It Ain't Got That Swing: Trends in Earnings Instability and Volatility

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Abstract

A growing literature examines trends in economic volatility, but the research to date has not been synthesized due to the use of different measures, data sets, time periods, and especially the sensitivity of apparently similar measures to seemingly minor methodological decisions. Using the PSID and a common set of methodological decisions, this chapter presents new trends in several types of instability measures—including short-term mobility measures, measures of earnings dispersion between and within individuals, estimates from multiple models of earnings dynamics, and a new measure of "pivot volatility". I present trends for both men and women, many of them the first to cover thirty years or more. The evidence provides little indication of a recent "risk shift" in the economy. For the typical male, earnings volatility probably increased by no more than a third between the early 1970s and the early 2000s. Among men without self-employment earnings, the increase in volatility was confined to the 1970s and early 1980s. The risk of a sudden drop in earnings grew modestly through the early 1980s but has been flat since. Among women, labor income volatility *declined* by as much as a quarter. The timing of the increase among men does not match accounts that claim wage and salary workers' security has recently deteriorated. Nor does the overall increase appear as large as some previous studies have implied. The typical earnings reversal over a short-term window increased only from 12.5 percent to 13.8 percent, and even when self-employment earnings are included, the increase was only from 14.1 to 17.7 percent. Other evidence suggests that volatility levels were probably higher prior to 1960 than after 1970, and they were probably similar in 2008 as in 2002 or 2004. My results—which show that different measures of volatility, properly estimated, yield similar conclusions—are broadly consistent with earlier studies, save a few oft-cited papers that find bigger increases using the PSID.

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Chapter 2
It Ain't Got That Swing: Trends in Earnings Instability and Volatility

Scott Winship, Doctoral Dissertation

In the typical non-elderly American household, nearly all income comes from earnings, the vast majority of it from wages and salaries.[1] Understanding whether or not economic instability has increased, then, begins by examining trends in individual earnings mobility and volatility. This chapter provides new trend estimates using the measures typical of each line of past research. The results are all based on a common dataset and common methodological choices in order to determine where consistent conclusions can be drawn. I provide trends for men and women separately and combined. For several measures of mobility and volatility, my estimates for women are the first of their kind, and I provide the longest time series to date for many other measures. I also provide a new measure of "pivot volatility" that captures the concept of volatility better than any measures used to date.

My results are broadly consistent across measures, and with the bulk of previous research, though they add important context that helps explain differences across the research. I find evidence that the risk of a large earnings drop increased very modestly over the 1970s and early 1980s among men, but that there has been no secular increase since then. While volatility may have been greater for the self employed, earnings volatility probably increased by 20 to 30 percent among wage and salary workers, which translates into minimal change in the experience of the typical worker. All of this change occurred before the mid-1980s. Earnings instability has declined among women. There is little indication of a "risk shift" since the early 1980s.

Previous Research

The research on earnings instability spans a number of distinct research literatures, including mobility scholarship, studies of economic insecurity, efforts to model earnings dynamics, and macroeconomic modeling using heterogeneous agents. Summarizing the literature and making sense of it—identifying and explaining inconsistencies—is a formidable challenge. In Appendix One, I present an extensive review of previous research on earnings instability. I summarize my conclusions from that review here.

Short-Term Directional Mobility

A number of studies examine trends in short-term downward and upward mobility, measured in either relative or absolute terms. Short-term relative mobility involves upward or downward movement in rank within the earnings distribution over a period of five years or less. For most measures used, upward and downward relative mobility need not balance each other out, since they are typically defined in terms of moving from a top or bottom quantile into any of several other quantiles. Mobility out of the bottom quintile, for instance, need not be matched by mobility from the top quintile, because there are movements from the middle three quintiles as well.

Short-term relative mobility declined during the postwar period, through the early 1960s, with downward mobility declining through the mid-1960s (Kopczuk et al., 2009). Upward and downward mobility followed cyclical patterns from the 1970s forward, with upward mobility trending downward from the mid-1970s to the early 2000s but downward mobility changing little beyond a drop in the early 1980s. Kopczuk et al.'s results did not disaggregate men and women. Buchinsky and Hunt (1999) found declines in downward relative mobility from the top of the earnings distribution and upward relative mobility from the bottom over the 1980s for men and women.

Turning to absolute mobility—the likelihood of experiencing a large earnings gain or drop over five years or less—Dahl et al. (2007) find that downward mobility also declined during the first half of the 1960s and then increased, declining over the decade as a whole. Downward absolute mobility probably increased among men in the 1970s (Dahl et al., 2007; Dynan et al., 2007; Hacker, 2007). However, the 1980s featured little change in upward or downward mobility, or perhaps declines in one or both. Results from the 1990s are inconsistent, but it appears that there was either little change or a decline in downward absolute mobility at the same time that there was little change or an increase in upward absolute mobility. The first years of the current decade, marked by the 2001 recession, featured increases in downward absolute mobility and declines in upward absolute mobility. As with directional measures of relative mobility, downward and upward absolute mobility show strong countercyclical patterns. The results of Dahl et al., using Social Security administrative data, conflict with the PSID-based studies of Dynan et al. and Hacker over the period as a whole, with Dahl et al. finding a decline in downward and upward absolute mobility from 1980 to the early 2000s instead of an increase.

Short-Term Non-Directional Mobility

As with directional relative mobility, short-term non-directional relative mobility declined from the late 1940s through the early 1960s, then began increasing, probably reversing the early '60s decline, though there are inconsistent findings at the end of the 1960s.[2] All but one study find increases in non-directional mobility over the 1970s.[3] Non-directional mobility declined during the 1980s and in the early 1990s before flattening out through the early 2000s.[4]

Non-directional absolute mobility increased in the 1970s among men, but most studies show flat or declining mobility over the 1980s. Trends thereafter are inconsistent.[5] Studies using measures of intertemporal earnings association—correlations between incomes measured one or a few years apart—are remarkably inconsistent, and little can be said about how the correlation has changed since the late 1960s. Prior to 1960, Kopczuk et al. (2009) found very large declines in mobility, but we have no other pre-1960 studies, so we cannot be sure their results would hold up using other data or methods.

Dispersion of Earnings Changes

Rather than focus on trends in the likelihood of experiencing a change of a given size, up or down, in earnings, other studies look at the entire distribution of earnings changes and see whether it has widened over time. Most research finds that male earnings instability measured this way increased during the 1970s.[6] Dynan et al. (2008) find a small decline for women.

The research also tends to find increases in male earnings volatility during the early 1980s recession, followed by declines over the mid-1980s.[7] It disagrees as to whether volatility rose or fell over the decade as a whole. According to Dynan et al.'s and Dahl et al.'s results, earnings movement among women declined steadily during the 1980s.

Male earnings volatility rose temporarily during the early 1990s recession, but there is little consistency across studies in the trends found over the rest of the decade, except that it rose late in the decade and in the early 2000s.[8] Dahl et al. and Dynan et al. found declines among women over the 1990s and early 2000s. As was the case for the research on short-term directional mobility, the Dahl et al. study disagrees with the PSID-based studies after the early 1980s in finding little change in male volatility. The research generally agrees that this measure of volatility follows a cyclical pattern similar to that found for directional mobility.

Within-Person Earnings Dispersion

Measuring how the typical person's earnings vary over time corresponds more closely with the concept of volatility than the above measures do. Among men, within-person dispersion of earnings grew over the 1970s and the 1980s, with counter-cyclical increases in the early 1980s and the early 1990s. There was probably little change thereafter, though the various studies are not entirely consistent.[9] Among women, Gosselin (2008) found that volatility was flat in the 1970s and declined in the subsequent decades. Studies combining men and women consistently show increases in volatility in the 1970s, but there is little agreement about what happened thereafter.

Across-Person Dispersion of Earnings Shocks

As noted in the introduction, a sizable literature models earnings dynamics as processes subject to "shocks", and dispersion in these shocks constitutes another measure of volatility. Nearly all of the research in this tradition focuses on male heads, and nearly all of it relies on the PSID. Volatility by these types of measure was either flat or increasing over the 1970s. Most studies find rising volatility in the 1980s, though several find a flat or declining trend. Most notably, two studies that use Social Security Administration data rather than the PSID show a decline over all or part of the 1980s (Gottschalk and Moffitt, 2007; Mazumder, 2001). The research generally agrees that volatility rose in the early 1980s recession and declined in the mid-1980s. The research also consistently shows that volatility increased during the recession of the early 1990s and over the course of the decade. The evidence is inconsistent as to whether it increased in the early 2000s. Among the studies that span the years in the PSID, male earnings volatility increased by 15 to 65 percent from the early 1970s to the early 2000s. Kopczuk et al.'s (2009) results imply that volatility was higher before 1960 than it was in subsequent decades.

Summary of Previous Literature

The 1970s appear to have been a bad decade for men: more downward earnings mobility and more volatility. Volatility may have also increased among women. Since 1980, downward and upward mobility have followed a cyclical pattern, and the secular change has been minimal. However, volatility as measured by the within-person dispersion of earnings or by dispersion of shocks to earnings appears to have increased between 1980 and the early 2000s.

This conclusion, however, relies on evidence that may be incomplete in several ways. First, the PSID-based studies, which constitute much of the research, rely on a survey with a number of features that greatly complicate its use in research on volatility and mobility, and which has often produced findings that differ from those obtained from Social Security Administration data. As a result, PSID-based results may not accurately portray trends in earnings instability. This could be true either because of problems with the PSID data itself or because of the methodological decisions that past researchers have made. My analyses in this chapter attempt to improve on the methodological decisions used by previous researchers and to standardize them across different types of mobility and volatility measures.

The second question is whether the within-person dispersion measures typically used or the model-based measures of dispersion of shocks adequately differentiate between trends in earnings growth and trends in volatility per se. Finally, the existing research is sparse in certain aspects. Most obviously, there is much less research on trends among women than among men. Furthermore, for some measures there exist no time series that include estimates for men and women separately as well as combined. In addition, some of the literatures do not extend as far back as the data allows or as far forward. The estimates I present here are an attempt to fill in these gaps.

Methods and Data

My goal for this chapter is to see what internally and externally consistent conclusions may be drawn about trends in earnings movements when various measures used in previous research are examined using a single dataset, both aggregating and disaggregating men and women, applying consistent methodological decisions, and taking great care in making those decisions.[10] All of my STATA programming files and my PSID extract are publicly available at www.scottwinship.com. To anticipate a major result of my experimentation, it is particularly important for consistency of trends that very low earnings be appropriately trimmed. Furthermore, there appear to be sound theoretical reasons for excluding individuals with no reported earnings from analyses for purposes of understanding trends in volatility and instability.

Data

Like most of the studies reviewed in Appendix One, I use the Panel Study of Income Dynamics (PSID), conducted by the University of Michigan's Institute for Social Research. The PSID interviewed a representative sample of nearly 3,000 households from the lower 48 states in 1968 (the "SRC sample"), along with another sample of nearly 2,000 low-income non-elderly households from metropolitan areas and southern rural areas (the "SEO sample"). Until 1997, surveyors conducted annual follow-up interviews with these respondents, tracking families as they moved, incorporating new family members as needed, and following adult children who left home to form their own households. Over the course of 1997 and 1999, PSID administrators added a sample of 511 families that had immigrated to the U.S. after 1968 in order to make the survey representative of the 1997-99 population. The PSID also went biennial after 1997, with surveys in 1999, 2001, 2003, and 2005.[11] Because analysis of PSID data must overcome a number of subtle and obscure pitfalls, I discuss the data in detail in this section to facilitate greater consistency in future research on earnings and income changes.

PSID users must first decide whether to confine themselves to the SRC sample or use the entire "core" sample, which includes the SEO and immigrant samples.[12] The PSID data includes weights that are designed to adjust for differential sampling probabilities and attrition in the entire core sample. Using the weighted core sample has both benefits and costs. On the benefit side, it maximizes sample size and adjusts for attrition. It also adjusts for other changes in the PSID sample from year to year. For instance, in 1990, 1992, 1993, and 1994, surveyors made concerted recontact efforts that resulted in the successful re-incorporation of several thousand attriters back into the survey. In 1990, 1993, 1994, 1996, 1997, and 2005, the PSID's rules for following household members that move were adjusted, and in 1994 the sample was redefined to include additional children. The SEO sample was also reduced for budgetary reasons in 1997. These changes produce "seams" in the data that make year-to-year comparisons potentially problematic.[13]

Using the entire core sample also has costs. The initial selection of the SEO sample involved significant departures from random probability sampling.[14] Even absent this problem, using weights introduces inconsistencies into the data. The weights are designed with some correction for attrition, with adjustments made every five years from 1969 to 1989, in 1999, and in 2005.[15] But because people enter and exit the PSID sample from year to year, using weights designed for year *t* to estimate earnings changes between years *t* and *t'* will not adjust the sample correctly.

Unequally spaced recontact efforts and introduction of a post-1968 immigrant sample make this issue even more problematic. From 1993 to 2003, respondents who were successfully added as part of the 1993 and 1994 recontact efforts were given weights only if they had been present in the 1989 wave. But in the 2005 data, weights were assigned to these respondents (the PSID weights were recently adjusted so that the 1993 to 2003 weights are consistent with the 2005 ones, but few papers cited in Appendix One were written before this change was made).[16] Furthermore, with the incorporation of the immigrant sample, the weights use post-stratification to make the PSID sample nationally representative. Prior to 1997, the sample in any year is supposed to be representative of noninstitutionalized Americans alive in 1968, plus their descendants. From 1997 onward, the weighted PSID sample is supposed to be representative of the noninstitutionalized U.S. population for a given year.[17]

To determine which option would provide the most accurate results, I compared trends in total earnings variances in the Annual Social and Economic Supplement to the Current Population Survey to trends using the SRC sample and the full weighted core sample.[18] Looking at levels and trends in the variance of male wages, male earnings, and female earnings, the SRC estimates were consistently as close or closer than the weighted core results to the CPS results (see Figure 1 for the SRC vs. CPS comparisons). For this reason, I chose to use only the SRC sample in my analyses. That said, I also ran my variance decomposition models using the weighted core sample, and the differences were not large.

The PSID asks detailed questions on sources and amounts of income received by a "family unit" head and the head's spouse or partner, if one is present.[19] The PSID nearly always designates the male partner of a couple as the head, apparently deviating from this convention only if he is incapacitated.[20] The earnings and income questions are fairly consistent over time, but several changes deserve mention.

Most earnings and income variables in the PSID are aggregates of component variables. Until 1976, a number of these variables are available only in categorical form, and this is true of most of them prior to 1970. From time to time the composition of aggregate measures changed, generally as component variables were split into two or more variables. This affects the measures of heads' and "wives'" labor income. From 1968 to 1983, income from self-employment appears to have been allocated between labor and asset income using a consistent approach. The approach also appears consistent from 1984 through 1992, with some labor income potentially allocated to "wives" for the first time. In 1993, however, the approach changed. And in 1994, not only did the approach change again—with the portion of market gardening income that was allocated to asset income in the past now going toward labor income, and with the portion of roomer/boarder income that was allocated to labor income in the past now going toward asset income—but labor income from businesses and farms was removed entirely from the PSID "labor income" variables for heads and wives.

I added the labor part of business and farm income back into labor income for the post 1993 surveys.[21] In addition, I estimated results that added the asset part of market gardening income back in and subtracted out labor income from roomers for all years. Finally, because of the relatively arbitrary allocation of self-employment income between asset and labor income, I also estimated results assigning all self-employment income to labor—including the asset part of heads' and wives' farm and business income. Again, the results were largely the same.[22]

The top-coding (and sometimes bottom-coding) of earnings and income component variables also changed from time to time, as did the top-coding and bottom-coding of the aggregate variables themselves. I addressed these inconsistencies by trimming the top and bottom two percent of positive earnings within age/year cells for my measures (within age/year/sex cells for estimates combining men and women).[23] It would be preferable to trim the component variables prior to aggregating them, but re-creating the component variables is often difficult, because they sometimes depend on multiple variables themselves, and one loses imputed values even where it is straightforward to re-create components. Any effect of changing top- or bottom-codes in these component variables should show up by comparing results for earnings measures made up of several components (such as male labor income) to results for measures with few components (such as male heads' wages).

Another source of inconsistency is the 1993 shift to more detailed questions for certain income component variables. Rather than the initial two-question format asking if income of a certain type was received and if so, what the amount was, a more elaborate sequence was introduced. If a respondent indicated receiving income of a certain type, he or she was asked about an amount, then whether that amount was received annually, monthly, weekly, or on some other schedule, then in which specific months the respondent received the income. This new sequence requires imputation of an annual amount if the respondent indicates any periodicity other than annually or monthly.

Imputation procedures also changed in the 1990s, as data collection, processing, and editing procedures were updated. Computer-assisted telephone interviewing (CATI) was introduced in 1993. Changes in the software used to collect, process, and edit the income data create potential inconsistencies in the data in 1994, 1995, 1999, and 2003, with the biggest potential seams between 1992 and 1993, 1994 and 1995, and 2001 and

2003 (which divide the period according to the version of data collection software used).[24]

The new income processing software led the Institute for Social Research to release supplemental "Income Plus" files for the years 1994 to 2001 that contained updated income variables that had undergone enhanced editing. After 2001, the income processing software had improved enough that supplemental enhanced files were deemed unnecessary.[25] I use the Income Plus versions of the variables in my analyses.[26] As a check against the potential problem of imputations of missing values, I conducted the variance decomposition analyses excluding incomes that incorporate imputed values. The results were not materially affected.[27]

Because so many methodological and data changes were made in the PSID in the early 1990s, volatility trends from the PSID that differ from other surveys in this period should be viewed as probable methodological errors. Research by the Institute for Social Research has shown that the introduction of CATI and new income processing software in 1993 increased income variances (with the income processing software probably more important than the switch to CATI). Compared with the CPS, income variance in the 1993 survey is suspiciously large (and greater than in adjacent years in the PSID). Percentiles below the median show one-time declines, and those above the mean show increases.[28] From 1992 to 1996 PSID income estimates at the first, third, and fifth percentiles are below the estimates from the CPS, though the opposite is the case for all other years between 1967 and 2004 and for all but the lowest percentiles even between 1992 and 1996.[29] Dynan et al. (2008) discovered a sizable jump beginning in the early 1990s in the frequency of heads reporting $0 in earnings at the same time they report working more than 120 hours. Nichols and Zimmerman (2008) also report a similar jump in the early 1990s.

Kim and Stafford (2000) enumerate the data issues during the 1990s that they urge users to take into consideration. They note that the CATI instrument used from 1995 to 2001 improved the accuracy of the data relative to the previous CATI instrument and the pencil-and-paper surveys that preceded it. They also indicate (in 2000) that the CATI instrument for 2003 onward "will be better" than the 1995-2001 instrument. The review concludes with the warning, "In brief summary, the PSID has undergone a great number of changes 1992 – 2000 and will be going through many more significant changes in the next few years. During this change process a large number of potential data seams could have arisen."

Beyond any issues with data comparability since the early 1990s, the Institute for Social Research reports that PSID income shows declines at percentiles below the median in the late 1980s that are not present in the CPS, as well as flatter increases above the median. At the very bottom of the income distribution (below the tenth percentile), the PSID and CPS trends do not match up very well between the mid-1980s and the early 1990s, with the PSID percentiles declining anomalously. There is also an up-tick in income at these low percentiles in 2004 that is not present in the CPS.[30]

Sample attrition and measurement error are also concerns in the PSID. Past research has found little attrition bias in the PSID, even though attrition rates are quite high.[31] There has been less examination of measurement error. Changes in the survey instrument and income processing software were meant to reduce measurement error, but the length of the survey interview doubled between 1995 and 1999, which would be expected to increase measurement error. These possibilities are important because measurement error can affect volatility estimates. Classical measurement error inflates measured volatility levels, so if measurement error in the PSID declined over time, this trend will understate the increase in volatility or overstate the decline. The opposite would be true if classical measurement error has increased over time. If the measurement error in the PSID is non-random, however, the effect on volatility trends is indeterminate.

Additional Methodological Considerations

In most analyses I transform earnings by taking their natural log. Using natural logs has the advantage of transforming earnings to a scale that is mean-independent. An across-the-board 10 percent change in logged earnings will not produce a change in the logged earnings variance. An enormously important problem with the log transformation, however, is that it has the effect of increasing the influence of changes in very low earnings, while reducing the influence of changes in large earnings. A non-negligible number of PSID respondents report annual earnings under $500. Year-to-year changes in measured volatility can be strongly influenced by changes in the proportion of individuals reporting such low earnings. In the PSID, there is enough year-to-year variation in low reported incomes that the problem can drive estimated changes in (log) volatility over time.[32]

Trimming earnings sufficiently before estimating volatility addresses this problem. While trimming may remove individuals with some of the biggest earnings increases or declines from the sample, there is no reason to think that the *trend* in earnings instability is biased by applying the same trim across all years. Essentially my results describe instability trends for people whose earnings always put them in the middle 96 percent of earners in the years that go into the computation of a particular instability measure.

My analyses include only persons with positive earnings in the years considered. This restriction is partly for methodological reasons – the log of a non-positive number is undefined – but also because persons who go an entire year without any earnings are likely to have done so for reasons that make their inclusion in these analyses inappropriate.[33] Setting aside people who simply misreport their earnings, they are likely to be sick or disabled, independently wealthy, homemakers, new parents, retirees, or students. Most concern over volatility *trends* revolves around what such trends imply for the structure and strength of labor markets.

Nevertheless, some persons without any earnings are discouraged workers, and volatility analyses should ideally retain such individuals. However, there is little reason to think that they represent a large fraction of those who go an entire year without earnings. One can gain some purchase on this question by looking at persons out of the labor force in the March CPS for 1993, the last year in which detailed questions are available. I focused on household heads and spouses between the ages of 25 and 59 who had not worked in over a year. Among women, two-thirds said that they were keeping house and were not currently interested in a job. Another 18 percent said they were not interested in a job for other reasons; half of them said they simply had no desire to work while most of the rest were sick or disabled. Of the remaining 15 percent, a third were ambivalent about whether or not they wanted a job (most of them homemakers). Only 9 percent said they wanted a job, and just 2 percent both wanted a job and cited problems finding work. Turning to men, 78 percent of those who had not worked in over a year said they did not want a job. That included one-third who cited illness or disability, 27 percent who simply had no desire to work, 9 percent who said they were retired, and 5 percent who were in school. Another 4.5 percent were ambivalent about whether they wanted a job, leaving 18 percent who did want a job. But even among men just 6 percent both wanted a job and cited problems finding work. Excluding persons without earnings, then, seems better than including them, unless these figures have changed significantly since 1993. That said, my data still include some people who ended or began spells of labor force nonparticipation that lasted twelve months or more but covered parts of two consecutive calendar years, giving them positive earnings in one or both years. Ideally, if the labor market's performance is the primary concern, the logic of excluding non-earners calls for omitting these individuals as well.[34]

I attempt to minimize the number of retirees and students by restricting my sample to persons between the ages of 21 and 60 during the survey (which makes them 20 to 59 years old during at least part of the calendar year for which income is reported). I chose this range as a compromise between being more inclusive and keeping sample sizes large in the PSID on the one hand, and wanting to exclude students and retirees on the other. Since labor force status is reported for the current year while earnings are reported for the previous year, excluding students and retirees directly is problematic in the recent survey years, which were conducted only biannually. Furthermore, wives' labor force status is unavailable in earlier years of the PSID. However, I ran the variance decomposition models excluding people who were students or retired both in the current survey and two years prior to the survey, bracketing the year for which earnings are reported. I also ran all variance decomposition models estimating transitory variances for individuals 18 to 64 years old. The results were negligibly affected.[35]

I adjust all earnings for inflation using the CPI-U-RS, linking it to the CPI-U for earlier years.[36]

Finally, the researcher must consider the scale of the measurements used in presenting volatility estimates. It makes little sense, for purposes of describing volatility trends, to present estimates in units of logged earnings squared, which is what variances measure. This is particularly true to the extent that one describes changes in percentage terms. In describing their income variance trends, for instance, Hacker and Jacobs (2008) write,

> Although the precise magnitude of the increase depends on the approach to measuring income variance that is used, we estimate that short-term family income variance essentially doubled from 1969-2004. (p. 2)

They note later that the increase in the standard deviation was about 40 percent rather than 99 percent. Instead of a more-than-150 percent increase between 1973 and 1993, they would have shown an increase of roughly 65 percent. Nor do they present their education-stratified estimates or their earnings volatility estimates in standard deviations.[37] I return all of my variances to the original units of logged dollars by taking the square root of the variances. While I present these results as logged dollars in all charts, I generally describe the results in terms of percentage changes in the text to make them more readily interpretable.

Nichols and Zimmerman (2008) note that different decisions about trimming and other methods affect measured volatility levels, which can affect year-to-year changes expressed in percentage terms. None of my trimming decisions or other sample restrictions were made with this issue in mind.

As a last note on presentation, all of my charts are scaled so that the levels of earnings change for similar measures may be visually compared (e.g., downward and upward mobility). Furthermore, the earnings results here and the income results in Chapter Three are consistently scaled in order to facilitate comparing changes across chapters. This presentation decision leads to a lot of empty space in some charts.

Measures of Volatility and Instability

Below I present trends in different measures of earnings instability and volatility used in previous work. I also show trends in "pivot volatility", a new measure that is intended to better capture the concept of volatility. I first show estimates of directional (downward and upward) short-term mobility (relative and absolute). I then present non-directional mobility estimates, including the association of earnings in different years. Next, I present a number of trends based on measurements of dispersion—the dispersion of earnings changes, within-person dispersion, and dispersion of transitory earnings shocks. Finally, I show trends in pivot volatility.

Relative Mobility. I first examine the probability of rising into another quintile or falling from one over two years.[38] I compute quintiles of positive trimmed earnings for each sample and each earnings measure, in every year. That is, quintiles are constructed after excluding persons outside the sample of interest (e.g., persons under age 20, persons with no earnings, men when the sample consists of women) but without regard to whether a person's earnings are observed in any other year (e.g., the second year over which mobility is measured when constructing quintiles for the first year). This approach means that quintile definitions are not consistent across my analyses, and it also means that upward mobility from a quintile need not be matched by someone moving downward into it. If sample attrition is concentrated among people with relatively high or low earnings, then my approach may indicate more mobility than actually exists. On the other hand, requiring quintile definitions to be based on adults present in both years would mean that only changes in rank relative to a person's original cohort "count" as mobility, rather than changes in rank relative to the entire labor force in a given year.

Absolute Mobility. I compute two measures of absolute mobility: the probability of experiencing a drop or gain of 25 percent or more over two years, and the probability of experiencing a drop or gain of $10,000 or more (in 2007 dollars) over two years. As with the relative mobility estimates, I do not log earnings for these analyses. Because I exclude those with non-positive earnings, I avoid the methodological problem of how to code a change from $0 to a positive amount in percentage terms. Because I trim the bottom and top two percent of observations, I avoid coding small increases from very low initial earnings as large percent changes (e.g., a doubling of earnings from $100 to $200).

Non-directional Mobility. I proceed from the directional mobility results to trends in the likelihood of moving up *or* down (in terms of quintiles or in terms of a 25 percent change in absolute earnings). I also include two measures of intertemporal earnings association: the Pearson product-moment correlation coefficient of logged earnings separated by two years, and Spearman's rank correlation coefficient.

Dispersion of Earnings Changes. Following several previous studies, I compute the standard deviation of two-year changes in logged earnings. This operationalization of instability essentially extends the absolute mobility analysis by looking at the full distribution of earnings changes. I use the difference in logged earnings rather than looking at percent changes because of the asymmetry involved in converting earnings increases and drops of the same dollar amounts to percentages. Imagine a group of three workers making $20,000, $30,000, and $40,000 in one year who each see their earnings rise by $10,000 the next year. The percent changes are 50%, 33%, and 25%. The next year their earnings fall by $10,000 each – constituting percent changes of -33%, -25%, and -20%. The standard deviation of percent changes has declined, even though earnings simply returned to their original levels.[39]

Within-Person Earnings Dispersion. For every sample member, I estimate the standard deviation of their logged earnings in a nine-year window, using the first, third, fifth, seventh, and ninth years in the window. I then use the mean of these individual standard deviations as a summary of volatility for the year on which the nine-year window is centered.[40] The earnings observations are for every other year because the PSID switched to biennial surveys after 1997. Like Gosselin and Zimmerman (2008), I require a person to have earnings in at least three out of the five years. This measure is related to the standard deviation of two-year earnings changes. It can be shown that the mean within-person variance using only years t-2 and t is equal to the variance of the two-year change multiplied by $(n-1)/2n$, where n is the number of individuals.[41]

Dispersion of Transitory Earnings Shocks. I include two sets of trend estimates for the standard deviation of transitory earnings. Researchers estimating trends in transitory variances or in the variances of innovations to transitory and permanent earnings assume that their results reflect changes in the frequency and magnitudes of these fluctuations, not changes in the long-term trajectories. These types of measures are model-driven estimates and depend on assumptions about earnings dynamics that only hold imperfectly at best. While these models are indispensable in other research contexts, they are less useful than valid and reliable direct measures for assessing how individuals experience earnings fluctuations.

One of the simplest ways of modeling earnings dynamics is the variance decomposition model of Gottschalk and Moffitt, which is the basis for my first set of transitory dispersion estimates.[42] Gottschalk and Moffitt begin with a standard model in which an individual's log earnings at a given time, y_{it}, are decomposed into a permanent component μ_i and a transitory component ν_{it}, with variances $\sigma^2_{\mu_i}$ and $\sigma^2_{\nu_{it}}$. Consider the multiplicative model,

$$z_{it} = \pi_i \omega_{it} , \quad (1)$$

where π_i is (an unlogged) permanent component and ω_{it} is (an unlogged) transitory component. Taking the log of both sides leads to the transformed equation

$$\log(z_{it}) = \log(\pi_i \omega_{it}) = \log(\pi_i) + \log(\omega_{it}) , \quad (2)$$

or simply

$$y_{it} = \mu_i + \nu_{it} . \quad (3)$$

Taking the variance of both sides gives the equation

$$Var(y_{it}) = Var(\mu_i) + Var(\nu_{it}) + Cov(\mu_i, \nu_{it}). \quad (4)$$

If the permanent and transitory components are uncorrelated, the last term drops out and the variance of income reduces to the sum of the variances of the permanent and transitory components. Furthermore, the covariance of earnings measured in two different years is

$$\begin{aligned}
&Cov(y_{it}, y_{it'}) = Cov(\mu_i + \nu_{it}, \mu_i + \nu_{it'}) = \\
&Cov(\mu_i, \mu_i) + Cov(\mu_i, \nu_{it'}) + Cov(\nu_{it}, \mu_i) + Cov(\nu_{it}, \nu_{it'}) = \\
&Var(\mu_i) + Cov(\nu_{it}, \nu_{it'}).
\end{aligned} \tag{5}$$

If there is minimal autocorrelation of transitory components over long enough periods of time, then if one chooses two years that are sufficiently far apart the covariance in Equation 5 reduces to the first term – the variance of the permanent component. One can then subtract the permanent variance from the income variance in each year to get the transitory variances. It should be reiterated that this model of earnings dynamics is exceedingly simple. In the idealized case in which there is no sample entry or exit, changes in the variance of earnings over time can *only* arise from changes in volatility.

As noted in Appendix One, Gottschalk and Moffitt actually have come to the view that this model is inadequate and instead emphasize the results from their more complicated error components model.[43] Estimating that model requires using generalized method of moments or nonlinear least squares techniques to produce earnings variance and covariance estimates that best fit the actual earnings covariance matrix observed in the data. The method essentially uses the elements of the covariance matrix as observations and attributes of the covariances as variables used to predict the covariances in a second model. Different assumptions about the dynamics of earnings and the relationships between their components imply restrictions on the model that define its equations and parameters.

The complexity of error components modeling raises the question of whether it produces estimates that sufficiently improve on those produced by the more basic variance decomposition model. Moffitt and Gottschalk (2008) present comparable results using both methods. They find disparate trends for transitory earnings variances using the two approaches. They argue that the error components model results are superior because the variance decomposition model systematically overstates the increase in permanent earnings variance, thereby understating the increase in transitory earnings variances. If the returns to permanent individual characteristics (estimated in the error components model as part of permanent earnings) are increasing but decelerating, then trends in the covariance of measured earnings will overstate the true increase in the variance of permanent earnings. Essentially, they argue that past returns to permanent characteristics affect future permanent earnings variances, which the variance decomposition model does not allow. Nevertheless, it is possible that the failure of the estimates from their different models to align more closely is due to the PSID data issues described above not being adequately addressed.

Because key volatility research in recent years has relied on Gottschalk's and Moffitt's variance decomposition model, I include estimates based on the model here in order to compare them to results using other volatility measures.

There are several important considerations when estimating Gottschalk and Moffitt's variance decomposition model. First is the lag to use between years in computing covariances. Because the PSID has been conducted biennially since 1997, one is restricted to lags of an even number of years. I present results using four-year lags. The results are not greatly affected, however, if one uses an 8-year lag. Moffitt and

Gottschalk (1995) presented evidence that covariance terms do not change much as one increases the lag, so long as it is of three or four years or more. Moffitt and Gottschalk (2008), however, showed differences in covariances if one uses a ten-year lag rather than a six-year lag. Acs et al. (2007) found that about three in five families experiencing a one-month drop in income of 50 percent or more fully recover within a year, while seven in ten recover 75 percent of their income within a year. Shin and Solon (2009) showed that if the returns to permanent individual traits vary over time, then the risk of biased estimates grows as the lag between years in the covariance term increases. This conclusion, however, hinges on the transitory component of earnings having no serial correlation. If serial correlation is present, then one should use longer lags.

Of course, one could use four-year *leads* instead of lags. The primary reason not to is that volatility estimates for 2002 and 2004 can no longer be computed, since the most recent currently available PSID survey is from 2005, and it measures earnings in 2004. But because of entry into and exit from the sample, even if the Gottschalk-Moffitt variance decomposition model accurately describes reality, using lags or leads will yield different results.

Consider the ways in practice that earnings variances can change from year to year under the model when using a four-year lag for the covariance term. A change in volatility between years *t*-1 and *t* can be caused by changes in the transitory variance or by exits from the sample between the two years, but it can also be caused by entries into the sample that occurred in year *t*-4. Workers entering the sample in year *t*-4 will not be included in the computation of the covariance or variance terms in year *t*-1 but will be included in the computation in year *t*.[44] Entries into the sample in year *t* will have no effect on the change in volatility and will, in fact, have no effect on volatility trends until year *t*+4.

This is a problem not only because young workers are continuously replenishing the labor force, but because of the PSID recontact efforts in the 1990s, which re-introduced individuals into the sample. If one computes covariance terms using a lead of four years rather than a lag of four years, then both exits and entries from the sample have an immediate effect on volatility trends. Of course, requiring individuals to have earning four years into the future means that the estimates will be for persons age 20-55 instead of 24-59, but at least the inconsistencies introduced by the recontact efforts will be mitigated. I note below the results when leads are used rather than lags where relevant.

Finally, because earnings rise as individuals gain experience and skills, the effect of age on earnings should be adjusted out in the variance decomposition models before estimating variances and covariances. To do so, I pool the PSID waves and regress trimmed logged earnings on a quartic in age, year indicators, and individual fixed effects (stratified by sex in analyses that combine men and women). I use the age coefficients to age-residualize earnings for all analyses. I have also rerun all variance decomposition analyses without the age-residualization, and the results are minimally affected.[45]

The second measure of transitory dispersion that I use is based on an error components model similar to that used by Haider (2001).[46] I model earnings as a function of age, individual fixed effects, a random growth component (individual-specific slopes), and a time-varying transitory component that follows an ARMA (1,1) process:

$$\begin{aligned} y_{it} &= f(a_{it}, t) + \mu_i + \gamma_i t + \nu_{it} \\ \nu_{it} &= \rho \nu_{it-1} + \theta \varepsilon_{it-1} + \varepsilon_{it} \end{aligned} \qquad (6)$$

This model implies that once earnings are age- and year-residualized[47], which removes the first term on the right-hand side in the equation for y_{it}, the covariance of earnings in any two years t and s is given by

$$\begin{aligned} Cov(y_{it}, y_{is}) &= Var(\mu_i) + tsVar(\gamma_i) + (t+s)Cov(\mu_i, \gamma_i) \\ &+ Var(\varepsilon_{it})\rho^{|t-s|}[1 + \theta/\rho + (\rho+\theta)^2/(1-\rho^2)] \end{aligned} \quad . \tag{7}$$

This model may be estimated by stacking the elements m of the empirical covariance matrix (including the diagonal and above), creating variables t and s to designate rows and columns, and using nonlinear least squares to estimate the model

$$\begin{aligned} m_c &= b_0 + tsb_1 + (t+s)b_2 \\ &+ \{b_3^{|t-s|}[1 + b_4/b_3 + (b_3+b_4)^2/(1-b_3^{\,2})]\}(b_5 + \sum_{j=2}^{C} d_{t=j} b_{j+4}) \end{aligned} \tag{8}$$

where the vector of dummy variables d indicates whether $t = j$. The coefficients b_5 to b_{C+4} provide the estimates of each year's transitory variance, of which I then take the square root.[48] This model is more sophisticated than some, less sophisticated than others, and I have not conducted tests to compare its fit to that of other possible models. I include these results simply to compare volatility estimates that similar models produce to estimates based on other measures of volatility and instability.

Pivot Volatility. My last set of estimates involves a new measure I developed to better capture the concept of volatility. A weakness of the volatility and instability measures discussed up to now is that they cannot differentiate between two very different kinds of earnings change: when individuals experience continuously increasing or decreasing earnings, and when rises and falls in earnings follow one another. Increases over time in the measures described thus far may be due to more volatility (the latter kind of earnings change) or due to individuals having an increasing chance of downward or upward mobility (the former kind).

To better capture the concept of volatility, I constructed a measure that is related to the measure of within-person dispersion described above. As with that measure, I focus on changes in individual earnings within a nine-year window centered on the year of interest. Once again, because of the biennial administration of the surveys after 1997, I focus on years *t*-4, *t*-2, *t*, *t*+2, and *t*+4 within the window. The basis for my measure is the concept of a "pivot", which I define as a year in which the change in earnings from the previous year is in the opposite direction from the change in the following year. In other words, a pivot year is a year where the direction of change reverses.

For the five years in my nine-year window, there are three potential pivot years—years *t*-2, *t*, and *t*+2. When one of these years is a pivot year for an individual, I compute the absolute value of the percentage change on each side of the pivot year (e.g., for year *t*-2, I compute the absolute value of the percentage change from *t*-4 to *t*-2 and from *t*-2 to *t*). I then average these two absolute values. When no pivot occurs in a potential pivot year, the average is zero. Each individual, then, has three pivot values, corresponding to the three pivot years. A person's pivot volatility is simply the average of the three values (including any zeroes). I then show trends in the mean pivot volatility across people.[49]

This measure has several attractive features. It is readily interpreted as the extent to which the average person's earnings "jump around" within a window of time. Individuals who experience relatively dramatic turns in their fortunes—experiencing, say, a large income drop after a large rise in income—will have higher pivot volatility than those experiencing a large drop after a small rise in income, who will have higher pivot volatility than those experiencing a small drop after a small rise. Individuals who experience multiple turns in their fortunes will have higher pivot volatility than those who experience a single pivot. Furthermore, the measure does not rely on mathematical concepts unfamiliar to non-researchers, such as logged earnings and standard deviations. It is based solely on percent changes and averages.[50]

The estimates I show may be roughly interpreted as the average across people of the average pre- and post-pivot percent change in earnings across possible pivot years. As awkward as this formulation is, it provides a more straightforward description of the magnitude of volatility changes over time than other measures—it allows one to readily see how big (in percentage terms) typical earnings reversals are today compared with the past.

On the other hand, the measure has some weaknesses. It is based on an arbitrary window of time, and ideally, one would not have to consider only alternating years. Furthermore, individuals must have valid earnings in each of the five years within the window, which—when combined with my trimming—means that they cannot be in the top or bottom two percent of earnings in any of the five years. Nevertheless, the measure more precisely distinguishes volatility from steady earnings change than any of the measures previously used.

Results

Downward Short-Term Mobility

I begin by estimating downward relative and absolute mobility from the PSID to compare them with the results of previous studies. Figure 2 shows trends in the percentage of family heads and their partners experiencing three kinds of earnings declines over a two-year period—a fall in the earnings quintile in which one is located, an earnings drop of over 25 percent, and a loss of over $10,000 in earnings. "Earnings" consists of wage and salary income, tips, commissions, bonuses, overtime pay, and self-employment earnings.[51]

The charts show that while downward relative mobility does not show much of a trend, the two measures of absolute downward mobility follow the same pattern, which is largely countercyclical. Averaging the figures for 2002 and 2004, roughly one in six prime-age workers was downwardly mobile by each of the measures. Compared with Kopczuk et al.'s (2007) downward mobility results (which give the percent of *all* workers—head, partner, or other—falling by *any* amount out of the *top two* quintiles), my relative mobility results are more volatile, but neither set of results shows much change in relative downward mobility. I find that relative downward mobility was 1 point lower in the early 2000s than in the early 1970s (I compare the average of 2002 and 2004 with the average of 1970 and 1972, pairs of years that bracket the cyclical unemployment peak year).

The trends in the estimated likelihood of an earnings drop greater than 25 percent shown in Figure 2 may be compared against the CBO's results using Social Security records. Overall, the trends match up reasonably well, especially considering that the CBO results include workers who transition from or to $0 in earnings. However, compared with the SSA data, the PSID figures for absolute mobility show more cyclicality, and the figures from 1994-1996 appear too high, perhaps because of methodological changes in the PSID. I show downward mobility defined in this way to have increased about 4 points between the early 1970s and the early 2000s, though there is little secular trend after the early 1980s.

One concern about using percent changes to define absolute downward mobility is that the trend could be driven by the bottom of the earnings distribution, which could be disproportionately influenced by part-time workers. If most 25 percent drops in earnings are from, say, $5,000 to $3,750, then it would be inappropriate to draw conclusions about broad societal patterns from the trend in 25 percent drops. However, as shown in Figure 2, the trends are similar if we look at the probability of a $10,000-drop in earnings.

Figure 3 shows the same trends when the sample is confined to male heads and the definition of earnings is restricted to wage and salary income.[52] Figure 4 presents trends for labor income and adds in the very small number of male spouses and partners in the PSID.[53] Figure 5 displays labor income trends for female spouses and partners. These charts show that relative downward mobility has clearly declined among both men and women when they are considered separately, notwithstanding a recent up-tick among men. That is consistent with Buchinsky and Hunt's (1999) results for the 1980s.

Among men, absolute downward mobility increased 6 to 8 percentage points from the early 1970s to the early 2000s. That absolute downward mobility rose while relative downward mobility fell may be explained by rising inequality—as earnings spread out over time, the widths of quintiles increases, making movement out of a quintile less likely for a given absolute change in earnings. Among women, however, the probability of a 25 percent drop fell over time.

The findings for both men and women are consistent with the CBO's results using trimmed SSA data, and the declines in downward mobility among both groups since the early 1980s are consistent with CBO's estimates using the full SSA dataset (Dahl et al, 2007, 2008). Women, however, experienced an increase in the likelihood of a $10,000 drop. Because the risk of a woman experiencing a 25 percent earnings decline has not increased, the trend is likely a result of women's earnings increasing over time; the women earn, the smaller a $10,000 drop is in percentage terms. Furthermore, the risk among women of a $10,000 drop in earnings is lower than other risks of income decline (and generally lower than the risks among men).

As in the SSA data, the gap between the risk that a woman will experience a 25 percent drop and the risk that a man will do so largely closes over time. Unlike the results of Dynan et al. (2007) for PSID family heads in general and Hacker (2007) for male labor income, my results for male heads' wages and for male labor income do not show an upward secular trend after the early 1980s, though my threshold for experiencing downward mobility differs from theirs. Among men, at least, the PSID figures for 1994-1996 again appear too high, especially in the case of male heads' wages. This anomaly may be related to the relatively low variance of men's wages in the PSID relative to the CPS for those years (see Figure 1).

For comparison, Figures 6 and 7 provide trends in the likelihood of experiencing earnings *gains* for, respectively, male and female labor income.[54] Relative and absolute upward mobility have not changed much among men and have declined among women. The exception is that for women, the likelihood of an absolute gain of over $10,000 again increases steadily. Upward mobility is generally more common than downward mobility.

Summarizing these directional short-term mobility results, the risk of an earnings drop of $10,000 or more has risen among both men and women. Among men, this has also translated into a rise in the risk that earnings will fall by 25 percent or more, but because inequality has grown and because the trend in large earnings losses is so cyclical, the probability of falling one or more quintiles in the earnings distribution has actually declined. Among women, the rising risk of a $10,000 drop has coincided with a *decline* in the risk of a 25 percent earnings loss, implying that the growth of women's earnings accounts for the former trend. If what matters for earnings drops is the size of percent changes, risk has increased among men and fallen among women since the early 1970s. However, there has been little secular change in risk for either since the recession of the early 1980s. The greater risk of a drop among men during the 1970s and early 1980s was not accompanied by a greater likelihood of large earnings gains. Thus far, then, the evidence suggests that any great risk shift was confined to men and to the 1970s and early 1980s.

The patterns of downward short-term mobility are reasonably consistent across measures and datasets, at least when my PSID estimates are compared with earlier results from other datasets. Where inconsistencies exist across studies, they are apparently due to minimal amount of change in downward mobility after the early-1980s recession.

Non-Directional Short-Term Mobility

Is it possible to reconcile estimates for other measures that more directly correspond to non-directional instability and volatility? The four measures of non-directional short-term mobility in Figures 8 to 11 provide a bridge between the directional mobility results above and the dispersion estimates to follow.

Probability of Earnings Change in Either Direction. Figure 8 displays trends for all heads and partners in non-directional short-term mobility. The top two lines show trends in the probability of moving up or down one or more quintiles and moving up or down 25 percent. Figure 8 clearly shows that there has been little change in the probabilities since the early 1970s, with both hovering around 40 percent. That is in contrast to the results of Kopczuk et al., which show an increase in the probability of falling from the top or rising from the bottom in the early 1970s, followed by a decline thereafter (see Figure 1 of Appendix One).

Figures 9 and 10 show the same trends for male wages and labor income, respectively. They indicate that among men non-directional relative mobility was flat or declining over the period while non-directional absolute mobility increased by roughly 5 percentage points—all of the increase occurring after the early-1990s recession.

Figure 11 shows that among women, non-directional mobility in either a relative or absolute sense declined over time. This result is unsurprising, given that Figures 5 and 7 showed declining absolute mobility in both directions among women.

The relative mobility trends for men and women are largely consistent with other studies, and again, where the previous research was contradictory (for the 1970s), the trend I find is flat. The past research on non-directional absolute mobility is sparse, but my results contradict those of Dynan et al., and my results for men contradict those of Dahl et al.

Intertemporal Earnings Association. The bottom two lines in Figure 8 show trends in two correlation coefficients—the Pearson and Spearman coefficients—each subtracted from one, corresponding to intertemporal association of logged earnings and earnings ranks. The two measures follow similar trends, indicating rising non-directional mobility, particularly during the late 1980s and early 1990s. Figures 10 and 11 reveal that the trends for men and women differ once again, with men seeing rising mobility (since 1989) and women declining mobility.

Figure 9 reveals that the rise among men disappears if one looks only at wage and salary earnings, revealing a difference that will recur in the dispersion-based measures below. Wage and salary mobility and labor income mobility take markedly different trajectories after 1990. These results imply that self-employment earnings are largely responsible for the apparent rise in mobility among men in Figure 10.[55] The literature review of previous research in Appendix One found little consistency against which to compare my results.

Overall, then, my estimates of non-directional short-term mobility indicate that it rose among men and declined among women. The likelihood of a large earnings change among men increased only after the recession of the early 1990s. Intertemporal association of male earnings has also increased since 1990, apparently driven by changes related to self-employment.

Dispersion of Earnings

The next set of measures I examine is based on dispersion of earnings or earnings changes. They correspond more closely to the concept of volatility than the mobility measures in the sense that they tend to focus on entire distributions of earnings changes across or within individuals or restrict themselves to components of earnings that are theorized to be transitory. While each of them has weaknesses as a measure of volatility, consistent results across different conceptualizations of volatility would suggest that my trend estimates are meaningful.

Dispersion of Earnings Changes. The upper line in Figure 12 measures the trend in the standard deviation of two-year changes in logged labor income. The measure shows little change over time, though a cyclical pattern is evident, with increases in volatility during most recessions. Volatility increased by just 3 percent over the thirty years between the early 1970s and the early 2000s. The pattern somewhat resembles the Dahl et al. results looking at the standard deviation of either one-year percent changes or one-year differences in logged earnings, but the resemblance would be closer if my early-1980s figures were higher, which would produce a steeper decline in volatility during the 1980s and an overall decline from the early 1980s to the early 2000s. However, the decline in the Dahl et al. study was largely due to a drop in the number of workers who reported $0 in earnings in one of the two years over which earnings change was measured. Since my results do not include persons without earnings, it is reasonable to think that Dahl et al.'s SSA figures would match mine if we treated persons without earnings in the same way. My slight increase over the entire span of years is also consistent with Dynan et al.'s (2008) finding of a slight decline among all heads and partners. The bottom line is that overall, volatility has not changed much in the past thirty years by this measure.

Disaggregating men and women, however, again leads to a different conclusion. Figure 13 and Figure 14 show trends in this same measure for male heads' wages and male labor income, respectively, indicating increases of roughly 20 percent and 60 percent from the early 1970s to the early 2000s. The trend in Figure 13 is very close to that found by Shin and Solon using the same dataset and a very similar measure, though their estimates fluctuate more because the results are shown as variances rather than standard deviations. My estimates are also qualitatively similar to those of Moffitt and Gottschalk (2008).

Between the early 1980s and 2004, Figure 13 shows a basically flat trend. Even though my PSID results include only heads, the results match reasonably well with the small decline found in the CBO results among men, especially if one factors in the effect of including $0 reports on the CBO findings. Figure 14, which includes self-employment income (unlike the CBO's SSA results), shows an increase from the early 1980s to 2004. It is unclear how to reconcile this increase with the CBO's results. The CBO found that when it included self-employment earnings after 1990, the trend in earnings volatility was unaffected.[56] On the other hand, Dynan et al.'s PSID-based research indicates that when the self-employed are included, male earnings volatility increases notably. Their 2007 paper showed a 40 percent increase in male heads' labor income volatility that dropped to a 20 percent increase when those without a business interest were excluded. Their 2008 paper found a 70 percent increase in male labor income volatility between the early 1970s and the early 2000s, which is consistent with my findings.

My results are also consistent with Dynarski and Gruber's (1997) finding that volatility rose by about a third from 1970 to 1991, though I do not find the large increase in volatility during the late 1980s that they show. Cameron and Tracy (1998) show a 17 percent increase from 1972 to 1996 (when measured in standard deviations). I show a 44 percent increase, though my trend for the 1970s is flatter than theirs, and I find a bigger increase in the early 1990s. My results are also broadly consistent with those of Abowd and Card (1989) and of Baker (1997). To summarize these results, it appears that volatility among men increased between the early 1970s and early 2000s, by about 20 to 30 percent when excluding self-employment earnings, and largely during the early-1980s. Growth in volatility was two to three times as large when self-employment earnings are included, with the difference entirely due to trends since the early 1980s.

Finally, I present results for women in Figure 15, which reveal that the overall flatness of the volatility trend in Figure 12 is the result of declining volatility among women balancing out rising volatility among men. My results align well with the CBO results for women, showing a 21 percent decline from 1981 to 2002, compared with the 20 percent decline in the SSA. The decline I find from the early 1970s to the early 2000s also closely matches that of Dynan et al. (2008).[57]

Within-Person Earnings Dispersion. Returning to Figure 12, I now examine trends in volatility measured as the average within-person standard deviation across a number of years, displayed in the second-lowest line in the chart. The trend shows a 10 percent increase from 1973 to 2000, which fell at roughly comparable points in the business cycle.[58] While my increase between 1973 and 1998 is comparable to Gosselin and Zimmerman's increase of 11 percent in the PSID, my trend along the way looks quite different from theirs, particularly given that our measures are very similar. Gosselin and Zimmerman (2008) find a sharp increase in volatility between 1986 and 1990, followed by an equivalent decline from 1990 to 1998, a pattern that is unique among all the volatility studies. Gosselin and Zimmerman's SIPP results are more consistent with my PSID estimates over this period than with their own PSID results, though the absence of data points in key years makes the comparison difficult. Gosselin and Zimmerman find a 10 percent increase in volatility between 1983 and 1996 in the SIPP, while I find no change in the PSID.

Between 1973 and 1991, Comin et al. (2006, forthcoming) show a doubling of earnings volatility (measured as an average of within-person variances) in the PSID. That increase is much bigger than the 7 percent increase I show (measured as an average of standard deviations). Unlike Keys (2008), I find similar levels of volatility in the 1980s and 1970s. The flatness of my results matches up well with the estimates of Nichols and Zimmerman (2008) when they take various transformations of earnings.

We can return to Figures 13 and 14 to consider the trend in male volatility measured as within-individual dispersion. Figure 13 shows a 20 percent increase between 1973 and 2000, which is consistent with the roughly 30 percent increase found using the standard deviation of log earnings changes. The 16 percent increase from 1974 to 1986 is an order of magnitude smaller than the 120 percent increase Gottschalk and Moffitt (1994) found for white male heads, though they report volatility in terms of average variances. Like Daly and Duncan (1997), I find higher volatility in the 1980s than the 1970s.

Figure 14 includes all labor income. As with the trend in the dispersion of male labor income changes, including income from self-employment produces a steadily increasing trend. Between 1973 and 2000, I show an increase of one-third, consistent with the 40 percent increase in the standard deviation of earnings changes over the same period.

Finally, Figure 15 displays the trend for women, which again is similar to the trend for the dispersion of earnings changes. Volatility declines 14 percent from 1973 to 2000, compared with 23 percent for the standard deviation of earnings changes. There are no previous estimates for women using this approach.

Transitory Earnings Dispersion. My final set of dispersion-based volatility estimates is comparable to previous research examining trends in the transitory variance of earnings. The second-highest line in Figure 12 shows the square root of the transitory variance of labor income when I use Gottschalk and Moffitt's variance decomposition model. Between the early 1970s and the early 2000s, volatility increased by about 15 percent. The trend is quite similar to that for the dispersion of earnings changes. The bottom line shows the trend in the transitory variance using a more complex error components model. In contrast to the variance decomposition model, this model indicates that volatility *declined* by over 20 percent.

Once again these overall patterns obscure significant differences by sex. Figure 13 shows trends for male heads' wage and salary income, and Figure 14 shows trends for male labor income volatility. Through 1990, the variance decomposition trends in the two figures track each other very well, and both clearly follow a cyclical pattern even after 1990. Both also track the trends in dispersion of earnings changes. Male heads' wage volatility increased 67 percent from 1973 to 2004 based on these estimates, while male labor income volatility increased 76 percent from the early 1970s to the early 2000s.

My variance decomposition estimates for male heads depart dramatically from Moffitt and Gottschalk's latest paper (2008). However, my estimates track Moffitt and Gottschalk's preferred error components model estimates very closely. The fact that my male variance decomposition estimates and error components estimates track each other well and also track Moffitt and Gottschalk's error components estimates too calls into question their conclusion that variance decomposition estimates of transitory variance are to be avoided, given that this conclusion stemmed from the lack of congruence between their own variance decomposition estimates and the other estimates they showed.

My results also depart from Gottschalk and Moffitt's 2006 results, which should be more comparable to mine than those in their 2008 paper. I find a 46 percent increase in heads' wage volatility from 1974 to 2002, which is notably smaller than their 145 percent increase. The difference is largely due to my taking the square root of the transitory income variances to return them to non-squared units of measurement. Putting the Gottschalk-Moffitt estimates on that scale would show an increase of roughly 55-60 percent.[59] But aside from the endpoints, the wage volatility trend in Figure 13 differs from their results in years between 1990 and 1998. I find a sizable decline in volatility between 1992 and 1993, while Gottschalk and Moffitt report a small increase, and I find a small increase in volatility from 1996 to 1998 while they find a decline. Gottschalk and Moffitt also find a bigger increase between 2000 and 2002 than I do. My variance decomposition estimates also fail to track the SSA estimates that Schwabish estimated for Gottschalk and Moffitt (Gottschalk and Moffitt, 2007).

Comparing Figure 14 with the results of Hacker and Jacobs (2008), my 75 percent increase in labor income volatility I find from 1973 to 2004 is very close to the increase they would have found if they had expressed their results in standard deviations.[60]

The volatility estimates for men using the Gottschalk-Moffitt variance decomposition model show larger secular increases than my other measures. But there is reason to think that these estimates overstate the true increase over time. A glance back at Figure 1 reveals that the total earnings variance increases among men after 2000 in the PSID but not the CPS, and my estimates indicate that the increases in the transitory variances of male earnings after 2000 are driven by increases in the total variance of earnings (not shown). Above, I noted that the CATI instrument changed in the 2003 survey, which could have introduced a discontinuity between pre-2002 volatility estimates and those for 2002 and 2004. If one compares the cyclical peak years of 1973 and 2000, the increase in wage or labor income volatility is roughly 55 percent.[61]

Furthermore, one can get a better estimate of the 1973 to 2000 change by computing the covariance term using years t and t+4 rather than t-4. When I re-computed volatility estimates using 4-year leads, I found that male heads' wage volatility and male labor income volatility increased by just 25 to 45 percent, which is similar to my estimates using other volatility measures. The difference is presumably related to the problem that leaving and entering the sample poses for variance decompositions based on covariances with lagged income, which I noted above.

Turning to the error components estimates, I find that transitory wage volatility *declined* slightly from the early 1970s to the early 2000s. Transitory earnings volatility (including self-employment earnings) increased by roughly a third.

In finding declines in transitory variances from the mid-1980s to the mid-1990s, my error components results depart notably from most earlier research, though it is worth pointing out that my estimates generally track my estimates using other measures of volatility. I find an increase of roughly 25 percent from 1973 to 2004, compared with Moffitt and Gottschalk's two-thirds increase (Moffitt and Gottschalk, 2008). Haider found an increase of roughly 60 percent in male labor income volatility (expressed in standard deviations) between 1971 and 1991, compared with my 27 percent increase, though my estimates show the same trends as his. Stevens (2001) found a 35 to 40 percent increase in male heads' wage volatility from 1973 to 1991 (expressed in standard deviations), while I find a 28 percent increase. Daly and Valletta (2008) found a roughly 15 percent increase in volatility from 1979 to 1996 among white male heads; I find a 19 percent increase among all male heads. While Mazumder (2001) finds a 25 percent increase from 1984 to 1997, I find a 15 percent decline from 1984 to 1996.

Finally, as with other volatility measures, Figure 15 shows that volatility among working women has declined. The transitory standard deviation based on the variance decomposition model was 12 percent lower in the early 2000s than in the early 1970s. The decline is clearer if the 2004 data point is discounted—25 percent from 1973 to 2000 (peak to peak) if the covariances are computed using four-year leads. The error components model indicates a decline of over 40 percent from the early 1970s to the early 2000s. Once again, there are no previous estimates to compare with these figures.

Pivot Volatility

Finally, I present my estimates of pivot volatility—the extent to which individuals experience sizable earnings reversals. These estimates are also shown in Figures 12 through 15. In general, trends in pivot volatility resemble those for within-person dispersion. The estimates reveal *very* modest increases in volatility for men. Looking at wage and salary income, the average pre- and post-pivot earnings change over a nine-year window increased from 12.5 percent to 13.8 percent between 1973 and 2000. Including all labor income increases volatility from 14.1 percent to 17.7 percent. Once again, volatility declined among women, from 21.5 percent to 17.9 percent. Overall, then, these estimates reinforce the results above, though they more clearly show how small the increase over time has been

Discussion and Conclusion

My different measures of earnings instability and volatility yield similar conclusions. Overall, there has been little change in earnings movements since the early 1970s for the typical worker, particularly in the past twenty-five years. However, this stability masks a sizable difference between trends for male and female workers.

For the typical male, downward earnings mobility (measured in terms of a large percentage decline) has increased, but the increase was largely confined to the 1970s and early 1980s. Among men with no self-employment earnings volatility increased by 20 to 30 percent using the dispersion-based estimates that are not model-driven. This increase ended in the early 1980s. The typical earnings reversal as measured by my pivot volatility measure was hardly any larger in 2000 than it was in 1973. If I include self-employment earnings, volatility continued to rise among men after the early 1980s.

Volatility including self-employment earnings rose between one-third and 60 percent among men from the early 1970s to the early 2000s. Again, however, the typical earnings reversal grew only modestly.

When self-employment income is excluded my estimates of the trend in volatility for men – increases through the early 1980s followed by a relatively flat trend – is consistent with the CBO estimates using Social Security Administration data (Dahl et al., 2007, 2008). But CBO did not find that adding in self-employment earnings altered their results. Why then, does the PSID tend to show increases in labor income volatility after the early 1980s?

The increase in labor income volatility in the PSID is due to a rise in the volatility of income from self-employment rather than to a rise in the frequency of self-employment (analyses not shown). Self-employment income in the PSID is allocated somewhat arbitrarily between labor and asset income and between heads and "wives", but the results were not much different when I allocated all self-employment income to heads' labor.

While the question remains open, one possibility is that sample attrition has biased PSID estimates over the past 15 years. However, as noted above, previous research on attrition from the PSID has failed to find any evidence of bias. The fact that the PSID did not try to survey a nationally representative sample until 1999 also suggests another possibility. Until 1997, the PSID represented the national population as of 1968 and its descendants. This population excludes nearly all post-1965 immigrants and their descendants. The PSID added immigrant samples in its 1997 and 1999 waves, and the weights were constructed to yield a nationally representative sample moving forward.

Beyond these explanations, it may also be relevant that the labor income variable in the PSID is composed of a number of component variables and that the composition of the overall variable – as well as the measurement and editing of the components – has changed over time. The variable for male heads' wages, on the other hand, remains nearly completely consistent over time. It is entirely possible that all of the changes in the PSID in the 1990s – recontact efforts, changes in following rules, a switch to more detailed survey questions, modifications to the CATI software, changing income editing procedures, budget cuts, and a more-than-doubling of the interview length – affected the composite labor income measure more than it affected the measure of male heads' wages. A final alternative is that self-employment earnings are better measured in the PSID than in the Social Security Administration data. Unfortunately there is no obvious way to determine which of these explanations accounts for the observed difference between the two data sets.

Finally, among women, downward mobility and earnings volatility declined fairly steadily over the period. The first-of-their-kind estimates I provide for trends in women's within-person dispersion and transitory earnings dispersion are consistent with the results from earlier studies that use different measurements. A reasonable interpretation of these trends is that as women became more attached to the labor force over time, increasing their hours and weeks worked, their earnings became less volatile. In results not shown, I find that these downward trends among women closely track Bureau of Labor Statistic figures on the percentage of women who work less than full time (including those who do not work at all).

My results are broadly consistent with earlier studies, save a few oft-cited papers that find bigger increases using the PSID. The evidence on earnings volatility provides little indication of a recent structural "risk shift" in the economy. Volatility among men increased during the 1970s and during the recession of the early 1980s, but there has been little secular change since then. The earlier increase may constitute a "risk shift", but its timing does not match recent accounts that argue for a deterioration in workers' security in the 1990s. Nor does it appear as large as some previous studies have implied. Furthermore, if the SSA short-term mobility estimates of Kopczuk et al. are any indication, volatility levels were probably higher prior to 1960. Earnings movement may have increased in the last twenty-five years among self-employed men. Volatility among women has declined over the period. Finally, if the indicators of risk in Chapter Five are any guide, instability and volatility were probably no worse in 2008 than in 2002 or 2004.

Of course, just because the risk-shift narrative does not appear to fit well in terms of earnings does not mean that it fits poorly in other domains, such as worker benefits or family income. The next chapter estimates trends in family income instability to see what the evidence shows.

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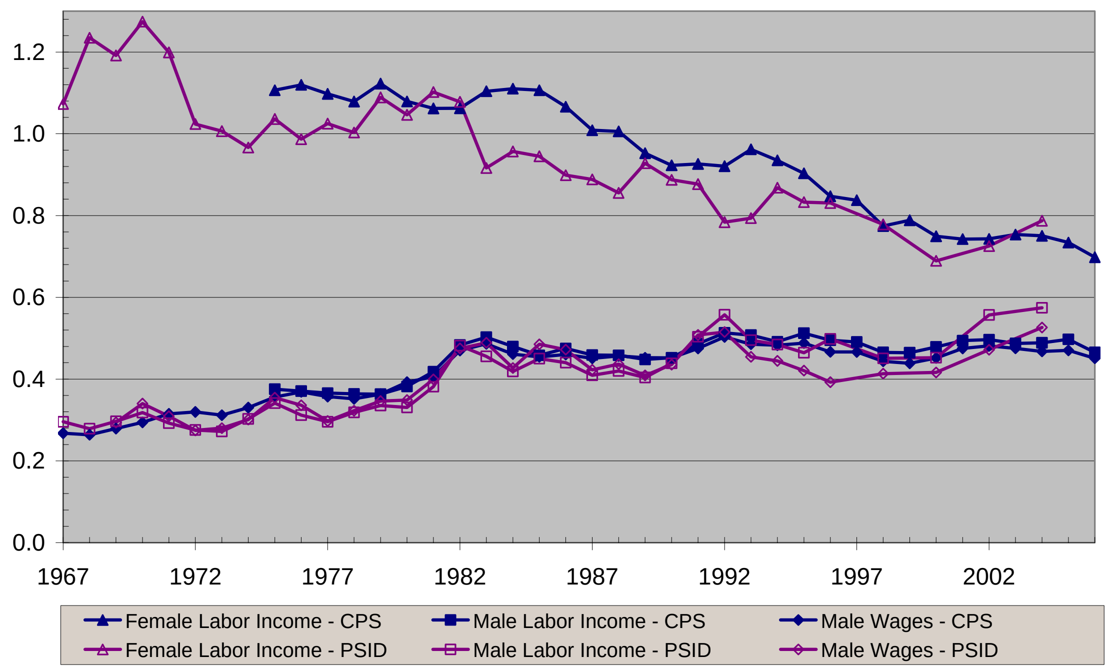
Figure 1. Total Earnings Variance, CPS vs. PSID



Source: Author's computations using PSID data and data from the March CPS (purchased from Unicon). CPS data is for household heads and their spouses, PSID data is for family unit heads and spouses.

Figure 2. Percent of Heads and Partners Experiencing Two-Year Declines in Labor Income

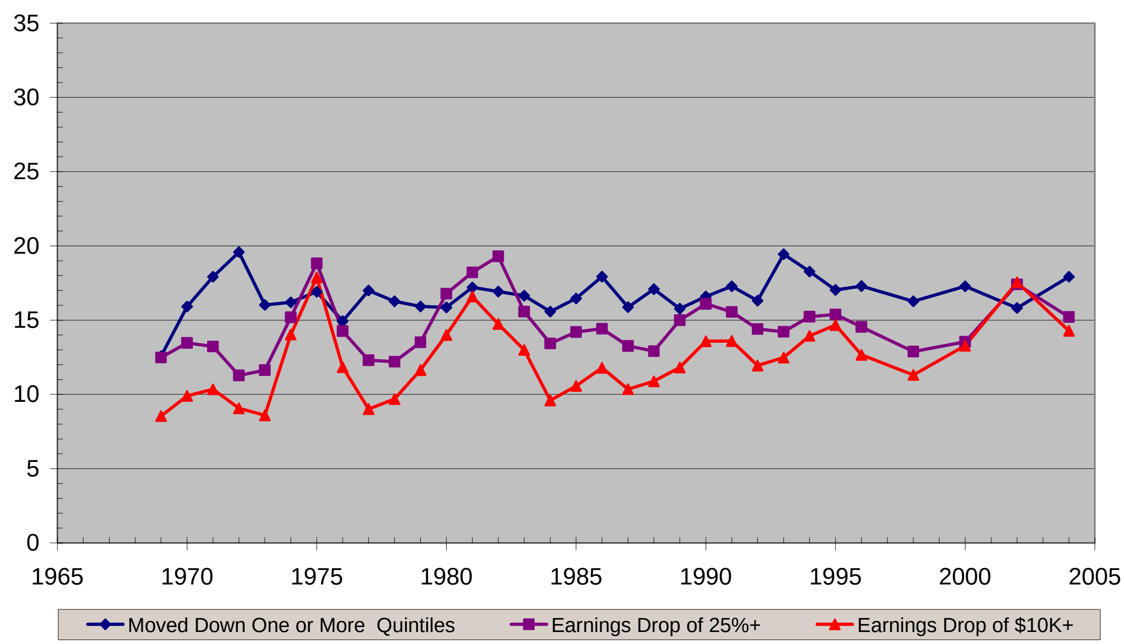


Figure 3. Percent of Male Heads Experiencing Two-Year Declines in Wage and Salary Income

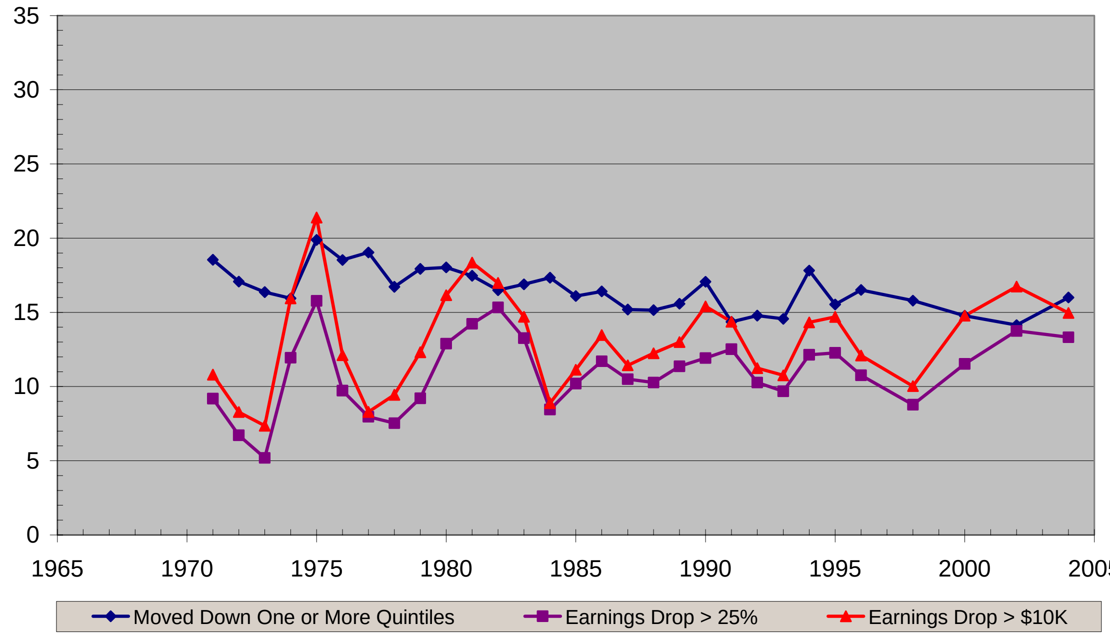


Figure 4. Percent of Male Heads and Partners Experiencing Two-Year Declines in Labor Income

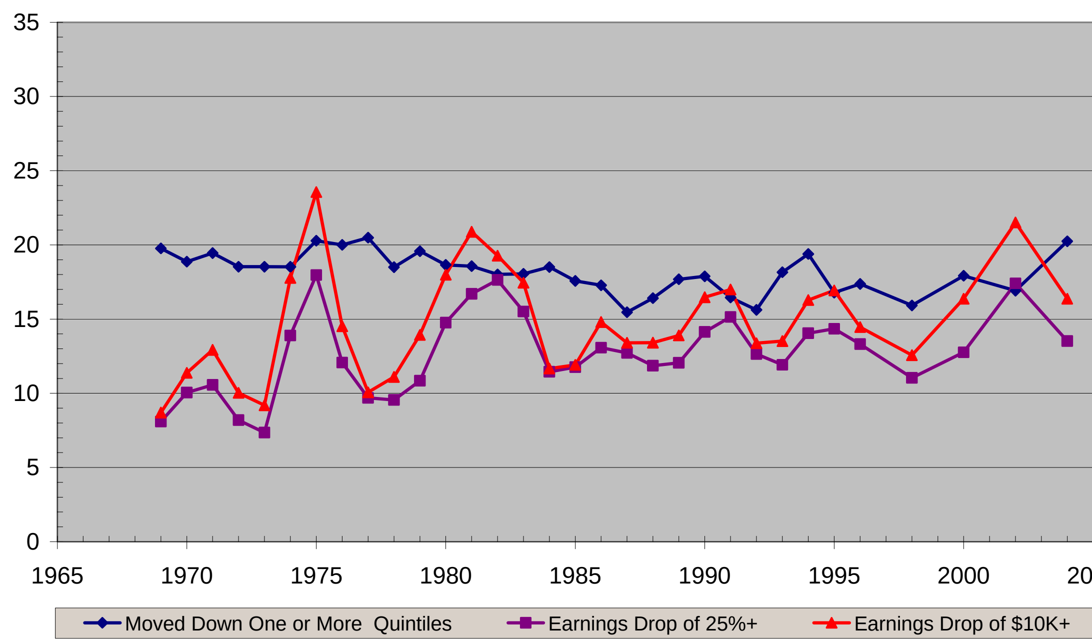


Figure 5. Percent of Female Heads and Partners Experiencing Two-Year Declines in Labor Income

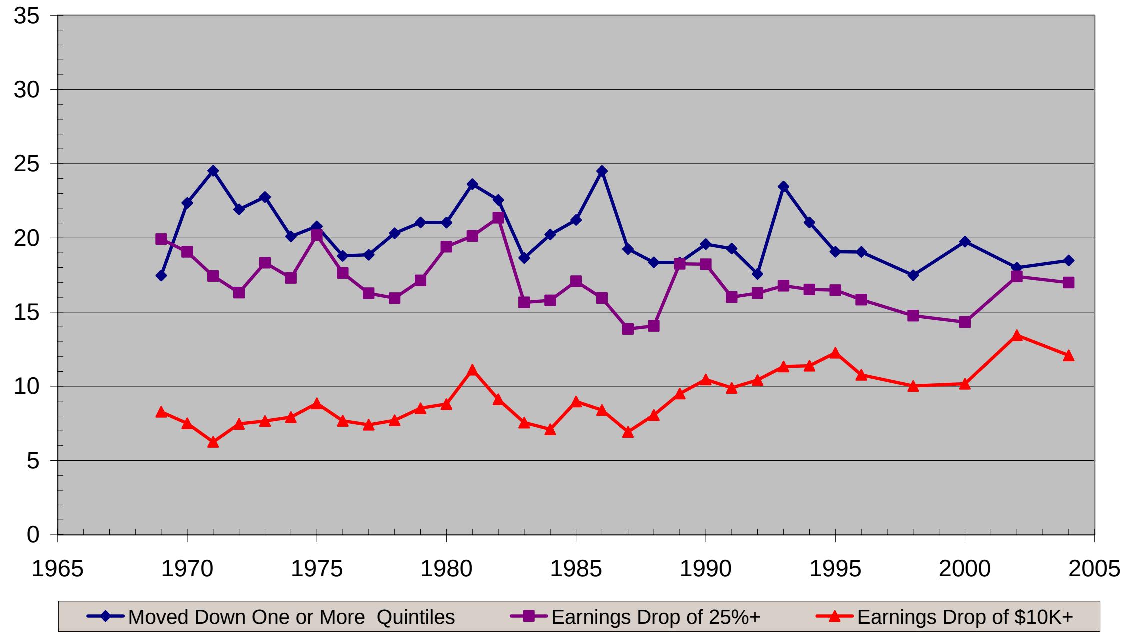


Figure 6. Percent of Male Heads and Partners Experiencing Two-Year Increases in Labor Income

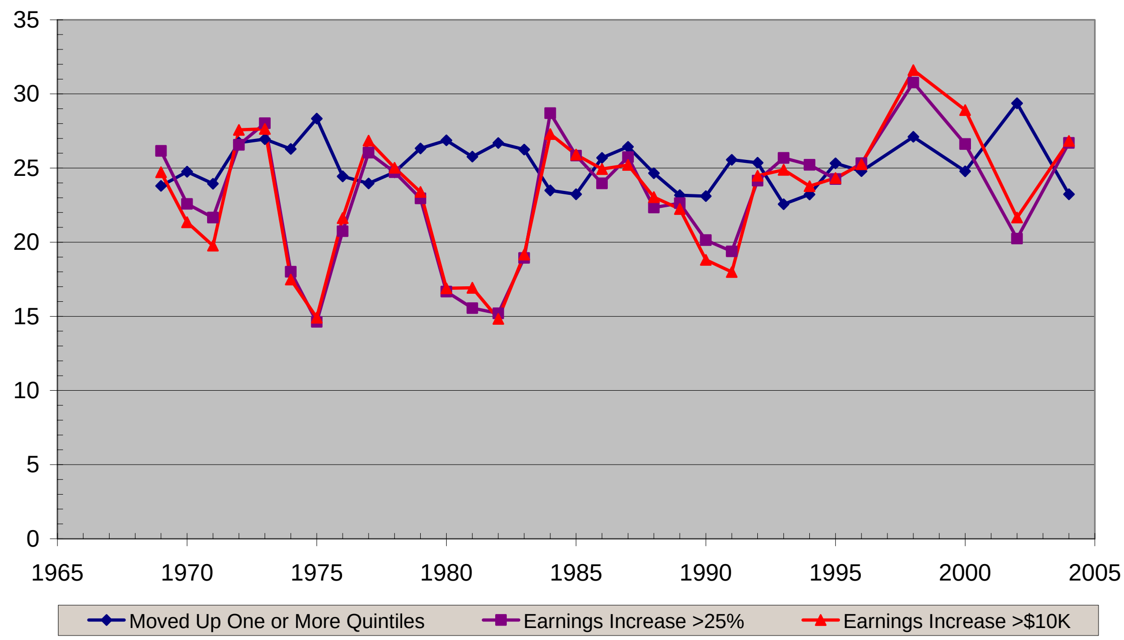


Figure 7. Percent of Female Heads and Partners Experiencing Two-Year Increases in Labor Income

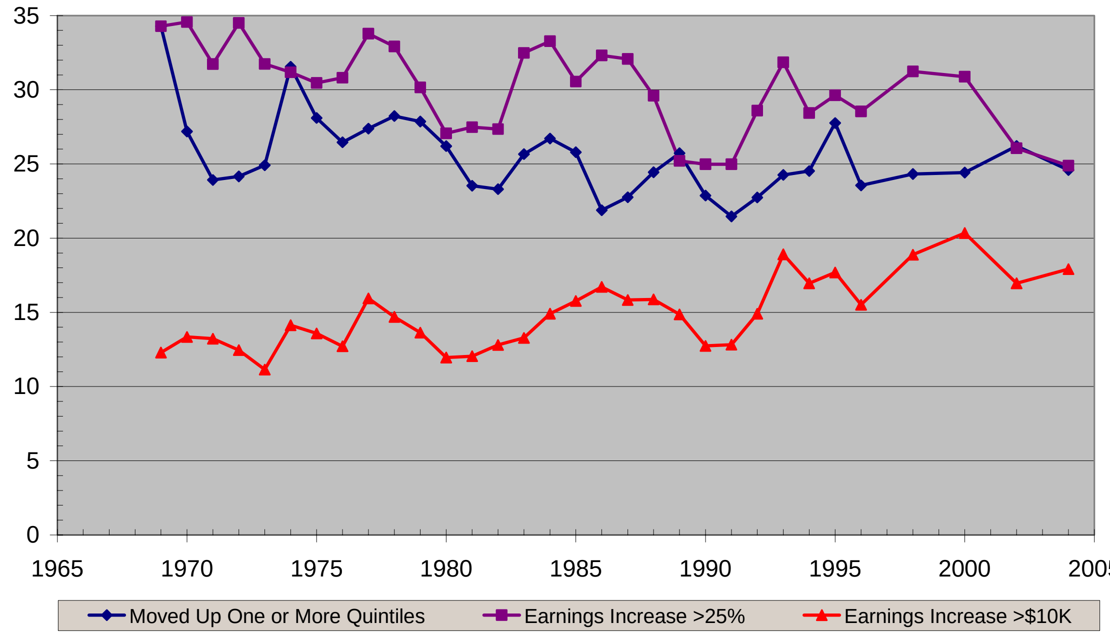


Figure 8. Non-Directional Labor Income Mobility Trends

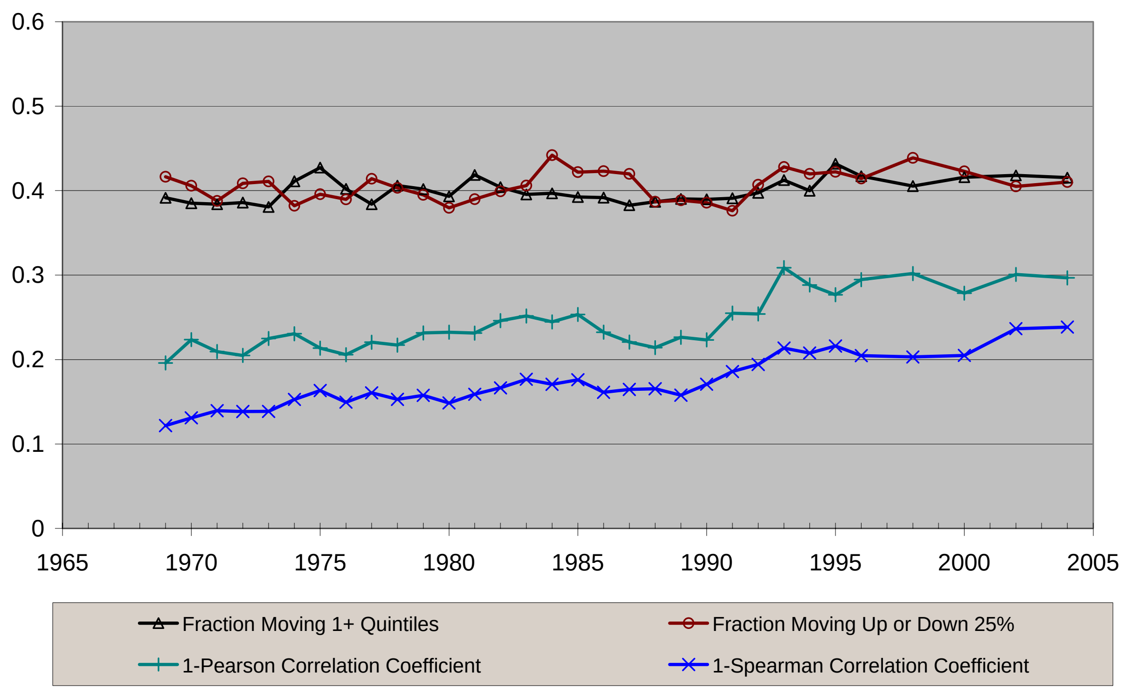


Figure 9. Non-Directional Male Heads' Wage Mobility Trends

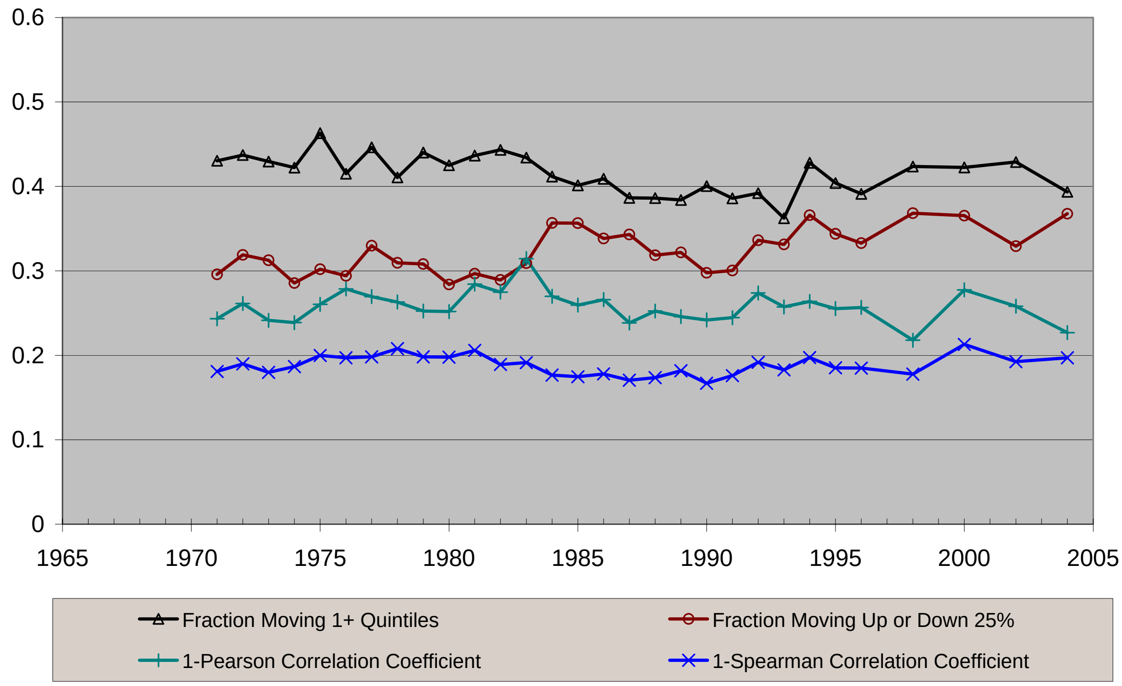


Figure 10. Non-Directional Male Labor Income Volatility Trends

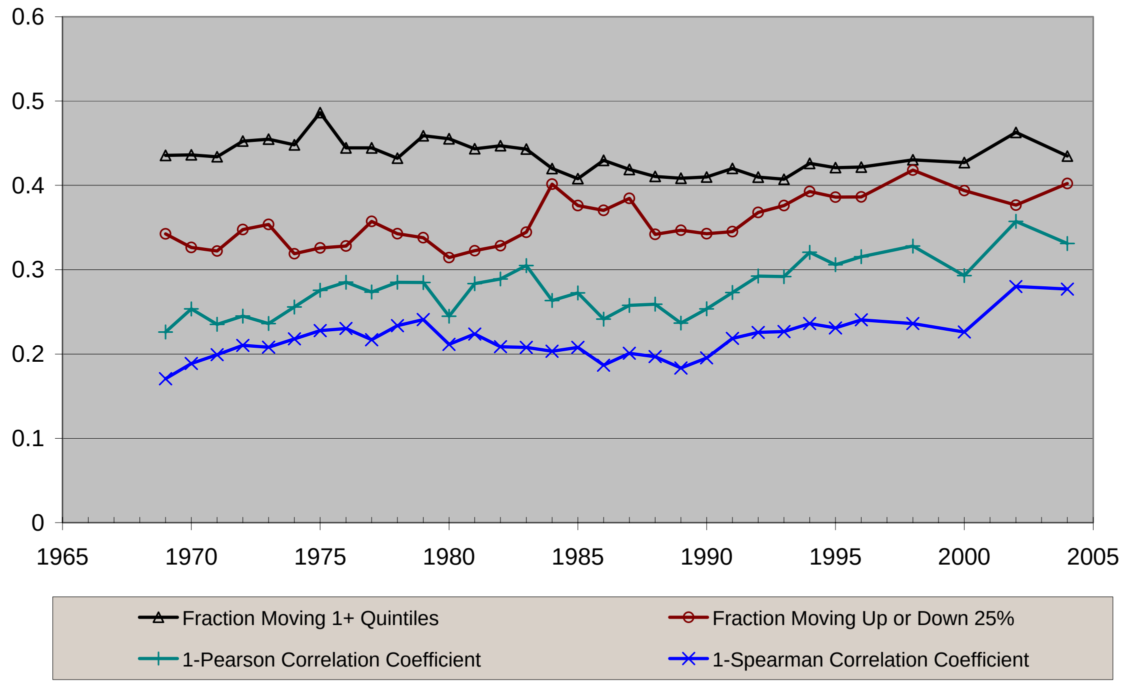


Figure 11. Non-Directional Female Labor Income Volatility Trends

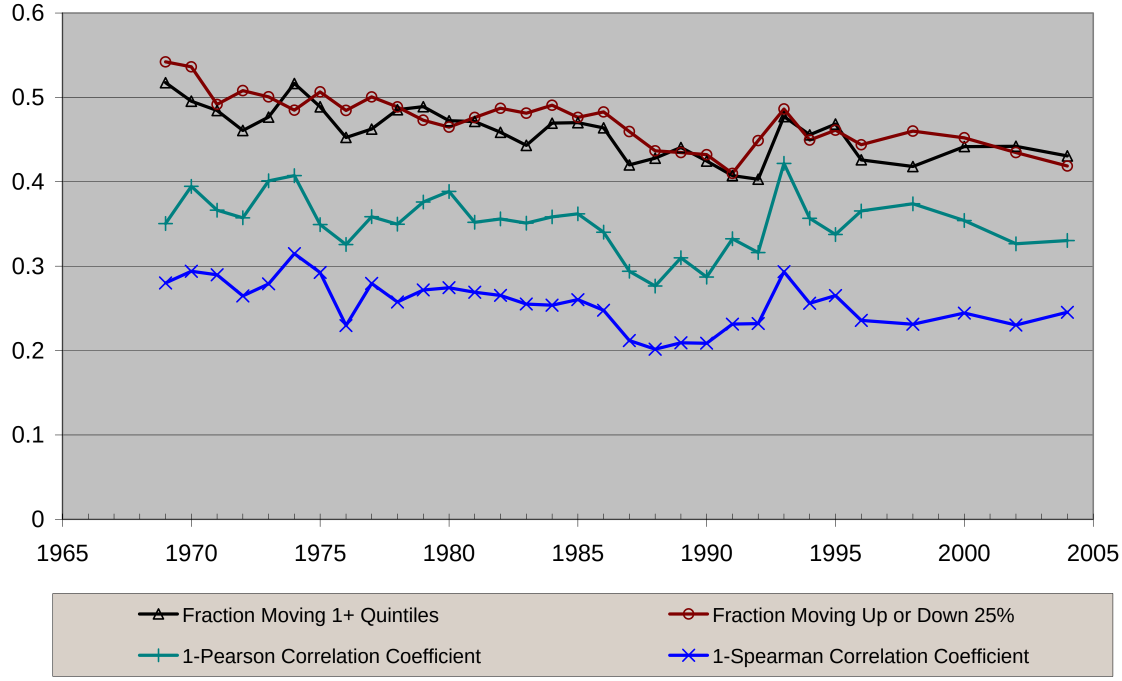


Figure 12. Labor Income Dispersion and Pivot Volatility Trends

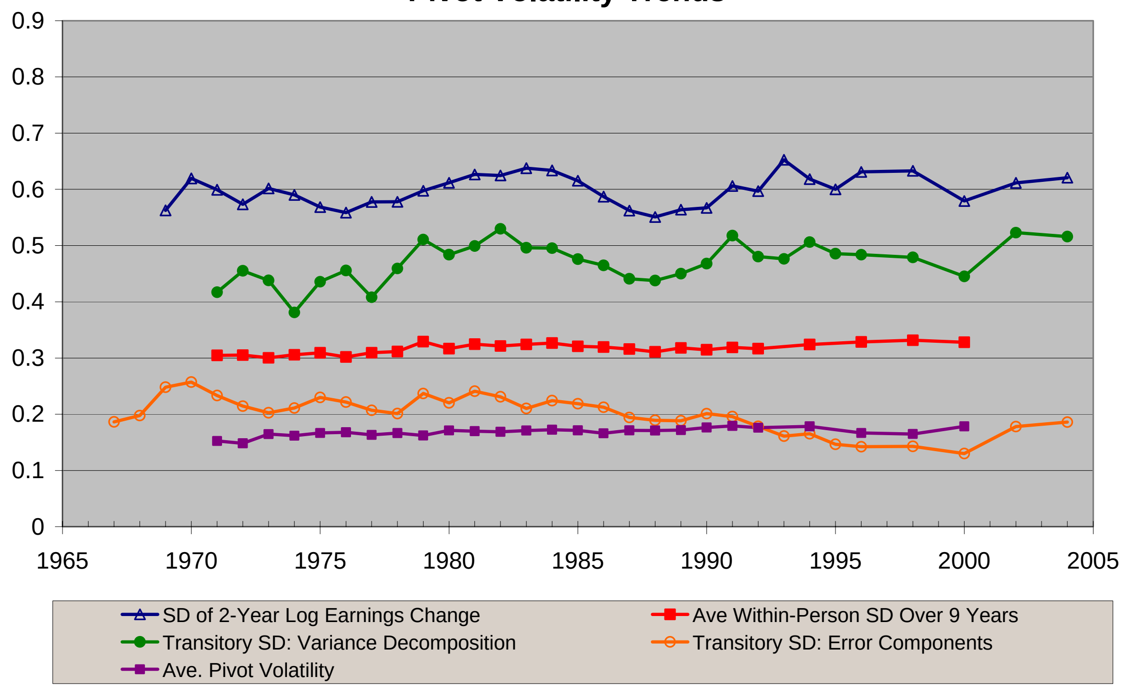


Figure 13. Male Heads' Wage Dispersion and Pivot Volatility Trends

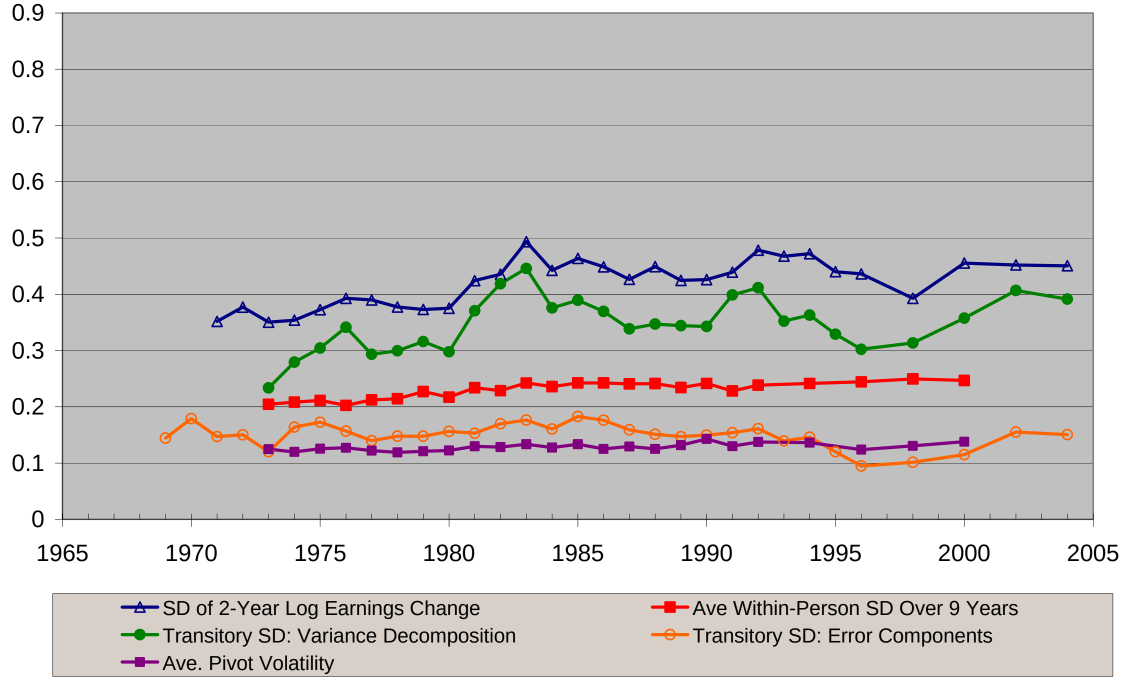


Figure 14. Male Labor Income Dispersion and Pivot Volatility Trends

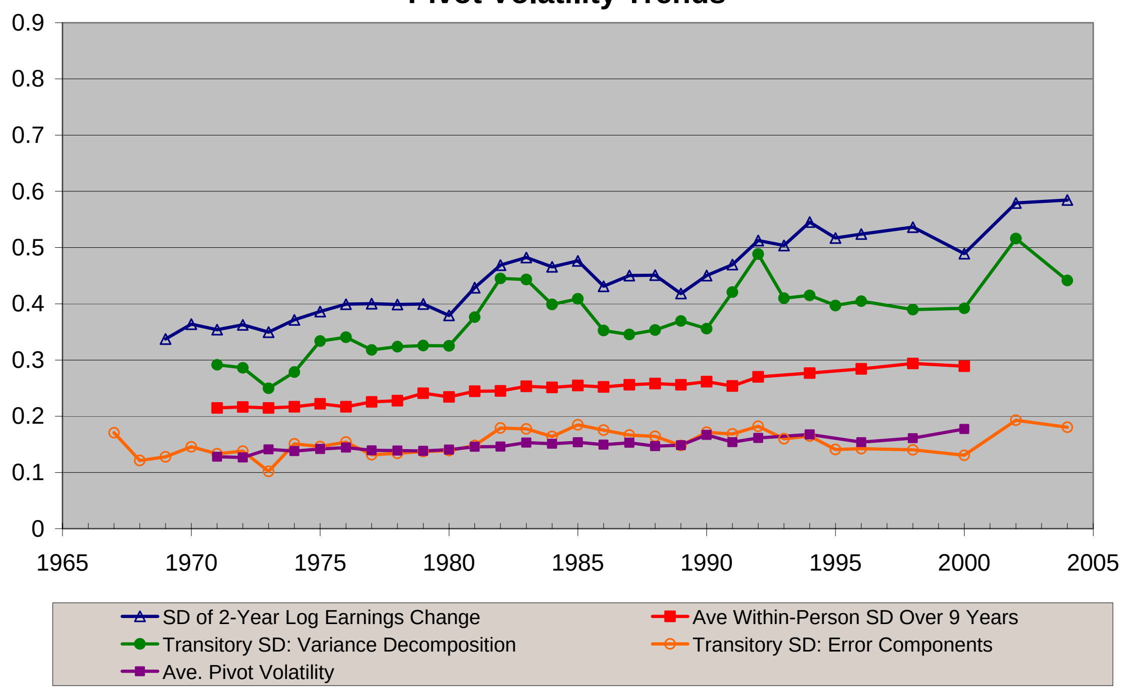
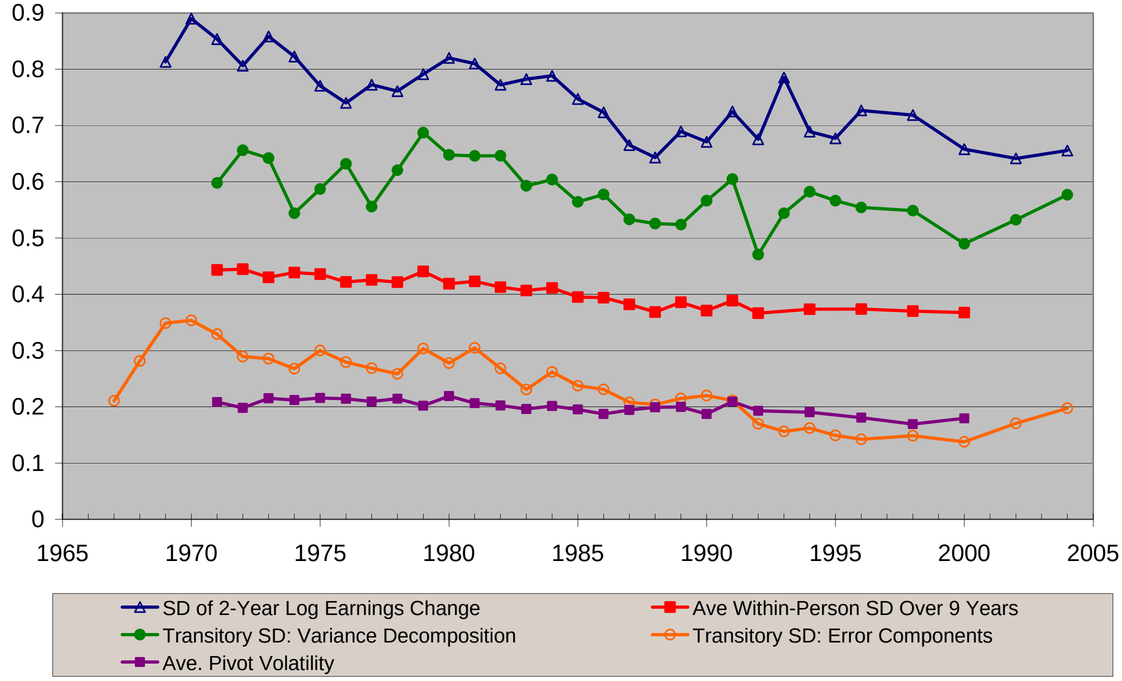


Figure 15. Female Labor Income Dispersion and Pivot Volatility Trends



End Notes

[1] In the median household with a head age 20-59 in 2006, earnings accounted for over 95 percent of the household's income, including self-employment earnings. Just 13 percent of households had any self-employment earnings. Author's computations using the 2007 Annual Social and Economic Supplement to the Current Population Survey.
[2] Kopczuk et al. (2009); Gittleman and Joyce (1995); Moffitt and Gottschalk (1995).
[3] Ibid. Fields, Leary, and Ok (2000); Daly and Duncan (1997). Moffitt and Gottschalk (1995) is the exception.
[4] Ibid. Buchinsky and Hunt (1999). But see Burkhauser et al. (1997).
[5] Dahl et al. (2007); Dynan et al. (2007); Jensen and Shore (2008); Fields, Leary, and Ok (2000).
[6] Moffitt and Gottschalk (2008); Dynan et al. (2008); Shin and Solon (2009); Dynarski and Gruber (1997); and Cameron and Tracy (1998). On the other hand, Abowd and Card (1989) and Baker (1997) indicate little change in earnings-change dispersion among men.
[7] Moffitt and Gottschalk (2008); Dynan et al. (2008); Shin and Solon (2009); Dynarski and Gruber (1997); and Cameron and Tracy (1998); Dahl et al. (2007).
[8] Shin and Solon (2009); Dahl et al. (2007); Moffitt and Gottschalk (2008); Dynan et al. (2008).
[9] Moffitt and Gottschalk (2008); Gottschalk and Moffitt (2007); Daly and Duncan (1997); Comin et al. (forthcoming); Gosselin (2008).
[10] The numerous tests that I conducted to examine the sensitivity of my estimates to methodological decisions, noted throughout the discussion to follow, were conducted in the course of producing volatility estimates based on the variance decomposition model of Gottschalk and Moffitt.
[11] Hill (1992); http://psidonline.isr.umich.edu/Data/Documentation/ImmigSample.pdf; and http://psidonline.isr.umich.edu/Guide/Overview.html.
[12] The PSID also includes a "Latino sample", which was surveyed from 1990 until 1995, when it was dropped. The core sample does not include the Latino sample.
[13] Gouskova et al. (2007). Heeringa and Connor (1999).
[14] Brown (1996).
[15] Heeringa and Liu (2001) and Gouskova et al. (2007). Gouskova et al. indicate that an attrition adjustment was made in the yet-to-be-released revised 2003 weights, but the 2005 weights are the only publicly available ones to reflect this adjustment. In the revised weights, for 1993 to 2003, there is no 1999 attrition adjustment.
[16] Gouskova et al. (2007).
[17] Heeringa and Connor (1999).
[18] I obtained the CPS data from Unicon Research Corporation (www.unicon.com). I compared the PSID variances for male family unit heads' wages, male labor income (family unit heads and spouses), and female labor income (family unit heads and spouses) with CPS variances for male heads' and spouses' wages and earnings, and female heads' and spouses' earnings. I looked at variances in the CPS defining headship both at the household and family levels. I also used different trims of the top and bottom of these earnings distributions. Figure 1 presents results using 2% top and bottom trims. Full results available from the author upon request.
[19] In the PSID a family unit is defined as "a group of people living together as a family. They are generally related by blood, marriage, or adoption, but unrelated persons can be part of a FU if they are permanently living together and share both income and expenses." (http://psidonline.isr.umich.edu/Guide/FAQ.aspx#90) There are a small number of households with more than one family unit. I ran my variance decomposition models using only family units where the head had the highest earnings among the multiple family units in a household, and the results were barely changed.
[20] See http://psidonline.isr.umich.edu/Guide/FAQ.aspx#130.
[21] I had to create heads' and wives' labor income from business for 1997 using the edited non-Income-Plus data. For details, see the "fam93.txt" file at ftp://ftp.isr.umich.edu/pub/src/psid/documentation/93famdoc.zip.

[22] Shin and Solon (2009) note that the definition of heads' wages changed in 1993, with "income from extra jobs" separated out from that year forward. But when they added this component back into wages, it barely affected the volatility estimates at all. I also found similar results when I added the component back in.
[23] I relied on my comparisons with CPS earnings variances to determine what trims to use. The age categories used for the trimming were 21-30 years, 31-40 years, 41-50 years, and 51-60 years. The influence of outlying high earnings is also minimized by using the natural log transformation, which makes my results relatively insensitive to large earnings and large changes in earnings.
[24] Kim et al. (2000), Kim and Stafford (2000) and http://psidonline.isr.umich.edu/data/Documentation/Fam/2003/FieldProcs.html. Haider (2001) reports that PSID staff indicated that the survey's editing budget was cut substantially beginning in 1993.
[25] See http://psidonline.isr.umich.edu/Guide/FAQ.aspx#30 and Kim and Stafford (2000).
[26] The Income Plus file in 1997 excluded the new immigrant sample, but edited income variables for immigrants are included in the data for that year available on the website. In the variance decomposition models of transitory earnings variance I ran using the full weighted core sample, I used these edited variables for immigrants (heads' wages, heads' labor income, wives' labor income, farm income, heads' and wives' taxable income, others' taxable income, money income, heads' and wives' transfer income, and others' transfer income).
[27] Shin and Solon (2009) report that the Institute for Social Research indicated to them that the relatively large number of $1 wages in the data from 1994 onward should be treated as missing values requiring imputation. My trimming of the data apparently obviates this problem; when I estimated results dropping all $1 reported wages, the trends barely budged.
[28] Kim and Stafford (2000), Gouskova and Schoeni (2007).
[29] Gouskova and Schoeni (2007).
[30] Ibid.
[31] Fitzgerald, Gottschalk, and Moffitt (1998a); Fitzgerald, Gottschalk, and Moffitt (1998b); Lillard and Panis (1998); Zabel (1998); Becketti et al. (1988). See Nichols and Zimmerman (2008), however, for evidence that from year to year, attriters are different from those included in volatility samples in terms of the joint distribution of a number of demographic variables.
[32] In my early research on household income volatility, discussed in detail in the next chapter, I discovered that this problem largely explained the extraordinary growth in income volatility that Jacob Hacker (2006) reported in the early 1990s (c.f., Hacker, 2008). Winship (2007) and personal communication with Hacker (2007).
[33] Including persons without earnings in the variance decomposition models is problematic, even if their earnings are recoded to $1 or some other value. The model requires permanent and transitory components to sum to total earnings. A person with $0 in earnings, must have both $0 in permanent earnings and $0 in transitory earnings or must have a transitory component that exactly cancels out his or her permanent component. The distribution of transitory earnings, in expectation, should be the same among those who do not work as it is among those who do. When one attempts to estimate the variance decomposition model by including $0 earners (after recoding their earnings to be positive), the transitory variance estimates balloon. Error components models are similarly sensitive to recoding of $0 values.
[34] I attempted to test the sensitivity of the results for male labor income to the exclusion of long-term non-earners by excluding men who were out of the labor force for twelve months or more (within a year or across years) for the years in which such information is available in the PSID (1985 to 1996). The results were unaffected.
[35] To address the changes in recontact rules and sample definitions, I also ran my variance decomposition results again restricting the sample to exclude the added respondents. Once again, the results were insensitive to this alteration. Additional sample restrictions used in all the results below include requiring individuals to be present in a household in the survey year (not necessarily the same household when comparing multiple years) and requiring them to be PSID sample members. I also require an individual to be a family head (or a head or partner) in all relevant years. For the male head wage volatility trends, I require sample members to have positive hours worked and positive weeks worked. I estimated variance decomposition models in which I held PSID sample membership constant (to address the 1990s changes in the definition), but the results were not much affected.

[36] See http://www.census.gov/hhes/www/income/income07/AA-CPI-U-RS.pdf. I also ran variance decomposition models using the CPI-U and ran all models using the CPI-U-RS linked to the CPI-U-X1, and the results were similar.
[37] Other presentation choices by Hacker and Jacobs also have the effect of exaggerating the increase they find, in particular the scaling of their vertical axis (which obscures the fact that in theory the "cumulative growth" of the transitory variance from its 1973 level could be negative) and (to a lesser extent) their compression of two-year changes from 1996 to 2004 into the horizontal space used for one-year changes from 1973 to 1996 (see their "Figure A"). I discuss these and other problematic presentation decisions by Hacker in Chapter Five.
[38] A window of two years is the smallest that can be considered over the entire course of the PSID because the survey switched to biennial interviews after 1997.
[39] Dynan et al. (2008) and Dahl et al. (2008) address this problem by using the average of the two years as the denominator in computing percent changes, though Dahl et al. also present results in an appendix using my approach.
[40] Specifically, I follow Gosselin and Zimmerman (2008) in using earnings in years t-4, t-2, t, t+2, and t+4 and report volatility in year t as the mean standard deviation across these years.
[41] Nichols and Zimmerman (2008).
[42] Moffitt and Gottschalk (1995, 1998, 2002).
[43] Gottschalk and Moffitt (2006), Gottschalk and Moffitt (2007), Moffitt and Gottschalk (2008). See also Shin and Solon (2009), who show how the transitory variance estimates produced by the Gottschalk-Moffitt model will be biased if the returns to permanent individual characteristics are changing over time.
[44] This assumes that one computes the total variance term using the same individuals for which the covariance term is estimated, as I do. That is, to be included in the variance computation, a person must also meet sample restrictions four years earlier. In practice, that means that my estimates are for persons age 24 to 59 rather than 20 to 59.
[45] My age-residualization strategy follows Gottschalk and Moffitt (1994). Unlike Gottschalk and Moffitt (2006), I do not residualize income by regressing on education categories (stratified by age and year), not wanting to control for changes in education levels over time. I do not age-residualize earnings for volatility measures other than the transitory earnings dispersion measures.
[46] I am indebted to Lorenzo Cappellari for sharing his STATA code with me, without which I could not have produced the error components trends below. I require sample members to have at least five non-missing observations in odd-numbered survey years from the time they first appear in the data, and I require them to have no more than 20 percent of observations in odd-numbered survey years missing from the time they first appear. Note that these criteria exclude people who enter the PSID sample in 1999 or later, since they cannot have five non-missing observations.
[47] Technically, I regress trimmed logged earnings on a quartic in age and year dummies. The regressions are also stratified on sex for the estimates that combine men and women.
[48] My model differs from that of Haider in that Haider allows the price of fixed effects and slopes to vary over time.
[49] I require sample members to have non-missing earnings in all five years in the nine-year window.
[50] In computing percent changes in earnings over two years, I divide the difference between the two earnings by their average. This ensures that increases and decreases in earnings are treated symmetrically (see the discussion under "Dispersion of Earnings Changes" above). Taking the average of these two "percent changes" is equivalent to summing the two quantities, (difference/sum).
[51] Technically, I use the PSID measure of "labor income", which includes the labor part of income from unincorporated businesses, from farming, and from market gardening. Prior to 1993, it also includes the labor part of income from roomers and boarders, and from 1994 onward it includes the asset part of income from market gardening. As noted in the methods discussion, the results are unaffected by these changes in the definition over time.
[52] Wage and salary income are available only for family unit heads in the PSID.
[53] Trends in labor income volatility for only male *heads* are similar to the trends for all men.
[54] Results for men and women combined and for male heads' wages are available from the author upon request.

[55] The labor income measure differs from the wage and salary measure in that it includes a very small number of male "non-heads", but such men are too rare in the PSID to account for the difference. The labor income measure also includes other sources of earnings besides self-employment income, including bonuses, overtime, tips, and commissions. Alternatively, the increase after 1990 could be due to changes in the way that men's labor income was measured over time in the PSID. That variable was an aggregation of up to six separate reported income amounts in the 1968 survey, up to seven during the 1980s and early 1990s, and up to eleven or twelve thereafter. The variable for men's wages and salary income was an aggregation of no more than two income amounts during any of the PSID survey years. Not only does this difference between the two measures make for greater inconsistency in the labor income measure, but many of the changes in the PSID administration discussed above—from topcoding to question structure—had bigger effects on the labor income component variables than the wage and salary variable. All that said, it is unclear why these changes should produce *steadily* declining correlations (steadily increasing mobility).
[56] Dahl et al. (2008). As my Figures 3 and 4 show, including self-employment does not alter my earnings-drop results, even though it does alter my dispersion-of-changes results (unlike those of CBO).
[57] I also estimated the mean absolute deviation (MAD) of two-year changes in logged earnings. The MAD is computed by obtaining the deviations of two-year earnings changes from the mean two-year earnings change, and then taking the average deviation. This measure of dispersion, unlike the standard deviation, does not weight large deviations more heavily than small ones in summarizing the "typical" deviation from the central tendency. The results, however, were generally unaffected. See Gorard (2005) for a critique of the conventional use of the standard deviation.
[58] The years for which this measure is available are reduced because it requires observations every other year in a nine-year span, which affects the beginning and end of the time series as well as two years in the 1990s (due to the shift to biennial surveying).
[59] Gottschalk's and Moffitt's income residuals come from regressing on education categories (stratified by age and year) rather than on age and year, and they trim the top and bottom 1 percent of the wage and salary distribution rather than the top and bottom 2 percent, among other smaller differences in our methods.
[60] This is unsurprising given that I shared my statistical programming with Jacobs between the release of Hacker's initial numbers and their publication of the EPI report.
[61] Interestingly, the estimates I produced when using the full core sample and applying the survey weights showed a 50-60 percent increase in wage or labor income volatility from the early 1970s to the early 2000s—that is, incorporating the suspicious 2002 and 2004 data points.