

# The Rising Instability of U.S. Earnings

Peter Gottschalk and Robert Moffitt

**T**he inequality of earnings and of family incomes in the United States has increased since the late 1970s (Autor, Katz, and Kearney, 2008). This increase in cross-sectional inequality has largely been interpreted as a growing disparity in permanent incomes between those with high incomes and those with low incomes. However, growing inequality could equally well be a result of growing income instability. If workers experience increasingly large fluctuations in earnings from year to year, this would also increase the measured inequality of earnings from year to year. For example, if everyone maintained the same level of permanent income but some experienced a \$500 increase in their income in the first year and then a reversal to \$500 below their permanent incomes in the following year, while an equal number experienced the opposite (a drop in income followed by an offsetting rise), measured inequality would rise though nothing would have happened to the dispersion of permanent incomes.

While this example is an extreme one, it points to the fact that the large rise in earnings inequality between the 1970s and the 1990s could reflect either a rise in disparity of permanent incomes, a rise in earnings instability, or some portion of both. Without longitudinal data, it is impossible to distinguish between these two very different explanations for increased cross-sectional measures of inequality.

In this paper, we provide longitudinal measures that separate changes in income inequality into changes that permanently change income to new levels and those that only reflect transitory change. We refer to the latter as changes in “income instability” and discuss how the instability of individual earnings and family income in the United States has evolved over the last quarter century.

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Rising inequality of permanent incomes and rising instability of incomes have very different implications for understanding causal factors and for drawing normative and policy conclusions. If the rise in cross-sectional inequality primarily reflects increases in inequality of permanent income, then research should focus on identifying economic factors that have lasting effects on incomes. For example, skill-biased technological change could raise the wages of skilled labor and lower the wages of less-skilled workers, or changes in the relative supplies of those types of workers could have a similar effect. Likewise, increased international trade could have a long-run effect in holding down the wages of less-skilled workers who face increased competition from those foreign workers who are good substitutes for less-skilled domestic workers. Factors such as these have largely been the focus of the literature on the causes of the increase in inequality. However, if the increase in cross-sectional inequality reflects increased instability, then this implies very different causal factors, such as changes in job turnover and changes in firm instability that could affect the dynamics of earnings.

Understanding the higher level of earnings instability or income instability matters for reasons beyond interpreting the rise in inequality. Higher income instability is often described as representing an increase in risk that decreases individual or household welfare, as noted in popular accounts (Hacker and Jacobs, 2008; Gosselin, 2008). However, this conclusion must be approached cautiously. Some types of instability are the result of voluntary decisions by workers and families; for example, increased earnings instability among the young may reflect a productive search for better matches with firms that need their skills (Topel and Ward, 1992). Other types of earnings instability, like the fluctuations in bonuses among highly paid analysts in the financial sector, do not seem like a source of individual risk that should be of much social concern. However, greater instability of earnings and income among low-wage and unskilled workers, where liquidity constraints are almost surely important, may well represent an increase in household risk that is troubling.

Instability of earnings and income also bears a close relationship to the concept of mobility, a long-standing topic of interest to both economists and sociologists (Atkinson, Bourguignon, and Morrisson, 1992; Blau and Duncan, 1967; Kopczuk, Saez, and Song, forthcoming). It has long been recognized that observing the same distribution of income at two successive points in time does not allow drawing any clear implications about mobility—everyone could have stayed exactly where they were or everyone could have changed places radically between the two time periods. Thus, distinguishing between permanent and transitory changes in income clearly sheds light on mobility. An increase in the extent of permanent changes in permanent incomes increases short-term mobility in the sense that it increases the chance of moving upward or downward in the income distribution in the period after the change, although it reduces mobility in the future because individuals are farther apart from each other in the distribution and hence a

change in relative rank is more difficult. An increase in the extent of transitory changes in income increases short-term mobility.<sup>1</sup>

Finally, we note that instability of family income involves additional considerations beyond instability of individual earnings. Instability in family income can result from increases in instability of individual earnings and also from instability of other sources of family income, such as capital income and government transfers, or changes in the correlation between these sources of income. Instability of family income also reflects changes in family composition. Thus, while instability of earnings primarily reflects changes in labor market factors, family income instability reflects a host of additional considerations.

We begin our discussion by laying out the conceptual and measurement issues that must be confronted in any study of earnings and income instability. We then present our estimates of instability of individual earnings and family income, including a discussion of how they have evolved in the United States as a whole as well as for different types of individuals and families. We consider alternative definitions of instability that have been proposed, and establish that all studies find that instability is considerably higher today than in the mid-1970s. This increase in instability is not a recent phenomenon. Earnings instability rose sharply in the late 1970s and early 1980s, then stabilized at these high levels through the recent period, although it may be increasing once again. We then discuss the factors that may be driving this increase in instability. The paper ends with a discussion of policies that could be used to counter the effects of the rise in earnings and income instability.

## Conceptual and Measurement Issues

### Definition of Instability

The concepts of permanent and transitory income are familiar to most economists, largely because of the work of Milton Friedman in the 1950s concerning how different types of changes in income affect consumption (Friedman, 1957). Friedman imagined transitory changes in income to be purely random from period to period, as might occur, for example, if a worker received a one-time bonus from an employer of \$500 that was not repeated in subsequent years. **One modification to this concept that is empirically important is the concept of a transitory change that does not go away immediately in the next period and hence is, in statistical language, serially correlated.** For example, a worker who is laid off from a job may be forced to look for other work for a year or two and have low earnings during that time as a result. The worker's earnings may not return to their original level until two or three years have passed. Formally speaking, a transitory change is usually

<sup>1</sup> Dragoset and Fields (2006) discuss a range of mobility concepts. Bayaz, Chen, and Couch (2009) show that changes in permanent and transitory variances map directly into Shorrocks's  $R$ , a common measure of mobility.

defined as any change that eventually goes away—meaning that the individual eventually returns to the original level of earnings, or to the original “path” of earnings—even if it may take a number of years to do so.

A second modification to the Friedman concept is to introduce the idea of a change in permanent earnings, which sounds like a contradiction in terms (how can something that is permanent change?). The formal definition of such a change is one that never goes away, even after a number of years. For example, suppose that a 45-year-old man who has worked for the automobile industry his entire life is laid off when the auto industry experiences a permanent downsizing. As a result of this downsizing, the worker may have to make a transition to another industry that requires retraining and learning new skills. At age 45, this transition is not easy, and it is probable that he will never attain a level of earnings quite as high as he had before. The gap between his original earnings and the eventual earnings he is able to obtain in a different industry is the size of the permanent change in earnings, and the amount he was able to eventually recover would determine the size of his transitory earnings change. For example, if he had earned \$75,000 in the automobile industry and was forced to drop to a \$50,000 job immediately after leaving the automobile industry, the immediate change in his earnings would be  $-\$25,000$ . If he was able to eventually work himself back up to a \$65,000 job in a different industry, the permanent change in his earnings would be  $-\$10,000$  and the transitory portion of the initial change—the part of the initial loss that was eventually recovered—would be  $-\$15,000$ .

The concepts of permanent and transitory income have direct implications for mobility of income. In fact, a completely specified model of income dynamics would completely determine mobility patterns. If mobility is defined as a change in relative rank, or relative position, in the income distribution, then the movements of income from one period to the next for each individual in the population necessarily determine who changes rank with whom or, statistically speaking, determine the probability of such changes in relative position. An increase in the variance of transitory income leads to increases in short-term mobility because it increases the chance that an individual will change relative position with someone else—both upward and downward. However, because transitory changes eventually disappear, such an increase in variance has no effect on the chance that an individual will change that person’s relative long-run position in the distribution of income. An increase in the variance of permanent income has somewhat more complex effects on mobility. An increase in that variance increases the prospect of long-term mobility because an individual now has a greater chance of moving upward, as well as downward, in the distribution of long-run income. However, once the changes in permanent earnings have occurred, individuals have a smaller chance of changing relative position, either because of permanent or transitory shocks to earnings, because they are farther away from each other in the distribution.

Our focus is on the measurement of permanent and transitory earnings. With a panel data set of adequate length, the decomposition of earnings into permanent and transitory components is best measured by looking at the autocovariance

structure of earnings—that is, the degree to which earnings are correlated between periods—and then applying what is called a dynamic error components model of earnings. In this approach, earnings that have a high covariance between years that are far apart signal a strong permanent component, because a high covariance implies that a high value in an initial year leads to a still-high value in a later year. If that covariance increases over time, it implies that the permanent component has risen. If the cross-sectional variance of income increases but the far-apart covariance does not rise, then the transitory component must have increased. There is a long tradition of estimating error component models in economics, and adapting these models to allow changes in the relative importance of permanent and transitory components over time involves estimation of a nonlinear model of moderate complexity (Moffitt and Gottschalk, 1995; 2008).

In this essay, we use a simpler, approximate approach to measurement that we developed in an earlier paper (Gottschalk and Moffitt, 1994). In this method, the earnings data of all individuals in a fixed calendar window—for example, the nine-year window 1970–1978—are selected. **We calculate the mean of log earnings for each individual,  $\bar{y}_i$ , as a measure of the individual's permanent earnings in that calendar window.** Transitory log earnings for individual  $i$  in year  $t$  is the difference between the individual's log earnings in year  $t$  and his permanent earnings,  $y_{it} - \bar{y}_i$ .<sup>2</sup> The calculation is then repeated for all calendar-time windows of the same length: for example, 1971–1979, 1972–1980, and so on. The resulting estimates provide time series estimates of the permanent and transitory variances.

There are two disadvantages of this method: One is that it does not get the

<sup>2</sup> The variance of transitory earnings for individual  $i$  over the  $T$  years covered by the window is given by the standard formula for sample variances  $\frac{1}{T-1} \sum_{t=1}^T (y_{it} - \bar{y}_i)^2$ . The variance of transitory log earnings for the full sample is simply the average of these individual variances over all individuals:

$$\text{Transitory variance} = \sigma_v^2 = \frac{1}{N} \sum_{i=1}^N \left[ \frac{1}{T_i - 1} \sum_{t=1}^{T_i} (y_{it} - \bar{y}_i)^2 \right]$$

The sample variance of mean log earnings across the  $N$  sample members, adjusted for the fact that the mean contains a portion of the transitory component that has not completely averaged out to zero, yields the variance of permanent earnings:

$$\text{Permanent variance} = \sigma_u^2 = \frac{1}{N-1} \sum_{i=1}^N (\bar{y}_i - \bar{\bar{y}})^2 - \frac{\sigma_v^2}{\bar{T}}$$

where  $\bar{\bar{y}}$  is the mean of log earnings across the full sample and  $\bar{T}$  is the mean years covered by the window over the individuals in the sample. These are the standard formulas for the variances in the so-called random effects model (Wooldridge, 2002). We apply this method to the residuals of earnings after taking out year effects. Otherwise, aggregate growth in earnings would generate transitory deviations from an average by itself. While the mean transitory shock is zero, the distribution of shocks is unconstrained. For example, the distribution need not be symmetric. We also take out year effects for the other outcomes examined in this essay—female earnings and family income—for the same reason.

exact turning points in the time series of transitory variances right because the calculation averages over several calendar years. Second, the method does not correctly treat some subtle dynamic processes in earnings such as serial correlation of the transitory component, random walk, and random growth processes of the permanent component and related features. However, as we demonstrated in Moffitt and Gottschalk (2008), this method produces approximately the same time series patterns of transitory variances as the more sophisticated and exact method which uses the autocovariance matrix of earnings.

### **Reporting Error from Respondents and Other Measurement Issues**

While a clear definition of income instability is essential, it is also important to address several more mundane measurement issues that can have a large effect on the results.

One set of measurement issues involves the measure of income. **Most studies in this literature have focused on the transitory fluctuations in annual wage and salary earnings of adult males not in school.** Narrowing the focus to wage rates yields results that are very similar to those for the broader earnings measure. While we would prefer to use total compensation, which includes fringe benefits, these data are not available in any of the longitudinal data sets used in this line of research. The self-employed are excluded because their reported earnings reflect returns to capital as well as labor market earnings.

An alternative income measure that has gained substantial attention recently is annual family income (Gittleman and Joyce, 1999; Dynan, Elmendorf, and Sichel, 2008; Gosselin, 2008; Hacker and Jacobs, 2008; Winship, 2009). This broader income measure includes the earnings of all family members as well as all non-earned income, including dividends, interest, rents, social insurance such as unemployment insurance and Social Security, and all cash income-tested programs such as the welfare program Temporary Assistance to Needy Families (TANF). Including these additional income sources could alter the results. Each source of income may itself be unstable, but if the transitory shocks to different income sources are negatively correlated, that would tend to reduce overall instability. For example, transitory declines in earnings could be offset by transitory increases in payments from unemployment insurance and other public transfers. Likewise, other family members may work more when the head of household experiences a transitory drop in earnings. In addition, family income volatility also includes the effects of demographic changes such as divorce and childbearing. It should, therefore, not be surprising if family income instability exhibits different patterns than instability in individual earnings.

A second set of measurement issues involves problems that arise out of reporting error. Most data sets that study income instability are gathered from household surveys that ask respondents to report their earnings and income over the previous calendar year. Respondents often misreport their earnings by either excluding income, such as tips or income gained in the underground economy, or failing to remember how much they earned. One might suspect that the resulting measurement error would add variance to the data, thus leading to overestimates of

inequality, mobility, and transitory variance. However, this turns out not to be the case.

The nature and magnitude of measurement error in income has been examined in studies where true values of income for each individual are obtained from some other source. In their review of the findings from this literature, Bound, Brown, and Mathiowitz (2001) find that these errors are often quite large. However, their review also indicates that response errors are not “classical” in the sense of being purely random. Instead, response errors are positively correlated over time, as occurs, for example, when respondents who overstate income do so repeatedly. More importantly, measurement error is “mean reverting,” meaning that respondents with high incomes tend to understate their incomes and respondents with low income tend to overstate their incomes. As a result, true inequality is understated in survey data instead of being overstated. In a study specifically examining the effects of nonclassical measurement error on estimated mobility, Gottschalk and Huynh (forthcoming) find that the different types of errors have offsetting effects—some biasing estimates of mobility upwards and others biasing them downwards—and that the offsetting errors largely cancel each other out, leaving, on net, little effect of measurement error on mobility. **Their findings are consistent with other studies, like that of Pischke (1995), which find that the covariance structure of earnings is similar whether one uses reported earnings from respondents or so-called validated (that is, true and confirmed) data from firms.**

Even if measurement error does bias estimates of the variance of transitory income, it will not bias the estimates of time trends in that variance unless the nature of the error changes over time. There is no reason to think that respondents have become more or less accurate in their reporting. However, survey organizations do occasionally change their data collection procedures in a way that might affect the amount of reporting error. For example, the survey organization that collects data from the main longitudinal data set in this literature, the Michigan Panel Study of Income Dynamics (PSID), changed its procedures in the early 1990s in a way that could have affected measurement error.<sup>3</sup> However, cross-sectional estimates of the income distribution of the PSID and the Current Population Survey before and after the period of the change exhibit the same trends, implying that the procedural changes had little effect on the trends (Gouskova and Schoeni, 2007). We have also compared trends in these two data sets and also find their patterns to be very similar.

### **Representativeness and Problems at the Top and Bottom**

The vast majority of studies in this literature use data from the Panel Study of Income Dynamics, a household survey conducted by researchers at the University

<sup>3</sup> The PSID shifted from paper and pencil telephone interviewing to computer-assisted telephone interviewing in 1993. Around the same time, the PSID changed its method of imputation for missing or outlying earnings values, moving from using a set of discretionary rules for individual items to a more conventional procedure. See Kim, Loup, Lupton, and Stafford (2000) for a discussion.



of Michigan. The attractiveness of the PSID is that it began in 1968 and families have been interviewed ever since then, giving researchers a longer period of observation of the earnings and income of specific U.S. workers and their families than any other data set. The PSID was designed to be representative of the U.S. population in 1968 and has attempted to remain so by continuing to interview the children in the families as they have become adults and left their original households. The data set has experienced a significant amount of attrition, although there are no indications to date that this causes noticeable bias (Fitzgerald, Gottschalk, and Moffitt, 1998). In addition, because the sample is (at best) only representative of the U.S. population in 1968, it cannot capture the portion of the current population that has immigrated since then. The data used for the tabulations here begin in 1970 and end in 2004, and contain annual earnings and family income by year, both for those who were adults in 1968 as well as all birth cohorts who became adults in each successive year.

Two additional measurement issues, focusing on those at the top and bottom of the income distribution, also have potentially important effects on estimates of economic instability. At the top of the distribution, all publicly available survey data sets top-code income to ensure confidentiality—that is, incomes above a certain cut-off point, such as \$99,999, are recoded to that value. Treating the recoded values for those at the top of the distribution as true values will artificially reduce cross-sectional variances and, if the top-codes change over calendar time (as they always do, at irregular intervals), this will affect trends in variances as well (Burkhauser, Feng, and Jenkins, 2009). One way of addressing the problem is to impute earnings and income to those above the top-code, but this missing income is essentially unknown, and so conclusions about variances would then to some extent be driven by assumptions about the unknown distribution above the top-code. A preferable procedure is to truncate the data at the upper end by deleting the top 1 percent of the distribution, which drops almost all the top-coded portion of the distribution. While changes in the distribution above this truncation point are necessarily excluded, analyzing changes in the lower 99 percent of the distribution is a well-defined concept.

The bottom of the distribution poses a different measurement problem. In all data sets, some individuals report low income or earnings, such as \$1 per year or some other small amount. Some of these reports are true, while others are inaccurate reports by survey respondents. These observations also distort estimates of inequality based on the variance of log income because, as incomes go to zero, the log of income goes to minus infinity, thus driving the variance of log income to infinity. As a result, even small absolute changes in incomes at the bottom of the distribution can have large effects on estimates of the instability of incomes. A method of addressing this issue, symmetric with the treatment of top-coded observations, is to delete the bottom 1 percent of the distribution, which almost always eliminates the problematic data. As before, the only important consequence is to take care in interpreting the results as capturing the earnings instability for persons in the inner 98 percent of the distribution only.



Figure 1

**Transitory Variance of Log Male Annual Earnings, by Year****Evidence on Earnings Instability**

We focus our initial attention on the annual earnings of prime-age males, 30 to 59, and at the start we include only men who had positive annual earnings during the year, as is typical in this literature (only a small fraction of prime-age males have no earnings for an entire year). We then analyze prime-age female earnings and family income separately.

Figure 1 shows our calculations of the transitory variance of annual male earnings. The calculation uses moving nine-year windows, and the figure plots each calculation at the middle year of the window (that is, “1974” denotes the value for the 1970–1978 window, “1975” denotes the value for the 1971–1979 window, and so on). The variance rose rapidly from the mid-1970s to the early 1980s, after which it rose more slowly, flattening out around 1989. There was no clear trend from 1990, though perhaps one slightly downward, until around 1998, after which it has demonstrated a sharp rise through 2000. The finding for the last two or three years must be treated cautiously because there are relatively few observations in the PSID over that period, and we must await more data before reaching conclusions about another upward trend.<sup>4</sup> For the earlier period, however, there is unmistakable evidence of a rise in instability for prime-age men from the late 1970s to the mid-to-late 1980s. Overall, the transitory variance roughly doubles over this time period.

<sup>4</sup> The PSID went to every-other-year interviewing in 1996, so the last few observations in our calculation are based almost entirely on three sets of annual observations, in 2000, 2002, and 2004.

The rise in variance shown in Figure 1 is quite substantial. To obtain a feeling for the magnitude, recall that the variance is the square of the standard deviation. Thus, an increase in the variance of transitory income from, say, 0.08 to 0.15 implies that the standard deviation rises from 0.28 to 0.39. Using the approximation that log points are roughly equal to percentage points, these estimates imply that the average annual transitory component rises from roughly 28 percent of income to 39 percent of income. In addition, an examination of percentile points of the transitory income distribution shows that the difference between the transitory income “shock” received by the individual at the 75th percentile of the distribution and the transitory income shock received by the individual at the 25th percentile of the distribution was \$6,400 in 1974 and \$11,100 in 2000, signaling a major increase in the dispersion of transitory income.

We can also answer the statistical question posed earlier: how much of the increase in cross-sectional male earnings inequality can be traced to this increase in the transitory variance as opposed to the permanent variance? When we calculate the permanent variance as well, we find that they both rose about the same percent (approximately 50 percent) from 1974 through 1990. Consequently, over that period, half of the increase in cross-sectional inequality was a result of an increase in transitory variance. This finding, which we originally uncovered in Gottschalk and Moffitt (1994) for the period through 1987, demonstrates the quantitative importance of the rise in transitory variance in the study of cross-sectional inequality trends in the United States. After 1990, however, the total cross-sectional variance has continued to rise slowly while the transitory variance has not, resulting in a falling share for transitory variance over that period.

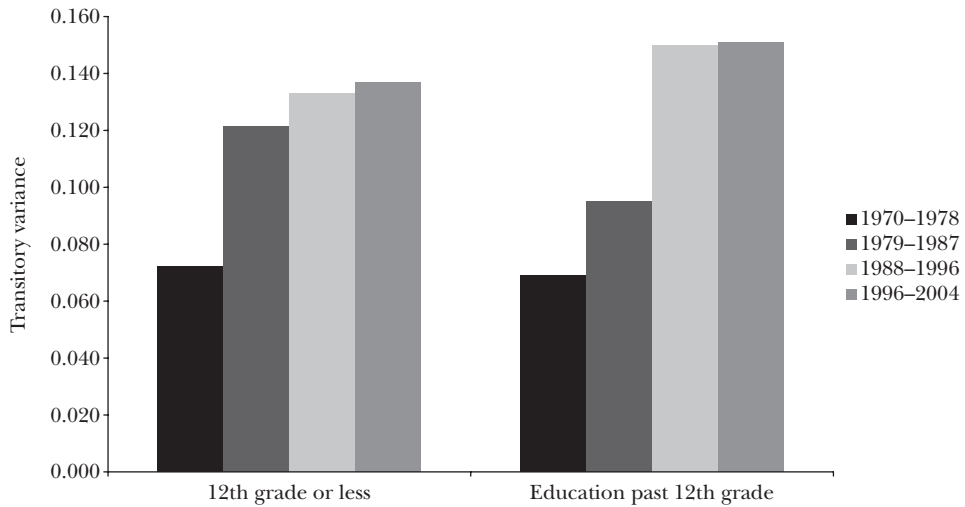
As discussed earlier, changes in the variances of permanent and transitory earnings are also related to changes in mobility. Increases in the variance of transitory earnings lead to short-term changes in rank, which is one measure of earnings mobility, while increases in the variance of permanent earnings make it harder to change rank in the long run. By this measure, the equi-proportionate rise in permanent and transitory variances through the 1980s implies that short-term earnings mobility did not change prior to 1990. The modest increase in the variance of permanent earnings and the stability of the transitory variance after 1990 implies a modest decline in short-term mobility. But the secular increase in the variance of permanent earnings implies a decline in long-term mobility.

### **Subgroup Trends**

Has the transitory variance differed for different types of workers? Answering this question may provide some clues as to the possible reasons for the rise. Subgroups of possible interest are individuals separated by education; by level of permanent earnings; and by percentile points in the distribution of permanent earnings.

Figure 2 shows values of the transitory variance for four successive nine-year periods, starting in 1970–78 and ending in 1996–2004, for those with twelve years

Figure 2

**Transitory Variance of Male Log Annual Earnings, by Year and Education Level**

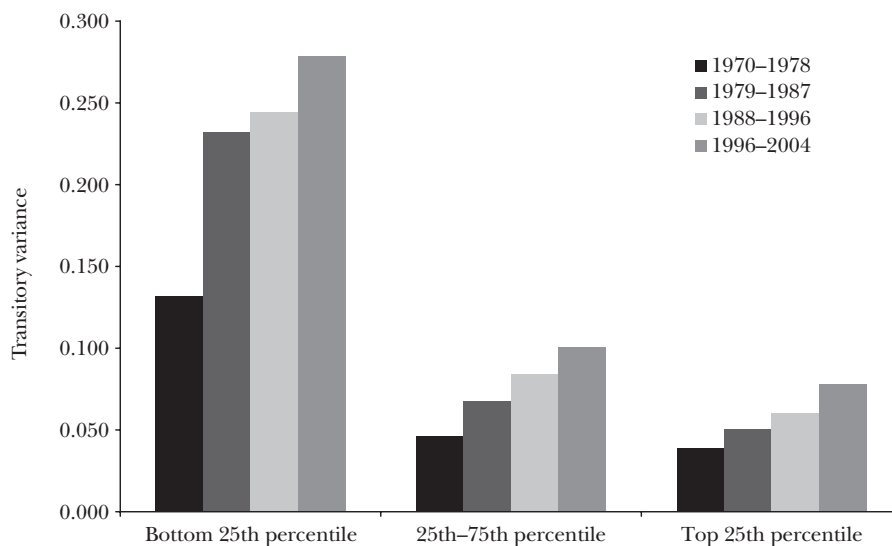
or fewer years of education and those with more than twelve.<sup>5</sup> (The sample sizes in the data are sufficiently small that further disaggregation is difficult.) While the two education groups had approximately the same transitory variance in the 1970s, and while they both rose from the 1970s to the 1980s, the increase was much larger for the less-educated group. However, interestingly, the transitory variance for the more-educated group “caught up” in the late 1980s and early 1990s and by the end of the period was higher than that for the less-educated workers. We note in passing that our estimates of the permanent variance (not shown) rose more for the less-educated in the 1980s than in the 1990s, while the permanent variance for the more educated rose steadily throughout, a pattern similar to that for cross-sectional measures of inequality (Autor, Katz, and Kearney, 2008). Whether this pattern is coincidental or reflects some association between changes in permanent and transitory variances is a question we remark on further below. In addition, we note that the 1990s were a period in which increases in cross-sectional inequality were driven largely by increases in earnings or income in the upper percentiles of the distribution (Piketty and Saez, 2003; Autor, Katz, and Kearney, 2008).<sup>6</sup> Again it is important to recognize that these changes in cross-sectional distribution of earnings may reflect changes in instability as well as changes in the distribution of permanent earnings.

Another way of examining how the rise in transitory variance differs for those in different parts of the earnings distribution is to examine groups defined by their

<sup>5</sup> The last two periods overlap by one year, 1996, in order to ensure that all periods span a nine-year calendar window.

<sup>6</sup> Atkinson (2008) and Atkinson and Piketty (2007) show that these increases at the top of the distribution also occurred in a variety of OECD and other countries.

Figure 3

**Transitory Variance of Male Log Annual Earnings by Year and Percentile of Permanent Earnings**

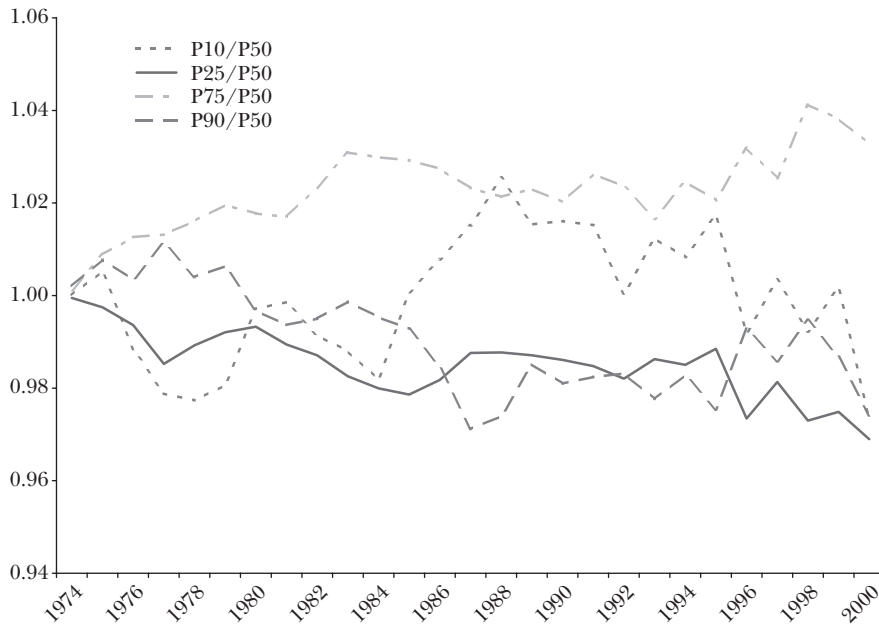
place in the distribution of permanent earnings. For each calendar window, we collect the value of permanent earnings (which is equal to average earnings in the nine-year window) for each individual and classify them into the lower quarter, middle two quarters, or upper quarter of that distribution. We then calculate transitory variances separately for each of these three groups. Figure 3 shows the results for the same four successive calendar periods examined in Figure 2. Transitory variances are much higher for those in the lower quartile of the permanent earnings distribution than for those in the upper three quartiles. Further, while the transitory variances rose for all three groups over time, the sharpest rise occurred between the 1970s and 1980s for the lowest-quartile, lowest-earning group. This pattern reinforces the education results in demonstrating that the sharp rise in transitory variance from the 1970s to 1980s was concentrated in the less-skilled portion of the population.<sup>7</sup>

**Trends for Women**

An interesting question is whether the increases in transitory variance found for prime-age men occurred as well for prime-age women. Cross-sectional studies of earnings inequality generally find that women have experienced considerably less of an increase in inequality than have men. The analysis of permanent and transitory earnings trends for women are complicated, however, by the marked

<sup>7</sup> Another subgroup analysis conducted by Jensen and Shore (2008) suggests that different individuals have persistently higher or lower instability than others and that most of the rise in average instability represents an increase for those with high levels of instability.

Figure 4

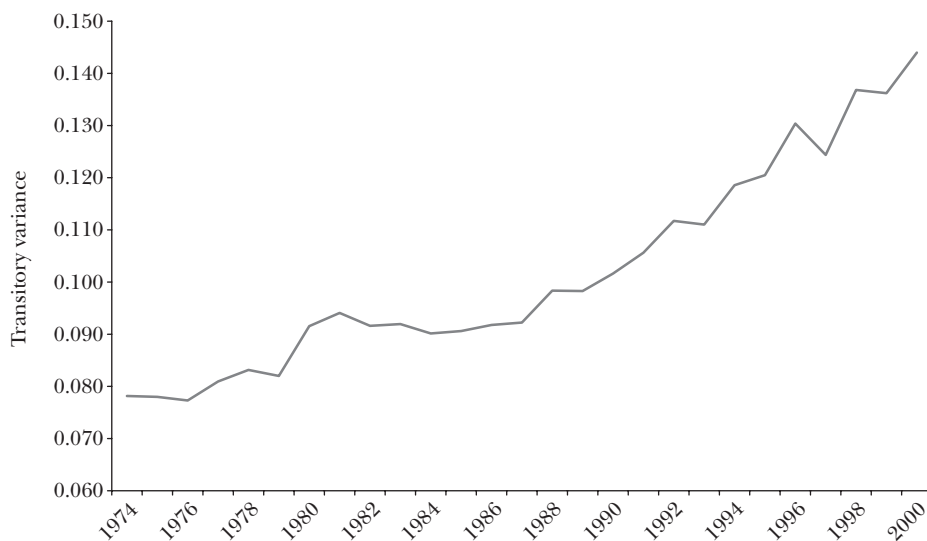
**Percentile Point Ratios for Female Annual Earnings Transitory Component, by Year**

Note: Each percentile is benchmarked to equal 1.00 in 1974, so values in other years show the value relative to 1974.

increase in the percent of women who were employed over the last quarter-century. Estimates of transitory variances of earnings based on employed women alone would be subject to composition bias if those who enter the labor force have different transitory variances than those already in the labor force. One approach to this problem is to include all women, including nonworkers, in the calculation, but this precludes the calculation of variances of log earnings because of the presence of observations with zero values for earnings. Our approach to this problem is instead to calculate percentile points of the earnings distribution for all women, including nonworkers, over our time period 1970–2004. The entry of women into the labor force will be represented as a movement from zero earnings to some positive value in this case, and its effect on the dispersion of transitory variances will be picked up in this way.

Figure 4 shows some illustrative percentiles. Each percentile is benchmarked to equal 1.00 in 1974, so values in other years show the value relative to 1974. The 10th percentile of the distribution of transitory earnings shows no clear trend, falling relative to the median, then rising, then falling again, over the period. The 25th percentile of the distribution more consistently fell relative to the median and the 75th percentile point rose more consistently relative to the median, but the 90th percentile fell relative to the median. Thus, although some evidence exists for an increase in dispersion in the inner portion of the transitory component distri-

Figure 5

**Transitory Variance of Log Annual Family Income, by Year**

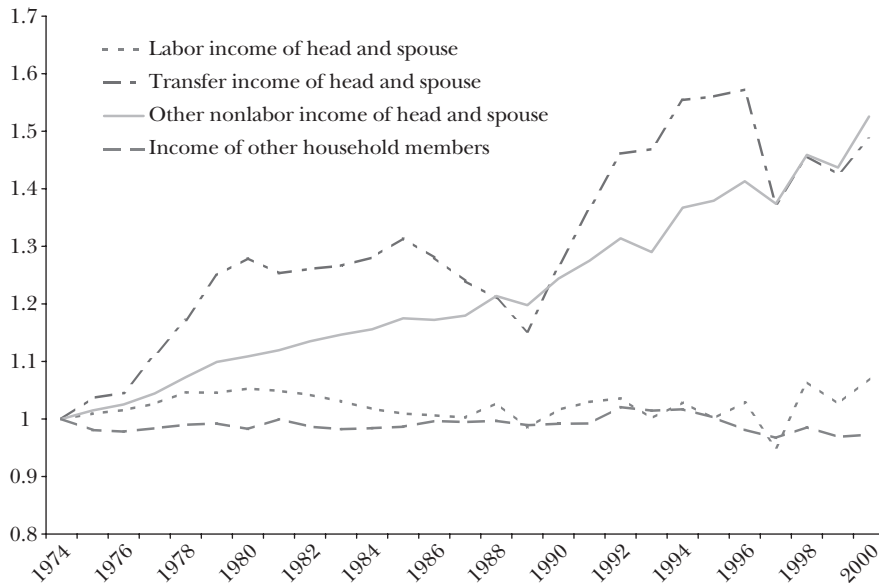
bution for women, the evidence for an overall trend is much weaker than for men. Certainly there is not the same pervasive increase in transitory variance occurring overall and for all subgroups in the population that we find for men.

**Family Income Instability**

Total family income includes the earnings of all family members and all private and public non-earned income. We follow two conventional procedures in our analysis of the instability of family income. First, we scale family income by a measure based on family size; in our case, we use a scale based on the official government poverty line, which varies by family size. This method is common, although some studies use other measures like per capita income. Second, with this adjustment, we consider the distribution of family income across individuals rather than across families. Thus the unit of observation is the individual—men, women, and children—each of which we assign the income-to-poverty-line ratio of its family. This method is the most common approach for avoiding the purely compositional problems that would arise if families were used as the unit of observation, for in that case a reshuffling of individuals into different families would result in a change in the distribution of family income, even if every individual carried the same income with them whatever family they were a part of. After adopting these procedures, we then calculate transitory variances of log family income using the same nine-year, fixed-window method used for individual earnings. We exclude families with zero income from any source because the log of zero is undefined. These families constitute only one-tenth of 1 percent of the population.

Figure 5 shows the result. The transitory variance of family income rose slightly through the 1970s, flattened out during the first half of the 1980s, but rose more

Figure 6

**Trend in 90–10 Percentile Gap of Transitory Income for Components of Family Income**

Note: The 90–10 percentile gap for each component of income is benchmarked to 1.00 in 1974, so values in other years show the value relative to 1974.

dramatically starting in mid-1980s, continuing through to the end of our observation period. Thus we find a strong increase in instability for family income, but the time pattern is completely different than that for male earnings or for female earnings.

An examination of changes in the dispersion of transitory income by individual subcomponent of family income reveals the reason for the discrepancy and highlights why there is no necessary relationship between instability in individual earnings and family income. The data allow a reasonably clean disaggregation of family income into four components that were measured comparably over all years: the sum of head and spouse earnings, the sum of head and spouse government transfer payments, the sum of head and spouse other nonlabor income, and the sum of income of other members in the family.

Figure 6 shows the trend in the gap between the 10th and 90th percentile points of the distribution of transitory income of each of these four components from 1970 to 2004.<sup>8</sup> Labor income of the head and spouse shows no increase in

<sup>8</sup> We do not show the ratio of the 90th percentile point to the 10th percentile point because we would have to include the zeroes in the family-income-component sample. Zeroes are very common for some components, and excluding them would distort the results; but including zeroes often generates a 10th percentile value that is very small and the 90–10 ratio blows up. Instead, we take the absolute difference between the 90th and 10th percentile points for each component and divide it by the median (50th percentile point), and compute the growth rate of that ratio.



transitory dispersion and, in fact, a slight decrease. Thus the increase in the instability of male earnings was offset by female earnings, such as might occur when a transitory decline in the husband's earnings was compensated for by an increase in the wife's earnings (for a study of a related issue, see Shore, forthcoming). Nor is there a trend in the dispersion of transitory income for other members of the household. However, there are increases in the dispersion of transitory income for both transfer income and other nonlabor income, with the 90–10 percentile gap for transfer income rising by 26 percent and that for nonlabor income rising by almost 300 percent. For transfer income, which primarily arises from payments from welfare programs, the increase in instability could have resulted from welfare reforms which began in the early 1990s and led to considerable movements off welfare and much shorter spells of welfare receipt. For nonlabor income, the data do not provide a sufficiently disaggregated breakdown to conclusively determine its source, however, the category does include capital income. A possible source of increase in instability of this form of income may be increased instability in the financial markets. This topic needs further research.<sup>9</sup>

### **Other Measures of Economic Instability**

Our primary measure of instability in this paper is based on the decomposition of earnings changes into those that are permanent and those that are temporary or transitory (although the latter may take some years to fade away). A different literature defines instability more simply as the variance of changes in income from one year to the next. No attempt is made to decompose the change into permanent and transitory components. This concept, often termed “volatility,” is drawn from the literature in finance, where volatility in financial markets is almost always measured by the variance of changes in market prices and other valuations. The literature on measuring volatility in the U.S. labor market has, perhaps surprisingly, shown much smaller increases in earnings volatility over time than we have reported here for the transitory variance, and sometimes no increases at all (Dynarski and Gruber, 1997; Cameron and Tracy, 1998; Dynan, Elmendorf, and Sichel, 2008; Dahl, DeLeire, and Schwabish, 2008; Shin and Solon, 2008). In Moffitt and Gottschalk (2008), we reconcile these different conclusions about earnings instability by showing that volatility is composed of two separate components which have trended in opposite directions over time and have cancelled each other out. On the one hand, the increase in transitory variance tends to also increase the variance of changes in earnings. On the other hand, the greater transitory income events fade out only slowly over time, which has the effect of reducing the magnitude of year-to-year changes in earnings. For example, suppose that an individual experi-

<sup>9</sup> For both of these sources, a more detailed examination of the timing of the increase in their dispersion shows that the dispersion rapidly accelerated in the 1990s, consistent with the increase in dispersion of family income as a whole shown in Figure 5. In addition, the increase in the dispersion of transfer income occurred in the lower part of the distribution, as the 10th percentile dropped precipitously, consistent with a welfare reform interpretation. We should note that this exercise does not take into account changes in the correlation between the components, which should be addressed in a more comprehensive analysis of the issue.

ences a positive transitory increase in earnings from 1975 to 1976 of \$500, and earnings return to their original value in 1977. The transitory component thus is +\$500 and then −\$500. Now suppose that later in calendar time an individual has a positive transitory increase in earnings from 1980 to 1981 of \$1,000 but earnings only return to \$900 above normal in 1982. The initial transitory component was \$1,000 but the second one was only −\$100, less than the −\$500 in the earlier period, thus indicating a reduction in the magnitude of income changes over time. The problem is that the data are not carried far enough out—eventually the full boost of \$1,000 disappears and the individual returns to his original position, at which point it will become clear that the transitory shock was much greater in the 1980s than in the 1970s. This conclusion is proven by examining the variance of income changes over longer periods, such as five or ten years. The variance of those changes shows an increase over the 1970s and 1980s, consistent with the evidence on trends in the transitory variance.

Decomposing income changes into permanent and transitory components is of more than statistical interest, for it has welfare implications. An individual can only partially insure against permanent shocks to earnings through precautionary saving and other forms of self-insurance (ignoring social insurance programs). On the other hand, for transitory shocks, individuals can more easily insure by either short-term saving and or borrowing in capital markets, to the extent these markets are well-functioning. While liquidity constraints are unquestionably important, particularly for the low-income population, they are not absolute. Hence, the permanent–transitory distinction is likely to be more important when considering the impact of changes in income instability on the well-being of low-income people (see Blundell, Pistaferri, and Preston, 2008, for evidence on this question).

## **Potential Explanations for Rising Instability**

While considerable progress has been made in documenting the rise in earnings and family income instability, much less is known about the potential causes for this rising instability, particularly for prime-age male earnings. The causal literature on cross-sectional earnings inequality is not very informative about the causes of rising earnings instability, because it has largely focused on factors affecting inequality of permanent earnings, such as skill-biased technological change and increased international trade with low-wage producers. Explanations of the growth in transitory earnings shifts the focus to changes in earnings dynamics, which itself depends on hours and wage dynamics. Thus, the increase in earnings instability during the 1980s can reflect changes in wages or hours worked due to unemployment. The increase in earnings instability could also reflect increases in wage and hours dynamics while working for the same employer.

The business cycle will clearly influence income instability. Indeed, when alternative measures of transitory income instability are used that are not smoothed, the way our measures here are, a positive correlation between earnings

instability and the unemployment rate is readily apparent (Moffitt and Gottschalk, 2008). However, as our evidence on male earnings instability indicates, the transitory variance has risen through the late 1980s but has not fallen back to its original levels, as the unemployment rate did in much of the late 1990s and early 2000s. Thus, explanations for this shift in instability require more than looking at the business cycle.

A pattern of increased job turnover could potentially lead to increases in transitory fluctuations in earnings—for example, if workers either experienced an intervening spell of nonemployment or experienced a change in wages when changing jobs. Whether job stability has decreased remains controversial. Early evidence in Neumark (2000) is at best mixed, but more recent work by Farber (2007) and the paper by Hallock in this symposium does find a decline in job stability.<sup>10</sup> Nevertheless, in our earlier work in Gottschalk and Moffitt (1994), the evidence indicated a large increase in the transitory variance of earnings for men who did not change jobs over a 10-year period.

The extent to which changes in job stability can account for the rise in earnings instability is explored with displaced workers in Huff Stevens (2001). This study finds that displaced workers did, in fact, experience large and rising increases in the variance of transitory earnings during the 1970s and 1980s. Since displaced workers have a higher variance of transitory earnings than nondisplaced workers, any increase in displacement would lead to an increase in the overall variance of transitory earnings. However, as Huff Stevens acknowledges, increasing displacement can only explain part of the overall increase in earnings instability since nondisplaced as well as displaced workers experienced a rise in earnings instability during the 1980s. Also, the Huff Stevens data ends in 1991, so this study draws no inferences about the more recent slowdown of the rise in earnings volatility.

The fact that the variance of transitory earnings is highly correlated with the business cycle and that hours as well as wages contribute to earnings instability shows that macro forces do indeed have an impact on earnings instability. Whether increased volatility at the firm level also accounts for increasing volatility of earnings requires firm-level data. Comin, Groshen, and Rabin (2009) show that earnings instability is higher for workers in large firms with volatile sales. They also show that firm-level instability increased after 1980.<sup>11</sup> While the authors do not claim a causal relationship between firm-level volatility and wage volatility, they do speculate that this correlation may be the result of a decrease in the ability of large firms to monitor the output of individual workers as tasks become more complex. As the

<sup>10</sup> Huff Stevens (2005) finds little change in long-term employment for workers at the end of their careers. By definition this excludes more recent cohorts. Whether including more recent cohorts would reinforce her conclusions or corroborate Farber's conclusion of declining job stability depends on whether more recent cohort had sufficiently large declines in job stability.

<sup>11</sup> Davis, Haltiwanger, Jarmin, and Miranda (2007) find that firm-level instability declined using Census data that includes nontraded firms excluded in COMPUSTAT. Comin, Groshen, and Rabin (2009) reconcile the findings in these two studies by arguing that non-publicly-traded firms included in the Census data are on average smaller than publicly traded firms in COMPUSTAT. Comin, Groshen, and Rabin then show that the increase in instability in COMPUSTAT occurred primarily in larger firms.

ability to monitor declines, firms tie wages to objective measures of firm-level performance, such as the growth in sales, which have themselves become more volatile. This hypothesis would also imply decreasing variance in wages within firms.

Another potential explanation for the rise in the variance of transitory earnings focuses on skill-biased technological change that increases the demand for skilled workers, holding relative wages constant. While the cross-sectional literature on inequality of earnings views skill-biased technological change as having an effect on permanent wages, it is also possible that changes in technology could affect transitory earnings. Violante (2002) develops a theoretical model in which technological change makes it more difficult for workers to transfer their skills to more recent vintages of capital. As a result, workers experience larger wage losses when separated from their firms because workers find it more difficult to match their skills to the more recent technologies, which results in an increase in the variance of transitory earnings.

One difficulty that all explanations for the rise in instability must face is how to explain both the rapid rise in earnings instability in the late 1970s and 1980s and the much slower growth in instability starting in the early 1990s. Card and DiNardo (2002) make the same point when evaluating skill-biased technological change as an explanation for the rapid rise in cross-sectional inequality in the 1980s. They argue that researchers should be skeptical of explanations for the rise in earnings inequality based on skill-biased technological change because these explanations require rapid technological change during the 1970s and 1980s and then a much slower rate of technological change after 1990. Similarly, an explanation for the rise in instability based in technological change has to explain both the rapid rise in instability during the 1980s and the slower growth in instability over the next 15 years.

A final source of explanation is that earnings instability is somehow tied to the level of permanent earnings. For example, the rise in earnings instability for the least skilled occurred from the 1970s to the 1980s, at exactly the same time as real wages and permanent earnings were declining for this group. The decline in the quality of jobs for unskilled workers could have been accompanied by an increase in earnings instability in the low-wage labor market, a hypothesis reminiscent of the dual labor market hypothesis of the 1970s. However, the fact that earnings instability rose for all groups, and rose for the more educated in the 1990s, makes any such simple explanation problematic. It is possible that the rise in transitory variance for the more educated in the 1990s was accompanied by a rise in permanent real wages, and that the increased risk that accompanied increased average earnings was just a trade-off between risk and return. These ideas deserve further investigation.

The reasons for differences in trends for men and women have not been explored in the literature to date. Women may have differential industrial and occupational distributions than men, and this could help to provide an explanation if instability is closely associated with industry or occupation. Women are more likely to work part-time than men, which would lead to higher instability for women than men, but not necessarily to an increase over time. Further work on this question is needed, as well.

## Conclusion

That jobs in the United States have become more unstable, that lifetime jobs have disappeared, that self-employment and contracting work have become commonplace, and that large firms often now shed white-collar workers in today's competitive market environment—all these themes have become staples of the popular press. The evidence supports these popular views up to a point, but no further. The increase in earnings instability in the labor market was primarily a phenomenon of the late 1970s and early 1980s, and has not continued since then, although there are suggestions that it might again be rising recently. Further, this increase occurred mostly for men and not for women. The popular press view may be more of a reflection of an increase in transitory variance for more-educated workers that occurred in the late 1980s and early 1990s. However, this rise in earnings instability among more-educated workers was not enough to keep the overall level of earnings instability in the labor market from stabilizing.

Our finding that the increase in transitory variance explains half of the increase in cross-sectional inequality through the late 1980s demonstrates the empirical importance of the phenomenon. That the increase was concentrated in the lower-skilled portion of the population should raise concerns about whether consumption and well-being in that portion of the population has been adversely affected, particularly given the high likelihood of liquidity constraints for this income group and the imperfect public social insurance available to them. Public policies to provide more insurance may be one appropriate response to this problem.

The reasons for the increase in earnings instability are poorly understood. That it was concentrated in the least-skilled portion of the labor force suggests that it reflected a change in the low-wage labor market that might have been tied to the decline in real wages for this group over that same time period. However, the fact that instability rose for all skill groups, albeit at lower rates for the more skilled, suggests that it is part of a large phenomenon. More work is needed to explore this important development in the U.S. labor market.

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