Did the Stimulus Package Help

Low-income Households?

: Household Consumption Change

Before and After the 2009 ARRA*

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* ARRA: American Recovery and Reinvestment Act of 2009

Introduction

In direct response to the Great Recession, Congress passed the American Recovery and Reinvestment Act (ARRA) in February 2009. It is commonly referred to as the "Stimulus Package" or the "Recovery Act". The three immediate goals of the ARRA were 1) to create new jobs and save existing ones; 2) spur economic activity and invest in long-term growth; and 3) foster accountability and transparency in government spending (Recovery.gov). At roughly $800 billion, it was one of the largest fiscal stimulus programs in American history.[1] This reform package entailed almost all dimensions of the U.S. economy, including tax relief, state and local fiscal relief, spending on infrastructure and science, entitlement programs for the vulnerable, education and training, and energy (ordered by the amount of spending).

There is substantial policy interest in evaluating the effects of the Recovery Act on overall economic activity, and particularly on vulnerable groups. This paper examines to what extent the Recovery Act helped low-income households or low-educated workers to cope with long-lasting impacts of the Great Recession. Did the Recovery Act successfully work for disadvantaged group whose earnings are subject to more volatility in the years of recession? I seek to identify the extent of mitigated fall in household consumption attributable to the Recovery Act, relative to that of more advantaged comparison group. Consumption is generally favored over income as a better measure of well-being of the poor, as it reflects permanent income, and the insurance value of government programs and credit markets as well as private and government transfers (Meyer and Sullivan, 2008).

I focus on parts of the Stimulus Package that were specifically targeted for vulnerable households including a number of provisions aimed to low-income workers, unemployed, and retirees.

To be specific, unemployment benefits were extended to as long as 99 weeks and increased by $25 a week. In addition, unemployment benefits were excluded from taxation for the first $2,400. There was also a one-time direct cash payment of $250 to Social Security recipients, people on

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[1]When it was first passed, the ARRA was estimated to cost $787 billion over ten years. Most recent estimates put the cost at $821 billion, of which about two-thirds comes from increased federal government spending and one third from reduced tax revenues (Congressional Budget Office 2011).

Supplemental Security Income[2], and veterans receiving disability and pensions. The Earned Income Tax Credit (EITC), which provides money to low income workers, was also expanded for families with at least three children. Furthermore, billions of dollars were distributed to support temporary welfare payments (TANF and WIC[3]), free school lunch programs, job training and employment service. In particular, the monthly benefit of the Supplemental Nutrition Assistance Program (SNAP, commonly known as Food Stamps Program) was increased by about 15 percent, and eligibility was expanded to jobless adults without children.

All in all, a large fraction of the ARRA was aimed to offset a collapse in the economy by protecting jobs and reviving consumer spending, through tax credits and direct transfer payments to poor households. Lower income households are expected to spend more of stimulus money and more quickly (Johnson et al, 2006), thus transfer to these households can push back against rising poverty and economic hardship.

In this paper, I focus on SNAP participants to examine the effect of increase in benefit. Table 1 presents the actual amount of SNAP benefit increase according to family size. This benefit increase is a decent addition to income, supplementing low-income household's food budget as well as expanding the budget line, even allowing them to afford other spending categories. I found that the fiscal recovery packages in response to 2008 recession certainly provided the firm grounds to low-income and low educated households by moderating unexpected reduction in household consumption. Though suffering from self-selection, SNAP participants' expenditure on food and utility is shown to be less negatively affected compared with low-income non-SNAP participants, which supports a substantial improving effect of the Recovery Act of 2009.

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[2] Supplemental Security Income is a government program that provides stipends to low-income people who are either aged (65 or older), blind, or disabled.

[3] Temporary Assistance for Needy Families (TANF) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) are all targeted to low income households under certain poverty line threshold.

Literature Review

I review two relevant literatures: 1) the effects of SNAP on food expenditure and; 2) the effect of past fiscal stimulus policies on consumer spending.

A large body of literature mostly used data from 20 years ago or earlier to examine the impact of SNAP on household food expenditures, mainly focusing on how much SNAP benefits increase household food expenditures compared to what would have occurred with an equal amount of cash. Salathe (1980), for example, used data from the 1972-74 Consumer Expenditure Diary survey and compared Food Stamps recipients with comparably poor non-recipients to estimate that Food Stamps increase at-home food expenditures by 36 cents for each Food Stamps benefit dollar received. In comparison, he reported that a cash transfer would expand at-home food purchases by only 6 cents.

Fraker (1990) reports on a major cash-out randomized trial that finds that the marginal propensity to consume food out of Food Stamps is two to ten times higher than the estimated marginal propensity to consume food out of cash income.

The most recent study is Hoynes and Schanzenbach (2007). They exploit variations in the timing of implementation of the Food Stamps Program (from 1963 to 1975) across counties to show that the introduction of the Food Stamps Program led to an overall increase in household total food expenditures among recipients, but a decreased propensity to eat out, and mixed results for cash food expenditures (out-of-pocket expenditures), suggesting that households were redirecting some dollars originally spent on food to other expenses.

All in all, a vast majority of literature consistently suggests that Food Stamp Program increases household food expenditures, with higher marginal propensity to consume on food out of Food Stamps than out of direct cash transfer.

Nord and Prell (2011) is the first study that investigated the effects of the SNAP benefit increase from the 2009 ARRA on food expenditures and several other outcomes. Using Current Population Survey Food Security Supplement (CPS-FSS), they compared SNAP participation, SNAP benefits, food spending, and food security in December 2009 with the corresponding statistics for

December 2008. To provide an estimate of changes in food expenditures and food security that is attributable to ARRA, they used difference-in-difference to net out the effect of year-to-year changes in food prices and any other factors that impacted the two groups similarly. Their results suggest that ARRA's SNAP increase in benefits and eligibility played a pivotal role — food security improved substantially among low-income households but not among households with income just above the SNAP eligibility range. The increase in food expenditures by very low-income households is estimated to be greater by 2.2 percent than nearly SNAP eligible households. They also compared SNAP participants and non-participants directly, taking self-selection issue into account. In this comparison, they found much larger impact: median food expenditures increased by 9.1 percent among SNAP-participant households compared with 3.4 percent among low-income non-SNAP households. This may be attributed to upward biased estimate due to self-selection into SNAP.

Shapiro and Slemrod (2009) evaluated the Economic Stimulus Act in 2008 and how these payments were actually spent by consumers. Similar to 2009 ARRA, the 2008 Stimulus Act included one-time stimulus payments, lower income tax withholding, and extended unemployment benefits. By using consumer survey data, they found that the most common plan for the rebate was dept payment, especially for low-income individuals. They suggested that those designing the next economic stimulus package should take into account that much of a temporary tax rebate is likely not to be spent.

In another paper, Sahm, Shapiro, and Slemrod (2011) compared survey-based estimates of the rebate's effect on aggregate consumer spending with data from the National Income and Product Accounts (NIPA). They again concluded that the 2008 rebates provided only a modest stimulus to spending.

In this paper, I examine the stimulus package of 2009. Yet, the 2008 rebate and the 2009 ARRA differ in that the ARRA is not limited to federal tax incentives, but also includes spending on infrastructure, funding for entitlement programs and other social welfare provisions. They used the Survey of Consumers, containing questions about expectations of their consumption in the future. But consumers may behave differently in practice from what they reported in the survey.

There are other studies that have used actual consumption expenditure data to study

temporary income increase. Parker (1999) investigated the effect on consumption of the income increase induced by reaching the social security payroll cap. Souleles (1999) studied the anticipated income increase from the receipt of tax refunds. Both studies used the CEX, and found a modest increase in nondurable consumption, and a larger increase in durable consumption, which was shown to be mainly driven by high-wealth individuals.

Johnson et al. (2006) examined the income tax rebate from the Tax Relief Reconciliation Act of 2001, which was sent to almost two thirds of U.S. households. Utilizing the fact that a check was mailed according to the second-to-last digit of the taxpayer's social security number, this natural experiment allowed them to identify the causal effect on household spending. They found that the average household spent 20-40% on nondurable goods, and the largest response came from households with low wealth and low income. This particular finding on low wealth and low income group's large consumption response closely aligns with the main take away of my study.

Agarwal and Souleles (2007) used panel data to identify credit card accounts, and found consumers initially saved some of the rebate, by paying down their credit card debt.

Not necessarily looking at a government stimulus package, Meyer and Sullivan (2008) documented the underlying trends in income and consumption[4] for single mother headed families between 1993 and 2003, using the CEX. The importance of their paper is coming from examining changes in well-being at different parts of the income distribution. They further analyzed components of consumption to avoid misleading conclusions and to show the contribution to the overall change from various spending categories. They found that housing expenditure pulls total consumption up sharply in the bottom two deciles, which is consistent with my finding. They added that the increase in housing consumption was mainly driven by increase in out-of-pocket rent, and this spending on housing is also accompanied by increased housing quality, including housing characteristics such as number of rooms, number of bedrooms, air conditioning, and the presence of major appliances.

Building upon a wide body of empirical literatures that evaluates the impact of government

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[4]Their definition of consumption is different from mine: they included all spending by all consumer unit members less spending on health care, education, pension plans, and cash contributions, which are better interpreted as an investment.

fiscal policies, this paper shares similar features with these studies, illustrating mostly positive consequences and the strength of the ARRA that helped vulnerable households with extra resources.

Data and the Empirical Model

I. *Data and Main Analysis Sample*

The Consumer Expenditure Survey (CEX), administered by the Bureau of Labor Statistics, is the only survey in the U.S. that collects a complete record of consumption expenditure data on hundreds of separate categories of goods and services. In addition to the buying habits of the nation's households, CEX also reports household characteristics, income, and program participation.

The CEX consists of two surveys, the quarterly interview survey and the diary survey. In the interview survey, each consumer unit is interviewed every three months, providing a short panel of up to five consecutive quarters. In the diary survey, respondents keep track of all of their purchases for two consecutive weeks. In this paper, I use the interview survey only, which is designed to obtain data on the types of expenditures respondents can recall for a period of three months or longer. Relatively large and regular expenditures, such as rent, utilities, health care, major durable goods, as well as food, are reported in the interview survey.

I analyze the 2-year pre ARRA period and the 2-year post ARRA period, namely from 2007 to 2011, to compare pre-ARRA consumption with post-ARRA consumption. For the robustness check, I do the same analysis but with shortened time window – 1-year pre and post ARRA, looking from 2008 to 2010, to examine the more immediate effects of the ARRA. The robustness check results are substantively similar.

II. *Descriptive Analysis*

First, I explored the underlying trend in income and consumption over a span of time around

the ARRA. Table 2 presents the results. In the CEX, expenditure information is collected every quarter from the second through the fifth interviews using uniform questionnaires. Income and employment information, however, is collected twice, in the second and fifth interviews. Thus, I compute changes in income and consumption by taking the difference of measures in log between the second and fifth interviews, looking at 3-quarter mean percentage change.

First panel reports a percentage change in after-tax income over the pre and post ARRA period. I see a significant drop of after-tax income in 2008, one year prior to the ARRA, when we experienced a marked global economic decline and sharp downward turn. Since the enactment of ARRA, change in income seems to become moderate. I also examine consumption as a measure of the set of socioeconomic conditions that underlie consumer behavior. Compared to income, the trends for reported consumption tells more severe story; mean percentage change in consumption show negative sign all over the period pre and post ARRA, with the most marked decline in the middle of the Great Recession, pulling down the consumption level by 5 percentage. During the period of ARRA, change in consumption reaches back to pre-recession level, and continue to improve since then.

Documenting the trends in income and consumption for the entire economy provides an indicator of economic health over the critical period of my analysis. This descriptive analysis shows that even if the change in income looks modestly improving, an adverse pattern in consumption is still observed. Meyer and Sullivan (2008) preferred consumption as a better measure of material well-being in that consumption captures permanent income, reflects the insurance value of government programs and credit markets, better accommodates illegal activity and price changes, and is more likely to reflect private and government transfers. However, trends in mean outcomes may mask important differences across the income and consumption distributions. In addition, changes in total consumption may miss important changes in the components of consumption. Therefore, in this paper, I focus on total consumption and further decompose it into various spending categories, comparing the very low income group with a comparison group whose income is modest, but still far below the U.S. median.

Figure 1 fully supports the descriptive analysis from Table 2. Figure 1 is abstracted from a Great Recession Brief (October 2012) by the Russell Sage Foundation and the Stanford Center on Poverty and Inequality. It plots trends in per-capita personal consumption expenditure and personal disposable income over the period around the ARRA enactment. As we saw from Table 2, the overall decline in personal consumption is more dramatic. The report explains that the sharp decline in financial income at the higher end of the distribution significantly lowered consumption among the better off. The report also illustrates that the post ARRA increase in income is explained entirely by a strong increase in government transfers to households – two main means-tested programs that experienced substantial increase in expenditures being SNAP and EITC (Petev and Pistaferri, 2012).

Keeping this broad view on underlying trends in consumption and income in mind, I now take a microscopic view and assess the role of ARRA in mitigating the fall in consumption, particularly for vulnerable households.

III. *Analytic Framework and Model Specification*

I examine to what extent the household consumption of low income households or SNAP recipients was affected, following the Recovery Act. Yet, I am not necessarily assessing the extent to which the Stimulus Package induced consumers to spend more as do Shapiro and Slemrod (2009). Even if we don't observe any consumption-stimulating effect of the ARRA, the well-being effect of the Act could be addressed – reallocations across spending categories. For example, the ARRA could have helped SNAP recipients to pay off debt or pay the delayed utility bill with the resources freed up by increased benefits.

Yet, direct comparison between SNAP recipients and non-recipients can be confounded by self-selection and under-reporting of SNAP participation. Especially, we need to consider the selection into SNAP at the time of the ARRA enactment. The increase in SNAP benefit may have changed the self-selection probabilities – some households would not have been motivated to participate with pre-ARRA benefit level, but now would be induced to participate by larger benefit.

These households are likely to be at the margin of eligibility, better off than the average pre-ARRA participants and worse off than the average pre-ARRA non participants (Nord and Prell, 2011). Accordingly, their inclusion into the SNAP participants could improve the household consumption status anyway, even in the absence of actual improvement due to the SNAP benefit increase.

Thus, following Nord and Prell (2011), I looked at all low-income households or all households headed by the low-educated, under the hypothesis that SNAP participants are mostly drawn from low-income households or those headed by the less educated. This joint analysis of all vulnerable households does not estimate the separate effect by SNAP participation status, but estimates the combined effect on disadvantaged households overall. Therefore, the impact of ARRA on SNAP recipients may be diluted by the inclusion of non-SNAP low-income households that were not affected by ARRA SNAP increase. In other words, the estimator presented here will likely understate the changes within SNAP participants.

The main identification strategy that I employ is difference-in-difference (DID):

$$C_{i,t} = \beta_0 + \beta_1 \cdot [LowIncome] + \beta_2 \cdot [After] + \beta_3 \cdot [After] \cdot [LowIncome] + \beta_4 \cdot X_{i,t} + \varepsilon_{i,t}$$

Where $C_{i,t}$ denotes consumption over the past 3 months, one in level ($2000), and the other in log; *LowIncome* is an indicator of a household from disadvantaged or vulnerable group. *After* is a dummy variable for whether the survey began after the ARRA was enacted. $X_{i,t}$ represents a vector of demographic characteristics such as age of reference person, age-squared, race, education[5], marital status, whether unemployed, family size, number of children less than 18 years old, proportion of children under 5 years old, proportion of children over 5 years old, proportion of elderly over 65 years old, metropolitan, region of residence. I include month and year fixed effect. This is a standard difference in difference model with β_3 measuring the difference between the change in low income group's consumption pre to post ARRA and the change in comparison group's consumption pre to post ARRA. Any changes to consumption common to both groups will be netted out.

I define *LowIncome* group and comparison group in five different ways:

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[5]Education is dropped from covariates when the *LowIncome* group is defined by education of head.

1) Households whose income is below 130% of the poverty line, compared to those whose income is above 130% but below 250% of the poverty line

2) Households whose income is between 90% and 130% of the poverty line, compared to those whose income is between 130% and 170% of the poverty line.

3) SNAP participants, compared to non-participants among those whose income is below 250% of the poverty line

4) SNAP participants, compared to non-participants among those whose income is below 130% of the poverty line

5) Head's education is less than college group compared to college or more, among whose income is below 250% of the poverty line

The main issue with this model specification is a possible compositional shift between treatment and control group over time. For example, suppose that I define *LowIncome* group as those whose income falls under 130% of the poverty line and comparison group as those whose income falls under 250% line, but above 130% line. Difference-in-difference model assumes that two groups are fixed over time, and there is no shift between groups. However, a household whose income was below 250% of the poverty line before ARRA could have been in extreme economic hardship, and fell below 130% of the poverty line after ARRA. Then, the inclusion of pre-ARRA control group into post-ARRA treatment group may improve the consumption due to their life cycle consumption trend, contaminating the estimator, β_3.

Hence, I looked at 3,323 households whose sequence of interviews was implemented around the ARRA (i.e. the first interview was before the ARRA and the last interview was after the ARRA). 389 households shifted in terms of income threshold, either moving from 130% to 250%, or vice versa. This accounts for 11.7% of the sample, which does not seem to be a huge concern in the specification.

This compositional change across groups can happen for the definitions 1) through 4). Therefore, I looked at definition 5), households headed by low-educated individual compared to those headed by more educated, under the assumption that household heads cannot choose to change their

education status endogenously in response to macro economic status.

A few things to note for the multivariate regressions are the following:

1) I exclude households in the CEX with total spending of more than $90,000 for the past quarter. These households are outliers in the regression that contaminate the estimators toward unwanted direction.

2) Each consumer unit in the CEX represents a given number of consumer units in the U.S. population. The translation of sample consumer units into a population estimate is accomplished by weighting. Thus, all the descriptive analysis and multivariate analysis are weighted in this paper.

3) All measures including expenditure, income, and poverty line are inflation-adjusted to $2000.

4) Samples are consumer unit-quarter observations (i.e. each consumer unit contributes 4 times in the data). Robust standard errors are clustered at consumer unit level to correct for within consumer unit dependence.

Findings

I. Households with income ≤ 130% compared to Households with income ≤ 250%

SNAP eligibility is determined by a combination of complex rules, but the income test is uniform across states, with a cap of gross income[6] less than 130% poverty line. I used this cutoff to define the low income group, with a comparison group of households whose income[7] is greater than the SNAP cutoff, but far less than U.S. median income. i.e. less than 250% of the poverty line. Table 3 presents results for after-tax income, and total consumption expenditures[8]. The detail of the CEX allows me to decompose the aggregate spending response into several consumption categories. I show

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[6] Gross income means a household's total, non-excluded income, before any deductions have been made.

[7] I use before-tax income minus SNAP benefit as income to determine treatment and control group.

[8] Appendix A describes what is included in this aggregate. Appendix B provides mean statistics of each spending category.

two outcomes –1) in dollar terms ($2000) to intuitively understand in absolute magnitude, and 2) in log forms to relatively compare in terms of percentage.

In each specification, three coefficients are shown: that on *LowIncome* dummy, that on post ARRA dummy, and that on the interaction term between the post ARRA dummy and the probability of being low income group (or low education group). The coefficient on *LowIncome* variable indicates the difference in consumption between two groups before ARRA. As we expected, low-income group has far less income and total expenditure in pre-ARRA period, showing that they are worse-off at baseline, or they may have hit harder by the Great Recession. The coefficient on *After* variable implies a change in consumption over time for the comparison group. Negative sign is exactly what one would expect given the downward trend in income and consumption over this period. To be specific, their total expenditure fell by $621.6, on average. The estimate of interest is the coefficient on interaction term. This is the difference in changes in consumption between two groups. The coefficient for total expenditure outcome, $445.2, is interpreted as that low-income group's consumption fell after ARRA, but the fall was less than that of comparison group by $445.2. By doing math, reduction in consumption was $621.6-$445.2=$176.4 for low-income households, almost a third of that for comparison group.

I decompose consumption categories into housing, health, and education, and they all show the positive and significant coefficient on the interaction term, except health. In CEX, health expenditure includes health insurance, prescription drugs, medical services and supplies, all of which are spent with out-of-pocket money. Negative sign on health expenditure indicates that low-income households actually spent less on health care than comparison group post ARRA.

The bottom panel shows the same regression results, but with log of every outcome. Accordingly, if the outcome variable has any zero, they are automatically dropped, thus sample size is slightly less than the first panel. Positive interaction terms are still observed here, although some of them are not statistically significant.

II. Households with 90%≤ income ≤ 130% compared to Households with 130%≤income ≤ 170%

A similar pattern of results occurs when somewhat different definitions of treatment and control groups are used. In Table 4, I looked at households whose income is just below SNAP eligibility threshold, 130% of the poverty line, and those whose income is just above. Since there are other rules that govern the eligibility, such as asset test and categorical eligibility, I admit that this is not a sharp cutoff that determines SNAP participation, but it is rather fuzzy.

Since we are comparing low-income households around SNAP eligibility cutoff, the effect of ARRA is not as marked as we saw in the previous section. Yet, we can note that housing expenditure, especially expenditure on shelter, has risen after ARRA for marginally eligible group compared to marginally ineligible group. Interestingly, positive and significant coefficient is observed for education expenditure as well. Even if marginally ineligible group went through some reduction in education expenditure, marginally eligible group's expenditure on education seems to be hardly affected after ARRA.

III. SNAP participants compared to non-participants

Table 5 and Table 6 compare SNAP participants and non-participants pre and post ARRA. Among all households whose income is less than 250% of the poverty line, those who receive SNAP benefit are from lower ends of income distribution – on average their after-tax annual income is less than non-participants by $8,350. Among all the households under 130% of the poverty line, SNAP recipients have lower after-tax annual income by $1,116 than non-participants.

Interestingly, in both Table 5 and Table 6, the coefficient on the interaction is positive and statistically significant with respect to expenditure on food, especially food at home. Moreover, the magnitude of coefficient on the interaction term ($128 from Table 5 and $160 from Table 6) is incredibly close to 3-month average SNAP benefit increase; by dividing by 3, they are $42-$53 per

household per month. Since regression results are in 2000 dollars, they are converted to $52-$66 in 2009 dollars. The mean household size in this sample is approximately 3 people, so by back-of-the-envelope calculation, this corresponds to $17-$22 per person, exactly same as described in Table 1.

Indeed, SNAP represents an important income supplement for many low-income households. SNAP benefits increase the gross monthly incomes of participating households by 39 percent and by 45 percent for households with children (CBO report, April 2012). A large body of research has shown that SNAP benefit increases food purchases but by less than the full amount of the benefits (Salathe, 1980; Hoynes and Schanzenbach, 2007). Estimates of the extra food purchased as a result of a $1 increase in SNAP benefits range from 17 to 47 cents (Andrews et al, 2007). Since benefits can be used to purchase only food, a typical participating household would cut back on out-of-pocket money that was used to buy food to meet other pressing non-food needs, such as housing, transportation, medical supplies or education that compete for a household's bounded budget.

Therefore, SNAP is expected to increase not only food spending but also a household's nonfood spending (Andrews et al, 2007). This is precisely what we see from Table 5 and 6. SNAP participant's food spending increases after ARRA by the amount of raised SNAP benefit, whereas that of non-participant declines. Food consumed at home (i.e. expense for grocery shopping) rather than food away mainly drives up the food expenditure of SNAP participants. In addition, the fall in utility fee (gas, electricity, fuel, telephone, water, etc.) is much less than non-SNAP participants. This supports a hypothesis that SNAP recipients shift some cash to urgent housing needs, which accounts for the largest portion of the entire expenditure.

In Table 6, house equipment spending of SNAP participants is also positively affected post ARRA. This spending entails expenditure on textiles, furniture, floor coverings, and house appliances as described in Appendix A.

IV. *Low-educated head compared to more educated head*

Caution should be exercised when interpreting the findings above – these results may be

driven and be confounded by compositional shift across groups over time. Difference-in-difference model assumes that two groups are fixed and exogenously determined, in ideal case, as a random assignment. Yet, these groups may not stay same over time, particularly with substantial fluctuation in the economy. Accordingly, I look at households headed by low educated person (less than college) compared to households headed by more educated person (college or more), given that education choice is made without regard to the ARRA but pre-determined before the Great Recession[9].

With this robust definition of treatment and control groups, the results are surprisingly similar with findings so far. The coefficients on the interaction term of housing expenditures, mainly from shelter cost, house operation, and house equipment are positive and significant. Interestingly, their consumption on entertainment seemed to have increased slightly after ARRA. Housing and entertainment categories include mostly durable goods (textiles, furniture, home appliances, TV, radios, and sound equipment) as well as services (domestic services, child day care, fees and admissions).

All in all, these results imply that vulnerable group that is subject to extreme hardship and economic distress is actually affected less negatively by significant consumption reduction. Their consumption does decline, but by much less than households with high-educated head. This finding supports the role of ARRA as a cushion for vulnerable households against negative impact of a long-lasting recession, who otherwise are at a higher risk of economic disaster.

V. *Robustness check*

To alleviate concerns that what is picked up might be a differential trend across groups, I ran same specifications over the entire period placed before ARRA. I don't provide the results in this paper (available upon request). For all of five different subgroup analyses, I find absolutely no effect and none of the coefficients on the interaction term is significant.

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[9]This may not be true for young heads, who can continue on for more education. Yet, a fraction of heads younger than 25 years old accounts for less than 10% in the analysis sample.

These robustness tests are reassuring; they suggest that my results are not driven by a particular specification or sample. In addition, GDP trend over this period is not what the results are capturing. The difference-in-difference estimates are only statistically and economically significant when two year pre ARRA is compared with two year post ARRA. This motivates the importance of identifying overall effect of the Recovery Act on vulnerable households. Furthermore, evaluating how this great deal of federal money has been spent and how this effectively reached out to the poor is must-understand to prepare for the next Great Recession.

Conclusion

The ARRA was one of the largest fiscal stimulus programs in U.S. history, total spending accounting for approximately 2.6 percent of GDP over the years 2009-2010. Yet, the Stimulus Act has received little attention in the previous literature, contrast to a large number of studies on government tax rebate or direct purchases. Clear evaluation based on empirical evidence is needed to learn a lesson of what could have been done better, and what would have occurred without the fiscal stimulus packages. Given that the consumption is generally favored than income as a better measure of well-being of the poor, understanding how household consumption responds to tax relief and welfare transfer is a key for the formulation of effective government policies. This study helps to shape legislation and suggest operational practices that provide a countercyclical impulse to the vulnerable group of people during the worst economic hardship. Focusing on vulnerable households such as low-income or low-educated, I found an attenuated consumption fall that is attributed to the availability of government-provided insurance through the Recovery Act 2009. The Act definitely offered a cushion for vulnerable group by helping them to reduce the fall in consumption upon the Great Recession. The findings do not necessarily support stimulus effects of the Act, but do suggest a positive welfare effects, allowing disadvantaged group to reallocate across spending categories by supplementing food budget and meeting pending housing needs.

This paper contributes to further variations on top of a number of existing literatures

evaluating the government fiscal policy that aimed to boost the consumer spending. These positive findings align with the original goal of the Act, which is to push back against poverty by reviving consumer spending. Government transfer payments, produced by stimulus packages, moderated the fall in low-income household consumption that would otherwise have occurred. The Recovery Act did not end the recession, but they reduced the severity. In particular, considering that SNAP is a counter-cyclical government assistance program, rise in SNAP benefit not only resulted in greater food expenditures, but also enabled SNAP recipients to shift cash expenditures from food to nonfood purchases. This can be interpreted as multiplier effect – increased consumption expenditures by household stimulate economic activity among industries and generate new economic production activity. It is an important finding with the concerns magnified for vulnerable households with low income and low asset at time of economic downturn. With lack of ability to improve their own economic and financial situation, they will likely face hardship with far more disadvantage. In this sense, this paper enlightens us with the possibility of government Recovery act to work as one of possible mechanisms through which fall in consumptions of low income families can be muted.

There are, however, some factors that could confound the findings of this paper. Reduction in consumption could be less for very low income households because they were consuming less to begin with. Accordingly, I also presented the analysis with log outcomes to compare in percentages, not in absolute dollar terms. Also, when interpreting the results comparing SNAP recipients and non-recipients, we need to account for other provisions of the Recovery Act from which SNAP participating households can be affected. Due to broad categorical eligibility, SNAP recipients are automatically eligible for other transfer programs, allowing them to receive multiple government assistances. Therefore, a combination of safety net programs could have positively affected SNAP recipients, not necessarily the sole effect of SNAP, itself.

All in all, large fiscal recovery packages in response to 2008 recession certainly provided the grounds to gain further insights into the response of consumption to the Recovery Act targeted to boost the dwindling economy. Evidence I produce here informs the design and implementation of policies and programs, which profoundly affects the lives of vulnerable group.

It would be valuable next step to further analyze other data sets to see whether food and housing quality actually improved, which may be linked to an increase in these expenditure categories. Time use data set could also provide evidence whether consumers actually spent more time for their entertainment, or grocery shopping. Predicting actual consumer behavior on what they have done with the extra resources will offer a strong empirical evidence with the results in this paper.

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Appendix A. Measures of Consumption from CEX 2007-2011

A.1 Food

 Spending on food includes food consumed at home (mainly through grocery shopping), and food eaten away from home. Alcoholic beverages are reported in a separate category.

     a.   Food at home

     b.   Food away from home

A.2 Housing

     a.   Shelter: For home owners, shelter cost includes mortgage interest, property taxes, maintenance, repairs, and insurance. For home renters, this includes rent for the rented dwelling.

     b.   Utility: Fees for natural gas, electricity, fuels, telephone service, and water

     c.   House operation: Domestic services, babysitting, and child day care

     d.   House equipment: textiles, furniture, floor coverings, and home appliances

A.3 Transportation

     a.   Cars, trucks, other vehicles (new and used)

     b.   Gasoline and motor oil

     c.   Vehicle finance charges

     d.   Maintenance and repairs

     e.   Vehicle insurance

     f.   Vehicle rental, and leases

     g.   Public transportation

A.4 Health

     a.   Health insurance

     b.   Medical services

     c.   Prescription drugs

     d.   Medical supplies

A.5 Entertainment

     a.   Fees and admissions

     b.   Televisions, radios, and sound equipment

     c.   Pets, toys, and playground equipment, and others

A.6 Apparel

      a. clothing

      b. footwear

      c. other apparel and services

A.7 Total expenditure

Total expenditure includes 6 items above plus alcohol/beverage, personal care, read, education, tobacco, cash contribution, personal insurance/pensions, and miscellaneous.

Appendix B. CEX Consumption Category Summary Statistics ($2000, over 3 months)

Category	Mean ($'s)	Standard deviation ($'s)	Mean ($'s)	Standard deviation ($'s)
	All observations		*Income ≤ 250% poverty line*	
Food	1507	1013	1215	802
Housing	3574	2856	2473	1866
Transportation	2021	4183	1336	3177
Health	502	753	330	607
Entertainment	562	1209	316	837
Personal Care	67	95	39	68
Read	29	64	15	41
Education	236	1258	108	664
Apparel	323	554	224	394
Total expenditure	**10822**	**8202**	**6810**	**5270**

Source: CEX 2007-2011. For details on these consumption categories see appendix A.

Figure 1.Consumption and Disposable Income
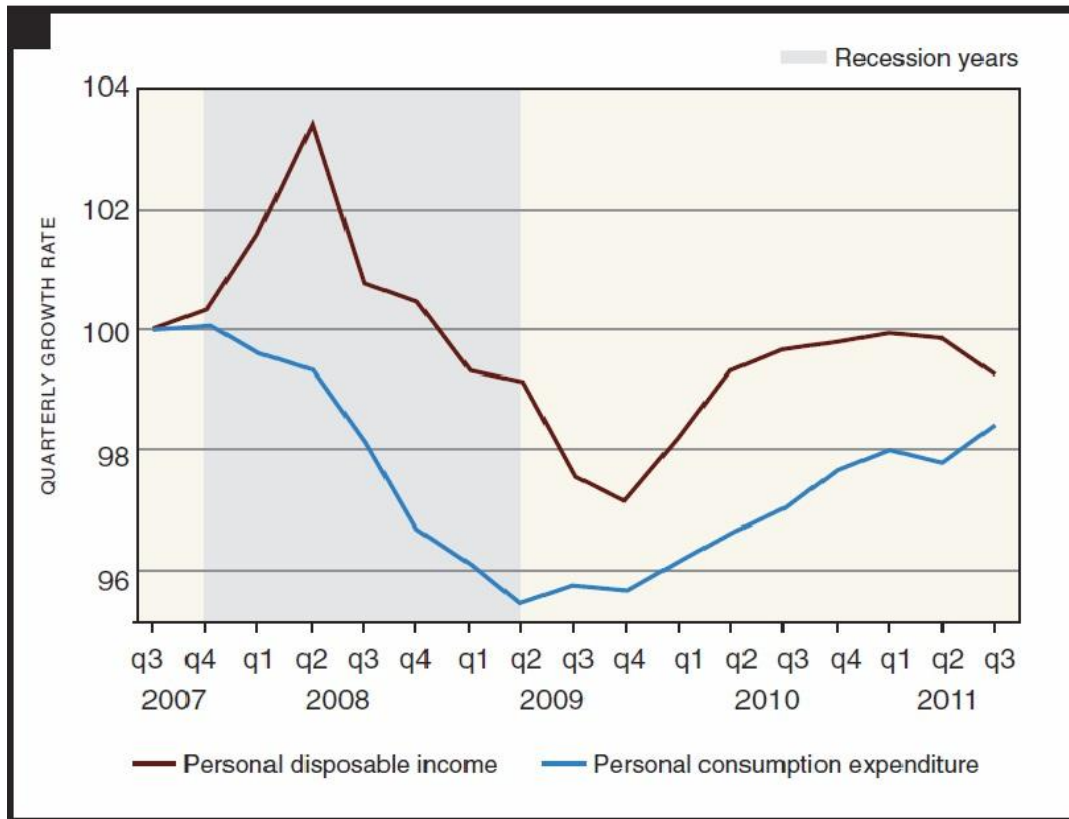
Source: BEA, NIPA tables 2.1, 2.3.4, and 2.3.5.

Table 1. SNAP Benefit Increase from the ARRA

Household size	Increase	Household size	Increase
1	$24	5	$95
2	$44	6	$114
3	$63	7	$126
4	$80	8	$144

* For each extra person, a household receives $18.

Table 2. 3 Quarter % Change in After-Tax Income and Consumption

Period	Weighted	Unweighted	Weighted	Unweighted
	After-tax income		*Consumption*	
2 yr-period prior to ARRA (2007.4~2009.4)	-0.33%	-0.72%	-3.17%	-3.15%
1 yr-period prior to ARRA (2008.4~2009.4)	-2.86%	-3.89%	-5.07%	-5.45%
Period including ARRA (2008.7~2010.3)	1.2%	0.74%	-3.84%	-3.76%
1yr-period after ARRA (2009.7~2010.9)	0.04%	-0.4%	-1.59%	-0.75%
2yr-period after ARRA (2009.7~2011.9)	0.95%	0.8%	-0.26%	0.05%

* I adjust for differences in family size by dividing income and consumption measures by the poverty line. Then I took log to produce percentage change between 3 quarters.

Table 3. Households with Income ≤ 130% Compared to Those with Income ≤ 250%

(1) ARRA ± 2 Years, Consumption($) Past 3 Months

	(1) AFTER-TAX INCOME	(2) TOTAL EXPENDITURE	(3) HOUSING	(4) SHELTER	(5) UTILITY	(6) HEALTH	(7) EDUCATION
LOW INCOME	-16,520.2***	-1,860.3***	-529.8***	-321.4***	-133.3***	-114.1***	-4.5
	[310.6]	[136.6]	[55.6]	[46.1]	[14.2]	[18.7]	[18.9]
AFTER ARRA	-784.7	-621.6**	-145.8	-99.9	-85.8***	21.8	-113.8**
	[605.0]	[296.0]	[119.5]	[100.6]	[28.7]	[39.6]	[56.6]
LOW INCOME * AFTER ARRA	-310.1	445.2**	209.7***	161.8**	38.9**	-49.3*	53.1*
	[452.5]	[179.6]	[77.1]	[65.2]	[18.2]	[26.4]	[28.6]
Observations	13,268	13,268	13,268	13,268	13,268	13,268	13,268
R-squared	0.715	0.251	0.189	0.148	0.283	0.107	0.035

Note: Regressions include control variables, month dummies, year dummies. Sampling weight is used. *** p<0.01, ** p<0.05, * p<0.1

(2) ARRA ± 2 Years, Log Consumption Past 3 Months

	(1) AFTER-TAX INCOME	(2) TOTAL EXPENDITURE	(3) HOUSING	(4) SHELTER	(5) UTILITY	(6) HEALTH	(7) EDUCATION
LOW INCOME	-1.1***	-0.36***	-0.277***	-0.273***	-0.268***	-0.363***	-0.384***
	[0.03]	[0.02]	[0.025]	[0.045]	[0.026]	[0.065]	[0.14]
AFTER ARRA	0.025	-0.095**	-0.08*	-0.047	-0.183***	0.139	-0.944***
	[0.05]	[0.04]	[0.047]	[0.087]	[0.05]	[0.12]	[0.27]
LOW INCOME * AFTER ARRA	0.06	0.045	0.046	0.06	0.048	-0.254***	0.25
	[0.04]	[0.03]	[0.03]	[0.06]	[0.035]	[0.087]	[0.185]
Observations	13,114	13,268	13,251	12,921	13,039	7,957	2,035
R-squared	0.563	0.374	0.234	0.171	0.291	0.141	0.169

Note: Regressions include control variables, month dummies, year dummies. Sampling weight is used. *** p<0.01, ** p<0.05, * p<0.1

Table 4. Households with 90%≤income ≤ 130% compared to those with 130%≤income ≤ 170%

(1) ARRA ± 2 years, consumption($) past 3 months

	(1) AFTER-TAX INCOME	(2) TOTAL EXPENDITURE	(3) HOUSING	(4) SHELTER	(5) UTILITY	(6) HEALTH	(7) EDUCATION
LOW INCOME	-5,982.6***	-868.9***	-394.7***	-282.4***	-86.4***	-43.0	-25.3
	[225.7]	[181.5]	[77.3]	[63.6]	[19.6]	[28.9]	[25.8]
AFTER ARRA	112.5	-383.6	-186.6	-212.0	-73.6*	-34.6	-73.6
	[444.8]	[398.8]	[167.6]	[143.1]	[43.0]	[62.3]	[69.3]
LOW INCOME * AFTER ARRA	377.0	262.8	**229.2****	**221.35*****	36.4	**-71.6***	**71.7***
	[311.9]	[238.7]	**[97.9]**	**[81.8]**	[26.1]	**[41.6]**	**[36.8]**
Observations	4,703	4,703	4,703	4,703	4,703	4,703	4,703
R-squared	0.835	0.210	0.168	0.142	0.263	0.072	0.035

Note: Regressions include control variables, month dummies, year dummies. Sampling weight is used. *** p<0.01, ** p<0.05, * p<0.1

(2) ARRA ± 2 years, log consumption past 3 months

	(1) AFTER-TAX INCOME	(2) TOTAL EXPENDITURE	(3) HOUSING	(4) SHELTER	(5) UTILITY	(6) HEALTH	(7) EDUCATION
LOW INCOME	-0.3***	-0.16***	-0.17***	-0.21***	-0.14***	-0.09	-0.52**
	[0.01]	[0.027]	[0.04]	[0.06]	[0.04]	[0.095]	[0.22]
AFTER ARRA	0.005	-0.09*	-0.08	-0.098	-0.17**	0.187	-1.59***
	[0.02]	[0.05]	[0.07]	[0.14]	[0.08]	[0.192]	[0.44]
LOW INCOME * AFTER ARRA	**0.026****	0.03	**0.08***	**0.145***	0.074	**-0.24***	**0.71****
	[0.013]	[0.035]	**[0.04]**	**[0.07]**	[0.047]	**[0.12]**	**[0.29]**
Observations	4,694	4,703	4,700	4,607	4,640	2,843	729
R-squared	0.874	0.315	0.201	0.174	0.263	0.085	0.181

Note: Regressions include control variables, month dummies, year dummies. Sampling weight is used. *** p<0.01, ** p<0.05, * p<0.1

Table 5. SNAP participants compared to non-participants (income ≤ 250%)

(1) ARRA ± 2 years, consumption($) past 3 months

	(1) AFTER-TAX INCOME	(2) TOTAL EXPENDITURE	(3) FOOD	(4) FOOD AT HOME	(5) FOOD AWAY	(6) HOUSING	(7) UTILITY	(8) ENTERTAINMENT
SNAP	-8,350.6***	-1,309.0***	-314.5***	-148.6***	-165.9***	-739.7***	-167.7***	-114.4***
	[590.6]	[114.1]	[28.3]	[22.5]	[14.27]	[65.4]	[18.6]	[14.1]
AFTER ARRA	-858.1	-223.1	-67.3	-61.0	-6.3	-18.7	-75.3***	8.7
	[914.9]	[209.08]	[51.2]	[38.9]	[26.3]	[123.9]	[28.7]	[35.9]
SNAP* AFTER ARRA	1,107.8	277.48**	128.0***	110.8***	17.2	84.7	77.0***	35.6*
	[768.954]	[140.35]	[36.1]	[29.2]	[17.4]	[85.3]	[23.8]	[18.66]
Observations	13,268	13,268	13,268	13,268	13,268	13,268	13,268	13,268
R-squared	0.422	0.179	0.233	0.271	0.069	0.165	0.269	0.039

Note: Regressions include control variables, month dummies, year dummies. Sampling weight is used. *** p<0.01, ** p<0.05, * p<0.1

(2) ARRA ± 2 years, log consumption past 3 months

	(1) AFTER-TAX INCOME	(2) TOTAL EXPENDITURE	(3) FOOD	(4) FOOD AT HOME	(5) FOOD AWAY	(6) HOUSING	(7) UTILITY	(8) ENTERTAINMENT
SNAP	-0.63***	-0.38***	-0.285***	-0.164***	-0.464***	-0.39***	-0.32***	-0.34***
	[0.06]	[0.03]	[0.03]	[0.03]	[0.05]	[0.04]	[0.04]	[0.055]
AFTER ARRA	0.06	-0.06	-0.065	-0.073*	0.02	-0.04	-0.17***	-0.007
	[0.06]	[0.04]	[0.04]	[0.04]	[0.07]	[0.048]	[0.05]	[0.08]
SNAP* AFTER ARRA	0.12	0.06	0.098***	0.13***	0.004	0.04	0.11**	0.085
	[0.07]	[0.04]	[0.036]	[0.035]	[0.065]	[0.05]	[0.05]	[0.07]
Observations	13,114	13,268	13,191	13,118	9,809	13,251	13,039	11,508
R-squared	0.314	0.291	0.271	0.318	0.097	0.212	0.276	0.065

Note: Regressions include control variables, month dummies, year dummies. Sampling weight is used. *** p<0.01, ** p<0.05, * p<0.1

Table 6. SNAP participants compared to non-participants (income ≤ 130%)

(1) ARRA ± 2 years, consumption($) past 3 months

	(1) AFTER-TAX INCOME	(2) TOTAL EXPENDITURE	(3) FOOD	(4) FOOD AT HOME	(5) FOOD AWAY	(7) UTILITY
SNAP	-1,115.6**	-975.7***	-306.9***	-162.56***	-144.35***	-116.6***
	[474.76]	[125.26]	[33.4]	[25.7]	[16.3]	[21.8]
AFTER ARRA	-1,062.8	151.4	-85.2	-78.3	-6.9	15.3
	[1,013.9]	[295.2]	[70.9]	[53.2]	[35.5]	[41.0]
SNAP* AFTER ARRA	**1,677.7****	174.4	**160.38*****	**140.7*****	19.6	**62.0****
	[674.6]	[170.4]	**[44.6]**	**[34.87]**	[21.4]	**[28.1]**
Observations	6,132	6,132	6,132	6,132	6,132	6,132
R-squared	0.321	0.155	0.223	0.266	0.072	0.259

Note: Regressions include control variables, month dummies, year dummies. Sampling weight is used. *** p<0.01, ** p<0.05, * p<0.1

(2) ARRA ± 2 years, log consumption past 3 months

	(1) AFTER-TAX INCOME	(2) TOTAL EXPENDITURE	(3) FOOD	(4) FOOD AT HOME	(5) FOOD AWAY	(6) UTILITY	(7) HOUSE EQUIPMENT
SNAP	-0.21***	-0.314***	-0.27***	-0.17***	-0.446***	-0.225***	-0.52***
	[0.07]	[0.04]	[0.03]	[0.03]	[0.06]	[0.05]	[0.12]
AFTER ARRA	0.11	-0.03	-0.08	-0.09	0.12	-0.08	-0.02
	[0.11]	[0.07]	[0.06]	[0.06]	[0.11]	[0.09]	[0.22]
SNAP * AFTER ARRA	0.10	0.06	**0.145*****	**0.186*****	0.003	0.10	**0.264***
	[0.086]	[0.05]	**[0.04]**	**[0.04]**	[0.08]	[0.06]	**[0.145]**
Observations	5,985	6,132	6,068	6,025	3,975	5,951	2,655
R-squared	0.257	0.253	0.265	0.316	0.111	0.266	0.065

Note: Regressions include control variables, month dummies, year dummies. Sampling weight is used. *** p<0.01, ** p<0.05, * p<0.1

Table 7. "less than college" compared to "college or more" (income ≤ 250%)

(1) ARRA ± 2 years, consumption($) past 3 months

	(1) AFTER-TAX INCOME	(2) TOTAL EXPENDITURE	(3) FOOD	(4) FOOD AT HOME	(5) FOOD AWAY	(6) HOUSING	(7) SHELTER	(8) HOUSE OPERATION	(9) HOUSE EQUIPMENT	(10) ENTERTAINMENT
LOW EDUCATION	-1,796.3***	-1,296.35***	-186.98***	-45.1*	-141.9***	-824.8***	-587.6***	-77.85***	-76.18***	-164.97***
	[620.9]	[140.9]	[37.8]	[23.0]	[24.6]	[85.9]	[70.7]	[15.3]	[16.13]	[23.1]
AFTER ARRA	-206.4	-573.35**	-88.3	-34.26	-54.0	-239.8	-140.3	-23.3	12.0	-45.1
	[1,185.4]	[258.4]	[62.6]	[44.98]	[35.4]	[162.5]	[137.5]	[26.2]	[28.8]	[43.5]
LOW EDUC * AFTER ARRA	**-1,207.3**	**440.84****	**42.1**	**-12.6**	**54.7***	**256.3****	**152.9**	**36.3***	**39.2****	**72.83****
	[866.9]	**[182.2]**	**[46.36]**	**[30.1]**	**[29.0]**	**[119.9]**	**[102.0]**	**[19.3]**	**[19.6]**	**[29.96]**
Observations	13,268	13,268	13,268	13,268	13,268	13,268	13,268	13,268	13,268	13,268
R-squared	0.382	0.179	0.226	0.268	0.060	0.169	0.139	0.078	0.021	0.046

Note: Regressions include control variables, month dummies, year dummies. Sampling weight is used. *** p<0.01, ** p<0.05, * p<0.1

(2) ARRA ± 2 years, log consumption past 3 months

	(1) AFTER-TAX INCOME	(2) TOTAL EXPENDITURE	(3) FOOD	(4) FOOD AT HOME	(5) FOOD AWAY	(6) HOUSING	(7) SHELTER	(8) HOUSE OPERATION	(9) HOUSE EQUIPMENT	(10) ENTERTAINMENT
LOW EDUCATION	-0.06	-0.28***	-0.14***	-0.045*	-0.21***	-0.32***	-0.434***	-0.255***	-0.36***	-0.41***
	[0.046]	[0.03]	[0.027]	[0.025]	[0.04]	[0.03]	[0.046]	[0.06]	[0.08]	[0.05]
AFTER ARRA	0.15*	-0.13***	-0.09*	-0.07	-0.004	-0.13**	-0.14	-0.3***	-0.03	-0.16
	[0.08]	[0.05]	[0.05]	[0.05]	[0.086]	[0.06]	[0.09]	[0.11]	[0.17]	[0.098]
LOW EDUC * AFTER ARRA	**-0.12****	**0.09*****	**0.04**	**0.02**	**0.03**	**0.098****	**0.17*****	**0.17****	**0.146**	**0.22*****
	[0.06]	**[0.03]**	**[0.04]**	**[0.03]**	**[0.06]**	**[0.04]**	**[0.065]**	**[0.08]**	**[0.10]**	**[0.07]**
Observations	13,114	13,268	13,191	13,118	9,809	13,251	12,921	7,664	6,265	11,508
R-squared	0.260	0.268	0.258	0.314	0.073	0.196	0.157	0.107	0.045	0.069

Note: Regressions include control variables, month dummies, year dummies. Sampling weight is used. *** p<0.01, ** p<0.05, * p<0.1