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[The Impact of Consumption Changes on Interest Rate and Unemployment Expectations]

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ABSTRACT

After reviewing the paper regarding how personal experience can affect aggregate outcomes by Kuchler & Zafar (2019), this paper further researches the correlation between changes in household consumption, interest rate expectations, and unemployment expectations as a supplement. The two-hypothesis made are quite similar which both emphasize the positive correlation between these two variables. By using the statistical linear regression model, the results of two regressions show a significant correlation and reject the null hypothesis of no correlation accordingly.

Keywords: Household consumption, Expectations, Macroeconomic outcomes.

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CHAPTER 1 Introduction

Household consumption plays an important role in economies. In general, household spending consists of around 60% of the GDP which includes food, clothing, daily utilities, etc. (OECD Statistics, 2022) Interest rates, however, constantly stand for a crucial position in the modern economy no matter what in the bank, firms, and governance. Therefore, investigating the relationship between changes in household consumption and interest rate expectations may give concrete instructions for banking regulation-making, investment strategy of the firms, or economic stabilization by the government.

Expectations seem like a rational behavior for agents when making choices based on limited information available. Economists usually assume people will have expectations following maximizing their expected utility (Manski, 2004). Besides, people will infer their circumstances by forming expectations of Macroeconomic factors (Kuchler & Zafar, 2019). On the other hand, the consumption of people especially in households would alter if some global event happened such as the Covid pandemic. Baker et al. (2020) discussed the responses to household spending from the pandemic. They found people increased their spending range before the disease and decreased their total spending after it. Therefore, the research question in this paper would be:

How did the change in household consumption affect the expectations of interest rates in general?

The effects of the pandemic on household consumption are generally negative but sometimes is not the case. Due to decreased income, households may experience an enormous decrease in transportation and culture spending but a large increased consumption in nutrition, and water-electric-gas expenses leading to a significantly increased consumption during the pandemic (Celik et al., 2020). Besides, there is another factor that cannot be ignored is the expectation bias. Kinari (2016) studied the properties of expectation bias with three forecasting horizons and the results show that people will be pessimistic for a shorter period but optimistic for a long period. However, overconfidence in each period exists and people will be more optimistic and overconfident in longer horizons in general. Therefore, the mean hypothesis stands out here will be:

H1: An increase in household consumption will have a positive impact on the expectations of higher average interest rates in the future.

The dependent variable is measured by the answer from the survey about how likely the respondents believed that the average interest rates of their savings account will increase in 12 months in percentage terms. The independent variable is also from the respondents of the survey that what percentage change do they think that current household spending at time t compared to 12 months ago. The control variables

control the effect of number of households, gender, employment status, educational level, and income level that may affect the expectations of interest rates. All control variables without the number of households are treated as category variables and conducted by creating several dummies.

The coefficient interested in the data is which measures the effect of change in household consumption on interest rate expectations. We will reject the hypothesis if the coefficient is not positively significant.

The database used in this paper comes from the Survey of Consumer Expectations (SCE). It is a monthly survey conducted by the Federal Reserve Bank of New York since 2013, which collects information on consumer expectations and contains panel data. The sample collected mainly consists of household spending surveys and consumer expectation surveys of Americans from 2018 to 2022. Since the data is contained in several survey forms, they will be firstly combined into one sheet based on the respondent's ID. The interest expectations are gathered from the consumer expectation survey in which a question asks about the expectations of interest rates. The change in household consumption comes from the household spending survey which provides the percentage change of their current spending. Household number is collected from the informal work participation questionnaire which asks each respondent about their family number constitution most of the time.

The result of the research shows a significant and positive correlation between changes in household consumption and interest rate expectations which proved the hypothesis made. An alternative hypothesis was made to test whether the correlation fits in the unemployment rate as well. The result from the analysis shows that the auxiliary hypothesis is that unemployment rate expectations have the same direction as interest rates. In chapter two, the theory behind what we studied will be discussed, the third chapter explains the data gathering and transformation. The fourth chapter illustrates the methodology of analysis used in this research. Finally, the fifth chapter discusses the findings of the research and a short conclusion afterward.

CHAPTER 2 Theoretical Framework

2.1 Introduction

In this chapter, some relevant literature about what we study in this paper will be discussed. Since the research background of this topic is about expectations of economic agents, some previous evidence of empirical research and theory needs to be provided to prove the validity of the research.

2.2 Expectation

People as agents always change their rational economic behavior based on expectations. Several research has illustrated the formation of expectations. One of the famous economists (Hey, 1994) discusses whether the formation of expectations is rational or adaptive by doing experiments. The rational hypothesis states that people form expectations based on all available information which is also unbiased meaning unpredictable systematically. The second adaptive hypothesis emphasizes that people form their expectations based on the past value of the element that best fits their interest and adjusts their predictions when new information comes in. The results show that people tend to predict rationally but usually appear to adaptive behavior. Since they will always predict followed experience and try to fit the patterns when they expect for the future. Therefore, the truth model of expectation formation should be blended rationally and adaptively.

Despite the formation of expectations by agents is not completely rational, measuring it properly is quite important especially since it may change agents' current behavior. The traditional economic assumption states that when people make decisions, they will form probabilistic expectations for unknown quantities and maximize their utilities (Manski, 2004). One theory that has been proposed in Manski's research is called modern economic theory which is subjective probability. It mentions that many economists for now are trying to obtain the data from survey respondents about probabilistic expectations of events which is also the research strategy used in this paper.

Kuchler & Zafar (2019) first brought the idea of projecting personal experience into aggregate outcomes which is quite like what has been researched in this paper. They find out that people who experience in person may impact the overall expectations in the future. For instance, if someone just loses a job, she will expect a high unemployment rate in this country. They also find that those inferences do not correlate with whether the person has abundant knowledge or experience and risks. This finding explains part of our research that the current change in households' consumption indeed affects their expectations of interest rates in general.

The expectation of people is not always showing their real and rational incentives as well. Kinari (2016) pointed out the expectation bias by using 14 sets of surveys on stock prices. By using optimism and

overconfidence as proxies of expectations bias, Kinari found people will have pessimistic beliefs in a short horizon but optimistic beliefs in a longer period, and whether people are optimistic varies from different times of sample collection, but overconfidence did not change. Another finding is that there is a negative relationship between optimism and the direction of stock price, He gives two possible reasons, one is that the expectations follow the random walk while he rejected it because the study does not support this. The other reason is because of status quo bias which is a phenomenon in behavioral economics. People tend to keep the current situations instead of change, but this hypothesis has not been tested in this paper.

2.3 Shocks, Household Consumption Change & Unemployment

Household consumption is not constant, and it can be affected by lots of factors, especially when some unexpected global events happen such as the pandemic. Baker et al. (2020) have researched how household consumption responds to those global events, and they picked the data on the consumption of Americans during COVID-19. They find that Americans changed their consumption radically. At the beginning of 2020, people increased their total consumption by over 40 percent and a decrease in consumption by 25-30 percent when the disease started spreading except food delivery only. While, the partisan bias, increased the optimism of the public on future economic conditions, cannot affect the actual household spending in general (Mian et al., 2023).

When household members become more affluent, they may change their consumption as well. Chai et al. (2015) focus on studying the spending diversification process of households. They first reviewed the facts of this process and then found the relationship between different approaches measuring the spending diversity and the link between household diversification of spending when their income increases by using UK household spending data to find the behavioral heterogeneity. The results of different approaches are quite similar, while they find that people at low-level income will concentrate their spending and diversify immediately when the income increased. Souleles (1999) also studied the effect of change in wealth on household consumption. He first reviewed the permanent-income theory states that consumption should not be affected by income fluctuations that can be predictable. Therefore, he tests how income tax refunds as a special type of increased income can affect household consumption. He also finds significant evidence that consumption is sensitive to income tax refunds. Besides, he also finds households that have liquidity constraints would increase the non-durable consumption significantly.

Household spending can change when they have future economic uncertainty as well. Coibion et al. (2024) investigate the study of how exogenous variation in macroeconomic uncertainty affects household consumption decisions. They use random treatment experiments by giving the first or second moments of future economic growth to generate this uncertainty in households. The result of this experiment shows that household tends to reduce their spending on non-durable goods and buy fewer larger items or luxury

goods if they meet a high economic uncertainty in the future. The uncertainty will also reduce households to invest in mutual funds which means that those bad expectations on future economies can have negative impacts on household consumption.

The relationship between household consumption and unemployment is not that clear and hard to research. Hurd & Rohwedder (2013) wants to estimate the effect of unemployment expectations on household spending by using panel data. They use the data both monthly and subcategories, finding that the effect of unemployment likelihood on total spending is hard to detect because of the fixed spending category monthly. While they find the effect of subcategories of spending is significant, for example, one extra probability of becoming unemployed, household will reduce consumption by 14% on clothing.

Our research, however, relevant for how does the effect of personal-experience shock on their future expectations also. (Hudomiet et al., 2011) delve into the study of how the outbreak of financial crises in 2008 affected people's expectations of the stock market index by using the data on subjective probabilities. They try to estimate the average expected returns, average uncertainty and disagreement on expected returns. The results show a temporary increase in average expectations and uncertainty while the disagreement lasts longer. That disagreement shows a larger difference between stockholders and more informed people.

Kuchler et al. (2023) also researched the effect of current changes in personal situations on expectations. They investigated what factors that can affect the house price expectations of housing market. They enforced that housing market expectations are strongly influenced by observed housing price changed, no matter in social network or personally or locally. Besides, the experience of house price change would also affect the expectation uncertainty. Finally, they discuss how these personal experience leading expectations would reversely decide their current financial decisions in household consumption and mortgages.

2.4 Interest & Inflation rates

Interest rates usually seem like a tool for the central bank to adjust the economy of a country. The expectations of interest rates may lead to economic development as well. Kloster (2000) proposed that household consumption will be affected by their expectations of interest rates and high short-term interest rates will have fewer contraction effects to the economy compared to persistent one. He also mentions that the term structure of interest rates can best be explained by expectation theory which based on assumption that market participants are risk-neutral and will maximize their expected return without any preferences on maturities of securities.

The traditional view shows that interest rates has no effect in evaluating consumptions (Weber, 1970), while Weber tends to examine whether they have a significant relationship. He tests this by first look at whether monetary policy can directly affect consumption. The research used empirically analysis by taking the aggregate data of US, finding that the relationship between interest rates and aggregate consumption is significant and when the interest rate increase, it leads aggregate consumption increase as well. He also finds that the income effect takes a more important role than substitution effect. When the interest rates increase, consumers will increase their current spending because they can keep the same level of consumption in the future.

Friedman (1977) proposed a very famous theory that proved the positive relationship between the inflation rate and unemployment in the long run. He against the traditional view by Philips which shows a stable inverse relationship between these two variables and criticizing that he did not consider the role of expectations of inflation into that will influence people's behavior in the long run.

In general, the underlying reason for the positive correlation between change in household spending and interest rate expectations can be deducted from the previous paper. For instance, Baker discussed how does unexpected incidents such as pandemic that will affect household consumption temporarily and leading to more uncertainty of expectations of aggregate economy. Besides, Hudomiet also proved the shocks of large financial incidents does affect the expectations of stock markets. When people face large shocks or accident, it will affect the formation of expectations related to those shocks and adjust it accordingly (Freudenreich & Kebede, 2022). What's more, changes in consumption due to income changes or other sources of earnings affect the expectations of households for future economy the same. Additionally, as Weber said the classic model ignored the effect of interest rates on consumption and always assumed zero, an increase in consumption could result in a good economic environment and a high growth rate. Combining previous research and the research on the connection between household consumption and unemployment expectation by Hurd & Rohwedder exhibited the negative relation between consumption and unemployment expectations and the research of Friedman's positive correlation between these two variables, the potential reasons of correlation between change in household consumption and interest rates expectations or unemployment expectations might be that potential reasons such as unexpected shocks or financial change affect household consumption that impacts their expectations with future economy.

CHAPTER 3 Data

3.1 Data Source

The data comes from the Survey of Consumer expectations (SCE) which is a monthly survey conducted by the Federal Reserve Bank of New York since 2013, mainly collecting the information on consumer expectations. The sample is collected by using the survey consisting of consumer expectation survey, household spending survey and informal work participation survey of Americans. The expectation survey use a rotate panel structure for each month where capture the changes of U.S population for every month. The household spending survey asked the questions for every four month which also captures the changes of household consumption of U.S citizens. There is no asking frequency for the informal work participation questionnaire which takes respondent weights into account.

3.2 Description of Variables

Table 3.1 The short description of all variables

Variables	Description
Probability of interest rates increased	Probability that interest rates will increase
Change in household consumption	The percentage change of household consumption compared to 12 months ago
Household size	The number of household members
Female	A dummy variable equals 1 if the respondent is female
Employment status	Whether the respondent is currently having a job
Educational level	The highest degree that respondent get
Income level	The current pre-tax income of total households' members

The dependent variable which is the Probability of interest rates increased is directly gathered from the survey of consumer expectations asking the question such that what percentage chance that respondents' think after 12 months from now that the interest rates of saving accounts will increase. While the independent variable change in household consumption comes from the question from the survey of household spending that asks what the change of the current household spending is compared to 12 months ago in percentage terms. There are five control variables which the first variable household size is took the answer from the question in survey of consumer expectations asking the number of household member in majority of time exclude the respondent. The second control variable Female is a categorical variable represented gender of respondents which comes from the same survey categorized by "Male", and "Female" and "1" represents the respondent is female and "0" if it's male. The third control variable employment status try to show whether the respondent currently has a job which has three categories where "1" represents "have a job", "2" represents "have no job" and "3" represents the respondent is

retired. The fourth control variable educational level represented the highest education of respondents get which is categorized by “Below bachelor’s degree”, “Bachelor’s degree” and “Master’s degree or above”. And the fifth control variable income level represented the pre-taxed income of all the family members have for 12 months which is categorized by “income less than 50”, “income between 50k to 100k” and “income large than 100k”.

3.3 Sample Description

The sample is collected by firstly combined the survey of consumer expectations from 2017-2019 with the latest survey of consumer expectation which is 2020 onwards and then merging the survey of household spending and consumer expectations. Since the survey frequency of dependent variable is larger than independent variable which observed for every month while independent variable observed for every four months. So, the reference when merging is not only includes each respondent ID number but also consider the date. The dependent variable is directly gathered in the survey while the independent variable combines the answer of two questions where firstly asking the respondents whether increased or decreased of their changed household consumptions. Then, combing the directions of change in household consumption with the actual percentage changed into a new variable using negative symbol to represents decrease in household consumption and positive symbol if it increases. Besides, the control variable Household size is adjusted by taking respondents into account and sum up each category to become a continues variable represents the total number of households. Gender is adjusted by creating a new dummy variable using “1” represents female and “0” represents male. The Employment status combined ten categories into three which only considers whether the respondents have a job, have no job or retirement. Educational level and Income level firstly gathered with nine categories and eleven categories respectively then both combined into three categories to make the frequency of each category more average that may increase the significance.

3.4 Summary Statistics

Table 3.2 Descriptive Statistics

Variable	Obs	Mean	Std.dev.	Min	Max
Probability of higher interest rates	15551	32.039	25.891	0	100
Change in household consumption	15551	3.378	12.819	-100	100
Household size	15551	2.721	3.857	1	162
Female	15551	0.486	0.5	0	1
Employment status	15551	1.547	0.81	1	3
Educational level	15551	1.819	0.798	1	3
Income level	15551	1.98	0.802	1	3

Note. The table shows the mean, standard deviation, min and max value of Likelihood of interest rates increased, Change in household consumption, Household size, Female, Employment status. The data of Likelihood of interest increased is the answer from the question designed like "what percentage would you think that interest rates in savings account would increase in 12 months". The unit of the mean of Likelihood of interest rates increased and change in consumption is in percentage and the unit of Female is in proportions.

Based on the summary of the variables used, the mean of the dependent variable, independent variable and controls are 32.046, 3.516, 2.721, 0.486, and 0.657 respectively which shows that the chance that people expect the interest rates would increase next year is 32 percent on average while the change in household consumption compared to previous year is roughly 3 percent increased on average. The average household members of respondent are 2 people on average and almost half of the respondent are female. The standard deviations of these variables are 25.892, 16, 3.857, 0.5 and 0.475 respectively.

Table 3.3 Frequency statistics of educational level

Educational level	Frequency	Percent	Cumulation
Below bachelor's degree	6619	42.54	42.54
Bachelor's degree	5136	33.01	75.54
Master's degree or above	3806	24.46	100
Total observations	15561	100	

The table 3.3 shows the observations for each education categories. Respondents who are below bachelor's degree have 6619 people, 5136 people for bachelor's degree and 3806 people for Master's degree or higher meaning that almost half percent of respondents do not have bachelor degree.

Table 3.4 Frequency statistics of Income level

Income level	Frequency	Percent	Cumulation
Income less than 50k	5156	33.13	33.13
Income between 50k to 100k	5556	35.7	68.84
Income larger than 100k	4849	31.16	100
Total observations	15561	100	

Table 3.4 exhibited the income distribution of respondents. The categories quite evenly distribute their income level. The number of people who have income less than 50k is 5156, 5556 for the people who have income between 50k to 100k and 4849 for people who have income larger than 100k.

Table 3.5 Frequency statistics of Employment status

Employment status	Frequency	Percent	Cumulation
Have job	10220	65.68	65.68
Have no job	2165	13.91	79.59
Retiree	3176	20.41	100
Total observations	15561	100	

Table 3.5 shows that 10220 respondents currently have a job which is over half of sample observations. While the number of people who have not job is 2165 and 3176 for retirement.

3.5 Missing data & Limitations

In this sample, 165 observations are deleted because of lacking data and 10 more observations are deleted because of outliers in Change in household consumption. What's more, there are less repeated observations which means the use of panel data is prohibited and reducing sample size may increase bias. The reduction of categories may make the variables more general on significance that cannot distinguish each category.

CHAPTER 4 Methodology

This paper aims to mainly investigate the relationship between changes in consumption and interest rate expectations. The hypothesis made as follows:

H1: Increase in household consumption will have a positive impact on the expectations of higher average interest rates in the future

To test this relationship, we use a linear regression analysis test with robust standard error.
The regression model used for testing the hypothesis here is:

$$\text{Expectation of Probability of interest rates increased} = \alpha + \beta_1 * Change\ in\ Household\ Consumption + \beta_2 * Household\ Size + \beta_3 * Gender + \beta_4 * Employment\ Status + \beta_5 * Educational\ Level + \beta_6 * Income\ Level$$

Besides, as supplement research, the relationship between change in consumption and unemployment expectations has also been investigated. Therefore, the second hypothesis has been made:

H2: Increased household consumption will have a positive impact on the expectations of higher unemployment rates on average

As before, linear regression analysis test used with robust standard error. The regression model use in this hypothesis looks as follows:

$$\text{Expectation of Probability of unemployment rates increased} = \alpha + \beta_1 * Change\ in\ Household\ Consumption + \beta_2 * Household\ Size + \beta_3 * Gender + \beta_4 * Employment\ Status + \beta_5 * Educational\ Level + \beta_6 * Income\ Level$$

The model includes several control variables that may influence the interest rates expectations. The statistical analysis performed in STATA, and we used robust standard error to prevent the heterogeneity. Additionally, multicollinearity will be checked by Variance Inflation Factors (VIF).

CHAPTER 5 Results & Discussion

Table 5.1 Regression analysis for Probability of higher interest rates

Probability of higher interest rates	Coefficient	Robust std. err.	P-value
Change in household consumption	0.034	0.012	0.006***
Household size	-0.177	0.046	0.000***
Female	-6.206	0.417	0.000***
Have job	-0.504	0.615	0.412
Retiree	-0.402	0.713	0.573
Bachelor's degree	5.398	0.488	0.000***
Master' degree or above	6.644	0.555	0.000***
Income between 50k-100k	1.355	0.502	0.007***
Income above 100k	4.193	0.574	0.000***
Constant	30.641	0.659	0.000***
Number of observations	15561	15561	15561

Note. This tables shows the results of the regression analysis with robust standard error by using OLS. The unit of the independent variable is in percentage and the unit of Female is in proportions.

***Significance at 1 percent level
**Significance at 5 percent level
*Significance at 10 percent level

Table 5.2 Regression analysis for Probability of higher unemployment rates

Probability of higher unemployment rates	Coefficient	Robust std. err.	P-value
Change in household consumption	0.035	0.016	0.026**
Household size	-0.107	0.046	0.021**
Female	-1.021	0.402	0.011**
Have job	-0.946	0.603	0.117
Retiree	-2.467	0.695	0.000***
Bachelor's degree	1.952	0.469	0.000***
Master' degree or above	2.634	0.529	0.000***
Income between 50k-100k	-1.212	0.491	0.014**
Income above 100k	-0.304	0.542	0.576
Constant	38.137	0.668	0.000***
Number of observations	15561	15561	15561

Note. This tables shows the results of the regression analysis with robust standard error by using OLS. The unit of the independent variable is in percentage and the unit of Female is in proportions.

***Significance at 1 percent level
**Significance at 5 percent level
*Significance at 10 percent level

Following the results from table 5.1, the coefficient of the independent variable means for every percentage point increase in the grow rate of consumption, people will increase 0.034 percentage chance believing that interest rates will increase in the future, and it is significant at 1 percent significant level. The coefficient of household size means that one number increased in household members will decrease the percentage chance of expectations of increase interest rates 0.177 percent on average, which is also significant at 1 percent significance level. The coefficient of female means that female respondent will expect that interest rates will increase 6.206 percent lower than male respondents. For the employment status, people who has the job will expect that interest rates will increase 0.504 percent lower and

compared to the respondent who has no job and its 0.402 percent lower for retiree. Besides, the respondents who achieve bachelor degree, master degree or above will expect 5.398 and 6.644 higher percentage change that interest rates will increase compared to the respondents who have lower than bachelor degree. Respect to income level, respondents who earn annual income between 50k to 100k and who can earn income above 100k expect 1.355 and 4.193 higher percentage that interest will increase compared to the respondents who has annual income below 50k.

The aim of this regression is to test the main hypothesis that increase in household consumption would increase the probability of higher expectation on interest rates. Given the p-value of the coefficient of independent variable equals 0.006, we can reject the null hypothesis that there is no effect of change in household consumption on interest rates expectations. Additionally, the coefficients for employment status did not show a significant relationship to the dependent variable at 5% significance level which is not a significant predictor in this model.

As supplement research, Table 5.2 shows a regression analysis respect to the expectations of unemployment rates has been done. The results of coefficients have similar directions as interest rates expectations but there are more insignificant coefficients as well. We can see the retiree has become significant in this model while the coefficient of respondents who earn an income above 100k becomes insignificance.

CHAPTER 6 Conclusion

In this research, we studied the effect of change in household consumption on their interest rate expectations. The hypothesis of positive correlation between two variables has been established to test the relationship. The results also show a significant positive correlation which supports our first hypothesis. The supplement research substituting dependent variables into expectations of the unemployment rate also exhibits a significant correlation to change in consumption which fits the second hypothesis.

In a broader view, the findings also provide insight into how personal experience or change could affect their future expectations. Policymakers must design and adjust their economic policy and strategy accordingly.

There are several limitations in the research as well. Firstly, the self-reported data is not completely reliable which may cause subjective bias. Besides, the demography of the data only includes Americans which means the findings may not generalize to other countries with different economic or development situations such as China.

For future research, it is possible to explore similar impacts but with the country of different cultural backgrounds to make the results more universal. Additionally, a longer time dimension of study on those effects on economic stability may provide further insights.

Finally, understanding how household adjust their expectations on macroeconomic factors when they meet changes in their situations is inevitable for enacting effective economic policy that can reduce the negative effect and bring stability to the whole society.

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