

## **Income Gains and Month-to-Month Income Volatility: Household evidence from the US Financial Diaries<sup>1</sup>**

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### **Abstract**

The US Financial Diaries track the daily finances of low and moderate-income households over a year. The households faced substantial swings in income from month to month. On average, they experienced 2.7 months when income fell more than 25 percent below average, and 2.7 months when income was more than 25 percent above average. The volatility is summarized by an average coefficient of variation of monthly income (within year, averaged across households) of 39 percent. The CV is greatest (55 percent) for households below the poverty line, but the CV remained relatively high (33-35 percent) and steady for households with income from 100 percent of the poverty line up to 300 percent. Thus, in the non-poor sample, greater income did not imply notably greater income stability.

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<sup>1</sup> The U.S. Financial Diaries Project ([www.usfinancialdiaries.org](http://www.usfinancialdiaries.org)) was designed and implemented by Jonathan Morduch (NYU Wagner, Financial Access Initiative), Rachel Schneider (Center for Financial Services Innovation), and Daryl Collins (Bankable Frontier Associates). Morduch and Schneider are the Principal Investigators for the ongoing analysis, and this study develops ideas in Jonathan Morduch and Rachel Schneider, *Spikes and Dips: How Income Uncertainty Affects Households* (US Financial Diaries Issue Brief, October 2013). Leadership support for the U.S. Financial Diaries Project is provided by the Ford Foundation and the Citi Foundation, with additional support from the Omidyar Network. We thank Rachel Schneider, Tim Ogden, and Julie Siwicki for valuable input. Views and errors are those of the authors only. Contact: Jonathan Morduch – [jonathan.morduch@nyu.edu](mailto:jonathan.morduch@nyu.edu).

## 1. Introduction

The dynamics of mobility are shaped by the ups and downs of households' incomes and opportunities. The ups and downs also stand as an independent concern. When asked in a Pew national survey about which they feel is more valuable, 92 percent of respondents opted for financial stability over moving a rung up the income ladder.<sup>2</sup>

While month-to-month financial instability matters to families alongside mobility, the ups and downs are hard to see in typical household surveys; most collect data too infrequently to reveal the ups and downs. Yearly surveys report conditions at a moment in time, but they do not reveal much about what happens between surveys. Even with a longitudinal household survey, noisy data impedes attempts to accurately measure volatility, particularly for low-income households (Dynan et al. 2012).

Recognizing the need for a different approach, the US Financial Diaries (USFD) project was designed to capture high-frequency financial volatility faced by working Americans (Morduch and Schneider 2013a). The survey tracked all cash flows over a year for a sample of low-income and moderate-income households in ten sites in four US regions (Northern California, New York City, Eastern Mississippi, and the Kentucky/ Ohio border).

Beyond the high-frequency of data collection, the method directly addressed problems with noisy and incomplete data. A custom-built database incorporated ongoing data checks to ensure completeness and accuracy, and a rigorous process was put in place to verify data after collection. The method put a priority on obtaining rich and complete financial information on households, rather than aiming to form a large, representative sample. More than 300,000 independent cash flows were collected over a year for the 244 households in the Financial Diaries sample.

The data lead to five main findings. First, the data reveal large swings in income from month to month, even after removing the impact of tax refunds (the largest income spike for most low-income households). Households experienced, on average, 2.7 spikes (months with income above their monthly average by at least 25 percent) and 2.7 dips (months with income below average by at least 25 percent). Typical volatility is thus not the product of one or two big spikes against a background of steady income. Instead, the ups and downs for most of the sample are part of "normal" month-to-month patterns of fluctuating income.

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<sup>2</sup> The finding is in Pew Charitable Trusts (2015b), Fig. 5. There were 7,845 Pew respondents. The portion of US Financial Diaries (USFD) households giving the same answer to this question is 78 percent. In the USFD sample, two-thirds of households below the poverty line chose financial stability, with financial stability becoming more important as households gain more income.

Second, income volatility is notably greater for households below the poverty line. Poor households faced, on average, 3.6 spikes and 3.5 dips over the year, suggesting that the challenge created by instability is an important part of the challenge of poverty.

Third, while income volatility is lower for non-poor households, volatility remains relatively high even at the top of the range studied (i.e., up to a household income of \$123,000).

Fourth, income volatility is mitigated in two-earner households, where the ups and downs of independent income streams partially offset each other. Non-labor income also tends to mitigate the volatility of earned income, although the effect is small.

Fifth, not only did poor households face substantially more income volatility than other households, but the income volatility was more strongly tied to ups and downs in spending. Because poorer households face greater challenges saving and borrowing, the spikes and dips of income are more likely to translate into spikes and dips of consumption.

The rest of the chapter describes related findings by others, describes the novel features of the Financial Diaries methodology, and describes the key findings and their implications.

## **2. Related Literature**

Economic insecurity creates ongoing worries for households, but insecurity has been difficult to quantify. Most studies measure volatility from year to year using the Panel Study of Income Dynamics (PSID), the longitudinal data set run by the University of Michigan that has followed families since 1968. The PSID allows annual snapshots, giving results that frame the month-to-month variation revealed by the Financial Diaries.

The data on year-to-year swings show striking trends over time. In summarizing the literature, Jonathan Latner (2014) shows that all of the major studies find increasing year-to-year volatility in national surveys. Dynan et al. (2012) find a 30 percent increase in income volatility in the PSID between 1971 and 2008 (where volatility is measured by the standard deviation of percent changes in annual income across two-year spans).<sup>3</sup> A 2015 update that analyzes the PSID between 1979 and 2011 finds that, in a given two year period, nearly half of households had a gain or loss of 25 percent or more (Pew Charitable Trusts 2015a, Figure 2). The Pew study finds that in 2011, the chance of a gain or loss of 25 percent or more was roughly equal (21 percent for a gain versus 22 percent for a loss). Looking back to households whose income dropped by more than 25 percent in 1994, a third had not recovered to previous income levels a decade later (Pew Charitable Trusts, p. 3). Gottschalk and Moffit (1994 and 2009) tie the rise in income volatility to increases in income inequality.

Income volatility has limited effect on household consumption if households can adequately smooth ups and downs through borrowing, saving, or insuring. Gorbachev (2011), however, shows that the upward trends in income volatility are echoed by upward trends in the volatility of

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<sup>3</sup> A notable exception to these findings is Dahl, DeLeire, and Schwabish (2011), who find that income volatility is flat between 1984 and 2004 in national administrative data on labor earnings.

household consumption. Using the PSID, she estimates that household consumption volatility rose by 21 percent between 1970 and 2004 (Gorbachev 2011).

The main source used to track month-to-month volatility is the Survey of Income and Program Participation (SIPP). Using the SIPP, Bania and Leete (2009) find that month-to-month income volatility in poor households grew substantially between 1992 and 2003, and that monthly income volatility is highest for the poor. A subsequent Urban Institute study finds a similar disparity in month-to-month volatility across income quintiles in the SIPP, observing households for five months within a 17-month time-frame; the lowest quintile is estimated to have a coefficient of variation of 50% for monthly household income, while the middle quintile has a CV of 32% (Mills and Amick 2010, Table 2). In a 2014 analysis of the SIPP between 1984 and 2008, Morris et al. (2014) show increasing volatility of monthly income for the poorest families and falling volatility for the richest households in the sample.<sup>4</sup>

A complementary approach relies on self-reported assessments of income volatility. In the 2013 Federal Reserve Survey of Household Economics and Decisionmaking (SHED), a national sample of 4,134 respondents was asked about volatility in their monthly income (Federal Reserve 2014).<sup>5</sup> Two-thirds of the respondents reported that their income was fairly steady from month-to-month.<sup>6</sup> In answering the same question, 21 percent of respondents reported that they

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<sup>4</sup> The SIPP is the best source for nationally-representative surveys, but researchers worry about recall bias and seam bias. Households are surveyed every three months, and they're asked to report on the previous four months, which is a relatively long stretch when income and spending are both volatile, and when, for the poorest especially, many transactions are in cash. Seam bias is a second problem in the SIPP: Seam bias exaggerates volatility, and is manifested as an implausibly large change in income from the end of one survey cycle to the start of the next one. The problem has been addressed in recent waves. Imagine that data are collected in November with questions about the preceding 4 months: July, August, September, and October. The next survey then would happen in March with questions about November, December, January, and February. Seam bias occurs when the answers about the 4 months in a given cycle are fairly uniform, but when there's an unusually large jump between responses from one cycle to the next – i.e., from October to November. An effort to address seam bias is now in place: Households are reminded of previous responses before being asked for current income data. This tends to lead to smoother responses. We appreciate input from Luke Shaefer about SIPP survey methodology. See also Mills and Amick (2010).

<sup>5</sup> The Federal Reserve ran the *Survey of Household Economics and Decisionmaking* in September 2013 to get a sense of how a broad cross-section of American households are doing today. We appreciate Julie Siwicki's assistance in relating the USFD sample to national statistics and national poverty thresholds. The SHED focuses on adults over age 18. An online panel of 50,000 individuals was sampled randomly and 6,912 were asked to take the survey. About 60 percent (4,134) agreed. The survey was quick (19 minutes was the median time), but covered a lot of ground. The relatively-low response rate means that it's unclear who agreed to answer, so the claim to representativeness is unclear. The report is accompanied by an appendix which slices the data by subsamples.

<sup>6</sup> Question C.85, p. 87; 4,134 observations.

experienced some unusually high or low months, and another 10 percent reported that their income “often varies quite a bit from one month to the next.”

Figure 1 shows that conditions are more variable in lower-income households.<sup>7</sup> Using Federal Reserve SHED data, the figure shows that, among households that bring in less than \$25,000 for the year, 18 percent of respondents said that income “often varies quite a bit from one month to the next.” The portion falls to 9 percent among households with \$25,000 to \$49,999 in annual income, and decreases again to 5 percent among those with household income of \$50,000 or more.

[FIGURE 1 ABOUT HERE]

Insight into income volatility can also be seen in banking transactions. A study of 100,000 customers served by JPMorgan Chase reveals substantial month-to-month income volatility, with similar levels of volatility observed for poor and rich (JPMorgan Chase Institute 2015). The banking data are weak on informal transactions and transactions in cash, however, a concern especially when interpreting the data on poorer families. At the high end, the Federal Reserve (2014) SHED data show that income volatility for the rich is disproportionately influenced by bonuses, commissions, and fluctuations in investment income, suggesting that the volatility experienced by richer households, while evident, may result from a desirable system of incentives.

Why is month-to-month income volatility so pronounced for low-income and moderate-income households? The 2013 Federal Reserve SHED finds that the biggest culprit is an irregular work schedule.<sup>8</sup> The earlier 2012 study by Dynan et al. finds that increasing levels of year-to-year income volatility are due to increases in the volatility of both work hours and wages per hour. Looking at the SIPP data, Bania and Leete (2009) find that the positive trend in month-to-month volatility among poor households is mostly due to a shift from relatively steady government benefits to reliance on relatively volatile labor earnings.

### **3. Data: The US Financial Diaries**

The US Financial Diaries project tracked the financial lives of 235 low- and moderate-income households over the course of 12 months. Here, we analyze a slightly broader sample of 244 households that reported income data for at least 8 full months.

The financial diaries are not actual diaries filled out by respondents. Instead the term “diaries” is used to reflect the high-frequency nature of the data collection and the intent to capture as many details as possible, especially those that are not easy for outsiders to see.

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<sup>7</sup> This result has not been published previously. We are grateful to David Buchholz, Arturo Gonzalez, and Jeff Larrimore of the Federal Reserve for sharing unpublished information from the SHED. Neither they nor the Federal Reserve are responsible for the content or interpretation of this analysis.

<sup>8</sup> Federal Reserve, 2014. Question C.86, p. 87. This question was asked only of those who said either that income “varies quite a bit from one month to the next”, or is “roughly the same in most months, but some unusually high or low months during the year.”

The US Financial Diaries aimed to go beyond the usual focuses on income and assets, and close attention was also paid to within-year cash flows (see Morduch and Schneider 2013a). Over the course of the study, 316,763 cash flows were collected in an attempt to capture every dollar spent, earned, borrowed, saved and shared. The data are not perfect, but a series of steps were taken to ensure data quality (described below). Most important, field researchers met with the households every 2-4 weeks to minimize reliance on long periods of recall. The regularity of the meetings helped build trust and provided the chance to fill in gaps as the study proceeded.

Households were sampled in four research sites – New York City, Ohio/Kentucky, Eastern Mississippi, and San Jose/Central California. Together, the samples represent a variety of household characteristics and environments, but the households are not a random sample. They were chosen to reflect typical parts of working America, not to form a representative population. The data are not weighted to reflect national population shares.

Attrition from the USFD sample during the main survey period contributed to different households having different lengths of data collection. Of the 268 households that reported their income, 91 percent (244 households) have at least 8 full months of income data, which is the sample that we analyze in this paper.

To focus the analysis on the typical experiences within the sample and to minimize the impact of data error, we exclude the 5 percent of households with the most volatile income. These are households that have a coefficient of variation of monthly household income greater than 89 percent. To focus on “normal” ups and downs, we also remove tax refunds from income (and compare results with and without tax refunds).

To normalize the data across regions, we compare household incomes to poverty thresholds defined in regional supplemental poverty measures (United States Census Bureau 2010). The Income is thus expressed as a percentage of the SPM threshold, with poverty defined by having income under 100% of the SPM threshold. An important advantage of deflating by the SPM is that it controls for differences in regional cost of living.

#### *Challenges to accurately measuring volatility*

Special attention was given to noisy data and two additional problems when measuring income volatility:

*Noisy data.* Problems with recall create noise in the data, and the noise can exaggerate impressions of volatility. Misremembered timing may also create the appearance of spikes and dips: Households may forget when exactly income was received or when spending occurred, so cash flows may get clumped together in self-reported data, creating the false appearance of spikes. Misremembering is worst in households where there is greater dependence on cash (because fewer records are kept) and where income is patched together from varying sources with irregular payments (due to part-time work, self-employment, irregular hours, over-time, etc.). These households tend to be poorer, and the noise can give an exaggerated impression that poorer households have more volatile income.

The Financial Diaries methodology built in a series of steps to minimize noise. Most important, during data collection, field researchers revised upcoming surveys to capture new information. The team also tracked inconsistencies in inflows, outflows, and cash balances; the inconsistencies triggered follow-on questions, especially about cash income. After the main period of data collection ended, for 6 months the team went back to the households to verify evidence indicating unusually high or low values for income or spending. The team then determined if the spikes and dips were due to measurement error or not and could probe which cash flows were missing or mis-recorded. The focus was on outliers that could most easily skew the picture, especially values 50 percent above or below the household's median monthly income. In the follow-up period, the team also checked unusually big or small values of tax refund flows, sales of physical assets, and withdrawals from retirement accounts. A similar process was used to detect typos and mistaken duplicates of information. As a cross-check, the team then turned to data collected on the form of transaction and on financial mechanisms. The team checked income inflows against the mode and deposit data to determine the net amount of the income inflow. The team then checked summary statistics to detect outliers and patterns that appeared inconsistent with the field researchers' understandings of the households and the overall sample.

*Time units.* When volatility is measured within a year, the focus is usually on month-to-month variation. Months go from the 1<sup>st</sup> to the end of the month, but if an end-of-month paycheck is delayed by a few days (or a beginning-of-month paycheck hits early), it can look like there's more volatility than households actually feel. Similarly, steady weekly earnings can translate into choppy monthly earnings: When workers are paid weekly, some longer months will include 5 paychecks, and thus will have 25 percent more income than months with just 4 paychecks. But from the households' perspective things are steady week by week. We address these issues in the analysis below, by checking for robustness by redefining the time units and spreading the irregular monthly income associated with week-based (and bi-weekly) payment schedules.

*Trend.* When income is steadily rising over a time frame, measures of volatility can give the impression that there are ups and downs when in fact there is just a steady trajectory. This is because along the upward trajectory, households first spend time below their mean for the period and then time above their mean (the opposite occurs for households with falling income). We test for robustness by looking for differences when measuring volatility around the household-specific trend (rather than around the average income). Although we see both positive and negative trends over time in monthly household income, we find that income around these trends is as volatile as income around the (flat) average.<sup>9</sup>

#### **4. Results**

The data yield 5 major findings: (1) month-to-month income volatility is substantial, (2) volatility is greatest, on average, for poor households, (3) middle-income households face substantial volatility, (4) earners within the same household can offset volatility, as can non-

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<sup>9</sup> The slope and intercept of each household's income trend are estimated in an ordinary least squares regression of the household's monthly income on time (where the month is the unit of time). The results are not included here.

labor income, and (5) the effects of income volatility translate into consumption volatility with greatest force for the poor.

### *Perceived Income uncertainty*

The main results report on cash flow data. At the start of the project, however, we asked households directly about volatility. They were asked: “How easy was it to predict total household income during the month?” The responses suggest substantial insecurity, with a marked trend by income, where having a higher annual income corresponds to experiencing much less uncertainty relative to the perceptions of poorer households. The pattern is reproduced in the observational data.

Households could choose from five answers that range from “very easy” to “very difficult.” Comparing the answers across income groups, we find that households who say income is easier to predict tend to be better off, with an average income of 165 percent of the poverty line in their area. In contrast, households reporting that their income is “very difficult” to predict had an average income just below the local poverty threshold (96% of the poverty line).

The survey guided households by providing monetary benchmarks: Income that was “very easy” to predict could be predicted to the nearest \$100, while “easy” corresponds to the nearest \$200, “not easy” to the nearest \$500, “difficult” to the nearest \$1000, and “very difficult” to the nearest \$2000. To frame the results above, we divided the amount at which income was reported as being unpredictable (i.e., \$100, \$200, etc.) by the household’s average monthly income over the following year. The ratio delivers a rough calculation of the portion of average monthly household income that respondents view as unpredictable.

[TABLE 1 ABOUT HERE]

Table 1 reports that, below the poverty line, on average 26 percent of income was reported as being not easy to predict. For households with annual income between 100 percent and 150 percent of the poverty line, 15 percent of income could not be easily predicted. And among households between 200-300 percent of the poverty line (which is around households’ median area income), just 9 percent of income was viewed as not easily predictable.

### **A. The extent of month-to-month volatility**

#### *Spikes and dips in cash flow data*

The self-reported uncertainty above parallels evidence from observed cash flows during the year. A starting point in measuring income volatility is to count the number of months in a year when measured income is far from its average. We follow Morduch and Schneider (2013b) in defining an income spike as a month when income is more than 125 percent of the household’s average. Similarly an income dip is a month when income is below 75 percent of the household’s average.

Both spikes and dips are common. On average households had 2.7 income spikes and 2.7 income dips in 12 months.<sup>10</sup> Pooling spikes and dips, households had on average 5.4 spikes or dips in 12

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<sup>10</sup> The number of spikes or dips was annualized if a household had fewer than 12 months of complete income data.



months. In these months, the average spike in income is in fact 55 percent above the household's average monthly income, while the average dip is 45 percent below average income. Figure 2 gives the distribution of spikes and dips across households, showing a slight skew to the right tail in the distribution of households.

[FIGURE 2 ABOUT HERE]

*Coefficient of Variation (CV) of month-to-month household income*

The coefficient of variation is the most common measure of income volatility over time. The CV is the standard deviation of a household's monthly income over time expressed as a percentage of the household's average monthly income during that same period. Across USFD households, we find an average CV of income of 39% (the left column of Table 2). The finding lines up with the analysis of spikes and dips above. To see this, consider a hypothetical case in which a household's monthly income held steady at its average income during half of the year and then was 50 percent above average for the next three months and then 50 percent below average for the final three months. That pattern roughly mirrors the pattern of spikes and dips in the USFD data, and it similarly generates a CV in the range here (35%).

[TABLE 2 ABOUT HERE]

The CV result is comparable to findings in national studies. In the national 2001 SIPP panel, the average CV in the lowest three quintiles falls between 32% and 50%.<sup>11</sup> An analysis of the SIPP (Bania and Leete, 2009) shows the median level of volatility, which ranges from 28% just below the poverty line to 18% above 150 percent of the poverty line. The median CV of income in the USFD sample is somewhat higher at 34%. No households in the Financial Diaries study have perfectly steady income; the lowest CV is 10%.<sup>12</sup>

A series of steps were taken to check robustness, detailed in Table 2. The base result (a 39% CV) is from a sample that removes the 5% most volatile households in an effort to control for measurement error beyond the checks already in place. In the full sample, the average CV rises to 46%. Focusing just on the 124 households that field researchers indicated as being "high-grade" in data quality reduces the CV to 36%, giving confidence in the benchmark number of 36%. Income from tax refunds was removed from income in the benchmark; considering income

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<sup>11</sup> In Mills and Amick, 2010, seam bias was avoided by including only the month of data that immediately preceded interviews, effectively observing five months of household income spread out over a 17-month span.

<sup>12</sup> The disaggregated data show that households vary in their level of volatility. The standard deviation of the coefficient of variation of income is 19%, within a right-skewed distribution. The bulk of households (68 percent of them) have volatility (CV) of income distributed close to uniformly between 15% and 45%, with decreasing incidence on either side of this range. The exception to the large group of households is the long, right tail, where 18 percent of households center between a 60% and a 90% CV of income. The same general pattern holds when the data are restricted to households which field researchers believed were to be of the highest quality.

inclusive of tax refunds takes the CV to 51%. The Brooklyn site posed the largest difficulties in data collection, though removing that part of the sample left the overall CV relatively unaffected at 37%. A final source of spurious volatility can occur through the imposition of months on income earned weekly, or through a payment expected at the end of one month which is delayed by a few days, making the first month low and the next month high. Efforts to address both possibilities generate CVs of 37% and 38%, again close to the benchmark.

## **B. Income Volatility across Income Levels**

Spikes and dips are pronounced across the sample, but they are greatest for the poorest part of the sample. Figure 3 shows that below the poverty line, the average number of income spikes is 3.6 over the year, and the average number of dips is 3.5. The averages above the poverty line are considerably reduced, but the highest income group in our sample (with income more than twice the local poverty line), nevertheless experience 1.9 spikes and 2.7 dips per year.

[FIGURE 3 ABOUT HERE]

In line with this, the average coefficient of variation of month-to-month household income is also greatest below the poverty line, where the average CV is 55%. Among households between 100-300 percent of the poverty line, the CV of income is roughly flat, staying near an average CV of 34% (see Table 2 and Figure 4).

Similar trends in income appear in the national SIPP data, where Mills and Amick (2010, Table 2) estimate that the CV of income in the first quintile is 50 percent, up from 37 percent in the second quintile, which is up from 32 percent in the third quintile.

Table 2 shows that checks for robustness raise and lower the average level of the CV, but the distributional pattern is maintained. Each check shows a high CV for poor households and a lower, relatively flat CV for non-poor households.

## **C. Hedging and Diversification in Labor Earnings**

The volatility of labor earnings shows a similar trend to that of household income: Labor earnings volatility falls on average with the level of average income relative to the household's poverty threshold (see Table 3 and Figure 4). The steepest difference in earnings volatility is across the poverty line, while the differences are small across income groups above the poverty line.

[TABLE 2 ABOUT HERE]

[FIGURE 4 ABOUT HERE]

Labor earnings are less steady than total income during the year, and the difference is greatest for low-income households (Table 3). A simple comparison at the average reveals that non-labor income tends to help steady households at each income level – even though non-labor income itself tends to be very unsteady. Examples of non-labor income are: food stamps, child support,

social security for disabilities or old age, safety-net support from religious institutions and non-profits, and gifts from friends or family. The mitigating effect of non-labor income is especially large for lower-income households, where the CV of income from jobs is greatest compared to the CV of total income.

Nichols and Zimmerman (2008) use annual data to argue that the volatility of family income increased over time as men's and women's incomes have become more correlated. We cannot address changes over time in the Diaries, but we can investigate diversification within households. In the sample, the labor earnings of adults are on average 70 percent of a household's income during the year. Tax refunds and credits are on average 9 percent of total income for the same sample.

Adults in a household may be able to significantly reduce their combined earnings volatility by diversifying their labor income. Across households, the average correlation in labor earnings between a man and a woman in the same household is 0.17, with a relatively large standard deviation of 0.34 within a left-skewed distribution. The median correlation is slightly higher, at 0.20.

The evidence shows that a man's coefficient of variation of labor earnings is on average 17 percent higher than the coefficient of variation of labor earnings of the household. This implies a substantial role of the woman's earnings in reducing the household's volatility. Still the drop in volatility is only a bit less than a fifth, leaving 83 percent of the volatility in male labor earnings to translate into volatility in total household earnings. Similarly, a woman's coefficient of variation of labor earnings is on average 26 percent higher than that of the household, which also suggests that the steadying effect from men's and women's earnings is roughly equal on average.

In the sample, women tend to be the secondary earners in terms of income, although not always. We distinguish the labor earnings share of the worker from their gender, though we find similar results in either analysis. Across households, the average correlation between the primary earner and the secondary earner is 0.14, still with a relatively large standard deviation of 0.34 within a left-skewed distribution. The median correlation is slightly higher at 0.16.

The evidence shows that the coefficient of variation of earnings from the primary earner is just 5 percent higher than that of the household, due to the labor income of the secondary earner, which indicates relatively little volatility-reduction from secondary workers on average.

The results by gender and earnings-share differ from each other slightly. A simple comparison shows that the damping by the woman's earnings owes largely to the portion of households where the woman is the primary earner. In general, the data show that primary earners, while they obtain higher labor earnings during the year, also have much steadier labor earnings. So it is not surprising that women's earnings tend to act strongly against the volatility from the male secondary in the same household, while the effect tends to be smaller when women are the secondary earners.

The analysis of adults so far does not highlight marital status. Similar to national figures, the USFD sample shows that working men and women who are married account for about half of the

total number of households where working men and women live together. We compared the main results here to the results for married couples and found little difference. The average correlation in labor earnings between married couples is 0.12, down from 0.17 in the full sample. The standard deviation is still relatively large at 0.34 within a right-skewed distribution. The median is lower, at 0.05. While this comparison suggests a slightly lower correlation generally among spouses, the difference is relatively small and the correlation still tends to be positive (rather than distinctly negative).

#### **D. Consumption smoothing and mismatch**

Households save, borrow, and share with others as a way to insulate their consumption from the ups and downs of income. Overall, the correlation of monthly income and monthly spending is 0.43, indicating considerable smoothing. Households are not living paycheck to paycheck, which would be implied by a correlation of 1.0.

Consumption-smoothing is most difficult for poor households, who tend to lack a substantial cushion of savings and have greater difficulty borrowing. In line with this, for better-off households the income-consumption correlation is relatively low at 0.36. For poor households, the income-consumption correlation is much higher at 0.53.

The ability to smooth consumption can also be seen in comparisons of the timing of income spikes/dips and spending spikes/dips, where both are defined as months in which income or spending is greater or less than 25% of the monthly average for the year.

[FIGURE 5 ABOUT HERE]

Looking at the timing of spending and income across the sample, 61 percent of spending spikes occur when there is no matching income spike, and 33 percent of the spending spikes occur when income is below the average level. This mismatch between income and spending levels is more common above the poverty line (see Figure 5). For the poor, spending tends to track income more closely, suggesting fewer options to de-couple spending and income. In this sense, greater mismatch is a sign that households have more options, since it means that households have the means to spend when they want, irrespective of the timing of income. Poor households are much more likely to delay spending until income is available or to find extra income when spending is needed. The evidence on mismatch, in sum, shows that not only do poorer households have less stable income, but the fluctuations in income are more likely to translate into fluctuations in consumption.

#### **5. Conclusion**

Economic insecurity is a growing concern in America, part of a story about transformations in the country that parallel transformations in inequality and mobility (e.g., Western et al. 2012). Uncertainty directly affects well-being and complicates choices over jobs, budgeting, planning, saving and borrowing.

Income is seldom completely steady over the year. For many Americans though, the bumps are hardly noticed: the ups and downs are small and households have enough saved up to provide a

financial cushion. But not everyone has a good cushion, and many households experiences large spikes and dips.

Most financial data on insecurity tracks changes from year to year. Here, we analyze data designed to capture ups and downs within the year. The US Financial Diaries data are not representative of the United States population, but the sample reflects important elements of the US population – big city, small city, small town, and rural; immigrant and US-born; white and black; poor, low-income, and moderate-income. A series of robustness checks shows that while particular numbers change depending on the sample, the general patterns do not. The findings align too with data from large, national surveys.

We show that overall income volatility is relatively high during the year, and it is particularly high for the poor. When more than one adult household member is working, total household labor earnings volatility tends to fall, but households are still exposed to considerable volatility. Better-off households are able to smooth the swings to a degree, while the spending of poorer households is much more likely to track the ups and downs of income.

The results suggest that within-year income variation deserves far greater attention. The challenges of living on a low income begin with limited resources, but the difficulties faced by households are exacerbated by the swings of income from month to month.

The evidence suggests that the problem of poverty is not just one of low incomes. Poverty is also tightly bound up with the volatility and uncertainty of income, a notion developed in an international context by Collins et al. (2009) and in the US context by Edin and Shaefer (2015). The finding has implications for the design of means-tested programs and is a cornerstone of a broader view of the condition of poverty (e.g., Mullainathan and Shafir 2013).

The evidence also shows that the poor are not alone in facing substantial income volatility. Many households at the highest range in our data (around the local median income) also face considerable income volatility. Policies to reduce volatility, or that give households better financial tools to accommodate volatility, thus hold the possibility of improving the well-being of a broad section of working America.

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**Table 1**

**Self-reported Unpredictable Portion of Income (percent)**

	Poor (< 100% SPM)	Near Poor (100%-150% SPM)	Moderate (150%-200% SPM)	Middle Income (> 200% SPM)
Average	26	15	9	9
Median	17	9	5	3
Number of Households	54	48	57	44

Note: Household income is normalized by the Supplemental Poverty Measure (SPM). “< 100% SPM” indicates poverty.



**Table 2**

**Coefficient of Variation (CV) of Monthly Household Income**

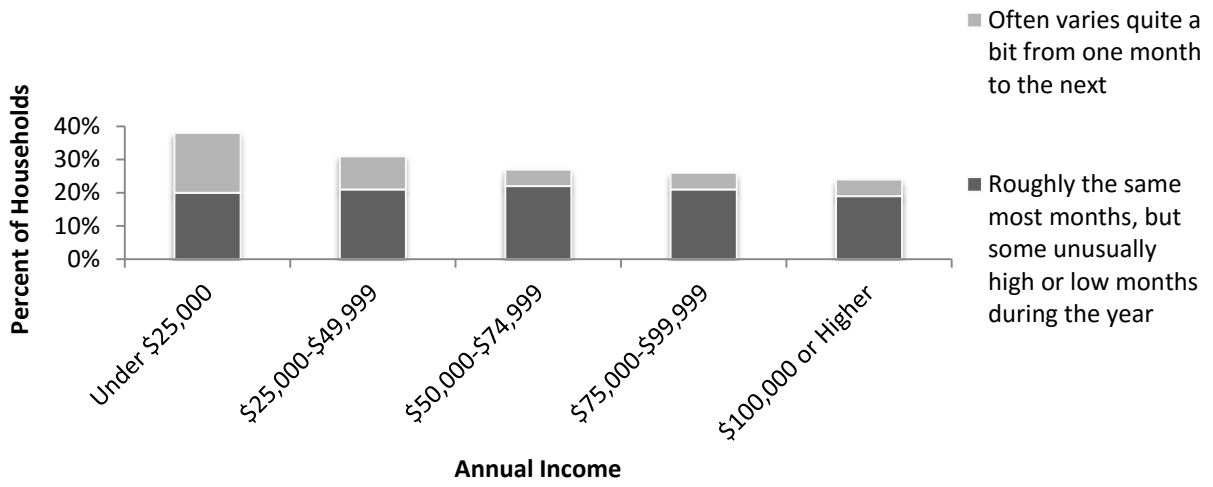
<b>Sample</b>	<b>Summary Statistics</b>	<b>Income as Percent of Supplementary Poverty Threshold</b>				
		<b>All</b>	<b>&lt; 100%</b>	<b>100%-150%</b>	<b>150%-200%</b>	<b>&gt; 200%</b>
<b>Households Below 95<sup>th</sup> Percentile of CV</b>	<i>Average</i>	39	55	35	32	33
	<i>Median</i>	34	54	33	29	29
	<i>Obs</i>	231	64	53	59	53
<b>All Households</b>	<i>Average</i>	46	66	40	36	38
	<i>Median</i>	36	56	33	30	30
	<i>Obs</i>	244	68	56	64	56
<b>High- Grade Households</b>	<i>Average</i>	36	48	32	35	31
	<i>Median</i>	32	44	31	30	29
	<i>Obs</i>	124	28	29	37	29
<b>Including Tax Refunds in Income</b>	<i>Average</i>	51	62	53	47	42
	<i>Median</i>	45	66	46	42	39
	<i>Obs</i>	226	60	54	59	52
<b>Excluding Brooklyn Households</b>	<i>Average</i>	37	51	32	31	33
	<i>Median</i>	32	47	30	29	29
	<i>Obs</i>	209	50	49	56	52
<b>Month Starting on the 8<sup>th</sup></b>	<i>Average</i>	37	52	31	31	31
	<i>Median</i>	32	48	26	29	25
	<i>Obs</i>	231	65	53	59	53
<b>Spreading Week-Based Income</b>	<i>Average</i>	38	55	32	30	31
	<i>Median</i>	32	54	30	28	28
	<i>Obs</i>	231	64	53	59	53

Note: Household income is normalized by the Supplemental Poverty Measure (SPM). “< 100% SPM” indicates poverty. The “combined robustness checks” row excludes tax refunds from income, starts months on the 8<sup>th</sup>, spreads week-based income, and narrows the sample to high-grade households, excluding households in Brooklyn (site eight), and excludes households above the top five percentile of CV in the remaining sample.

**Table 3**  
**Volatility (CV) of Income by Source**

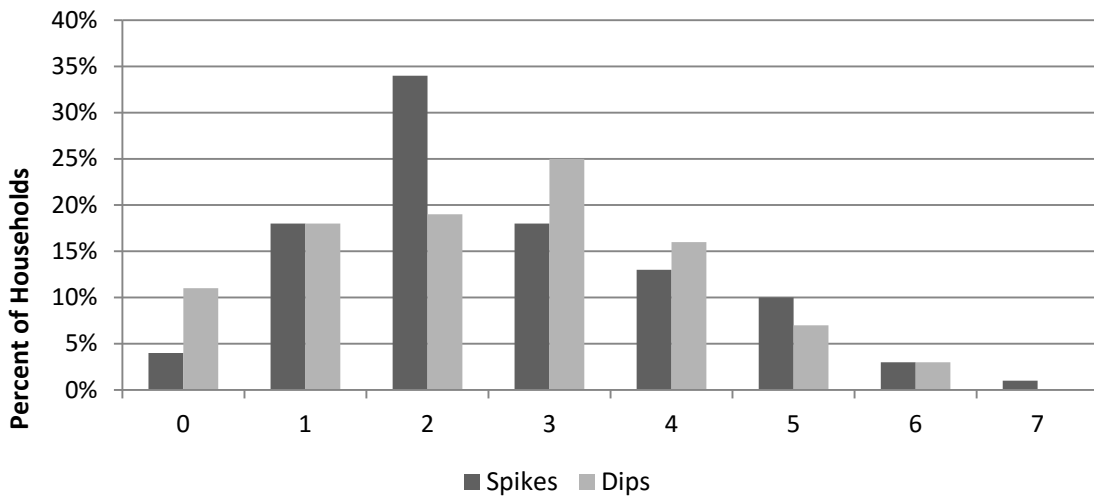
	<b>Poor</b> <b>(&lt; 100% SPM)</b>	<b>Near Poor</b> <b>(100%-150% SPM)</b>	<b>Moderate Income</b> <b>(150%-200% SPM)</b>	<b>Middle Income</b> <b>(&gt; 200% SPM)</b>
<b>Household</b>				
<b>Income</b>				
Average	54	34	32	32
Median	49	32	28	30
<b>Labor</b>				
<b>earnings</b>				
Average	72	40	38	32
Median	69	34	36	28
<b>Non-labor</b>				
<b>income</b>				
Average	117	97	104	108
Median	79	68	72	91
<hr/>				
Number of Households	43	44	48	35

Notes: Coefficient of variation of month-to-month income. Household income is normalized by the local poverty threshold established by the US Census Supplemental Poverty Measure (SPM). “< 100% SPM” indicates poverty. Table excludes households above the 95<sup>th</sup> percentile in CV of total income, labor earnings, or non-labor income.



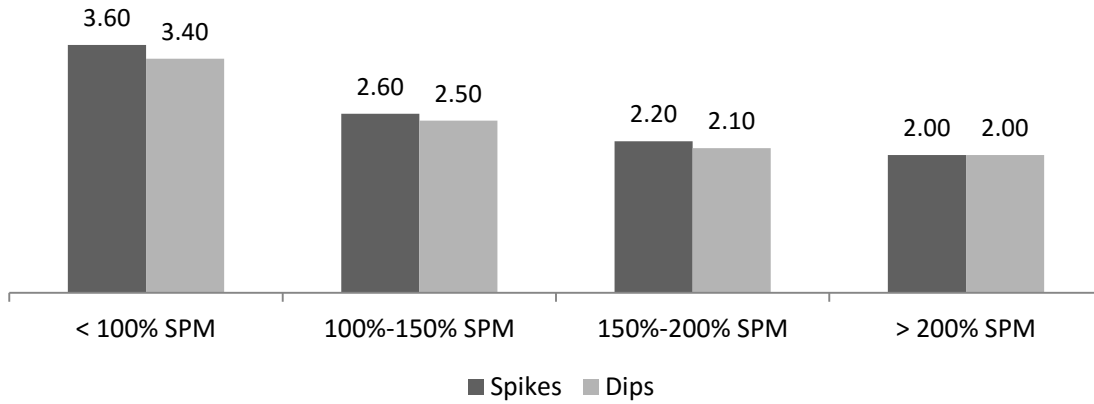
**Figure 1**

**Self-reported monthly income volatility, Federal Reserve SHED Survey 2013**

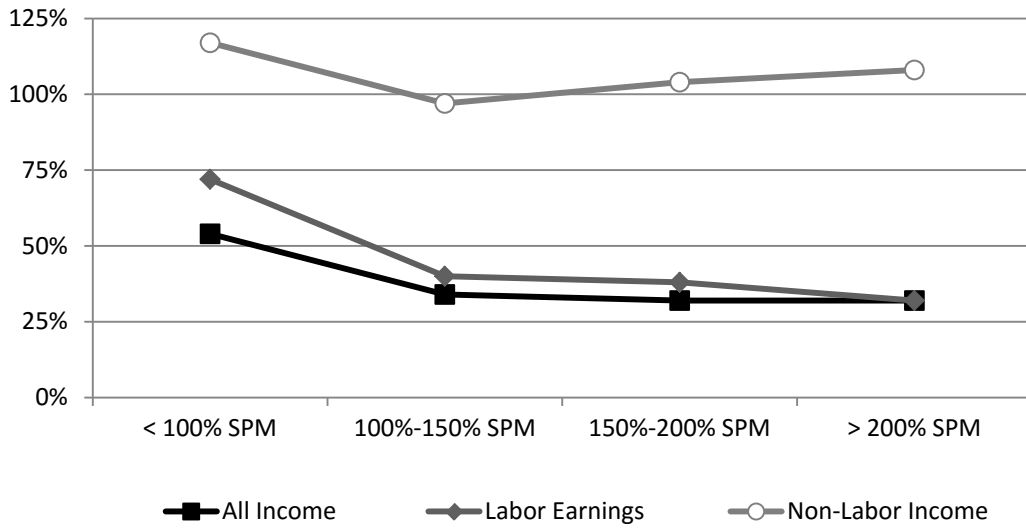


**Figure 2**

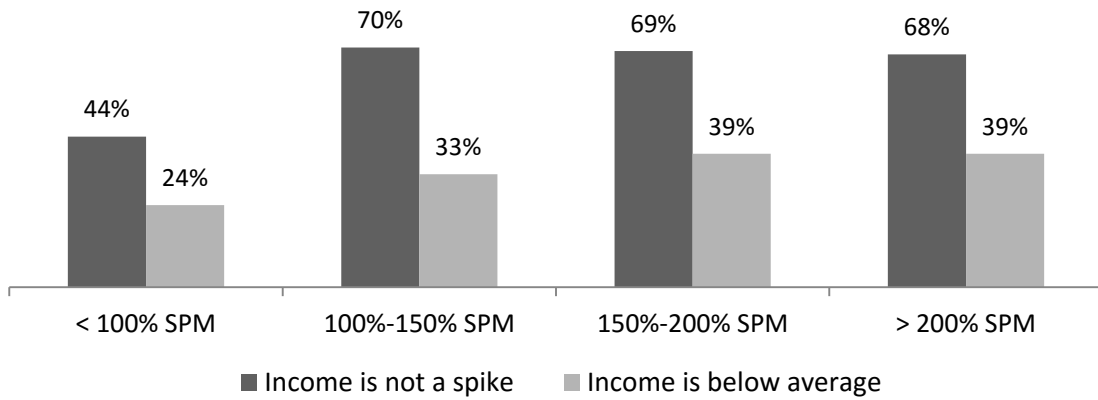
**Income Spikes: Distribution of Households by Number of Income Spikes or Dips During the Year. US Financial Diaries.**



**Figure 3**  
**Income Spikes: Average number of spikes or dips in income during the year, by income group**  
**US Financial Diaries.**



**Figure 4**  
**Volatility in Income Types**  
**(Average CV by Income Group)**  
**US Financial Diaries.**



**Figure 5**  
**Mismatch of Spending Spikes and Income Spikes.**  
**US Financial Diaries.**

Notes: Across income groups, the percent of months in which spending spikes occur without a corresponding income spike (dark bar) and where monthly income is below its average for the year.