Weathering Volatility

Big Data on the Financial Ups and Downs of U.S. Individuals

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JPMorgan Chase & Co.

INSTITUTE

About the Institute

The global economy has never been more complex, more interconnected, or faster moving. Yet economists, businesses, nonprofit leaders and policymakers have lacked access to real-time data and the analytic tools to provide a comprehensive perspective. The results – made painfully clear by the global financial crisis and its aftermath – have been unrealized potential, inequitable growth and preventable market failures.

The JPMorgan Chase Institute is harnessing the scale and scope of one of the world's leading firms to explain the global economy as it truly exists. The mission of the JPMorgan Chase Institute is to help decision-makers – policymakers, businesses and nonprofit leaders – appreciate the scale, granularity, diversity and interconnectedness of the global economic system and use better facts, real-time data and thoughtful analysis to make smarter decisions to advance global prosperity. Drawing on JPMorgan Chase's unique proprietary data, expertise and market access, the Institute develops analyses and insights on the inner workings of the global economy, frames critical problems and convenes stakeholders and leading thinkers.

The JPMorgan Chase Institute is a global think tank dedicated to delivering data-rich analyses and expert insights for the public good.

Acknowledgments

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Fiona Greig

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Dear Reader,

When it comes to the global economy, businesses, policymakers and nonprofit leaders look to the best information available to frame critical issues and determine how to address them most effectively.

It is becoming clear, however, that the best information available isn't always good enough. Hard data that describe the economy as it truly exists are hard to come by, making it difficult to have a complete understanding of the economy, how individuals and businesses make decisions and the reach of economic interconnectedness.

Instead of measuring granular transaction-level data, inferences are made from macroeconomic trends. Instead of observing changes in economic behavior, self-reported answers to survey questions drive analyses. As a result, economic policy has relied on inadequate or inaccurate information. And individuals, households, businesses and other organizations have felt the consequences.

It's time to use hard data and smart insights to address the complex problems that affect us all. That's why we established the JPMorgan Chase Institute.

By combining the power of big data with an increased understanding of how social science affects financial behavior, we have an opportunity to understand the economy as it *truly* exists – using observable data to provide an unprecedented level of detail. With our access to proprietary data, combined with thoughtful analysis from policymaking, academic and business experts, we can help decision-makers understand global economic shifts as they are happening, or even before they occur. As part of our mission, we'll convene leading economic minds to discuss insights, debate their implications, and draw actionable conclusions.

As the world economy has become more interrelated, it has become even more essential for us to connect the dots. I have spent my entire career using hard data to develop insights that address complex challenges, and I can attest that what we are doing here is truly unique. I am honored to have the opportunity to lead this new organization and, with our inaugural report, *Weathering Volatility*, deliver data-driven insights that, until now, would not have been possible.

We're excited to begin.

Sincerely,

DIANA FARRELL,
President and CEO, JPMorgan Chase Institute

Executive Summary

In this inaugural report, researchers from the JPMorgan Chase Institute analyzed proprietary data from JPMorgan Chase & Co. to determine how income and consumption fluctuate on a monthly and a yearly basis. Drawing from detailed transaction information for nearly 30 million customers, we constructed a unique data asset of 2.5 million account holders. We examined income and consumption habits on a transaction-by-transaction basis between October 2012 and December 2014 to draw conclusions about fluctuations in earning and spending among U.S. individuals.

THE JPMORGAN CHASE INSTITUTE DATA ASSET SAMPLE

27M
Chase accounts

from which a sample of
2.5M
is taken

100,000
people out of the 2.5 million sample were randomly selected and the following four types of information were analyzed

Criteria used to select the 2.5 million accounts include:
- Checking account in October 2012 to December 2014.
- At least $500 of deposits every month.
- At least five outflow transactions every month.
- Chase credit card in October 2012 to December 2014.

MONTHLY BALANCES
For 27 months on all Chase consumer products: **checking account, savings account, credit card, mortgage and home equity loans** and **auto loans**

135M TRANSACTIONS
Information on **amount, day and time, zip code, merchant** and **channel**

CREDIT BUREAU DATA
Estimate of **monthly payments** as well as current **outstanding balances** and delinquency statistics for credit cards, mortgages and other lines of credit

INDIVIDUAL CHARACTERISTICS
On an entirely de-identified sample: **gender, age** and **zip code**

Our findings are summarized into three key points:

Finding One

Individuals experienced high levels of income volatility and higher levels of consumption volatility across the income spectrum.

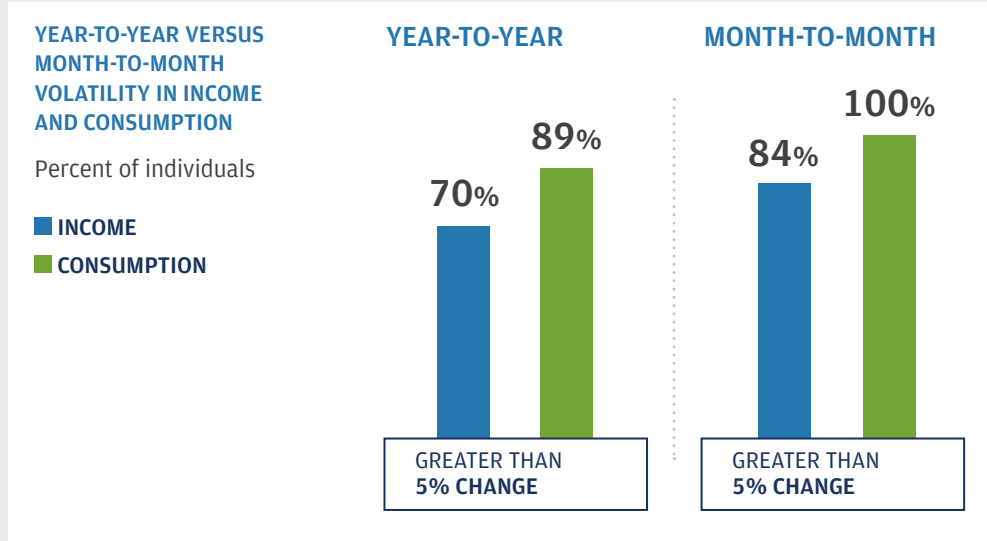Volatility was even greater on a month-to-month basis than on a year-to-year basis. Some of the drivers of monthly volatility included months with five Fridays, when individuals may be paid three times instead of two; tax bills and refunds; and the year-end shopping season.

YEAR-TO-YEAR VERSUS MONTH-TO-MONTH VOLATILITY IN INCOME AND CONSUMPTION

Percent of individuals

- ■ INCOME
- ■ CONSUMPTION

YEAR-TO-YEAR

70% INCOME
89% CONSUMPTION
GREATER THAN 5% CHANGE

MONTH-TO-MONTH

84% INCOME
100% CONSUMPTION
GREATER THAN 5% CHANGE

MONTH-TO-MONTH INCOME AND CONSUMPTION VOLATILITY BY INCOME QUINTILE
25th and 75th percentile monthly changes

Half of our sample experienced monthly volatility in income and consumption within the ranges below in any given month.

- ■ INCOME
- ■ CONSUMPTION

75th percentile

QUINTILE ONE	QUINTILE TWO	QUINTILE THREE	QUINTILE FOUR	QUINTILE FIVE
+11% / +26%	+14% / +27%	+15% / +27%	+15% / +27%	+16% / +29%
-9% / -25%	-11% / -25%	-12% / -25%	-14% / -25%	-15% / -27%

25th percentile

3

Finding **Two**

Income and consumption changes did not move in tandem; there was only a slightly positive correlation between changes in income and changes in consumption between 2013 and 2014. Three behavioral groupings describe the link between income and consumption changes:
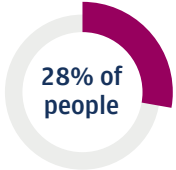
BEHAVIORAL GROUPINGS OF INDIVIDUAL INCOME AND CONSUMPTION CHANGES

Change in consumption between 2013 and 2014 (%)

Change in income between 2013 and 2014 (%)

Responders

Individuals for whom income and consumption changes are within 10 percentage points of each other. Responders are more likely to have lower annual incomes and less access to liquidity through credit cards. They account for 28% of our sample.

28% of people

RESPONDERS:
Income and consumption changes are within 10 percentage points of each other.

INCOME   CONSUMPTION

Sticky **Optimists**

Individuals for whom consumption changes are higher than income changes by more than 10 percentage points. Sticky Optimists are more likely to have higher annual incomes and more spending power through credit cards. They account for 33% of our sample.

33% of people

STICKY OPTIMISTS:
Consumption increases more than income by more than 10 percentage points.

CONSUMPTION

INCOME

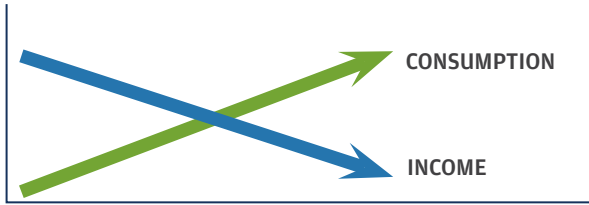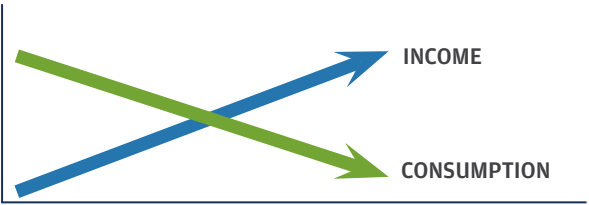## Sticky **Pessimists**

Individuals for whom consumption changes are lower than income changes by more than 10 percentage points. Sticky Pessimists are equally represented across income levels – from low-income to high-income – and they make up 39% of our sample.

39% of people

STICKY PESSIMISTS:
Consumption increases less than income by more than 10 percentage points.
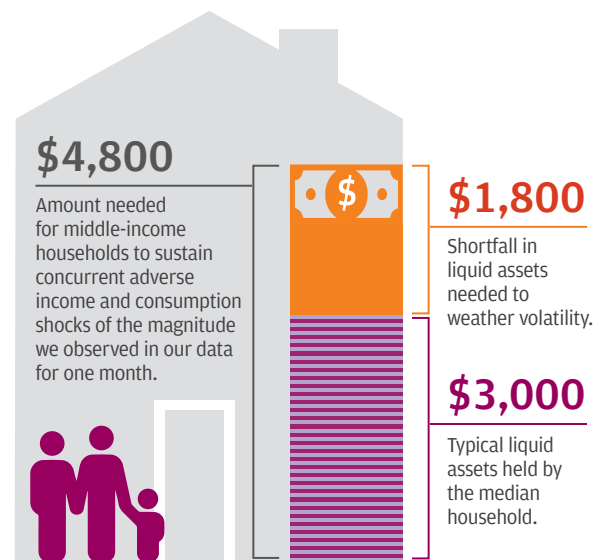
INCOME

CONSUMPTION

Finding **Three**

The typical household did not have a sufficient financial buffer to weather the degree of income and consumption volatility observed in our data.

The typical household did not maintain enough liquid savings that could be accessed immediately in the event of a large, unexpected expense sustained at the same time as a loss in income. While many in the field of consumer finance have long advised that consumers maintain an emergency fund, our research into income and consumption volatility shows that a financial buffer is a more important consideration for individuals across the entire income spectrum than is generally understood. We find that not only was volatility high for income and consumption, but also changes in income and consumption did not move in tandem. This creates the risk that people might experience a negative swing in income at the same time that they incur a large, potentially unexpected, expense. Based on our findings, we estimate that a typical middle-income household needed approximately $4,800 in liquid assets – roughly 14% of annual income after taxes – to have sustained the observed monthly fluctuations in income and spending but they had only $3,000. Required levels of liquid assets, however, were largely unavailable to most individuals across quintiles, except top earners.

LIQUID ASSETS NEEDED BY THE TYPICAL AMERICAN HOUSEHOLD TO WEATHER VOLATILITY

$4,800
Amount needed for middle-income households to sustain concurrent adverse income and consumption shocks of the magnitude we observed in our data for one month.

$1,800
Shortfall in liquid assets needed to weather volatility.

$3,000
Typical liquid assets held by the median household.

Conclusion

We conclude from these early findings that, given how noisy and unpredictable financial lives are, most individuals would benefit from innovative tools to better understand and manage their bottom line. These tools could include analytical platforms that help people track their earning and spending patterns as well as the sources, magnitude and timing of fluctuations in income and consumption. In addition, financial service providers, employers and policymakers can help individuals reduce and manage volatility, better match income and consumption changes or put these fluctuations to good use to help them save money. Potential solutions include new savings, insurance and credit products to help smooth income and spending; technical solutions, such as making deposited funds more immediately available to banking customers; and products or automated transfers that allow people to save during naturally occurring upswings in income, such as in five-Friday months and tax refund season.

Findings: Individual Income and Consumption Volatility

Most individuals in the U.S. are not prepared to sustain typical changes in their income or consumption. U.S. households do not have the necessary financial cushion to cover large expenses that may occur at the same time as a job loss or other reductions of income. These conclusions are based on a robust data asset assembled by the JPMorgan Chase Institute that shows changes in income and consumption, a lack of correlation between the two and the lack of liquid assets maintained by American individuals to weather a financial storm.

Finding One

Individuals experienced high levels of income volatility and higher levels of consumption volatility across the income spectrum.

Analysis of income and spending behaviors requires a robust set of data. The JPMorgan Chase Institute created a data asset encompassing a universe of 2.5 million customers. Though the individuals who make up the data asset differ from the nation in some important ways, they comprise a broad spectrum of individuals across income, age and geography. Using a random sample of 100,000 primary account holders (for the purpose of this report, "individual(s)" refers to those account holders comprised in the data asset), we categorized transactions into income, consumption and other activity to observe financial behavior.

We categorized individuals in our sample into five income quintiles and five consumption quintiles, ranging from the lowest income to the highest income and from the lowest consumption to the highest consumption. Doing so allowed us to examine how volatile income and consumption were within a given income quintile and also assess the degree to which individuals moved from one quintile to another.

While most existing academic and government research has focused on per capita income statistics of aggregate population data or limited surveys of individuals, we looked at the actual financial activity of individuals from month to month

and observed income and consumption changes both in the aggregate and at the individual level. By taking a granular view over time, we observed the timing, magnitude and sources of income and consumption changes – both extreme and subtle.

Upon examining the data, we learned that: (1) individuals from across the income spectrum experience high levels of both income and consumption volatility, more so on a month-to-month basis than on a year-to-year basis; (2) income and consumption did not move together – for only a minority of the population did income and consumption move together; and (3) individuals needed a significant financial cushion – roughly $4,800 among middle-income earners – to weather the degree of volatility in income and spending observed in our data. Yet, few individuals maintained this type of buffer, suggesting that volatility in income and consumption is an important consideration for individuals across the income spectrum, from low-income earners to high-income earners. These key findings contribute to the understanding of the financial lives of individuals in the United States. We describe them further in the following analyses.

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Year-to-Year Income and Consumption Volatility

We find that individuals experienced significant year-to-year income volatility. In fact, only 30% of individuals experienced a change in income of 5% or less between 2013 and 2014 (see Figure 1).[1] Eighteen percent saw their income increase between 1% and 4% in that time frame, and 12% experienced a 0% to 4% drop in income. At the other extreme, 26% of individuals experienced a change in income of more than 30%, up or down, with most seeing increases. Thus, 44% of individuals experienced a 5% to 30% change in income year over year.

Individuals' spending fluctuated even more than individual income. Between 2013 and 2014, only 16% of our sample experienced less than a 5% change in consumption in either direction. At the other extreme, 14% of individuals increased consumption by more than 30% and 10% decreased consumption by more than 30%.

Comparing volatility in income and consumption, we find that individuals were almost twice as likely to experience "narrow" changes of less than 5% in income than in consumption. But they were much more likely to experience "large" changes of between 5% and 30% in consumption than in income. Specifically, 59% of individuals experienced consumption changes of between 5% and 30%, whereas only 44% experienced income changes of between 5% and 30%.

When it comes to big changes, a similar proportion of our sample experienced greater than 30% changes in income (26%) as the amount that experienced a greater than 30% change in consumption (24%).

Our data show a slight upward trend in both income and consumption between 2013 and 2014. Average income in our sample increased by 6.5%, while average consumption increased by 3.8%.[2] Although directionally consistent with national trends of a recovering economy, we do not infer macroeconomic trends from the JPMorgan Chase Institute data asset, which only covers 2013 to 2014.[3] Observing changes over a longer time period will reveal how persistent are the volatility and trends in income and consumption we see now. Income volatility has already been well documented in the economics literature, and our estimates of income volatility are within the range of what has been observed in the literature in year-over-year estimates.[4] We observed higher levels of income volatility within the year than existing sources. According to the Census Bureau's Survey of Income and Program Participation, the four-month standard deviation of changes in income was 44% in 2011 compared to 55% for our sample in 2013 and 51% in 2014.
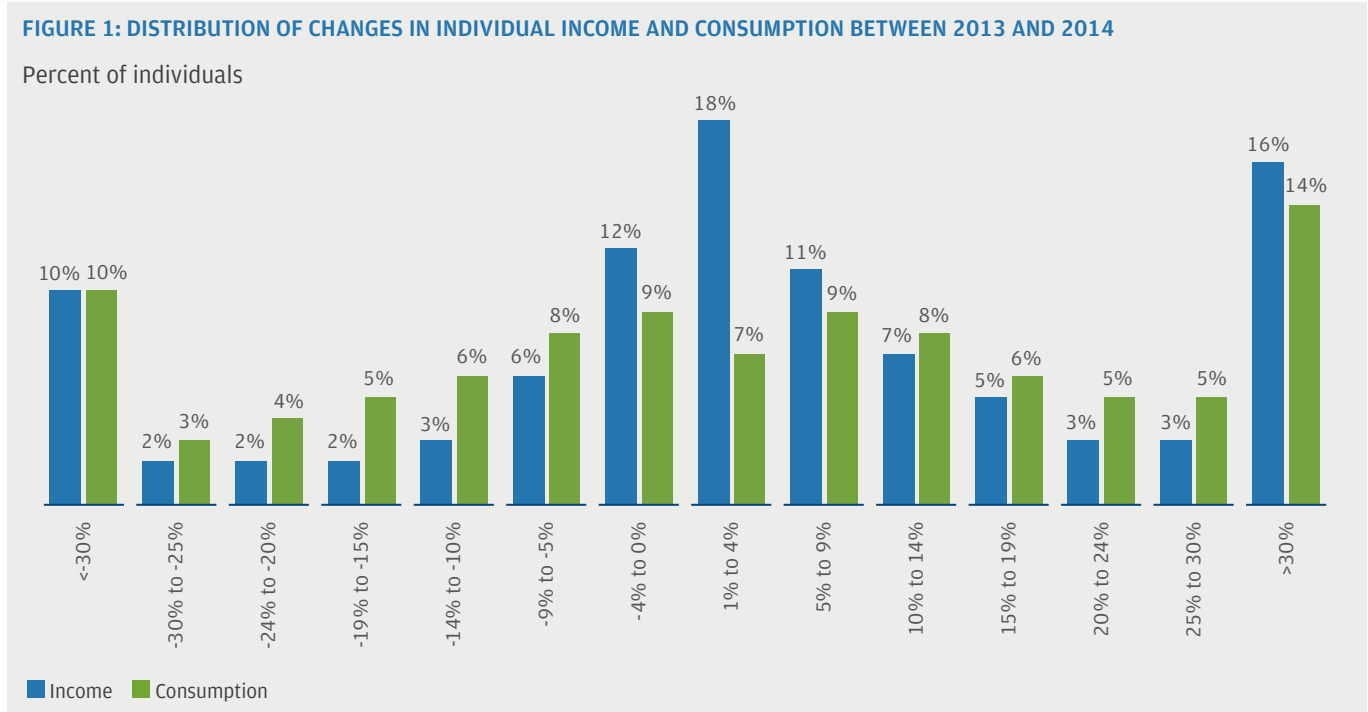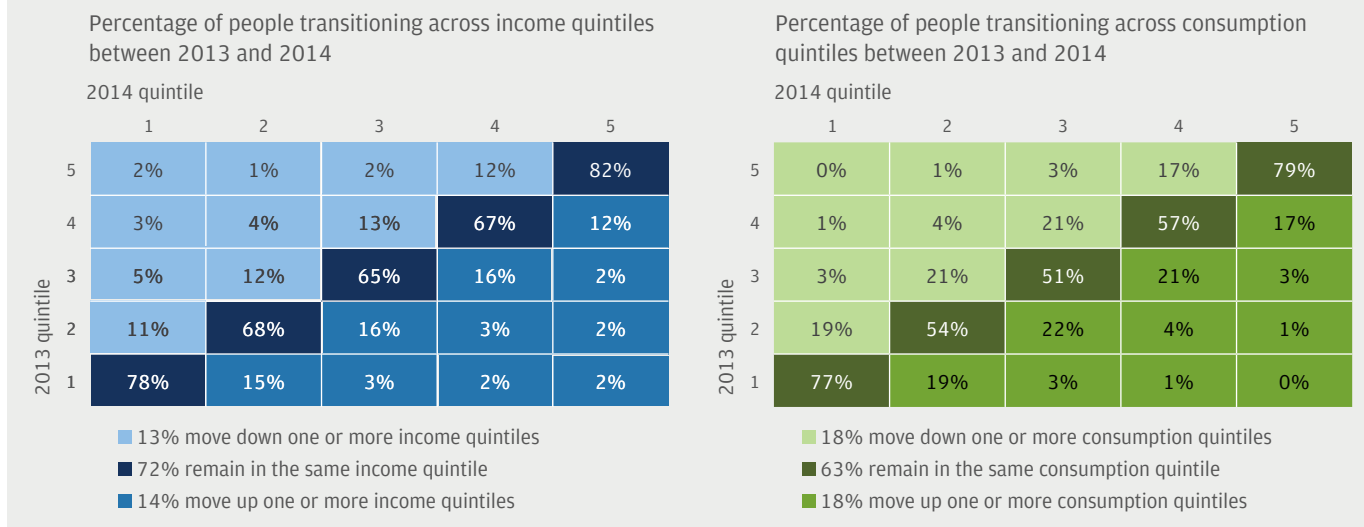

FIGURE 1: DISTRIBUTION OF CHANGES IN INDIVIDUAL INCOME AND CONSUMPTION BETWEEN 2013 AND 2014

Percent of individuals

FIGURE 2: INCOME AND CONSUMPTION MOBILITY ACROSS QUINTILES (2013–2014)

Percentage of people transitioning across income quintiles between 2013 and 2014

2014 quintile

2013 quintile	1	2	3	4	5
5	2%	1%	2%	12%	82%
4	3%	4%	13%	67%	12%
3	5%	12%	65%	16%	2%
2	11%	68%	16%	3%	2%
1	78%	15%	3%	2%	2%

- 13% move down one or more income quintiles
- 72% remain in the same income quintile
- 14% move up one or more income quintiles

Percentage of people transitioning across consumption quintiles between 2013 and 2014

2014 quintile

2013 quintile	1	2	3	4	5
5	0%	1%	3%	17%	79%
4	1%	4%	21%	57%	17%
3	3%	21%	51%	21%	3%
2	19%	54%	22%	4%	1%
1	77%	19%	3%	1%	0%

- 18% move down one or more consumption quintiles
- 63% remain in the same consumption quintile
- 18% move up one or more consumption quintiles

Our results, however, make an important contribution to the understanding of consumption volatility. Prior literature on household consumption volatility is limited and typically measures the volatility of food consumption alone (both at home and in restaurants) based on the Panel Study of Income Dynamics (PSID).[5] Although we currently only compare two years of data, our data suggest that significant changes in consumption levels between years may be a wider phenomenon than previously understood. It remains unclear whether these fluctuations between years reflect true changes in lifestyles and welfare or simply the "lumpiness" of spending, as people pay for their new refrigerator, vacation, home repair or college tuition in one year but not the other. In any case it reflects the "sources and uses" reality of financial flows.

Mobility of Individuals Across Income and Consumption Quintiles

The volatility described earlier resulted in many individuals moving across income and consumption quintiles between 2013 and 2014. We observed greater consumption mobility than income mobility. Figure 2 shows the percentage of people who transitioned from one income quintile to another between 2013 and 2014.[6] Mobility between one income quintile and the next can represent a change in income of as much as $25,000. Based on Figure 2, for example, 78% of people who were in quintile 1 in 2013 remained in quintile 1 in 2014; 15% moved up to quintile 2 and 3% moved up to quintile 3.

Across our whole sample, 72% of individuals remained in the same income quintile between 2013 and 2014; the remaining 28% of the population moved up or down one or more quintiles.[7] This shows a level of income mobility that is consistent with mobility over much longer time periods as documented in other research (Debacker et al, 2012).

In terms of consumption mobility, the picture is notably less stable. Only 63% of the population remained in the same consumption quintile between 2013 and 2014. Consistent with the evidence presented above that consumption is more volatile than income, we also find more consumption mobility than income mobility between 2013 and 2014.

Month-to-Month Income and Consumption Volatility

Income and consumption volatility was higher on a monthly basis than on a yearly basis (see Figure 3 on page 9). While 70% of our sample experienced annual income changes of more than 5% between 2013 and 2014, on a monthly basis 89% of the sample experienced average monthly income changes more than 5% over the same time frame. Similarly 41% of individuals experienced fluctuations in income of more than 30% on a month-to-month basis compared to only 26% of people who experienced more than a 30% annual change in income between 2013 and 2014.

As with income, consumption volatility was greater when viewed at the monthly level: 84% of our sample experienced more than a 5% change in consumption over the course of a year, while 100% experienced more than a 5% change in monthly consumption over the same time frame.

Our data suggest that very few individuals follow a consistent monthly budget that sets strict parameters on spending. About 39% of individuals saw changes in consumption between 5% and 30%, and a full 60% of people experienced average monthly changes in consumption of greater than 30%.

Moreover, as shown in Figure 4 there was little correspondence in the timing of month-to-month changes in aggregate income and consumption. The month-to-month view suggests that many individuals experienced income and consumption movements simultaneously. As we discuss below, this raises the risk that unpredicted events can meaningfully affect an individual's financial stability.

Sources of Income and Consumption Volatility

There are a few notable sources of aggregate per capita income and consumption volatility, as depicted in Figures 5 and 6 (see page 10). Figure 5 demonstrates the considerable income volatility experienced over time and across all individuals by component. One can think of these sources as "seasonal" affect that might impact individuals more broadly.[8]

By far the largest source of identified income is labor income. Traditionally the steadfast backbone of an individual's liquidity, labor income was also the most volatile component of income. Some of the monthly labor income volatility can be attributed to December bonuses and to five-Friday months (November of 2012, March, May, August and November of 2013 and January, May, August and October of 2014). The average difference in labor income between a five-Friday month and the other months was 10%. Other drivers of labor income volatility included changes in hours worked, overtime wages and other factors not discernible in our data.

Other components of income were small in comparison to labor income and were generally more predictable. Tax refund season in February, March and April contributed to peaks in aggregate annual income in March and April, which is clearly evident in Figure 5 (see page 10). There was almost no volatility in Social Security and capital income (i.e., annuities and pensions) for the population in aggregate. Other income, which includes payments from other individuals and other miscellaneous or unclassifiable income, such as ATM cash deposits, was also stable and small.[9]

FIGURE 3: AVERAGE ABSOLUTE VALUE OF CHANGES IN INDIVIDUAL INCOME AND CONSUMPTION ON A YEARLY VERSUS A MONTHLY BASIS (2013–2014)

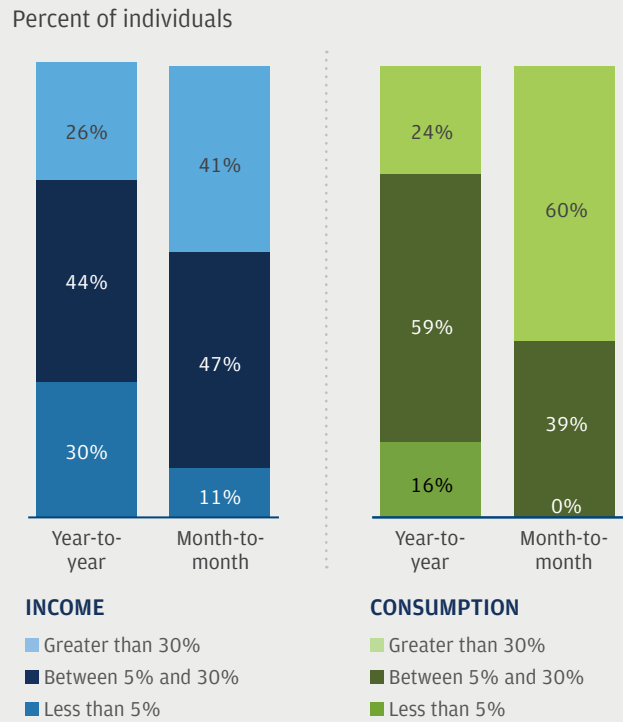Percent of individuals

INCOME
- Greater than 30%
- Between 5% and 30%
- Less than 5%

CONSUMPTION
- Greater than 30%
- Between 5% and 30%
- Less than 5%

FIGURE 4: MONTH-TO-MONTH PERCENTAGE CHANGE IN INCOME AND CONSUMPTION
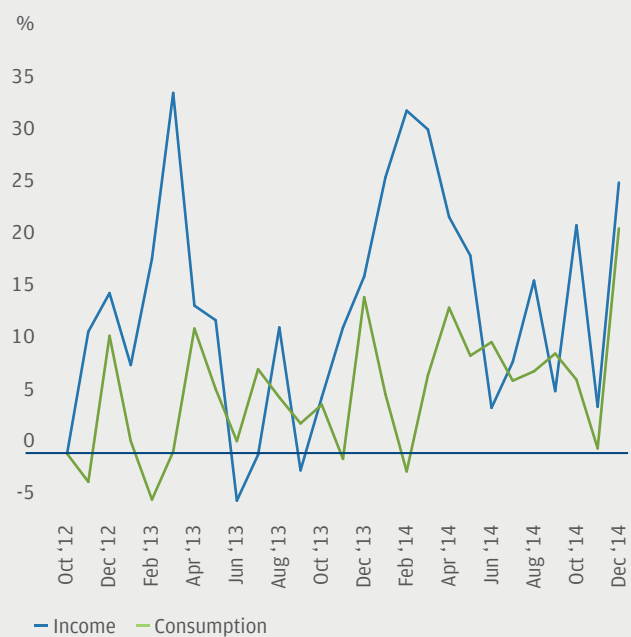

— Income — Consumption

Figure 6 displays the key known components of consumption on a monthly per capita basis for all of the individuals in our sample. The largest and most volatile category of consumption was goods, such as groceries, household appliances and fuel, with spikes occurring around the end-of-year holiday shopping season. The next three largest categories of consumption were services; housing, including both rent and the non-principal portion of mortgage payments; and "other," including miscellaneous categories and outflows, such as ATM withdrawals. These three categories were less volatile than goods, though services appeared to mirror trends in the purchase of goods in a more attenuated way. Utility and debt payments were the next largest categories and remained fairly stable. Finally, payments to government, though the smallest spending category, spiked during tax season when many households made tax payments rather than received tax refunds.
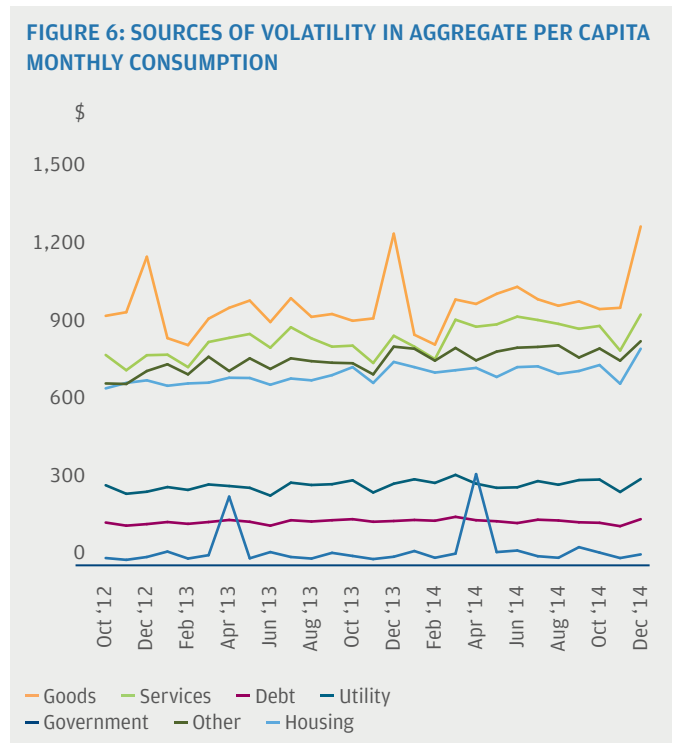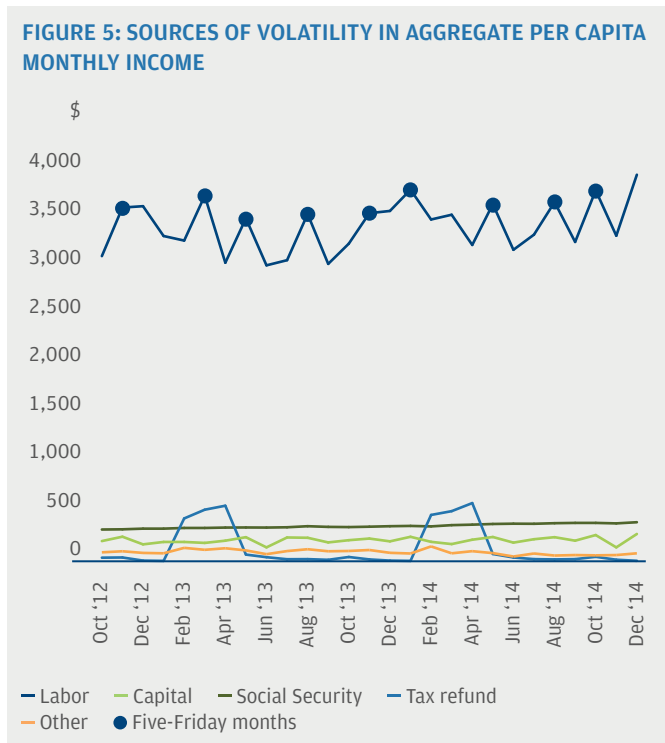
Monthly Income and Consumption Volatility by Income Quintile

Top income quintile individuals experienced as much volatility in both income and consumption as bottom income quintile individuals. Figure 7 (see page 11) displays month-to-month volatility in income and consumption separately for each income quintile expressed in percentage terms.[10] The distribution of changes across the income quintiles suggests a widening spread from the lowest quintile to the highest quintile of income earners. We acknowledge that our estimates of volatility may be underestimated across the income spectrum but particularly in the lowest quintile because our sampling approach requires that individuals have a minimum of $500 in deposits each month.[11] Even so, comparing individuals across income quintiles 2 through 5 reveals comparable levels of monthly income volatility across the income spectrum. Individuals in the bottom income quintile experienced increases greater than 11% for 25% of the time and decreases greater than 9% for another 25% of the time. In comparison, a top quintile earner experienced income increases greater than 16% for 25% of the time and 15% drops in income for 25% of the time.

Consumption volatility is prevalent across the income ladder. The average person in the bottom two quintiles experienced a consumption increase of about 27% or decrease of 25% in half of the months.[12] Top quintile earners, similarly, saw consumption increase by 29% or decrease by 27% in half of the months.

The granular view of individual changes in income and consumption from one month to the next highlights how individuals across the income spectrum experienced dramatic volatility in income and consumption. What's particularly surprising is the degree of positive and negative fluctuation in both income and consumption. For individuals at all income levels, the degree of fluctuation was wider for consumption than for income.[13]

FIGURE 5: SOURCES OF VOLATILITY IN AGGREGATE PER CAPITA MONTHLY INCOME

FIGURE 6: SOURCES OF VOLATILITY IN AGGREGATE PER CAPITA MONTHLY CONSUMPTION
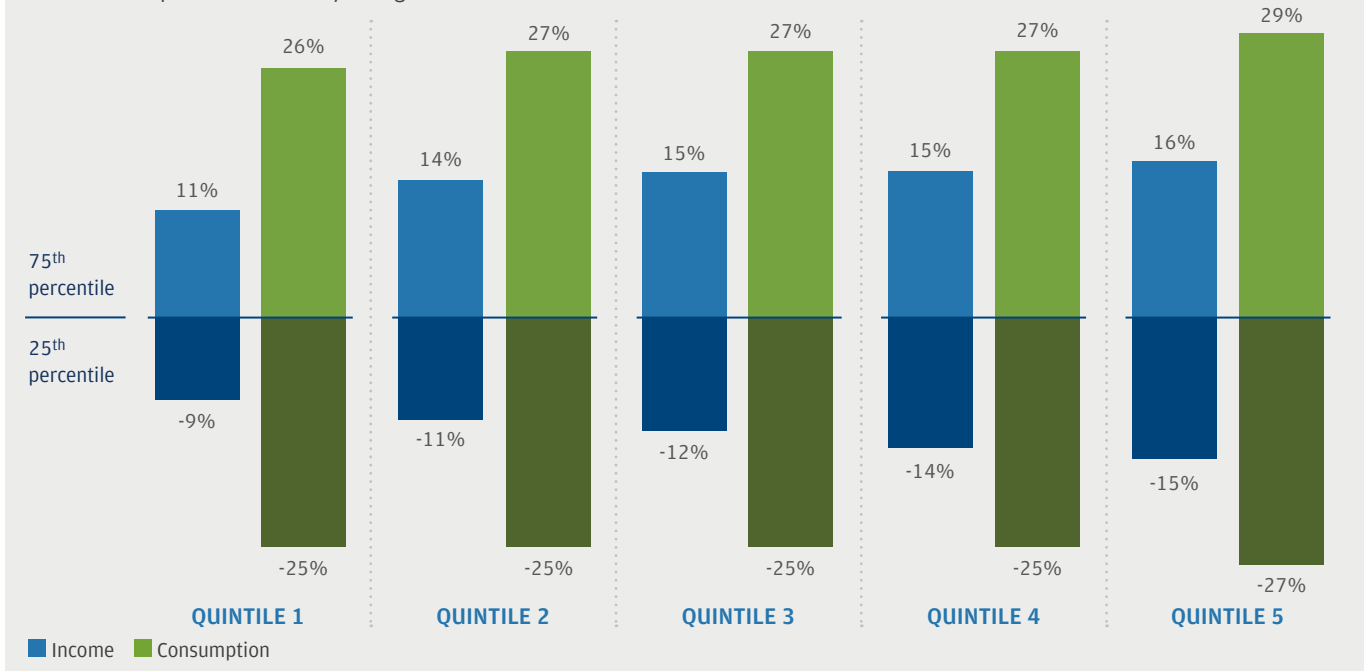
These are important findings. Scholars have long focused on the income volatility among low-income earners, both the extent of this volatility and its impact on people's ability to cover costs.[14] Our evidence suggests that no income group is immune to financial fluctuation – higher-income individuals experience as much volatility as lower-income individuals. Moreover, that individuals in every income quintile experience significantly more volatility in consumption than in income suggests that managing consumption shocks is critical to financial resilience. While some of these changes may be expected and predictable, other life events, such as sudden illness, are often unplanned and can disrupt stability, especially if the immediate cost far exceeds income. These wide swings in income and consumption can lead to instability at any level of income, highlighting the value of liquid assets to buffer against such shocks.

As discussed in Finding Three below, there is no one-size-fits-all liquidity balance that will serve as an appropriate buffer for individuals across incomes. The buffer required to weather income and consumption shocks is higher for high-income earners than for low-income earners given the higher levels of income.

We next turn to an equally important question for financial health: How, if at all, do income and consumption fluctuations move together? We find, generally speaking, that they do not.

> " *No income group is immune to financial fluctuation – higher-income individuals experience as much volatility as lower-income individuals.* "

FIGURE 7: MONTH-TO-MONTH INCOME AND CONSUMPTION VOLATILITY BY INCOME QUINTILE
25th and 75th percentile monthly changes

	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5
Income 75th percentile	11%	14%	15%	15%	16%
Consumption 75th percentile	26%	27%	27%	27%	29%
Income 25th percentile	-9%	-11%	-12%	-14%	-15%
Consumption 25th percentile	-25%	-25%	-25%	-25%	-27%

■ Income ■ Consumption

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Finding Two

Income and consumption changes did not move in tandem; there was only a slightly positive correlation between changes in income and changes in consumption between 2013 and 2014. Three behavioral groupings describe the link between income and consumption changes.

Relationship Between Changes in Income and Consumption

Our data indicate only a very limited positive correlation between changes in income and changes in consumption. Figure 8 (below) plots our sample in terms of the percentage changes in income versus consumption that individuals experienced between 2013 and 2014[15]. The line represents the relationship between changes in income and changes in consumption.
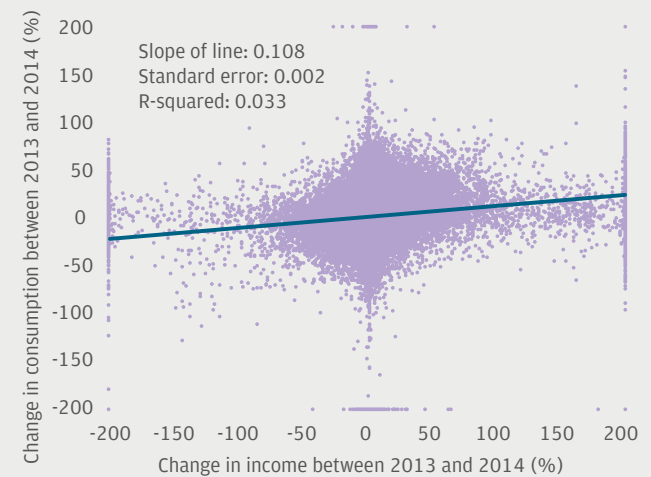
Figure 8 provides two new insights. First, points are scattered across the spectrum of income changes and consumption changes, with no strong discernible pattern between the two. Second, both income and consumption have trended upward, as evidenced by the many individuals in the top right quadrant of the chart who experienced a positive change in both.

It is important to note that the positive relationship between income and consumption changes is weak. The trend line overlaid on the chart indicates that for each 1% increase in income, individuals experienced a 0.1% increase in consumption. This relationship is statistically significant given our large sample size. However, given that these are changes over the course of two years, we might have expected a stronger relationship between changes in income and consumption.[16] In fact, 39% of people – everyone in the top-left and bottom-right quadrants of the graph – experienced changes in income and consumption that moved in opposite directions. In other words, they experienced either an increase in income while consumption decreased (24%); or, potentially more concerning, they experienced a decline in income while their consumption rose (15%).

We explore whether the relationship between income and consumption changes is sensitive to several economic and demographic factors. We find that the slope of the line is significantly steeper for individuals in income quintiles 1 and 2 (compared to those in quintiles 4 and 5), those who have outstanding balances on their credit cards (compared to those who do not), women (compared to men) and individuals aged 50 and older (compared to those younger than 50). Although statistically significant, these results are not economically significant in that the relationship between income and consumption changes remains only weakly positive even for these groups. Controlling for these variables explains less than one additional percent of the variance.

We also explored the relationship between an individual's income and consumption changes from month to month. We find an even weaker positive relationship between month-to-month changes in income and month-to-month changes in consumption, with a slope of 0.06 that does not explain even 1% of the variance.

FIGURE 8: SCATTER PLOT OF INDIVIDUAL CHANGES IN INCOME AND CONSUMPTION BETWEEN 2013 AND 2014

Slope of line: 0.108
Standard error: 0.002
R-squared: 0.033

Change in consumption between 2013 and 2014 (%)

Change in income between 2013 and 2014 (%)

These findings have important implications. They suggest that individuals need to appreciate the degree to which income and consumption are volatile, and to prepare for the possibility that they might – unexpectedly or outside of their control – experience a negative swing in income concurrent with a positive swing in expenditures. Later in this section, we explore further the financial safeguards necessary to weather such swings concurrently.

Behavioral Groupings

Three behavioral groupings describe the link between income and consumption changes (see Figure 9 below).[15] These groupings are a first step toward understanding the prevalence of certain behaviors and how these different groups may react to future income and consumption shocks.

We describe the first group of individuals as "Responders." This group, which comprises 28% of our sample, consists of individuals for whom income and consumption changes fell within 10 percentage points of each other between 2013 and 2014. They respond to changes in income and consumption within a band of 10 percentage points.

A few characteristics distinguish this group. First, Responders are often responding to small and positive changes in income and consumption: 42% of Responders experienced less than

a 5% change in income, and 34% saw less than a 5% change in consumption. Sixteen percent saw more than a 30% change in either income or consumption between 2013 and 2014. This suggests that small adjustments in income and consumption are generally easier to match and may not be the most important threat to an individual's financial stability.
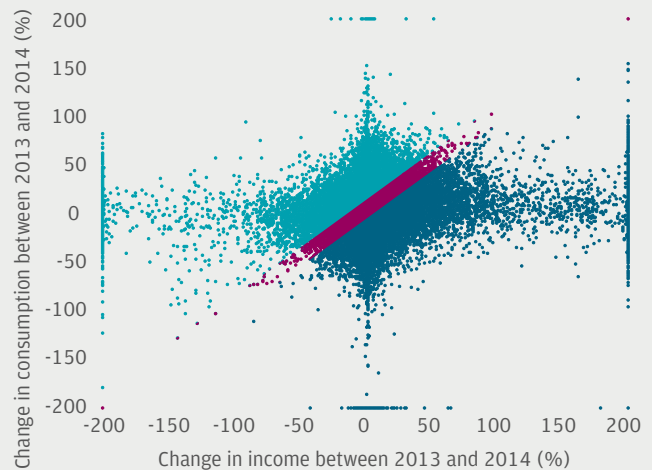
Next we sought to determine whether individuals who are more liquidity constrained – with lower income and/or less access to liquidity through credit cards – are less able to sustain a drop in income without a commensurate reduction in consumption. We use credit bureau data to estimate the degree to which individuals have already utilized credit cards as a source of liquidity.[17] Figure 10 suggests that Responders were slightly more likely to be among the bottom-income quintile and have more fully utilized their credit cards, giving them limited access to additional liquidity. Thirty percent of the bottom-income quintile earners were Responders compared to 25% of top quintile earners. Twenty-six percent of those who have no outstanding credit card balances were Responders compared to 32% of those who had outstanding credit card balances of more than 66% of their credit limit. In addition, Responders were more likely to be receiving Social Security. Thus, Responders appear to be a group who, possibly of necessity, either constrain consumption when they see a decrease in income or increase their earnings when they increase consumption.

FIGURE 9: BEHAVIORAL GROUPINGS OF INDIVIDUAL INCOME AND CONSUMPTION CHANGES

Responders 28%
Individuals for whom income and consumption changes are within 10 percentage points of each other between 2013 and 2014.

Sticky Optimists 33%
Individuals for whom consumption changes positively exceed income changes by more than 10 percentage points.

Sticky Pessimists 39%
Individuals for whom income changes positively exceed consumption changes by more than 10 percentage points.

13

Upon closer inspection of income and changes on a monthly basis, we found that virtually no one in this group matches their income and consumption changes month to month. In other words, even while typically responding to modest changes in income or consumption, Responders need more than one month to match changes in income with proportional changes in consumption, or vice versa. This implies that, in the month in which they experience an adverse fluctuation, they require liquid savings or access to credit to cover their expenses, which, as demonstrated above, they are less likely to have than our other two groups.

We describe the second behavioral grouping as "Sticky Optimists." Comprising 33% of our sample, these are the individuals whose consumption changes positively exceed their income changes by at least 10 percentage points. In other words, they maintain their spending level even when their income drops significantly; in a sense, they stick to their higher consumption pattern. Conversely, if they increase expenditures, either by choice or by necessity, their income does not increase

commensurately. In the face of a positive change in income, they increase their spending by an even greater percentage. Sticky Optimists, on average, experienced a drop in income and a concurrent increase in consumption between 2013 and 2014: 67% experienced a drop in income of more than 5%. While 89% experienced an increase in consumption of more than 5%.

Sticky Optimists are more likely to be higher earners. Figure 10 indicates that 35% of top quintile earners were Sticky Optimists, compared to 31% of bottom quintile earners. Figure 10, also indicates, as would be intuitive, that Sticky Optimists were more likely to have additional access to credit on their credit cards. Thirty-five percent of people who have no outstanding balance on their credit cards were Sticky Optimists, compared to 30% of people who had outstanding credit card balances of more than 66% of their credit limit. Although Sticky Optimists were more likely to have higher incomes and be less liquidity constrained, their response to income and consumption changes between 2013 and 2014 is unsustainable over the long term absent significant assets or additional income upon which they can draw.

We might expect individuals transitioning into retirement to be in this group, as their incomes potentially drop without a commensurate drop in consumption, but find that Sticky Optimists are less likely to be receiving Social Security payments and that the average age in this group is similar to the other two groups.

We describe the third behavioral grouping as "Sticky Pessimists." This group represents the largest number of individuals, at 39% of the sample. These are individuals for whom income changes positively exceed consumption changes by at least 10 percentage points. In other words, they stick to their lower consumption pattern despite an increase in income, and they drop consumption when income drops. In fact, many Sticky Pessimists experienced an increase in income and a drop in consumption at the same time. A full 66% saw income increases of more than 5%, and 65% saw consumption decreases of more than 5%. During the current income growth climate, these "cautious consumers" may be restraining unnecessary expenditures to even out any losses incurred during the economic downturn, or they may be maintaining consumption due to uncertain market expectations. Alternatively, these individuals may have more opportunity to increase income beyond their consumption needs or simply might have made a large one-time purchase in 2013 causing their 2014 spend to be lower than 2013. Interestingly, Sticky Pessimists were equally represented across the income and liquidity spectra, suggesting that these individuals are reluctant to spend outside their safety margin regardless of their level of income or access to credit card liquidity.

FIGURE 10: BEHAVIORAL GROUPINGS BY INCOME AND CREDIT UTILIZATION CHARACTERISTICS

Percent of individuals in each behavioral grouping by income quintile

Percent of individuals in each behavioral grouping by degree of credit utilization*

■ Responders ■ Sticky Optimists ■ Sticky Pessimists

* Credit utilization is measured as a person's total revolving balance on all credit cards as a percentage of their total credit limit across all credit cards.

Finding Three

The typical individual did not have a sufficient financial buffer to weather the degree of income and consumption volatility that we observed in our data.

Low-income individuals are not alone in the degree of volatility in income and expenses they experience. Individuals across the income spectrum may face financial and liquidity management challenges. Our findings clearly underscore that individuals require a financial cushion to manage their cash flow as well as unexpected adverse swings in either income or spending. Based on evidence from the 2013 Survey of Consumer Finance on liquid assets, we find that the vast majority of U.S. households did not have sufficient liquid assets to cover the magnitude of volatility in both income and consumption evident in our data.

We use the month-to-month volatility observed at the individual level as illustrated in Figure 7 (see page 11) to estimate the amount of money individuals in each income quintile would have needed to safely absorb a negative fluctuation in income at the 5th percentile month, a positive fluctuation in consumption at the 95th percentile month, and both concurrently. We explore the level of assets needed to weather swings in both income and consumption, as we have observed that income and consumption swings do not move together either on a year-to-year or a month-to-month basis. Furthermore, volatility in consumption may reflect necessary lump sum payments (such as tuition payments) or changes in family circumstances, rather than in large discretionary outlays such as durable goods or vacations. Our estimates reflect the liquid assets that would have been required to sustain these adverse fluctuations for just one month. It may well be the case that adverse income and consumption changes, such as a job loss or a new medical condition, could persist for many months.
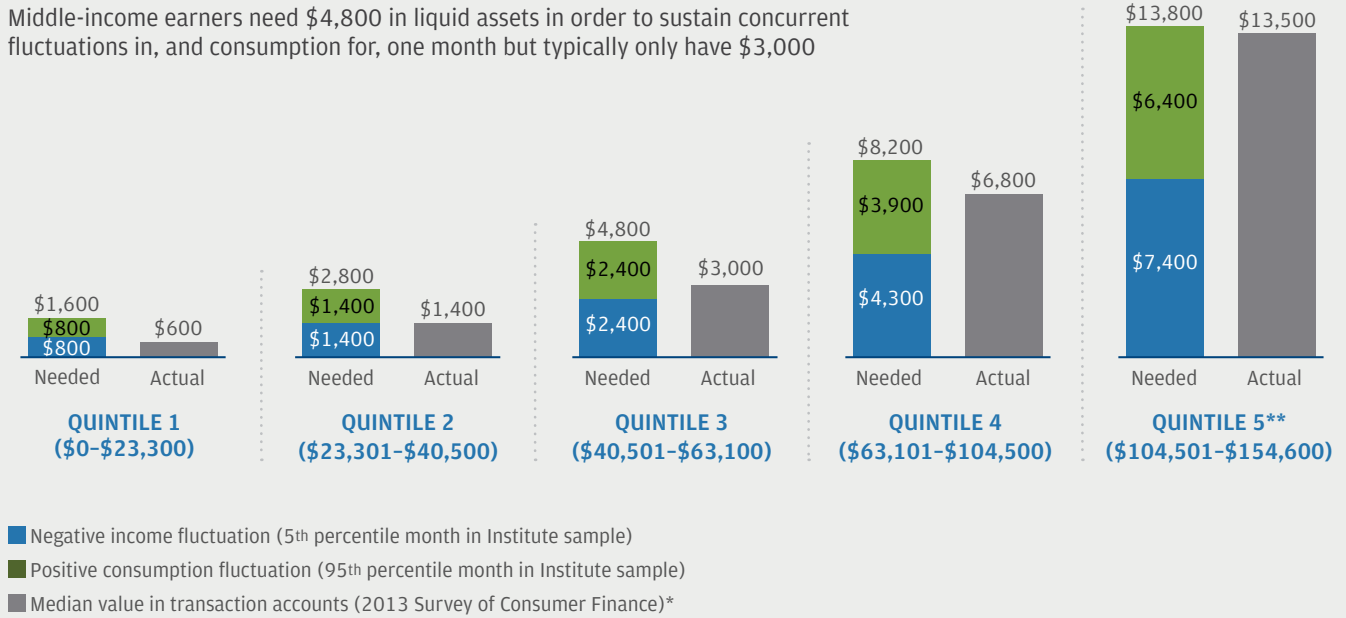
Although our population is somewhat more affluent than the general population, we apply the volatility estimates specific to each income quintile, as illustrated in Figure 7 (see page 11), to the income quintiles observed in the most recent Survey of Consumer Finance to provide rough estimates for the liquid assets needed to weather financial volatility across the population as a whole.[18] Specifically, we multiply the 5th percentile income change and 95th percentile consumption change by the median income for each income quintile as reported by the Survey of Consumer Finance. We then compare these levels of needed liquid assets to actual liquid assets as measured by the Survey of Consumer Finance for each income quintile.[19]

As shown in Figure 11 (see page 16), households in the bottom quintile needed a cushion of $800 in liquid assets to sustain 90% of the adverse income shocks observed in our data for one month. They needed an additional $800 to sustain a consumption shock for one month and a total of $1,600 to be able to sustain concurrent adverse income and consumption shocks of the magnitude we observe in our data. These liquid asset requirements increase significantly with each income quintile. For top quintile households this translates into a minimum of $7,400 to have sustained a negative income shock, $6,400 to have sustained a positive consumption shock, and $13,800 to have weathered income and consumption shocks of these sizes at the same time. The results in Figure 11 demonstrate how the degree of volatility evident in our data translates directly into the need for large financial cushions that increase in size for individuals with higher incomes.[20]

> " Individuals need to prepare for the possibility that they might — unexpectedly or outside of their control — experience a negative swing in income concurrent with a positive swing in expenditures. "

FIGURE 11: LIQUID ASSETS NEEDED FOR U.S. HOUSEHOLDS IN EACH INCOME QUINTILE TO WEATHER INCOME AND CONSUMPTION VOLATILITY FOR ONE MONTH (2013)

Middle-income earners need $4,800 in liquid assets in order to sustain concurrent fluctuations in, and consumption for, one month but typically only have $3,000

QUINTILE 1
($0–$23,300)

QUINTILE 2
($23,301–$40,500)

QUINTILE 3
($40,501–$63,100)

QUINTILE 4
($63,101–$104,500)

QUINTILE 5**
($104,501–$154,600)

■ Negative income fluctuation (5th percentile month in Institute sample)
■ Positive consumption fluctuation (95th percentile month in Institute sample)
■ Median value in transaction accounts (2013 Survey of Consumer Finance)*

* Transaction accounts include checking, savings, and money market deposit accounts, money market funds, and call or cash accounts at brokerages including medical or health savings accounts and 529 education accounts.

** Quintile 5 reflects incomes for the 80th to 90th percentile.

Next to the liquid assets needed to withstand volatility, Figure 11 displays actual account balances for cash accounts maintained by each income quintile as reported by the 2013 Survey of Consumer Finance. Most households, except bottom income quintile households, had sufficient liquid assets to absorb 90% of negative income fluctuations. However, most households, except top income quintile households, did not have sufficient liquid assets to weather 90% of negative fluctuations in income and 90% of positive fluctuations in spending at the same time. An important conclusion from Figure 11 is that households in quintiles 2, 3 and 4 – the more typical U.S. households – had sufficient liquid assets to cover most fluctuations in income, but if they, for example, had needed to take a month of unpaid leave from their job and pay a large medical or tuition bill in the same month, they would have had difficulty doing so and would have likely needed to take on debt or liquidate other assets that are costly to access.[21] Low-income households would have had to do so even in the face a major negative swing in income for one month alone. Except for top earners, households across the income spectrum did not have sufficient liquid assets in place

to weather 90% of financial fluctuations observed in our data. Even top quintile households might have struggled if faced with adverse shocks that persisted beyond one month. Thus, if faced with a big negative swing in income and a positive swing in expenses, most individuals would have likely been forced either to draw down on illiquid assets or to take on debt, both of which carry a price tag.

> *Except for top earners, households across the income spectrum did not have sufficient liquid assets in place to weather the degree of financial fluctuations observed in our data.*

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Implications for Individuals

Amidst so much volatility, understanding and managing one's financial bottom line is difficult.

The three findings above suggest a number of implications for individuals, financial institutions, employers and policymakers. First, given how noisy individual financial lives can be, individuals can benefit from tools to better understand and manage their bottom line. Understanding one's net income picture can be complex and difficult for the many individuals who cannot fully predict the changes they may face month to month and year to year. If many months out of the year are influenced by aberrations – from the mundane, such as five-Friday months, to the unexpected, such as the need to pay for a major home repair – it may be critical and difficult for individuals across the income spectrum to answer the most basic financial management question, such as:

- **Income:** What is my income in a typical month? By how much and when does my income fluctuate up and down?

- **Consumption:** What are my expenses in a typical month? What large one-time expenses do I have over the course of a year and when do I make them?

- **Cash management:** How much money should I have in reserve to weather fluctuations in my income and spending?

- **Bottom line:** Am I living beyond my means? How much money do I need in my rainy day fund to cover unexpected expenses and losses in income? Am I on track to meet my goal to save $5,000 for retirement this year?

Such basic questions are vexing precisely because income and expenditure can be so volatile. Getting a sense for one's bottom line requires a full accounting of not just consistent, recurring income and expenditures, such as regular paychecks and monthly expenditures on rent and groceries, but also anticipated but non-recurring income and expenditures, such as end-of-year bonuses and holiday spending, and unpredictable income and expenditures, such as a roof repair or job loss. Our measure of volatility in this report combines all identified sources of income and consumption.

The weak correlation between income and consumption changes suggests that people may be experiencing fluctuations in income and consumption that are unrelated. Moreover, the volatility in income and consumption could translate into balance sheet volatility: positively, in the case of the Sticky Pessimists, who saw larger changes in income than consumption, and negatively, in

the case of Sticky Optimists, who saw smaller changes in income than consumption. This is less true for low-income earners, who were more likely to behave as Responders, suggesting that low-income earners increase earnings or cut discretionary or even non-discretionary spending when they experience shocks.

Importantly, the volatility that individuals experience carries not only a financial cost, but also psychological and cognitive costs. A recent study by Pew highlights that people favor financial stability over increasing income (The Pew Charitable Trusts, 2015b). Other researchers have previously shown that financial insecurity and scarcity exact a mental toll, making it more difficult for people to solve problems, exert self-discipline, and have the mental bandwidth to weigh the costs of borrowing or other short-term solutions.[22] While positioned as a problem that plagues low-income individuals, the scarcity caused by mismatched changes in income and consumption might be a more widespread experience than previously thought. We find that income and consumption volatility may be an important source of financial instability for individuals across the income spectrum, especially if their assets are small or illiquid. We demonstrate that the liquid assets of most U.S. households generally fall short of the levels required to cover the magnitude of most changes in income and consumption observed in our data.

> " There may be an untapped opportunity for service providers, employers and policymakers to help individuals manage and mitigate financial volatility through innovative tools, products and programs. "

Implications for Service Providers, Employers and Policymakers

Help Individuals Manage or Mitigate Volatility

From these early findings we conclude that there may be an untapped opportunity for service providers, employers and policymakers to help individuals manage and mitigate financial volatility through innovative tools, products and programs. These tools could include analytical financial planning platforms that integrate multiple aspects of a household's financial picture and help people see their typical earning and spending patterns and the sources, magnitude and timing of fluctuations in income and consumption. These tools may help people achieve not only better financial outcomes but also peace of mind.

There may be an untapped opportunity for financial products to assist individuals in "getting in front of" volatility and putting it to good use. The right financial tool could help individuals save (rather than spend) upswings in income, such as from five-Friday months, tax refunds or months with higher-than-typical earnings. For example, financial institutions could give individuals the option to automatically allocate to savings a specific dollar amount or percentage of income when their income exceeds a certain threshold or on predictable upswings such as five-Friday months or any tax refunds. Conversely, innovative insurance or credit products could also help individuals prepare for future unexpected dips in income or increases in necessary spending.

The magnitude and disparate timing of the income and spending fluctuations observed in our data suggest that people would benefit if they had real-time access to deposited funds in a way that was fully consistent with preventing fraud, currently only possible for same-institution deposits. According to the Federal Reserve Board's Diary of Consumer Payments, currently 46% of payment dollars are paid by check or electronic transfer, both of which require a minimum of one day before funds can be accessed by the payee (Bennett et al, 2014). Only a few transaction channels allow funds to be transferred and accessed by the payee immediately. These include wire transfers and, more recently, general-purpose immediate fund transfers, pioneered in the United States primarily by non-bank financial institutions.[23] Our research suggests that work currently under way by the Federal Reserve Board and financial institutions to improve the U.S. payment system by, for example, enabling same-day Automatic Clearing House electronic transfers could be a valuable step forward for individuals who do not have the financial buffer estimated in this report to be necessary to cover typical swings in income and spending.

Opportunities to help individuals mitigate or better match income and consumption volatility also extend to the workplace and public policy. Employers may want to consider more consistent work schedules as well as pay cycles and structures that better match consumption needs. These could include opting to pay employees on the first and 15th of every month (with amounts paid calibrated to reflect the length of the month) rather than every two weeks to better match payroll with large monthly outlays, such as rent, mortgage and other loan payments. Other workplace benefits, such as emergency funds, could help insure employees against the financial shocks they experience in their lives, which can reduce productivity and easily disrupt their ability to work.

Governments may want to pay out tax refunds more gradually or, if taxes are owed, structure and aggressively promote payment plans that allow individuals to smooth their payments in advance and after tax time. In the absence of more gradual payment mechanisms, financial institutions, policymakers and nonprofits could create more innovative products and services that assist individuals in saving their tax refunds or saving money in advance of tax payments.

In conclusion, managing volatility in income and in consumption looms large across all income quintiles to a greater extent than is generally understood. Total financial volatility for a given individual is potentially even higher, as changes across income and consumption do not move in tandem. Liquidity buffers that would help individuals weather typical volatility can represent a very large percentage of average incomes, constituting liquidity levels largely unavailable to most individuals. Better tools to help individuals understand and better manage their bottom line amidst these financial fluctuations are needed across the income spectrum, as are measures to increase predictability in income and consumption and match income to expenditure over time.

The JPMorgan Chase Institute Data Asset

In this report, the JPMorgan Chase Institute seeks to inform the public debate on the financial lives of U.S. individuals. To draw conclusions about household liquidity and income and consumption volatility, we adapted the firm's internal data on nearly 30 million U.S. account holders into a secure groundbreaking data asset. As the first financial institution to channel this wealth of information for the benefit of the public good, JPMorgan Chase put strong guardrails and strict privacy protocols in place to protect personal information throughout the creation and analysis of this data asset.

Data Privacy

The JPMorgan Chase Institute has adopted rigorous security protocols and checks and balances to ensure all customer data are kept confidential and secure. Our strict protocols are informed by statistical standards employed by government agencies and our work with technology, data privacy and security experts who are helping us maintain industry-leading standards.

There are several key steps the Institute takes to ensure customer data are safe, secure and anonymous:

- Before the Institute receives the data, all unique identifiable information – including names, account numbers, addresses, dates of birth and Social Security numbers – is removed.

- The Institute has put in place privacy protocols for its researchers, including requiring them to undergo rigorous background checks and enter into strict confidentiality agreements. Researchers are contractually obligated to use the data solely for approved research, and are contractually obligated not to re-identify any individual represented in the data.

- The Institute does not allow the publication of any information about an individual consumer or business. Any data point included in any publication based on the Institute's data may only reflect aggregate information.

- The data are stored on a secure server and can be accessed only under strict security procedures. The data cannot be exported outside of JPMorgan Chase's systems. The data are stored on systems that prevent them from being exported to other drives or sent to outside email addresses. These systems comply with all JPMorgan Chase Information Technology Risk Management requirements for the monitoring and security of data.

The Institute provides valuable insights to policymakers, businesses and nonprofit leaders. But these insights cannot come at the expense of consumer privacy. We take every precaution to ensure the confidence and security of our account holders' private information.

The Institute's data asset and research complement a giant body of surveys and other tools used to understand the financial behavior of individuals and businesses in the United States. Traditionally, research on earning, spending and financial behavior has relied primarily on a number of recurring public surveys in which individuals or establishments self-report their income, expenses or business sales. These surveys are costly to administer and often experience low response rates that recently have been falling even lower.[24] Public agencies typically administer these surveys periodically, seldom more than once a year, and sample 4,000 to 60,000 individuals (in the case of the Census). Typically these surveys gather information on only a few dimensions of financial behavior – either income or consumption, but not both. Private research organizations and think tanks also conduct a number of important and insightful surveys focused on financial health issues. Recent examples include the U.S. Financial Diaries conducted by the Center for Financial Services Innovation (CFSI) and NYU's Wagner's Financial Access Initiative (FAI) in 2013 and the Survey of American Family Finances conducted by The Pew Charitable Trusts in 2014.[25] Figure 12 provides an overview of the most common public, recurring surveys.

In 2014, spending on gas peaked on Friday, May 23, the Friday of Memorial Day weekend, and fell by 75% to a low point on December 31, New Year's Eve.

People spend three times as much on Mondays, the highest spending day of the week, as they do on Sundays, the lowest spending day of the week.

FIGURE 12: RECURRING SOURCES OF PUBLIC DATA ON THE FINANCIAL LIVES OF U.S. HOUSEHOLDS

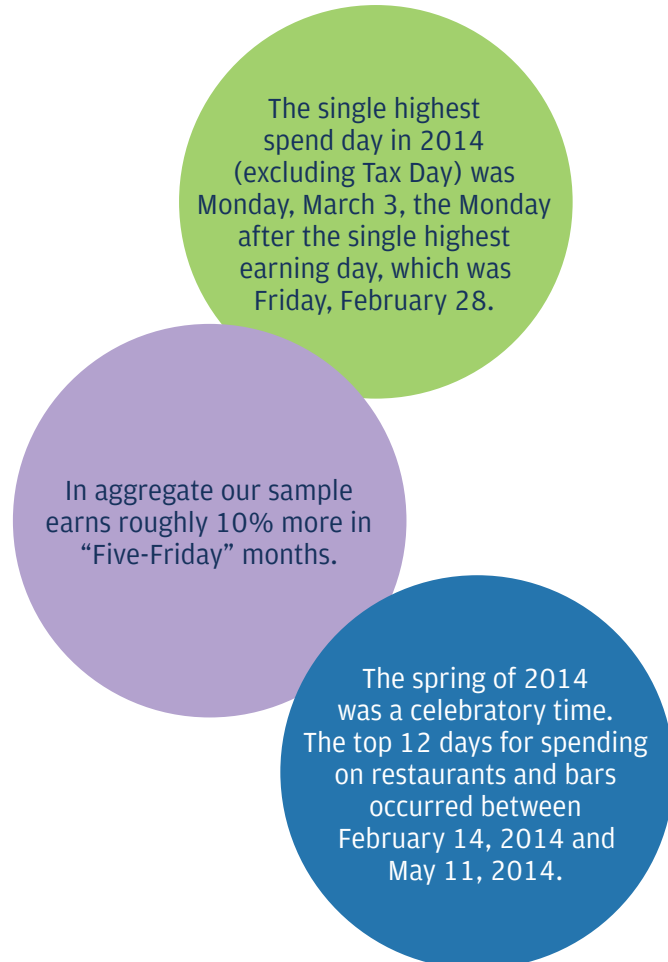| Source	Data	Description	Sampling Approach and Size	Response Rate	Frequency
CENSUS	Current Population Survey	Personal income, labor force statistics	60,000 housing units from 824 sample areas	90%	Monthly
	Survey of Income and Program Participation	Personal income, income volatility, economic well-being, asset ownership, health insurance, housing expenditures	National panels: 14,000 to 52,000 households	70%	2.5 to 4 years
	Retail Trade and Food Services Survey	Personal consumption, sales/inventories at/held by retail, ecommerce, food stores	12,000 to 22,000 retail businesses with paid employees	60% to 80%	Monthly/annually
BUREAU OF ECONOMIC ANALYSIS	National Income and Product Accounts	GDP, personal income, savings, fixed Investment	National/aggregate of various government surveys	N/A	Monthly
BUREAU OF LABOR STATISTICS	Consumer Expenditures Survey	Personal/consumer unit consumption and income	Nationally representative sample of 7,000 consumer units for two one-week diaries and four interviews quarterly	72% to 75%	Monthly
FEDERAL RESERVE	Survey of Consumer Finance	Family income, net worth and asset and debt holdings	Nationally representative sample of 6,026 families	60%	Every three years
	Survey of Household Economics and Decisionmaking	Personal finances of households, credit access and behavior, student debt, savings, retirement and health-related expenses	Nationally representative sample of 4,134 households	70%	N/A (New)
UNIVERSITY OF MICHIGAN	Panel Study of Income Dynamics	Longitudinal study of 5,511 families on economic, education, health and financial outcomes	Nationally representative sample of family members of an original sample of 5,511 households	94%	Every two years
IRS	Tax return data	Annual income tax return data on tax filers	National	100%	Annually

More recently, scholars are turning to selected government records, including comprehensive IRS tax filings of individuals and their dependents, and records from participants in government programs such as Medicare or Social Security.[26] These administrative data have the benefit of offering large samples that are more likely to represent individuals' actual financial behavior than what is reported on surveys, but they lack a comprehensive and integrated view of both income and consumption. On a more limited basis, large-scale private data sets also are becoming available to researchers. These data sets include public data aggregators, such as Zillow.com and Redfin; personal financial websites that aggregate daily transactions and/or financial accounts; and other online tools. These sources offer a window into real behavior on a high-frequency basis. In particular, information from personal finance websites also has the potential to provide a near-complete picture of an individual's financial life if account holders are sufficiently active users.

The Institute's data asset combines access to daily account data with the ability to track the same account holders over time, creating a unique data asset that is comprehensive and consistent. The data asset differs from existing data sets in a number of important ways that help to make new contributions to the general understanding of the way individuals manage their money. First, our large sample of roughly 2.5 million individuals enables us to make observations of a broad and diverse population as well as focus on interesting subpopulations, such as retirees or other demographic groups. Second, our data are based on actual behavior of the same individuals over time with low attrition from month to month, offering a longitudinal, dynamic perspective rather than one-time snapshots. The data asset also offers a window into both inflows and outflows of financial accounts, complemented with credit bureau data on liabilities, offering a more complete perspective of earning and spending. Finally, unlike personal finance websites, which typically rely exclusively on transaction text descriptions to categorize transactions, our data include significant information on each transaction, including: merchant information for all debit and credit card purchases; the transaction channel by which the funds flowed; and a significantly longer text string for all electronic transfers that includes important payee and payer identification numbers that enhance our categorization algorithm. In short, this new data asset offers granular, high-frequency, longitudinal data on multiple dimensions of financial behavior.

Constructing our Sample

In constructing our data asset, we sought to provide an integrated profile of the financial lives of individuals. For the purposes of this research, the unit of analysis is the primary account holder, whom we subsequently refer to as individuals.[27] To avoid double counting financial activity, all joint accounts are captured under one individual, the primary account holder.

From almost 30 million accounts, we created a subsample of 2.5 million individuals for whom we have a near-complete view of their finances. To do so, from our initial universe of account holders, we selected individuals who maintained an active checking account every month between October 2012 and December 2014 with a monthly minimum of $500 in deposits and at least five outflows. These active users are considered to be "core" customers of the bank. In addition, we selected only individuals who kept an open Chase credit card for all 27 months, allowing us to analyze additional financial information reported by other banks to the credit bureaus. Applying these criteria, we culled our subsample of 2.5 million individual account holders, from which we drew a random sample of 100,000 individuals for use in this report.
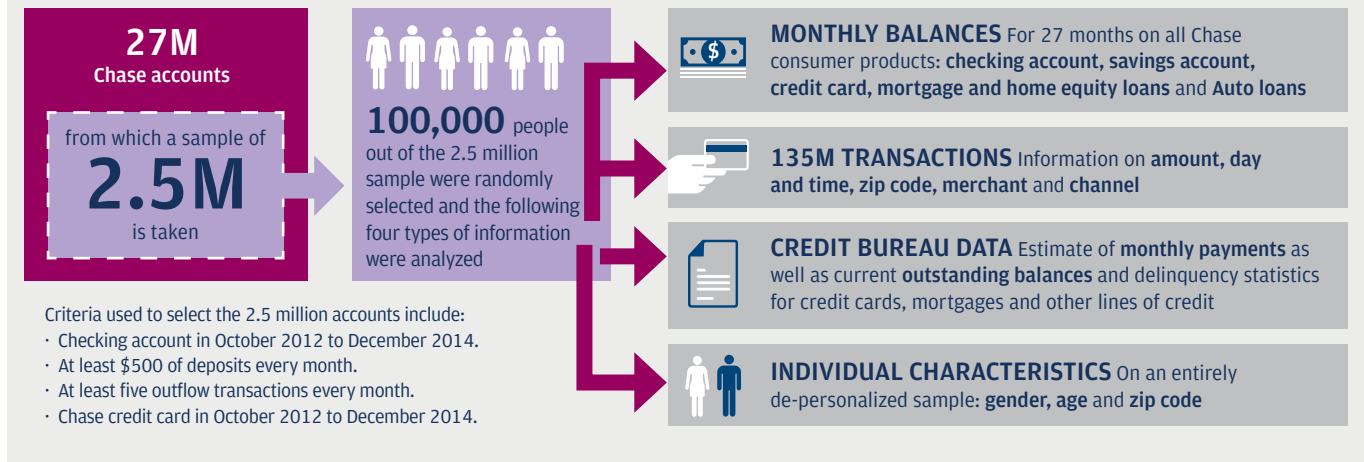
The single highest spend day in 2014 (excluding Tax Day) was Monday, March 3, the Monday after the single highest earning day, which was Friday, February 28.

In aggregate our sample earns roughly 10% more in "Five-Friday" months.

The spring of 2014 was a celebratory time. The top 12 days for spending on restaurants and bars occurred between February 14, 2014 and May 11, 2014.

FIGURE 13: THE JPMORGAN CHASE INSTITUTE DATA ASSET SAMPLE

27M
Chase accounts

from which a sample of
2.5M
is taken

100,000 people out of the 2.5 million sample were randomly selected and the following four types of information were analyzed

MONTHLY BALANCES For 27 months on all Chase consumer products: **checking account, savings account, credit card, mortgage and home equity loans** and **Auto loans**

135M TRANSACTIONS Information on **amount, day and time, zip code, merchant** and **channel**

CREDIT BUREAU DATA Estimate of **monthly payments** as well as current **outstanding balances** and delinquency statistics for credit cards, mortgages and other lines of credit

INDIVIDUAL CHARACTERISTICS On an entirely de-personalized sample: **gender, age** and **zip code**

Criteria used to select the 2.5 million accounts include:
· Checking account in October 2012 to December 2014.
· At least $500 of deposits every month.
· At least five outflow transactions every month.
· Chase credit card in October 2012 to December 2014.

We have four types of depersonalized data for each individual:

1. **Monthly balances:** Monthly balances for all consumer products used by primary account holders in our sample, except for co-branded credit cards (for example, a merchant credit card issued by Chase). These products include checking accounts, savings accounts, certified deposit accounts, and monthly payments and outstanding balances on Chase borrowing products, such as credit card, mortgages, home equity loans and auto loans.

2. **Transactions:** Record of all inflow and outflow transactions that take place out of the checking account (including debit card and credit card transactions).

3. **Credit bureau data:** Estimate of monthly payments as well as current outstanding balances and delinquency statistics for credit cards, mortgages and other lines of credit.

4. **Individual characteristics:** Characteristics, such as age, gender and zip code. In addition, independent of the

Institute's estimates of individual income derived by categorizing account inflows, for each individual, JPMorgan Chase calculates an estimated pre-tax annual income based on individual, third-party and zip code information. As described in the Findings: Individual Income and Consumption Volatility section, we use these data in specific analyses; for example, when we construct and segment our sample by income quintile.

Our sample of 100,000 people is different from the nation in a few important ways. First, our sample is biased geographically by Chase's physical branch footprint, which only covers 23 states.[28] Figure 14 compares the share of individuals in our sample in each Census region to the share of the total U.S. population in each region (according to the Census) and to the share of the banked population in each region (according to the FDIC Survey of the Unbanked in 2013). Our sample gives us broad coverage of the four Census regions, but with a bias in favor of the Northeast.

FIGURE 14: REGIONAL DISTRIBUTION OF THE INSTITUTE SAMPLE COMPARED TO THE NATION
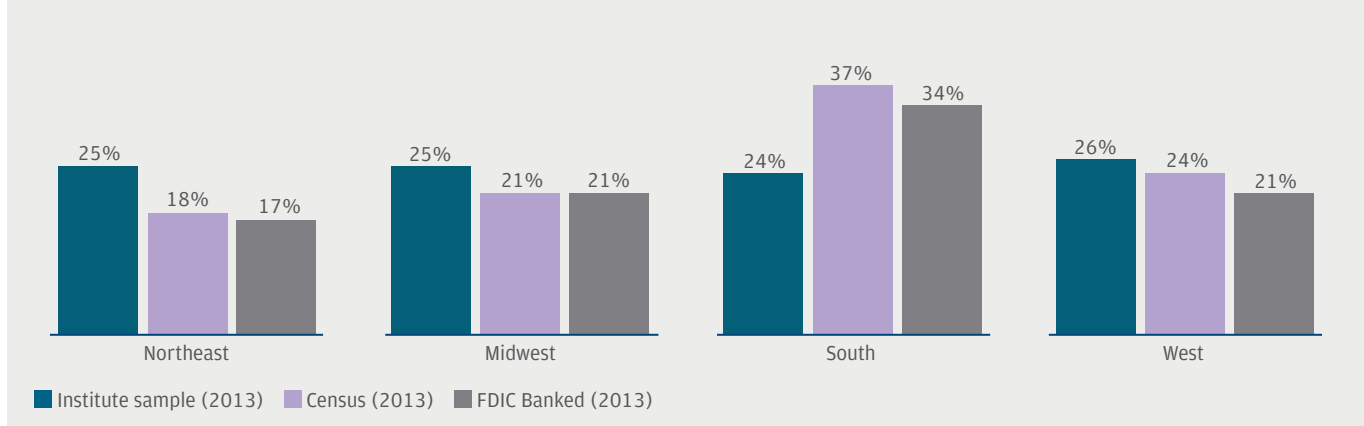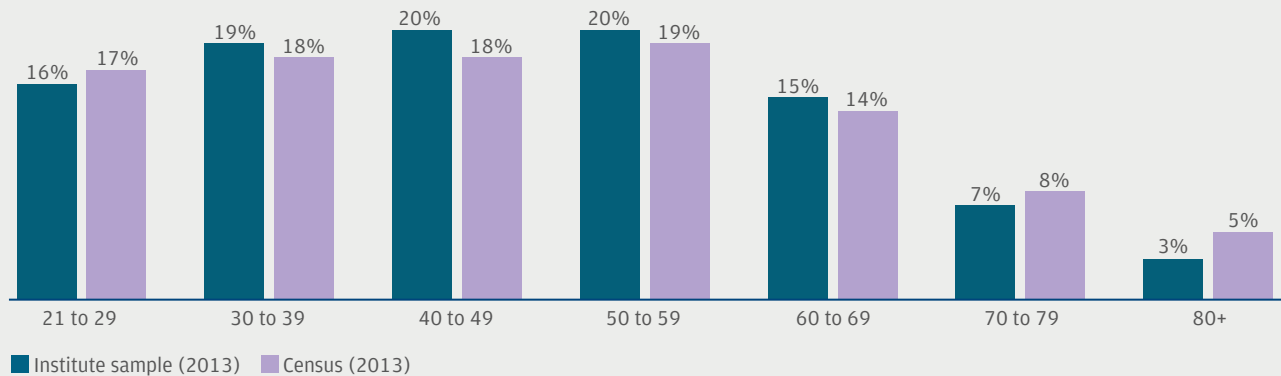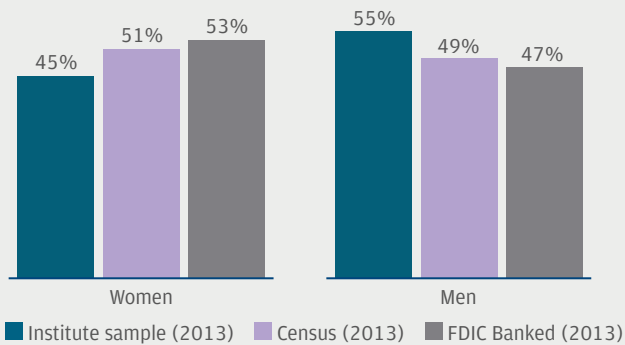
	Northeast	Midwest	South	West
Institute sample (2013)	25%	25%	24%	26%
Census (2013)	18%	21%	37%	24%
FDIC Banked (2013)	17%	21%	34%	21%

FIGURE 15: AGE DISTRIBUTION OF THE INSTITUTE SAMPLE RELATIVE TO THE NATION*

■ Institute sample (2013) ■ Census (2013)

* Age distribution reflects a population over 21 years.

FIGURE 16: GENDER DISTRIBUTION OF THE INSTITUTE SAMPLE RELATIVE TO THE NATION

■ Institute sample (2013) ■ Census (2013) ■ FDIC Banked (2013)

Second, as shown in Figure 16, our sample is skewed in favor of male account holders: 55% of our sample is male (compared to 49% for the 2013 Census and 47% for FDIC Banked), and 45% is female (compared to 51% for the 2013 Census and 53% for FDIC Banked).[29] This bias may reflect a tendency for men to be listed as primary account holders on joint accounts rather than an underlying bias in the Chase population in favor of men. Our sample is comparable to the nation in terms of average age but slightly underrepresents individuals aged 21 to 29 and aged 70 and above compared to the nation.

Finally, our sample is skewed in favor of higher-income individuals for a number of reasons. In our data asset, we observe only those individuals who have a relationship with Chase. Roughly 8% of Americans do not bank with a U.S. financial institution and tend to be disproportionally lower income and non-Asian minorities (FDIC 2014). In addition, our sampling criteria bias our sample in favor of higher-income
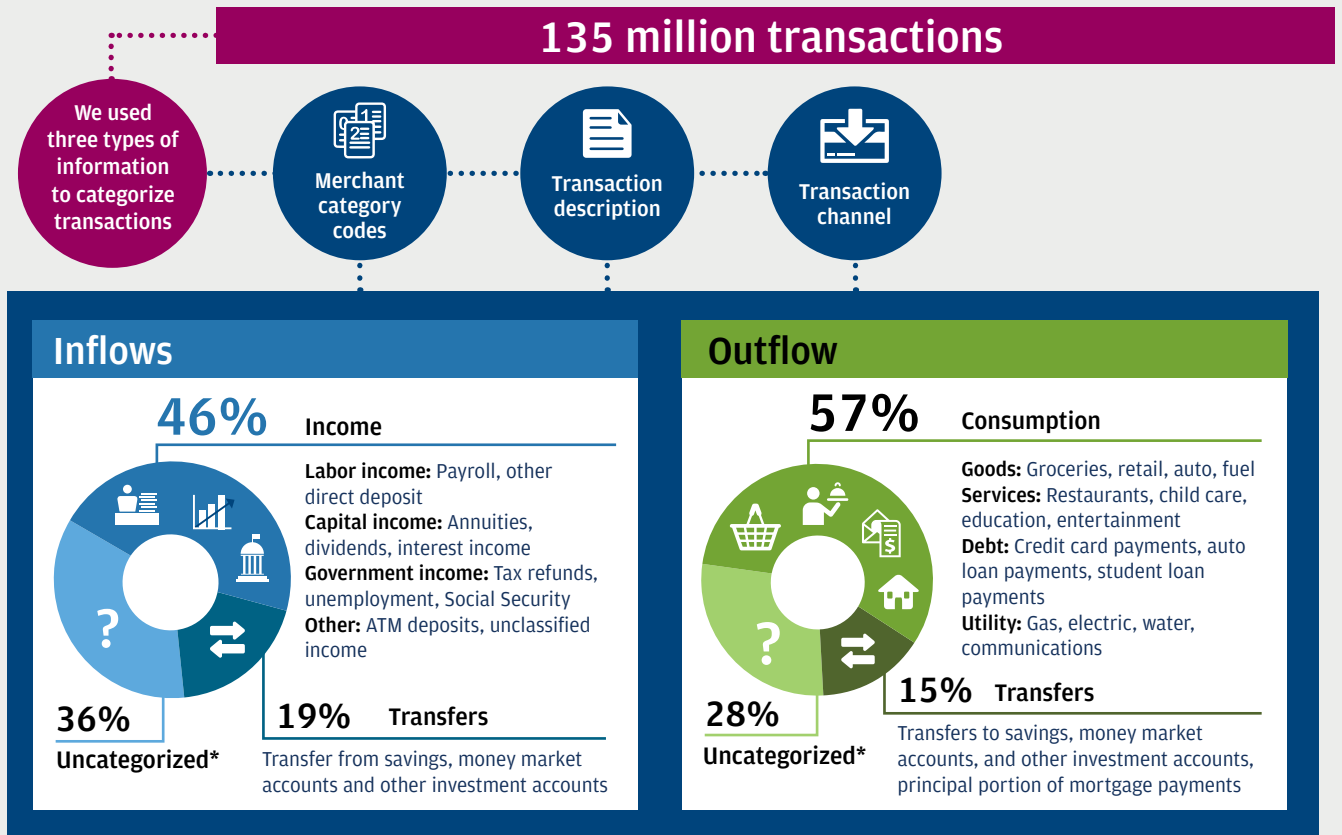
individuals within the universe of Chase customers. The lowest income earners may not meet the sampling criteria of having $500 in deposits every month. And, because Chase does not operate in the subprime credit market, Chase credit card holders have credit scores above a specific threshold. Thus, Chase credit card holders skew towards higher-income earners.

Making Sense of the Data

On average, the individuals in our sample saw more than $8,000 moving in and out of their accounts each month, of which a significant portion represented transfers to and from other Chase and non-Chase financial accounts. Yet, money coming into an account cannot immediately be classified as income, nor can money moving out of an account be immediately classified as consumption. Through a number of techniques, we separate inflows into actual income and "dis-saving," or transfers from other financial accounts. Similarly, we separate outflows into consumption and saving. Figure 17 (on page 24) provides an overview of the outcome of our classification.

We use several strategies to categorize incoming and outgoing transactions into income, consumption and other categories. Specifically, we analyze merchant information to accurately sort debit and credit card purchases into appropriate consumption categories, such as grocery, fuel or department store. For electronic transfers, we categorize transactions into, for example, mortgage or utility payments. We also exploit the transaction channel by which the funds flow to categorize inflow and outflow transactions when payee or merchant information are not available. For example, we assume that all ATM cash withdrawals represent consumption and all ATM cash deposits represent income.

FIGURE 17: CATEGORIES ASSIGNED TO INFLOW AND OUTFLOW TRANSACTIONS

135 million transactions

We used three types of information to categorize transactions

Merchant category codes

Transaction description

Transaction channel

Inflows

46% Income

Labor income: Payroll, other direct deposit
Capital income: Annuities, dividends, interest income
Government income: Tax refunds, unemployment, Social Security
Other: ATM deposits, unclassified income

36%
Uncategorized*

19% Transfers

Transfer from savings, money market accounts and other investment accounts

Outflow

57% Consumption

Goods: Groceries, retail, auto, fuel
Services: Restaurants, child care, education, entertainment
Debt: Credit card payments, auto loan payments, student loan payments
Utility: Gas, electric, water, communications

15% Transfers

Transfers to savings, money market accounts, and other investment accounts, principal portion of mortgage payments

28%
Uncategorized*

* Certain types of transactions, such as check deposits or check withdrawals, were unknown and thus remained uncategorized.

We are still left with some unidentified transactions – 36% of inflow dollars and 28% of outflow dollars – that are not included in this report's analyses. Despite these unidentified transactions, the resulting mean income levels in the Institute data asset are higher than national averages (see Figure 18 on page 25). Total average monthly inflows for the sample are $8,779, of which we identify $4,058 (46%) as income. This income figure is higher than estimates of $3,289 from the Bureau of Economic Analysis' National Income and Product Accounts which show monthly per capita disposable income (after taxes), as well as the Census Bureau's Current Population Survey at $3,443, which measures individual income before taxes.[30] In addition, we find that 73% of our sample received some form of labor income in 2013 compared to 71% nationally, and 21% of our sample received Social Security payments in 2013 compared to 25% nationally.

Figure 19 (on page 25) also indicates that we find higher levels of consumption than national estimates. We observe average monthly outflows of $8,247, of which $4,690 (57%) is consumption. In addition, we complement our Chase data with credit bureau data that allow us to identify additional consumption that may or may not be flowing through the Chase

account.[31] The credit bureau data show an additional $1,200 worth of consumption, leading to much higher levels compared to the other sources. The consumption levels in the Institute sample, both with and without credit bureau data, are higher than national estimates from the Bureau of Economic Analysis's National Income (at $3,021) and Product Accounts and the Bureau of Labor Statistics' Consumer Expenditure Survey (at $4,258).[32]

The income and consumption statistics shown in Figures 18 and 19 confirm that the Institute sample is biased in favor of individuals who earn and spend more than the average individual nationally. Moreover, they reveal that we have been able to identify proportionally more outflows as consumption than inflows as income. As a result, our consumption estimates exceed our income estimates. These comparative statistics underscore the fact that the focus of this report is on the dynamic changes in income and consumption rather than the absolute levels of income and consumption. We examine the volatility of income and consumption and how they change in relation to one another. To further emphasize this point and more accurately highlight changes within the income spectrum, our findings are also shown by individual income quintile.
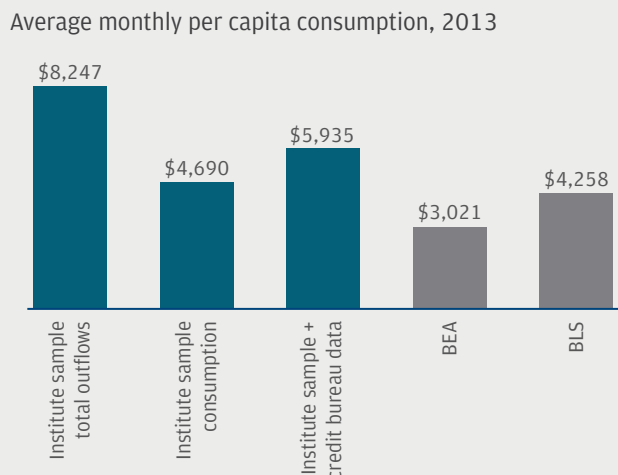
FIGURE 18: INCOME CHARACTERISTICS OF THE INSTITUTE SAMPLE COMPARED TO NATIONAL BENCHMARKS

Average monthly per capita income, 2013

Income characteristics, 2013

■ Institute sample (2013)   ■ Census*

* Census estimates of percentage receiving any labor income and percentage receiving Social Security are based on the population aged 25 and older.

Source: Bureau of Economic Analysis data are from the National Income and Product Accounts, 2013 and represents total disposable income. Census data come from the Current Population Survey and are based on person income estimates from 2013.

FIGURE 19: CONSUMPTION CHARACTERISTICS OF THE INSTITUTE SAMPLE COMPARED TO NATIONAL BENCHMARKS

Average monthly per capita consumption, 2013

Source: Bureau of Economic Analysis data are from the National Income and Product Accounts, 2013 and reflects per capita consumption. Bureau of Labor Statistics data come from the Current Expenditure Survey and are based on average annual expenditures.

Future Enhancements

Our new and evolving data set, mined at regular intervals for changing trends, provides fresh insights into the volatility of income and consumption that comprise this report. Additionally, throughout this section we highlighted a few new facts that demonstrate how the bank's consumer data can provide fresh insights into the financial lives and behaviors of individuals and the economy at large. Interesting in their own right, these facts also highlight the granularity and power of our data asset.

The JPMorgan Chase Institute will continue to build and refine this data asset to address an even broader array of important economic and policy questions pertaining to individuals and households. Ultimately, our ability to understand where individuals spend their money and how this varies month to month is an important cornerstone of our data asset. This inaugural report focuses on the volatility observed in income and consumption and how income and consumption changes move together. In future reports, we plan to provide additional insights into the financial ins and outs observed in our customer data. For example, if income declines, we will see if individuals cut back on restaurant purchases and increase what they spend on groceries. In addition, we plan to widen the time horizon of the data by including a full five-year history and including real-time, new monthly data as they occur. This will allow us to more fully explore the impacts of the global financial crisis and produce timely indices that can benchmark financial behavior. Other planned expansions to the data asset include a more complete view of consumer assets and liabilities to develop a perspective on household balance sheets. Finally, while still fully preserving the anonymity of our data, we plan to add third-party data on demographics to develop a granular perspective on consumer finance issues by important segments of the population and household characteristics.

Unique JPMorgan Chase Assets

While our inaugural report and initial data investment focus entirely on consumer finance, the future research agenda of the JPMorgan Chase Institute extends across the portfolio of JPMorgan Chase's lines of business and vast geographic reach. Future data assets and analytics of the JPMorgan Chase Institute will focus on businesses, large and small, the global flows of funds and other critical economic topics. These data, combined with expert insights, are unique assets the JPMorgan Chase Institute will use to provide a comprehensive perspective on the complex inner workings of the global economy and help policymakers, businesses and nonprofit leaders make smarter decisions to advance global prosperity.

Glossary

Channel: The delivery channel by which money flows in or out of an account. Outflow channels include debit card purchase, ACH – debit, check withdrawal and ATM cash withdrawal. Inflow channels include ACH – credit, ATM cash deposit, ATM check deposit and teller deposit.

Consumption: Outflow transactions that have been identified by the JPMorgan Chase Institute as spending. These include purchases of goods and services, utilities, tax payments, ATM withdrawals, debt payments, rent, non-principal portion of mortgage payments and fees. Transfers to other financial institutions, allocations to saving and investment accounts and outflow transactions that cannot clearly be identified as consumption are not included in consumption.

Consumption mobility: The degree to which individuals move between consumption quintiles from one year to the next, where consumption quintiles are defined based on the distribution of consumption in the current year.

Credit bureau data: Monthly data obtained from credit bureaus on all lines of credit a de-identified individual has, as reported by financial institutions including JPMorgan Chase & Co.

Credit utilization: The size of the individual's revolving balance across all open credit cards expressed as a percentage of the total credit limit across all open credit cards. The revolving credit card balance is estimated as the total outstanding credit card balance minus the credit card spending in that month.

Income: Inflow transactions that have been identified by the JPMorgan Chase Institute as income. These include direct deposits such as payroll, annuities and dividends, tax refunds, unemployment insurance, Social Security and ATM deposits. Transfers from other financial institutions, saving and investment accounts, and inflow transactions that cannot clearly be identified as income are not included in income.

Income mobility: The degree to which individuals move between income quintiles from one year to the next, where income quintiles are defined based on the distribution of income in the current year.

Income quintile: One of the five segments of the population where each segment reflects 20% of the population on the basis of the income distribution. Quintile 1 refers to individuals with incomes in the bottom 20% in terms of income (0-20%); quintile 2 refers to individuals in the 20%–40% range of incomes; quintile 3 refers to individuals in the 40%–60% range of incomes; quintile 4 refers to individuals in the 60%-80%

range of incomes; and quintile 5 refers to individuals in top 20% in terms of income (80%-100%).

Inflow: A credit transaction to an account holder's checking account.

JPMorgan Chase data asset: The evergreen data set compiled by the JPMorgan Chase Institute that currently includes monthly balances on all Chase consumer accounts and credit bureau data on liabilities for 2.5 million primary account holders as well as daily transaction-level data on Chase debit and credit cards for a random sample of 100,000 account holders.

Liquid asset: Cash and assets readily accessible at no or minimal cost, including balances held in checking, savings and money market deposit accounts and money market funds.

Outflow: A debit transaction to an account holder's checking account.

Primary account holder: The signatory legally responsible for the account. In the JPMorgan Chase data asset, all account activity is reflected under the person listed as the primary account holder. When there is more than one primary account holder, the account activity is reflected under the person listed first on the account.

Responders: Individuals for whom income and consumption changes fell within 10 percentage points of each other between 2013 and 2014. Examples include those who saw between 2013 and 2014 a 10% increase in income and a 15% increase in consumption, or a 10% decrease in income and a 15% decrease in consumption.

Sticky Optimists: Individuals for whom consumption changes positively exceed income changes by at least 10 percentage points between 2013 and 2014. Examples include those who saw between 2013 and 2014 a 10% increase in income and a 21% increase in consumption, or a 21% decrease in income and a 10% decrease in consumption.

Sticky Pessimists: Individuals for whom income changes positively exceed consumption changes by at least 10 percentage points between 2013 and 2014. Examples include those who saw between 2013 and 2014 a 21% increase in income and a 10% increase in consumption, or a 10% decrease in income and a 21% decrease in consumption.

Transaction: A single deposit or withdrawal of funds by any transaction channel.

Volatility: The magnitude of positive and negative dispersions from the median.

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Endnotes

1   In each case here and throughout much of this report, we have calculated symmetric percent change between A and B, calculated as (B-A)/(0.5*(A+B)). This formula has the benefit of allowing for positive and negative changes to be represented symmetrically and also for changes from zero to be calculable.

2   During this period, total inflows observed decreased by 2.2% and outflows increased by 0.2% respectively between 2013 and 2014.

3   See U.S. Economy at a Glance: Perspective from the BEA accounts, available at http://www.bea.gov/newsreleases/glance.htm. In addition, increases in income tax rates that took effect on January 1, 2013 caused some employers to pay out 2012 bonuses in 2012 rather than 2013, and thus potentially resulted in lower incomes in 2013.

4   In our sample 12% experienced at least a 25% decline in income between 2013 and 2014, and 31% experienced a change in income of 25% or more in either direction. Dynan et al (2012), using the Panel Study of Income Dynamics, found that the percentage of people experiencing a 25% or more decline in income over a two-year period increased from 16% in the early 1970s to over 20% in the 2000s. A 2008 Congressional Budget Office study found that roughly 20% of the population experienced a 25% decline in income between 2002 and 2003, and 39% experienced earnings changes of more than 25% in either direction between 2001 and 2002. In terms of aggregate income mobility, our data confer with previous estimates of income mobility. For example, DeBacker et al (2012) find that 74% of individuals remained in the same income quintile from year to year between 1987 and 2009 compared to 72% in our sample.

5   Our finding that consumption is significantly more volatile than income sharply departs from theoretical predictions from the permanent income hypothesis from economics that people should be able to smooth consumption as they experience transitory income shocks and only adjust consumption in response to permanent changes in income (Hall, 1978). It is also inconsistent with existing empirical research, which shows volatility of food consumption to be significantly lower than volatility of income. Gorbachev (2011) and Keys (2008), using the PSID, found that year-over-year food consumption volatility is substantially lower than income volatility and that volatility in food consumption grew at less than half the rate that income volatility grew between 1970 and the early 2000s. Fisher and Johnson (2006) complemented the PSID with data from the Consumer Expenditure Survey in order to estimate both income mobility and consumption mobility in the United States and found them to be similar.

6   Here income and consumption quintiles are created based on the JPMorgan Chase Institute's estimates of income and consumption respectively. In 2013 income quintiles are defined as follows: quintile 1 is $16,200 or less; quintile 2 is $16,200–$28,900; quintile 3 is $28,900–$43,200; quintile 4 is $43,200–$67,600; and quintile 5 is $67,600 and above. In 2013 the consumption quintile 1 is $29,800 or less; quintile 2 is $29,800–$43,400; quintile 3 is $43,400–$61,000; quintile 4 is $61,000–$92,600; and quintile 5 is $92,600 and above.

7   A slightly smaller sample with an odd number of individuals was used for this calculation, resulting in approximate quintiles that cause the shares moving up or down a quintile to not be exactly equal.

8   Data presented in this report have not been seasonally adjusted.

9   See The JPMorgan Chase Institute Data Asset section for a full discussion of our transaction classification strategy.

10 For the purposes of this analysis, we base income quintiles on an annual pre-tax income estimate for 2014 ascertained by JPMorgan Chase based on individual, third-party and zip code-level data rather than the income estimated by the JPMorgan Chase Institute analysis of inflows. The first income quintile is $35,300 or less; quintile 2 is $35,300–$50,000; quintile 3 is $50,000–$67,800, quintile 4 is $67,800–$100,000; and quintile 5 is $100,000 or more. As in earlier analyses, we continue to use symmetric percent change.

11 For the sake of comparison, we calculate the distribution of percentage changes in income between four-month periods over a 16-month period between 2010 and 2011 using data from the Survey of Income and Program Participation (SIPP) for both the entire national sample and a subsample with monthly income always $400 or greater in order to approximate our sample selection screen. We discover that for the entire national sample income volatility in the bottom income quintile far exceeds income volatility in the top income quintile. Income volatility is overall much lower in the subsample of individuals surveyed in the SIPP with income greater than $400, and there is comparable income volatility across income quintiles.

12 We do not believe that we have underestimated volatility of consumption in the bottom quintile to the same extent that we may have underestimated volatility of income in the bottom quintile. Our sampling approach requires only that people have five outflow transactions rather than any minimum dollar amount.

13 We performed two robustness checks to validate these results. First, we calculated the 25th and 75th percentile changes for total inflows and outflows in order to ensure that our results are not driven by irregularities in the way in which we categorized inflows and outflows into income and consumption respectively or biases in how volatile uncategorized flows (e.g., paper checks) are relative to categorized flows. We find that volatility is even greater when we evaluate total inflows and comparable when we evaluate total outflows and volatility increases with income quintile. For example the 25th to 75th percentile spread on inflows was -22% to 24% for income quintile 1 and -32% to 33% for income quintile 5, wider spreads than those in Figure 7. The 25th to 75th percentile spread on outflows was -24% to 25% for income quintile 1 and -30% to 31% for income quintile 5, comparable to the spreads in Figure 7. The second robustness check was to calculate the 25th to 75th spreads on a small sub sample of roughly 8,000 people for whom 90% of total inflow and outflow dollars were fully categorized. We also segment this group into income quintiles based on the income identified by the JPMorgan Chase Institute rather than by the annual income estimate. We find that income volatility among this subsample is virtually identical to the results presented in Figure 7, but that consumption volatility is slightly lower than what we observed above (e.g., -22% to 24% for middle income quintile earners). Bottom quintile earners experience slightly less volatility in income than top quintile earners, still likely due to our sampling criteria that select out people with inflows below $500, but they experience slightly more consumption volatility (-24% to 26% spread) than individuals in the top income quintile (-21% to 23% spread).

14 For example, Gosselin and Zimmerman (2008) showed that income volatility was not only higher among bottom quintile earners than among top quintile earners and but also increased significantly more between 1973 and 2003 than volatility for top quintile earners. Hardy and Ziliak (2012) showed that volatility of earnings among the top 1% of earners has been increasing but still remains lower than the volatility experienced by the bottom 10%. The recent evidence from the U.S. Financial Diaries highlights the extent and unpredictability of fluctuations in income experienced by low-income families and the impact on their ability to cover costs (Morduch and Schneider, 2013). Even recent research on the negative impacts of the Great Recession largely concentrates on the economically vulnerable subgroups (Boshara and Emmons, 2012).

15 Each dot in Figures 8 and 9 represents a group of individuals in order to adhere to privacy protocols.

16 Although there is a large literature that explores the relationship between income and consumption changes, it typically explores the short-term impacts of income on spending and demonstrates the significant immediate increase in spending in response to positive income fluctuations such as the 2008 Economic Stimulus Payment (Parker, 2014), Social Security benefits (Stephens, 2003), food stamp benefits (Hastings and Washington, 2008) and even paychecks (Stephens, 2006).

17 Specifically, we measure credit utilization by estimating the total revolving balance (i.e., outstanding balance that individuals carry from the previous month) as a percentage of the total credit limit across all credit cards.

18 Refer to the section on the JPMorgan Chase Institute Data Asset for a more complete discussion of how our sample differs from then nation.

19 The 5th percentile change in income from the prior month by income quintile was -76% for quintile 1, -81% for quintile 2, -83% for quintile 3, -90% for quintile 4 and -101% for quintile 5. The 95th percentile change in consumption from the prior month by income quintile was 80% for quintile 1, 81% for quintiles 2 and 3, 82% for quintile 4 and 87% for quintile 5. Pre-tax median income as reported by the Survey of Consumer Finance was $14,203 for quintile 1, $28,407 for quintile 2, $46,668 for quintile 3, $76,090 for quintile 4, and $121,744 for the 80th to 90th percentiles within quintile 5. We calculated post-tax median incomes by assuming tax rates of 15% for quintile 1; 25% for quintiles 2, 3 and 4; and 28% for quintile 5.

20 We recognize that some individuals may intuitively consider their median or mean levels of income and consumption as more relevant reference points than the previous month when experiencing and managing volatility. Although we believe measuring monthly volatility as the change from the previous month is more indicative of the liquidity management challenge; as a robustness check, we also calculated liquid asset buffers using the percentage changes in income and consumption relative to the moving average and moving median levels over the prior 12 months. These methodologies yielded slightly lower estimates of the liquid asset buffer necessary for individuals in each income quintile to weather volatility: $1,200 for quintile 1; $2,100–$2,200 for quintile 2; $3,600 for quintile 3; $6,000 for quintile 4; and $9,800–$10,700 for quintile 5. On the other hand, as noted previously, our estimates of income volatility, and therefore liquid asset buffers, may likely be biased downward given that our sampling criteria require individuals to have a minimum of $500 in deposits each month. We intend to continue to refine these estimates as we further explore these methodological and sampling approaches.

21 A recent study by Brookings describes roughly a third of the population as the "wealthy hand-to-mouth," because, although they have illiquid assets, they do not have sufficient liquid assets to cover cash flow needs or other unexpected shocks (see Kaplan et al, 2014). Similarly, a recent Pew study highlights that even the middle class do not have sufficient resources to weather the financial fluctuations they experience (The Pew Charitable Trusts, 2015a).

22 See several studies by Sendhil Mullainathan and Eldar Shafir and others recently summarized in their book: *Scarcity: Why Having too Little Means So Much*.

23 Several countries, such as Mexico, South Africa and the United Kingdom, have established banking infrastructures that support general-purpose immediate fund transfers.

24 Response rates to these surveys are typically in the range of 60% to 90%, but have been decreasing in recent years; according to Browning et al (2014), CEX response rates fell 11 percentage points from 1986 to 2007.

25 See Morduch and Schneider (2013) and The Pew Charitable Trusts (2015a and 2015b).

26 See for example, Chetty et al (2014) and Maestas et al (2013).

27 Among our sample, roughly half of primary account holders are individual account holders, and the activity we see for these individuals is likely to reflect the financial life of one person. The other half of our sample are primary account holders on at least one individual account, but who also have a joint account. The account activity we see for these individuals could reflect the financial lives of multiple individuals if they are the primary account holder on the joint account, or it could offer only a partial view of their financial life if they are the secondary account holder on the joint account.

28 In fact our sample includes individuals in all 50 states.

29 16% of our sample has an unidentified gender. We have displayed the gender distribution of those with an identified gender.

30 The Census Bureau's estimate of monthly household income for 2013 was $6,053 before taxes. Although the primary account holder is our unit of analysis, some accounts may reflect the financial lives of more than one individual.

31 For example, if individuals are paying their credit card out of their Chase account this consumption will be reflected in our total outflow numbers, but we may not have identified it as consumption per se if the individual pays their credit card bill by writing a paper check. If, however, individuals use some other non-Chase financial account to pay these credit card bills, or they spend using but don't pay off non-Chase credit cards, this activity will not be reflected in the total outflows we observe.

32 The Consumer Expenditure Survey measures average annual consumption per consumer unit, which essentially includes all members of a household and reflects the consumption of, on average, 2.5 people. With an average annual consumption per consumption unit of $51,100, the average per person average annual consumption is $20,440, or $1,703 on a monthly basis, which is significantly lower than the Personal Consumption Expenditure as measured by the Bureau of Economic Analysis. For a discussion and explanation of these discrepancies, see Campos et al (2012).