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# Inflation Expectations of Japanese Households:
## Evidence from Monthly Consumer Confidence Survey

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# I. Introduction (1)

- Expectations of economic agents are crucially important in determining macroeconomic outcomes.
- The mainstream macroeconomics had long assumed that expectations of the representative agents were rational.
- There had been almost no work testing alternative models of expectations using actual empirical data, probably due to the lack of testable alternatives.
- The sticky information model by Mankiw and Reis (2002) provides us with  empirically testable implications.

# I. Introduction (2)— continued.

- Equipped with the well maintained survey data, including Michigan Survey, a considerable number of empirical studies are conducted in the U.S.

  Mankiw, Reis, and Wolfers (2004), Carroll (2003), etc.

- In Japan, there has been almost no serious empirical research on the inflation expectations by households, for lack of data.

- After the agonized experience of deflation, two surveys on Japanese inflation expectations are launched in FY2004.
  - *Monthly Consumer Confidence Survey covering all of Japan* (MCCS)
  - *Monthly Survey of Japanese Economic Forecasts* (ESPF)

# I. Introduction (3)— continued.

- Our study takes advantage of micro data from the two monthly surveys to empirically examine inflation expectation dynamics in Japan.

- Gaining a foothold in a version of sticky information model by Carroll (2003), we propose a micro data based test of alternative models of inflation expectations.

Rational vs. Adaptive vs. Sticky Information.

# II. The theory and empirical model (1)

- The Carroll (2003) model:

Each individual faces a probability $\lambda$ of reading the latest news article on inflation in any given period.

Individuals who do not read an article simply continue to believe that the last forecast they read about. Thus, individuals change their inflation expectations with probability of $\lambda$ .

If we denote the population-mean inflation expectation by $M_t$[], we can express it as a function of the Newspaper forecast $N_t$[].

$$\begin{aligned} M_t[\pi_{t,t+12}] &= \lambda N_t[\pi_{t,t+12}] + (1-\lambda) M_{t-1}[\pi_{t,t+12}] \\ &= \lambda N_t[\pi_{t,t+12}] + (1-\lambda)\{\lambda N_{t-1}[\pi_{t,t+12}] + (1-\lambda)(\lambda N_{t-2}[\pi_{t,t+12}] + \cdots\}. \end{aligned} \quad (1)$$

# II. The theory and empirical model (2)—cont.

With a few extra assumptions on consumers' belief about the information process, Carroll derived a *macro based* empirically testable equation.

$$M_t[\pi_{t,t+12}] = \lambda N_t[\pi_{t,t+12}] + (1-\lambda) M_{t-1}[\pi_{t-1,t+11}]. \qquad (2)$$

- Here, we use exactly the same setting to derive a different spec. for inflation expectations by individual households.
- By focusing on the change in inflation expectations, we can derive the following equations:

$$\begin{aligned}
E_{i,t}[\pi_{t,t+12}] - E_{i,t-1}[\pi_{t-1,t+11}] &= (N_{t-1}[\pi_{t-1,t+11}] - E_{i,t-1}[\pi_{t-1,t+11}]) + (N_t[\pi_{t,t+12}] - N_{t-1}[\pi_{t-1,t+11}]) \quad \textit{and,} \\
E_{i,t}[\pi_{t,t+12}] - E_{i,t-1}[\pi_{t-1,t+11}] &= (N_{t-1}[\pi_{t-1,t+11}] - E_{i,t-1}[\pi_{t-1,t+11}]) + (E_{i,t-1}[\pi_{t-1,t+11}] - N_{t-1}[\pi_{t-1,t+11}]).
\end{aligned} \qquad (3)$$

# II. The theory and empirical model (3)—cont.

- That is, when a household revises its inflation expectation from month *t-1* to *t*, the size of the adjustment should be the gap between its inflation expectation and Newspaper forecast in the previous month plus the size of change in Newspaper forecast from *t-1* to *t*.

- Since all variables in the equation are directly observable, we can run the following regression to assess the validity of the model.

$$E_{i,t}[\pi_{t,t+12}] - E_{i,t-1}[\pi_{t-1,t+11}] = \beta_1(N_{t-1}[\pi_{t-1,t+11}] - E_{i,t-1}[\pi_{t-1,t+11}]) + \beta_2(F_t[\pi_{t,t+12}] - N_{t-1}[\pi_{t-1,t+11}]) + \varepsilon_{i,t}. \quad (4)$$

- There are at least two testable restrictions:

  (1) Nec. condition for the rational exp.: $\beta_1 = 0$

  (2) Nec. conditions for the sticky info.: $\beta_1 = \beta_2 = 1$

$\beta_1 = 0$

# III. Empirical Analyses—III.1 Data (1)

- Data of inflation expectations by households.

Inflation rate question in the MCCS (allowed res. are in brackets)

(Price Expectation Question) During next 12 months, do you think that prices of goods and services that you frequently purchase on a daily basis will go down, up, or remain the same?

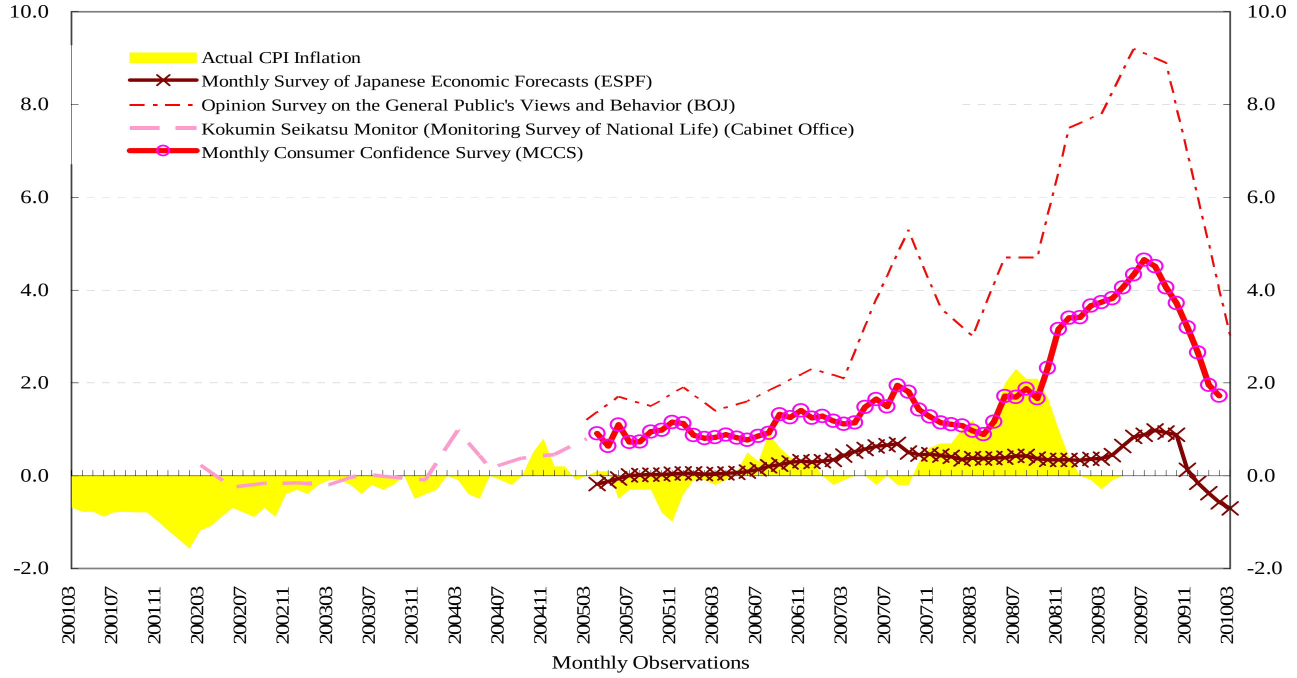
[(1) down by more than 5 percent, (2) down by 2-5 percent, (3) down by less than 2 percent, (4) remain the same, (5) up by less than 2 percent, (6) up by 2-5 percent, (7) up by more than 5 percent, or (8) uncertain]

- We need to use the median of intervals, as the actual percentage numbers are not directly asked, unfortunately.

- We use the mean of professional forecasts from the ESPF as the proxy for the Newspaper forecast.

# III. Empirical Analyses—III.1 Data (2)

Figure 1. Average Inflation Expectations and Actual Inflation by Survey (from 2001 to 2009)




1. Japanese consumers have gotten rid of the deflationary expectations by 2004.

2. The average inflation expectation by households continues to be biased upward.

3. The mean of professional forecasts outperformed the household expectations.

## III.2 Can the professional forecast be a good anchorage?

- Need to confirm the view that professional forecasters are ‘more rational,’ and can be used as an anchorage for better expectations.

- How good/bad household expectations are (relative to the mean of professional forecasts? (Table 1)

  => Majority (more than 80 percent) of households underperform the mean of professional forecasts. (Absolute bias, RMSE)

- Whether the professional forecasts have better forecasting power for future inflation than the household expectations? (Table 2)

  => Yes. Only the mean of professionals has significant predictive power.

- Is there an information flow from professionals to households? (Table 3) => Yes. Lagged professional forecast affects households.

# III.3 Estimating the Empirical Model (1)

- Regression analyses to see whether the MCCS can be well represented by the sticky information model.

- Mean Based Macro Regression (5) —Table 4.

Is the mean inflation expectation for next year weighted average between the newspaper forecast and last period's expectation?

=> While the restriction of the sticky information model, i.e. $\alpha_1 + \alpha_2 = 1$, is rejected, the professional forecast appears to have a reasonable positive impact on the mean expectation.

- We have not yet accumulated satisfactory numbers of time-series observations.

# III.3 Estimating the Empirical Model (2)

- Regression analyses to see whether the MCCS can be well represented by the sticky information model.

- Household Based Micro Regression (4) —Table 5.

Can the size of inflation expectation adjustments be defined as the gap between its inflation expectation and Newspaper forecast before the adjustment plus the size of change in the Newspaper forecast?

=> Household expectations are far away from rational. $\beta_1 \neq 0$

=> Sticky information restriction $\beta_1 = \beta_2 = 1$ is rejected, either.

- However, the sticky information model is not necessarily a bad approximation of inflation expectation dynamics.

# III.4 Other Related Issues (1)

- Can sticky information explain the disagreement among household expectations? (Table 6)

  => Yes, but only a small portion of disagreement.

- Size and determinants of $\lambda$

  - Can *Poisson process* account for the distribution of average interval between the expectation updates among individual households? (Figure 2)

    => Not necessarily true. Longer tailed distribution.

  - Is the implication by Carroll (2003), i.e. the speed of updating is faster in periods when there are more news stories on inflation, supported by the data? (Table 7)

    => Yes, but only marginally. $\lambda$ might be different among households.

    $\lambda$ may be different among individual households.

# IV. Summary of Findings and Conclusions (1)

- Inflation expectations by Japanese households are not rational in the sense that they are biased upward, and that households do not incorporate readily available professional forecast into their expectation instantaneously.

- While the sticky information model seems to explain some part of inflation expectation dynamics among Japanese households, the part of expectation disagreement among households that could be explained by the model is not large.

# IV. Summary of Findings and Conclusions (2)

- Are the data used in our analyses reliable?

  - Our preliminary examination of micro data from the MCCS could not detect systematic patterns indicative of dubious respondent.

  - We tried several cuts of anomalous observations based on several criteria to decrease the sample by half, but our empirical findings were not qualitatively (even quantitatively) affected.

- It is modest to take our findings as they are to contain some truth in the real world than to refute the findings totally.