

Effects of Financial Liberalization on Consumption in Korea

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In this paper I set out to find the effect of financial liberalization on consumption in Korea. When we want to know the effect of new policy, we generally compare the change of parameters. But financial liberalization is not the event of a day but a process sustained over a long time, so here I employ it as a variable.

With an OLS model I find that financial liberalization caused consumption. In addition, I show that real estate did not have a positive relation with consumption until the start of financial liberalization. The unconstrained group, who can borrow money against future income, increased as financial liberalization proceeded in the GMM model. A state-space model shows that real estate, which had not had a fixed relationship with consumption before the foreign currency crisis in Korea in the late 1990's, influences consumption following the crisis.

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Key words: Financial liberalization, consumption, principal component analysis, GMM, state-space model

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. Introduction

Since the 1980's most countries, whether developed or not, have experienced a series of financial liberalization moves. Financial liberalization aims at economic development through the efficient allocation of financial resources or is a response to the worldwide pressure for financial liberalization. So it is meaningful to examine the effect of financial liberalization at a time when much of the financial liberalization has been completed or is still in progress. In this paper I try to grasp the effects of financial liberalization on consumption in Korea.

It is not easy to forecast the effects of financial liberalization on consumption, because when interest rates are increased by interest rate deregulation, consumption may be increased by the income effect or decreased by the substitution effect.

A previous study about the effects of financial liberalization on consumption by Cho(1986) showed that because of the asymmetry of information, the effects of financial liberalization on consumption may be obscure in developing countries whose stock markets are not well developed. According to Boone, Girouard and Wanner(2001)'s empirical study, the effects of financial liberalization on consumption differed among OECD countries. In U.S. the effect was strong, but in Japan there was no effect on consumption.

Bandiera, Caprio, Honohan and Schiantarelli(2000)'s study showed that the effects of the financial liberalization on consumption also differed among developing countries. Notably they calculated a financial liberalization index with principal component analysis. They divided the sample period into only two periods: 'before and after', however, which meant they ignored the steplike process of financial liberalization. In this paper, I try to take consideration steplike process of financial liberalization in Korea.

In Kim and Lim(2001) and Lee(2001) show that consumption is affected by not only income but also the dependency ratio, easier access to consumer credit and expansion of the public pension system. In this paper, I use three models to show the effects of the financial liberalization on consumption in Korea. First, I add as a variable a financial liberalization index to their model(OLS model) to identify the effects. Second, I use Caporale et al.(2001)'s model, which incorporates consumer theory and reflects forward looking income expectations. Finally, I setup a state-space model, which is another method to recognize the dynamics of independent variables in the consumption function.

In the next chapter, I introduce the process of financial liberalization in Korea and calculate a financial liberalization index. In Chapter , I provide three models to grasp the effect of financial liberalization and in Chapter , I summarize the results.

. Financial Liberalization in Korea

1. Outlook

It was at the outset of the 1960's that government-led economic development began. At that time there were few resources for economic development in Korea. The inadequate financial resources were concentrated on a specific area, export-oriented industries because the level of domestic consumption was so low. Foreign exchange was strictly controlled to secure funds to buy raw materials from foreign countries for export. And outward foreign investment was barred. Most banks, including commercial banks, in Korea were taken over by government because there were few private resources and the government tried to channel to economic development. It did not allow new private bank licenses. The main purpose of monetary policy was to supply the financial resources for economic development. The central bank depended on the discount window and legal reserve requirement ratios as policy instruments.

Financial liberalization began with the privatization of banks and the deregulation of new licenses for the financial industries in the mid 1980 s. In the late 1980 s the chronic current account deficit shifted into surplus, companies accumulated reserves and the level of price increases was moderate. At that time the Korean government tried to launch financial liberalization in keeping with the worldwide trend of financial liberalization. In this paper I adopt seven separate financial liberalizations to calculate financial liberalization index. They are the liberalization of interest rates, the liberalization of foreign exchange, the lowering of legal reserve ratios, the reduction of policy loans, permission for new banks, the capital liberalization (across the board) and the privatization of banks.

A. Liberalization of interest rates

The liberalization of interest rates, which was the most important, was begun in December 1998 under moderately favorable financial circumstances. But in early 1989, prices began to be unstable and interest rates picked up. So the monetary

authority resumed the regulation on interest rates by moral suasion. In August 1991, the Korea government and the Bank of Korea launched a four-stage plan for the liberalization of interest rates. Under the plan, interest rates on overdrafts and commercial bills, commercial paper etc. were liberalized in November 1991. The second stage was begun in November 1993. It contained the following: the liberalization of lending rates except for loans subsidized by government or the Bank of Korea, and of deposit rates on placements longer than two years and the issuing rates of financial debentures and corporate bonds. In July 1994, the interest rates of most short term product deposits were liberalized(3rd stage). And the fourth stage liberalization went into in effects July 1997.

B. Liberalization of foreign exchange

The liberalization of foreign exchange is a very complex process. It alone involve numerous sub processes of liberalization. So, as a proxy variable, I choose the process of expansion of the band of the exchange rate which proceeded in tandem with other foreign exchange liberalization.

From February 1980, Korea adopted a 'multi currency basket system', under which the currency rate was determined by change of the exchange rate of the basket currencies. But as there was scope for suspicion that the Korean government manipulated the exchange rate, in March 1990 Korea shifted to a market average rate system, under which currency rate was determined in the market but the band of daily variation was regulated. The authority loosened the band gradually. In March 1990, the band of the exchange rate above or below daily variation was within 0.4percent of the previous trading day's rate. This was widened to 0.6percent in September 1991, 0.8percent in July 1992, 1.0percent in October 1993, 1.4percent November 1994, 2.25percent in December 1995 and 10.0percent in November 1997 before being removed completely in December 1997.

C. Legal reserve ratio

Changes in reserve requirement were the main instrument of monetary policy until the 1980's. The legal reserve represented an expense for bank and worsened the availability of their funds because reserve requirements are unremunerated. So for the conventional monetary control and financial deregulation, it needs to lower or to abolish the legal reserve ratio

In the late 1980's, the Bank increased the legal reserve ratio to 11.5percent to absorb liquidity which was increased by the shift into surplus on the current account. The Bank lowered the requirement to 9 percent in April 1996 and

7percent in November 1996 and to 5percent for demand deposits, and to 2percent for savings deposits in February 1997.

D. Reduction of policy loans

We can divide loan into two categories. The first is loans from bank funds such as paid in capital, surplus or deposits, the other is loans from funds provided or subsidized by government or the central bank. The former are called general loan, the latter are called policy loans or directed loans. Even though the ratio of policy loan is higher in the earlier stage of economic development, it should be decreased for economic efficiency as policy loans detract banks' own loan screening and analysis. So the policy loan ratio can be another barometer of financial liberalization.

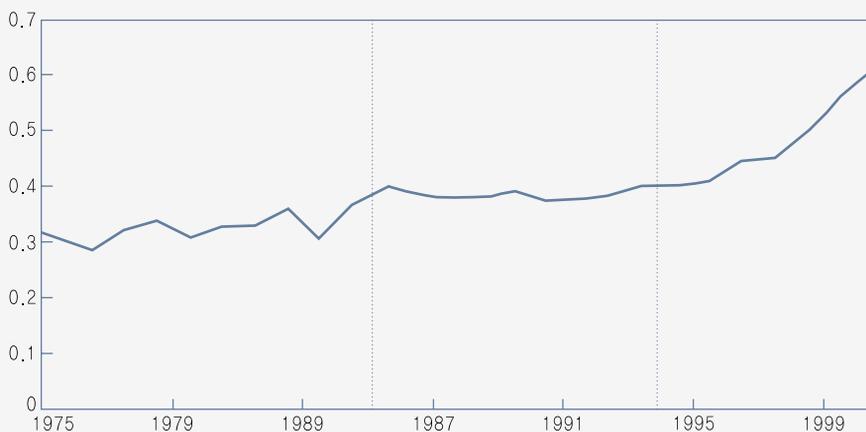
[Figure 1] shows the ratio of general loans to total loans. The ratio was very low, below 30percent, until 1984, but it increased to 40percent the period of 1985~1994 and has risen to over 60percent since 1999.

E. Permission for new banks

Permission for the entry of new banks is one of the indicators of financial liberalization as new entry brings about free competition in the banking industrys. The early 1980's saw the establishment of the Shinhan Bank(by Korean Japanese) and Koram Bank(invested by BOA). Donghwa Bank(capital subscribed by Korean from Northen Korea, 1989), Daedong Bank(1989),

Figure 1

ratio of general loans/policy loans



Source : the Bank of Korea, Monthly Bulletin

Dongnam Bank(1989), Hana Bank(1991) and Boram Bank(1991) were permitted to enter the market.

F. Capital Liberalization

The Capital liberalization means the deregulation of international capital movements. It also contains many of sub liberalizations. So I adopt the process of opening the capital market as a proxy variable. In December 1988, the Korean government published 'the Plan of Capital Market Internationalization (1989~92)'. Investment in the stock market by foreigners was allowed up to 10percent of individual stock issues in January 1992. The Korean bond market was opened in July 1994 because of the big spread between domestic and foreign issues. Finally in December 1997, the government abolished most of the regulations on investment in listed securities by foreign investors.

G. Privatization of banks

The privatization of banks can enhance the efficient allocation of financial resources. Before privatization, banks pursued the national economic growth instead of their own profitability by suppling loans at lower than market rates.

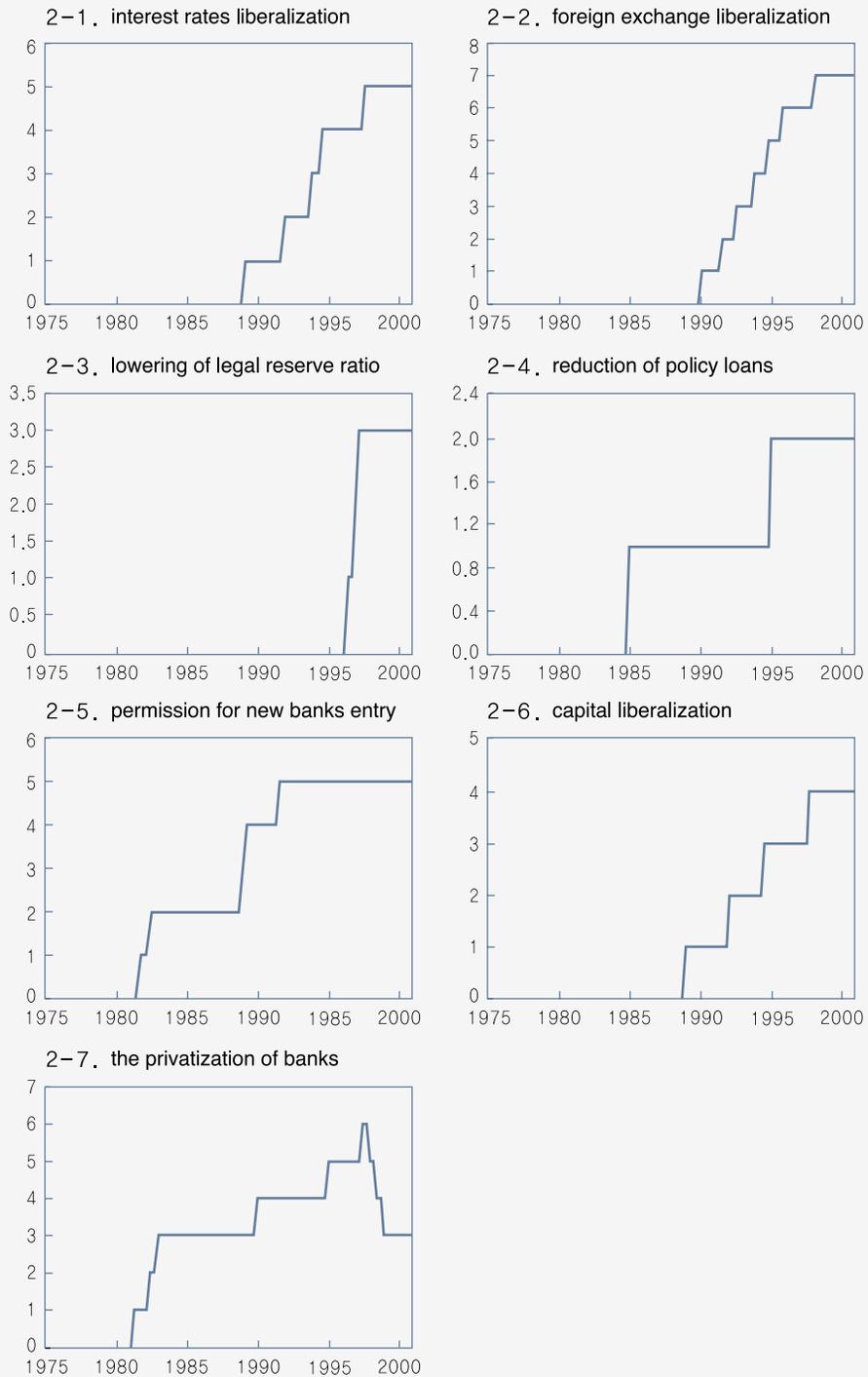
The first privatization was that of Korea Commercial Bank in May 1972. Hanil Bank(May 1981), Seoul Bank(August 1982), Korea First Bank(September 1982) and Choheung Bank(March 1983) were gradually denationalized. After the privatization of commercial banks, specialized banks, those established for particular purpose under a specific act rather than the Bank Act, were also privatized. Korea Exchange Bank(December 1989), Kookmin Bank(January 1995) and Korea Housing Bank(August 1997) were privatized step by step. But, after the foreign currency crisis in 1997, Korea First Bank and Seoul Bank(January 1998), Korea Commercial Bank and Hanil Bank(September 1998) and Choheung Bank(February 1999) all had to be renationalized again as a interim measure because of their huge bad loans.

2. Financial Liberalization Index

A number of research such including Kim, Kim and Wang(2001) seek to capture the effects of a new policy on the economy by comparing changes in the parameters of the same model. But financial liberalization is not a event of a day but a process extending over a long time. So I make a variable of financial liberalization to reflect the gradual processes.

Bandiera, Caprio, Honohan and Schiantarelli(2000) and Caporale and

Figure 2 Individual Financial Liberalizations in Korea



Williams(2001) have already calculated financial liberalization indexes. Bandiera et al.(2001), as I noted above, divided the sample period into only two sub-periods-‘before and after’. This ignored the steplike or gradual processes of financial liberalizations in Korea. Caporale et al.(2001) used the residual of the regression of the loan to value(LTV) on the mortgage rate and the house price to income ratio. The difference between two method is that the former focused on enforcement of financial liberalization but the latter on the response of financial liberalization.

I use Bandiera et al.(2000)’s method. But I divide the sample more than two sub-periods to reflect the gradual nature of the financial liberalization process. This means that the value of the variable set at ‘0’ before liberalization and plus ‘1’ at each step of the incremental process of liberalization. The values of the variable is displayed in [Figure 2].

Financial liberalization in Korea began with the privatization of banks() and permission for new bank’s entry() in the early 1980’s. Those were followed by the gradual putting in place of the reduction of policy loans() in the mid 1980’s, interest rate liberalization(), capital liberalization(), foreign exchange liberalization() in the late 1980’s and the lowering legal reserve ratio() in the mid 1990’s(see [Figure 3])

The results of the principal component analysis is shown in [Figure 4]. The principal component(PC1) looks like steps. I am worried about out-liers if we were to difference the principal component for empirical tests, and so I use Hodrick-Proscott filtering(HPC1) for smoothing.

Figure 3 Financial Liberalizations in Korea

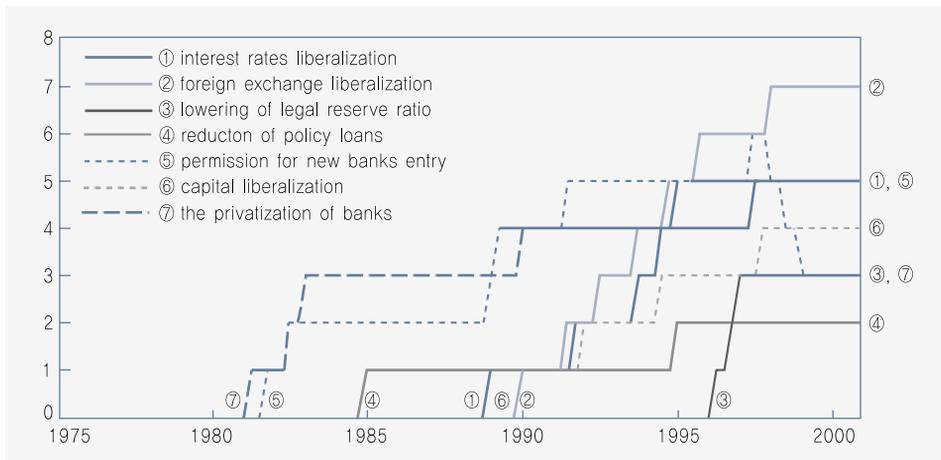
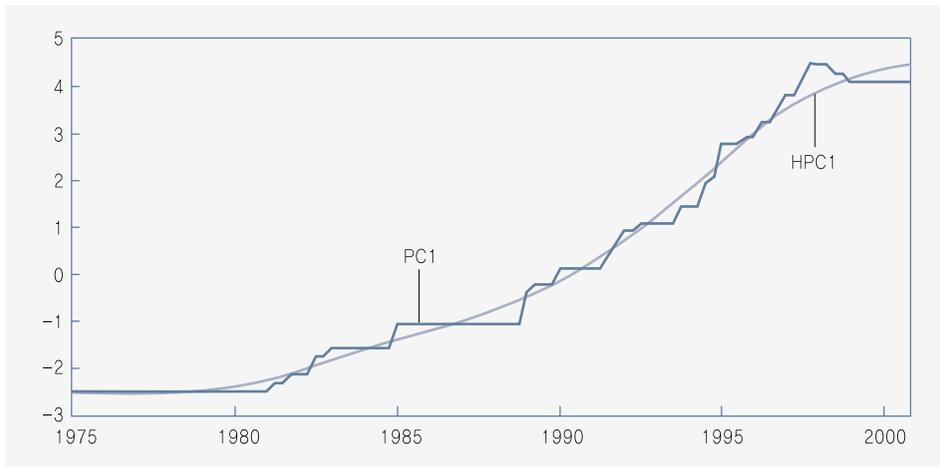


Figure 4 Financial liberalizations by principal component analysis in Korea

. Effects of Financial Liberalization on Consumption in Korea

In this chapter, I try to show the effects of financial liberalization on consumption in Korea using the financial liberalization index that was calculated in the previous chapter. For the empirical tests, I use three kinds of model, OLS, GMM and state-space model. For the OLS model, I add a financial liberalization index as a independent variable on the general consumption function. As the OLS model can not escape Lucas' critique(1981), I use the GMM based on forward looking expectations on future income, that was used by Caporale and Williams(2001). And, to grasp the dynamics of the variables that affect consumption, a state-space model was used.

1. OLS model

I set up an OLS model by a adding financial liberalization index to previous OLS models¹⁾ as in equation (1). Most of the variables are integrated with trend. So we need to differentiate the variables.

$$\ln cp_t = \alpha_0 + \alpha_1 \ln y_t + \alpha_2 \ln fa_t + \alpha_3 \ln ea_t + \alpha_4 r_t + \alpha_5 \ln i_t + \alpha_6 \ln fli_t \quad (1)$$

Note: 1) Choi et al.(1999), Kim et al.(2001a) and Lee(2001).

cp_t = real consumption(seasonally adjusted)
 y_t = real disposable income(seasonally adjusted)
 fa_t = real value of financial assets(seasonally adjusted)
 ea_t = real value of real estate(seasonally adjusted)
 r_t = yields on corporate bonds(3 years) - inflation rate
 π_t = inflation rate
 fli_t = financial liberalization index

The sample period is from the first quarter of 1975 to fourth quarter of 1999. Two sub-sample periods, 1975~1989 and 1985~1999 are employed to capture the change of the parameters. To grasp the wealth effect, three OLS models are used: () including only real estates, () including only financial assets, () and including both real estate and financial assets.

I use the change in the gross value of real estate instead of real estate prices. In Korea, the gross value of real estate may increase even though the price of real estate falls, as lots of properties are constructed because of chronic demand for constructions like houses and offices. According to Boone, Girouard and Wanner(2000), deregulation may not only affect consumption directly but may also increase lending which can cause a housing boom. House-owners can borrow money under better conditions by using their house as collateral and thus increase consumption. [Table1] shows the estimators of parameters of the consumption function (1). In the full sample period(1975~1999) the financial liberalization index($\ln fli_t$) does not show statistical significance. In the second sub-sample(1985~1999) most of coefficients have statistical significance except for financial assets($\ln fa$). The financial liberalization index($\ln fli_t$) has a positive relation with consumption. So it can be said that consumption increased as financial liberalization proceeded. In particular, real estate has had a positive relation with consumption, i.e. a wealth effect, since 1985 when financial liberalization started.

The other variables, disposable income($\ln y_t$), prices($\ln p_t$) have a positive relation with consumption, a result similar with previous research(Choi et al.(1999), Kim et al (2001) and Lee(2001)).

2. Generalized Moment Method

According to recent studies(Caporale et al.(2001) and Darby et al.(1994)), many of previous empirical studies could escape Lucas' critique(1981), because they were not based on a microeconomics foundation. In this paper, I use

Table 1 Estimators of the Consumption Function

1975 1999							
Constant	₀	0.023770	(2.946007 ^{***})	0.021125	(2.471779 ^{**})	0.019203	(2.216402 ^{**})
disposable income	₁	0.301274	(3.541780 ^{***})	0.302900	(3.600309 ^{***})	0.278970	(3.239638 ^{***})
prices	₂	-0.300356	(-2.631359 ^{**})	-0.237121	(-1.886855 [*])	-0.224816	(-1.788285 [*])
financial assets	₃			0.151604	(1.638915)	0.131250	(1.400609)
real estate	₄	0.107802	(1.495694)			0.089833	(1.233229)
interest rate	₅	-0.001481	(-2.799002 ^{**})	-0.001800	(-3.666090 ^{***})	-0.001553	(-2.936125 ^{**})
FLI	₆	0.315781	(0.947199)	0.454200	(1.406863)	0.351069	(1.055435)
Adj-R ²		0.446400		0.448997		0.452066	
D.W.		2.501627		2.472289		2.489598	
1975 1989							
Constant	₀	0.038044	(3.069478 ^{***})	0.034431	(2.496746 ^{**})	0.031134	(2.168089 ^{**})
disposable income	₁	0.082214	(0.666752)	0.112246	(0.931536)	0.089798	(0.726159)
prices	₂	-0.465527	(-2.837851 ^{**})	-0.388938	(-2.012624 [*])	-0.363044	(-1.851004 [*])
financial assets	₃			0.113980	(1.028020)	0.106501	(0.955071)
real estate	₄	0.087000	(0.929378)			0.079921	(0.850392)
interest rate	₅	-0.000894	(-1.192629)	-0.001296	(-2.077305 ^{**})	-0.000941	(-1.251927)
FLI	₆	-0.435690	(-0.762424)	-0.200721	(-0.361673)	-0.341171	(-0.587792)
Adj-R ²		0.375324		0.377555		0.374287	
D.W.		2.731038		2.755272		2.764973	
1985 1999							
Constant	₀	0.014237	(1.852306 ^{**})	0.014268	(1.714392 [*])	0.020144	(2.471074 ^{**})
disposable income	₁	0.412004	(4.784518 ^{***})	0.481079	(4.821940 ^{***})	0.491616	(5.210570 ^{***})
prices	₂	-0.882151	(-4.942651 ^{***})	-1.042957	(-5.492799 ^{***})	-0.973471	(-5.372258 ^{***})
financial assets	₃			-0.125124	(-0.924196)	-0.255082	(-1.869228 [*])
real estate	₄	0.152836	(2.174045 ^{**})			0.200550	(2.735345 ^{**})
interest rate	₅	-0.001404	(-2.460190 ^{**})	-0.001387	(-2.348974 ^{**})	-0.001431	(-2.564995 ^{**})
FLI	₆	1.002152	(2.536748 ^{**})	1.510845	(4.096888 ^{***})	1.049828	(2.712198 ^{**})
Adj-R ²		0.718510		0.698639		0.730937	
D.W.		1.848006		1.754729		2.031034	
1985 1997							
Constant	₀	-0.003257	(-0.437638)	-0.010068	(-1.176703)	-0.003771	(-0.392003)
disposable income	₁	0.317105	(3.917427 ^{***})	0.292921	(3.067735 ^{**})	0.312856	(3.270847 ^{**})
prices	₂	-0.508487	(-3.564567 ^{***})	-0.499227	(-3.236617 ^{***})	-0.504159	(-3.299811 ^{***})
financial assets	₃			0.096905	(0.876127)	0.010812	(0.085800)
real estate	₄	0.086355	(1.656248)			0.083782	(1.381508)
interest rate	₅	-0.000545	(-1.119353)	-0.000466	(-0.926226)	-0.000537	(-1.071358)
FLI	₆	1.487195	(3.728543 ^{***})	1.808147	(5.017666 ^{***})	1.497777	(3.551930 ^{**})
Adj-R ²		0.535995		0.516395		0.525762	
D.W.		2.044210		2.008560		2.044111	

Notes: 1) ***, **, * are 1%, 5% and 10% significance levels respectively
2) () represent t-values

Caporale et al.(2001)'s model, which uses consumer theory and reflect forward looking income expectations.

We can divide consumers into two groups, the first of which can not use borrowings(constrained group) and the second of which can use borrowings against expectations of future income(unconstrained group). The proportion of the constrained group is α , and that of the unconstrained group is $1 - \alpha$, may change as financial liberalization proceeds.

$$C_t^u = (A_{t-1}^u + H_{t-1}^u) + \alpha \quad (2)$$

$$C_t^c = Y_t^c \quad (3)$$

$$C_t = (A_{t-1}^u + H_{t-1}^u) + Y_t^c + \alpha \quad (4)$$

C_t^u : consumption of unconstrained group

C_t^c : consumption of constrained group

A_t^u : assets of unconstrained group

H_t^u : present value of unconstrained group's future income

Y_t^c : income of constrained group

With Hayashi(1982)'s quasi-differencing we have equation(5)²⁾

$$\begin{aligned} C_t = & \alpha(Y_t - IP_t) \\ & + \{A_{t-1} - \alpha DB_{t-1} + (1 - \alpha) Y_{t-1} - \alpha(A_{t-1} - \alpha DB_t)\} \\ & + \alpha \{C_{t+1} - \alpha(Y_{t+1} - IP_{t+1})\} \\ & + \alpha e_t - \alpha u_{t+1} + u_t \end{aligned} \quad (5)$$

Y_t : disposable income

IP_t : interest payment

DB_t : borrowings

$$2) H_{t-1}^u = \frac{C_t - Y_t^c - \alpha}{1 - \alpha} - A_{t-1}^u$$

$$H_t^u = \alpha^{-1}(H_{t-1}^u - Y_{t-1}^u) + e_t$$

$$\frac{C_{t+1} - Y_{t+1}^c - \alpha}{1 - \alpha} - A_t^u = \alpha^{-1} \left(\frac{C_t - Y_t^c - \alpha}{1 - \alpha} - A_{t-1}^u - Y_{t-1}^u \right) + e_t$$

$$C_{t+1} - Y_{t+1}^c - \alpha = \alpha^{-1}(C_t - Y_t^c - \alpha - A_{t-1}^u - Y_{t-1}^u) + e_t$$

$$\begin{aligned} C_t = & Y_t^c \\ & + (A_{t-1}^u + Y_{t-1}^u - A_t^u) \\ & + (C_{t+1} + Y_{t+1}^c) \\ & + e_t - \alpha^{-1} + \alpha \end{aligned}$$

The financial liberalization index was calculated in the previous chapter by principal component analysis.

$$c_t = \exp(-\alpha - \beta fli_t) \quad (6)$$

fli_t : financial liberalization index

$$c_t = (1 + r_t + \mu_t)^{-1} \quad (7)$$

c_t : discount factor

r_t : interest rate

For the orthogonality condition of GMM, I use two lagged term of variables as instrumental variables. [Table 2] shows the estimators of parameters of GMM. Most of the variables are statistically significant. The two parameters α , β to estimate c_t are positive. This means that the portion of constrained group is decreased as financial liberalization proceeds. So the results are consistent with consumer theory.

Table 2	Estimators of Consumption Function
α	2.633151 (5.490727***)
β	0.974666 (4.177385***)
	0.059987 (9.111197***)
μ	-4.565906(-4.928148***)
constant	-0.111175(-12.79267***)
adj. R ²	0.97
D. W	2.04
$\chi^2(2)$	3.92

Notes: 1) ***, **, * are 1%, 5%, 10% significance levels respectively
2) critical value: 3.84

3. State-Space Model

A state-space model is another method to grasp the dynamics of independent variables in the consumption function. I set up a state-space model, equation(8) is the measurement equation and equation(9) is the state equation.

$$\ln cp_t = \alpha + \beta c'_{t-1} + \epsilon_t \quad (8)$$

$$\epsilon_t \sim \text{iid } N(0, \sigma^2)$$

$$c_t = c_{t-1} + \eta_t \mathbf{I} \quad (9)$$

$$\eta_t \sim \text{iid } N(0, \sigma^2 \mathbf{I})$$

$$\begin{aligned}
 cp_t &= \text{real consumption} \\
 x_t &= \{ \ln y_t, r_t, \ln eat_t, \ln p_t \}, \\
 y_t &= \text{real disposable income} \\
 r_t &= \text{real interest rate} \\
 eat_t &= \text{estate} \\
 p_t &= \text{inflation rate} \\
 \beta &= \{ \beta_1, \beta_2, \beta_3, \beta_4 \} \\
 I &= 4 \times 4 \text{ identity matrix}
 \end{aligned}$$

[Table 3] shows the estimators of hyper-parameters of the state-space model by Kalman filter-maximum likelihood estimation.

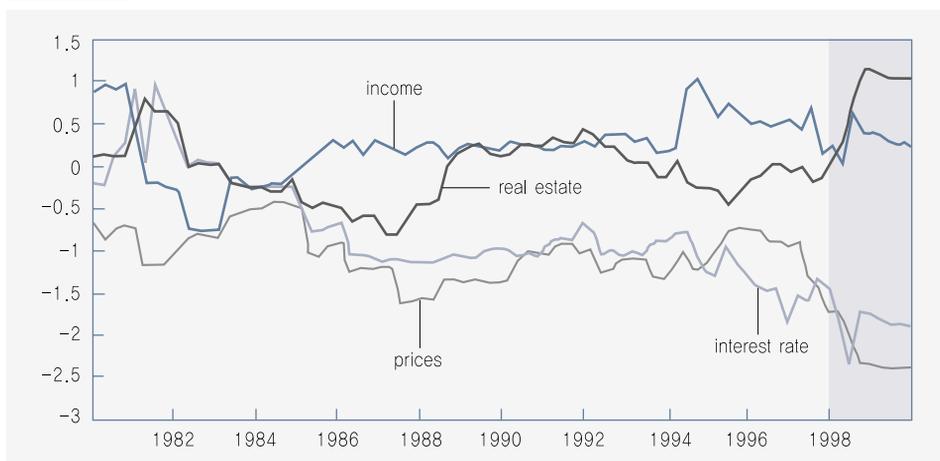
[Figure 5] shows the dynamics of independent variables in the consumption function

According to the results of the state-space model, income shows a positive relation with consumption and interest rate and prices have negative relation with consumption. The dynamics of real estate are somewhat different. Before 1997 when financial liberalization in Korea was still in progress, the relationship between real estate and consumption was not fixed (changed as time went by). But after 1998 when most of the financial liberalizations in Korea had been completed, real estate shows a positive relation with consumption. These results are owing to the foreign currency crisis in Korea in late 1990's. As the financial liberalization proceeded, even though banks could lend money to households under better conditions combining high yield and low risk, the client effect prevented banks from collecting their loans to companies. But so many companies went into default after the foreign currency crisis in Korea, banks were able to fund to households.

Table 3 estimators of hyper-parameters

			t-value ¹⁾
		0.01023	7.63433***
		0.19191	3.44728***
0	constant	0.03317	5.49172***
1	income	0.41239	1.93538*
2	interest	0.16855	1.24575
3 ²⁾	estate	0.01000	—***
4	price	1.10000	110.88***
likelihood value		251.30	

Notes : 1) ***, **, * are 1%, 5%, 10% significance levels respectively
 2) The standard error of 3 is extremely small

Figure 5 Dynamics of independent variables in the consumption function

Conclusion

The proclaimed intent of financial liberalization is to enhance the efficiency of financial industry and achieve a more efficient allocation of financial resources. In this paper I have tried to find the effect of financial liberalization on consumption. Previous research has sought to capture the effect of a new policy by comparing the change of parameters. But financial liberalization is not the event of one day but a long drawn-out process. So I make a financial liberalization variable.

In Korea, financial liberalization started with the privatization of banks in the

early 1980's. In the mid 1980's the share of policy loans was reduced. The steplike liberalizations of interest rates, capital and foreign exchange began in the late 1980's. In the mid of 1990's, the legal reserve ratio was lowered.

With the OLS model I find that financial liberalization caused the consumption. In addition, I show that real estate did not have a positive relation with consumption until the start of financial liberalization. The unconstrained group, who can borrow money against their future income, increased with financial liberalization in the GMM model. The state-space model shows that real estate, which had not a fixed relationship with consumption before the foreign currency crisis in Korea, affected consumption after the crisis.

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