ECONOMIC POLICY AND TRANSITION ECONOMIES

TAKAHARU ISHII

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Preface

Chapter 1. This section is examined statistically whether the importance of the motives for act and the acceptances for lower wage and labor incentives is different between each age group. Above results shows young age group is “self-actualization” as important motive, old age group is “moral” as it. And old age group has higher labor incentives when it is suggested higher wage than the wage according to my ability, and when it is the lifetime employment system. Older age group think “moral” as important motive. They think that want to rewarded with the lifetime employment system and higher wage. It checked that action motives differed according to a generation. Moreover, Prospect Theory, the efficiency wage hypothesis, and the relative wage hypothesis were satisfied, and it was checked that the influences differ in his twenties as compared with other generations. Moreover, the rate of desiring lifelong employment system as a senior was large, and his twenties had many people who do not desire

lifelong employment system strongly. This shows that consciousness change and a behavioral change may have arisen in that time in 1990 which shifted to the market economy bordering on people who were his teens, i.e., his present twenties, and his 30's. It is shown that there is no big difference the results of transition country, the results of advanced nations, especially the result of Japan.

Chapter 2. In this section, the money illusion not only has arisen, but it was checked that a time preference rate is not constant. If it is consumed as the younger age group and a rate of time preference changes with generations, it will be thought that 1-dollar value changes with generations. That is, even if the loss of the same amount produces the younger age group and an old age layer, if it is the younger age group, a loss may also feel the loss by a money illusion small. That is, the time preference rate which affects consumption smoothing also affects a money illusion. The difference for every generation of a time preference rate becomes larger than the influence which only consumption smoothing has on people's economical action. It has a possibility of bringing a big difference to the economical action for every generation. If the preference of a between at the different time changes with generations, the consumer behaviors at a certain time not only differ for every generation, but it will be thought that the reactions to a loss also differ.

Chapter 3. This section investigates whether the monetary policy framework has changed since the introduction of inflation targeting in Thailand. We analyze the changes in the model of monetary policy and estimate its effects by estimating the demand function for money. We obtain four results from our analysis. First, changes in the monetary policy framework did not change the model of the money demand function. Second, the adoption of inflation targeting policy leads to structural changes. Third, the effects of

monetary policy changed with the adoption of inflation targeting policy. Interest rate elasticity is positive before the framework change but negative after the policy change. However, its value is weak. Fourth, the interest rate elasticities of M2 and r are stable and predictable. This is important because the domestic interest rate, not the exchange rate or the foreign interest rate, controls monetary policy. It can also be applied with the same money demand function as in advanced economies.

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20 May 2022

Contents

1 A study on incentives and behaviors of each age group in transition countries: Case for Mongolia

Introduction

This chapter examine whether market economy make differences in the consciousness of each generation in transition countries. Mongolia has moved from the socialist economy to market economy in 1990 twenty years ago. Market economy led to major changes in lifestyle. The effort is also likely to increase income. This paper consider whether such environments change make differences in labor awareness and consumer behaviors of each generation by using behavioral economics methods. I specially verify whether the changes of awareness has occurred bordering on teens when it has changed from a socialist economy to market economy in 1990. That is now 30's. Purpose is to examine whether market economy make differences in the awareness of each generation. This research verifies whether general economic is satisfied in transition countries, and

whether the results of transition countries difference with that of development countries, especially in Japan. I consider three views based on survey of behavioral economics. Based on the above-mentioned viewpoint, this research clarifies the volition as workers, and the motive of action by considering the result of investigation of the behavioral economics in shift country

Mongolian. Furthermore, this research considers the difference in between the generations to the gap of wages and the consciousness to labor. In the following, it consider about the difference in awareness and behaviors of each generation in transition countries by examining above views. In Section II, it consider about labor motive. In Section III, it conclusion.

Labormotives

This section focuses on three points. Firstly, Do people take action on based on what motivated? Standard economics focus on only economic incentives. But, Section 2.2 verify that how much do people focus on economic incentives than other various incentives. Secondary, Section 2.3 focuses on incentives as a worker. It verify whether people accept the low wage under various situations if people are salaried worker. By above, It examine about relative wage hypothesis and efficiency wage hypothesis, whether the lifetime employment system increases labor incentives. Thirdly, Section 2.4 verifies that what incentives of each generation relation to low wage acceptance and labor incentives.

2.1. Data

I surveyed to 430 people in Ulaanbaatar, Mongolia. Table 1-Table3 show about sexes, ages, household income. Sex ratio is about half. The number of sample of age composition

is 50 or more in each age group of every 10 years old. Household annual income is distributed widely.

Its survey was questioned about five incentives as incentives that people bahavioir. This is “you gain economically by do a behavior”, you are evaluated socially by do a behavior”, “doing a behavior is useful for self-actualization”, “doing a behavior is morally right”, “doing a behavior is pleasant”. Answers are five steps. It is “very important”, “Important”, “nether”, “not important”, “not important at all”. Higher value for the motives means the low importance more for motives. I imaginary questioned.

I assume that respondent is salaried worker, and I did four question about labor motive.

1. If you think that your wage is according to your ability when deflation occurs, can you accept the lower your wage than ever before?

2. If you think that your wage is according to your ability when deflation occures, can you accept the lower your wage than colleague’s wage?

3. If you think that your wage is higher than the wage according to your ability, Do you rise your motive to your work?

4. If you can work with one company forever, Do you rise your motive to your work than ever before?

Answers to two questions about the decline in wages are following four steps. “Accept” ”Accept unwillingly” “None too accept” “Not accept”. Answers to two questions about the motives to works are following five steps. “Very rise” “Rise” “Not change” “Rather weaken” “Weaken”. I questioned about the identity and attributes as other questions.

Table 1. *The frequency table for every sex*

	Frequency	Percent
Man	210	49
Women	220	51
Total	430	100

Table 2. *The frequency table for every age*

Age	Frequency	Percent
20-29	107	24.88
30-39	92	21.40
40-49	95	22.09
50-59	85	19.77
60-69	35	8.14
70-	16	3.72
Total	430	100

Table 3. *Household Income (unit: thousands togrig)*

	Frequency	Percent	Accumulation (%)
～15	75	17.25	17.25
15～18	34	7.93	25.17
18～21	26	6.06	31.24
21～24	25	5.83	37.06
24～27	26	6.06	43.12
27～30	21	4.9	48.02
30～33	18	4.2	52.21
33～36	20	4.66	56.88
36～39	20	4.66	61.54
39～42	23	5.36	66.9
42～45	26	6.06	72.96
45～48	29	6.76	79.72
48～51	7	1.63	81.35
51～54	6	1.4	82.75
54～57	8	1.86	84.62
57～60	6	1.4	86.01
60～63	8	1.86	87.88
63～66	4	0.93	88.81
66～69	2	0.47	89.28
69～72	14	3.26	92.54
72～	32	7.45	100
Total	430	100	

2.2. Incentives for behaviors

Five motives are assumed as a motive when people act. Firstly, it investigates the importance of eachmotive. This is "you gain economically by do a action(=economic motives)", "you are evaluated sociallyby do a behavior(=social evaluation)", "doing a behavior is useful forself-actualization(=self-actualization)", "doing a behavior is morally right(=moral rightness)", "doing a behavior is pleasant(=pleasure)".

Table 4 - Table 9 shows descriptive statistics and frequency distribution. The importance of five motives is high in order of "economic motives", "social evaluation", "self-actualization", "moral", "pleasure" from average value. The importance of "economic motives" is the highest. Tukamoto (2010) shows that the importance for motives when people acts is high in order of "moral", "pleasure" in Japan.

Table 4. *Descriptive statistics about the importance of motivation*

	Economic motivew	Social evaluation	Self-actualization	Moral righrness	Pleasure
Freauency	430	430	430	430	430
Average	1.33	1.77	1.82	1.85	2.33
Median	1	2	2	2	2
Mode	1	2	2	2	2
Std.Dev.	0.55	0.81	0.84	0.90	1.05

Table 5. *The frequency table of "gaining economically"*

Economic motives	Frequency	Percent	Accumulation (%)
1. Very important	304	70.7	70.7
2. Important	112	26.05	96.74
3. Neither	12	2.79	99.53
4. Not important	2	0.47	100
5. Not important at all	0	0	100
Total	430	100	

Table 6. *The frequency table of "evaluating socially"*

Social motives	Frequency	Percent	Accumulation (%)
1. Very important	174	40.47	40.47
2. Important	204	47.44	87.91
3. Neither	30	6.98	94.88
4. Not important	20	4.65	99.53
5. Not important at all	2	0.47	100
Total	430	100	

Table 7. *The frequency table of "contributing to self-actualization"*

Self-actualization	Frequency	Percent	Accumulation (%)
1. Very important	158	36.74	36.74
2. Important	220	51.16	87.91
3. Neither	30	6.98	94.88
4. Not important	14	3.26	98.14
5. Not important at all	8	1.86	100
Total	430	100	

Table 8. *A "morally right" frequency table*

Moral rightness	Frequency	Percent	Accumulation (%)
1. Very important	158	36.74	36.74
2. Important	222	51.63	88.37
3. Neither	16	3.72	92.09
4. Not important	24	5.58	97.67
5. Not important at all	10	2.33	100
Total	430	100	

Table 9. *A "pleasant" frequency table*

Pleasure	Frequency	Percent	Accumulation (%)
1. Very important	82	19.07	19.07
2. Important	218	50.7	69.77
3. Neither	52	12.09	81.86
4. Not important	64	14.88	96.74
5. Not important at all	12	3.26	100
Total	430	100	

2.3. Acceptance for low wage and labor incentives

This verify whether people accept the low wage under various situations if people are salaried worker. And, it examine about prospect theory, relative wage hypothesis

and efficiency wage hypothesis, the lifetime employment system by using frequency distribution.

Table 10 – Table 12 show the descriptive statistics and frequency distribution of about the acceptance for the low wage. Corresponding questions are two of 1 and 2.

1. If you think that your wage is according to your ability when deflation occures, can you accept the lower wage than before?

2. If you think that your wage is according to your ability when deflation occurs, can you accept the lower your wage than colleague's wage?

Answers about two questions are four steps. Higher value means that not accepting the wages more. There are many replies of "Accept unwillingly" and "None too accept" about both questions. There is many replies of "Accept unwillingly" of two. It is the same as the result of Japan. Standard economics indicates that people are not influenced by the surrounding situation such as deflation and colleague's wage if people match my ability. But the result is different with standard economics. The ratio of "Accept" is less than 20%. The prospect theory by Kahneman & Tversky (1979) suggests that people has a referring points as the standard of estimation, and it evaluates that the loss from a referring point is more greatly than the profit from it. If people's referring point is the present nominal wage, the prospect theory from frequency distribution is right. Because The results of Table 11 can explain that people are reluctant acceptance to recognize as the loss the lower wages than before when deflation occurs.

If people's referring point is the relative wage to colleague, the relative wage hypothesis from frequency distribution is right. Because it can explain that people are reluctant acceptance to recognize as the loss the lower wages than colleague. It can think that the relative wage hypothesis is a part of the prospect theory. The relative wage hypothesis

is indicated that workers think as important not only my wage but also the other's wage. The results of Table 12 shows that it is also important colleague's wage for my wage's acceptance. Next, It reports the results about labor incentives. The questions about labor incentives is following two. Higher value means the low importance more for motives.

3. If you think that your wage is higher than the wage according to your ability, Do you rise your motive to your work?

4. If you can work with one company forever, Do you rise your motive to your work than ever before?

Table 13 – Table 15 show the deskriptive and frequency distribution. The wage beyond capability means the increase in wages exceeding the increase in products that the additional labor supply make. Higher incentive has the possibility which make higher productivity. Standard economics is not important about labor incentive. The efficiency wage hypothesis by Akerlof & Yallen (1986) suggests that workers has higher incentives and productivity if workers accept the higher wage than the wage according to theirself that workers think theirself. Table 14 shows that workers of about 90% has higher incentives if workers accept the higher wage than the wage according to theirself that workers think theirself. Galbraith & Darity (1994) shows the connotation which efficiency wage hypothesis and relative wage hypothesis give to macroeconomy. So the efficiency wage hypothesis is right. Above result about the prospect theory, the relative wage hypothesis, the efficiency wage hypothesis is right in transition country, in Mongolia. It is the same as the result of Japan. The effect that the lifetime employment system influences to labor incentives is the effect that the system raises the incentives and decreases the incentives to cause the moral hazard by the disappearance of the risk of dismissal. Table 15 shows that 29.3% is not change

for labor incentives. About 60% raises the incentives. The lifetime employment system has positive effect for labor incentives. Mongolia's result is the same as the result of Japan.

Table 10. *Descriptive statistics about acceptance of low wages*

	Acceptance of the wages fall at deflation	Acceptance of wages lower than a coworker
Frequency	430	430
Average	2.40	2.12
Median	2	2
Mode	2	1
Std.Dev.	0.97	1.08

Table 11. *The frequency table about acceptance of the wages fall at the time of deflation (Prospect Theory)*

	Frequency	Percent	Accumaliton (%)
1. Accept	80	18.6	18.6
2. Accept unwillingly	164	38.14	56.74
3. None too accept	118	27.44	84.19
4. Not accept	68	15.81	100
Total	430	100	

Table 12. *The frequency table about acceptance of wages lower than a coworker (relative wage hypothesis)*

	Frequency	Percent	Accumaliton (%)
1. Accept	80	18.6	18.6
2. Accept unwillingly	164	38.14	56.74
3. None too accept	118	27.44	84.19
4. Not accept	68	15.81	100
Total	430	100	

Table 13. *Descriptive statistics about work incentives*

	Work incentive when having obtained the wages beyond capability	Work incentive when working in one company throughout life
Frequency	430	430
Average	1.68	2.32
Median	2	2
Mode	2	2
Std.Dev.	0.76	1.14

Table 14. *The frequency table of work incentives when having obtained the wages beyond capability*

	Frequency	Percent	Accumaliton (%)
1. Very rise	194	45.12	45.12
2. Rise	194	45.12	90.23
3. Not change	34	7.91	98.14
4. Rather weaken	2	0.47	98.6
5. Weaken	6	1.4	100
Total	430	100	

Table 15. *The frequency table of work incentives when working in one company throughout life (lifelong employment system)*

	Frequency	Percent	Accumaliton (%)
1. Very rise	114	26.51	26.51
2. Rise	146	33.95	60.47
3. Not change	126	29.3	89.77
4. Rather weaken	8	1.86	91.63
5. Weaken	36	8.37	100
Total	430	100	

2.4. Incentives for act and labor incentive and acceptance for low wage

This investigates from correlation about the coefficient relation with five motives and acceptance for low wage and labor incentive. Answers about motives is five steps. Answers about the acceptance for the low wages is four steps. Answers about labor incentives is five steps.

It is calculated Pearson correlation coefficient and Kendall's rank correlation coefficient to confirm whether their values is interval scales or ordinal scales. Kendall's rank correlation coefficient has merits which is not assumed normality and homoscedasticity. Steps for answers are two type of four steps and Table 16 – Table 19 show the results about correlation coefficient. Table16 shows the results for the questions about the acceptances for the lower wages than before when deflation occurs. Both the results of pearson's and kendall's about the questions is significant at 5% levels is "moral" and "pleasure". So the respondent which is important "moral" accepts lower wages than before when deflation occures. All sign is negative in Japan. so the results in Mongolia is contrary to the result in Japan.

Table 16. *Correlation with the importance of each motivation, and the degree of acceptance of the wages fall at the time of deflation*

Acceptance of the wages fall at deflation		Pearson correlation coefficient	Kendall's rank correlation coefficient (tau b)
		0.098*	0.083
Economic motives	P value	0.041	0.059
	Sample	430	430
		0.071	0.043
Social evalution	P value	0.143	0.313
	Sample	430	430
		0.100*	0.075
Self-actualization	P value	0.038	0.076
	Sample	430	430
		0.219*	0.184**
Moral rightness	P value	0	0
	Sample	430	430
		0.206*	0.188**
Pleasure	P value	0	0
	Sample	430	430

Table 17 shows the results for the questions about the acceptances for the lower wages than colleague's wage. Both the two results about the questions is significant at 5% levels is "economic motives" and "moral" "pleasure". Sign is positive. People who think these motives as important have the strong concern about myself, and seldom care about the others. So it think they accept the lower wage than colleague's wage.

Table 17. *Correlation with the importance of each motivation, and acceptance of wages lower than a Coworker*

Acceptance of wages lower than a coworker		Pearson correlation coefficient	Kendall's rank correlation coefficient (tau b)
		0.121*	0.13**
Economic motives	P value	0.012	0.003
	Sample	430	430
		-0.043	-0.039
Social evalution	P value	0.371	0.355
	Sample	430	430
		0.08	0.051
Self-actualization	P value	0.096	0.229
	Sample	430	430
		0.196**	0.201**
Moral rightness	P value	0	0
	Sample	430	430
		0.130**	0.112**
Pleasure	P value	0.007	0.007
	Sample	430	430

Table 18 shows the results for the questions about labor incentive when it is suggested for higher wage than according to your ability. Both the two results about the questions is positive and significant at 5% levels is "economic motives" and "social evaluation". People who think these motives as important means that has higher motives than before when it is suggested for higher wages

than according to your ability. People who think these motives as important want to earn and evaluate to the others than before.

Table18. *Correlation with the importance of each motivation, and the degree of work incentives when having obtained the wages beyond capability*

Work incentives when having obtained the wages beyond capability		Pearson correlation coefficient	Kendall's rank correlation coefficient (tau b)
		0.12*	0.134**
Economic motives	P value	0.013	0.004
	Sample	430	430
		0.124**	0.145**
Social evalution	P value	0.01	0.001
	Sample	430	430
		0.087	0.102*
Self-actualization	P value	0.073	0.022
	Sample	430	430
		0.066	0.094*
Moral rightness	P value	0.17	0.035
	Sample	430	430
		0.05	0.09*
Pleasure	P value	0.303	0.037
	Sample	430	430

Table 19 shows the results for the questions about labor incentives for when the lifetime employment system. Both the two results about the questions is positive and significant at 5% levels is "economic motives" and "self-actualization". I think people who think self-actualization motives as important think that would like to try hard in order to achieve my aim. Self-actualization and social estimation has affected labor incentives in addition to the economic motives when the lifetime employment system and when higher wage than the wage according to my ability. It can think that higher labor incentives improve labor productivity. It also

thinks other motives in addition to economics motives as important. Its results is not introduced from standard economics.

The motives which influence to the acceptance for the lower wage is different to the motives which influence to the labor incentives.

Table 19. *Correlation with the importance of each motivation, and the degree of work incentives when working in one company throughout life*

Work incentives when having obtained the wages beyond capability		Pearson correlation coefficient	Kendall's rank correlation coefficient (tau b)
		0.101*	0.147**
Economic motives	P value	0.037	0.001
	Sample	430	430
		0.069	0.031
Social evalution	P value	0.155	0.458
	Sample	430	430
		0.166**	0.134**
Self-actualization	P value	0.001	0.002
	Sample	430	430
		0.06	0.088*
Moral rightness	P value	0.217	0.038
	Sample	430	430
		0.09	0.041
Pleasure	P value	0.063	0.317
	Sample	430	430

2.5. Age and incentives for act and labor incentive and acceptance for low wage

This section focuses on the age. It examines statistically about the relationship the age and the motives for act, the age and the acceptances for the lower wage and labor incentives. It uses for each age group 10 years as age variances.

2.5.1. Age and Incentives for act

Firstly, it examines about the relationship the age and the motives for act. It investigates whether the importance of five motives is different between each age group. This use Kruskal-Wallis test which is not assumed the normality and homoscedasticity. The result is showed in Table 20."social evaluation" is different to and significant at 5% levels between each age group. Next, it examines whether there is the difference between two age group using Mann-Whitney test. Number of age group is six. Each combination of the two is fifteen. When it sets to the 5% significance levels, it is 0.0033 by using the correction to the Bonferroni's inequality, it is that 15 divided by 0.05. Table 21 shows that the importancebof "social evaluation" for 20's age group is different to the importance of "social evaluation" for 30's age group. 20's age group thinks as important "social evaluation" than 30's age group. That is, I think that the younger age group wants to be evaluated by the others.

Table 20. *Kruskal-Wallis test about the importance of the motivation for every age group*

	Economic motives	Social evaluation	Self-ectualization	Moral rightness	Pleasure
Chi Square	9.047	10.786*	7.33	2.253	7.488
Degree of freedom	5	5	5	5	5
P value	0.107	0.048	0.197	0.813	0.187

Table 21. *The frequency table of "evaluating socially" for every age group*

	Frequency	Average	Std.Dev.
20's	132	1.67	0.748
30's	102	1.87	0.718
40's	120	1.77	0.923
50's	60	1.87	0.769
60's-	16	1.75	1.01
Total	430	1.77	0.807

Table 22. *Mann-Whitney test of "evaluating socially" for every age group*

Mann-Whitney	Social evaluation			
	Mann-Whitney's U	Wilcoxon's W	Z	P value
20's and 30's	5630	14408	-2.355	0.019*
20's and 40's	7690	16468	-0.439	0.661
20's and 50's	3356	12134	-1.872	0.061
20's and 60's-	1048	1184	-0.055	0.957
30's and 40's	5316	12576	-1.848	0.065
30's and 50's	3002	4832	-0.225	0.822
30's and 60's-	684	820	-1.14	0.254
40's and 50's	3162	10422	-1.469	0.142
40's and 60's-	924	1060	-0.267	0.789
50's and 60's-	404	540	-1.089	0.276

2.5.2. Age and Acceptance for low wage

Secondary, it examines about the relationship the age and the acceptances about lower wage. Although it was checked that Prospect Theory is satisfied from Section 2.3, it is verified whether the impact of Prospect Theory differs for every generation here. It investigates whether the acceptances about lower wage is different between each age group. Table 23 shows the result. it is not different between each age group. It is not confirmed the results that two tests is both significant. A result shows that Prospect Theory which presupposes that a wages fall is realized as a bigger loss is satisfied. Moreover, it was checked that the acceptance to a wages fall differs for every generation.

The results of Mann-Whitney test are Table 25 and Table 27. Although the acceptance of the wages fall at the time of deflation was not able to check the significant difference between generations, it was checked that the low wages acceptance in comparison with a coworker has a difference among generations. The difference was found out between his twenties and his 30's, between his twenties and his 50's, between his 40's and his 50's, and between his 50's and his 60's.

Table 23. *Kruskal-Wallis test about acceptance of the low wages for every age group*

	Acceptance of the wages fall at deflation	Acceptance of wages lower than a coworker	Work incentives when having obtained the wages beyond capability	Work incentives when working in one company throughout life
Chi square	14.408*	20.324**	16.199**	48.753**
Degree of freedom	5	5	5	5
P value	0.013	0.001	0.006	0

Table 24. *The frequency table of "acceptance of the wages fall at the time of deflation" for every age group*

	Frequency	Average	Std.Dev.
20's	132	2.45	0.911
30's	102	2.35	0.886
40's	120	2.32	1.012
50's	60	2.5	1.033
60's-	16	2.63	1.258
Total	430	2.4	0.965

Table 25. *Mann-Whitney test of "acceptance of the wages fall at the time of deflation" for every age group*

Mann-Whitney	Acceptance of the wages fall at deflation			
	Mann-Whitney's U	Wilcoxon's W	Z	P value
20's and 30's	6338	11591	-0.809	0.419
20's and 40's	7146	14406	-1.406	0.16
20's and 50's	3858	12636	-0.299	0.765
20's and 60's-	970	9748	-0.556	0.578
30's and 40's	5844	13104	-0.609	0.543
30's and 50's	2834	8067	-0.893	0.732
30's and 60's-	712	5965	-0.857	0.392
40's and 50's	3216	10476	-1.218	0.223
40's and 60's-	830	8090	-0.972	0.356
50's and 60's-	430	2280	-0.394	0.693

Table 26. *The frequency table of "acceptance of wages lower than a coworker" for every age group*

	Frequency	Average	Std.Dev.
20's	132	2.32	1.021
30's	102	2.00	1.053
40's	120	2.13	1.107
50's	60	1.77	0.998
60's-	16	2.50	1.366
Total	430	2.12	1.077

Table 27. *Mann-Whitney test of "acceptance of wages lower than a coworker" for every age group*

Mann-Whitney	Acceptance of the wages fall at deflation			
	Mann-Whitney's U	Wilcoxon's W	Z	P value
20's and 30's	5542	10795	-2.42	0.016*
20's and 40's	7098	14358	-1.483	0.138
20's and 50's	2776	4606	-3.484	0**
20's and 60's-	965	9742	-0.592	0.554
30's and 40's	5734	10987	-0.851	0.394
30's and 50's	2662	4492	-1.481	0.131
30's and 60's-	650	5903	-1.375	0.169
40's and 50's	2926	4756	-2.104	0.03*
40's and 60's-	812	8072	-1.046	0.295
50's and 60's-	332	2162	-2.055	0.040*

2.5.3. The difference in the work incentives for every generation

Thirdly, it examines about the relationship the age and labor incentives. It was checked that the efficiency wage hypothesis and the relative wage hypothesis are satisfied in Section 2.3. Here, it is verified whether the influences of the hypothesis differ for every generation. It investigates whether labor incentives is different between each age group. Table 28 shows the result. Table 28 shows that old age group has higher labor incentives than young age group at average value when it is suggested higher wage than the wage according to my ability. Table 29 shows the result of Mann-Whitney test to examine about labor incentives between each age group. It is different between 20's and 40's,

40's and 50's. It is confirmed the results that two tests is both significant. That is, work incentives are not concerned with wages, and are not constant, and the influence which wages have on work incentives is the greatest his twenties.

Table 28. *The frequency table of "the work incentives when having obtained the wages beyond capability" for every age group*

	Frequency	Average	Std.Dev.
20's	132	1.59	0.761
30's	102	1.67	0.674
40's	120	1.83	0.737
50's	60	1.57	0.890
60's-	16	1.63	0.719
Total	430	1.68	0.757

Table 29. *Mann-Whitney test of "the work incentives when having obtained the wages beyond capability" for every age group*

Mann-Whitney	Work incentives when having ontained the wages beyond capability			
	Mann-Whitney's U	Wilcoxon's W	Z	P value
20's and 30's	6040	14818	-1.5	0.134
20's and 40's	6246	15024	-3.226	0.001**
20's and 50's	3718	5548	-0.766	0.444
20's and 60's-	1012	9790	-0.305	0.760
30's and 40's	5492	10745	-1.460	0.144
30's and 50's	2586	4416	-1.819	0.069
30's and 60's-	770	906	-0.398	0.691
40's and 50's	2616	4436	-3.128	0.002**
40's and 60's-	808	944	-1.148	0.251
50's and 60's-	434	2264	-0.666	0.505

2.5.4. The difference in the consciousness to the lifelong employment systemfor every generation

Fourth, it examines about the relationship the age and labor incentives for the lifetime employment system. Although it was checked that lifelong employment system is desired in Section 2.3, it is verified whether the expected values to lifelong employment system differ for every generation here. It investigates whether labor incentives for

the lifetime employment system is different between each age group. Table 30 shows the result. Table 30 shows that old age group has higher labor incentives than young age group at average value when it is the lifetime employment system. Table 31 shows the result of Mann-Whitney test to examine about labor incentives between each age group. It is different between 20's and 30's, 20's and 40's, 20's and 50's, 30's and 50's, 40's and 50's, 50's and 60's. 20's is different to all age group. Labor incentives increase significantly if people can work life at one company. That is, his twenties and his 50's differ from other generation to expectation value to lifetime employment system. When his twenties becomes lifelong employment system, there are more people who think that work incentives decline than other generations.

Table 30. *The frequency table of "the work incentives when working in one company throughout life" for every age group*

	Frequency	Average	Std.Dev.
20's	132	2.79	1.29
30's	102	2.33	1.102
40's	120	2.17	0.920
50's	60	1.57	0.722
60's-	16	2.25	1
Total	430	2.32	1.135

Table 31. *Mann-Whitney test of "the work incentives when working in one company throughout life" for every age group*

Mann-Whitney	Work incentives when working in one company throughout life			
	Mann-Whitney's U	Wilcoxon's W	Z	P value
20's and 30's	5484	10737	-2.528	0.011*
20's and 40's	5864	13124	-3.718	0**
20's and 50's	1734	3564	-6.489	0**
20's and 60's-	824	960	-1.485	0.138
30's and 40's	5686	12946	-0.959	0.337
30's and 50's	1806	3636	-4.585	0**
30's and 60's-	796	932	-0.165	0.869
40's and 50's	2258	4088	-4.316	0**
40's and 60's-	916	8176	-0.315	0.753
50's and 60's-	290	2120	-2.462	0.008**

Conclusion

This section is examined statistically whether the importance of the motives for act and the acceptances for lower wage and labor incentives is different between each age group. Above results shows young age group is "self-actualization" as important motive, old age group is "moral" as it. And old age group has higher labor incentives when it is suggested higher wage than the wage according to my ability, and when it is the lifetime employment system. Older age group think "moral" as important motive. They think that want to rewarded with the lifetime employment system and higher wage. It checked that action motives differed according to a generation. Moreover, Prospect Theory, the efficiency wage hypothesis, and the relative wage hypothesis were satisfied, and it was checked that the influences differ in his twenties as compared with other generations. Moreover, the rate of desiring lifelong employment system as a senior was large, and his twenties had many people who do not desire lifelong employment system strongly. This shows that consciousness change and a behavioral change may have arisen in that time in 1990 which shifted to the market economy bordering on people who were his teens, i.e., his present twenties, and his 30's. It is shown that there is no big difference the results of transition country, the results of advanced nations, especially the result of Japan.

Table. 32. *Economic motives*

Mann-Whitney	Economic motives			
	Mann-Whitney's U	Wilcoxon's W	Z	P value
20's and 30's	633	15108	-0.87	0.332
20's and 40's	7576	14836	-0.788	0.437
20's and 50's	3854	12632	-0.375	0.708
20's and 60's	600	655	-0.612	0.54
20's and 70's-	212	8990	-2.397	0.017*
30's and 40's	5496	12756	-1.659	0.097
30's and 50's	2970	4800	-0.38	0.704
30's and 60's	432	487	-0.97	0.332
30's and 70's-	174	5427	-2.106	0.035*
40's and 50's	3362	10622	-0.949	0.343
40's and 60's	574	629	-0.31	0.757
40's and 70's-	190	7450	-2.562	0.01**
50's and 60's	206	321	-0.732	0.47
50's and 70's-	104	1934	-2.042	0.041*
60's and 70's-	97	1869	-2.016	0.044*

Table 33. *Self-Actualization*

Mann-Whitney	Self-Actualization			
	Mann-Whitney's U	Wilcoxon's W	Z	P value
20's and 30's	5966	14744	-1.656	0.098
20's and 40's	7128	15906	-1.5	0.134
20's and 50's	3892	12670	-0.212	0.832
20's and 60's	440	9218	-1.905	0.057
20's and 70's-	386	9164	-0.115	0.909
30's and 40's	6072	13332	-0.113	0.91
30's and 50's	2728	4558	-1.334	0.182
30's and 60's	362	5615	-1.687	0.012
30's and 70's-	274	295	-0.497	0.691
40's and 50's	3280	5110	-1.083	0.274
40's and 60's	442	7702	-1.491	0.136
40's and 70's-	330	351	-0.378	0.705
50's and 60's	202	2032	-1.825	0.068
50's and 70's-	178	2008	-0.052	0.958
60's and 70's-	120	141	-1.125	0.261

Table 34. *Moral rightness*

Mann-Whitney	Moral rightness			
	Mann-Whitney's U	Wilcoxon's W	Z	P value
20's and 30's	6442	11695	-0.636	0.525
20's and 40's	7362	14622	-1.063	0.288
20's and 50's	3914	5744	-0.145	0.885
20's and 60's	560	9338	-0.881	0.378
20's and 70's-	364	385	-0.375	0.708
30's and 40's	5916	13176	-0.474	0.635
30's and 50's	2964	8217	-0.378	0.705
30's and 60's	422	5675	-1.004	0.315
30's and 70's-	296	317	-0.153	0.878
40's and 50's	3382	10642	-0.728	0.467
40's and 60's	504	7764	-0.911	0.367
40's and 70's-	356	7616	-0.050	0.960
50's and 60's	254	2084	-0.851	0.395
50's and 70's-	168	189	-0.305	0.761
60's and 70's-	24	45	-0.693	0.488

Table 35. *Pleasure*

Mann-Whitney	Pleasure			
	Mann-Whitney's U	Wilcoxon's W	Z	P value
20's and 30's	6052	14830	-1.407	0.16
20's and 40's	7712	14972	-0.387	0.698
20's and 50's	3686	12464	-0.821	0.412
20's and 60's	482	9260	-1.506	0.132
20's and 70's-	310	9088	-0.953	0.341
30's and 40's	5232	12492	-2.024	0.043*
30's and 50's	2908	4738	-0.572	0.567
30's and 60's	414	5667	-1.055	0.291
30's and 70's-	270	5523	-0.520	0.603
40's and 50's	3218	10487	-1.281	0.2
40's and 60's	410	7670	-1.836	0.066
40's and 70's-	266	7526	-1.192	0.233
50's and 60's	234	2064	-1.233	0.218
50's and 70's-	152	1982	-0.697	0.486
60's and 70's-	128	149	-0.258	0.796

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2 A study on consumption behaviors of each generation in Mongolia in transition countries

Introduction

This section is examine about consumption behavior in Mongolia in transition countries. Mongolia has moved from the socialist economy to market economy in 1990 twenty years ago. Market economy led to major changes in lifestyle. The effort is also likely to increase income. This paper consider whether such environments change make differences in labor awareness and consumer behaviors of each generation by using behavioral economics methods. I specially verify whether the changes of awareness has occurred bordering on teens when it has changed from a socialist economy to market economy in 1990. That is now 30's. Purpose is to examine whether market economy make differences in the awareness of each generation. This research verifies whether general economic is satisfied in transition countries, and whether the results of transition countries difference with that of development countries,

especially in Japan. I consider two views based on survey of behavioral economics.

Firstly, it is the existence of money illusion. Secondary, it is existence of the consumption smoothing is satisfied by estimating time reference rate of each generation. Products Prices is determined at market prices in market economy. The impact for deflation and inflation is more bigger in developing countries than that for development countries. So people need to consider such impact. Since socialist economy planned to produce products, the variation of monetary inflation and deflation is smaller. So people with experience of life in the socialist economy is less responsive to inflation and deflation. It considers that they can't recognize the real value and the nominal value. That means that they illusion for money.

Next, it had assumed that general economic was constant about time reference rate because people consume the changes from permanent consumption. But many products are imported from abroad in transition countries since introduction to market economy. It mainly stimulate young. And the socialist economy has a goal to distribute resources equally. So the state had ensured the life for elderly even as people become old age. So It might consider that thoughts about preparing for retirement also had changed according to introduction of market economy. It might reduce the consume when young, and increase the save. It might such circumstances made differences of each generation about time reference rate.

Camerer & Loewenstein (2004) shows the following three as a consumptive anomaly. Firstly, This is that man recognizes income not as a real value but as a nominal value. This is called a money illusion. According to standard economics, rational consumers consider worth of income from the amount of goods which can be purchased. Secondary, This is that man does not smooth consumption

through the whole life. According to the life-cycle model drawn from standard economics, rational consumers should smooth consumption. Thirdly, This is that man also changes how to use if a source of income is different.

According to standard economics, rational consumers should regard it as the same income regardless of the source of income. As typical lliteratures of behavioral economics, there are Kahneman & Tversky (1979), Kahneman, Slovic, & Tversky (1982), Camerer, Lowenstein, & Rabin (2004), Altnam (2006) etc.

This section takes up the 1st anomaly, i.e., money illusion. Next section takes up the 3rd anomaly, i.e., consumption smoothing. A money illusion is making decisions not based on a real value but based on a nominal value, when people do economical action. The utility and benefits which people get are generated from goods, i.e., thing. So as for people, making decisions based on a real value is rational.

Although the real value and the nominal value have deviated, since making decisions based on a nominal value is contrary to economic rationality, it is called a money illusion.

Previous review about money illusion and consumption smoothing

About the money illusion is verified in Section 3, about 80 years ago, although the book of the title a"money illusion" was published, after that, Patinkin (1965) also takes up this problem and, as for Fisher (1928), the scholars of behavioral economics have taken up this problem in recent years.

The result of empirical study is supporting existence of a money illusion. For example, there is research of Shafir, Diamond & Tversky (1997) which investigated the virtual question in the United States, and Fehr & Tyran (2001) which conducted experiment investigation in Switzerland.

In this section, it verifies whether a money illusion is observed using micro data in transition country Mongolian.

It indicates that Kachelmeier & Shehata (1992) was not able to find out a difference although the result obtained from the virtual question was compared with the result obtained from the situation where the money incentive was given to the participant. So, it is thought that the result obtained from the virtual question also has validity.

About the money illusion is verified in Section 4, Rae (1834) considered that the choice between at different time consists of many psychological factors. But many people accepted the method which replace many factors to one parameter since Samuelson (1937) suggested the model which discounted utility. This meant that discount rate was used to many people. But it replaced to the discount of hyperbola type which Laibson (1997,1998) suggest so which did not have the good empirical results. But, Frederick, Loewenstein, & O'Donoghue (2002) says that the present consumption may be affected by the influence of past consumption. and the preference itself may change with formation of a new custom, or change of a reference point, or change of man's instinct. There is the following as criticism to the utility function which standard economics assumes. Simin (1986) says that the economist is using a word called rationality in the sense of a narrow sense extremely, and insists that he will eliminate many domains of the rational phenomenon which a psychologist includes therein as a result. And Frank (1987) says, If man's emotional side is taken into consideration in specification of a utility function, the range to which an economic model is applied is arguing that it can expand sharply. Tversky & Thaler (1990) says, in behavioral economics, value and a preference are made from a derivation process by people, and it is being argued that a preference stands on the position in which it is formed depending on the situation where the decision maker and

the decision problem set. As research which presumed the state-dependent utility function, there is research of Viscusi & Evans (1990) or Evans & Viscusi (1991).

The early researcher think that it is difficult to think that a single parameter can show the factor of consumption distribution between a time and other time. This research should think that some parameter show the factor of consumption distribution between at the different time, without using a single parameter. Taking into consideration here is two of the difference in the enjoyment capability of utility between generations and the residual effects of utility which produced at a time affects the utility of henceforth at that time. The model of this research rewrites the Euler equation which uses a rate of time preference. Time preference rate changes into the parameter that show the difference in the enjoyment capability of the utility between generations, and the parameter which shows the residual effect of the utility. In Mongolia, Investigation of the consumption distribution by generation during the whole life under the assumption which removes uncertainty (Ishii, 2012) shows the result that consumption distribution of youth is larger than that of old. This can explain the model of this research.

It is assumed that neo-classical economics model maximizes the utility that a household is obtained from consumption of each term through the future. This means solving dynamic optimization problem about a consumptive time series. A permanent income hypothesis indicates that consumption is decided by permanent income. The increase in income leads to the increase in consumptive in the range reflecting the increase in permanent income. When higher-income than permanent income, that means when fluctuating income is high, positive savings is performed, and savings is pulled down when low. People smooth a consumptive time path using savings and borrowing.

However, when presuming permanent income, there is a problem that the relation between the permanent income estimated and consumption is close to actual income and a consumptive relation since permanent income had a close relation with actual income, Therefore, it was difficult to distinguish a permanent income hypothesis from the Keynesian type consumption function. Then, by introducing a rational expectation hypothesis, the random walk hypothesis of consumption of Hall (1978) proposed the radical solution over this problem. Hall verified the hypothesis about the time series of the consumption theoretically drawn from a permanent income hypothesis and a rational expectation hypothesis instead of presuming the permanent income. He thought that the rational consumer can improve the utility by smoothing it, if a consumptive change is predicted. A rational individual adjusts consumption of his this term to the point that a consumptive change is no longer predicted. If an individual performs optimal consumption selection based on all the information which can be obtained at the time, consumption of a term will be set to 1/T of aggregate consumption expectable in the whole life T period. And consumption of the next term expected at each term is equal to consumption of this term. That is, it will be said that a consumptive change cannot be predicted and a consumptive random walk hypothesis is satisfied. The result of Hall could not have rejected the hypothesis that a consumptive change could not be predicted using lag value of income or the consumptive lag value as above-mentioned. However, it was criticized that his method cannot be interpreted unambiguously the obtained result. Campbell & Mankiw (1989) built the hypothesis that some consumers consumed all the present income in hand-to-mouth life, other consumers performed consumption smoothing according to permanent income hypothesis. He estimated hand-to-mouth life consumers'

percentage λ using instrumental variables method. They increased consumption by about 50 cents intentionally in response to the increase in income of 1 dollar expected. This means that a random walk hypothesis was rejected.

However, since the ratio of λ by Campbell and Mankiw is much smaller than 1 at about 0.5, Romer (2006) claims that a permanent income hypothesis is still important for a consumptive understanding. Although a random walk hypothesis is rejected in the research using macro data including Campbell and Mankiw in many cases, since the research using macro data was not persuasive enough, its research using the micro data obtained from the social experiment would be mainstream after the 90s. Shea (1995) showed that 1% of rise of the wages by a labor contract which can be predicted brought about the increase in 0.89% of consumption using micro data. Souleles (1999) showed that 35-60% of the tax rebates which can be predicted were consumed within a quarter. The research using the micro data shows that household consumption overreacts to change of the expected income (Flavin, 1981). That is, it is clear to react to change of the income which can predict consumption unlike the hypothesis of Hall, and a random walk hypothesis is rejected like the research findings using macro data.

From the above, it is clear that, the result of study of permanent income hypothesis which obtained using macro data and micro data is not satisfied strictly. Assumption which sets it as it is constant and use time preference rate of a single parameter is considered to be one of the causes as a factor of the consumption determination between a time and other time. There is a problem in assumption which time preference rate was constant, and I thought that time preference consists of various factors.

Money illusion

3.1. Sample

The attribute of the sample used in this section before analysis is checked. The data to be used is sex, age, a household annual income, and an inhabitable area. A man-and-woman ratio has a slightly high male ratio, although there is no deviation. Although it was made for the number of samples for every generation to turn into the same number mostly, a 40's ratio is slightly high.

The question of a questionnaire Please imagine that he is a salaried worker. Suppose that your salary and prices changed to six situations shown below in the past six months. You thought that you would buy a certain goods six months ago. When you set in six situations shown below, does the probability that you will buy this product change?

Please choose one from five choices. Achoice is the following. 1 increases, 2 increases a little, 3 does not change, 4 is slightly low, 5 is low.

Situation 1: *The prices of all the goods including the goods currently regarded as your buying it in these six months are changeless, and your salary went up by 3%.*

Situation 2: *The prices of all the goods including the goods currently regarded as your buying it in these six months rose by 3%, and your salary went up by 6%.*

Situation 3: *The prices of all the goods including the goods currently regarded as your buying it in these six months fell 6%, and your salary fell 3%.*

Situation 4: *The prices of all the goods including the goods currently regarded as your buying it in these six months are changeless, and your salary was not changeful, either.*

Situation 5: *The prices of all the goods including the goods currently regarded as your buying it in these six months rose by 3%, and your salary also went up by 3%.*

Situation 6: *The prices of all the goods including the goods currently regarded as your buying it in these six months fell 3%, and your salary also fell 3%.*

Table 1. *The frequency table for every sex*

	Frequancy	Percent
Man	176	49
Woman	184	51
Total	360	100

Table 2. *The frequency table for every age*

Age	Frequancy	Percent
20-29	86	23.89
30-39	74	20.56
40-49	86	23.89
50-59	64	17.78
60-69	38	10.56
70-	12	3.33
Total	360	100

3.2. Result

3.2.1. Basic Statistics

3.2.1.1. The case for 3%rise of real salary

This section verifies the existence of a money illusion. The descriptive statistics of the reply to the question shown with Section 2 will be shown. Table 4 is the descriptive statistics about the reply of the question about a money illusion. Since a numerical value is the reply of five-step evaluation, the more a numerical value is high, the more decline in consumption probability is shown. If it checks by average value, consumption probability will fall in order of the situation 3, the situation 2, and the situation 1. The consumption probability of the situation 3 is smaller than

other two. Table 5 is about the situation 1. The ratio of the replies "it does not change" is the largest, and a "slightly high" ratio is large to the next. It is the distribution which inclined toward the left. Table 6 is about the situation 2. Like the situation 1, although the ratio of "not changing" among replies is the largest, a "slightly low" ratio is next large. Although the situation 2 resembles the situation 1, the reply is flowing in the direction in which consumption probability is reduced a little. Although a substantial situation does not change, it is thought that the respondent reacted to the rise of prices lowered consumption probability compared with the situation 1. Table 7 is about the situation 2. The ratio of the replies "it is low" and a "slightly low" ratio are the largest. Compared with the situations 1 and 2, the reply is flowing through the reply of the situation 3 in the direction in which consumption probability is reduced more. It is thought that the respondent reacted to the fall of the salary lowered consumption probability compared with the situation 1 or 2. Two of falls of the rise of prices and a salary can be considered as a factor which lowers consumption probability. Asymmetry is seen by these reactions and consumers are considered to react more sensitively to the fall of a salary rather than the rise of prices. Even if a real salary does not change, it will be thought that the psychology where he would like to avoid the fall of a nominal salary worked.

Table 3. *Household Income(unit: 100 thousands togrig)*

	Frequency	Percent	Accumulation (%)
～15	74	20.56	20.56
15～18	34	9.44	30
18～21	26	7.22	37.22
21～24	25	5.56	42.78
24～27	26	7.22	50
27～30	21	4.44	54.44
30～33	18	2.22	56.67
33～36	20	5.56	52.22
36～39	20	3.33	65.56
39～42	23	2.22	67.78
42～45	26	4.44	72.22
45～48	29	4.44	76.67
48～51	7	1.11	77.78
51～54	6	1.67	79.44
54～57	8	2.22	81.67
57～60	6	1.67	83.33
60～63	8	2.22	85.56
63～66	4	1.11	86.67
66～69	2	0.56	87.22
69～72	14	3.89	91.11
72～	32	8.89	100
Total	430	100	

Table 4. *Descriptive statistics of the reply about a money illusion: real income 3%up*

Variable	Case1	Case2	Case3
Obs	358	358	358
Mean	2.99	3.43	3.78
St.Dev.	1.20	0.99	1.01
Min.	1	1	1
Max.	5	5	5

Table 5. *The frequency table for every reply(Situation1):price 0%, income 3%up*

Case1	Freq.	Percent	Cum.
1	40	11.17	11.17
2	94	26.26	37.43
3	98	27.37	64.8
4	82	22.91	87.71
5	44	12.29	100
Total	358	100	

Table 6. *The frequency table for every reply(Situation2):price 3%up, income 6%up*

Case2	Freq.	Percent	Cum.
1	12	3.35	3.35
2	44	12.29	15.64
3	131	36.59	52.23
4	119	33.24	85.47
5	52	14.53	100
Total	358	100	

Table 7. *The frequency table for every reply(Situation3):price 6%down, income 3%down*

Case3	Freq.	Percent	Cum.
1	12	3.35	3.35
2	28	7.82	11.17
3	76	21.23	32.4
4	154	43.02	75.42
5	88	24.58	100
Total	358	100	

3.2.1.2. The case for 0%rise of real salary

Table 8 is the descriptive statistics of a reply of the question about three situations meaning a real salary not changing. If it sees by average value, consumption probability will fall in order of the situation 6, the situation 5, and the situation 4. The consumption probability of the situation 6 is smaller than other two. Table 9 is about the situation 4. The ratio of the replies "it does not change" is large, and a "slightly high" ratio is large to the next.

Table 8. *Descriptive statistics of the reply about a money illusion: real income 0%up*

Variable	Case4	Case5	Case6
Obs	358	358	358
Mean	2.95	3.12	3.53
St.Dev.	0.67	0.94	1.11
Min.	1	1	1
Max.	5	5	5

Table 9. *The frequency table for every reply(Situation4):price 0%, income 0%up*

Case4	Freq.	Percent	Cum.
1	6	1.68	1.68
2	56	15.64	17.32
3	262	73.18	90.5
4	18	5.03	95.53
5	16	4.47	100
Total	358	100	

Table 10. *The frequency table for every reply(Situation5):price 3%up, income 3%up*

Case5	Freq.	Percent	Cum.
1	14	3.91	3.91
2	46	12.85	16.76
3	230	64.25	81.01
4	18	5.03	86.03
5	50	13.97	100
Total	358	100	

Table 11. *The frequency table for every reply(Situation6):price 3%down, income 3%down*

Case6	Freq.	Percent	Cum.
1	12	3.35	3.35
2	32	8.94	12.29
3	176	49.16	61.45
4	30	8.38	69.83
5	108	30.17	100
Total	358	100	

Table 10 is about the situation 5. The same result as the situation 4 was obtained. Rather than the situation 4, the reply is flowing through the situation 5 in the direction in which consumption probability is reduced a little.

Table 11 is about the situation 6. Compared with the situations 4 and 5, the reply is flowing through the situation 6 in the direction which has many people who choose "it is low" and in which they reduce consumption probability. Although a substantial situation does not change, it is thought that the respondent reacted to the fall of the salary lowered consumption probability compared with the situation 4 or 5. The same result was obtained compared with the situation 1, the situation 2, and the situation 3.

3.3. Test of difference

If people are making decisions based on the real value, since three situations are substantially the same, there must be no difference between replies. In order to verify strictly whether a difference is between the replies under three situations, the statistical technique is used and it estimates test of a difference. Analysis in the case of regarding it as the case where a reply regards it as an interval scale, and an ordinal scale is conducted. When a reply regards it as an interval scale, analysis of variance of repetitive measurement is conducted, Since the reply in three situations is repetitive measurement by the same respondent, when regarding it as an ordinal scale, Friedman test is performed.

Firstly, the case where a reply regards it as an interval scale is considered. Before estimating the analysis of variance of Repeted measure, it is necessary to estimate Mauchly's test of sphericity. This test verifies whether the standard error of the average value between replies is equal. Although Table 12 shows the result, it is significant with the 5% level. Since this means that the standard error of the average value between replies is not equal, it should see the test results of

Greenhouse-Geisser or Huynh-Feldt in an analysis-of-variance table. Table 13 shows the test results of Greenhouse-Geisser and Huynh-Feldt. It is shown that both of the test results, Greenhouse-Geisser and Huynh-Feldt, is significant with the level 5%, and a reply has a difference among three situations.

Next, in order to find between which situations there is any difference among three situations, Table 14 is the result of test of the difference between two situations respectively. The Bonferroni method was used in this test. It indicates that Table14has a difference significantly with the level 5% among all the situations. There is a difference between situations significantly and consumption probability is falling in order of the situations 3, 2, and 1.

Secondary, the case where a reply is regarded as an ordinal scale is considered. It estimates Friedman test which is the nonparametric estimation in the analysis of variance of repeted measure is performed. A nonparametric test has a merit which does not assume the normality of data. Table 15 was shown the result of Friedman test, there is a difference significantly with the level 5% among three situations. The multiple comparison of three situations is carried out by using the reply of two situations among three situations respectively like the above analysis of variance also here. Test used for the multiple comparison is the Wilcoxon rank test. Table16 –Table18 is shown this results. There is a point which it must be careful of in the interpretation as a result of theWilcoxon rank test. Since it is testing whether a difference arises in a result with the combination of three situations, it is necessary to correct the significance level to the Bonferroni inequality. Since three situations will be used if 5% of a significance level is adopted, you have to correct the significance level to 0.0167 which divided 0.05 by 3. Table 16 - table 18 which corrected the significance level is shown it has a difference significantly with the level 5% among all the

situations. This conclusion is the same as the result of the above analysis of variance.

Table 12. *Mauchly's test of sphericity: Case for real income 3% up*

		Situation repetition measurement
Machly's W		0.84
Approximation Chi square		62.237
Degree of freedom		2
Significant probability		0***
Epsilon	Greenhouse-Geisser	0.862
	Huynh-Feldt	0.866
	Minimum	0.5

Table 13. *The variance analysis of repeted measure: Case for real income 3% up*

		Sum of square	Degree of freedom	Men of square	F value	Significant probability
Between situation	Assumption of a surface of a sphere	63.709	2	31.855	40.691	0***
	Greenhouse-Geisser	63.709	1.725	36.964	40.691	0***
	Huynh-Feldt	63.709	1.731	36.802	40.691	0***
	Minimum	63.709	1	63.709	40.691	0***
Error (between situation)	Assumption of a surface of a sphere	558.957	714	0.783		
	Greenhouse-Geisser	558.957	615.307	0.908		
	Huynh-Feldt	558.957	618.015	0.904		
	Minimum	558.957	357	1.066		

Table 14. *Test of the difference between two situations: Case for real income 3%up*

(I) Situation	(J) Situation	The difference of average value (I-J)	Standard error	Significant probability
1	2	-0.173	0.054	0.001
	3	-0.581	0.065	0.000
2	1	0.173	0.054	0.001
	3	-0.408	0.077	0.000
3	1	0.581	0.065	0.000
	2	0.408	0.077	0.000

Table 15. *Friedman's test: : Case for real income 3%up*

Sample	358
Chi square	58.61
Degree of freedom	2
Asymptotic significant probbbility	0***

Table 16. *Wilcoxon rank test: (Situantion1 and 2)*

Z	*-3.34*
Asymptotic significant probbbility	0.001***

Table 17. *Wilcoxon rank test: (Situantion1 and 3)*

Z	-8.121
Asymptotic significant probbbility	0.001***

Table 18. *Wilcoxon rank test: (Situantion2 and 3)*

Z	-5.169
Asymptotic significant probbbility	0.001***

Like the situations 1-3, if people are making decisions based on the real value, since three situations are substantially the same, there must be no difference between the replies of the situations 4-6. The statistical technique is used in order to verify strictly whether a difference is among three situations also here again. Firstly, The case where a reply regards it as an interval scale is considered. Table19 is the results of Mauchly's test of sphericity. It is significant with the 5% level.

Since this means that the standard error of the average value between replies is not equal, it should see the test results of Greenhouse-Geisser or Huynh-Feldt in an analysis-of-variance table. Table 20 shows the test results of Greenhouse-Geisser and Huynh-Feldt. It is shown that both of the test results, Greenhouse-Geisser and Huynh-Feldt, is significant with the level 5%, and a reply has a difference among three situations. Next, In order to find between which situations there is any difference among three situations, Table 21 is the result of test of the difference between two situations respectively. It indicates that Table 21 has a difference significantly with the level 5% among all the situations. There is a difference between situations significantly and consumption probability is falling in order of the situations 3, 2, and 1.

Secondary, the case where a reply is regarded as an ordinal scale is considered. It estimate Table 22 was shown the result of Friedman test, there is a difference significantly with the level 5% among three situations. Test used for the multiple comparison is the Wilcoxon rank test. Table23 – Table25 is shown this results. Table 23 - Table 25 which corrected the significance level is shown it has a difference significantly with the level 5% among all the situations. This conclusion is the same as the result of the above analysis of variance.

Table 19. *Mauchly's test of sphericity: Case for real income 0%up*

		Situation repetition measurement
Machly's W		0.263
Approximation Chi square		475.292
Degree of freedom		2
Significant probability		0***
Epsilon	Greenhouse-Geisser	0.576
	Huynh-Feldt	0576
	Minimum	0.5

Table 20. *The variance analysis of repeted measure: Case for real income 0%up*

		Sum of square	Degree of freedom	Men of square	F value	Significant probability
Between situation	Assumption of a surface of a sphere	111.67	2	55.835	59.591	0***
	Greenhouse-Geisser	111.67	1.151	96.978	59.591	0***
	Huynh-Feldt	111.67	1.153	96.865	59.591	0***
	Minimum	111.67	1	111.67	59.591	0***
Error (between situation)	Assumption of a surface of a sphere	686.996	714	0.937		
	Greenhouse-Geisser	686.996	411.085	1.627		
	Huynh-Feldt	686.996	411.564	1.625		
	Minimum	686.996	357	1.874		

Table 21. *Test of the difference between two situations: Case for real income 0%up*

(I) Situation	(J) Situation	The difference of average value (I-J)	Standard error	Significant probability
1	2	-0.344	0.027	0.000
	3	-0.444	0.086	0.000
2	1	0.344	0.027	0.000
	3	-0.788	0.087	0.000
3	1	0.444	0.086	0.000
	2	0.788	0.087	0.000

Table 22. *Friedman's test: : Case for real income 0%up*

Sample	358
Chi square	104.648
Degree of freedom	2
Asymptotic significant probbbility	0***

Table 23. *Wilcoxon rank test: (Situantion4 and 5)*

Z	-10.497
Asymptotic significant probbbility	0.001***

Table 24. *Wilcoxon rank test: (Situantion4 and 6)*

Z	-4.964
Asymptotic significant probbbility	0.001***

Table 25. *Wilcoxon rank test: (Situantion5 and 6)*

Z	-8.104
Asymptotic significant probbbility	0.001***

In Section 3, in order to verify whether a money illusion is observed in transition country Mongolian, the virtual question about a consumer behavior was investigated for the man and woman of Ulaanbatar. A question was asked about six situations as a virtual question. I showed three situations where a real salary goes up by 3%, and three situations where a real salary did not change, and got the consumption probability under it to answer in five steps.

As the situation where a real salary goes up by 3%, It is a case where a salary goes up by 3% although, as for the 1st case, prices do not change. The 2nd case is a case where prices rise by 3% and a salary goes up by 6%. The 3rd case is a case where prices fall 6% and a salary falls 3%. As the situation where a real salary goes up by 0%, As for the 4th case, prices and a salary do not change. As for the 5th case, both prices and a salary go up by 3%. As for the 5th case, Both prices and a salary fall 3%. As for each situation of the three former, a real salary goes up by 3%, and each of three latter situations shows that a real salary does not change. If

people do not have a money illusion and it is acting based on a real base, consumption probability should not change. However, according to the analysis conducted in this section, even when it was able to be considered that a reply is an interval scale, and even when it was able to be regarded as an ordinal scale, the significant difference was statistically seen by the reply obtained among each three situation, and existence of a money illusion was proved. And consumption probability fell in order of the order of the situations 3, 2, and 1, and the situations 6, 5, and 4. While both the situations 2 and 3 have maintained the rise of the real salary to 3%, in the situation 2, prices and a salary go up, but, Prices and a salary are falling in the situation 2. It is thought that, as for the former, the respondent reacted to the rise of prices lowered consumption probability, and, as for the latter, the respondent reacted to the fall of the salary lowered consumption probability. Asymmetry was checked by the respondent's reaction and it has reacted greatly due to the fall of a salary rather than the rise of prices. It is thought that there is avoidant to a nominal wage falls. Unlike the usual economic variable, wages are the countervalues to labor of them and it can be considered that they are evaluation to themselves. Man believes that I am a worthy existence, and man is wishing he would like to accept so also from the surroundings. Since the fall of wages means deterioration of my value if it is right, it is hard to accept the fall of wages. Although Tsukahara (2003) pointed out "approval of the self-value as a human being who exists in society" as man's action motive, he is considered that such human psychology serves as a backdrop by avoidant [of a nominal wage fall].

As a problem before pursuing economic rationality, existing in society will be the requisite, and if man does not survive, he cannot pursue economic rationality. Man recognize that having a motive about survival of a human

being with will is a subject which is worth being sufficient for he existing in society.

As political implication, even if real wages are constant, in the deflation situation where a nominal wage also falls, it is expected that consumption declines. When the government performs business stimulating measures, the policy operation which considered the trend of the nominal wage rather from real wages is needed.

The result of this section checked that the fall of a nominal wage made consumption decline. Probably, people are going to avoid the fall of a nominal wage, since consumptive decline reduces a living standard. This is considered to bring about the downward rigidity of wages.

Consumption smoothing

4.1. Model

This section clarifies the model of consumers' optimal consumer behavior over the whole life. Firstly, the model of standard economics is introduced, secondary, It shows the model which this research, and Tsukahara & Matsuzaki (2010) suggest. This model took the humane factor i.e., a physical factor and the mental factor into consideration. Here, the world which does not have uncertainty for simplification is assumed. This assume the

individual who lives 2 periods of a youth term and older term. A individual's lifetime utility U presupposes that it is shown by the following formula.

$$\mathrm{U} = \mathrm{U}(C_Y) + \left\{\frac{1}{1+\rho}\right\}\mathrm{U}(C_0) \qquad (1)$$

C_Y is consumption at youth term. C_0 is consumption at older term. ϱ is subjective time preference rate. Although consumptive marginal utility is positive, it is assumed that the rate of change is negative. The budget constraint over

this individual's whole life is shown by the following formula.

$$C_0 = (1+r)(W + Y_Y - C_Y) + Y_0 \quad (2)$$

W is initial asset. Y_Y is income at youth term. Y_0 is income at older term. r is interest rate. An individual assumes that all of property or income are used up. Under restrictions of (2) equation, it assumes that an individual determines consumption of each term by maximizing the lifetime utility of (1) equation.

It substitute (2) equation for (1) equation, and the first order condition is calculated to maximize the lifetime utility.

$$\mathrm{U}'(C_Y) + \left\{\frac{1+r}{1+\rho}\right\}\mathrm{U}'(C_0) \quad (3)$$

(3) equation is a conditional equation which shows the optimal consumption of between a time and other time, and is called the Euler equation. This shows the following. If interest rate is larger than subjective time preference rate, the consumption of the older term will become larger than consumption of the youth term, and if an interest rate is smaller than subjective time preference rate, the consumption of the older term beomes smaller than the consumption of a youth term. If an interest rate and a subjective time preference rate are equal, consumption of the older term and consumption of a youth term will become equal, and consumption smoothing will be satisfied.

Secondary, It shows the model which this research, and Tsukahara & Matsuzaki (2010) suggest. This model took the humane factor i.e., a physical factor and the mental factor into consideration. A individual's lifetime utility U presupposes that it is shown by the following formula.

$$\mathrm{U} = U_Y(C_Y) + U_0(C_0) + \delta U_Y(C_Y) \quad (4)$$

U_Y is utility at youth term. U_0 is utility at older term. δ is the residual coefficient of the utility at youth term. There are two features of this model as compared with a standard model. It explains that by using the residual effect of a utility and the difference in the enjoyment capability of utility between generations, by not using a subjective time preference rate between a time and other time. If an actual human being is assumed, utility enjoyment capability will change for every generation. In order that people's physical capability may decline with age, I think that utility enjoyment capability declines. For example, in traveling abroad, even if it is a plan of the same tour, when young, from the time which is not young, it can turn around many tourist resorts and fresh impression can be obtained. This research assumed that the utility function at youth term and older term was different, and assumes $U'_Y > U'_0$ if the same amount of consumption. If a more actual human being is assumed, I thought that there is the residual effect in utility. Consumption experience at youth term remains for years as recollections or experience. Here, this was considered to be mental positive property and it is assumed that only the rate of δ remains for years. There is Ikeda (2003) as a paper which shows about the custom formation in a consumer behavior. The budget constraint over this individual's whole life is the same as the above-mentioned (2) equation. Under restrictions of (2) equation, it assumes that an individual determines consumption of each term by maximizing the lifetime utility of (4) equation. It substitute (2) equation for (4) equation, and the first order condition is calculated to maximize the lifetime utility.

$$U'_Y(C_Y) = \left\{\frac{1+r}{1+\delta}\right\} U'_0(C_0) \tag{5}$$

(5) equation is a conditional equation which shows the optimal consumption of between a time and other time which took the more human factor into consideration.

Although (5) equation is similar to (4) equation, even if interest rate and the residual coefficient of the utility at youth term are equal, the consumption at youth term and the consumption at older term will not become equal. It means it is not satisfied consumption smoothing through the whole life. In order to emphasize the feature of this model, the model of the standard economics when assumes that interest rate and subjective time preference rate are equal, and the model which took the more human factor when assumes that interest rate and the residual coefficient of the utility at youth term are equal into consideration is shown by a figure. A figure shows a marginal utility function. The former model is Fig.1, and the latter model is Fig.2. The model which took the humane factor into consideration can explain bigger difference of the consumption at youth term and the consumption at older term. This model enables explanation of the phenomenon in which the consumption at youth term is large compared with older term, from the difference in the utility enjoyment capability and coefficients by age.

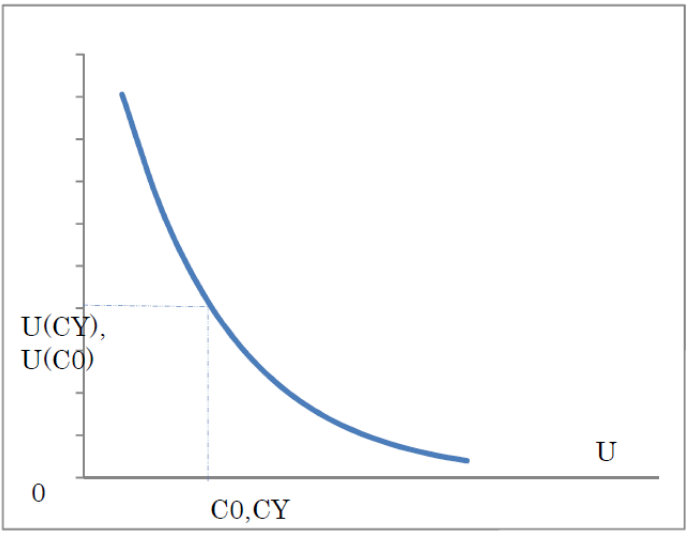

Figure 1.

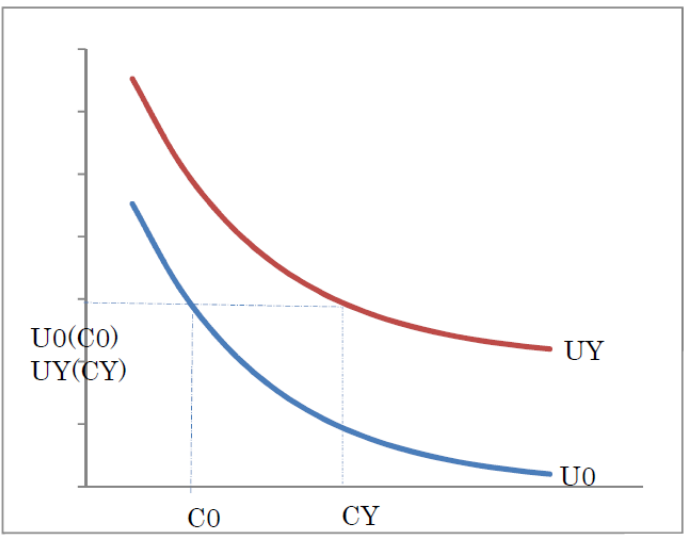

Figure 2.

4.2. Estimation

Table 26 shows the descriptive statistics of the amount of consumption in every 10 years old obtained from results of an investigation. Sample size is 360. Both average value the

median and a mode are decreasing as the amount of consumption in every 10 years old grows older. The question assumes the interest rate to be zero. So if subjective time preference rate is positive even if it is a model of standard economics, negative correlation of age and an amount of consumption can be explained. The Estimation of the rate of time preference using the model of standard economics is also performed. Table26 indicates relatively that the amount of consumption in every 10 years old is most largest by 30's and 20's is next large. 50's, and 60's is a degree in the middle, more 60's are small. Reduction of the amount of consumption is not constant and classification of the amount of consumption is able to made in adolescence, a its mature stage, and the golden age. This can be interpreted as it being because consumptive enjoyment capability being different in each term. That is, the adolescence when consumptive enjoyment capability is high has the large amount of consumption, the amount of consumption is decreased at the golden age which declines in consumptive enjoyment capability. The model with this conformable interpretation is a model which took the humane factor into consideration. Table 27 shows the time preference rate every adjacent 2 term using (3) equation which are a model of standard economics. In calculation, the consumption function of i term assumed $U_i = logC_i$ and it asked for marginal utility as $1/C_i$.

Table 26. *Descriptive statistics of consumption for every age (a unit is 100,000 togrigs)*

	Average	Median	Mode	Std.Dev.	Min.	Max.
20's	12.15	10	10	6.24	3	40
30's	13.01	10	10	5.67	3	40
40's	11.12	10	10	4.45	2	30
50's	10.13	10	10	4.39	2	40
60's	8.93	10	10	3.19	2	25
70's	8.43	10	10	3.09	2	20
80's	8.05	10	10	3.37	1	20

Table 27. *The point estimate of the rate of time preference for every adjacent generation*

	Estimation value
20′s and 30′s	0.015
30′s and 40′s	0.219
40′s and 50′s	0.121
50′s and 60′s	0.193
60′s and 70′s	0.196
70′s and 80′s	0.27

The above table shows that time preference rate is very unstable, although it is positive, firstly. Secondary, a time preference rate of 20's and 30's is very small, and the time preference rate of 40's and 50's is smaller than other age. Such a difference in time preference rate for every age is the same result as Tsukahara & Matsuzaki (2010) which analyzed in Japan. In the model of the standard economics which assumes the same consumption function through the whole life, and assumes a stable rate of time preference, it is difficult to explain the difference in the rate of time preference for every age. The utility function is affected by the influence of the democratization of the 1990s, or thinks that a utility function changes a lot in adolescence, a mature stage, and the golden age.

It was checked that time preference rate differ for every generation. It is proved that the utility enjoyment capability and the residual coefficient for every generation differ from each other as a different reason for every generation. It focused on the consumer behavior which led consumers' whole life. As the equation which replace with the Euler equation based on a standard economic model as a conditional expression of the optimal consumption, The equation based on the model which took the more humane factor into consideration was drawn and verified. One of the features of this model is the point that the enjoyment

capability of consumption of man changes with age. The analysis result is supporting this model.

Conclusion

In this research, the money illusion not only has arisen, but it was checked that a time preference rate is not constant. If it is consumed as the younger age group and a rate of time preference changes with generations, it will be thought that 1-dollar value changes with generations. That is, even if the loss of the same amount produces the younger age group and an old age layer, if it is the younger age group, a loss may also feel the loss by a money illusion small. That is, the time preference rate which affects consumption smoothing also affects a money illusion. The difference for every generation of a time preference rate becomes larger than the influence which only consumption smoothing has on people's economical action. It has a possibility of bringing a big difference to the economical action for every generation. If the preference of a between at the different time changes with generations, the consumer behaviors at a certain time not only differ for every generation, but it will be thought that the reactions to a loss also differ.

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3 Monetary policy framework changes and the money demand function

Introduction

The aim this section is to investigate whether a change of the monetary policy framework—such as the adoption of an inflation targeting policy—changes the effect of monetary policy. After the financial crisis in Thailand in 2000, the Bank of Thailand adopted just such an inflation-targeting policy that attempts to manage interest rates.

This section tests and verifies two hypothesis: First, I investigate whether the model of the money demand function changes from one of a developing country to the one of a developed country with the adoption of an inflation targeting policy. I find that a monetary policy framework does indeed change the model of the money demand function. Second, I test the effect of monetary policy changes through changes to the monetary policy framework. I estimate interest rate elasticity to investigate the effect of monetary policy.

This paper aims to investigate whether and how a monetary policy framework change affects the model and the effect of monetary policy.

Literature review

This section reviews findings from the previous literature. If an equilibrium relationship is observed with the money demand function, financial authorities can achieve a reasonable inflation rate by changing the money supply. The inflation rate is predictive. In this paper, I look at variables that influence the money demand by analyzing the money demand function.

Since the 1980s, many previous reviews have analyzed the question of whether money demand and money supply is consistent (Boughton, 1990). If it is not consistent, the economy can become unstable and the effect of monetary policy yields unpredictable results. If the variables of the money demand function (such as income, money demand, and interest rate) exhibit cointegration, this means that money demand and money supply are consistent. Much of the previous literature, however, has focused on developed countries. Money supply and money demand converge at an equilibrium over time.

In the U.S., Hoffman & Rasche (1991) show that cointegration is established using the M1 definition of money, but they also find that interest rate elasticity is unstable. Ball (2001) considered the question of whether interest rate elasticity can stabilize when controlling for income elasticity. Miyao (1996) finds that, in Japan, whether cointegration is established depends on the estimation method and value of income elasticity.

In developing countries, for example, Arize *et al.* (1991) and Chowdhury (1997), show that the national interest rate does not influence demand for money in Thailand. Arize *et al.* (1991) confirm that a model of the money demand

function excluding the national interest rate is reliable. Because of monetary administrations' desire to receive more capital inflow from foreign countries, many developing countries are often tempted to adopt higher interest rate policies. In this case, the authority sets an upper interest rate limit, and interest rates are not determined by the money supply. The authority then buys and sells foreign money to maintain to a fixed exchange rate system. This influences money supply, so the relationship between the interest rate and money supply don't appear to be strong. This situation potentially limits the applicability of studies looking at interest rate elasticity in developing countries. Arize et al consider whether foreign interest rates and exchange rates influence the demand for money.

Chowdhury (1997) used quarterly data for a period from 1974 to 1993 to perform cointegration tests. He was not able to confirm a cointegration relationship when using four variables (M1, M2, production and price level), but was able to confirm a cointegration relationship when including the exchange rate variable in his estimation. He was also able to show that income elasticity is 1[1].

Bahmani-Oskooee & Chomsisengphet (2002) argue that it is necessary to test for uniformity of the long-run dynamics in the stability test once cointegration has been established. Many studies in developing countries have estimated only the money demand function without performing any stability tests. Interest rate elasticity must be estimated using specific econometric methods when the variables exhibit cointegration. However, few studies which estimate interest rate elasticity using these specific methods have been performed using data from developing countries.

In a more recent study, Amara Sriphayak *et al.* (2006)[2] report that the effect of exchange rates and foreign interest rates on money demand have become weaker. This article investigated whether the model of the money demand

function has changed due to recent changes in monetary policy frameworks.

The most important feature of this paper is its investigation of the possibility that the relationship between the real and financial sectors has changed after the monetary policy framework changes.

To this end, Section III explains monetary policy and reports basic statistics. Section IV explains the model of the money demand function and estimation methods. My estimates are in Section V. I estimate income elasticity using panel data for each prefecture to confirm Chowdhury's (1997) result that income elasticity is 1. Section VI modifies the model of the money demand function econometrically using the income elasticity that has been estimated earlier[3], and investigates whether the money demand function can be established using time series data. I perform unit root tests and a cointegration test. Section VII estimates the values of interest rate elasticity, and looks at whether interest rate elasticity is stable before and after a framework change. I investigate whether its value changes before and after a framework change. This section discusses whether the effect by which monetary policy influences the real economy has changed. Section VIII concludes.

The contributions of this article are as follows. First, unlike previous studies, the model used in this paper includes the national interest rate into the money demand function in empirical studies. Second, this paper uses recent the data from after the financial crisis. Finally, this paper estimates not only the existence of cointegration but also the interest rate elasticity in order to investigate changes in the effect by which the interest rate influences the real economy.

Monetary policy changes and basic statistics in Thailand

3.1. Monetary policy

Monetary policy in Thailand has passed through three stages. The first was a period of fixed exchange rates (from the end of World War II to June 1997). The Thai exchange rate was determined via a basket pegging system based on major currency around the world. That said, the component ratio of the U.S. dollar in the basket was about 80% just before financial crisis. Therefore, this was virtually a dollar pegging system. For this reason the US economy had a major impact on Thailand, and Thailand had almost no the leeway to conduct traditional monetary policy such as rapid changes to the money supply and interest rate policies.

Second was a period of monetary targeting (July 1997 to April 2000)[4]. Thailand had received support from the IMF during financial crisis, had changed its monetary policy to one based on a managed float, and had chosen to adopt money supply as the intermediate target of monetary policy. The central bank set a target value for the growth rate of monetary base and conducted management of liquidity on a day-to-day basis.

Today, Thailand is in a period of inflation targeting (April 2000 -). The end of the support from the IMF has led to the adoption of inflation targeting which takes the price level as the target of monetary policy. The central bank has committed itself to maintaining an inflation rate range of 0 to 3.5% for foreign investors. The exchange rate system is a managed floating system[5].

3.2. The change of monetary variables

Change in monetary variables can be used to confirm whether the change of monetary policy frameworks described above influenced financial variables in the data.

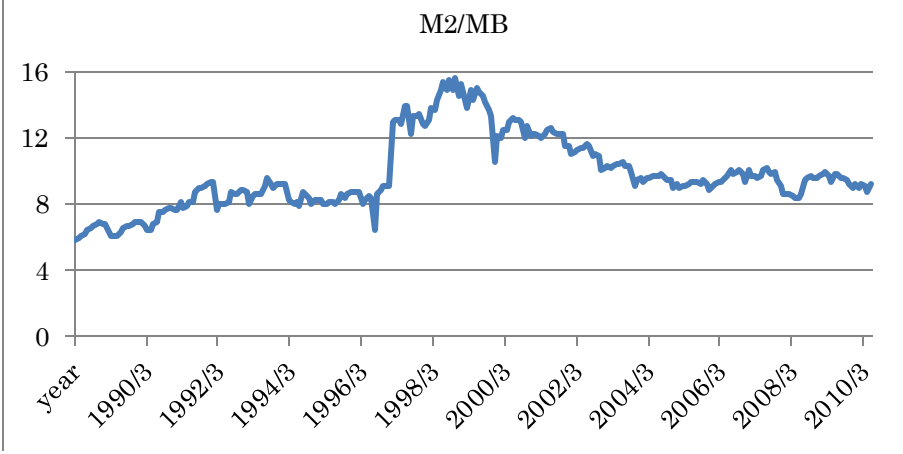

Figure 1. *Ratio of Money Supply to Monetary Base*

Figure 1 shows ratio of the M2 money supply to the monetary base (MB). In this Figure we can see that the level of the variable changes three times following changes in the monetary policy framework. The value increased gradually during the fixed exchange rate period. During the money supply targeting period it changed rapidly. It increased sharply from 1997 to 1999 as a result of the financial crisis. This value has decreased steadily since 1999 with the support of the IMF. It achieved its maximum value in 1999 after the financial crisis at approximately twice its value in 1988. During the period where price level was used as a target, the variable was stable.

Figure 1 shows the change in money supply relative to the monetary base. It can be used to confirm the change in money variables related to three monetary policy changes in Thailand. First, its value doubled from 1988 to 1999. During the financial crisis, from 1997 to 1999, it rose rapidly because of a dramatic increase in the money supply. Under the terms that the IMF specified for Thailand, it decreased steadily[6]. In 2005, it recovered the values of its low for the 1990s.

Figure 2 shows the change of money velocity. The velocity of money declined until 1999. In 1988, it reached 0.6, but it has remained lower since 1988. This means that money velocity was stable in 1999 after the financial crisis. Figure 1 shows that the change in money supply has recently been smaller than during the financial crisis, and Figure 2 shows that the relationship between income and money supply has recently been stable. From the two Figures we can see that the change for money variables had been become smaller in recent years.

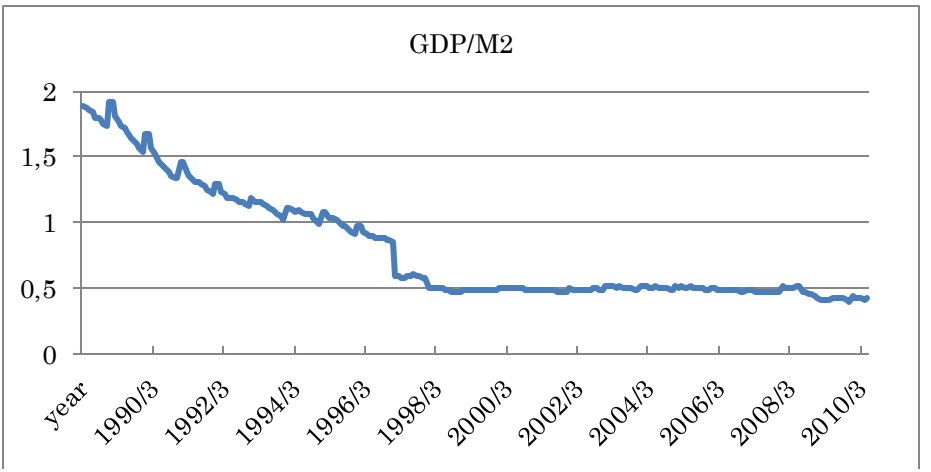

Figure 2. *Velocity Speed*

In order to estimate the money demand function, it is important to confirm whether the relationship between money supply and income is stable. Lower velocity of money might weaken the effect that the change in money supply has on economic growth. This means the relationship between income and money supply is weaker than it used to be before. The stabilization of the money velocity after the financial crisis indicates that the relationship between money supply and income is stable. Regarding the reason for this stability, I think that the change from a fixed exchange rate

system to a floating exchange rate system meant that changes in the money supply in order to maintain fixed exchange rates were no longer necessary. Therefore, the relationship between money supply and exchange rates has become weaker.

These two Figures show that the monetary policy framework influences real money variables. I also confirmed that monetary policy changes easily influence money demand and that the relationship between income and money supply is stable.

Estimation method

The estimation method used in this paper is as follows. In this paper I estimate the money demand function in three steps. First, I estimate income elasticity by using prefectural panel data (Section V). Second, I make a new variable by using the income elasticity results from section V. I estimate the unit root test and consider whether it is appropriate to divide the sample from the unit root test (DF-GLS test) which can reflect the existence of the structural change. I also estimate whether a cointegration relationship exists between the new variable and interest rate (Section VI). If the cointegration relationship is present then money demand and supply are at equilibrium. Third, I estimate the value of interest rate elasticity and whether this elasticity stabilizes over time.

The theoretical model I use is the money demand function. The money demand function equation shown below is generally based on the Keynesian liquidity preference hypothesis.

$$\frac{M}{P} = L(r, Y)$$

M is the money supply. P is the general price level, Y is the real income, and r is nominal interest. L depends on the income and interest rate. Income is positive and the interest rate is negative. Equation (1) is the LM curve and the money demand function. t is the time period.

$$\ln\left(\frac{M_t}{P_t}\right) = \alpha_1 + \beta_1 \ln Y_t + \beta_2 \ln r_t + u_t \quad (1)$$

Equation (2) assumes 1 as the income elasticity when the income term is moved to the right-hand side.

$$\ln\left(\frac{M_t}{P_t}\right) - \ln y_t = \alpha_2 + \beta_3 \ln r_t + \varepsilon_t \quad (2)$$

β_3 is interest elasticity. If we use the logarithm of interest rate we call this a double-log model. If we use the original unmodified interest rate, we call this a semi-log model. Equation (1) is a double-log model. Equation (2) is semi-log model.

The estimation in this paper is based on Equation (2). If we use relatively few variables, then we can stabilize the result by increasing the degrees of freedom (Maddala & Kim, 1998). In section V I look at whether income elasticity is really 1.

Estimating income elasticity using cross sectional data

Below I estimate the income elasticity of money demand using panels of 1997-2014 data.

The equation that corresponds to equation (1) for panel data estimation is equation (3):

$$\ln(Deposit_{it}) = \alpha_{it} + \beta_{1t} \ln(Expenditure_{it}) + \beta_{2t}(Branch_{it}) + u_{it} \quad (3)$$

Data on demand deposits held by individuals and firms at domestically licensed banks by prefecture (end of year standing) are available online from the Bank of Thailand.

Table 1. *Income Elasticity Using Panel Data*

Dummy Var.	α	β_1	β_2
Time Dummy		0.855***	
		(0.001)	
Time and Random	-241.22***	2.04***	
Dummy	(0.000)	(0.000)	
Time and Regional		1.641***	
Dummy		(0.000)	
Time		0.858***	-0.004
		(0.002)	(0.606)
Time and Random	-28.510	0.994***	0.004
Dummy	(0.660)	(0.000)	(0.908)
Time and Regional	-44.110	1.032***	0.001
Dummy	(0.541)	(0.000)	(0.761)

Note: P value reported in parentheses. *** denotes significance at the 1% level; ** at the 5% level; * at the 1% level.

Table 1 shows results of an estimate of equation (3) using panel data. Rows (2)-(4) show results that include the number of banks branches per capita per prefecture. These three results show income elasticity between 0.95 and 1.05, or very close to 1. Rows (5)-(7) show results that do not include the number of bank branch per prefecture. These results are also close to 1, ranging between 0.97 and 1.02.

Above, income elasticity is close to 1 using both cross-section data (with a range of 0.8 - 1.2) and using panel data (with a range of 0.95 - 1.03). Chowdhury (1997) calculates income elasticity of 0.91 using time-series data and thus I consider this result as reasonable and valid in comparison with previous reviews.

Unit root test and cointegration test

In this section I estimate the unit root and cointegration tests to investigate whether a money demand function can be established. As the variables have cointegration, money demand and supply are equal. This means that changes of monetary variables such as interest rate and money supply influence variables in the real sector.

In this section I use time series data. I perform my analysis using monthly data over the period of February 1989 to June 2014. I use nominal GDP, a GDP deflator, the one-day interbank rate, CPI, M1, and M2 published by the Bank of Thailand. M1 and M2 are deflated using the CPI. Nominal GDP is deflated with the GDP deflator. I assume income elasticity of 1 based on the result described in the previous section. In other words, I am using two deflated variables (M1 and M2) subtracted from the deflated nominal GDP, as well as the interest rate to perform this estimation.

Table 2. *Unit root test*

Level Variable				
	M1	M2	r	lnr
1989February-1999June				
ADF	-2.817(2)	-2.992(4)	-1.886(2)	-0.592(3)
	(0.630)	(0.200)	(0.165)	(0.458)
PP	-7.227(2)	-2.447(6)	-2.734(2)	0.801(7)
	(0.531)	(0.396)	(0.302)	(0.872)
July 1999 – June 2010				
ADF	-0.445(10)	-2.402(8)	-0.402(5)	0.498(7)
	(0.741)	(0.403)	(0.669)	(0.824)
PP	-0.301(10)	-0.271(9)	-0.151(5)	-0.139(3)
	(0.743)	(0.520)	(0.656)	(0.655)
Entire Sample				
ADF	-1.999(2)	-3.402(8)	-0.528(5)	-0.592(3)
	(0.673)	(0.444)	(0.569)	(0.458)
PP	-8.433(2)	-0.271(9)	-0.1342(5)	-0.159(3)
	(0.601)	(0.720)	(0.716)	(0.672)

Diffenrential Variable				
	M1	M2	r	lnr
1989February-1999June				
ADF	-6.422***(2)	-6.117***(5)	-7.468***(2)	-3.423***(4)
	(0.000)	(0.000)	(0.000)	(0.001)
PP	-112.234***(2)	-90.554***(5)	-125.822***(2)	-120.315***(6)
	(0.000)	(0.000)	(0.000)	(0.000)
1999July-2010June				
ADF	-6.381***(10)	-5.698***(10)	-3.085***(4)	-2.929***(6)
	(0.000)	(0.000)	(0.002)	(0.003)
PP	-106.230***(10)	-99.349***(7)	-71.718***(4)	-74.730***(2)
	(0.000)	(0.000)	(0.000)	(0.000)
All Sample				
ADF	-6.381***(10)	-5.698***(10)	-3.124***(4)	-4.115***(2)
	(0.000)	(0.000)	(0.002)	(0.000)
PP	-100.477***(10)	-99.349***(7)	-230.563***(2)	-74.730***(2)
	(0.000)	(0.000)	(0.000)	(0.000)

Note: P value reported in parentheses. *** denotes significance at the 1% level; ** at the 5% level; * at the 1% level.

I estimate unit roots tests to investigate whether each variable variables has a unit root. If variables have unit roots, unconditional variance does not converge as the sample size increases. M1 and M2 in Table 2 indicate the variables of money (M1 and M2) minus GDP, which correspond to left hand of equation (2). I estimate the Phillips and Perron test (PP) and Augmented Dickey Fuller test (ADF) as unit root tests. The upper result is for level variables. The lower result is for differential variables. As a result of the unit root tests, the level of each variable was found to have a unit root, whereas the first difference of each variable was found not to have a unit root. Thus, we can assume that all variables are non-stationary variables with a unit root. If we perform a regression using variables which have a unit root our results may have cointegration. If our results have cointegration, we can perform an estimation without using differential variables. For this reason, we need to estimate a cointegration test.

I estimate three cointegration tests. First, I estimate an ADF type test based on residuals. Second, I estimate a test (the trace test) proposed by Johansen (1988) and Johansen & Juselius (1990). Third, I perform a test proposed by Gregory & Hansen (1996) that allows the possibility of structural changes (in other words, it allows shifts of the cointegration vector). The null hypothesis is that money demand minus income (the left side of equation (2)), and interest rate (the right side of the same equation) do not have a cointegration relationship.

However, there are problems with the first two tests. Augmented Dickey Fuller (ADF) type tests have weak power. Rejection region tends to be much bigger because the Johansen (JOH) test has the feature that the size distortion of the distribution is bigger. For this reason, I have chosen to use both tests.

The Gregory and Hansen (GH) test is estimated in order to investigate whether the change to an inflation targeting framework causes structural change. If structural change occurs then the coefficient is incorrect, an indication that we should divide the data. The ADF is performed once for data up to and including each time period, and the GH test statistic is the maximum of these values. Table 3 shows cointegration results.

Table 3. *Cointegration tests using income elasticity of 1*

	M1		M2	
	r	lnr	r	lnr
February 1989 – June 1999				
ADF	-4.515***	-4.503***	-1.214	-1.312
	(0.009)	(0.008)	(0.961)	(0.550)
JOH	4.317*	1.019	5.016**	2.711*
	(0.050)	(0.497)	(0.023)	(0.092)
July 1999 – June 2010				
ADF	-4.110*	-3.766*	-3.410	-3.419
	(0.032)	(0.052)	(0.394)	(0.461)
JOH	3.425	2.811*	6.405**	2.832
	(0.163)	(0.086)	(0.017)	(0.231)
Entire Sample				
ADF	-5.311***	-6.306***	-1.532	-2.313
	(0.000)	(0.000)	(0.873)	(0.707)
JOH	8.423***	3.912***	2.661	-2.476
	(0.006)	(0.042)	(0.285)	(0.301)

Note: P value reported in parentheses. *** denotes significance at the 1% level; ** at the 5% level; * at the 1% level.

ADF is Augmented Dickey & Fuller (1979) test. JOH is Johansen trace test.

Table 3 shows the results of the cointegration tests. On the left are the results of an estimation using M1. On the right are results of an estimation using M2 as money demand. From the left, I use the variables combinations (M1,r) (M1,lnr) (M2,r) (M2,lnr). I use level variables (semi-log model) and logarithm variables (double-log model) for the interest rate.

All combinations are significant in at least one test on the first half of the sample. The second half results show that (M1,r) (M1,lnr) (M2,r) have cointegration regarding the money demand function, all sample results show that only (M1,r) (M1,lnr) have cointegration regarding the money demand function. The variable combination (M2,r) does not have cointegration regarding the money demand function.

Table 4 shows maximum statistic results for 1999 over the entire sample. This indicates that structural changes happened regarding the money demand function in 1999, quite close to 2000 when inflation targeting was adopted.

Chowdhury (1997), which produced the result that income elasticity is one in Thailand, suggests using M2 rather than M1 as money in the money demand function. The result reached in this paper is not same as that of Chowdhury. If significant results for a single test are acceptable, both M1 and M2 can be used. On the other hand, only M1 can be used if significant results for two tests are required.

Table 4. *Gregory and Hansen test*

r		lnr	
M1	M2	M1	M2
-6.914***	-7.511***	-6.412***	-6.063***
(0.000)	(0.000)	(0.000)	(0.000)

Note: P value reported in parentheses. *** denotes significance at the 1% level; ** at the 5% level; * at the 1% level.

Previous reviews were unable to find cointegration for a model which includes the national interest rate. This model, however, has cointegration in two tests and includes the national interest rate. The model is established before the monetary policy framework change. Moreover, in first half and second halves, I do not find a major differences in the results of the cointegration test. For this reason, in the next session I estimate stability tests of interest rate elasticity for each period. I test whether interest rate elasticity stabilizes by estimating fully modified least square (FMLS). Stability tests can test estimates if a cointegrating relationship exists.

Changes in the interest rate elasticity of the money demand function

In this section, I test the effect of monetary policy following monetary policy framework changes by estimating interest rate elasticity. Interest rate elasticity using FMLS can be interpreted as the value of the effect of monetary policy. If variables have cointegration, the coefficient of OLS has bias. For this reason, we use FMLS to modify this bias.

In the sixth section, I obtained the result that money demand function in Thailand has a cointegrating relationship. Table 5 shows the results of FMLS from Hansen (1992).

FMLS results are not reliable if a cointegrating relationship does not exist. Packages that exhibit cointegrating relationships include all packages in the fourth sample, (M1,r)(M1,lnr)(M2,r) in the latter one, and (M1,r)(M1,lnr) in the complete one. Packages that exhibit cointegration in Table 4 and have significant results in Table 6 are (M1,r) (M1,lnr) in the latter sample. The coefficient -0.002 on (M1,lnr) over the latter sample means that money demand minus income decreases 0.2% if interest rate rises by 1%.

From these results, I believe that using that the package consisting of (M1,r) (M1,lnr) as the money demand function after the adoption of inflation targeting policies is appropriate.

The interest rate elasticity of the double-log model using M1 in Japan is about -0.1, and by comparison the same value using M1 in the latter sample in Thailand is about -0.002. The effect of monetary policy is clearly much smaller than in Japan. Thus, it is necessary to raise the interest rate more to control money demand than in Japan. In addition, the results of OLS and FMLS for interest rate elasticity are both positive before adoption of an inflation targeting policy. Since

adoption of an inflation targeting policy, interest rate elasticity has been negative.

Next, I estimate stability tests from Hansen (1992) to test whether interest rate elasticity is stable. Stabilization of interest rate elasticity means that the effect of monetary policy can be predicted. I consider whether interest rate elasticity changes before and after the adoption of an inflation targeting policy[7]. I estimate two tests, the Sup-F test and the Mean-F test, which is a stabilization test from Hansen (1992).

The stability test from Hansen (1992) estimates an F-value for each term. The maximum F-value is the Sup-F statistic and the average is the Mean-F statistic. The null hypothesis of two tests is that the parameters (cointegration vectors) are constant. The alternative hypothesis of the Sup-F test is that parameters change at unknown times. The alternative hypothesis of the Mean-F test is that this changes depends a random walk. The Sup-F statistic is preferable in order to determine whether structural change happens at a particular time. The Mean-F statistics is preferable in order to determine whether the difference of the coefficient between before and after a structural change is large. I estimate both tests.

Table 5. *Interest Rate Elasticity and FMLS*

	M1			M2		
	Const.	r	lnr	Const.	r	Lnr
	February 1989 – June 1999			February 1989 – June 1999		
OLS	-2.182***	0.003		-0.008	0.007	
	(0.033)	(0.311)		(0.07)	(0.005)	
	-2.109***		-0.019	0.298**		-0.100
	(0.057)		(0.026)	(0.11)		(0.089)
FMLS	-1.062***	0.002**		-0.302***	0.009**	
	(0.014)	(0.001)		(0.04)	(0.004)	
	-1.086***		0.018**	-0.512***		0.052
	(0.021)		(0.008)	(0.08)		(0.053)
	July 1999 – June 2010			July 1999 – June 2010		
OLS	-1.637***	0.017		0.754***	-0.010*	
	(0.031)	(0.012)		(0.014)	(0.006)	
	-1.602***		0.003	0.756***		-0.041***
	(0.024)		(0.029)	(0.011)		(0.024)
FMLS	-0.797***	-0.009***		0.416***	-0.009	
	(0.006)	(0.002)		(0.019)	(0.078)	
	-0.602***		-0.006**	0.302***		-0.022*
	(0.004)		(0.000)	(0.015)		(0.013)
	Entire Sample			Entire Sample		
OLS	-0.171***	-0.039***		0.694***	-0.048***	
	(0.022)	(0.001)		(0.034)	(0.004)	
	-1.521***		-0.251***	0.715***		-0.304***
	(0.000)		(0.015)	(0.032)		(0.017)
FMLS	-1.183***	0.000		-0.143	0.003	
	(0.015)	(0.001)		(0.16)	(0.009)	
	-1.032***		-0.003	-0.004		-0.031
	(0.011)		(0.005)	(0.102)		(0.040)

Note: Standard error reported in parentheses. *** denotes significance at the 1% level; ** at the 5% level; * at the 1% level.

Table 6 shows the results of a stability test of interest rate elasticity that was obtained by FMLS. This test can also be used when cointegration relationships exist.

Regardless of the model chosen, the result is not all rejected under the null hypothesis that the parameter is

constant when used in the first half. This indicates that the coefficient of the interest rate is stable. In latter half, only (M2,r) is not rejected null hypothesis. This indicates that the effect of monetary policy using the package (M2,r) is stable and predictive.

Table 6. *Stability test*

February 1989 – June 1999				
	(M1,r)	(M1,lnr)	(M2,r)	(M2,lnr)
MeanF	4.117	4.621	3.014	2.485
	(0.18)	(0.11)	(0.21)	(0.18)
SupF	8.629	12.147	8.013	6.411
	(0.17)	(0.11)	(0.19)	(0.18)
July 1999 – June 2010				
	(M1,r)	(M1,lnr)	(M2,r)	(M2,lnr)
MeanF	9.305***	9.364***	4.834	5.633*
	(0.01)	(0.01)	(0.12)	(0.07)
SupF	14.178*	14.662*	12.343	8.009
	(0.07)	(0.06)	(0.14)	(0.20)
Entire Sample				
	(M1,r)	(M1,lnr)	(M2,r)	(M2,lnr)
MeanF	7.256*	3.814	27.316***	7.441*
	(0.05)	(0.20)	(0.01)	(0.04)
SupF	35.754***	14.474	68.121***	7.312
	(0.01)	(0.19)	(0.01)	(0.20)

Note: P value reported in parentheses. *** denotes significance at the 1% level; ** at the 5% level; * at the 1% level. I choose to apply to the method proposed in Andrews (1991) the bandwidth which gained using unprewhitened bartlett kernel.

Conclusion

In this chapter I investigate whether Thailand's change to an inflation targeting monetary policy framework in 2000 changed the model and the effect of monetary policy by estimating a money demand function. This paper does not use three variables that are used in previous works focused on developed countries. I eliminate one variable by

performing a step to create a variable for money demand minus income to increase the effectiveness of my results.

I obtain five sets of finding. First, the monetary policy framework change did not affect the appropriate money demand function model. Thus, the model of this paper is sufficient. I found that the model should include the national interest rate before and after the adoption of an inflation-targeting policy. Second, structural change occurs via adoption of an inflation targeting policy. Third, the effect of monetary policy changes with the adoption of an inflation targeting policy. Interest rate elasticity is positive before the framework change but negative after that. Its value is weak, however. Fourth, the interest rate elasticity of the package (M2,r) is stable and predictive. Fifth, other packages become unstable after adopting an inflation targeting policy. The elasticity of all package were stable before adopting the inflation targeting policy.

This suggests that the national interest rate, rather than the exchange rate and foreign interest rates, is important to managing monetary policy. It also suggests that the same money demand function used in analyzing developed countries can be applied.

The task of investigating the causal relationship between the framework change to inflation targeting and the above results is left to future research.

Notes

[1] Hataiseree (1995) shows that the cointegration relationship between M1, M2 and Production exists using the quarterly date from 1980 to 1990.

[2] Stability tests should consider short term change. In order to accomplish this, Bahmani-Oskooee & Hafez (2005) perform a two-step estimation. First, they create an error correction model, and second they perform CUSUM and CUSUMSQ tests using an ARDL model. Because estimating interest elasticity is the goal of this paper, I have chosen not to include estimates of the CUSUM and CUSUMSQ tests.

[3] Econometrically, when using only two variables it is expected that a better estimated value can be obtained (in other worlds, the standard error will be smaller). Theoretically, if the utility function as the framework of a standard MIU model is specified, income elasticity is one.

[4] Shirai (1999) shows that population cannot predict the inflation rate and monetary management even when the central bank makes public the money supply as an intermediate target if the monetary authority chooses as the monetary policy monetary targeting under a system of floating exchange rates. He also shows that achieving a money supply target becomes difficult if capital movement is active.

[5] The central bank has made public information indicating that a depreciation of 10% in terms of baths (to US dollar) would increase the core inflation rate by 0.9% point (BOT, 2002).

[6] After the financial crisis, each bank established an Asset Management Company. However, the number of bad loans did not decrease. In 2002, the number of bad loans decreased with the foundation of Thailand Asset Management Company.

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