Consumption Smoothing During the Financial Crisis: The Effect of Unemployment on Household Spending

Michael Hurd and Susann Rohwedder

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Michael Hurd
RAND, NBER, NETSPAR, and SMU

Susann Rohwedder
RAND, NETSPAR, and SMU

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Abstract

Because of data limitations, the quantification of consumption smoothing in response to economic shocks has been challenging to investigate empirically. We used monthly data on total household spending, income, and labor force participation to estimate the effects of unemployment on household spending. The data come from the RAND American Life Panel, a standing survey sample that is representative of the United States adult population. We compare monthly spending and income of households prior to unemployment with spending and income following unemployment for up to 40 months. We compare spending and income following re-employment with spending and income while unemployed. We find that by month two of unemployment total household spending per month declined to about 83 percent of pre-unemployment spending. At about 14 months of unemployment, spending began to decline further, reaching 70 percent of pre-unemployment spending by month 30. Income declined much more sharply to 37 percent of its pre-unemployment level by month two of unemployment, with little change after that as the duration of unemployment increased. Thus, consumption does not decline as much as income, so that it is somewhat smoothed relative to income; yet, particularly over long-duration unemployment the decline is substantial.

On re-employment, income increased rapidly, spending much less rapidly. As of the third month, high-frequency spending was about 9 percent above its value in the last month of unemployment. It continued to increase until it was about 20 percent higher. Just as with an income drop, spending is somewhat smoothed when income increases.

Citation

Authors' acknowledgements

Introduction

The Great Recession officially started in December 2007 and ended in June 2009.

However, the economic situation of many households did not improve thereafter, and in many

cases it worsened. The national unemployment rate continued to go up, reaching its peak of

10.0 percent in October 2009 and remaining over 9.0 percent until October 2011. Besides

these labor market challenges, households also experienced economic shocks in the housing

and stock markets. Many households responded to the recession by reducing consumption

(spending): in the RAND American Life Panel (ALP) about 75 percent of households reported

reducing spending because of the financial crisis in the months following the collapse of the

stock market. That gives a sense of the wide distribution of effects, but the size of these effects

is also of great interest to both economists and policy makers. The magnitude of the reduction

would convey the extent to which households are able to smooth their consumption and

maintain their economic well-being when experiencing economic shocks. A marked reduction

in consumption, accompanied by an inability to smooth it, could contribute to further

contractions in the overall economy, leading to a downward spiral in United States economic

activity.

According to economic theory, the size of the consumption response to a shock depends

on the degree to which households are insured against such shocks, and on whether the

economic shock is permanent. If shocks to income were fully insured, then households would

be able to smooth their consumption completely. Some types of insurance, such as

unemployment benefits, do not replace 100 percent of earnings. In the absence of complete

insurance, households need to find ways of buffering shocks. One possibility is self-insurance.

That is, assuming sufficient liquidity of assets, households could set aside some money in

healthier times in order to be able to smooth the effect of economic shocks. Households doing

so would be able to distribute the effect of the shock over a longer period of time, but would

still need to re-optimize their consumption if the shock proves permanent.

The ability of households to adjust their consumption is likely to vary by good or service.

For some categories of spending, an immediate adjustment in response to a shock may not be

possible. This is particularly true for spending on durable goods, such as automobiles or major

household appliances, where the consumption services are distributed over a longer period of

time, although payment tends to occur at the time of purchase. Even some nondurable

categories of spending, such as those purchased through a contract for communications or

insurance services, may be difficult to adjust quickly. Patterns of change observed in some sub-

categories of spending cannot be generalized to others.

The question of consumption smoothing in response to economic shocks is challenging

to investigate empirically for at least two reasons. First, it is difficult to find sizeable,

unanticipated changes in households' economic circumstances. For example, in "normal" times

stock prices increase and decrease within modest ranges. Such modest changes may be

anticipated and not lead to spending changes. Second, there are very few U.S. data sources

that track total household spending. The Consumer Expenditure Survey (CEX) collects a

comprehensive set of measures of household spending, but while there is a short longitudinal

component, the CEX lacks detail on labor market activity.

Given the lack of comprehensive measures of household spending, several studies have

sought to explore smoothing of food expenditures, for which data are available. Using data

from the Health and Retirement Study (HRS) and the Panel Study of Income Dynamics (PSID),

Stephens (2004) found that unemployment was associated with a reduction of approximately

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16 percent in food spending. More to the point, Gruber (1997) used food spending in the PSID

(1968-1987) to estimate the effect of public unemployment insurance (UI) benefits on

consumption smoothing. He found that those who received generous UI benefits experienced

little change in consumption during and after a period of unemployment. Those with no UI

benefits experienced a drastic reduction (approximately 22 percent) in consumption. UI

benefits thus seem to have a significant effect on consumption smoothing, especially among

those who do not anticipate the unemployment shock. There appeared to be no differential

long-term effects of unemployment on consumption by level of UI entitlement, but eligibility

for such benefits does seem to crowd out private savings that would otherwise buffer

unemployment shocks.

Using Canadian data that covered 1993 to 1995, Browning and Crossley (2009) derived a

fairly comprehensive measure of household spending, albeit in a sample limited to those who

experienced unemployment. Their empirical results suggest that among households with no

liquid assets, total household expenditure is sensitive to the level of unemployment benefits.

Among specific commodities, they found expenditures on clothing were more sensitive to cuts

in benefits than were expenditures on food.

In this paper we use monthly data on household spending, household income, and labor

force participation to estimate the effects of a specific economic shock — unemployment — on

household consumption. These data, collected through a high-frequency survey, allowed us to

compare changes in spending and income of households recently experiencing unemployment

with those in households where respondents continue to be employed. We estimated the time

trajectory of changes in spending and income by durations (as measured in months) of

unemployment. We calculate the implied elasticities of spending with respect to income. We

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repeat such calculations following re-employment to find similar trajectories of income and spending.

Data: The ALP Financial Crisis Surveys

The RAND American Life Panel

We collected data for this research through the RAND American Life Panel (ALP) survey. The ALP is an ongoing Internet panel survey, operated and maintained by RAND Labor and Population. In November 2008, at the time of our first survey, it comprised about 2,500 persons, and about 1,000 new panel members have been added since then. Panel members were initially recruited from respondents to the University of Michigan Survey Research Center's Monthly Survey (MS). The MS is considered to have good population representation (Curtin, Presser, and Singer, 2005). At the end of an MS interview, respondents are asked to participate in the ALP; about 80 percent do so. ALP participants without Internet access were initially provided a Web TV (www.webtv.com/pc/) account, Internet subscription, and an email account (an approach used successfully for many years in the Dutch CentER panel and which helps reduce selection bias against noncomputer-owners). Later ALP recruitment efforts provided participants without Internet access with laptops. The ALP uses post-stratification weights to approximate the distributions of respondent age, sex, ethnicity, education, and income in the Current Population Survey.

Several times monthly, respondents received an email request that they visit the ALP website to complete questionnaires that typically take no more than 30 minutes to finish. Respondents were paid about $2 per three minutes of survey time. Response rates were

typically between 80 and 95 percent depending on the topic, the time of year, and how long a survey is kept in the field.

The ALP had conducted a large number of longitudinal surveys of its respondents, so that over time it has collected data on a very wide range of covariates. The ALP has asked respondents about their financial knowledge and their retirement planning, as well as hypothetical questions about risk aversion. The ALP has also administered to its respondents' modules of the Health and Retirement Study (HRS), including the wide range of HRS health queries and the HRS cognitive battery.

A strength of the ALP is its use of Internet technology. This allows for a short turn-around time between questionnaire design and the fielding of a survey, facilitating rapid responses to new events or insights. Thus, surveys can be operated at high frequency, reducing risk of missing events or their effects on households.

The Financial Crisis Surveys

The very large stock market declines in October 2008 prompted the ALP's first financial crisis survey, administered in November 2008.[1] The survey covered a broad range of topics, including life satisfaction, self-reported health measures, indicators of affect, labor force status, retirement expectations, recent or potential job loss, housing, financial help (received, given, and expected), stock ownership and value (including recent losses), stock transactions (recent and expected over the next six months), expectations about stock market returns (one year ahead, 10 years ahead), spending changes, credit card balances and changes in amounts carried, impact of the financial crisis on retirement savings, and expectations about asset

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[1] See Hurd and Rohwedder (2015) for a description of the financial crisis surveys, including response rates, survey length, fielding schedule, and other details.

accumulation. We administered a second interview to the same panel in late February 2009 covering approximately the same topics.

In our first survey, 73 percent of households reported they had reduced spending because of the economic crisis. This reinforced our motivation for undertaking this study. Such reductions can have welfare implications, increasing the importance of understanding their magnitude. Obtaining better data on how spending responds to economic shocks can also help establish the empirical connection between the triggering events and the magnitude of consumption reductions. The reported wide-spread spending reductions prompted us to re-orient the survey by expanding the collection of quantitative information on the components of spending.

Beginning with the May 2009 interview (wave 3), we established a monthly interview schedule to reduce the risk of recall error about spending and to collect data at high frequency on items such as employment, satisfaction, mood, affect, and expectations. We also sought detailed sequencing of events and their consequences.[2]

Measuring Spending

Each month we asked about spending in 25 categories during the previous month. These high-frequency categories comprised about 70 percent of total spending. Every third month, beginning in July 2009, we asked about spending during the previous three months on an additional 11 low-frequency categories plus seven big-ticket items. Taken together, the monthly and quarterly surveys measured total spending over a three-month period. This three-

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[2] To further reduce recall error, we made the survey available to respondents only for the first 10 days of each month (except when the first day of the month fell on a weekend). Thus stated variables such as unemployment refer to approximately the first 10 days of a month, not the entire month.

month schedule of two shorter monthly surveys and a longer quarterly survey continued through financial crisis survey wave 32 (October 2011).

After wave 32, monthly surveys of high-frequency spending categories continued, but every third month, half of the sample was randomly broken out to receive monthly surveys of low-frequency categories during that quarter, with the intent of checking for recall error on low-frequency items. For spending analyses of low-frequency categories in this paper, we used only the quarterly totals. This schedule continued through wave 50 (April 2013). Then, the surveys of low-frequency categories reverted to quarterly-only, and the surveys of spending on what had been high-frequency items were also reduced to quarterly in frequency (though the period of interest remained the preceding month). The last of the financial surveys was conducted in wave 61 (January 2016). The survey schedule is summarized in Table 1.

These surveys are unique in several ways. The first and most obvious is that they are monthly panel surveys. This design permits the observation of the immediate effects of changes in the economic environment that cannot be captured in low-frequency surveys via retrospection. Second, we are measuring the majority of total spending on a monthly basis. This measurement reduces recall bias for high-frequency purchases. Yet, because the surveys cover an entire year, this measurement also captures low-frequency purchases. The use of a reconciliation screen in the consumption module, described in detail below, substantially reduces noise in the spending data, allowing meaningful analysis even in a small sample. The combination of spending data with a very rich set of covariates, elicited at high frequency, allows for a wide variety of analyses, with much more thorough information on timing and sequencing of events for investigating determinants and effects.

Eliciting Total Household Spending

The 25 categories queried in the monthly surveys are shown in Appendix Table 1, grouped as they were displayed. For example, the following categories were displayed at the same time because they are associated with household operations.

Mortgage
Rent
Electricity
Water
Heating fuel for the home
Telephone, cable, Internet
Car payments: interest and principal

The grouping by broad types of spending or by frequency of spending was meant to facilitate placement of reported amounts in the proper category: The thought was that respondents unsure about category placement might find it helpful to see other possibly relevant categories simultaneously. Also, it was hoped that the grouping would reduce the risk of omission and double-counting.

Appendix Table 2 shows the categories of spending elicited quarterly which we call "low frequency spending." The categories include durables, but also some nondurables purchased irregularly or at low frequency.

A major innovation was the development of a "reconciliation" screen. Outliers are a problem in self-administered data collection, such as Internet interviewing, because there is no interviewer to question extreme values. Therefore, we designed a new strategy to help with outliers in the ALP. Following the queries about spending on the 25 categories in the previous month, we presented the respondent with a summary table listing the responses and summing

them to produce an implied monthly spending total. We invited the respondent to correct any items after seeing this total.

This has had two very favorable results: It reduced item nonresponse to a low level, and it reduced outliers, which can have a large impact on statistical standard errors. Appendix Table 3 presents a display of the reconciliation screen. In the initial wave that elicited spending (wave 3 of the financial crisis surveys), respondents modified or updated about 3 percent of their entries after seeing the reconciliation screen. The rate of correction declined further to about 2 percent by wave 9. Thus the typical person would correct one entry approximately every other wave.

Although this seems like a small rate of correction, the effect on outliers can be substantial if the corrections are for entries that are extreme. A measure of the potential extent of the problem is the standard deviation of spending. While some fraction of the measured standard deviation reflects true variation in spending across individuals, some fraction is the result of measurement error and often is the result of extreme outliers. In the first two waves the reduction in the standard deviation was very substantial: from an average of $17,700 to $4,100. In later waves the reduction was much smaller. Still, averaged over 20 waves, the standard deviation was 64 percent higher before the reconciliation screen. This reduction had a substantial effect on the standard errors in the estimation of models of spending.

Comparison with the Consumer Expenditure Survey

As a check, we compared the annual spending reported in our panel survey with that in the cross-sectional CEX, the most authoritative survey measure of spending at the household level. We chose the calendar year 2010 for this comparison, as this was the first complete year of monthly data on household spending in the ALP and was also the latest calendar year for which published tables from the CEX are available. For ALP we calculated spending over a year by summing all 25 monthly spending items from the 12 monthly surveys and the quarterly reported spending items from the quarterly surveys covering 2010. Average spending in 2010 as reported in the CEX was $42,736.[3] Average weighted spending in the ALP was quite close at $41,360, or 97 percent of CEX spending. The same CEX-ALP comparison conducted for the 2011 data showed ALP spending at 98 percent of CEX spending.

Measurement of Income

We asked about income during the previous month. The respondent was queried about any earnings, including those of a spouse, and the amount before taxes and other deductions. We asked whether the household had any additional income sources in other broad categories in the previous month, including income from investments such as dividends, interest, or rental income; retirement income such as Social Security, pensions, or other annuities; and government benefits such as unemployment, disability, SSI benefits, or other welfare benefits. (In case of item nonresponse, we used bracketing.) We asked households with any of these income sources the total amount from them before taxes and other deductions.

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[3] We report CEX totals excluding "personal insurance and pensions" as these may contain components of saving and are not collected in the ALP.

Results

The survey asked respondents if they or their spouse had become unemployed, and, if so, how they compensated for the resulting loss of income. Table 2 shows the common ways of compensating. Nearly 85 percent reported reducing their spending, by far the most widespread way of compensating. The second most common way was to reduce savings; 44 percent of respondents reported reducing the amount of income they saved. Postponing bill payment (other than rent or mortgage) was the third-most frequent mechanism reported, with 37 percent doing this. Postponing rent and mortgage payments were less common. Only 3 percent reported taking none of the actions queried.

Quantifying the Effects of Unemployment on Income and Spending

We expected that the effects of unemployment on income and subsequent effects on spending by any given household would vary with the time elapsed. As we noted earlier, newly unemployed persons may be able to immediately reduce their spending on some categories of goods and services, while consumption of others, particularly durable goods such as housing, can be difficult to change quickly.

Table 3 presents the distribution of lengths of unemployment spells used in our regressions. We have 87,797 person-wave observations on the employment situation where at least one of the spouses in a household is in the labor force. Of them, 80,046, or 91.2 percent, pertain to household waves where neither the respondent (nor the spouse if married) was unemployed. Note that each household contributes multiple observations. Households who experience unemployment contribute one separate observation for each wave that they are observed experiencing unemployment in the data. We use these data in our analyses in two

different ways. For the descriptive statistics we compute the difference in household income and household spending between the month preceding the onset of unemployment and the various months during unemployment. In the regressions we present fixed effects estimations which incorporate covariates in the comparison of income and spending while unemployed with income and spending while employed.

There were 1,618 spells of unemployment of at least one month, that is, monthly observations on people who were unemployed following a month of employment. Some of the 1,618 returned to employment in the following month and some continued in unemployment in the following month. There were 990 spells of unemployment that lasted at least two months, and there were 681 spells that lasted at least three months, and so forth on to 301 spells of 20 to 24 months and 252 of 36 or more months. The data of someone with a spell that lasts for many months will enter the estimations many times.

Figure 1 shows spending on high-frequency items before (pre) and during (post) unemployment by month of unemployment spell among those with 12 or more months of continuous unemployment. In the month when unemployment commences, spending is about $2,300 compared with spending in the previous month of $2,500. Spending continues to decline until about seven months of unemployment when it is $1,900 or 77 percent of its pre-unemployment value (the top line). With continuing unemployment, spending continues at about 75 percent of its pre-unemployment value.

Because the figure pertains to people who are unemployed for 12 months or more, pre-unemployment income should not vary across durations of unemployment. This would be true were the sample to be the same across durations, but that is not the case: Not everyone is interviewed in every month so that the sample changes modestly in each month of

unemployment duration. For example, spending at month four is based on 160 observations.

These are people who became unemployed four months earlier and who were interviewed and

reported spending in both month four and prior to becoming unemployed. Furthermore, they

eventually were unemployed for 12 months or more. Spending at month five is based on 142

observations. They became unemployed five months earlier and were interviewed and

reported spending in both month five and prior to becoming unemployed. Most of them, but

not all, were interviewed and reported spending in wave four. Both pre-unemployment

spending and spending at month four are calculated over the 160 observations. Both pre-

unemployment spending and spending at month five are calculated over the 142 observations.

Despite the variation in sample, spending prior to unemployment is relatively flat.

A possible complication concerns expectations about eventual re-employment and its

effect on spending earlier in the spell of unemployment. For example, individuals who are

realistically less optimistic about finding a job should choose a sharper decline in spending even

months before re-employment than individuals who are realistically more optimistic. If

expectations have predictive power for unemployment duration, there should be a positive

relationship between spending reduction and unemployment duration. An implication is that

relative spending by month of unemployment should be calculated over observations that

eventually have the same duration of unemployment.   We address that issue in Table 4.

The table shows the ratio of spending in a month when unemployed to spending prior

to unemployment, classified by the eventual duration of unemployment. If such ratios in a

particular month of unemployment vary negatively with eventual duration, that could be

regarded as evidence that the eventual duration of unemployment influences spending even

months before re-employment. For example, in row three (which shows log spending at month

three of unemployment relative to spending prior to unemployment), among those with

unemployment duration of three months or more (as shown by the column number), spending

was reduced in month three of unemployment (read down column three to row three) to 91.2

percent of pre-unemployment levels. Among those with unemployment duration of 12 months

or more, spending was reduced in month three to 86.8 percent of pre-unemployment levels.

This variation is consistent with the hypothesis that the duration of unemployment influences

spending declines even early in the unemployment spell. However, other rows do not show a

consistent decline and where there is a difference, it is relatively small. Under that

interpretation we concluded that we can aggregate observations according to their

unemployment state in any particular wave: We would not have to further disaggregate by the

eventual duration of unemployment.

Low-frequency Spending

As discussed above, the ALP Financial Crisis Survey included both monthly and quarterly

collection of data on household spending. The quarterly surveys, conducted in January, April,

July, and October, each covered expenditures in the preceding three months on a limited list of

spending categories, including automobiles and six other big-ticket items. Conducting part of

the financial surveys at lower frequencies had the advantages of limiting respondent burden

and survey costs. It had the drawback of reducing the number of observations of spending

changes. For example, among those with unemployment durations of 12 months or more, we

have about 56 observations on quarterly spending for each month of unemployment,

compared to about 150 observations of monthly spending on high-frequency items. Because of

the smaller sample sizes, we cannot present results for low-frequency items in a manner similar

to the presentation for high-frequency items in Figure 1. Instead, we present results that are less dependent on a large sample.

Figure 2 shows the percentage ratio of two means: the mean of quarterly spending for the month of unemployment and the mean of quarterly spending just prior to unemployment. Thus, in the figure, the percentage ratio in month one of unemployment is 86 percent, indicating a 14 percent drop since the preceding quarter. The percentage ratio then gradually increases through the following months, before eventually declining by month six. Note that quarterly spending pertaining to the first month of unemployment also partially reflects spending from the two preceding months, months when the person was not yet unemployed.

Figure 3 is similar to Figure 2 except the analysis is based on medians instead of means. Here, at one month of unemployment (calculated over everyone who had any unemployment regardless of duration), quarterly spending is about 20 percent lower than the pre-unemployment level. Although there appears to be estimation error due to small samples, the overall impression is that, as measured by the ratio of medians, low frequency spending is approximately constant with duration of unemployment at least up to eight months of unemployment.

Low-frequency expenditures are a combination of durable and nondurable items infrequently purchased. The spending trend shown in Figures 2 and 3 is consistent with a cessation of durables purchases with the onset of unemployment, combined with a continuation of low-frequency payments such as for taxes and insurance.

To smooth sampling and measurement errors, we used a local polynomial smoothed regression of the deviation of spending in logs at unemployment duration t, minus the log of spending just prior to unemployment, on indicator variables for duration, but where the

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coefficients on the indicators are locally smoothed. Figure 4 shows the results for high-

frequency spending. As shown in the figure, spending is initially reduced by about 10 percent,

which is statistically significant (the 95 percent confidence interval is shown in gray). With each

subsequent month, spending is further reduced until it reaches 30 percent below initial

spending in month 10. There is then some increase in spending, which may be the result of

increased household income (we plan to investigate this at a later date).

A different pattern is observed in the results of the analogous graph for low-frequency

expenditures in Figure 5. Here, there is an initial large drop in spending of about 30 percent.

There is then a moderate increase that reduces the deficit relative to initial expenditures to

around 20 percent. Finally, there is a long-term, 20-month decline of about 60 log points or 45

percent below initial spending.

Fixed effects regression

To further explore the relationship between unemployment and high-frequency

spending, we regressed the logarithm of such spending on indicator variables for length of

unemployment. The control group was employed persons. This was a fixed-effects regression.

The analyses on monthly data had just less than 83 thousand household-wave observations,

pertaining to 3,554 unique households. Estimations on quarterly data had about 38,500

household-wave observations from 3,303 unique households.

We first discuss findings from the fixed-effects regression of the log of the sum of

monthly spending items on unemployment duration. The regression included indicator

variables for unemployment duration (1, 2, …, 19, 20-24, 25-35, and 36 or more months), wave

indicators (3-61), and household composition indicators. Figure 6 shows the coefficients on the

indicators for length of unemployment and the 95 percent confidence intervals (twice the standard error on either side). Thus, high-frequency spending declined from pre-unemployment spending by about 10 log points or 9 percent in the first month of unemployment. In the second month, it declined by an additional seven log points to 16 percent below pre-unemployment spending. The rate of decline then slowed but nonetheless continued. This continuing decline was somewhat obscured by error in the estimates but showed clearly when we took a moving average of the coefficients (Figure 7). This shows that the decline continued for very long durations of unemployment, even if at a slower pace, reaching more than 20 percent of initial spending.

Because low-frequency expenditures were surveyed once every three months instead of every month as with high-frequency spending, there were only about one-third as many observations. For the high-frequency, fixed-effects regression there were 1,500 observations with a duration of one month or more. For the low-frequency analysis there were just 659 (see Table 5).

We estimated a fixed-effects regression similar to that described above, but for the log of spending on low-frequency items elicited quarterly. Figure 8 shows the coefficients. Spending initially declined by much more (about 20 percent) than was the case for high-frequency spending. But there was no further decrease in spending with unemployment until the latter reached a duration of 13 to 14 months of unemployment. For very long spells of unemployment (more than two years), low-frequency spending fell by a total of more than 40 log points, or about 33 percent below pre-unemployment levels.

Income Results

We estimate the decline in income following unemployment with a similar fixed-effects regression where the left-hand variable is the log of monthly income and the right-hand variables at the same is in the fixed-effects regression of log spending. Figure 9 shows the coefficients on the indicator variable for unemployment duration and the upper and lower 95 percent confidence intervals. In the first (partial) month of unemployment, we estimate a decline of 64 log points in pre-unemployment income, which is a reduction of 47 percent. In the next month, it declines by a further 16 percent of pre-unemployment income, at which point income is just 37 percent of its initial level. Income remains at approximately that level, with possibly an increase at month 12.

To visualize spending and income paths simultaneously, Figure 10 combines estimates of spending and income paths from Figures 6 and 9. These show the patterns in the preceding displays: A drop in spending during the first several months of unemployment, then a very slow further decline, and a large, immediate drop in income, followed by a slow increase. It is likely that the continued spending drop despite the slight recovery in income has to do with asset spend down and the possible realization that the unemployment spell may last longer than had been anticipated, thus the need to spend more defensively.

Elasticity: High-frequency Income and Spending Compared

The elasticity of spending with respect to income is the percent change in spending divided by the percent change in income. According to the fixed-effects analysis, income dropped in the first month by 47 percent (=(1-exp(-0.64)*100), and spending by 9 percent, so the one-month elasticity was 0.19. Income in the second month was 71 percent below the pre-

unemployment level and spending was 15 percent below, implying an elasticity of 0.21. Figure 11 shows an upward trend in elasticity, reaching about 0.40 as unemployment approached three years. The increase is due to slowly declining spending as the duration of unemployment increases as shown in Figures 7 and 8. An increasing elasticity is consistent with depletion of assets and with damped expectations of re-employment with the passing months of unemployment.

Total Spending

Figure 12 combines the fixed-effects results from the high- and low-frequency patterns of spending decline following unemployment. Initial spending in month zero is calculated as the spending on high-frequency items in the month before unemployment ($2,452), and one-third of the spending on low-frequency items in the quarter before unemployment ($1,108) for a total of $3,560. The figure displays three trend lines—the simulated paths of high-frequency spending (based on the fixed-effects coefficients displayed in Figure 6), of low-frequency spending (based on the fixed-effects coefficients displayed in Figure 8) and of total spending by month of unemployment, the sum of high- and low-frequency spending. The total declined rapidly to about $2,981, then fluctuated at that level until week 30, when it fell more to about $2,500 or about 70 percent of initial spending. By week 30, income was about 30 percent of the initial value.

Re-employment

The time path of income and spending following the transition from unemployment to employment is also of interest because spending should be smoothed when there is a positive shock to income, not just a negative shock. For the analysis of re-employment, we used a fixed-

effects model with spending and income expressed as logarithms. Indicator variables were for the number of months of employment following unemployment. We estimated separate regressions for high- and low-frequency expenditures.

As illustrated in Figure 13, the log of income increased rapidly at employment. In the first, partial month of employment, it was 60 log points above its level prior to re-employment. By the third month, it was 1.15 log points above its prior value. Spending increased much less rapidly: by the third month, high-frequency spending was just nine log points above its prior value and continued to increase until it was about 20 log points higher. As employment progressed, low-frequency spending increased more than high- frequency, probably because during the unemployment phase, it fell more than high-frequency spending.

Conclusions

Using monthly and quarterly spending data, we found that total spending declined within two months of the onset of unemployment to about 83 percent of its level prior to unemployment. With some fluctuations, most likely due to small samples, it remained approximately constant until unemployment duration of 30 months when it declined further, reaching about 70 percent of its pre-unemployment level. An implication is that households have some insurance against short-term unemployment through savings, an ability to borrow, family support, or unemployment compensation, but they were not well insured against long-term unemployment. The proximate cause of the longer-term reduction could be a liquidity constraint: the exhaustion of savings or credit. But other mechanisms operating through expectations could come into play: The long-term unemployed may have reduced their expectations of the chances of re-employment or of the quality of the job on re-employment. Either would cause a reduction in spending even among those without constrained liquidity.

Total spending is composed of spending measured at monthly intervals (high-frequency) and spending measured at quarterly intervals (low-frequency). High frequency spending is spending on nondurables; low frequency spending includes durables but some nondurables that are purchased at irregular, low-frequency intervals such as property taxes, insurance, home repairs, and trips and vacations. While both types decreased rapidly following the onset of unemployment, high frequency spending stabilized at about 80 percent of pre-unemployment spending whereas low frequency spending declined further, reaching just 57 percent of pre-unemployment spending.

The fact that spending decreases substantially more as unemployment becomes long term suggests that there may be a need for better insurance against long-term unemployment, possibly at the expense of short-term unemployment insurance. The logic would be that, in the short term, households can finance spending (albeit with some reduction) from their own resources but in the long term their resources are depleted. However, determining whether this is so will require further study of the asset positions of households while they are unemployed.

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Tables

Table 1

Month	Year	Wave	High-frequency spending items	Low-frequency spending items
May … October	2009 … 2011	3 … 32	**Monthly**, asking about spending in last calendar month	**Quarterly**, asking about spending in last three calendar months
Nov … April	2011 … 2013	33 … 50	**Monthly**, asking about spending in last calendar month	**Quarterly**, asking about spending in last three calendar months, half of existing sample (assigned at random) **Monthly**, asking about spending last calendar month, half of existing sample (assigned at random) plus refresher sample
July … Jan	2013 … 2016	51 … 61	**Quarterly**, asking about spending in last calendar month	**Quarterly**, asking about spending in last three calendar months

Table 2: Compensating for Income Loss due to Unemployment

Way of compensating	Percent
Reduced spending	84.8
Reduced amount going into saving	43.4
Behind on mortgage	8.4
Behind on rent	15.2
Behind on other bills	37.3
None of the above	3.4

Note: Only queried of households where respondent or spouse lost a job resulting in a loss of income. Not asked of households where those losing a job immediately found a new one and suffered no loss of income.

Table 3: Number of unemployment spells by duration of spell

Month of unemployment	N	percent	cumulative
0	80,046	91.17	91.17
1	1,618	1.84	93.01
2	990	1.13	94.14
3	681	0.78	94.92
4	581	0.66	95.58
5	438	0.5	96.08
6	356	0.41	96.48
7	336	0.38	96.87
8	283	0.32	97.19
9	232	0.26	97.45
10	221	0.25	97.7
11	194	0.22	97.93
12	161	0.18	98.11
13	164	0.19	98.3
14	136	0.15	98.45
15	114	0.13	98.58
16	109	0.12	98.7
17	95	0.11	98.81
18	88	0.1	98.91
19	80	0.09	99
20-24	301	0.34	99.35
25-35	321	0.37	99.71
36+	252	0.29	100
	87,797		

Table 4: Spending following unemployment compared with pre-unemployment spending.

Percent of pre-unemployment spending by month of unemployment and by minimum duration of unemployment

Minimum duration of unemployment

Months of unemployment	1	2	3	4	5	6	7	8	9	10	11	12
1	96.3	96.3	94.6	95.0	95.1	95.2	94.7	95.4	93.8	93.3	91.9	92.2
2		95.3	93.7	92.3	92.8	93.2	90.1	90.2	85.6	84.9	85.5	84.1
3			91.2	91.4	91.5	92.0	88.7	88.8	89.7	87.9	87.5	86.8
4				87.6	87.1	85.9	85.2	84.0	82.6	82.4	86.4	85.7
5					90.5	91.5	91.4	91.7	91.4	92.6	91.5	89.1
6						85.6	83.0	82.9	80.9	80.2	80.3	79.1
7							79.9	78.4	78.0	76.7	80.0	76.7
8								89.4	87.3	87.6	88.6	86.9
9									84.6	80.9	76.3	72.6
10										80.6	77.5	75.7
11											80.4	75.8
12												78.7

Note: each column shows the spending ratios by month of unemployment among those whose unemployment durations were equal to or greater than the column heading. The entries in a column show that the spending ratios decline with increasing unemployment. For example, among those with 12 or more months of unemployment spending in the first month of unemployment was 92.2 percent of spending prior to unemployment; that percentage declined to 78.7 percent in the 12th month of unemployment. The percentages in column 12 are derived from the data presented in Figure 1.

Table 5: Distribution of observations by length of unemployment. Low-frequency spending.

Length of unemployment (months)	N	Percent
0	35,158	91.26
1	659	1.71
2	462	1.20
3	259	0.67
4	247	0.64
5	213	0.55
6	120	0.31
7	139	0.36
8	148	0.38
9 & 10	170	0.44
11 &12	145	0.38
13 &14	132	0.34
15 & 16	95	0.25
17 -19	105	0.27
20 - 24	128	0.33
25 - 29	99	0.26
30 - 39	102	0.26
40 or more	144	0.37

Figures

Figure 1: Spending on high-frequency items before (pre) and during (post) unemployment by month of unemployment spell among those with 12 or more months of continuous unemployment
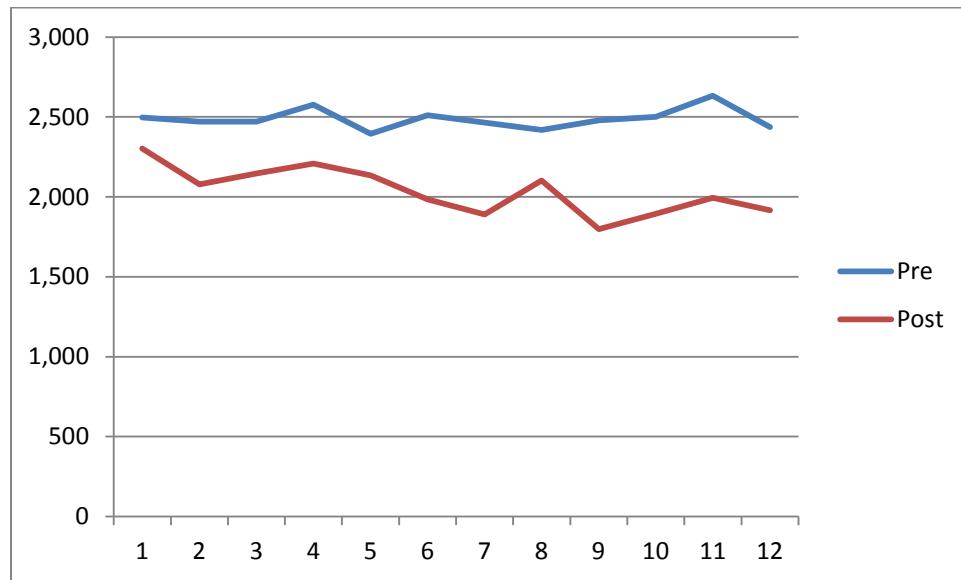
Figure 2: Quarterly spending on low-frequency items following unemployment relative to quarterly spending prior to unemployment. Ratio of means.
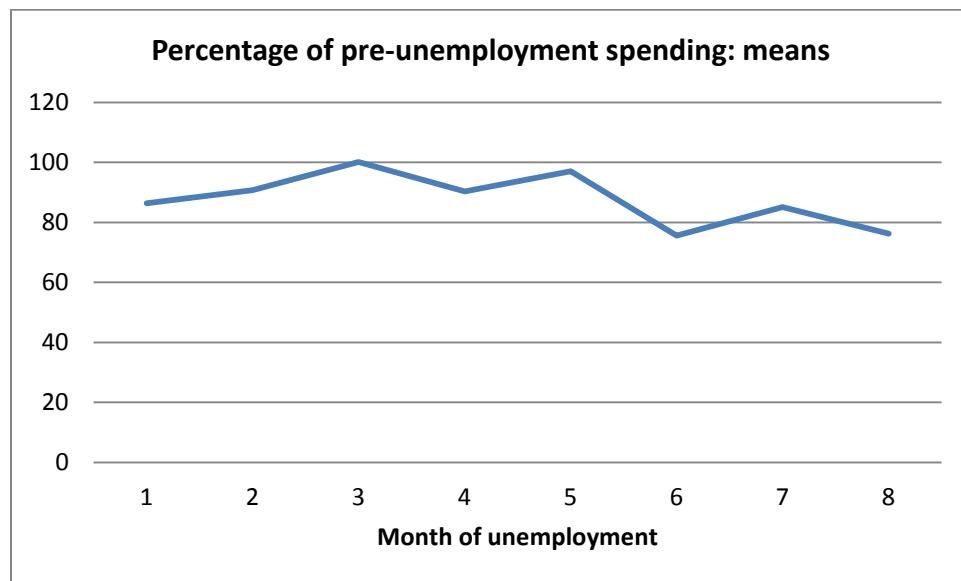
Figure 3: Quarterly spending on low-frequency items following unemployment relative to quarterly spending prior to unemployment. Ratio of medians.

Percentage of pre-unemployment spending: medians
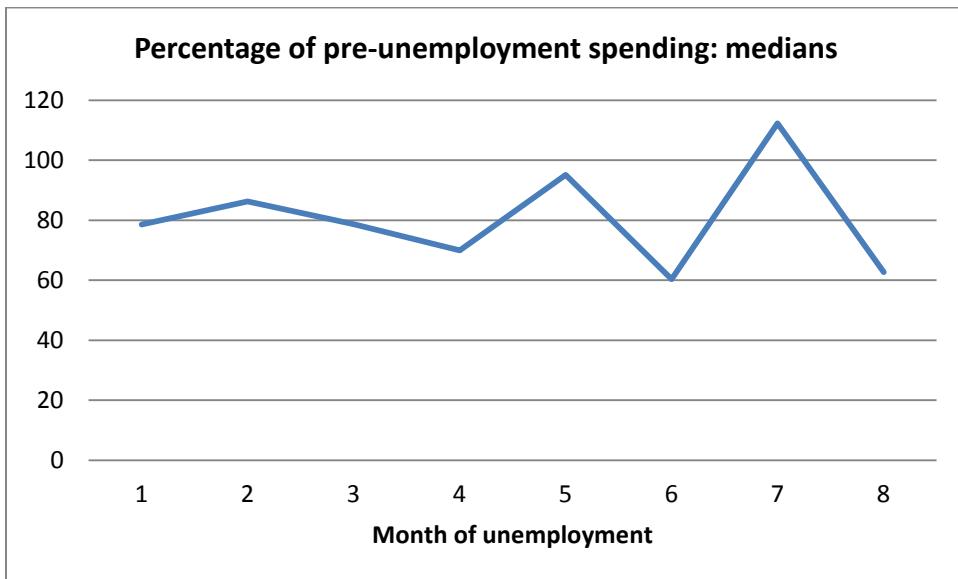
Figure 4: Spending while unemployed relative to spending prior to unemployment: high-frequency items. Kernel smoothed trajectory.
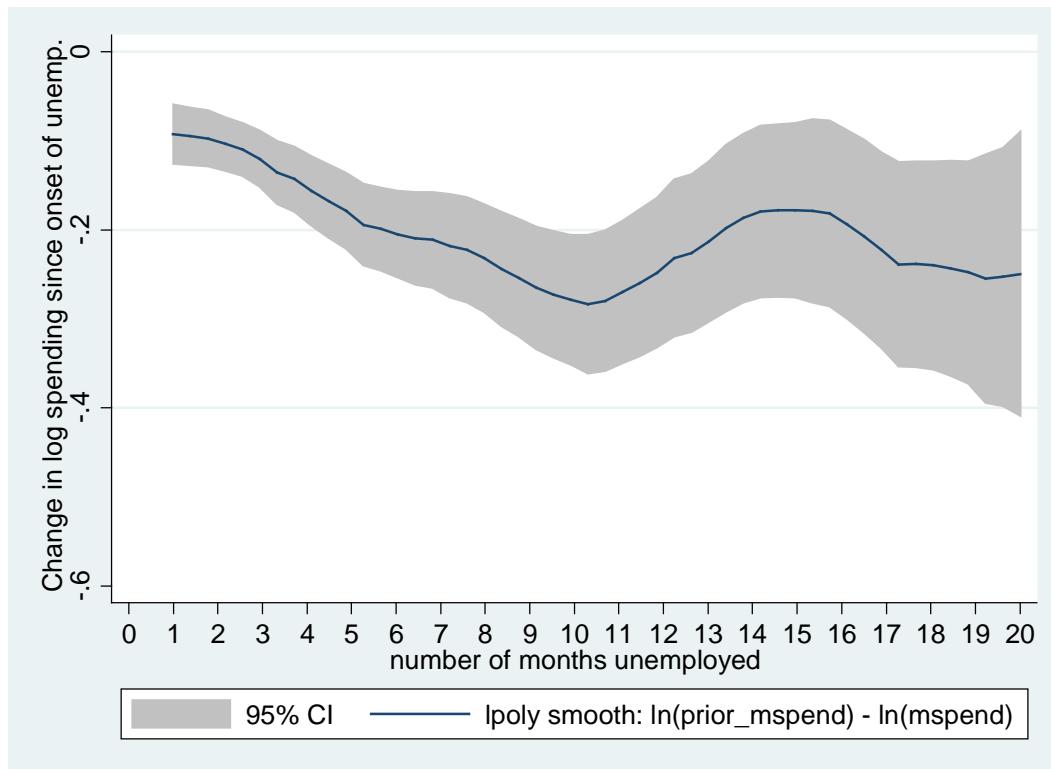
Figure 5: Spending while unemployed relative to spending prior to unemployment: low-frequency items. Kernel smoothed trajectory.
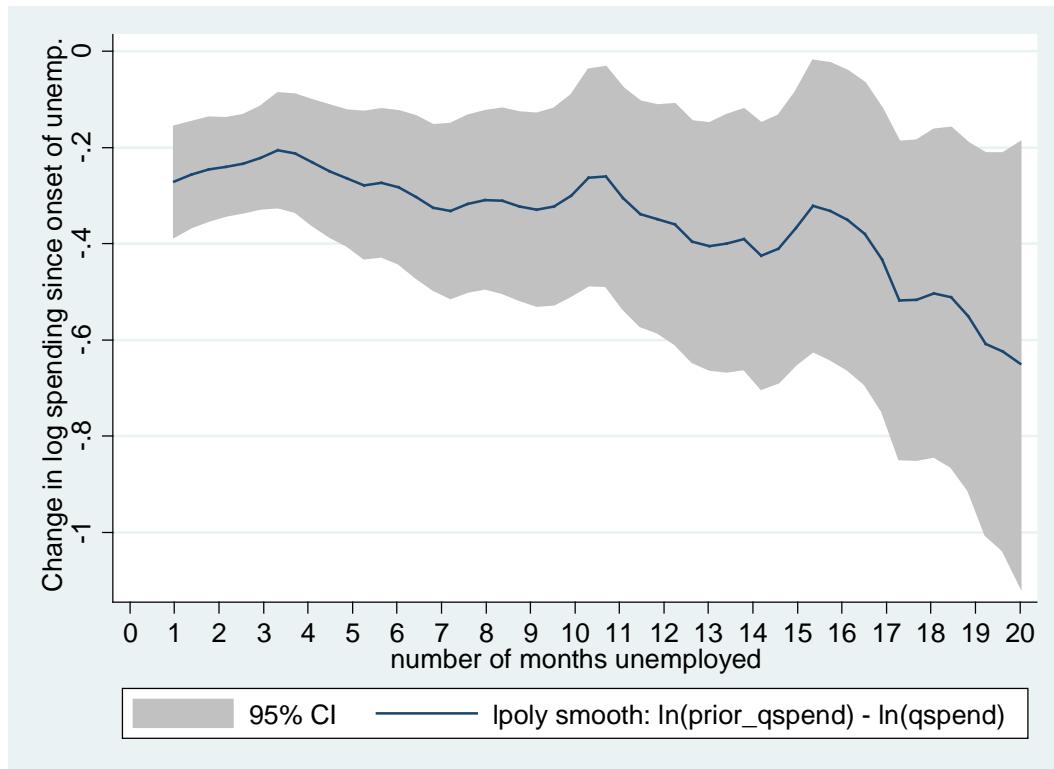
Figure 6: Regression coefficients: regression of log of the sum of monthly spending items (high-frequency) on unemployment duration indicators.
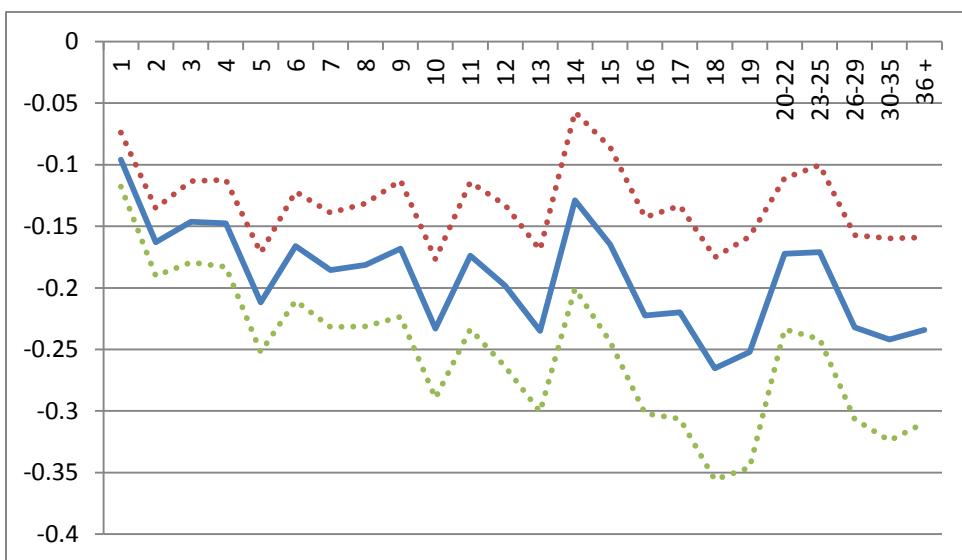
Figure 7: Moving average of regression coefficients: regression of the log of the sum of monthly spending items on unemployment duration indicators.
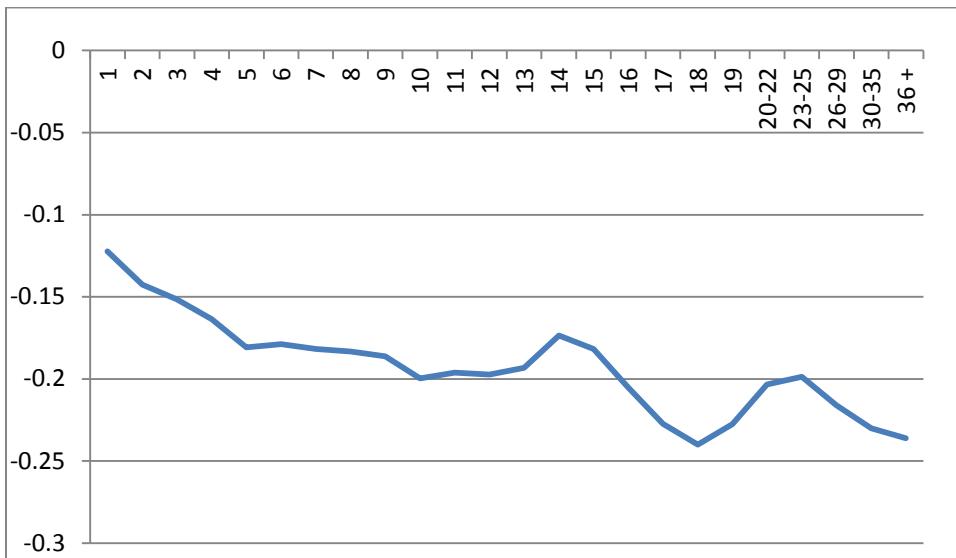
Note: Weights on regression coefficients centered at *t* are 0.1, 0.2, 0.4, 0.2, 0.1

Figure 8: Regression coefficients: regression of log of the sum of quarterly spending items (low-frequency) on unemployment duration indicators.
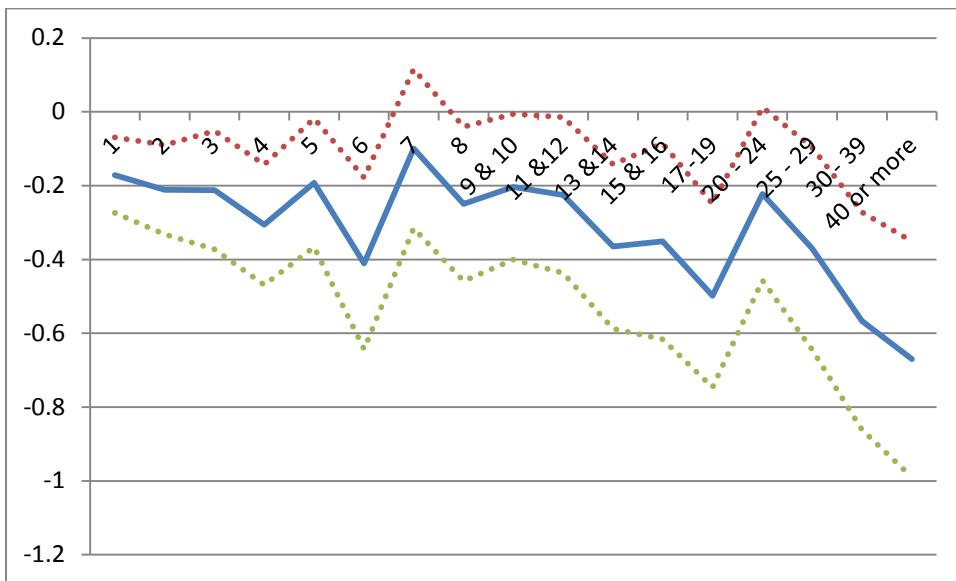
*Figure 9: Regression coefficients: Log household monthly income following unemployment relative to pre-unemployment log income*
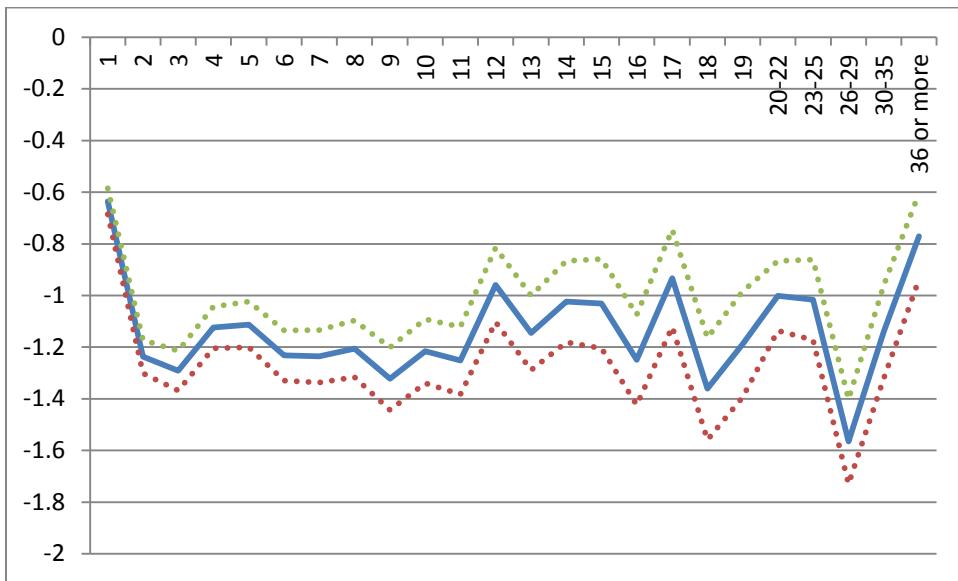
*Figure 10: Coefficients on log spending and on log income from fixed effects regression*
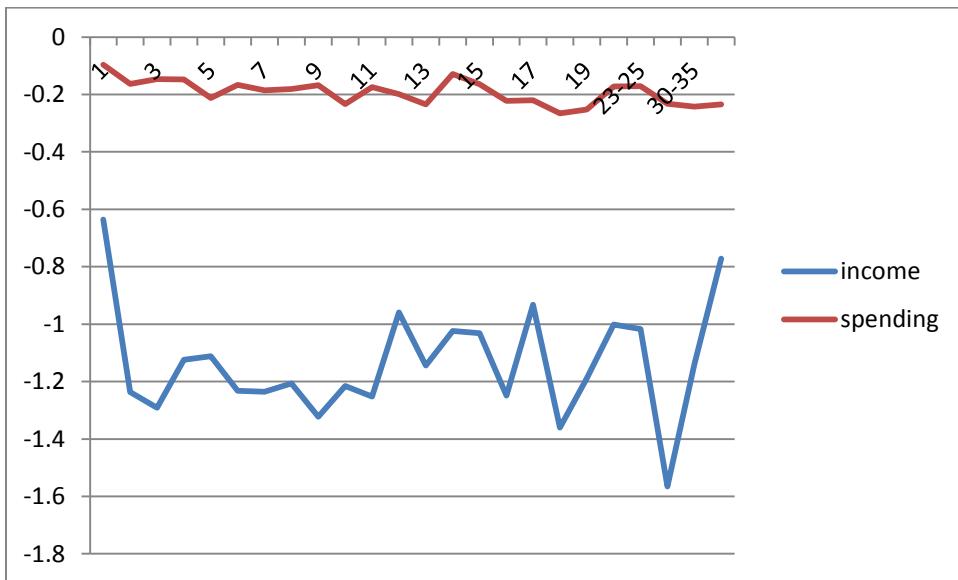
*Figure 11: Elasticity of spending with respect to income*
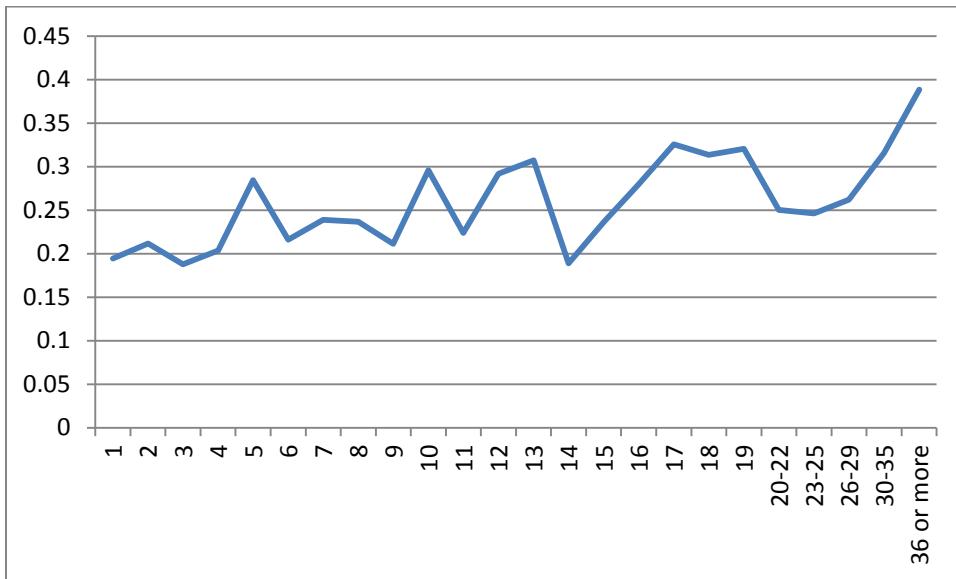
Figure 12: Simulated path of total, high frequency and low frequency by month of unemployment following initiation
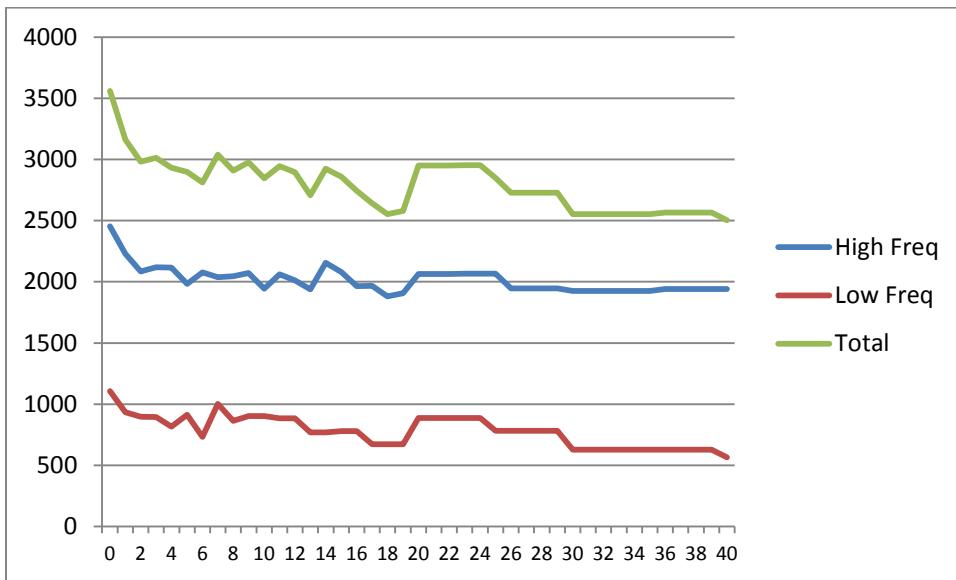
Figure 13: Log income and log spending (high frequency and low frequency) following re-employment relative to log income and log spending prior to re-employment
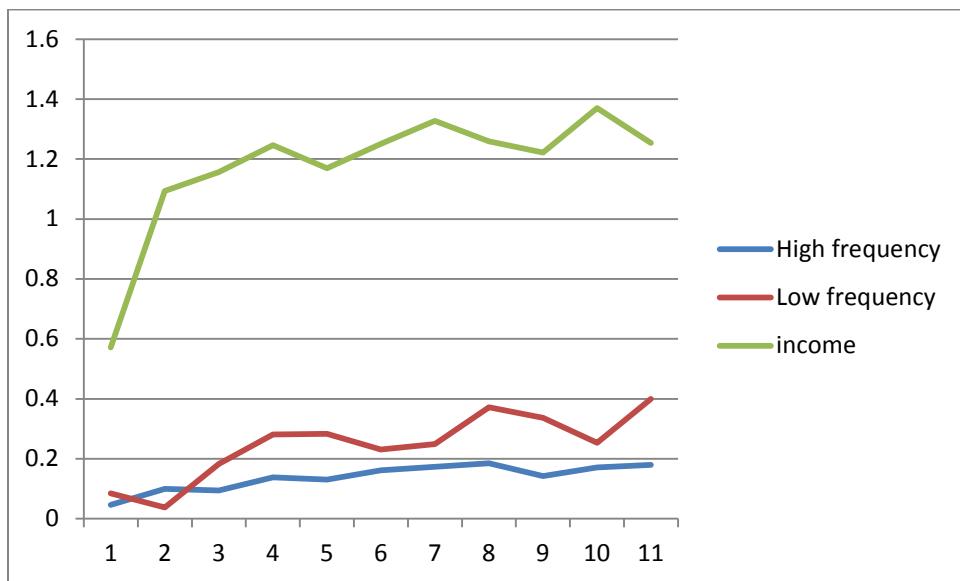
Appendix

Construction of Unemployment Spells

The spells are mainly based on monthly observations of employment status. The respondent reports about own employment status (work for pay; unemployed, looking for work; temporarily laid off; on sick or other leave; disabled; retired; homemaker; self-employed; student; other). Based on this information we determine for each wave whether the respondent was working for pay or unemployed and looking for work. If the respondent is working for pay then the variable measuring the length of the unemployment spell is set to zero. In the first month of unemployment it is assigned the value one and the value two in the second month of unemployment. If the respondent is observed working again then the length of unemployment for that wave is set to zero again. Should there be a gap between waves, say, because a respondent missed a wave or more, we developed an algorithm to fill these gaps with additional information. First, if the gap is only one or two months and the person is observed still being unemployed two months later, then we assume that this person was continuously unemployed. If the person is working again two months later, then we do not know when the unemployment ended, so we leave the measure of length of unemployment missing and hope to fill this gap in the next step.

The second source of information comes from periodic modules that ask respondents about the dates of unemployment spells. Because this information is recalled over the last 12 months for most respondents, but for some respondents over longer periods of time, we need

to be mindful of potential recall error in this retrospective reports.[4] Therefore, we give priority

to the reported current employment status recorded in each wave and only use the dates to fill

remaining gaps that arise mostly because a respondent may not have participated in some

survey waves. When the survey frequency changes to quarterly in the latter part of the field

period we also use the retrospective information on unemployment spell dates to fill the gaps

of the intervening months between survey waves.

For married respondents we also asked every month about the employment status of

the spouse and unemployment spell dates of the spouse in occasional modules. So we have the

same information as for the respondent and construct unemployment spell data for the spouse

using the same algorithm described for the respondent.

Because spending (and income) is a household-level measure and is presumably

affected when either the respondent or the spouse (or both) are unemployed, we then

combine the information of unemployment spells of the respondent and spouse to a

household-level variable: If neither is unemployed and at least one is working for pay, then the

length of unemployment measure is set to zero. If one of the two is unemployed, then the

length of unemployment for the household takes the value of the unemployed person in the

couple. If both should be unemployed, which is very rare in our data, then the length of

unemployment of the household is set equal to the higher one of the individual spouse's

measures of length of unemployment. For example, consider the situation where the

respondent becomes unemployed, then the length of unemployment takes the value one. As

long as the spouse's employment status does not change to "unemployed" the count of

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[4] For many respondents we have overlapping reports from modules that are a year apart, but cover some of the same unemployment spells. From comparing the dates it is clear that there is reporting error in the reported dates.

"number of months of unemployment for the household continues counting the number of months of unemployment of the respondent. Should the spouse become unemployed eventually as well, then the length of unemployment still counts the length of the respondent's unemployment. It turns out that we only have 85 observations out of more than 80,000 person-wave observations where this happens.

Periods of self-employment of either spouse are excluded and the individual length of unemployment variables are assigned a special missing code. These observations will not enter the analyses.

Appendix Table 1: Items queried each month, grouped by actual screen display

Screen 1:

Mortgage
Rent
Electricity
Water
Heating fuel for the home
Telephone, cable, Internet
Car payments: interest and principal

Screen 2:

Food and beverages
Dining and/or drinking out
Gasoline

Screen 3:

Housekeeping supplies
Housekeeping, dry cleaning, and laundry services
Gardening and yard supplies
Gardening and yard services

Screen 4:

Clothing and apparel
Personal care products and services
Prescription and nonprescription medications
Health care services
Medical supplies

Screen 5:

Tickets to movies, sporting events, performing arts, etc.
Sports, including gym and exercise equipment such as bicycles, skis, and boats
Hobbies and leisure equipment

Screen 6:

Personal services, including cost of care for elderly and/or children, after-school activities
Education, including tuition, room and board, books, and supplies
Other child-related spending, not yet reported, including toys, gear, and equipment

Appendix Table 2: Additional 11 items queried quarterly beginning in the July survey about spending over previous three months

Screen 1:

Big ticket items

- Automobile or truck
- Refrigerator
- Stove and/or oven
- Washing machine and/or dryer
- Dishwasher
- Television
- Computer

Follow-up questions on big ticket items queried amounts, and in the case of cars how the purchase was financed.

Screen 2:

Homeowner's or renter's insurance
Property taxes
Vehicle insurance
Vehicle maintenance: parts, repairs, etc.
Health insurance

Screen 3:

Trips and vacations
Home repair and maintenance materials
Home repair and maintenance services
Contributions to religious, educational, charitable, or political organizations
Cash or gifts to family and friends outside the household

Appendix Table 3: Selected Screen Shots from ALP Spending Module

Sample screen shot from the monthly spending survey module

Mortgage, rent, utilities, car

Please, provide your best estimate of how much in total your household spent in the following categories. Please include spending by all members of your household, that is, by you or anyone living with you. Even if the amount your household spent last calendar month was unusual, please report that amount.

	Amount spent last month	No money spent on this last month
Mortgage	$ _____ .00 **OR**	☐
Rent	$ _____ .00 **OR**	☐
Electricity	$ _____ .00 **OR**	☐
Water	$ _____ .00 **OR**	☐
Heating fuel for the home	$ _____ .00 **OR**	☐
Telephone, cable, internet	$ _____ .00 **OR**	☐
Car payments: *interest & principle*	$ _____ .00 **OR**	☐

[<<Back] [Next>>]

RAND
American Life
Panel

Screen shot of the reconciliation screen

According to your entries your household's spending in on the described categories was: **$.00**. Below is a summary of your entries. If you would like to make any changes to your entries, you can change the amounts in the table below and then click the 'Update total' button in the lower right corner of the screen to recalculate your total. Once you are satisfied with your entries, please just click 'Next'.

Category	Amount spent last month
Mortgage	$ _____ .00
Rent	$ _____ .00
Electricity	$ _____ .00
Water	$ _____ .00
Heating fuel for the home	$ _____ .00
Telephone, cable, internet	$ _____ .00
Car payments	$ _____ .00
Food and beverages	$ _____ .00
Dining and/or drinking out	$ _____ .00
Gasoline	$ _____ .00
Housekeeping supplies	$ _____ .00
Housekeeping, dry cleaning and laundry services	$ _____ .00
Gardening and yard supplies	$ _____ .00
Gardening and yard services	$ _____ .00
Clothing and apparel	$ _____ .00
Personal care products and services	$ _____ .00
Prescription and nonprescription medications	$ _____ .00
Health care services	$ _____ .00

This screen shot displays the top portion of the reconciliation screen. In the actual interview the first sentence includes an additional fill so that it says "[…] your household's total spending on the described categories last calendar month ([display applicable reference month]) was: [fill sum of all reported spending items], bold face, large font.) All dollar amount fields are filled with the respondent's previously provided entries. Any missing categories are filled with a zero. Using the scroll bar to the right the respondent can scroll through the entire list of categories and edit any entries. At the bottom is a field that displays the "Total," an update button to have the total (displayed at the top and bottom) recalculated and the usual "Back" and "Next" buttons.