This is the "option value" of work. Empirically testing this type of model requires detailed information about an employer's pension plan and a worker's past work history.

After another year on the job, the worker has more information about the future, based on any other relevant knowledge he has acquired. He must then make another retirement decision, again comparing immediate retirement with retirement in subsequent years. The forecasts of future conditions will be different from what they were a year ago, because of new information.

Critical to these models are assumptions about how expectations are formed and how sensitive they are to new information, both of which are difficult to model.

Berkovec and Stern (1991) propose a much more complicated dynamic programming model in which workers choose among four states—remaining on the current job, switching to a new full-time or a new part-time job, or retirement. These choices are made each period, based on current expected wages, pensions, and preferences for leisure. Since the model does not include Social Security, their predictions miss important discontinuities in retirement behavior at ages 62 and 65. Nonetheless, they report that their dynamic model outperforms an analogous static model and they urge that model dynamics be included explicitly in the estimation procedure.

Lumsdaine and Mitchell (1999) focus on this modern literature on retirement behavior. All of the models they investigate flow from these three types of dynamic models and have been tested using sophisticated longitudinal data sets that contain detailed information on lifetime earnings, Social Security and employer pension plans, and health. As this literature has developed, the models have become more inclusive and the policy predictors more robust, and better data have become available to more precisely model these changes. Surely one of the most promising avenues of research using panel data is through these types of sophisticated studies of retirement. It is likely that such models will also be adapted to other work-related changes such as short- and long-term unemployment and disability.

Dynamic Issues of Disability

Bound and Burkhauser (1999) have recently reviewed the literature on programs targeted on people with disabilities. Like the retirement literature, the empirical literature on disability began from a cross-sectional perspective in which the population with disabilities in a given period was compared to the population without disabilities. Repeated cross-sections then were used to show how the relative economic well-being and labor force behavior of people with a

disability changed over time (see, for example, Haveman and Wolfe 1990; Burkhauser, Haveman, and Wolfe 1993). These studies show substantial differences between the labor earnings and economic well-being of working-age people with and without disabilities. However, such cross-sectional analysis may not accurately portray a disability's effects on individuals over time.

Cross-sectional analysis cannot distinguish between differences caused by the onset of work-limiting health conditions and differences that may have existed prior to onset. From the perspective of policymakers, this distinction is important. Economic disparities that exist prior to the onset of a disability may not be eliminated by disability-based programs. In addition, cross-sectional snapshots of the population with disabilities reveal little about the transition to disability, the opportunities for intervention, or the time frame during which individual economic well-being declines. Finally, as Bane and Ellwood (1986) have shown, cross-sectional data oversample "long-stayers." Thus, any cross-section of people with disabilities will have a disproportionate percentage of individuals whose disability occurred long ago. If work and economic well-being deteriorate as a spell of disability lengthens, then cross-sectional samples may overstate the impact that disability initially has on economic well-being.

Burkhauser and Daly (1996, 1998) try to address these points by providing a multiperiod view of disability using longitudinal data from two countries—the United States and Germany. Table 2 from Burkhauser and Daly (1998) uses 1983 through 1989 waves of PSID and GSOEP data to follow the life course of men who experience the onset of disability between age 25 and 59. The first row of each panel of Table 2 shows that prior to the onset of their health-related work limitation, about 96 percent of both United States and Germany males this age worked. In subsequent rows we see that after the onset of a disability, work declines in both countries, but more so in the United States. Labor earnings are most seriously affected in the United States. Mean labor earnings fall from just over $29,000 the year before onset to about

$24,000 two years following onset. In Germany there is virtually no change over this period. While the drop in labor earnings in the United States was greater than in Germany, it was still much smaller than might be inferred from cross-sectional differences in labor earnings reported in the cross-sectional data based literature.

This same pattern is found with respect to economic well-being. Mean real household size-adjusted income is not adversely affected in either country following the onset of a disability. This was true for both before-government income and after-government income. In fact, after-government income increases in both countries. These findings provide further evidence that inferences from cross-sectional data exaggerate the initial change in both labor earnings and economic well-being associated with disability. Such evidence can only be gained from longitudinal data.

Behavioral Models of Disability and Work

This descriptive evidence from both the United States and Germany suggests that while the onset of a health condition that affects work reduces the labor force participation and labor earnings of such workers, the effect is neither immediate nor complete. The vast majority of men in both countries continue in the workforce following the onset of a disability. This suggests that policy variables may be as important in explaining who continues in the labor force following the onset of a disability as is health status. Longitudinal data are ideal for capturing changes in socio-economic variables and how these changes affect on economic behavior. But until recently, multiperiod data with sufficient institutional information to track the consequences of changes in health and labor market outcomes have not been available. Burkhauser et al. (1999) use retrospective data from both the 1978 Survey of Disability and Work (SDW) and the 1992 Health and Retirement Study (HRS) to follow the consequences of the onset of a health condition that affects work on the speed to application for Social Security disability insurance.

Table 3 from Burkhauser et al. (1999) reports Kaplin-Meier estimates of the time to application for disability benefits following the onset of disability. The SDW combines a random sample of the population with a choice-based sample of Social Security disability applicants to make up a special population panel. The choice-based sample was collected because an application for disability benefits is a relatively rare occurrence in the working-age population in the United States. Hence, the oversample of people who have applied for disability benefits is useful as a special panel for disability program evaluation purposes.

The first column of Table 3 reports the speed to application for the combined sample. Entry onto the disability rolls is quite rapid. However, this is to some degree an artifact of the data. By definition a choice-based sample of disability applicants will undersample long-stayers in the market—that is people who postpone application following the onset of a disability. In the extreme, such a sample will never capture those who never apply. Hence, a choice-based sample must be weighted to accurately represent the full population who experience the onset of a disability.

When this is done, the weighted sample of the SDW yields application rates that are remarkably similar to the 1992 unweighted random sample in the HRS. Less than 20 percent of workers who experience the onset of a disability apply for Social Security disability benefits within the first year following the onset of a disability. Over 50 percent are still non-appliers five year after onset, and over 40 percent are non-appliers after ten years.

Burkhauser et al. (1999) then employs a hazard model to control for heterogeneity with the population to determine which factors delay application for benefits. The linkage of Social Security administrative records to both of these datasets enables these data to be used to test the importance of policy variables. For instance, accommodation by an employer following onset and the size of potential Social Security benefit are both found to importantly affect speed to application.

Benitez-Silva et al. (1999) and Bound et al. (1999) use the first three waves of the HRS data to look at the importance of policy variables and health on labor force withdrawal and the Social Security disability application, award, and appeals process. These are the first published papers to make use of the contemporary data on health in the HRS in this manner. Benitez-Silva et al. (1999) focus on the award and appeals process of Social Security Disability Insurance, while Bound et al. (1999) focus on the interplay between health and labor supply behavior following a health shock. As was the case with the PSID, as more waves of HRS data become available it will be possible to track out the behavior of individuals following a change in their health. Benitez-Silva et al. (1999) find that an individual's self-assessed disability status is one of the most powerful predictors of application, appeal, and award decisions. Bound et al. (1999) find that even when controlling for lagged values of heath, poor current health is strongly associated with labor force exit in general and with application for disability insurance in particular. Both papers conclude that modeling health in a dynamic, longitudinal framework offers new insights into the effect of poor health on the labor supply behavior of older workers.

Other Policy Relevant Areas

The dynamic studies of disability and retirement discussed in detail above, rely on sophisticated multinational panel data. They have their counterparts in the empirical literature focusing on other areas with social policy relevance. Briefly, some of these include:

- *Intergenerational studies of mobility*. Longer panels and panels with retrospective questions permit analyses of intergenerational income mobility. Recent studies in the United States (e.g., Solon 1992; Zimmerman 1992) have been followed up with Swedish and other replications, e.g., Björklund and Jäntti (1997). These important papers help link economic mobility to family background and find relatively high (0.3 to 0.5) correlations between the earnings of fathers and sons. A separate literature has begun to trace the effects of the intergenerational transmission of parental welfare dependency (e.g., Maynard 1997; Gottschalk, McLanahan, and Sandefur 1994).

- *Wealth dynamics and wealth transfers.* As world capital markets continue to generate financial wealth, both wealth dynamics and intergenerational patterns of wealth

transfer (*inter vivos* or at death) become increasingly important topics for public policy. The PSID includes a detailed wealth sample every five years, thus permitting studies of wealth mobility (e.g., Hurst, Luoh, and Stafford 1998). Because wealth transfer is still a fairly rare event, specialized panels such as the HRS or panels of long duration such as the PSID are the most important loci for such studies (e.g., Juster, Smith, and Stafford 1997; Juster and Smith 1997).

- *Dynamics of schooling decisions.* Investment decisions regarding human capital are likely to be more important to long-term economic well-being than are wealth transfers. Recent work with the BHPS (Francesconi and Ermisch 1997) has just begun to explore this important policy area. Data summarized in Haveman and Wolfe (1995) review similar studies in the United States.

- *Child poverty, child achievement, and parenting behavior.* Closely related to the dynamics of schooling decisions is the new literature on the effects of parental income, parental background, and environmental conditions on children's achievements or status of child poverty. While much of this work was pioneered using United States panel datasets (e.g., Haveman and Wolfe 1995; Duncan et al. 1998), similar studies have begun in the United Kingdom as well (e.g., Francesconi and Ermisch 1997, 1998a, 1998b). In order to more fully explore these types of effects, most panels need to add substantially to measures of child outcome, parental behavior, and environmental factors (home and community) in order to fully specify models of child development.

- *Household formation.* Panel datasets provide an important source of data on the determinants of household formation at younger ages. Decisions to leave home, have a child, cohabit, marry, or divorce are all tied to changes in household formations from the supply side, especially at younger ages. Housing conditions and policy, and social policy more generally may have a strong effect on these outcomes. Here British researchers seem to have taken the lead, while the topic is still in its infancy in the United States (e.g., see Buck and Scott 1993; Ermisch 1999; Ermisch and DeSalvo 1997; Francesconi and Ermisch 1998b; Iacovou and Gershwin 1998; Jarvis and Jenkins 1998).

Applications of Panel Data to Future Policy Concerns

Panel data will play an important role in future policy debates. To maximize the impact of panel data in informing future policy debates, managers of the BHPS, GSOEP, and other "living" panels must both ensure the continued representiveness of their core data and focus their models to capture the specific data from which future researchers will draw. Clearly not every panel dataset can address every type of issue. However, the longer a panel's duration the more valuable are special one-time supplements, links to administrative data, retrospective questions,

and experimental modules that can be linked to the panel's core questions. For instance, the PSID, now in its thirtieth year, has matured from a dataset that focused on short-term welfare, poverty, and duration studies into a survey that can be used to measure long-term outcomes such as intergenerational mobility, the effect of parental behavior on long-term child outcomes, changes in wealth accumulation over the life cycle, and the effects of expectations on subsequent behavior. The long family histories make it possible to measure detailed health outcomes via a health model and to link these outcomes to events captured earlier in the data.

Here we suggest some potential additions to current panel data that will make them more policy relevant. We begin with policy issues that are currently in the news (e.g., population aging) and then move to additions that will require careful thought and implementation before they can contribute to future policy issues.

Population Aging and Administrative Data Links

In nearly every western industrialized country, the population is aging rapidly, individuals are living longer and, in most of these countries, these demographic trends are straining the financial viability of the social security system (OECD 1996). Gruber and Wise (1999) find that despite improvements in both mortality and morbidity, workers in most western industrialized countries are leaving the labor force at a much younger age than they did two decades ago.

Gruber and Wise (1999) make an important addition to the new pension literature discussed in the last section. By focusing on the anti-work incentives in the social security systems of western industrialized countries, the authors show how these policies reduce the incentives to work past some age. Gruber and Wise (1999) and their colleagues in eight nations provide evidence that spikes in the incidence of labor market exit in each of these countries parallel the ages at which each country's social security benefits are first offered. They argue that in most countries, workers face a substantially higher implicit tax penalty on their wage

earnings after they reach the age of social security eligibility that at younger ages. As the debate over how to solve the coming crises in social security focuses in each of these countries, policymakers will need to know how potential changes in their tax incentives will affect both the behavior and economic well-being of future cohorts of older workers.

The literature discussed above, using the HRS, is on the cusp of a new wave of literature focused on the behavior of workers who, for the most part, are not yet at early retirement age in the United States. But in 2000, over one-half of the HRS cohort will reach age 62, the earliest age for Social Security retirement. When these data are made available to researchers, the HRS data on the health, wealth, and work behavior of the cohort of new older persons in the United States will make it the richest existing longitudinal dataset for exploring the labor market behavior of older workers. But even more important for this purpose, the HRS can be linked to individual records from the Social Security Administration and to detailed information on an employer's fringe benefit package including health and pension rules.

Since employers provide a major component of a worker's health and pension insurance in the United States, these data are critical for United States-based studies. Currently among European countries only The Netherlands has produced a major cohort study similar to the HRS. (See Kerkhofs, Linderboom and Theeuwes 1999, for a fuller discussion.) However, the United Kingdom and some other countries are now developing plans for such a study.

Panel studies like the PSID, GSOEP and the BHPS, however, could be greatly enhanced in their ability to provide information on labor market exits by increasing the information they provide on retirement saving, health and wealth changes at older ages, and by linking their data on work, income and family characteristics to Social Security administrative records (e.g., on lifetime earnings, contributions, and benefits).

With the explicit consent of the respondent and under strict guidelines for access to such data in secured locations for pre-screened applicants only, such linkages are available in the

United States. The BHPS should explore such linkages in the United Kingdom, and the GSOEP in Germany. Also, we note that the availability of linked long-term earnings histories would permit sophisticated studies of lifetime earnings trajectories (and their variance) for specific cohorts, allowing separation of the permanent and transitory components of earnings (e.g., see Gottschalk and Moffitt 1994, for a United States attempt at this separation) and to separate age, period, and cohort differences in labor income over the lifecycle. Linking such data to social security records for the GSOEP will permit similar analyses for Germany.

Social Exclusion, Neighborhoods and Geography More Generally

Across Europe in general, there is a growing interest in measuring the extent of social exclusion (e.g., Berghmans 1995), and the United Kingdom is no exception (Howarth and Kenway 1998). A similar concept in the United States is that of a permanent "underclass" who do not actively participate in the mainstream economy or in mainstream civic, social, or political activities. While the concept is in need of further definition it includes, in part, long-term dependency on social assistance, economic immobility, long-term joblessness, attachment to the informal (and sometime illegal) economy, and other types of behaviors. As these behaviors are better defined, panel datasets should attempt to measure them. Comparisons of people living in the eastern and western states of Germany might yield similar findings and these are just now beginning, based on the GSOEP.

One certain element of exclusion is geographic concentration. Social exclusion is liable to be heavily concentrated in specific neighborhoods or areas. The PSID has improved its usefulness for such research by attaching census and other "block" or "small area" data to individual records. These links allow researchers to measure the economic and social environment within which family and economic life takes place. Issues related to spatial mismatch in jobs, cost of housing, youth crime, school quality, and related events have provided an opportunity to examine and to attempt to separate the effects of "place" (e.g., neighborhood)

on individual social outcomes, including child outcomes, (e.g., see Massey 1997; Brooks-Gunn, Duncan, and Aber 1997; Duncan and Brooks-Gunn 1997; Duncan and Raudenbush 1999). Geographic identifiers have also been linked to housing mobility among the elderly (e.g., Burkhauser, Butrica, and Wasylenko 1995), and to joblessness, crime, and related topics (e.g., Jargowsky 1997).

Interhousehold and Intrahousehold Resource Allocation

Two issues of growing policy importance are relatively unexplored and lend themselves to panel data: intrahousehold resource allocation and interhousehold resource transfer. In the United Kingdom Jenkins (1994), Jenkins and O'Leary (1995), and Sutherland (1997) have begun to address the question of intrahousehold resource allocation and use. Lundberg, Pollak, and Wales' (1997) investigation of how child-related purchases changed when the United Kingdom's child allowance changed payment from the father's paycheck to the mother directly, demonstrate the importance of public policy for affecting intrahousehold resource allocation.

To properly measure intrahousehold resource allocation, data on time allocation as well as money allocation are needed. Gershuny (1997), Gershuny and Sullivan (1998), Vickery (1997), Michael (1996), Gauthier and Smeeding (1999), and Smeeding (1997a) suggest that powerful insights can be gained from a set of time-use questions attached to panel data. Other questions regarding behaviors and resource control might be obtained from the household bargaining literature (e.g., Lundberg and Pollak 1994, 1996) and could be further extended to assess caregiving and other time-intensive services that affect intrahousehold resource allocation (e.g., Wolf, Freedman, and Soldo 1997; Folbre 1994).

Interhousehold resource allocation decisions are also important. Over the past decade, financial wealth accumulation has increased throughout the western industrialized countries, resulting in a large and growing pool of financial and real wealth. As mentioned earlier, this pool of wealth will provide for increased frequency and value of both *inter vivos* gifts (e.g.,

down payment on first house or college tuition transfers from grandparents or parents to children) and bequests. Moreover, the greater the current and future emphasis on "self-protection" as opposed to social protection, the greater will be the policy emphasis on future wealth accumulations. While large bequests and *inter vivos* gifts may be rare on an annual basis, they are not nearly so rare over a 10- to 20-year period. Capturing such data as part of the BHPS panel would go a long way toward exploring long-term economic class mobility (or lack thereof) and the intergenerational patterns of economic well-being mentioned briefly above. Using panel data to measure household savings might also allow us to indirectly observe consumption as the difference between income and change in net worth (Holtz-Eakin and Smeeding 1994).

Another interhousehold resource allocation issue of growing importance is child support and alimony. Over 20 percent of British children live in single mother households (LIS data, 1999) and the fraction is steadily growing. The fathers of these children are expected to provide them with financial support, but we lack the evidence to know the extent to which these children are supported. Panel data should be focusing on the economic circumstances to both the donor (father) and recipient (mother) households of child support. Most surveys collect data on payments received, but not on payments made. The BHPS, which collects data on both, is a notable exception. Data on both child support payments made and benefits received (Jarvis and Jenkins 1996) should be more frequent, focused, and tied to policy.

Immigration

One of the foremost and growing topics for cross-national microdata is the assimilation of immigrant populations into large rich western nations. United States-based studies show that the long-run benefits of immigration exceed its costs (National Academy of Sciences 1997). However, short-term costs are also present and transitions may take several generations. The GSOEP has taken the panel data lead in this respect, adding a sample of 1,000 new immigrants to the GSOEP. Ongoing general population panels in other nations should follow this lead.

Conclusion: Future of Cross-National Comparative Microdata Research and Research Networks

Databases, particularly longitudinal data, are the social scientist's equivalent of the astronomer's telescope, the microbiologist's genetic typing, or the chemist's lab experiments. Building on the astronomer's metaphor, good policy requires a focused and relevant lens through which we observe the world in which policy operates, and the behavior that it influences. Focusing a national lens on particular social issues and then looking at similar issues in other nations permits the scientist to observe similarities and differences in social issues and the impacts of social policies across nations. As the European Community Household Panel (ECHP) has begun to collect unified data on Europe, and as panel data comparability projects have flourished, it is important for panel data sponsors to be mindful of these efforts and to have international comparability as one criterion to judge the appropriateness of specific questions or panel data supplements.

It is also important to maintain a clear lens. Policy can be accurately informed only to the extent that the picture of the world that is drawn is accurate and the ratio of signal (real change) to noise (spurious correlation, sampling and nonsampling errors) is high. It is imperative that all panel datasets conduct frequent studies of attrition, selectivity, and other related issues that may compromise its quality. Here the BHPS and the GSOEP can learn from others such as the PSID and NLS (Gottschalk, Fitzgerald, and Moffitt 1998a, 1998b).

Panel data researchers can learn from others who are engaged in similar enterprises on a methodological level as well. For instance, the "unfolding brackets" methodology for collecting asset data has vastly improved the quality and quantity of asset data in the United States (Juster and Smith 1997). Similarly asking about asset income (flow) data in the same sequence as one asks asset amount (stock) data improves the quality of both types of data. Survey research

centers could learn much about survey design, sample retention, and the accuracy of the data they collect by talking to each other and adopting proven techniques developed by one another.

It is necessary for national and international bodies to sponsor comparative cross-national research projects and gatherings to help researchers improve comparability and to foster joint studies. The International Genome Project sponsored by science foundations from many nations is one such example from the biological sciences. The U.S. National Institute on Aging (NIA) and the TRANSCOOP project are two consistent sponsors of these projects and meetings for panel datasets, as are the European community and the U.S. National Science Foundation's IRISS (Integrated Research Infrastructure in the Social Sciences) ongoing project at CEPS/INSTEAD. A greater proliferation of such efforts will produce greater harmony and comparability for cross-national panel data. The seeds of such efforts for household income microdata have been formulated by the recent "Canberra Project" begun by several national statistics agencies concerned with improving cross-national comparability for household income distribution comparison. (See LIS website <http://lissy.ceps.lu/index.htm> for more.)

Finally, it is important that panel data administrators make active efforts to market their findings to policymakers as accurate and timely information in an appropriate form. Scientific journal articles need to be transformed into shorter and more focused "policy briefs" which are distributed to appropriate journalists as well as policy staff at all levels of government. Even shorter one-to-two page "policy bites" can pique interest in longer and more thorough scientific articles. At the end of the day, it is the policy uses to which panel data will be put that will ultimately determine the fate of the entire enterprise. The case must be made that panel data helps better inform public policy in general, and social policy in particular. If such a case cannot be made, the collection of panel datasets will not prosper.

Endnotes

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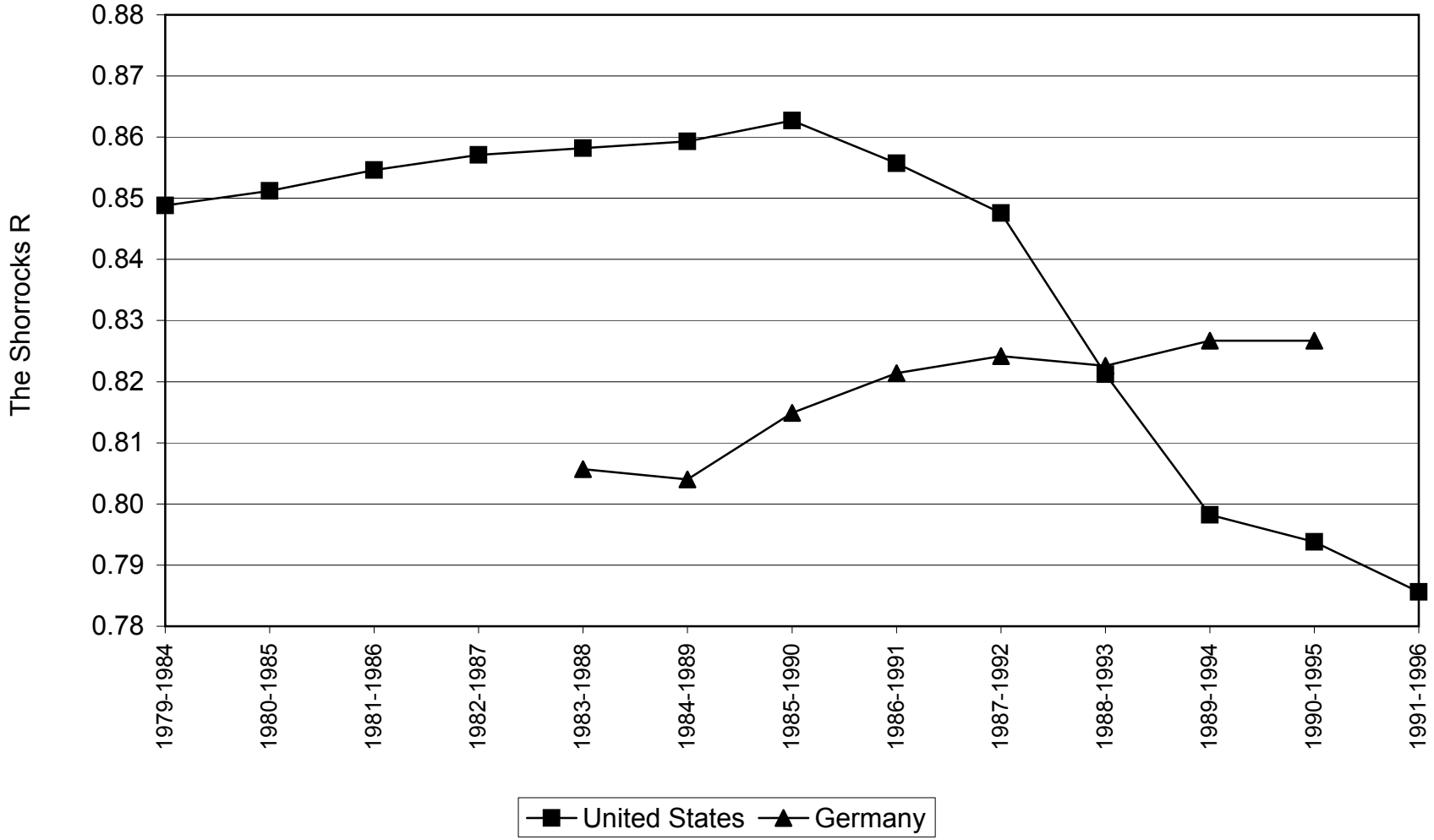
1. Column 4 of Row 7 includes both people aged 65 and over in 1983 who stayed in the sample and people who were not in the PSID survey in 1983 but who were in the sample in 1989. Since we are interested in comparing people who were old in both periods we compare row 1, column 2 with row 7, column 5. New entrants aged 71 and over in 1989 made up only 2.23 percent of the entire 1989 population. Alternatively this comparison could have been made using repeated cross-sectional data and a synthetic cohort model.

2. Burkhauser, Cutts, and Lillard (1999) also show that these results held for the median person and when the household head's age is used to disaggregate age.

3. See for instance, Quinn and Burkhauser (1994) and Lumsdaine and Mitchell (1999), for reviews of this debate in the context of the old age retirement literature. Also Bound and Burkhauser (1999) for a review of this debate in context of the disability literature.

4. See Quinn and Smeeding (1993) for a review of this cross-sectional evidence in the United States. See Smeeding (1997b, 1998) for a review of old age poverty in western industrialized countries.

Figure 1. The Shorrocks R Measure of Post-Government Income Stability for Overlapping Six-Year Periods



Source: Burkhauser, Butler, and Houtenville (1999).

Table 1. Importance of Age Composition in Cross-Sectional Comparisons of the Economic Well-Being of Older Persons

	Mean Household Size-Adjusted Income[a]					
	1983			1989		
	Total (1)	Stayers (2)	Attritors (3)	Total (4)	Stayers (5)	New Entrants (6)
(1) All older people[b]	18,462	19,623	16,159	19,231	19,038	25,498
(weighted sample share)	(100.00)	(66.47)	(33.53)	(100.00)	(97.02)	(2.98)
(3) Aged 59 to 64 in 1983	23,244	23,236	23,295	---	---	---
(weighted sample share)						
(5) Aged 65 to 70 in 1989				21,263	21,228	22,707
(weighted sample share)				(31.99)	(31.24)	(0.75)
(7) Aged 71 and over in 1989				18,275	17,988	26,443
(weighted sample share)				(68.01)	(65.78)	(2.23)
Total Sample Size	1,356	855	501	1,566	1,460	116

[a]Post-tax post-transfer household size-adjusted income per individual in 1991 United States dollars based on cross-sectional and longitudinal data from the Panel Study of Income Dynamics (1984). Equivalence scale equals 0.5.

[b]Older persons are those persons aged 65 and over.

Source: Derived from Burkhauser, Cutts, and Lillard (1999).

Table 2. Short-Run Economic Consequences of a Disability among Working-Age Men in the United States and Germany

	Two Years Prior	One Year Prior	Disability Event Year of Disability Event	One Year After	Two Years After
United States Equivalent Mean 1991 Dollars					
Percent Employed	95.6	96.7	89.5	80.1	78.0
Mean Labor Earnings	28,428	29,300	27,636	24,663	23,777
Before-Government Income	26,128	28,147	27,853	28,073	27,916
After-Government Income	22,196	24,066	24,191	25,028	25,273
German Equivalent Mean 1991 DM					
Percent Employed	96.3	96.3	95.4	89.9	83.3
Mean Labor Earnings	52,765	47,553	47,644	39,794	47,680
Before-Government Income	45,862	43,735	45,861	43,911	49,727
After-Government Income	34,733	33,739	34,867	35,014	39,464

Source: Burkhauser and Daly (1998), using the 1989 Response-Nonresponse File of the Panel Study on Income Dynamics and the Syracuse University Public Use File of the German Socio-Economic Panel.

Table 3. Kaplan-Meier Estimates of the Time to Application for Social Security Disability Insurance for Men, with and without the Manski-Lerman Correction[a]

	Unweighted 1978 SDW Sample			Weighted 1978 SDW Sample			Unweighted 1992 HRS Sample		
	Number of	Probabilities		Number of	Probabilities		Number of	Probabilities	
Year	Applications Per Year	Application Rate	Cumulative Survival Rate[b]	Applications Per Year	Application Rate	Cumulative Survival Rate	Applications Per Year	Application Rate	Cumulative Survival Rate[b]
1	464	0.376	0.624	138.0	0.116	0.884	127	0.171	0.829
2	246	0.324	0.422	96.2	0.105	0.791	98	0.165	0.692
3	108	0.219	0.330	37.6	0.055	0.748	53	0.112	0.615
4	74	0.202	0.263	67.1	0.120	0.658	21	0.052	0.583
5	50	0.182	0.215	15.3	0.037	0.634	22	0.061	0.547
6	41	0.199	0.173	26.5	0.081	0.582	19	0.060	0.515
7	24	0.156	0.145	19.9	0.082	0.534	16	0.058	0.485
8	25	0.201	0.116	10.5	0.053	0.506	13	0.053	0.459
9	9	0.094	0.105	3.0	0.017	0.497	11	0.051	0.436
10	15	0.183	0.086	3.7	0.025	0.485	7	0.037	0.420
11	9	0.136	0.074	3.5	0.026	0.472	5	0.030	0.407
12	8	0.151	0.063	2.6	0.022	0.462	4	0.027	0.396
13	8	0.191	0.051	18.5	0.190	0.374	2	0.025	0.390
14	9	0.295	0.036	3.0	0.046	0.357	2	0.016	0.384
15	2	0.111	0.032	0.3	0.005	0.355	4	0.036	0.371
16	3	0.214	0.025	2.7	0.055	0.335	2	0.020	0.363
17	1	0.125	0.022	0.2	0.004	0.334	3	0.034	0.351
Total[c]	1,096			448.6			426		

[a]These estimates assume censoring is distributed uniformly within a year and allocates half of the number censored in each year to the sample available for application in each year. The initial size of the 1978 SDW sample is 1,240. The initial size of the HRS sample is 750.

[b]Surviving into the next period without applying for Social Security Disability Insurance.

[c]Years where the unweighted sample size is 50 or less are not shown but are included in the total.

Source: 1978 Survey of Disability and Work, 1992 Health and Retirement Study.

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