

## **The Evolution of Household Income Volatility\***

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Using a representative longitudinal survey of U.S. households, we find that household income became noticeably more volatile between the early 1970s and the late 2000s despite the moderation seen in aggregate economic activity during this period. **We estimate that the standard deviation of percent changes in household income rose about 30 percent between 1971 and 2008.** This widening in the distribution of percent changes was concentrated in the tails of the distribution. The share of households experiencing a 50 percent plunge in income over a two-year period climbed from about 7 percent in the early 1970s to more than 12 percent in the early 2000s before retreating to 10 percent in the run-up to the Great Recession. Households' labor earnings and transfer payments have both become more volatile over time. As best we can tell, the rise in the volatility of men's earnings appears to owe both to greater volatility in earnings per hour and in hours worked.

**KEYWORDS:** household income volatility, earnings volatility, income distribution, PSID, great moderation.

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## 1. INTRODUCTION

Researchers have found it relatively straightforward to document changes in the volatility of the U.S. economy as a whole over the last several decades. The aggregate U.S. economy entered a period of relative stability known as the Great Moderation in the mid-1980s and, much more recently, has been in dramatic flux since the onset of the financial crisis and Great Recession in 2007 and 2008. However, aggregate trends do not necessarily translate into trends in the experiences of individual households. For example, the Great Moderation is generally thought to be a period over which the economy became more dynamic, with globalization, deregulation, and technological change increasing the competitive pressures and risks faced by workers. Given these developments, it is not clear that the economic environment facing individual households was in fact more stable during this period. Thus, to the extent that one is interested in household economic security, one is compelled to consider micro data. Accordingly, a large literature has developed that directly examines the volatility of earnings and income at the household level. While income volatility is not the same thing as the risk or uncertainty faced by households, changes in volatility are likely to be associated with changes in risk and uncertainty.

To date, this literature has been inconclusive. Starting with the seminal work of Gottschalk and Moffitt (1994), many studies have found that individual earnings and household income have become more volatile during the past few decades. That said, there are some notable exceptions, which find no increase or a decline in the volatility of earnings and total household income (such as CBO, 2008, and Dahl, DeLeire, and Schwabish, 2011).

This paper examines household income volatility using data from the *Panel Study of Income Dynamics* (PSID). As the longest-running representative survey of U.S. households, the PSID is an ideal vehicle for considering how the household economic environment has changed. **In contrast to much of the early literature in this area, we focus on the volatility of overall household income as opposed to the volatility of labor earnings.** To be sure, the evidence on labor earnings provides important insights into labor market dynamics. We believe, however, that the broader concept of household income brings an important additional element to the table for two reasons. First, some important questions of economic welfare hinge more on the resources available to households (and the volatility of that stream of resources) rather than on the labor earnings of a single member of that household. Moreover, for macroeconomists interested in understanding the micro foundations of aggregate household-sector behavior, household income provides the natural starting point. Although a few other studies have looked at the volatility of household income in the PSID, we are the first (to our knowledge) to incorporate survey results through the late 2000s.

To make the analysis as transparent as possible, we do not estimate a formal model of income dynamics but rather document changes over time in the cross-sectional distribution of income changes. We carefully investigate, and correct for, measurement problems in the data. We also explore the evolving volatility and correlations of movements in various components of income (including earnings) and the evolving volatility of related characteristics such as hours worked and earnings per hour.

To summarize our results, we estimate that the volatility of household income—as measured by the standard deviation of two-year percent changes in income—increased about 30 percent between the early 1970s and the late 2000s. The rise in volatility did not occur in a single period but represented an upward trend throughout the past several decades; it occurred within each major education and age group as well. Yet, the run-up in volatility was concentrated in one important sense: It stemmed primarily from an increasing frequency of very large income changes rather than larger changes throughout the distribution of income changes.

Turning to the components of income, we estimate notable increases in the volatility of labor earnings and transfer income and a small increase in the volatility of capital income. *Household* labor earnings (combining earnings of heads and spouses before estimating volatility at the household level) became more volatile even though the volatility of *individual* earnings (heads and spouses taken as individual observations) edged down. The explanation is that women's earnings became less volatile while men's earnings became more volatile, and the latter matters more for household earnings because men earn more than women on average. We show that rising volatility in men's earnings owes both to rising volatility in earnings per hour and in hours worked, though our interpretation could be affected by changes in PSID methodology. And we demonstrate that earnings shifts between household members, as well as shifts in market income and transfer income, provide only small offsets to each other.

The limitations of our analysis bear emphasis. First, an increase in the *volatility* of household income does not imply a corresponding increase in *risk or uncertainty*. Our calculations distinguish only slightly between voluntary and involuntary changes in income, they do not include shocks to desired spending, and they do not account for adjustments to saving and borrowing that can buffer income shifts. Second, our findings are based on a particular methodology applied to a single dataset. Given the wide range of findings across studies that use different techniques and different data sets, further research is needed to reconcile the various results before economists can have a high degree of confidence in the facts about household income volatility. Moreover, our analysis ends in 2008 and therefore precedes much of the recent turmoil; once the relevant

data become available, researchers undoubtedly have much work to do to establish how income dynamics changed following the Great Recession.

The next section of the paper discusses how we measure volatility using PSID data. Subsequent sections present our results on the evolution of volatility of individual labor earnings, of the components of household income, of household income, and of hours worked and earnings per hour. We then discuss how our results fit in with the broader literature. A final section concludes.

## **2. MEASURING VOLATILITY IN THE PSID**

The PSID contains longitudinal information for a large set of households. Households participating in the PSID were surveyed every year when the survey began in 1968, but beginning with the 1997 wave, the frequency was changed to every other year. The most recently released full wave contains information from about 8,000 interviews conducted in 2009, with its income data corresponding to the calendar year 2008. In addition to providing detailed data about participating households' incomes, the survey includes information on the employment and demographic characteristics of individuals in the household. In this section, we describe how we prepared our data set and how we measure volatility.

### *PSID Data*

Households (dubbed “family units” by the PSID) are composed of people living together who are related by blood, marriage, or adoption—or living together permanently and sharing income and expenses. If households are headed by a man and a woman, the PSID labels the man as the household head and the woman as his spouse; when households are headed by a woman alone, she is the head. Because the data are available on only a biannual basis since 1997, we examine two-year changes in income. The first two-year change in our sample is between 1967 and 1969 (from the 1968 and 1970 waves). The two-year changes overlap thereafter (i.e. the second two-year change is between 1968 to 1970 and the third is between 1969 to 1971) until the frequency of the survey changes, after which the two-year differences become non-overlapping (i.e. the change between 1994 and 1996 is followed by the change between 1996 and 1998 and so on). For all income series, we deflate nominal dollars into real 2002 dollars using the CPI for urban consumers.

The PSID data are released with a considerable lag. With the most recently released income data corresponding to the calendar year 2008, our analysis will not capture most of the effects of the Great Recession. As discussed in Dynan (2012), the 2008 level of total household income at the median was a bit higher than the 2006 level. This pattern is broadly consistent with what was

observed in the aggregate; although the Great Recession began in late 2007, NIPA personal income continued to rise through 2008 and posted its first annual decline in 2009.

Our baseline sample excludes observations where the head is a student in order to avoid income changes associated with the transition between school and work because such transitions are typically anticipated and, at least to some extent, under the control of the household. Likewise, our baseline sample excludes observations where the head is retired so as to steer clear of transitions between work and retirement. We select the sample such that our analysis of household income does not capture the change in income that a child experiences when he or she moves out and sets up a new household, but does capture all other income movements associated with changes in family structure. In particular, it captures the change in household income that a widowed, newly separated, or newly divorced head or wife has experienced because we think such changes can have an important (and often negative) effect on the standard of living experienced by this individual. Admittedly, though, these choices of whom to exclude and not to exclude are somewhat arbitrary, so, for completeness, we examine the robustness of the results to changing these restrictions later in the paper. For our analysis of labor earnings, we also drop observations where farm income is positive because such income is not reported comparably over time.<sup>1</sup>

**In contrast to much of the previous literature in this area, we do not drop observations simply because they had zero or low readings of income.** Given that some of the events that have the greatest bearing on household welfare (such as job loss) involve a drastic reduction in earnings or income, we believe that a complete analysis of trends in household income volatility needs to include such realizations. As we discuss below, this choice influences how we calculate volatility (most notably because we cannot calculate a simple percent change when income rises from zero to a positive value).

We examine the volatility of different components of household income, beginning with the labor earnings of the head of household, before exploring how the volatility of total household income has changed. Our analysis of the various components of household income is informative about what is driving changes in the total and also about whether changes in some pieces tend to be offset by changes in other pieces (as would be the case if one household member stepped

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<sup>1</sup> The PSID's variables for total labor earnings included the labor parts of farm and business income through the 1993 survey but not afterwards. The labor part of farm income is not provided after the 1993 wave, so we drop any observations for which the household reported having farm income. The labor part of business income is provided separately beginning with the 1994 survey, so we add it back into total labor earnings. However, the PSID's algorithm for splitting business income into labor and capital income has changed over time, so achieving perfect consistency is not possible.

up her hours worked in response to another reducing his hours worked). Ultimately, though, we are interested in how the volatility of total household income has evolved over time because that pattern bears most closely on how household economic security has changed. Thus, our goal is somewhat different from that of papers that focus on the volatility of workers' earnings; these papers speak more to how labor market dynamics have evolved over time than to changes in the risk faced by households.

Following Shin and Solon (2011), our analysis focuses on the nationally representative "Survey Research Center" sub-sample of the PSID. The PSID also includes special samples of low-income households (since 1967), immigrants (since 1997), and Latino households (between 1990 and 1995). Incorporating these samples into our analysis would be ideal because of the greater breadth of coverage and greater representation at the bottom of the income distribution. However, even though weights are available that, in principle, can be used to generate representative results from the full sample, we choose to stay with the narrower sample because of the concerns that Shin and Solon (2011) raise about how the low-income sample was selected.

Top-coding in the PSID can distort estimates of volatility: Variables top-coded at the same level in consecutive readings will appear more stable than they really are, and changes in the level of top-coding can affect the reported evolution of income in spurious ways. For each variable, we look at every wave of the survey and find the maximum share of the sample that was top-coded in any wave (for example, for total household income, it was 0.6 percent of the sample in the 1979 wave). We then exclude that same share of observations from the top of the distribution in all years. In addition, some variables have been bottom-coded at \$1 in some years. For consistency over time and across variables, we replace any value of \$0 or below with \$1.<sup>2</sup>

PSID data include a significant amount of measurement error, so one should not take our estimates of the *level* of volatility literally. However, the crucial question for evaluating *changes* in volatility is whether measurement error has changed over time. A possible source of concern along these lines is that the PSID implemented two major methodological changes in the early 1990s, as described by Kim, Loup, Lupton, and Stafford (2000) and Kim and Stafford (2000). Income data for 1992 and later were collected using Computer Assisted

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<sup>2</sup> We retained imputed values in the analysis on the view that imputations contain some (albeit noisy) information about the household's actual income. However, following Shin and Solon (2011), and in consultation with the PSID staff, we excluded observations for which the wages and salaries of the head or spouse equaled \$1 starting with the 1994 wave. Such values were used by the PSID staff to indicate that the case required further investigation. Between 1994 and 1999, 10 to 20 observations per wave were flagged this way; the problem essentially disappears thereafter implying that our calculations for the total increase in volatility from the beginning through end of our sample are unaffected by the anomaly.

Telephone Interviewing rather than traditional paper questionnaires, and income data for 1993 and later were processed using different software. Kim et al warned that these shifts create a “potential double seam” in the data. We return to this issue shortly.

### *Measuring Volatility*

Gottschalk and Moffitt’s seminal papers on labor earnings measured volatility using the magnitude of transitory earnings, which they calculated in two ways—as earnings less a moving average of earnings and as derived from time-series decompositions of earnings. These studies yielded important results that we review later.<sup>3</sup>

In this paper, though, we measure volatility using the magnitude of total changes in income rather than trying to isolate the transitory components of those changes. We view our approach as a significant complement to the Gottschalk-Moffitt procedure for three reasons. First, given the lack of consensus in existing literature on the evolution of household income volatility, documenting the facts in the least processed and filtered manner is valuable. We count it a virtue that our results do not depend on a particular model of income dynamics; indeed, Shin and Solon (2011) show that the interpretation of key parameters estimated using the Gottschalk-Moffitt procedure is very sensitive to the underlying assumptions about the income process. Second, understanding the full changes in income experienced by households is as useful and necessary as understanding the transitory movements. **Third, the comparative simplicity of our technique allows us to explore measurement issues in the data, the evolving volatility and correlations of movements in various components of income,** and the evolving volatility of related characteristics such as hours worked and earnings per hour.

To summarize the magnitude of income changes experienced by the population in each year, we calculate the cross-sectional standard deviation of percent changes in income.<sup>4</sup> Most research on the volatility of individuals’ earnings has reported variances rather than standard deviations, because the additive nature of variances is crucial to the goal of parsing volatility into permanent and transitory components. Yet, this additive property is not needed to describe changes in volatility over time, and volatility described in terms of squared growth rates is difficult to interpret. An economy with three households experiencing income changes of 20 percent, -20 percent, and 0 percent would have a standard deviation of income changes equal to 16 percentage points,

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<sup>3</sup> Distinguishing between permanent and transitory movements in income is crucial for many purposes. For example, Carroll and Samwick (1997) emphasize this distinction in their tests of the buffer-stock model of consumption and saving.

<sup>4</sup> Because we analyze percent changes rather than levels of income, no further scaling is needed to maintain comparability over time.

measured in the same units as income growth and comparable to it. If these changes become +30, -30, and 0, the standard deviation rises to 24 percentage points, a 50 percent increase that sensibly characterizes the increase in economic turbulence. However, the variance of income changes rises from 266 to 600 percentage points squared; neither these levels nor the 125 percent increase between them is easy to interpret.

We calculate percent changes as  $100*(Y_t - Y_{t-2})/Y_{\text{average}}$  with  $Y_{\text{average}} = 0.5*(Y_t + Y_{t-2})$ . This formula has two advantages over simple percent changes: It is symmetric regarding increases and decreases, and it naturally bounds the results between 200 and -200 percent.<sup>5</sup> More generally, percent changes are easier to understand than other transformations and, under the common assumption that utility displays constant relative risk aversion, a given percent change corresponds to the same relative change in utility regardless of the absolute change. We experimented with simple percent changes and with scaling changes by the average levels of the previous three years; the results were similar qualitatively but somewhat different quantitatively.<sup>6</sup>

Neither this paper nor previous ones on the volatility of earnings and income distinguish effectively between voluntary and involuntary changes.<sup>7</sup> For example, we do not separate people whose earnings decline because they choose to cut back to part-time work from those whose earnings decline because they

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<sup>5</sup> Davis, Faberman, and Haltiwanger (2006) used this formula to calculate percent changes in employment.

<sup>6</sup> We also considered other options. First, we thought about analyzing deviations relative to a longer moving-average level (as done by Gottschalk and Moffitt) rather than analyzing changes. But a return of income to its previous long-run level represents stability in that calculation and volatility in ours—and the latter seemed more appropriate. Second, we considered scaling income changes by the levels of income predicted by households' demographic characteristics. However, this approach is less transparent than ours, and households presumably care about income movements relative to their previous income rather than an econometrician's prediction of their income. Third, we could have replaced our formula for percent changes with logarithmic changes, but this would also have been less transparent. Fourth, we thought about using a more complex transformation in order to give weight to the absolute change as well as the percent change. Carroll, Dynan, and Krane (2003) noted that “effects [of risk on wealth] estimated using logs could give undue weight to responses at the lower end of the wealth distribution” (page 592), and they transformed wealth using the inverse hyperbolic sine function instead. However, this approach would lose the clarity and simplicity of percent changes. In addition, it is not obvious that a decline from \$1000 to \$1 is less troublesome than a decline from \$100,000 to \$10,000, especially because we are studying income rather than consumption and because the PSID incorporates transfer income.

<sup>7</sup> Cunha and Heckman (2007) decompose the increase in earnings inequality during recent years into a component that is predictable by individuals and a component that is not. They find increases in both components, with the rise in the unpredictable component especially pronounced for less-skilled workers.



lose full-time jobs and can find only part-time new jobs. We return to this issue later in the paper.

### 3. VOLATILITY OF INDIVIDUAL LABOR EARNINGS

Labor earnings—defined in the PSID to include wages and salaries, overtime pay, bonuses, commissions, and a portion of self-employment income determined by the PSID staff—are the largest component of income for most households. In this section we consider earnings at the individual level; in the next sections we address earnings and other components of income at the household level.

#### *Volatility of Household Heads' Earnings*

In preliminary analysis of the data we noticed a sharp jump during the early 1990s in the number of household heads reporting zero earnings followed and preceded by substantial earnings. These sequences generate very large earnings gains and declines, so the step-up in their frequency significantly raises the estimated volatility of earnings during the past fifteen years.

However, the step-up in the probability of zero earnings sandwiched between substantial earnings appears to reflect changes in measurement rather than changes in the economic environment. First, the coincidence of timing with the PSID methodological changes noted earlier is striking. Second, identifying changes in economic conditions that would have had such a large and sudden effect is difficult. Third, we see no evidence of other outcomes that would be expected if economic conditions had become much more turbulent at that time: There is no reported change in the frequency of zero earnings following or preceding *low* earnings or in the frequency of zero earnings right before or after substantial earnings for *spouses*. Fourth, and most persuasive, the top left panel of figure 1 shows that the percentage of household heads recorded as having zero labor earnings in a year despite working more than 120 hours jumped immediately after 1991, which is the last year of income data preceding the changes in the PSID. This combination likely signals an error in either reported hours or reported earnings; in the latter case, it generates a spurious drop in earnings and rebound in the subsequent year of just the sort we observe. The frequency of such observations stays high through 2002 and then falls back in 2004, returning to a very low range.

To assess the evolution of true economic volatility, the remainder of our analysis excludes the apparently spurious observations with household heads' earnings of zero and hours worked over 120.<sup>8</sup> The role of this exclusion can be

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<sup>8</sup> We could drop all observations with head earnings equal to zero, but this would mean excluding many cases for which the head actually has no earnings. As we argue above, such realizations

seen in the top right panel of figure 1. For each year we calculate the standard deviation across household heads of the percent changes in their earnings (as defined earlier); we then graph the moving average of the standard deviation across that year and the preceding two years. The increase in volatility for the entire sample range is about the same—roughly 35 percent—for all observations (dashed line) and for the subsample that excludes the spurious observations (solid line). However, the time series pattern is different, with the latter series showing an increase that is more even over time (albeit not perfectly so). The 1971-2008 changes are shown in the top lines of table 1, which also presents comparable numbers for other categories of earnings and income that we discuss shortly.

#### *Volatility of Spouses' Earnings*

In contrast with the rise in earnings volatility for household heads, the volatility of spouses' earnings has declined since 1970. As shown in the bottom left panel of figure 1, the standard deviation of percent changes in earnings of spouses moved down 20 percent between the early 1970s and the late 2000s. Still, the volatility of earnings remains higher for spouses than for heads. Because we include cases where earnings are zero, the higher volatility likely reflects, at least in part, a weaker attachment to the labor force among spouses.

#### *Volatility of Heads' and Spouses' Pooled Earnings*

The bottom right panel of figure 1 displays the volatility of earnings for the pooled sample of household heads and spouses in the PSID. The volatility of earnings in this pooled sample edged down, on balance, during the past forty years, as depicted by the solid line. Focusing on the split between men and women, volatility rose for males (the dashed line) but fell for females (the dotted line). This split by gender is consistent with the patterns shown in the previous panels for household heads (who are mostly men, given the PSID's labeling convention) and spouses (who are all women, for the same reason).<sup>9</sup>

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often represent very real sources of distress for the household and thus should be included in an analysis aimed at capturing how the economic security of households has evolved over time. Another alternative is to replace any level of reported earnings below a threshold value with the threshold value itself. However, the observations of zero earnings are generally bracketed by earnings over \$10,000, so even a substantial threshold leaves a marked rise in large earnings movements in the early 1990s.

<sup>9</sup> The volatility of earnings for male heads increased over time, while the volatility of earnings for female heads was roughly unchanged.

Figure 1  
**Volatility of Real Individual Labor Earnings**  
 Nonfarm Representative Sample; 1971- 2008

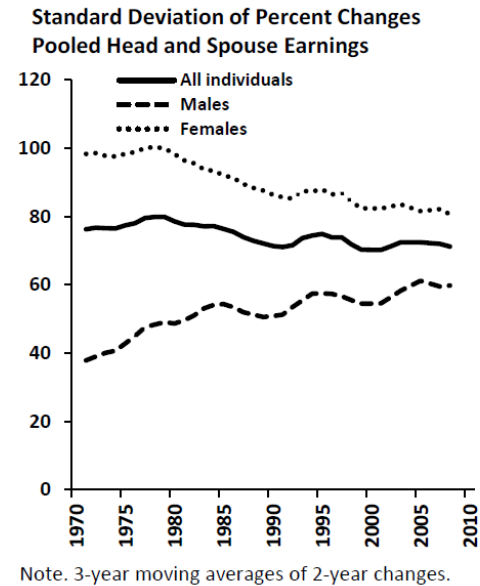
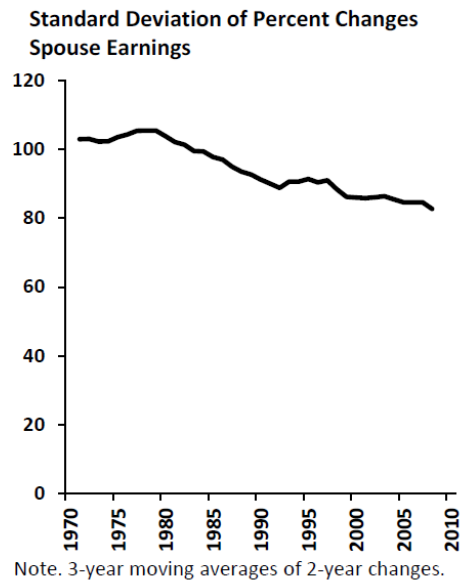
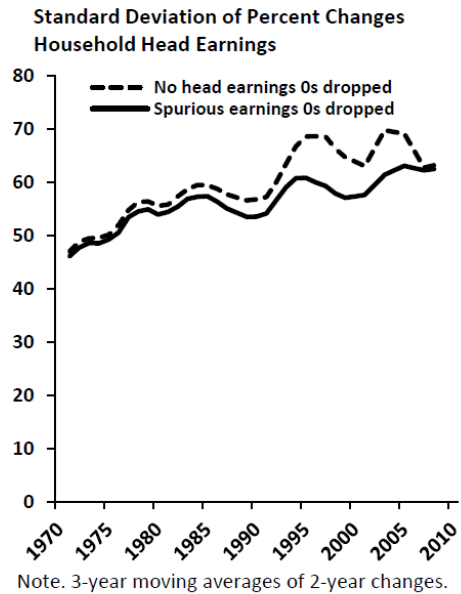
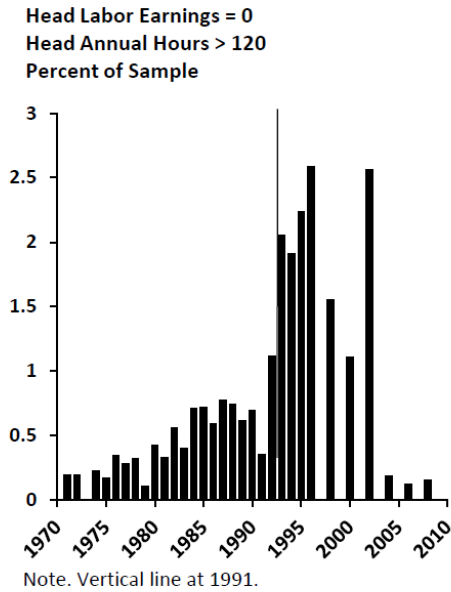


Table 1  
**Three-Year Rolling Standard Deviations of Percent Changes**

	1971	2008	Change	Pct Ch.
Labor earnings household heads				
All observations	47	63	16	35
Exc. spurious observations	46	62	16	36
Labor earnings spouses	103	83	-20	-20
Labor earnings pooled heads & spouses				
All observations	76	71	-5	-7
Males	38	60	22	58
Females	98	81	-18	-18
Labor earnings combined hds & spouses	51	59	8	15
Capital income heads and spouses	105	110	5	5
Household market income	52	59	8	15
Transfer income heads and spouses	91	112	21	23
Household income				
All observations	38	50	11	29
No high school degree	43	63	20	46
High school but no college degree	36	51	15	42
College degree	33	45	12	37
Drop top and bottom 10 percent	19	23	4	21
Drop top and bottom 25 percent	9	10	1	9
Annual hours of household heads	41	53	12	30
Earnings per hour of household heads	42	54	12	28
Note. Uses two-year pct. changes as described in text, with nominal values deflated by the CPI. Based on PSID representative sample excl. observations with student head, retired household head, and (for earnings) positive farm income. Consistent top- and bottom-coding of levels.				

#### 4. VOLATILITY OF COMPONENTS OF HOUSEHOLD INCOME

This section examines, in turn, total household labor earnings, capital income, and transfer income.

##### *Heads' and Spouses' Combined Earnings*

The top left panel of figure 2 depicts the evolving volatility of the combined labor earnings of household heads and their spouses. The standard deviation of percent changes in combined earnings rose 15 percent between the early 1970s and the late 2000s, as reported in table 1. Yet, we showed in figure 1 that the volatility of earnings for the pooled sample of heads and spouses as individuals moved down a bit over this period. We turn now to what explains this combination of results.

The increase in women's labor force participation is not the answer. Consider a household with a husband in the labor force and his wife out of the labor force. If the wife enters the labor force with the same earnings distribution as her husband, then the average volatility of *individual* earnings rises (because the wife's earnings previously had been perfectly stable at zero), but the volatility of *household* earnings falls in percentage terms (because the wife's earnings buffer shocks to her husband's earnings unless the two are perfectly positively correlated). Therefore, this scenario works in the opposite direction of our finding that household earnings volatility rose relative to individual earnings volatility.<sup>10</sup>

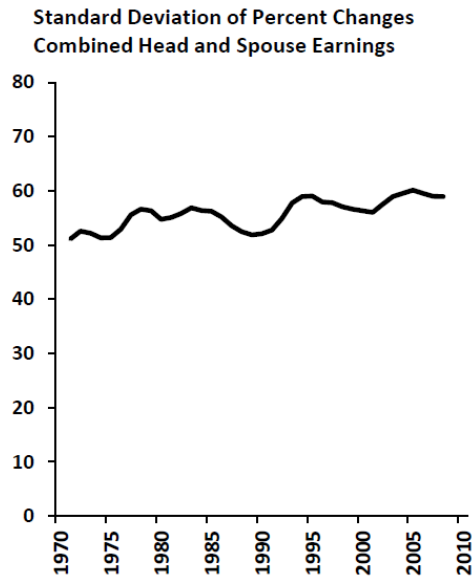
Our results about earnings also are not explained by changes in the correlation of earnings of household heads and their spouses. It might be expected that an individual would try to adjust his or her earnings to buffer changes in a partner's earnings—for example, by taking a more demanding job if a partner lost a job, or by shifting toward home production if a partner's earnings rose significantly. At the same time, adults in the same household may face some of the same earnings shocks—for example, changes in economic conditions for workers in certain regions, industries, or occupations. The strength of these forces might well vary over time. For example, Warren (2005) argued that the rise in two-earner families has reduced people's scope for getting a job when their partners' earnings falter; others might speculate that the rise in two-earner families makes it easier for people to work more hours when their partners' earnings falter.

In fact, the correlation of movements in household heads' and spouses' earnings seems to have stayed fairly close to zero throughout the past thirty years.

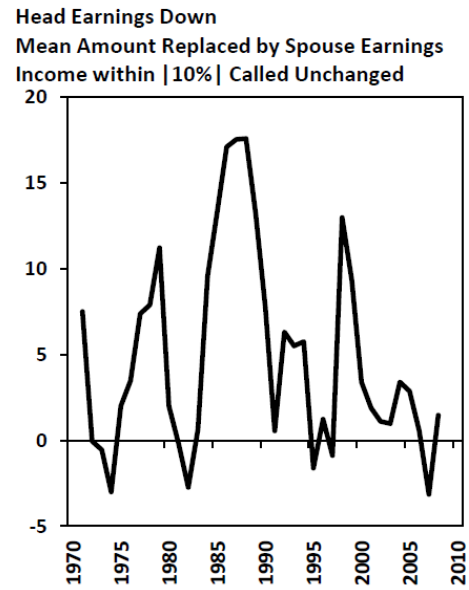
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<sup>10</sup> However, while rising labor force participation for women does not explain the relationship over time between the volatility of pooled individual earnings and the volatility of combined household earnings, it may help to explain why the volatility of combined household earnings increased by less (15 percent) than the volatility of household head earnings (36 percent).

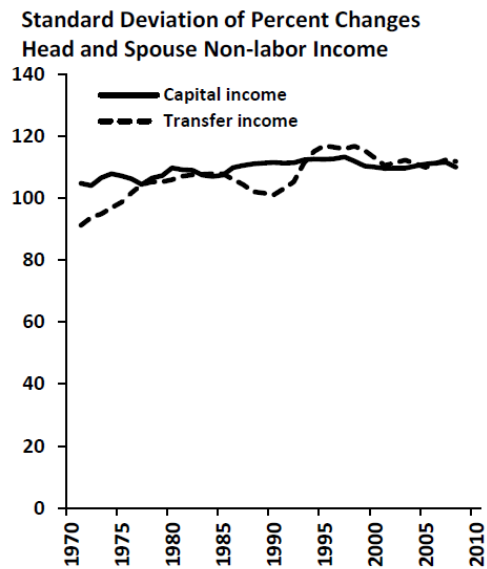
Figure 2  
**Volatility of Components of Real Household Income**  
 Representative Sample; 1971- 2008



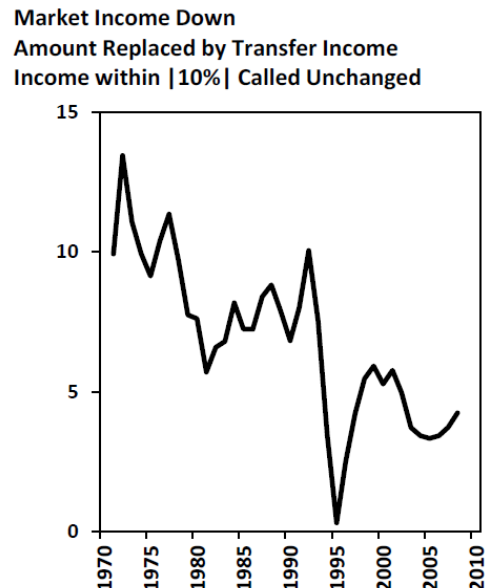
Note. Nonfarm sample; 3-year moving averages of 2-year changes.



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For every decline in a head's earnings exceeding 10 percent, we calculate the share of the decline in a head's earnings offset by an increase in the spouse's earnings. As shown in the top right panel of figure 2, the average offset to such significant earnings declines has oscillated over time but has never been very large and shows little trend during our sample period.<sup>11</sup> We find similar results for the average offset to *increases* in heads' earnings and for the *frequencies* with which decreases and increases in head's earnings occurred in conjunction with offsetting changes in spouses' earnings.<sup>12</sup>

Instead, the volatility of combined head and spouse earnings increased while the volatility of individual earnings did not because of the different trends for heads and spouses. Here's why the different trends matter: When calculating volatility for the pooled sample of individuals, each person's percent change in earnings receives the same weight regardless of the dollar change in their earnings. But when calculating volatility for households, each person's dollar change in earnings is added to his or her partner's dollar change to obtain the change for the household as a whole. Among two-earner couples in our sample, spouses earn less than half what heads earn on average, so they get less weight in household volatility. The existence of one-earner couples reinforces this point. In a world with one two-earner couple and one one-earner couple, the single head's earnings receive a one-third weight in individual volatility and a one-half weight in household volatility. Indeed, if we estimate individual earnings volatility by weighting percent changes by earnings levels, volatility trends up along with the volatility of combined head and spouse earnings.

### *Capital Income*

Capital income in the PSID equals total income from market sources (which the PSID labels "taxable income") less labor earnings; it excludes capital gains. The solid line in the bottom left panel of figure 2 shows that the volatility of household heads' and spouses' combined capital income rose 5 percent between the early 1970s and the late 2000s. Capital income doesn't seem to do much to buffer labor earnings. As shown in table 1, the volatility of total income from market sources—which includes capital income—rose by the same percentage over the past thirty years as did the volatility of combined household labor earnings.

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<sup>11</sup> To reduce the impact of extreme outliers, this figure drops the top and bottom one percent of offsets.

<sup>12</sup> At least two previous studies used PSID data to carefully investigate the relationship between earnings of household members. Focusing on the 1979-95 period, Hyslop (2001) estimated that wives' earnings were positively correlated with their husbands' earnings in both preceding and successive years. In contrast, Shore (2006) concluded that innovations to husbands' and wives' permanent earnings were slightly negatively correlated, on balance, between 1968 and 2001.

### *Transfer Income*

Transfer income in the PSID includes monetary transfers but excludes in-kind transfers. The dashed line in the bottom left panel shows that the volatility of transfers received by household heads and spouses rose 23 percent over the past thirty years, with the biggest increases in the 1970s and early 1990s.<sup>13</sup> Since 2000, the volatility of transfer income has edged down a bit.

One might expect that shifts in transfer income would be negatively correlated with shifts in income from market sources—because transfers act as a safety net when market incomes decline, because people earn more market income when public benefits decline, or both. The strength of these effects might change over time, for example because of changes in eligibility rules for transfer programs. However, the PSID data suggest that transfer income has tended to offset only a small share of declines in market income over the last several decades. For every decline in market income exceeding 10 percent, we calculate the share of the decline offset by an increase in transfer income. As shown in the lower right panel of figure 2, the average offset has been around 7 percent of the decline in market income and the offset has trended down over time.<sup>14</sup>

## **5. VOLATILITY OF HOUSEHOLD INCOME**

Total household income, labeled “total money income” in the PSID, equals the combined labor earnings, capital income, and monetary transfer income of the head and spouse, as well as the income of other household members. After-tax income is not available consistently in the PSID, so we examine pre-tax income; as a reminder, our baseline sample does not include households headed by students or individuals that are retired.

The volatility of total household income increased about 30 percent between the early 1970s and the late 2000s, as shown in the top left panel of figure 3. Volatility rose in the 1970s, 1980s, and 1990s and then was fairly stable over the 2000s (at least until the Great Recession set in). The standard deviation of percent changes in household income averaged 0.40 in the 1970s, 0.42 in the 1980s, 0.47 in the 1990s, and 0.50 in the 2000s.

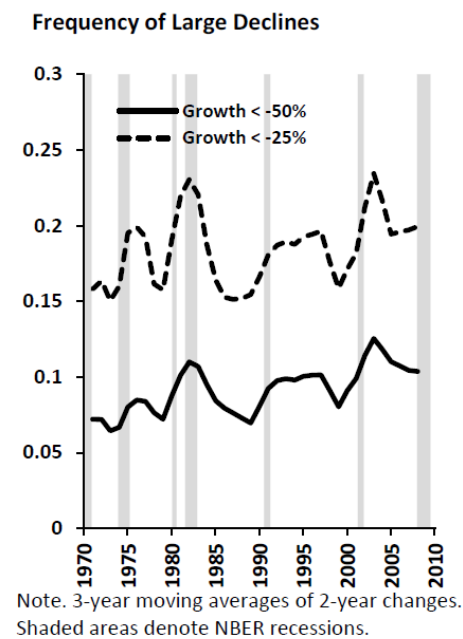
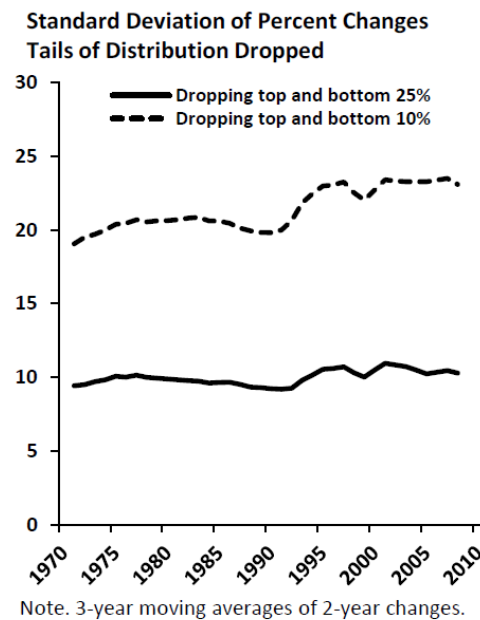
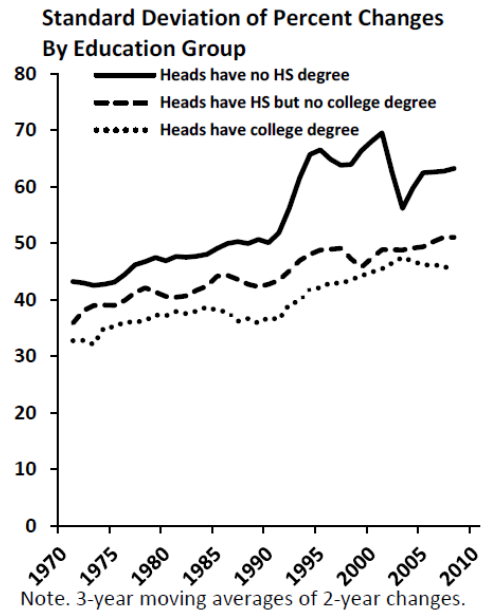
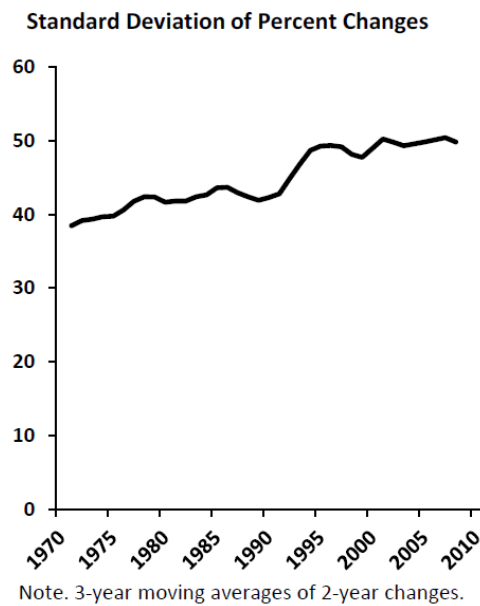
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<sup>13</sup> We could find no evidence that the dynamics of reported transfer income or reported capital income were affected by the methodological changes in the PSID. There are no notable shifts in the tails of the distributions, no sudden change in the frequency of very large increases and decreases, and no sudden change in the frequency of zero values.

<sup>14</sup> To reduce the impact of extreme outliers, we again drop the top and bottom one percent of offsets.



Figure 3  
**Volatility of Real Total Household Income**  
 Representative Sample; 1971- 2008



The run-up in income volatility can be seen in each major education group, as depicted in the upper right panel of figure 3 and in table 1. On net, less-educated households experienced somewhat greater increases in volatility. The relative volatilities of the different education groups have not changed over time:

Households whose head does not have a high school degree have consistently experienced more volatile income than households whose head has a high school degree but no college degree, and those households in turn have had slightly more volatile income than households whose head has a college degree. Similarly, and not shown, income volatility increased for households in each major age group.

Between the early 1970s and early 2000s, the standard deviation of percent changes in income rose from 0.44 to 0.55 (25 percent) for households whose head is under 35 years old, from 0.34 to 0.46 (36 percent) for households whose head is between 35 and 54 years old, and from 0.39 to 0.48 (22 percent) for households whose head is 55 years or older. The similarity in levels and changes of income volatility for households in different age groups suggests that shifts in the age composition of the population were not a principal cause of the moderation in aggregate economic activity in the decades leading up to the Great Recession (contrary to the provocative analysis by Jaimovich and Siu, 2007).

In one important sense, though, the increase in the volatility of household income was more concentrated: The distribution of percent changes in income did not widen uniformly, but principally in the tails. The solid line in the bottom left panel of figure 3 drops the top and bottom ten percent of changes in each year; the resulting standard deviation rises 21 percent over time compared with 29 percent for the complete data. Going further, the dashed line drops the top and bottom quarter of percent changes in each year; here, the standard deviation moves up just 9 percent. The implication is that the increase in income volatility occurred partly because small income shifts were replaced by medium shifts and because large income shifts were replaced by very large shifts.

The bottom right panel of figure 3 confirms this observation by showing a pronounced increase in the frequency of very large income declines. The share of households experiencing a 50 percent or greater plunge in income over a two-year period (with percent changes calculated as described above) climbed from about 7 percent in the early 1970s to more than 12 percent in the early 2000s before retreating to 10 percent in the run-up to the Great Recession. The pattern is similar for the share of households experiencing a 25 percent or greater decline in income over a two-year period, rising from 16 percent in the early 1970s to more than 23 percent in the early 2000s before falling back to 20 percent more recently. The share experiencing large jumps in income (not shown) also has trended up. Note also that weak aggregate economic activity—the shaded bars denote recessions—generates an increase in the frequency of very large household

income declines. Presumably, the frequency of large declines has risen again with the onset of the Great Recession.<sup>15</sup>

*Robustness of the Results to Changes in the Sample*

As we noted above, our baseline sample excludes students and retirees. These restrictions were motivated by the recognition that income changes associated with transitions between school and work and between work and retirement may result in volatility but do not necessarily represent uncertainty and risk because such transitions are more likely to be planned and under the control of a household than, for example, episodes of job loss. However, we acknowledge the limitations of this approach. These transitions are not always controllable and other transitions captured by our measure of volatility (such as a parent reducing his hours to spend more time with his children) are, in fact, the result of choice. Moreover, given our interest in tying microeconomic dynamics to macroeconomic development, there is an argument for not excluding any households from our analysis. These various considerations warrant further exploration as to how our results hold up in the face of changes in the sample.

Table 2 presents results on the 1971-2008 change in the volatility of household income for different samples. The top row repeats the “all observations” row from Table 1. Moving to the next few rows, broadening the sample to include students and retirees raises the level of volatility relative to the baseline, as might be expected, but it only slightly mutes the change over time. The broadest variation—which essentially includes all usable observations from the nationally representative PSID sample—volatility is estimated to have risen by 27 percent. We also present results for one case where the sample is narrower than in the baseline: excluding observations where the head or spouse has changed lowers volatility slightly but generates a slightly larger increase over time. On a year-by-year basis (not shown), the pattern is quite similar across variants. All told, then, our results appear to hold up well to a variety of changes in the sample used for analysis.

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<sup>15</sup> Presently, the PSID has publicly released only preliminary balance sheet and mortgage distress data for the 2011 wave; income data are not scheduled to be released until the spring of 2013.

Table 2  
**Three-Year Rolling Standard Deviations of Percent Changes in Household  
Income  
Alternative Samples**

	1971	2008	Change	Percent Change
Baseline sample	38	50	11	29
Broader samples				
Inc. student heads	39	51	11	29
Inc. retired heads	40	51	11	29
Inc. student & retired heads	41	52	11	27
Narrower sample				
Excl. observations where head or spouse has changed	37	48	12	32

Note. Uses two-year percent changes as described in text, with nominal values deflated by the CPI. Baseline sample is PSID representative sample excluding observations with student head, retired household head, and (for earnings) positive farm income. Imposes consistent top-coding and bottom-coding of levels.

## 6. VOLATILITY OF HOURS WORKED AND EARNINGS PER HOUR

Of the various components of income we study, household heads' labor earnings experienced the largest increase in volatility. We now investigate that rise more closely.

### *Decomposition of Rising Earnings Volatility for Household Heads*

An individual's earnings during a year can be described as the product of hours worked and earnings per hour. Earnings and hours are collected in the PSID, and we use their ratio as our measure of earnings per hour. To be sure, this calculation transmits measurement error in earnings and hours directly to earnings

per hour. Of course, measurement error distorts our conclusions about trends only to the extent it has changed over time.

The volatility of annual hours worked by household heads (shown in the top left panel of figure 4) and earnings per hour (shown in the top right panel) both increased during the past three decades. As listed in table 1, the standard deviation of hours rose 30 percent between the early 1970s and the late 2000s, while the standard deviation of earnings per hour climbed 28 percent. Thus, over the full sample, the rising volatility of earnings owes both to increasing volatility of hours and earnings per hour. While that conclusion seems likely to be broadly right, we interpret the precise allocation between increases in the volatility of hours and earnings per hour cautiously. Given that a sizable chunk of the increase in the volatility of earnings per hour occurred right around the time of the change in PSID methodology in the early 1990s, it seems possible that that change in methodology could be contributing to the increase in volatility of earnings per hour over that period.<sup>16</sup>

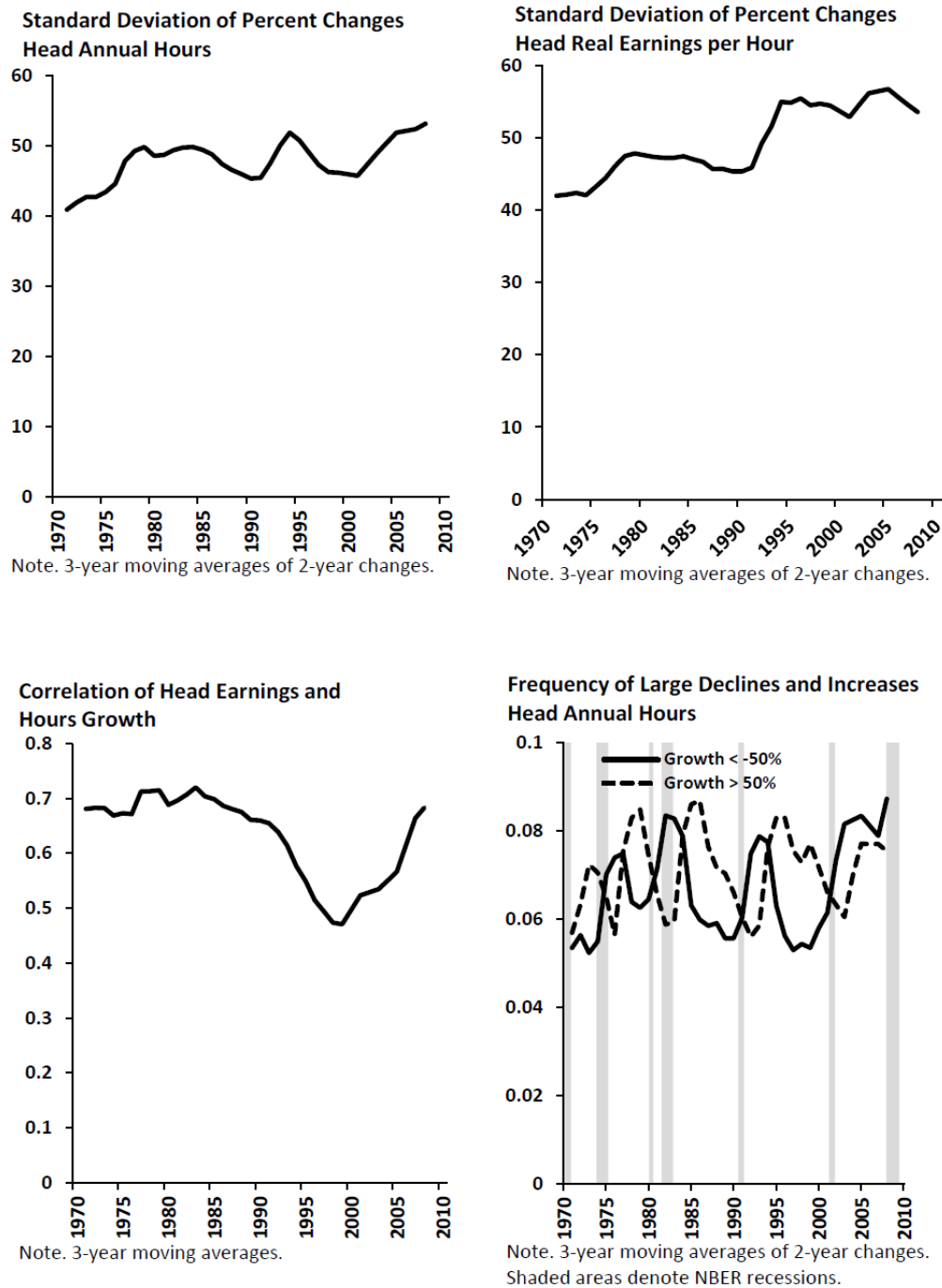
Not surprisingly, our measures of hours and earnings are highly correlated for household heads (shown in the lower left panel) though that correlation has changed over time. In particular, the volatility of hours increased much less than that of earnings per hour through the late 1990s, and, accordingly, the correlation between movements in earnings and hours growth showed a pronounced decline. However, the volatility of head hours has risen notably over the last decade while the volatility of earnings per hours has been stable. As one might expect, the rebound in the relative importance of movements in hours has caused the correlation between head earnings and hours growth to return in recent years to its higher earlier range.

Just as large changes in income have become more frequent, so too have large changes in hours. The frequency of very large declines in hours worked, shown in the bottom right panel, increased, on net, between the early 1970s and early 2000s and has jumped considerably higher in recent years. It is too early to say how the frequency of large declines in hours has evolved more recently. As can be seen in the graph, the series has tended to continue to rise for a while after the end of past recessions. On the other hand, aggregate data from the Bureau of Labor Statistics' *Job Openings and Labor Turnover Survey* show that the lay-off

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<sup>16</sup> That said, we have not detected any obvious changes that would lead to this result. Moreover, although some anomalies appear in the data set in the early 1990s (such as the jump in reports of heads' earnings of zero and hours worked over 120), they do not seem to affect more recent waves and thus presumably do not influence conclusions drawn from comparing results from the beginning of our sample with those from the end of our sample.

Figure 4  
**Volatility of Hours Worked and Earnings per Hour**  
 Nonfarm Representative Sample; 1971- 2008



rate peaked in early 2009 (just after the end of our sample) and had returned to its pre-recession range by 2010.<sup>17</sup>

Changes in hours can be either voluntary—for example, as a worker chooses to cut back to a part-time job—or involuntary—for example, as a worker loses a full-time job and can find only a part-time new job. We suspect that changes in earnings per hour are more likely to be involuntary—because workers may be reluctant to choose to cut back on their hourly compensation rate—though some voluntary job-to-job changes also surely lead to declines in earnings per hour. Thus, our finding that the volatility of earnings per hour rose about the same on net as the volatility of hours worked suggests (subject to the caveat noted above) that the increase in household heads' earnings volatility during the past thirty years had an important involuntary component.

## 7. COMPARISON WITH PREVIOUS LITERATURE

The paper that initiated this literature, Gottschalk and Moffitt (1994), examined the volatility of labor earnings. While we present results on earnings, we are particularly interested in the volatility of household income for the reasons cited in the introduction. In this section, we start by comparing our results on the volatility of household income to those of other researchers and then turn to a comparison of our results on earnings volatility to the previous literature. Because the literature has generated mixed results across datasets and researchers, we take a bit more space than might be typical to discuss how our work relates to that of others.

### *Household Income Volatility*

Table 3a provides a scorecard, summarizing prior work on the volatility of *household income*. Many of these papers found that the volatility of household income increased in recent decades, though the timing and magnitude of the increase vary considerably across researchers. In contrast, a handful of recent papers have argued that household income volatility has been flat or has only trended up a bit.

A few of these studies have examined how the volatility of household income has increased using the PSID. Gittleman and Joyce (1999), Batchelder (2003), Gosselin (2008), Hacker and Jacobs (2008), Hacker (2008), and Winship (2009) all found increases in volatility to varying degrees. The range in results appears to reflect the use of different techniques, different samples, and different periods of focus. Relative to these earlier studies, our analysis uses one of the

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<sup>17</sup> See [http://www.bls.gov/web/jolts/jlt\\_labstatgraphs.pdf](http://www.bls.gov/web/jolts/jlt_labstatgraphs.pdf).

Table 3a  
Selected Studies of *Household Income Volatility*

Authors (Date)	Data	Measure of Volatility	Key Conclusions
Gittleman and Joyce (1999)	PSID; 1968 to 1991; households; total income	Variance of transitory income estimated using formal model of income dynamics	Volatility of household income rose between 1970s and 1980s
Batchelder (2003)	PSID; 1968 to 1992; households; market income	Variation in income around average income	Volatility of household income rose between 1968 and 1992
Gosselin (2008)	PSID; 1970 to 2004; households; total income	Fluctuations in income	Volatility of household income rose between the early 1970s and the early 2000s
Hertz (2006)	CPS; 1990 to 2004; households; income	Median absolute value of dollar changes in income	Volatility of household income rose between early 1990s and early 2000s
Bania and Leete (2007)	SIPP; 1992 to 2003; low-income households; total income	Variation in monthly income around average income	Volatility of household income rose between early 1990s and early 2000s



Bollinger and Ziliak (2007)	CPS; 1979 to 2004; households headed by women aged 16-54; total income	Variance of transitory income defined using decomposition	Volatility of household income was stable in 1980s and early 1990s, but rose between mid-1990s and early 2000s
Hacker (2008); Hacker and Jacobs (2008)	PSID; 1969 to 2004; households headed by people aged 25-61; total income	Transitory income from Gottschalk-Moffitt decomposition and other measures.	Short-term family income variance “essentially doubled from 1969-2004.”
Winship (2009)	PSID; 1974 to 2004; households; total income	Standard deviation of two-year percent changes	Volatility of household income rose “by under one-third.”
Dahl, DeLeire, and Schwabish (2011)	Matched SIPP-SSA; 1984-2004. SIPP; 1984-2004. Men and women aged 25-55; excl. self-employment earnings	Fraction of +/- 50 percent changes in household income; also std dev of arc percent changes in household income	Volatility of household income has been roughly constant from the mid-1980s to the mid 2000s
Winship (2011)	SIPP; 1984-2008. CPS; 1982-2009. PSID; 1969-2006. Adults aged 20-59. Inc. self-employment earnings. Excl. obs. w/zero or negative income.	Fraction of households with 25 percent decline in income.	Instability of household income rises using the PSID and the CPS, stable in the SIPP.

DeBacker, Heim, Panousi, and Vidangos (2012)	IRS tax data; 1987-2006.	Std dev of one- and two-year percent changes in household income	Volatility of household income rose between 1987 and 2006
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less-filtered measures of volatility and looks at the longest sample period, with results through the 2009 wave of the PSID. We also put few restrictions on the sample in an effort to best reflect the full range of experiences across U.S. households. Of particular note, we do not exclude observations where income has dropped to zero or very low levels. Our baseline sample does exclude households headed by students and retirees, but we include some results showing that the qualitative finding that volatility has increased moderately still holds even when one looks at all PSID households.

Researchers using some other datasets have also found that the volatility of household income has increased over time. Using Current Population Survey (CPS) data, Hertz (2006) analyzed dollar (not percent) changes in households' incomes from one year to the next. He estimated that income volatility increased significantly between 1990-91 and 1997-98 and then rose further by 2003-04. Based also on the CPS, Bollinger and Ziliak (2007) showed that income volatility for households headed by women was stable in the 1980s and early 1990s but rose 60 percent between 1995 and 2004. Using data from the Survey of Income and Program Participation (SIPP), Bania and Leete (2007) studied monthly deviations in households' incomes from their average incomes. Focusing on low-income households, they estimated that volatility increased substantially between 1992 and 2003. Using IRS data, DeBacker, Heim, Panousi, and Vidangos (2012) estimated that household income volatility rose from 1986 to 2006.

Although many papers have results that are consistent with our finding of an increase in household income volatility over time, one recent paper found no increase in the volatility of household income (Dahl, DeLeire, and Schwabish (2012)) and another argued that any increase that did occur was not large (Winship (2011)). Dahl, DeLeire, and Schwabish—referred to subsequently as DDS—analyze two different data sources to assess trends in the volatility of household income. Their preferred dataset matches administrative earnings data from the Social Security Administration (SSA) with non-labor income based on

survey data from the SIPP (referred to as the SIPP-SSA data). They also use a measure of household income directly from the SIPP, combining the SIPP's measure of labor earnings with non-labor income from the SIPP. Both datasets provide information on annual income changes spanning 1985 to 2004. They consider two measures of income volatility, the standard deviation of percent changes (comparable to our measure of volatility) and also the fraction of households experiencing very large increases or decreases in income. DDS' preferred measure considers increases or decreases of 50 percent or more.

Over the sample period investigated by DDS (1985-2004), we find a notable increase in the volatility of household income. In contrast, DDS find that volatility changed relatively little, on balance, over this sample period. (See figure 3 in DDS.) Their results do show an uptrend when they use the SIPP dataset (using SIPP labor earnings rather than SSA labor earnings), with the volatility of household income relatively flat from 1985 through the mid 1990s and then increasing through the mid 2000s. However, DDS note the large and rising fraction of observations in which income is imputed in the SIPP, and they argue that these imputations may account for the apparent rise in household income volatility in the SIPP. Indeed, when the imputed observations are dropped, the upward trend is significantly muted.

What accounts for the difference between DDS' finding that volatility in household income did not rise between 1985 and 2005 and our finding of a considerable increase over that period? Several studies have tried to sort out differences across studies and found that a challenging task.<sup>18</sup> We also have not been able to identify a smoking gun. That said, we highlight some differences between our work and DDS; some of these differences seem unlikely to account for the divergent results, while other seem likely to be more important.

We start with differences that seem unlikely to account for divergent results. DDS analyze one-year changes, while the limitations of the PSID force us to study two-year changes. Results in Winship (2011) indicate that for the period through 1996—in which the PSID covered every year—the volatility of two-year changes is larger and more variable than the volatility of one-year changes but the trends are fairly similar. While this pattern could have changed since 1996, these results at least loosely suggest that one-year versus two-year changes may not be a source of big differences across studies.

Another difference is that DDS include all individuals between ages 25 and 55. In contrast, we do not select on age but rather exclude observations where the head of household is a student or is retired. Accordingly, DDS include students who are aged 25 or older and retired individuals aged 55 or less, while they exclude those who are older than 55 and working. On the other hand, we

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<sup>18</sup> For example, see Shin and Solon (2011), Celik, Juhn, and Thompson (2012), and DDS (2011).

exclude workers who are not a household head or spouse, a group included by DDS. Shin and Solon (2011) suggests that these differences in age coverage are unlikely to account for the different volatility trends in our work and DDS.

A third difference involves the trimming of observations. As discussed above, we do as little trimming as possible for our baseline results, so as to capture the broadest range of U.S. household experiences. (The exception is that we remove households with income levels in about the top ½ percent of observations because of top-coding in the PSID.) In contrast, DDS trim the top and bottom 2 percent of observations in each year's cross section of percent changes. Given our finding that much of the rise in volatility over time has been in the tails of the distribution, this difference likely explains some of the difference.<sup>19</sup>

Another difference that seems likely to be quite important is that we include self-employment earnings, and DDS do not in their preferred SIPP-SSA measure. Because we are ultimately interested in total household income, we use the most inclusive measure of earnings available.<sup>20</sup> Although Congressional Budget Office (2008) argued that the exclusion of self-employment income is not likely to be a big deal (p. 18), our analysis and a number of other papers suggest that excluding self-employment earnings damps the rise over time in volatility. When we drop household heads who report having a financial interest in a business (which removes 10 to 15 percent of the sample) we find that volatility of heads' earnings rises 29 percent over our sample period compared with 36 percent in the baseline sample.<sup>21</sup> Shin and Solon (2011) also argue that the inclusion or exclusion of self-employment income matters for the trend in earnings volatility, and Jensen and Shore (2008) make this case as well.<sup>22</sup>

A final important difference between the studies is the datasets used. Although a standard presumption is that the SIPP-SSA administrative data would be more accurate for wages and salaries than the PSID survey data, this view could be incorrect. Bound and Krueger (1991) took administrative data as the

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<sup>19</sup> However, our earlier analysis defined tails much more broadly than the top and bottom 2 percent: we considered households in the top and bottom 10 percent and in the top and bottom 25 percent.

<sup>20</sup> Whether excluding self-employment earnings raises or lowers volatility is unclear *a priori*: Such earnings are likely more volatile than wages and salaries, but they also tend to be negatively correlated with wages and salaries—for example, as individuals turn to self-employment when they lose their jobs, a transition reported by Fairlie (2005) to occur often.

<sup>21</sup> In addition, because more men than women are self-employed, self-employed earnings likely have a bigger effect on earnings volatility for men than for women, which is consistent with the difference between our result and DDS's.

<sup>22</sup> In particular, Jensen and Shore (2008) provide evidence that rising earnings volatility was concentrated among groups who, *ex ante*, would have been expected to have more volatile incomes, such as the self employed.

benchmark for examining measurement error in surveys, but Bound, Brown, Duncan, and Rogers (1994, page 357) were more skeptical: “Part of the reason that Bound and Krueger find larger errors than we do has to do with errors in the social security record and part has to do with [Current Population Survey, CPS] recording errors. ... We expected that the problems would be mostly with CPS reports; in fact in 15 of 26 cases [with the largest discrepancies] it was one of the SSA reports that seemed ‘out of line.’”

In addition, when DDS match the SIPP non-labor income data to the SSA earnings data, they are not able to match every observation. They report not being able to match 10 to 20 percent of household members in most years and not being able to match 40 percent of household members in 2001. While the patterns of volatility for unmatched observations could be the same as for matched observations, the rate of non-matching seems high enough to raise the possibility that non-matching could have affected their results. Of course, as with a number of discrepancies that arise in this literature, there is no obvious way to get a definitive answer.

Another recent paper—Winship (2011)—argues that, whatever increase in the volatility of household has occurred, that increase was not particularly large. Winship compares instability of household income across three different datasets: the SIPP, the PSID, and the CPS. As a measure of instability, Winship focuses on the fraction of households experiencing 25 percent decreases in income. Importantly, he excludes all observations with zero income or with income less than zero in a year. He obtains mixed results. Using his preferred measure, he finds that instability increased using both the PSID (from the late 1960s to the mid-2000s) and the CPS (from the early 1980s to the late 2000s). For the CPS results, he excludes observations in which a significant fraction of income was imputed; with these observations included, the uptrend in instability in the CPS is quite a bit larger. Using the SIPP (excluding observations with significant income imputations), Winship estimates that instability changed little, on balance, from the mid-1980s to the mid-2000s, qualitatively matching the results in DDS.

Winship’s paper usefully compares results across datasets. However, for a number of reasons, we do not see his work as resolving the question of whether household income volatility has increased. First, his results are mixed across datasets as is the case in the prior literature, and he is not able to ascertain the sources of these differences. Second, he uses a different measure of volatility than that in most other studies. Third, as noted above, high imputation rates in the SIPP (and in the CPS) are of concern. Finally, Winship’s exclusion of observations with income of zero or less raises the possibility that he is missing some important and potentially large income changes.

### *Labor Earnings Volatility*

The literature on *labor earnings* volatility is larger than that on *household income* volatility, though the two strands are closely related given that labor earnings make up a large share of household income for most households. As noted above, however, we see these papers as saying more about how labor market dynamics have evolved than about how overall household economic security has evolved. Table 3b summarizes selected studies from this line of research, starting with the paper that kicked off this literature: Gottschalk and Moffitt (1994). As indicated in the table, most research on individual earnings volatility has concluded that volatility increased during the past several decades, although the timing and magnitude differ across papers, and not all studies agree that volatility has increased.

For many of the same reasons as discussed above for studies on household income volatility, ascertaining the sources of these differences is difficult, owing to the wide range of empirical techniques used and the variety of choices made about which individuals and types of income to analyze. As above, because results in the literature are so mixed, we compare with some care our results for the volatility of men's earnings to a few recent papers that have received widespread attention.

Shin and Solon (2011) examine the volatility of male earnings using the PSID. They find an increase in the volatility of men's earnings during the 1970s, a relatively flat trend through the late 1990s, followed by a new uptrend starting around 1998 that continues through the end of their sample in 2006. Our results are consistent with regards to the increase in volatility over the full sample, but the timing of the increases in their results differ from ours, with our results showing a more steady increase, with some flattish regions in the second half of the 1980s and the second half of the 1990s.

Shin and Solon provide a useful discussion of the possible sources of differences between their results and ours. As noted above, that discussion suggests that our inclusion of self-employment income may be an important contributor (p. 978-980). Indeed, when they use broader measures of earnings that include self-employment income, the timing of increases in volatility in their results looks more like our results. However, Shin and Solon raise concerns about the consistency over time of the PSID data on self-employment earnings. We prefer the broader measure because it seems closer to the concept of total household income that we are trying to capture, but we acknowledge Shin and Solon's point of the possibility that data inconsistencies could be part of the explanation for why we show a more consistent increase in volatility over the sample period than they do.

Table 3b  
Selected Studies of *Earnings Volatility*

Authors (Date)	Data	Measure of Volatility	Key Conclusions
Gottschalk and Moffitt (1994)	PSID; 1970 to 1987; white male household heads aged 20-59; wages and salaries	Variance of transitory earnings defined as gap between actual earnings and individual average earnings	Volatility of earnings rose between the 1970s and 1980s
Gottschalk and Moffitt (1995)	PSID; 1970 to 1987; white male household heads aged 20-59; wages and salaries	Variance of transitory earnings estimated using formal model of earnings dynamics	Volatility of earnings rose between the late 1960s and late 1980s
Daly and Duncan (1997)	PSID; 1969 to 1995; male household heads aged 25-44; labor earnings	Variance of transitory earnings and other measures	Volatility of earnings rose between the 1970s and 1980s
Dynarski and Gruber (1997)	PSID; 1970 to 1991; male household heads aged 20-59; labor earnings	Variance of transitory earnings defined as gap between actual earnings and individual earnings growth path	Volatility of earnings rose in the late 1970s and early 1980s

Cameron and Tracy (1998)	CPS; 1968 to 1997; men; wages and salaries	Variance of transitory earnings	Volatility of earnings rose in 1970s and early 1980s, and later retraced part of run-up
Haider (2001)	PSID; 1968 to 1992; white male household heads aged 25-60; labor earnings	Variance of transitory earnings estimated using formal model of earnings dynamics	Volatility of earnings rose between early 1970s and late 1980s
Hyslop (2001)	PSID; 1979 to 1985; men and women aged 18-60; labor earnings	Variance of transitory earnings estimated using formal model of earnings dynamics	Volatility of earnings rose in 1980s
Moffitt and Gottschalk (2002)	PSID; 1970 to 1996; male household heads aged 20-59; wages and salaries	Variance of transitory earnings defined using decomposition and estimated using model	Volatility of earnings rose in early 1980s and early 1990s, and later retraced run-up
Comin, Groshen, and Rabin (2006)	PSID; 1970 to 1993; household heads; labor earnings	Variance of transitory earnings defined as gap between actual earnings and individual average earnings	Volatility of earnings rose between early 1970s and early 1990s
Gottschalk and Moffitt (2006)	PSID; 1970 to 2002; male household heads aged 20-59; wages and salaries	Variance of transitory earnings defined using decomposition and estimated using model	Volatility of earnings rose in 1970s, 1980s, 1990s, and early 2000s



Congressional Budget Office (2007)	CWHS; 1980 to 2003; men and women aged 22-59; labor earnings excl. self-employment	Percent changes in earnings	Volatility of earnings has changed little since 1980
Jensen and Shore (2008)	PSID; 1969-2004. Men age 22-60.	Various measures	Rise in earnings volatility concentrated among self employed and others who typically experience large income changes.
Keys (2008)	PSID; 1970-2000. Men, women, various demographic groups.	Gottschalk-Moffitt type decomposition.	Increasing volatility in most groups.
Abras (2010)	CPS; 1980-2008; private nonfarm jobs	Weighted average of absolute growth rate of earnings	Volatility of earnings (and hourly earnings and hours) increased from 1980 to 2008.
Ziliak, Hardy, and Bollinger (2010)	CPS; 1972-2008; men and women	Std dev of arc percent change	Volatility of men's earnings rose 1970 to mid-1980s then stable; volatility of women's earnings fell 1970 to mid-1980s then stable
Shin and Solon (2011)	PSID; 1971 to 2006; male household heads aged 25-59	Std dev of two-year arc percent change	Volatility of earnings rose in 1970s, was flat through late 1990s, then rose further through 2006.

Congressional Budget Office (2008)	CWHS; 1984-2003. Men and women aged 25-55; excl. self-employment earnings	Std dev of percent change; fraction of +/- 25 percent changes in earnings	Volatility of overall, men's, and women's earnings declined over most of period
Celik, Juhn, McCue, and Thompson (2012)	CPS, SIPP, LEHD, and PSID; men aged 25-59	Std dev of percent changes	Volatility of earnings stable in 1990s and 2000s using CPS, SIPP, and LEHD; rose using PSID. In CPS and PSID, volatility rose over full sample from late 1960s/early 1970s.
Moffitt and Gottschalk (2012)	PSID; 1970-2004. Male heads of households aged 30-59.	Error-components decomposition to obtain transitory variance	Transitory variance rose in 1970s and 1980s and stable since then. Total variance (incl. permanent component) rose over period

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Two other recent papers argue that the volatility of men's earnings remained fairly stable in the 1990s and 2000s. Celik, Juhn, McCue, and Thompson (2012), examines the volatility of men's earnings in four different datasets. They focus on men aged 25-59 and only include wages and salaries (which excludes self-employment income). The authors emphasize their results for the past couple of decades. Using three of their datasets (the CPS, the SIPP, and administrative data from the Longitudinal Employer-Household Dynamics (LEHD)), they find relative stability in the volatility of men's earnings during the 1990s and 2000s. In contrast, they cite the Shin and Solon (2011) results for the PSID, which find an increase in volatility from the late 1990s forward. Looking

further back in time, the CPS and PSID data show a sizable increase in volatility from the late 1960s/early 1970s to the early 1980s and show an increase in volatility over the full sample period.

DDS also examined the volatility of men's earnings.<sup>23</sup> In their preferred dataset, they find a decline in men's earnings volatility from 1985 to 2005 (figures A-2 and A-3).<sup>24</sup> Both Celik et al. and DDS highlight the likely role of different datasets in explaining divergent results across studies. As noted above, it is very challenging to precisely nail down the reasons for differing results across datasets.

Another important paper examining men's earnings volatility is the latest work by Moffitt and Gottschalk (2012). Using the PSID and an updated version of the decomposition they developed in their 1994 paper, they find (p. 204) that "transitory variance started to increase in the early 1970s, continued to increase through the mid-1980s, and then remained at this new higher level through the 1990s and beyond." Although the focus of their paper is on transitory variance, they also report the permanent component of variance and total variance (which incorporates both transitory and permanent variance and is closely related to our volatility measure). Their measure of total variance rises from 1970 through the mid-1980s, remains relatively stable through the early 2000s, and then rises further through 2004. Though there are differences in methodology and the treatment of data in our work and in Moffitt and Gottschalk's paper, the pattern they estimate over time in the overall volatility of men's earnings is, nonetheless, relatively similar to our results.<sup>25</sup>

## 8. CONCLUSION

The Great Moderation of U.S. aggregate economy activity that occurred in the 1980s and 1990s did not show through at the level of individual households. Instead, households faced larger income changes—especially, a greater chance of very large changes in income—than they did several decades ago. Connecting these developments should be a central goal of research. Dynan, Elmendorf, and Sichel (2006b) showed that aggregate income constructed from PSID data has become less volatile over time. They reconciled this finding with greater household-level volatility by documenting a decline in the covariance of income across households in various demographic groups. Future research also needs to

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<sup>23</sup> These results are reported in CBO (2008), an earlier version of DDS (2012).

<sup>24</sup> When DDS examine earnings, they prefer data from the Continuous Work History Sample (CWHs), administrative data provided by the Social Security Administration.

<sup>25</sup> See Shin and Solon (2011) for a comparison of Moffitt and Gottschalk's formal modeling approach to the simpler measures of volatility.

examine what effect the dramatic macroeconomic developments of recent years have had on household-level income dynamics.

We close by emphasizing that an increase in the *volatility* of household income does not necessarily imply a corresponding increase in the *risk* faced by households. First, only part of income variability reflects involuntary job loss and wage cuts, while part reflects voluntary choices such as deciding to leave the labor force. Our finding that the volatility of earnings per hour rose significantly suggests an important involuntary component to rising income variability, but much more analysis is needed.

Second, risk can arise from a variety of economic shocks besides the income variations we studied here. Because of limitations in the PSID data, we cannot study changes in taxes or non-monetary transfer payments. And we did not examine risks on the spending side, such as an unexpected need to pay for extra health care.

Third, shocks to income can be buffered to some extent by adjustments to saving and borrowing, thereby reducing their impact on consumption. Dynan, Elmendorf, and Sichel (2006a) argued that financial innovation has enhanced households' access to credit over time and thus strengthened their ability to smooth consumption in the face of income shocks. Using aggregate data, they showed that consumer spending has become less sensitive in the past few decades to movements in contemporaneous income. In preliminary work using household data (2006b), these authors confirmed that spending has become less responsive to income shifts. In terms of people's well-being, an improvement in the ability to smooth consumption relative to income provides a partial counterweight to the increase in income volatility documented in this paper.

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