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The PSID and Income Volatility: Its Record of Seminal Research and Some New Findings

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Abstract

The Panel Study of Income Dynamics (PSID) has made more contributions to the study of income volatility than any other dataset in the United States. Its record of providing data for seminal research is unmatched. In this article, we first present the reasons that the PSID has made such major contributions to research on the topic. Then we review the major papers that have used the PSID to study income volatility, comparing their results to those using other datasets. Last, we present new results for income volatility among U.S. men through 2014, finding that both gross volatility and the variance of transitory shocks display a three-phase trend: upward trends from the 1970s to the 1980s, a stable period in the 1990s through the early 2000s, and a large increase during the Great Recession.

Keywords

earnings volatility; permanent variance; transitory variance; semiparametric model; PSID

The Michigan Panel Study of Income Dynamics (PSID), as its name implies, was intended from its origins to study the dynamics of income. The study of income volatility with the PSID began very quickly after its initiation in 1968, after only a few waves of data were available, and has continued since. Defining volatility generally as the degree of change in any one of many variables associated with earnings and household income from one time period to a later one, the PSID has permitted studies of a wide variety of forms of economic volatility, including studies of individual or family earnings, family income, job mobility and labor market turnover, and turnover in welfare participation, for example. The studies in these areas have made major contributions to research and policy over the years. For example, Duncan et al. (1984) reported findings from the first 10 years of the PSID, which found a high level of economic mobility and poverty mobility, as well as a high level of instability and turbulence, among U.S. families, a finding not possible with other data. Bane and Ellwood (1996) examined transitions into and out of welfare using additional years of PSID data, finding that most families were only on welfare for short periods of time but that a few were on welfare for many years, another finding not possible with other data. This

study heavily influenced congressional welfare reform legislation in 1996. Moffitt (1992) reviewed research using the PSID to examine the work disincentives of welfare programs, which also influenced the discussion surrounding that legislation. In addition, the PSID studies have in many cases provided the initial impetus for research on volatility by researchers using other panel datasets in the United States and using panel data in other countries, and its influence consequently goes beyond those studies using the PSID itself.

This article has three goals. First, we discuss the reasons that the PSID has been so valuable for research on economic volatility, providing some comparisons with other datasets to emphasize the ways in which the PSID has a comparative advantage. We discuss some of its disadvantages as well. Second, we review the research on income volatility using the PSID, providing a brief overview of that voluminous literature and giving a detailed review, specifically on models of individual earnings and family income volatility.¹ We also compare findings using the PSID specifically on the question of trends in U.S. volatility to findings on trends using other datasets. Third, we provide new estimates of earnings volatility among U.S. men through 2014. To our knowledge, trends in male earnings volatility during and after the Great Recession have been rarely studied in the literature.

The Usefulness of the PSID in the Study of Income and Economic Volatility

The PSID began with a sample of approximately five thousand households in 1968, combining an oversample of low-income households from a previous survey with a fresh random sample drawn from the U.S. population at that time. Households were interviewed annually thereafter, initially in person and later by telephone, and were asked a comprehensive set of socioeconomic questions. The low-income oversample was mostly dropped in 1997, and biennial interviewing began in 1998. An important feature of the PSID is its rules for following household members, which require that individuals who leave original PSID households and form new households (“splitoffs”) are retained in the sample and asked approximately the same comprehensive set of socioeconomic questions as the initial households, thereby allowing the PSID to stay broadly representative of the U.S. population, aside from immigration, which was underrepresented before adding a refresher sample of immigrant families in 1997/1999.

While there were few alternative panel datasets in 1968, many more have developed since that time. Survey data have been collected as part of the National Longitudinal Surveys (NLS), which consist of a series of birth cohorts of individuals who are interviewed annually for several years; the health and Retirement Study (HRS), a survey of older individuals in the United States; and the Survey of Income and Program Participation (SIPP), a set of short panels of no longer than three or four years whose respondents are interviewed every four months and for whom a comprehensive set of socioeconomic data are obtained.² While the Current Population Survey (CPS) is primarily a cross-sectional survey, it can be used to

¹Analyses of individual earnings volatility and family income volatility have different interpretations and different implications. Earnings volatility is mostly related to labor market factors, while family income volatility is related to family composition, the correlation of volatility between members of the household, and the volatility of unearned income.

²The SIPP has now moved to an annual interviewing frame.

construct a set of two-year panels by matching families who appear in two surveys a year apart.

In addition to these surveys, the development of panel data from administrative records has increased substantially over the last two decades. For example, earnings data from the Social Security Administration (SSA), panel data on tax records from the Internal Revenue Service, and earnings data from state-level Unemployment Insurance (UI) records have all been used to study earnings volatility. These data are typically restricted in use and require application and licensing procedures for their analysis. In a few special cases, administrative data have been matched to one of the surveys mentioned in the previous paragraph (e.g., HRS, SIPP), but this is still the exception rather than the rule.³

Strengths of the PSID

That the PSID is a longitudinal dataset was its chief advantage relative to available alternatives in its early years. Today, though, its relative strength does not rely on its panel nature given the existence of several alternatives. Instead, its current strengths lie in the content and comprehensiveness of the survey and its data. First and foremost is its long length, with data from 1968 through the present, covering almost a 50-year age span. Most sample members who were working adults in 1968 were either dead or retired 50 years later. For those born into PSID families after 1968, a similarly long age span is available. The 50-year period also allows a long period with which to examine business cycles, long-term trends, and related calendar-time events. Aside from SSA earnings data, no other panel has this breadth in life cycle period covered or calendar years covered. The comprehensiveness of the life cycle coverage also makes it advantageous relative to panels such as the HRS, which only cover part of the life span (but in much greater detail than the PSID for that part). The long period makes it advantageous for life cycle research (i.e., where age effects are important) relative to short panels such as SIPP (although SIPP has advantages, too, noted below). In addition, as described in more detail below, a long panel is very important for determining whether “transitory” events like the loss of a job have effects on future income that are short-lived or long-lived.⁴

The following rules of the PSID also make it advantageous relative to cohort panels such as the NLS, which are cohort-based. Cohort-based panels necessarily support research only on the cohorts selected for enrollment, and they also make it difficult to separate life cycle effects from calendar-time effects. The PSID decision not merely to follow the families in the initial 1968 sample, but also the splitoff families, makes it superior for this purpose.

An important strength of the PSID relative to most administrative datasets is its comprehensive set of questions on variables related to earnings and employment, as well as its collection of information on other family members. Most administrative datasets used for

³There have been movements in Europe to link administrative data with survey data. For example, the UK Understanding Society panel, the successor to the British Household Panel Survey, offers linkages to administrative data on education, health, and other variables. The SHARE project successfully tested linking a German survey to administrative data on pensions and has begun extending it to more countries.

⁴Econometrically, the measure of earnings or income volatility using error components models relies crucially on a sufficiently long panel. A long panel allows for not only calculation of variances but also long autocovariances and for different periods of calendar time (Moffitt and Gottschalk 2012).

earnings do not have information on hours of work and only sometimes on weeks or quarters of work, making it difficult to separate volatility in the amount of labor employed and volatility in the earnings per unit of labor, an important distinction. While many administrative datasets have information on industry of work, few have information on occupation, while the PSID has both. Administrative data also rarely have information on job search and unemployment (UI data are a partial exception), which are often needed to estimate models of volatility that involve movements into and out of the labor force as well as into and out of employment.

The family context is also important, for it has been a long-standing finding of research on labor force and employment decisions that those decisions are closely intertwined with family dynamics. Spousal decisions on whether and how much to work, and at what level of potential earnings, are affected by the other spouse's decisions and outcomes. A common hypothesis, for example, is that the earnings shocks of spouses are usually negatively correlated; thus, family earnings may be less volatile than the earnings of either spouse taken individually. Social Security and UI earnings data, because they are not easily linked within families, are not as well suited for these questions. Tax data do have some family information, although there are coverage differences with survey data. The PSID also has information on total earnings of others in the family who are not the head or spouse, even if not for those people individually.

Information on family composition permits controls for the presence and numbers of children, which many administrative datasets cannot do. Data collected on children in the PSID also allow the study of the effect of volatility on child outcomes, a research topic pursued more in sociology and child development than in economics (see Hill et al. [2013] for a review). The presence, number, and ages of children may also be determinants of volatility, especially for parents who are their caregivers. The availability of information on the presence or absence of a spouse or cohabiting partner permits the PSID to be used to study volatility among single mothers, a large and typically disadvantaged subgroup in the United States known to have high economic volatility.

Finally, the availability of state and county identifiers for PSID families permits geographic-level research. While the county-level data are restricted use and sample sizes for individual areas are usually small, models that pool areas and use covariates measuring area-level characteristics can be estimated with the PSID. Many administrative and survey datasets do not have geographic level data beyond the state level. If they do have geographic data, they are not as detailed as the PSID restricted use data.

Weaknesses of the PSID for economic volatility research

While the PSID has major strengths, it has some weaknesses and is not as strong as some other datasets on certain dimensions. One issue often noted in comparing any survey like the PSID to administrative data is that response error and attrition may affect PSID estimates relative to those in administrative data. In principle, this issue can be examined by comparing the PSID to administrative data and, if the latter are taken as truth, determining whether volatility patterns in the PSID match up to those in administrative data. This exercise is not completely straightforward because most administrative datasets also have

errors, and most exact matches between survey and administrative datasets find differences in both directions—that is, survey reports often have jobs and earnings reports that are missing from the administrative data as well as the other way around. In many cases, this seems to be because the administrative data are in error and do not, for a variety of reasons, pick up jobs and earnings that survey respondents report (Juhn and McCue 2010; Abraham et al. 2013; Abowd and Stinson 2013; see also Abowd, McKinney, and Zhao [2018] for a discussion of fraudulent Social Security numbers). Relatedly, many administrative datasets (e.g., those from tax records) miss large fractions of the population (e.g., those who do not file taxes). Nevertheless, in the next section, we review whether volatility as reported in the PSID appears to be the same or similar as in administrative datasets.

There have been a number of studies comparing cross-sectional distributions of earnings in the PSID to those in the CPS (Beckett et al. 1988; Fitzgerald, Gottschalk, and Moffitt 1998; Gouskova, Andreski, and Schoeni 2010). As a general rule, earnings data in the PSID line up reasonably well with the CPS, except among individuals in the tails of distribution curves where small sample sizes do not allow detailed comparisons. In addition, the PSID appears to have higher mean levels of earnings reports than the CPS. However, for the purpose of studying volatility, comparisons cannot be easily made with the CPS because the CPS can only be used to measure one-year volatility. Comparing CPS one-year estimates to PSID's now biennial estimates is not straightforward.

Comparisons of the PSID volatility with other surveys also does not reveal which is the truthful value. One study that attempted to do so compared presumably accurate payroll records from a private company in two successive years to earnings reports in a PSID-worded survey given to the same workers (Bound et al. 1994). The study found a reliability ratio—the ratio of the variance of the true change in earnings in the payroll records to the variance of the change in earnings from the survey—of .75, a relatively high number. Pischke (1995) also showed that measurement error in the PSID has little effect on earnings covariances, and Gottschalk and Huynh (2010) show that this is a result of the nonclassical structure of measurement error in earnings found in many surveys.⁵ However, Fitzgerald, Gottschalk, and Moffitt (1998) found that attrition rates seemed to be positively correlated with past income volatility, which might result in PSID having families who are more stable than the population at large over time.

A variety of other aspects of the PSID make it somewhat weaker than other datasets for the study of volatility. One is that the PSID went to biennial interviewing after 1996, which prevents the study of volatility at the annual level, which most other datasets have. Some, like the SIPP, have historically permitted the study at the subannual level. While most surveys, including the PSID, attempt some retrospective reporting, most analysts do not believe that such reporting has a high degree of accuracy for earnings. Another aspect of the PSID that puts it at a disadvantage relative to some other panels is its lack of detailed

⁵In fact, Gottschalk and Huynh (2010) find that the cross-sectional variance of true earnings is greater, rather than smaller, than that variance in survey data, contrary to expectations (this is because measurement error is negatively correlated with true earnings—high earners underreport and low earners overreport). Nevertheless, we do expect some measurement error in the PSID data and expect this to affect our estimates. However, since our focus is on how the various variance estimates have changed over time, this should be a problem for our work only if PSID measurement error has changed.

earnings information for individuals in the household other than the head or spouse. Some other surveys obtain more detail on those types of individuals, and most administrative datasets (UI wage records, Social Security earnings data) have information on all working individuals, regardless of position within the family, although those datasets also have the disadvantage mentioned above that they usually cannot identify headship or spouse relations and hence cannot separately identify individuals who are not heads or spouses. This also makes comparisons of volatility between the PSID and those datasets more difficult (see below).⁶ A third weakness of the PSID is its relative lack of coverage of those who have immigrated to the United States since 1968, which constitutes more than 10 percent of the U.S. population. The PSID attempted to incorporate that population in 1997 to 1999 but was only partially successful; another effort was initiated in 2017, which could yield an immigrant sample close to 10 percent of the total sample.

Finally, the PSID has smaller sample sizes in general than many other datasets. To take one example, examining earnings volatility broken out by gender and by education level for prime-age workers runs into small samples if education has more than two categories. The sample size is also limiting for the study of volatility if percentile points of volatility are used, since percentile points in the tails typically have insufficient sizes for reliable calculation. Administrative datasets generally have the strength of much larger sample sizes and permit greater disaggregation as well, at least using the variables they have available. Datasets such as the SIPP generally have somewhat larger sample sizes, and NLS cohorts and the HRS have larger samples for the specific age and cohort groups they examine.

A Review of PSID Research on Income Volatility

As we noted, economic volatility is, at the most general level, the measurement of the degree of change in an economic variable from one time period to the next. For example, individual A has higher earnings variability than individual B if A has earnings of \$9,000 in even months and \$1,000 in odd months, while B receives constant earnings of \$5,000 every month: the earnings of individual A fluctuate more, even though average earnings are the same for both individuals. We use very specific definitions of volatility when we review the literature in earnings and income volatility here, but we begin by mentioning briefly some PSID studies of volatility in a broader sense. For example, the PSID was used for the study of economic mobility—most commonly studied by examining transition rates from one quantile of a distribution to other quantiles of the distribution between two time periods—in the early years of the panel, with Smith and Morgan (1970) possibly representing the earliest. Smith and Morgan used the first two waves of the PSID, 1967–1968, to study family income mobility across deciles of the distribution. Their early study showed that while remaining within the same decile was most common, moving to a different decile was also very common. They found that the most important determinant of mobility was changes in male earnings within the family. They also found that, despite considerable mobility

⁶The PSID has started to collect earnings information for individuals at least 18 years old in the Transition to Adulthood Study (TAS) since 2005. This captures earnings information for some “other family unit members” (OFUM) in the main sample, although comparison with other datasets is still not straightforward because the TAS sample does not cover all OFUMs. For example, there were 1,118 young adults interviewed in the 2007 TAS survey, while there were about 3,700 individuals between age 18 and 59 identified as neither heads or wives in the PSID main sample.

across deciles, very few of the movements moved families over the poverty line or on or off welfare, so that poverty and welfare transitions were much less common. These findings, familiar from many studies since that time, illustrate the contribution of the PSID from the early days of the literature. The PSID has been used heavily in the succeeding years for the study of mobility.⁷

A landmark 1984 volume edited by Duncan et al. compiled a broad range of findings related to economic dynamics over the approximately first 10 years of the PSID by a number of authors, changing the conclusions from some of the early analyses.⁸ For example, they found a high degree of economic mobility, with less than half of families staying in the same relative position from one year to the next, combined with many large movements up and down. Another dramatic finding from this volume was that the dynamics of family income mobility were actually associated with changes in family composition.⁹ The findings on poverty mobility also changed, with the longer-term data showing that only one half of those in poverty in one year were also in poverty the next year, implying a very high level of poverty mobility. Mobility on and off welfare was also found to be very high many years later by Bane and Ellwood (1996), who, using even more years of PSID data, pointed out that while the majority of families had only short periods of time on welfare, a small fraction had very long durations and spent many years on welfare, and these two patterns were not inconsistent with one another. The Duncan et al. volume also examined the dynamics of labor market status, hours of work, and differences in various aspects of dynamics by race and gender. Taken together, the findings from the PSID reported in the Duncan et al. volume revealed a startlingly high level of dynamism and mobility, but also instability and turbulence, in the lives of American families.¹⁰ This was a completely new picture of American society, which was made possible because of the PSID.¹¹

Studies of earnings and income volatility

One of the many literatures on economic dynamics to which the PSID has made particularly strong contributions has been the literature on earnings volatility in the United States and how it has changed over time. This literature, primarily located within the discipline of economics, began in the 1950s, 1960s, and early 1970s with the development of econometric methods for the analysis of panel data.¹² Those methods were aimed at the problem that if a sample has observations on the same individual at multiple points in time (and not just observations on different individuals, as in a pure cross-sectional dataset), the error terms in a linear regression would likely be positively correlated between time periods. Or, put

⁷The literature here is obviously massive. For a recent review, see Jäntti and Jenkins (2013). An important study that we do not review here, although it focused mostly (but not exclusively) on mobility trends, is Kopczuk, Saez, and Song (2010).

⁸The volume drew heavily from a sequence of ten volumes analyzing the early years of data from the PSID.

⁹This explains much of why Smith and Morgan (1970) found lower rates of mobility, because that part of their analysis restricted the sample to families whose head remained the same from year to year.

¹⁰We attach no normative values to these different concepts because their implications for well-being depend upon whether they are permanent or transitory as well as how well they can be smoothed.

¹¹There is not space here to discuss the methodological contributions of these studies to the study of dynamics and mobility of all kinds, as researchers began to confront the challenges posed by dealing with long panels like the PSID. Some illustrations of methodological advances with the PSID specifically on the earnings dynamics are given here.

¹²Panel data econometric methods were first applied in the 1950s and 1960s to panel datasets of firms and to state aggregates for consumption (Nerlove 2002). The PSID was the first individual or household panel dataset to which the methods were applied, and those applications pushed the econometric literature forward by illustrating new issues.

differently, individuals whose error terms were positive in one period are more likely to be positive in other periods, since those who are above average or below average at one time period tend to be above average or below average at other periods as well. The econometric work at that time captured this idea with so-called error components models, which posited that the regression error terms for a cross-sectional unit (individual or household) had two components: an unobserved, time-invariant component (which made them either above or below average in all periods) and a second component that was more likely the usual, random term that varies independently not only across individuals but also over time for the same individual.¹³ This model was attractive because it corresponded to the theoretical model of permanent and transitory effects developed in the late 1940s and early 1950s in macroeconomics by Milton Friedman (for example, Friedman 1957). Friedman had a different application in mind, because he was interested in whether households' consumption and savings decisions were affected by whether their current income was going to stay fixed over time versus change in the future. If their incomes were transitorily high, for example, they may not purchase a house and incur a big mortgage payment every month. But in studies of individuals and households, the distinction is very useful because the variance of the second component, called the transitory component, is the usual measure of the magnitude of income volatility.

Table 1 lists several of the leading papers in this literature using the PSID, running from papers in 1972 to papers in 2017.¹⁴ An early paper by Benus and Morgan (1972), using the first four waves of the PSID, was the first to decompose earnings of the family head into several components in a simple version of an error components model. The first component was just average earnings over the four years, called the "permanent" component; the second was the trend in earnings over the years; and the third was the instability, or volatility, of earnings experienced by individuals around their trend.¹⁵ The authors found a pattern that has held up ever since: heads with higher permanent earnings have both higher trends and lower instability. Benus (1974) and Mirer (1974) followed up with work that more formally calculated earnings instability as the variance of regression residuals around individual-specific means or trends, and analyzed the correlates of that instability.

The literature took a more technical and econometric turn in 1978 with a well-known paper by Lillard and Willis (1978), which applied the more formal methods and models that had then recently emerged from the econometrics literature on the estimation of error components models with panel data. The authors used PSID earnings data from 1967 through 1973 among men to estimate log earnings as a function of observed covariates and an error term that had a time invariant permanent component and an transitory component with a first-order autoregressive pattern, called an "AR(1)" process. An AR process captures the fact that transitory events like a sudden increase or decrease in earnings fade away only

¹³The "error components" model was originally developed to study the residuals from regressions of earnings on covariates such as age. Later it was also used to study earnings directly in addition to earnings residuals.

¹⁴In this table and in Tables 2 and 3, we list only papers that have appeared in published journals or books.

¹⁵Thus, the authors had three components, not two. The second component was not part of the standard textbook model discussed above. Some of the later studies in the literature also added this component (see Baker [1997], Guvenen [2009], and Hryshko [2012] referenced below; but the last of these papers rejected the existence of time trends). These studies do not include the variance in time trends across individuals in their measures of volatility. Time trends, if they exist, should not be included in volatility if it is assumed that individuals and families are aware of those trends, which is not possible to determine from these decompositions alone.

slowly, and it can take several periods of time before the individual or household returns to their average, permanent level. About 73 percent of the residual earnings variance was a result of the permanent component and the AR(1) correlation coefficient (the measure of how long it takes for the transitory event to fade away) was high. They used their estimates to analyze the dynamics of movements into and out of poverty, finding a high degree of mobility and that the probability of still being in poverty in 1973 conditional on having been in poverty in 1967 was quite low. Several important papers followed, including an analysis by MaCurdy (1982), using 1967 to 1976 PSID data on male earnings, but with a richer specification of the serial correlation of the transitory component. MaCurdy found that a moving average (MA) specification fit better than an AR specification for the dynamics of earnings. An MA process is one where the transitory event lasts only one or two time periods, and then goes away completely, allowing the individual to fully return to his or her permanent level. MaCurdy's findings implied much shorter lags than found by Lillard and Willis, which implied that periods of transitorily high or low earnings (or periods of temporarily being in poverty or out of poverty, for example) did not last long. Hall and Mishkin (1982) argued more strongly for the presence of a unit root in the permanent component, which is at the opposite pole from the MA type of process. In a unit root process, an individual experiences an event that is permanent, and never goes away for the rest of her or his life. Put differently, there is a change in the individual's permanent, or average, earnings (as might happen if the industry she or he has been working in goes into permanent decline, and her or his earnings fall and never fully recover). A unit root process also has the implication that earnings inequality increases over time if individuals are hit with random permanent changes like this—some people have good luck and others have bad luck, and those permanent changes move their earnings farther apart. Abowd and Card (1989) and Carroll (1992) also found evidence for a unit root in male earnings and for a low-order (i.e., an MA) transitory process. Carroll also emphasized the relative importance of permanent and transitory components, finding them to be approximately equal in variance.

The literature has since progressed significantly in various directions. Baker (1997), following an earlier suggestion by Hause (1980), argued in favor of what is called a heterogeneous growth component in earnings, which implies that different individuals not only have different average earnings over their lifetimes but also different trends (the early work by Benus and Morgan noted above found something similar). Geweke and Keane (2000) focused instead on the relative contributions of the permanent and transitory components to the distribution of lifetime earnings as opposed to annual earnings, finding that the transitory component was a greater contributor to the latter but the permanent component was the main contributor to the former. Meghir and Pistaferri (2004) proposed a different model of the transitory variance, allowing for variance to shift randomly over time, while Guvenen (2009) returned to the heterogeneous growth model of Baker, providing new evidence for its support. Bonhomme and Robin (2010) developed new methods for estimating the entire distribution of permanent and transitory components, finding them to be nonnormal and to have fat tails, while Browning, Ejrnæs, and Alvarez (2010) focused on expanding the number of heterogeneous components in the error components model.

Low, Meghir, and Pistaferri (2010) attempted to incorporate job mobility into a model of earnings mobility, an important issue because most of the prior literature had examined only

individuals with positive annual earnings, thereby ignoring mobility into and out of annual employment; and the literature mostly had not attempted to decompose annual earnings instability into within-year instability in job mobility and instability in wage rates on the job.¹⁶ Among many other findings, the authors found that the variance of the permanent component of wage residuals is lower when job mobility is ignored.¹⁷ In another paper, Hryshko (2012) argued that the unit root process in earnings does, in fact, fit the data better than the heterogeneous growth process analyzed by earlier authors. Arellano, Blundell, and Bonhomme (2017) allowed a more flexible specification of the persistence of shocks to earnings, allowing those shocks to have a different level of persistence for workers at different points in the earnings distribution. They found strong persistence of shocks both among high-earnings individuals who experience positive shocks and low-earnings individuals who experience negative shocks.

Calendar time trends

The sampling design and long length of the PSID has also permitted a large number of studies about whether the structure of earnings volatility has changed over time in the United States. The majority of these studies have followed the literature just discussed by estimating separate permanent and transitory components of earnings and determining whether either or both have shifted over time. The studies are listed in Table 2.

The first paper in this literature was that of Gottschalk and Moffitt (1994), who noted that the increase in U.S. cross-sectional inequality that had recently appeared had to be accompanied by an increase in the permanent variance, the transitory variance, or both. They used the PSID to ask this question of white male heads of households from 1969 to 1987 and found that both the permanent and transitory variance had grown over the period and that they had experienced about equal growth. Therefore, half of the increase in cross-sectional inequality could be attributed to an increase in volatility. A 1995 paper by the same authors (Moffitt and Gottschalk 1995), using a more formal error components model, yielded the same result, a finding reported again by Gittleman and Joyce (1999). The literature evolved by adding additional years to the PSID and estimating different models for the decomposition into permanent and transitory effects.

Haider (2001) used a slightly different model that also showed increases in the variances of both components but a slowdown in transitory growth after 1982, while Hyslop (2001) estimated a simpler error components model of husband and wife earnings and found that both husband and wife transitory variances rose from 1979 to 1985. Moffitt and Gottschalk (2002) extended the data frame through 1996 and also found a slowdown in the growth of volatility but beginning at a later date than Haider had found. Keys (2008), using data through 2000, also found a slowdown in male transitory variance growth beginning around 1990. Keys was also the first to examine female earnings and total family income, finding

¹⁶There is an enormous literature on job mobility that is connected, but somewhat separate, from the earnings volatility literature we review here. But the PSID has been a major contributor to that literature as well. See the volume by Neumark (2000), which contains several studies using the PSID; Stevens (2001) for another example; and the recent paper by Altonji, Smith, and Vidangos (2013) for an econometric treatment of job mobility with the PSID.

¹⁷See also Liu (forthcoming), who finds that individuals can partly insure themselves against firm-specific shocks by moving to a different firm, implying that the variance of shocks is larger than what is seen in realized earnings after mobility.

much smaller percentage increases in volatility for women but much larger increases in total family volatility, compared to that for men.¹⁸ Gottschalk and Moffitt (2009) used data through 2004 and also found that transitory variance growth had ceased in the late 1980s but detected a possible reemergence of growth in the late 1990s. Heathcote, Storesletten, and Violante (2010) found general increases in both permanent and transitory variances but pooled over men and women, making the results difficult to compare to other studies in the literature. Moffitt and Gottschalk (2012), using formal error components model methods on data through 2004, found once again that the transitory variance earnings for men had stopped growing after the late 1980s, and that their earlier suggestion of a reemergence of growth in the late 1990s had turned out to be only a business cycle effect.

Jensen and Shore (2015) were the first to attempt to identify and estimate heterogeneity across individuals in the growth of male earnings volatility, finding that different men have different levels of volatility and that almost all of the growth in volatility had occurred among men who had high long-run levels of volatility in the first place.

Other studies related to time trends in earnings volatility

A small number of studies have not attempted to decompose earnings changes into permanent and transitory components. Instead, they simply estimate the variance or other measures of dispersion of the change in earnings from one period to the next. The results of these studies are noncomparable to those just reviewed because the variance of changes in earnings can arise from either a change in permanent earnings dispersion or transitory earnings dispersion. These studies are therefore labeled as studying “gross” volatility in Table 2 and must be interpreted as estimating a sum of changes in permanent and transitory variances.

In this category are studies by Dynarski and Gruber (1997); Shin and Solon (2011); and Dynan, Elmendorf, and Sichel (2012). Dynarski and Gruber examined the variances of residuals in a first-differenced male earnings regression and found those variances to have risen steadily from 1970 to 1991, although with a strong cyclical component visible as well. Shin and Solon found the variance of two-year changes in male earnings to have risen from 1970 through the mid-1980s, to have declined after that until about 1997, and to have risen from 1997 to 2004. Dynan, Elmendorf, and Sichel found the variance of male earnings changes also to have risen through 1985, but to have fluctuated after that around a slowly rising trend through 2008.¹⁹ Dynan, Elmendorf, and Sichel also examined female earnings gross volatility through 2008, finding it to have actually declined over the period, especially in the earlier years. The authors found that combined head and spouse earnings gross volatility rose on net, but at a slower rate than for male head earnings alone. Finally, the study examined gross volatility trends for household income, finding a significant upward trend over the entire 1970 to 2008 period but rising at different rates in different periods.

¹⁸Part of the reason for a smaller percentage increase in female earnings volatility, relative to male earnings or family income, is that the base level of female earnings volatility is higher than those of family income or male earnings. The absolute change in family income volatility is not far different from the sum of the absolute changes in male and female volatility.

¹⁹Dynan, Elmendorf, and Sichel (2012) included observations with zero earnings at one of the two periods of the two-year change. Shin and Solon (2011) argue that Dynan, Elmendorf, and Sichel's turning points were affected by the inclusion of labor income and farm income in addition to wage and salary income.

Earnings volatility in datasets other than the PSID

Earnings volatility has also been estimated in a number of other datasets, some household surveys but some instead drawn from administrative records. Table 3 lists the major studies that focused on calendar time trends in volatility.²⁰ Interestingly, most of the studies using datasets other than the PSID have focused on trends in gross volatility rather than making an attempt to do a decomposition into permanent and transitory components. This may be partly because an important initial question is whether even trends in gross volatility in other datasets match those in the PSID. For this reason, the studies examining gross volatility are listed first in Table 3.

Two studies examined trends in gross volatility in the SIPP (Bania and Leete 2009; Celik et al. 2012). Bania and Leete's (2009) study is somewhat noncomparable to other work because the authors calculated short-term monthly volatility within a calendar year, which may follow a different pattern than year-to-year volatility. In any case, the authors found that gross volatility of household income by this measure rose over the 1990s. This is consistent with the one PSID study that examined gross volatility of household income (Dynan, Elmendorf, and Sichel 2012). Celik et al. (2012) examine the more conventional year-to-year volatility of male earnings with the SIPP starting in 1984, finding that it declined from that year through 2006, although experiencing strong business cycle variation around the trend. This finding is inconsistent with the PSID study of Dynarski and Gruber (1997) and somewhat inconsistent with the PSID study of Dynan, Elmendorf, and Sichel (2012), who found that, after the mid-1980s, male volatility of biannual earnings rose slowly, around periods of decline, through 2008. But it is a bit more consistent with the PSID study of Shin and Solon (2011), who found that male gross volatility fell after the mid-1980s, at least through 1997.²¹

Three studies examined matched year-to-year CPS records to obtain a measure of one-year-apart gross volatility, which is not strictly comparable to the PSID measures of gross volatility two years apart. Matched CPS files face a well-known problem that the CPS returns to housing units, not families or individuals, and hence only some families can be matched, which is likely to lead to an understatement of volatility. Ziliak, Hardy, and Bollinger (2011) found that male earnings gross volatility rose sharply from the early 1970s to the mid-1980s, followed by a decline and a rise that left it at its mid-1980s level by the last year of the analysis, 2009, not inconsistent with the PSID. The authors also examined female earnings volatility and found it to decline over the entire period from the 1970s to 2009. This is consistent with the PSID study of Dynan, Elmendorf, and Sichel (2012). Celik et al. (2012) also examined the CPS and found male earnings gross volatility to have risen strongly from the 1970s through the early 1980s, followed by a slow decline through 2006, followed by a rise through 2009. While the first period is consistent with the SIPP, the PSID,

²⁰As noted previously, only studies that have been published in journal or book form are listed. Also, almost all of this literature has focused on calendar time trends, so we omit the few studies that did not focus on that issue. We also only review U.S. studies, since our goal is to compare trends to those in the PSID.

²¹This may be the place to note again that attrition bias in the PSID could affect its findings and explain some of the differences here. However, the main concern with PSID attrition is that those individuals with high levels of volatility are more likely to attrite, given evidence reported in Fitzgerald, Gottschalk, and Moffitt (1998) that attrition probabilities are positively correlated with past levels of instability. This would tend to bias the time trend of volatility in the PSID downward.

and the Ziliak, Hardy, and Bollinger CPS findings, this finding of Celik et al. for the later periods is not consistent with the CPS findings of Ziliak, Hardy, and Bollinger nor with the studies of Dynarski and Gruber (1997) or, to an extent, Dynan, Elmendorf, and Sichel for the PSID, all of whom found a stable or rising trend after the 1980s. Finally, Hardy and Ziliak (2014) focused on gross volatility in household income using the CPS, finding it to have risen strongly from 1980 to 2009.

Three studies of gross volatility used Social Security earnings data, and of these Debacker et al. (2013) used data matched with IRS 1040 returns and hence only for the taxpaying population. Debacker et al. saw no long-term trend in gross male earnings volatility from 1987 to 2009, although there were significant short-term trends up and down and an upturn at the end of their data, from 2006 to 2009. Sabelhaus and Song (2010) find that gross earnings volatility fell steadily from 1980 to 2005, but the authors combined men with women. Given the survey evidence of a decline in volatility among the latter, it is difficult to compare these authors' results to those from the surveys examining only men. Indeed, Dynan, Elmendorf, and Sichel (2012) found that when men and women were combined, the net trend in the PSID gross volatility is negative. Also, as noted in the previous section, Social Security earnings data include nonheads, who are explicitly excluded from the PSID studies and from many of the SIPP and CPS studies.²² If trends in volatility among nonheads differ from those of heads, Social Security earnings data will not necessarily show the same trends as the survey datasets. Dahl, DeLeire, and Schwabish (2011) also pooled men and women, using Social Security earnings data from 1984 to 2005, finding a decline in gross volatility over the period (albeit at different rates), consistent with Sabelhaus and Song, who also combined men and women.²³

Celik et al. (2012), alone among the studies, also examined male gross earnings volatility with UI wage records in the LeHD dataset. The authors had only twelve states with complete data over the 1992 to 2008 period and found no trend in volatility over the time frame. This also is not inconsistent with the several survey datasets that found that the rise in male earnings volatility either stopped completely or grew or declined slowly in the middle period of the three periods demarcated above.²⁴

Three non-PSID studies have attempted a decomposition of volatility into permanent and transitory components. Sabelhaus and Song (2010) used an approximate method for decomposition based on the work of Carroll (1992) listed in Table 1.²⁵ The authors found

²²The cross-national equivalent file (CNEF) constructs equivalently defined earnings or income measures that are comparable both over time and across countries, including the United States, using PSID as the basis for income imputation. The CNEF imputes individual labor earnings variables for all individuals including heads and nonheads. Venn (2011) uses CNEF to examine gross earnings volatility in selected OECD countries. Their analysis for the United States includes all persons who were employed full time, including positive self-employment income. Zhang (2010) compares household income volatility in the United States with Germany and Great Britain, using CNEF 1979–2004.

²³In unpublished work, however, Dahl, DeLeire, and Schwabish (2008) found that male gross volatility in SSA data declined after 1984 but was essentially flat from 1984 to 2005 when the sample was restricted to men employed at both periods. We also note that Guvenen, Ozkan, and Song (2014), in a study focused on cyclical effects on volatility rather than trends, found a small trend decline in SSA male gross earnings volatility (see Figure 5). Carr and Weimers (2018), using Social Security earnings data matched to the SIPP, found a rise in male gross volatility from 1978 to 1983, a decline from 1983 to either the late 1990s or mid-2000s (depending on a judgment of what is cycle and what is trend), and a rise in volatility thereafter. Thus, the various studies of male gross earnings volatility using Social Security data, including these three and those of Debacker et al. (2013) and that of Hryshko, Juhn, and Kristin McCue (2012) noted below, are not consistent with one another.

²⁴However, see Abowd, McKinney, and Zhao (2018) for a discussion of possible errors in the low-wage UI data.

that the decline in gross volatility was shared by both permanent and transitory component declines. Debacker et al. (2013) used W-2 data on male earnings matched to IRS 1040 records from 1987 to 2009, finding that the variance of the transitory component was stable over this period, which is consistent with several of the survey dataset findings for the middle period. While it is inconsistent with the trends found for the two Social Security earnings studies just referenced, the fact that those two studies combined men and women and included nonheads make the results noncomparable.²⁶ Debacker et al. also estimated the transitory variance of household income, finding it to have risen slightly. Finally, Hryshko, Juhn, and McCue (2017) used Social Security earnings data matched to SIPP records with a focus on the differences in transitory variance levels and trends for husbands and wives, and for their joint earnings. The authors found that the male transitory variance fell from 1980 to 2000 but rose thereafter and that the variance for the couples' combined earnings fell over the entire period. The former finding is consistent with much of the rest of the literature, albeit less often for the period after 2000. Volatility among couples' combined earnings has been little examined in the literature. Dynan, Elmendorf, and Sichel (2012) also examined this earnings concept with the PSID, albeit only for gross volatility, and found a decline after the late 1980s.

Summary of PSID and non-PSID research on income volatility

Summing up, the PSID studies of trends in male earnings volatility are consistent with a three-phase trend. In the first phase, virtually all show an increase, whether in gross volatility or in the transitory variance, from the 1970s to the mid-1980s, although the exact year of the turning point differs somewhat across studies. However, the PSID studies differ for periods in a second phase after the mid-1980s, with some finding a slowly rising trend, others showing a flat trend, and others showing a declining trend. But the trends in either direction are not large in magnitude, and it would not be surprising if differences in samples and volatility measures accounted for these differences. In a third phase, most PSID studies also show some increase in male earnings volatility in later years but with, again, differences in the turning points, with some showing the rise to have begun in the late 1990s while others show it to have begun later, sometimes close to the Great Recession.

Comparing these findings to those using other datasets, the PSID is consistent with trends in the CPS, where studies using gross volatility measures for men also show the three-phase trend of rises from the 1970s to the 1980s, followed by a flat or declining trend through sometime in the 2000s, and with one study showing an increase starting in 2006. The SIPP, however, shows an increase in the 1990s to 2000s in intrayear volatility but a decline in year-to-year volatility from 1984 to 2006. Published studies using SSA male earnings data that focus on long-term trends are sometimes consistent with the survey findings and sometimes not. Most consistent is the work of Debacker et al. (2013), who find no trend in gross volatility for men from 1987 to 2009 but a small rise from 2006 to 2008, consistent with the

²⁵See also Carroll and Samwick (1997).

²⁶Another issue with the Debacker et al. (2013) study is that the authors did not estimate a permanent-transitory model but rather a persistent-transitory model, allowing an autoregressive process to be located in the permanent rather than the transitory component. This is likely to yield different results than a model that restricts the permanent component to have a unit root and puts all autoregressive processes into the transitory component.

PSID and the CPS. One study using SSA earnings data on married men found declines, then increases, in the transitory variance from 1980 to 2000, but ending in that final year slightly above what it was in 1980 (Hryshko, Juhn, and McCue 2017).²⁷ The decline in the early 1980s is inconsistent with the PSID-CPS trend, but the small net increase from the mid-1980s to 2000 is consistent with them.

The volatility of female earnings has only been examined with the PSID and the CPS, both finding it to have declined over the periods examined, starting as early as 1967 and running through as late as 2009.²⁸ household income volatility has been examined in only a few studies, mostly using the PSID or the CPS, where volatility has been found to exhibit a much smaller rise. Other datasets sometimes show a rise as well, but smaller in magnitude.

New Results on Trends in Male earnings Volatility

The work examining trends in earnings volatility with the PSID reported in the previous section used data only through 2008. Data through 2014 are now available, so we provide new results through that year. The 2008 to 2014 period is particularly interesting because it encompasses the Great Recession. For our new results, we focus solely on male earnings, which has been the focus of the majority of the literature to date. We provide measures both of gross volatility and estimates of an error components model, which allows us to decompose trends in gross volatility into trends in permanent and transitory volatility.

We use data on wage and salary earnings of male heads ages 30 to 59 from interview year 1971 through interview year 2015, with only every other year after 1996 observed. Earnings are collected for the previous year, so our data cover the calendar years 1970 to 2014.²⁹ Further data details are given in the appendix (The appendix can be found with the online version of the paper). As is common in the literature, we work with residuals from regressions of log earnings on education, a polynomial in age, and interactions between age and education variables, all estimated separately by calendar year. We use these residuals to form a variance-autocovariance matrix indexed by year, age, and lag length, but we group the data into three age groups—30 to 39, 40 to 49, and 55 to 59—for sample size reasons.

Figure 1 shows the variance of two-year differences in the residuals from the log earnings regression, the usual measure of gross volatility. Gross volatility rose from the 1970s to the mid-1980s and then exhibited no trend (albeit around significant instability) until around 2000, when it resumed its rise.³⁰ Our results through 2014 show that gross volatility rose sharply during the Great Recession. As shown by the unemployment rate (also in the figure), volatility is correlated with the unemployment rate but with a slight lag, although the correlation is less obvious between 2002 and 2012. Our findings are consistent with

²⁷ That study only included married men. In addition, it found an uptick in volatility toward the end of the period, just before 2009, consistent with the study by Debacker et al. (2013).

²⁸ Hyslop (2001) is an exception.

²⁹ We use the variable of head's wage and salary income in the PSID, and this measure is consistent over all survey years. The CNEF constructs other equivalently defined earnings or income measures that are comparable both over time and across certain countries. More information about the CNEF can be found at <https://cnef.ehe.osu.edu/>.

³⁰ It is difficult to determine precisely the year in which volatility rose in the early 2000s because unemployment was rising, which could make the rise from 2000 to 2003 just a cyclical movement. Dating the turnaround to have occurred 2003 to 2004, when the unemployment rate had started falling but volatility continued to rise, is arguably more consistent with the figure.

Dynarski and Gruber (1997), who found rising (on average) gross volatility from 1970 to 1991, and with Shin and Solon's (2011) results through 2005, although those authors found more of a decline in the middle period than a stable and flat trend. Our results for the early and late periods are similar to those of Dynan, Elmendorf, and Sichel (2012), although those authors found a slow rise in the middle period. The two extreme fluctuations in the middle period in our data may be responsible for these other authors' finding of a slight decline or rise.³¹

Figure 1A in the online appendix shows the variance of two-year differences for two separate education groups: high school diploma or less, and some college or above. The trends are similar before 2006, with the level of volatility higher for less educated men. However, after the Great Recession, the gross volatility for less educated men rose sharply, while it remained stable for higher educated men.

Figure 2 shows trends in the percentile points of the distribution of the two-year change, showing that the increasing volatility reflects a widening out at all percentile points but with the largest widening occurring at the top and bottom of the change distribution. Figure 3 shows the variance of two-year changes of log earnings itself, not of residuals from a regression. The trend pattern and, in particular, the existence of three approximate periods of rise, then flat trend, then rise, is the same for the residuals.

To decompose gross volatility into its permanent and transitory components, we adopt an error components model similar to those used in the past literature but with some of the more restrictive features of those models eliminated. Our new model, called the Extended Semiparametric (ESP) model, is

$$y_{iat} = \alpha_t \mu_{ia} + \beta_t v_{ia}, \quad (1)$$

where y_{iat} is the log earnings residual for individual i at age a in year t ; μ_{ia} is the permanent component for individual i at age a ; v_{ia} is the transitory component for individual i at age a ; and α_t and β_t are calendar time shifters for the two components. We specify the processes for the permanent and transitory components in the online appendix, and we fit the model to the autocovariance matrix of the data using conventional methods.

Figures 4 and 5 show the trends in α and β , respectively, which are the calendar time factors in the model. The results show that both permanent and transitory variances trended upward over time, and both roughly followed the pattern exhibited by gross volatility, with an initial rise, followed by a middle period when the rise had stopped, and ending with a rising trend. The turning points—with a necessary caution as to the difficulty of detecting them visually in the face of considerable instability—are slightly different, however. The transitory variance appears to have stopped rising in the early 1980s, whereas the permanent variance continued to rise through the late 1980s. The transitory variance exhibits a slight decline in the middle period, whereas the permanent variance is mostly flat. However, both variances turned up toward the end of the period. One reading of the results is that neither variance

³¹. Our main analysis trims the top and bottom 1 percent in earnings. When we trim the top and bottom 2 percent in earnings, the two bumps in 1992 and 1994 do not exceed the peak in the middle 1980s significantly.

substantially departed from a process with fluctuations around a stable trend until 2008, when its increase truly started to emerge. This would be consistent with an effect of the Great Recession. The variances also show signs in the last two years of starting to decline from their recession peaks.

The implications of these trends for the variances of the permanent and transitory components themselves are shown in Figure 6 for those age 40 to 49. Results for those age 30 to 39 and 50 to 59 are shown in the online appendix Figure 2A and online appendix Figure 3A, respectively. The variances differ by age, with older individuals having higher variances, but the trend is the same at all ages given the model specification. The now-familiar three-phase trend is still apparent. The transitory variance is about two-thirds of the total variance and has risen more than the permanent variance from beginning to end. Thus, we find that a larger fraction of the increase in cross-sectional male earnings inequality is accounted for by increases in the transitory component.

Sensitivity Tests: Imputation and Window Averaging

We conduct two sensitivity tests to our findings. The first estimates the sensitivity of our results to the inclusion of imputed earnings values in the PSID. The second presents estimates of time trends in the transitory variance using the window averaging (WA) method, which is a particularly intuitive method of estimating transitory variances that is used in many studies.

Like all survey datasets, a certain fraction of earnings values are imputed in the PSID because of “do not know responses and refusals to answer,” from implausible values indicating response error, and other reasons. The PSID has conducted imputations for all these reasons and the exact method of using them has varied somewhat over time, generally with growing sophistication and complexity. Current imputation procedures for income use a variety of imputation methods, depending on the type of income being imputed and using a different set of variables for each (Duffy 2011). In our sample of male heads from 1970 to 2014, the percent of wage and salary income observations that are imputed ranges from a low of 0.30 to a high of 4.6, with the high value occurring in 1992, a period when the PSID changed its methodology and interviewing method. While the low value of 0.30 is unlikely to change the results much, the higher value of 4.6 could if imputation is strongly correlated with volatility.

The traditional primary issue with imputation is whether it is ignorable, that is, whether those observations that are imputed have unobservable differences in earnings from those that are not, and whether the imputation process can adjust for any such differences. The common method of testing for nonignorability and the accuracy of the process is simply to estimate models with and without imputed observations even though, if nonignorability holds, both estimates are biased. Figure 7 shows the trend in gross volatility in our sample including and excluding the imputed observations. There is very little difference in the trends in either case, suggesting that the observations being imputed are ignorable or that the imputation process adequately corrects for any nonignorability.

Moffitt and Gottschalk (2012) dubbed any method of estimating transitory variances based on taking an interval of annual observations and computing transitory components as the deviations from some (possibly trend-adjusted) mean as a WA method. This method has been used primarily in the literature on calendar time trends in volatility and was used by the initial paper in that literature, Gottschalk and Moffitt (1994), but has been used in modified form in several subsequent papers (see Tables 2 and 3). A traditional analysis of variance (ANOVA) definition of the transitory variance within a window of T observations is:

$$\frac{1}{N(T-1)} \sum_{i=1}^N \sum_{t=1}^T (y_{it} - \bar{y}_i)^2. \quad (2)$$

However, because $y_{it} - \bar{y}_i = \frac{1}{T} \sum_{\tau \neq t}^T (y_{it} - y_{i\tau})$, the WA method is based on the variance of pairwise differences between each y and the others within the window. Hence, it is closer to an extended version of gross volatility than a true measure of the transitory variance, combining changes in permanent and transitory variances. In addition, if any model like that in equation (1) holds, the WA method produces some time average of α_t and β_b , weighted by the variances of the pairwise differences.

Figure 8 shows estimates of equation (2) using a nine-year window for our male head dataset, 1970–2014, plotted against the year in the center of the window. The levels of the estimated variances are quite a bit below those of the transitory variance in Figure 6, which is to be expected since the WA method averages over years and hence damps down the year-to-year variances from the ESP model. But the three-phase pattern revealed previously for both gross volatility and the transitory variance continues to hold here, although the turning points are considerably more indistinct than in the ESP model because of the smoothing inherent in the use of a nine-year average. Appendix Figure 4A further shows the WA results for two education groups: high school diploma or less, and some college or above. The transitory variance of less educated men rose more sharply during the Great Recession than the other group.

Conclusion

The PSID was the first representative U.S. panel to demonstrate the high level of mobility and volatility in economic measures since 1970. Because of its advantages in terms of panel length, comprehensive measures of socioeconomic status, and following rules allowing it to stay reasonably representative of the population, the PSID has made major contributions to our understanding on economic volatility. A large number of studies using the data to study specifically the volatility of individual earnings and family income have not only contributed to our understanding of economic volatility but have also spawned numerous methodological innovations. Most PSID studies show growing volatility from the 1970s to the mid-1980s, and a flat or declining trend after that, followed by a resumption of increasing volatility beginning in approximately the early 2000s and throughout the Great Recession. New estimates using a more flexible model than used in past work confirms these general results.

The research from the PSID and other longitudinal datasets has been important for U.S. public policy, particularly for policy directed toward the low-income population. The high levels of volatility among lower educated groups shows that economic need often arises for short periods of time and not on a permanent basis. Families do not stay in poverty permanently but often transition frequently into and out of income below the poverty line. Reforms in the Supplemental Nutrition Assistance Program (SNAP), for example, have deliberately tried to make eligibility determination simpler and to make it easier for families to quickly obtain assistance. These reforms began in the 2000s and have become widespread across most states. Recently, other reform proposals have been made to recommend short-term cash assistance for families who have such temporary needs and those proposals have entered the policy discussions in Washington.

Looking forward, the PSID can be expected to continue to be a major contributor to discussions of income volatility and its policy implications. However, as noted in our review, some other datasets do not show the same trends in volatility as does the PSID. A research priority for the PSID should be to work with those analyzing other datasets to resolve these differences. Our discussion of possible reasons for differences included the lack of data on nonhead earnings in the PSID, for example, which suggests a possible test collection of those data to compare to those in other datasets. The nonrepresentativeness of the immigrant sample is another source of differences with other datasets. Other possible reasons for differences with other datasets could be explored with one-time special topical modules in the PSID that ask respondents more detail about earnings in the past year, their exact sources and their intrayear variation and their sector of work, for example, all of which relate to some differences with other datasets that have been mentioned.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Biography

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References

- Abowd John M., and Card David. 1989 On the covariance structure of earnings and hours changes. *Econometrica* 57 (2): 411–45.
- Abowd John M., McKinney Kevin L., and Zhao Nellie L.. 2018 Earnings inequality and mobility trends in the United States: Nationally representative estimates from longitudinally linked employer-employee data. *Journal of Labor Economics* 36 (S1): S183–S300.
- Abowd John M., and Stinson Martha h.. 2013 Estimating measurement error in annual job earnings: A comparison of survey and administrative data. *Review of Economics and Statistics* 95 (5): 1451–67.
- Abraham Katherine G., Haltiwanger John C., Sandusky Kristin, and Spletzer James. 2013 Exploring differences in employment between household and establishment data. *Journal of Labor Economics* 31 (S1): 129–72.
- Altonji Joseph G., Smith Anthony A., and Vidangos Ivan. 2013 Modeling earnings dynamics. *Econometrica* 81 (4): 1395–1454.
- Arellano Manuel, Blundell Richard, and Bonhomme Stéphane. 2017 Earnings and consumption dynamics: A nonlinear panel data framework. *Econometrica* 85 (3): 693–734.
- Baker Michael. 1997 Growth-rate heterogeneity and the covariance structure of life-cycle earnings. *Journal of Labor Economics* 15 (2): 338–75.
- Bane Mary Jo, and Ellwood David. 1996 *Welfare realities: From rhetoric to reform*. Cambridge, MA: Harvard University Press.
- Bania Neil, and Leete Laura. 2009 Monthly household income volatility in the U.S., 1991/92 vs. 2002/03. *Economics Bulletin* 29 (3): 2100–2112.
- Beckett Sean, Gould William, Lillard Lee, and Welch Finis. 1988 The Panel Study of Income Dynamics after fourteen years: An evaluation. *Journal of Labor Economics* 6 (4): 472–92.
- Benus Jacob. 1974 Income instability In *Five thousand American families: Patterns of economic progress*, eds. Morgan James N., Dickinson Katherine, Dickinson Jonathan, Benus Jacob, and Duncan Greg. Ann Arbor, MI: Institute for Social Research, University of Michigan.
- Benus Jacob, and Morgan James. 1972 Income instability as a dimension on welfare In *Proceedings of the American Statistical Association*, 102–6. Ann Arbor, MI: Institute for Social Research, University of Michigan.
- Bonhomme Stéphane, and Jean Marc Robin. 2010 Generalized non-parametric deconvolution with an application to earnings dynamics. *Review of Economic Studies* 77 (2): 491–533.
- Bound John, Charles brown, Duncan Grey J., and Rodgers William L.. 1994 Evidence on the validity of cross-sectional and longitudinal labor market data. *Journal of Labor Economics* 12 (3): 345–68.
- Browning Martin, Mette Ejrnæs, and Javier Alvarez. 2010 Modelling income processes with lots of heterogeneity. *Review of Economic Studies* 77 (4): 1353–81.
- Carr Michael D., and Wiemers Emily E.. 2018 New evidence on earnings volatility in survey and administrative data. *AEA Papers and Proceedings* 108:287–91.
- Carroll Christopher D. 1992 The buffer-stock theory of saving: Some macroeconomic evidence. *Brookings Papers on Economic Activity* 23 (2): 61–156.
- Carroll Christopher, and Samwick Andrew. 1997 The nature of precautionary wealth. *Journal of Monetary Economics* 40 (1): 41–71.
- Celik Sule, Juhn Chinhui, Kristin McCue, and Jesse Thompson. 2012 Recent trends in earnings volatility: evidence from survey and administrative data. *B.E. Journal of Economic Analysis and Policy* 12 (2). Available from 10.1515/1935-1682.3043.
- Dahl Molly, Thomas DeLeire, and Jonathan Schwabish. 2008 Year-to-year variability in workers earnings and in household incomes: estimates from administrative data. *Congressional budget Office Working Paper*, Washington, DC.
- Dahl Molly, Thomas DeLeire, and Schwabish Jonathan A.. 2011 Estimates of year-to-year volatility in earnings and in household incomes from administrative, survey, and matched data. *Journal of Human Resources* 46 (4): 750–74.

- Debacker Jason Matthew, Bradley T Heim T, Ivan Vidangos, and Vasia Panousi. 2013 Rising inequality: Transitory or permanent? New evidence from a U.S. Panel of household Income 1987–2006. *Brookings Papers on Economic Activity* 2013 (4): 67–142.
- Duffy Denise. 2011 2007 PSID income and wage imputation methodology. Technical Series Paper #1103. Ann Arbor, MI: University of Michigan Available from <https://psidonline.isr.umich.edu/Publications/Papers>.
- Duncan Greg J., Coe Richard, Corcoran Mary, Hill Martha S., Hoffman Saul, and Morgan James N.. 1984 Years of poverty, years of plenty - The changing economic fortunes of American workers and families. Ann Arbor, MI: Institute for Social Research, University of Michigan.
- Dynan Karen, Elmendorf Douglas, and Sichel Daniel. 2012 The evolution of household income volatility. *B.E. Journal of Economic Analysis & Policy* 12 (2): 1–42.
- Dynarski Susan, and Gruber Jonathan. 1997 Can families smooth variable earnings? *Brookings Papers on Economic Activity* 1997 (1): 229–303.
- Fitzgerald J, Peter Gottschalk, and Moffitt Robert A.. 1998 An analysis of sample attrition in panel data: The Michigan Panel Study of Income Dynamics. *Journal of Human Resources* 33 (2): 251–99.
- Friedman Milton. 1957 The permanent income hypothesis In *A theory of the consumption function*, 20–37. Princeton, NJ: Princeton University Press.
- Geweke J, and Keane M. 2000 An empirical analysis of male income dynamics in the PSID. *Journal of Econometrics* 96 (2): 293–356.
- Gittleman Maury, and Joyce Mary. 1999 Have family income mobility patterns changed? *Demography* 36 (3): 299–314. [PubMed: 10472495]
- Gottschalk Peter, and Huynh Minh. 2010 Are earnings inequality and mobility overstated? The impact of nonclassical measurement error. *Review of Economics and Statistics* 92 (2): 302–15.
- Gottschalk Peter, and Moffitt Robert. 1994 The growth of earnings instability in the U.S. labor market. *Brookings Papers on Economic Activity* 1994 (2): 217–72.
- Gottschalk Peter, and Moffitt Robert. 2009 The rising instability of U.S. earnings. *Journal of Economic Perspectives* 23 (4): 3–24.
- Gouskova Elena, Andreski Patricia, and Schoeni Robert F. 2010 Comparing estimates of family income in the Panel Study of Income Dynamics and the March Current Population Survey, 1968–2007. Ann Arbor, MI: Survey Research Center, Institute for Social Research, University of Michigan.
- Güvenen Fatih. 2009 An empirical investigation of labor income processes. *Review of Economic Dynamics* 12 (1): 58–79.
- Güvenen Fatih, Ozkan Serdar, and Song Jae. 2014 The nature of countercyclical income risk. *Journal of Political Economy* 122 (3): 621–60.
- Haider Steven J. 2001 Earnings instability and earnings inequality of males in the United States: 1967–1991. *Journal of Labor Economics* 19 (4): 799–836.
- Hall Robert E., and Mishkin Frederic S.. 1982 The sensitivity of consumption to transitory income: estimates from panel data on households. *Econometrica* 50 (2): 461–81.
- Hardy Bradley, and Ziliak James P.. 2014 Decomposing trends in income volatility: The “wild ride” at the top and bottom. *Economic Inquiry* 52 (1): 459–76.
- Hause John. 1980 The fine structure of earnings and the on-the-job training hypothesis. *Econometrica* 48 (4): 1013–29.
- Heathcote Jonathan, Storesletten Kjetil, and Violante Giovanni L.. 2010 The macroeconomic implications of rising wage inequality in the United States. *Journal of Political Economy* 118 (4): 681–722.
- Hill Heather D., Morris Pamela, Gennetian Lisa A., Wolf Sharon, and Tubbs Carly. 2013 The consequences of income instability for children’s well-being. *Child Development Perspectives* 7 (2): 85–90.
- Hryshko Dmytro. 2012 Labor income profiles are not heterogeneous: evidence from income growth rates. *Quantitative Economics* 3 (2): 177–209.

- Hryshko Dmytro, Juhn Chinhui, and Kristin McCue. 2017 Trends in earnings inequality and earnings instability among U.S. couples: how important is assortative matching? *Labour Economics* 48:168–82.
- Hyslop Dean R. 2001 Rising U.S. earnings inequality and family labor supply: The covariance structure of intrafamily earnings. *American Economic Review* 91 (4): 755–77.
- Jäntti Markus, and Jenkins Stephen. 2013 Income mobility. In *Handbook of income distribution*, eds. Atkinson Anthony B. and Bourguignon Francois. New York, NY: North Holland.
- Jensen Shane T., and Shore Stephen H.. 2015 Changes in the distribution of earnings volatility. *Journal of Human Resources* 50 (3): 811–36.
- Juhn Chinhui, and Kristin McCue. 2010 Comparing measures of earnings instability based on survey and administrative reports. U.S. Bureau Census for Economics Studies Paper CES-WP-10–15, Washington, DC.
- Keys B 2008 Trends in income and consumption volatility, 1970–2000. In *Income volatility and food assistance in the United States*, eds. Jolliffe D and James Ziliak. Kalamazoo, MI: W.E. Upjohn Institute.
- Kopczuk Wojciech, Saez Emmanuel, and Song Jae. 2010 Earnings inequality and mobility in the United States: evidence from Social Security data since 1937. *Quarterly Journal of Economics* 125 (1): 91–128.
- Lillard Lee A., and Willis Robert J.. 1978 Dynamic aspects of earning mobility. *Econometrica* 46 (5): 985–1012.
- Liu Kai. Forthcoming Wage risk and the value of job mobility in early employment careers. *Journal of Labor Economics*.
- Low Hamish, Meghir Costas, and Pistaferri Luigi. 2010 Wage risk and employment over the life cycle. *American Economic Review* 100 (4): 1432–67.
- MaCurdy Thomas E. 1982 The use of time series process to model the error structure of earnings in a longitudinal data analysis. *Journal of Econometrics* 18 (1): 83–114.
- Meghir Costas, and Pistaferri Luigi. 2004 Income variance dynamics and heterogeneity. *Econometrica* 72 (1): 1–32.
- Mirer Thad. 1974 Aspects of the variability of family income In *Five thousand families: Patterns of economic progress*, vol. II, ed. Morgan James N.. Ann Arbor, MI: Institute for Social Research, University of Michigan.
- Moffitt Robert A. 1992 Incentive effects of the U.S. welfare system: a review. *Journal of Economic Literature* 30 (1): 1–61.
- Moffitt Robert A., and Gottschalk Peter. 1995 Trends in the autocovariance structure of earnings in the United States: 1969–1987. *Journal of Economic Inequality* 9 (3): 439–59.
- Moffitt Robert A., and Gottschalk Peter. 2002 Trends in the transitory variance of earnings in the United States. *Economic Journal* 112 (478): C68–73.
- Moffitt Robert A., and Gottschalk Peter. 2012 Trends in the transitory variance of male earnings: Methods and evidence. *Journal of Human Resources* 47 (1): 204–36. [PubMed: 25605977]
- Nerlove M 2002 *Essays in panel data econometrics*. Cambridge: Cambridge University Press.
- Neumark David, ed. 2000 *On the job: Is long-term employment a thing of the past?* New York, NY: Russell Sage Foundation.
- Pischke Jörn-Steffen. 1995 Measurement error and earnings dynamics: Some estimates from the PSID validation study. *Journal of Business & Economic Statistics* 13 (3): 305–14.
- Sabelhaus John, and Song Jae. 2010 The great moderation in micro labor earnings. *Journal of Monetary Economics* 57 (4): 391–403.
- Shin Donggyun, and Solon Gary. 2011 Trends in men's earnings volatility: What does the Panel Study of Income Dynamics show? *Journal of Public Economics* 95 (7–8): 973–82.
- Smith James D., and Morgan James N.. 1970 Variability of economic well-being and its determinants. *American Economic Review* 60 (2): 286–95.
- Stevens Ann Huff. 2001 Changes in earnings instability and job loss. *Industrial and Labor Relations Review* 55 (1): 60–78.

- Venn Danielle. 2011 Earnings volatility and its consequences for households. OECD Social, Employment and Migration Working Papers, No. 125 Available from http://praha.vupsv.cz/fulltext/ul_1374.pdf.
- Zhang Sisi. 2010 Recent trends in household income dynamics for the United States, Germany and Great Britain. *Economics Bulletin* 30:1154–72.
- Ziliak James P., Hardy Bradley, and Bollinger Christopher. 2011 Earnings volatility in America: Evidence from matched CPS. *Labour Economics* 18 (6): 742–54.

FIGURE 1.
Variance of Two-Year Difference in Male Log Earnings Residuals

FIGURE 2.
Percentiles of Two-Year Difference in Male Log Earnings Residuals

FIGURE 3.
Variance of Two-Year Difference in Raw Male Log Earnings

FIGURE 4.
Extended Semiparametric (ESP) Model Estimates of Alpha

FIGURE 5.
Extended Semiparametric (ESP) Model Estimates of Beta

FIGURE 6.
Fitted Permanent, Transitory, and Total Variance of Log Earnings Residuals, Age 40–49,
ESP Model

FIGURE 7.
Variance of Two-Year Difference of Log Earnings Residuals, Including and Excluding Imputed Observations

FIGURE 8.
Window Averaging (WA) Estimate of Transitory Variance, Nine-Year Window

TABLE 1

PSID Studies of Permanent-Transitory Volatility with No Calendar Time Trends

Study	Sample	Method	Findings
Benus and Morgan (1972)	Families in first four PSID waves, 1968–1971, with same family head who works in all years	Decomposition of head labor income into average, trend, and instability	Higher average income is correlated with higher trend and lower instability
Benus (1974)	Families in first five PSID waves, 1968–1972, with same family head who works in all years	Instability in head labor earnings and total family income measured as variance of deviation of trend from regression residuals	Instability higher for those with low permanent income, farmers and the self-employed, younger heads, and those in areas of high unemployment; instability of total family income largely driven by head labor income, little offset from other income sources except transfers
Mirer (1974)	Families in 1967–1969	Instability of total family income measured as standard deviation of residuals from a regression with a year trend	Instability negatively related to expected income, instability largely driven by head labor income with spouse labor income playing little role
Lillard and Willis (1978)	Prime-age working male heads, 1967–1973	Error components model for earnings with random permanent effect and AR(1) transitory effect	Permanent component explains 73 percent of residual variable. Significant AR(1) component and high degree of mobility.
Hall and Mishkin (1982)	Families 1969–1975	Error components model of total after-tax family income decomposed into deterministic portion, unit root, and stationary transitory component	Significant variances of unit root and transitory components with evidence for MA components of latter
MaCurdy (1982)	Prime-age white married working male heads, 1967–1976	Error components model for earnings with random permanent effect and ARMA transitory effect	Low-order ARMA fits the data
Abowd and Card (1989)	Prime-age working male heads, 1969–1979	Error components model for earnings with unit root permanent effect and MA(2) in transitory effect changes	Nonstationary unit root and MA(2) model fits the data best
Carroll (1992)	Families with prime-age heads, 1968–1985	Error components model for labor income with a unit root and a transitory error	Variances of permanent and transitory shocks approximately equal
Baker (1997)	Prime-age working male heads, 1967–1986	Error components model of earnings with tests for random growth versus random walk	Rejects random walk in favor of random growth
Geweke and Keane (2000)	Prime-age working male heads, 1968–1989	Error components model with non-Gaussian shocks for earnings with random permanent effect and autoregressive transitory effect	Most cross-sectional earnings differences are explained by transitory shocks but lifetime differences explained but individual heterogeneity
Meghir and Pistaferri (2004)	Prime-age working male heads, 1968–1993	Error components model for earnings allowing ARCH effects in permanent and transitory shocks	Strong evidence for ARCH effects
Guvenen (2009)	Prime-age working male heads, 1968–1993	Error components model for earnings with focus on testing for heterogeneous income profiles model	Finds support for heterogeneous income profiles
Bonhomme and Robin (2010)	Working male heads, 1978–1987	Nonparametric estimates of the density of permanent and transitory earnings in an error components model	Densities are non-Gaussian, with higher modes and fatter tails
Browning, Ejrnæs, Alvarez (2010)	Prime-age white male working high school heads, 1968–1993	Error components model for earnings with features to incorporate additional types of heterogeneity	Data show more heterogeneity than that using simpler models
Hryshko (2012)	Prime-age working male heads, 1968–1997	Error components model for earnings with new tests for unit root process versus heterogeneous profile process	New tests provide support for the unit root process
Arellano, Blundell, and Bonhomme (2017)	All families 1999–2009	Allows nonparametric first-order Markov process for persistent component of total family earnings	Finds strongest persistence among high-earnings households experiencing large positive shocks and among low-earnings households experiencing large negative shocks

NOTE: AR(1) = first-order autoregressive pattern; MA = moving average; ARMA = autoregressive moving average; ARCH = autoregressive conditional heteroskedasticity.

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TABLE 2

PSID Studies of Volatility with Focus on Calendar Time Trends

Study	Sample	Method	Findings
Permanent-transitory decomposition			
Gottschalk and Moffitt (1994)	White male heads, 1970–1987	WA method applied to earnings	Equally large increases in the permanent and transitory variance from 1970–1978 to 1979–1987
Moffitt and Gottschalk (1995)	White male heads, 1970–1987	Error components model of individual earnings with unit root permanent effect and ARMA transitory effect	Same as 1994 paper
Gittleman and Joyce (1999)	Families, 1968–1991	WA method applied to total family income	Both permanent and transitory components grew (former slightly greater than latter), from 1967–1979 to 1980–1991
Haider (2001)	White male heads, 1967–1991	Error components model with heterogeneous growth component	Equal split of growth of permanent and transitory effects but transitory did not grow after 1982
Hyslop (2001)	Married couples, 1979–1985	Error components model allowing husband and wife permanent and transitory components to be correlated	Permanent and transitory variances of men rose equally over the period, while permanent variances of women did not rise but transitory variances did
Moffitt and Gottschalk (2002)	Male heads, 1969–1996	Same error components model as Moffitt and Gottschalk (1995)	Permanent variance rose over the whole period, but transitory variance declined in the 1990s
Keys (2008)	Male and female heads and families, 1970–2000	WA method applied to head earnings and family income	Permanent and transitory variances of male earnings rose from 1970 to 1990 but usually flattened out in the 2000s. Permanent variances for female heads fell and their transitory variances rose a small amount. Permanent and transitory variances of family income rose.
Gottschalk and Moffitt (2009)	Individual earnings and family income, 1970–2004	WA method for male earnings and family income, percentile point method for women	Male transitory variance rose from the 1970s to the late 1980s, flattened out and rose starting in the late 1990s. No clear trend in variance for women. Strong upward trend for transitory variance of family income.
Heathcote, Storesletten, and Violante (2010)	Heads and spouses, 1967–2006	Error components model of earnings with unit root in permanent component	Upward trends in permanent and transitory variances, differ somewhat by estimation method
Moffitt and Gottschalk (2012)	Male heads, 1970–2005	Error components model of earnings together with WA and nonparametric method	Transitory variance increased from the 1970s to the mid-1980s, then remained at this level through 2005
Jensen and Shore (2015)	Male heads, 1968–2009	Error components model of earnings with evolving permanent effect and correlated transitory effect that captures heterogeneity in permanent and transitory variances	Variances have not risen for most of the population but have risen strongly for those with high past volatility levels
Gross volatility			
Dynarski and Gruber (1997)	Male heads, 1970–1991	Variance of residuals from a first-difference regression of earnings	Variance rises over time, punctuated by business cycles
Shin and Solon (2011)	Male heads 1969–2006	Standard deviation of two-year change in earnings residuals	Variance rose in the 1970s, peaked in 1983, declined through approximately 1997, rose thereafter
Dynan, Elmendorf, and Sichel (2012)	1967–2008	Standard deviation of two-year arc percent change	
	Male heads	Labor earnings	Strong increase from 1970 to 1985, followed by slower trend upward punctuated by periods of decline
	Female heads and spouses	Labor earnings	Sharp decline through early 1990s, slower rate of decline thereafter
	Household	Combined head and spouse labor earnings and income	Steady upward trend interrupted by decline in late 1980s and early 1990s (combined head and spouse labor earnings) and slow trend upward except for a large jump upward in the early 1990s (household income)

NOTE: WA method = window averaging method. Within a fixed interval of years, the variance of the permanent component is calculated as the variance of average earnings and the variance of the transitory component is calculated as the variance of the deviations of actual earnings from average earnings.

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TABLE 3

Non-PSID Studies of U.S. Volatility with Focus on Calendar Time Trends

Study	Sample	Method	Findings
Gross volatility			
Bania and Leete (2009)	SIPP households from 1991–1992 and 2001 panels	Calculates coefficient of variation of monthly household income over 12-month periods	Volatility rose over time mostly for low-income households
Sabelhaus and Song (2010)	Social Security individual earnings data, 1980–2005	Gross volatility calculated as the variance of changes in log earnings	Volatility fell over the period
Dahl, DeLeire, and Schwabish (2011) ^a	Social Security individual earnings data, 1984–2005	Volatility measured as dispersion of arc earnings changes greater than 50 percent between years	Volatility declined in late 1980s and then more gradually through 2005
Ziliak, Hardy, and Bollinger (2011)	Matched CPS data, 1973–2009	Volatility measured as standard deviation of arc earnings change	Male volatility rose from the early 1970s to the mid 1980s, was at same level by 2009. Female volatility declined over the entire period.
DeBacker et al. (2013)	Tax returns merged with male primary or secondary earner W-2 data, 1987–2009	Standard deviation of percent change in earnings for men	Fluctuations in several year intervals around a stable trend
Celik et al. (2012)	LEHD (UI earnings records) in twelve states, 1992–2008, compared to CPS, SIPP, and PSID. Men only.	Standard deviation of change in log earnings residuals	LEHD shows little or no change in volatility, 1992–2008. PSID and CPS show rising volatility from 1970s to early 1980s, subsequent declines, and then resumption of increase starting in early 2000s (PSID) and 2006 (CPS). SIPP shows declines, 1984–2006.
Hardy and Ziliak (2014)	Matched CPS data, 1980–2009	Variance of arc percent change of household income	Volatility doubled over the time period, most pronounced among top incomes
Permanent-transitory decomposition			
Sabelhaus and Song (2010)	Social Security individual earnings data, 1980–2005	Permanent variance identified change in variance of change in log earnings by lag length	Both permanent and transitory variances fell over the period
DeBacker et al. (2013)	Male primary or secondary earner W-2 data merged with IRS tax return data, 1987–2009	Two WA methods plus error components model applied to earnings and household income	Permanent variance of male earnings rose but transitory was stable around fluctuations. Transitory variance of household income rose by a modest degree.
Hryshko et al. (2017)	Married couples in matched SSA-SIPP data, 1980–2009	WA method for estimating transitory variance of earnings	Husband volatility fell 1980–2000, then rose, small net positive. Couple earnings volatility fell more, net decline/

NOTE: LEHD = Longitudinal Employer-Household Dynamics.

^aThe authors also conducted an analysis of household income volatility using matched SIPP-SSA data from 1985 to 2005, finding stability over that period.