

# The International Review of Financial Consumers

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## The International Review of Financial Consumers

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# How to Avoid Household Debt Overhang? An Analytical Framework and Analysis for India

Naoyuki Yoshino<sup>1</sup> · Prachi Gupta<sup>2</sup>

### ABSTRACT

In this paper we develop an analytical framework using the household utility maximization approach to model stability conditions to avoid household debt overhang. Our theoretical framework suggests that household debt stability is a function of five factors, namely the rate of interest, period of lending, income growth, loan-to-income ratio, and households' disutility from borrowing. Further, we apply our analytical model to the case of India and estimate household debt stability conditions for Indian households under various scenarios to estimate the ceiling borrowing ratios below which households can avoid the risk of running into a debt overhang problem.

*Keywords:* debt overhang, household finance, household borrowing

*JEL Classification:* C13, C15, C62, D10, H31

## 1. Introduction

Household debt has been on the rise across countries since the early 2000s (see Figure 1). Estimates from the IMF suggest that household debt as a percentage of GDP rose from 35% in 1996 to more than 60% in 2016 (Figure 2). The proportion of household debt to disposable income in the Republic of Korea increased from a high of 120% in 2006 to a whopping 170% in 2016 (Figure 3). In the case of the United States, the rate stood at 96% in 1997, peaked at 128% in 2007, and stood at 100% in 2016 (Figure 3). Household indebtedness has also increased very rapidly in emerging market economies. In the People's Republic of China (PRC), household indebtedness doubled from 29.6% of GDP in 2012 to 44.3% in 2017.<sup>1</sup> For emerging market economies overall, house-

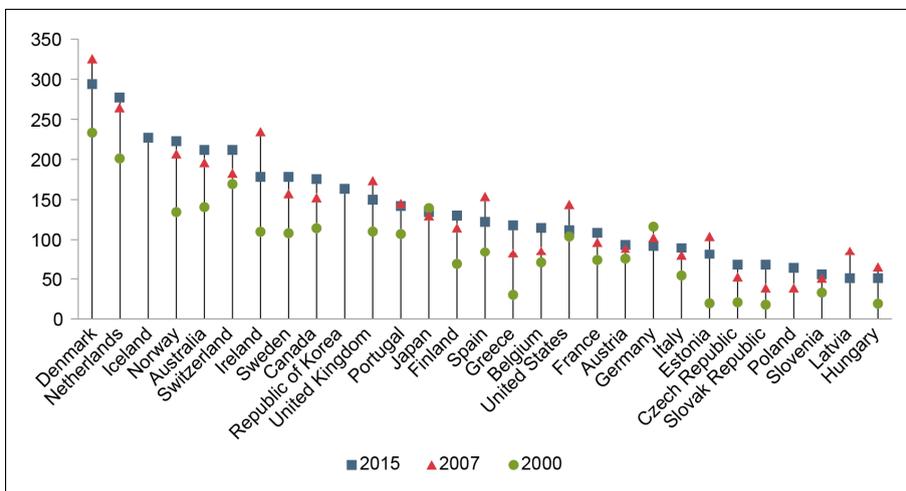
hold debt as a percentage of GDP rose from 2 percent in 1996 to 20 percent in 2016.

Why is rising household debt an economic problem? Literature suggests that excessive levels of household debt can lead to situations of debt overhang, thereby curbing consumption, investment, and economic growth. Schularick and Taylor (2012) show that high levels of household debt are not only good predictors of financial crises but also an important determinant of the intensity of the ensuing recession. Another study, by Drehmann and Juselius (2014), demonstrates that household debt levels could predict future banking system crises. Using data from 54 countries for the period 1990-2015, Lombardi, Mohanty, and Shim (2017) show that in the long run, a 1 percent increase in the household debt-to-GDP ratio leads to a 0.1 percentage point lower growth.

Mian, Sufi, and Trebbi (2014) analyzed US household-level data and found that the great financial crisis of 2007-08 was aggravated by the fact that US households that had a higher marginal propensity to consume and were highly indebted, rapidly reduced spending following

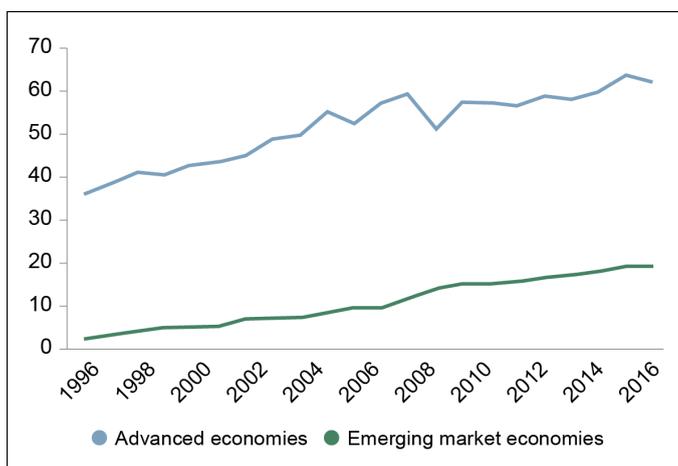
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Note: For Iceland and Rep. of Korea, the square points refer to data from 2014 instead of 2015. For Ireland and Slovenia, the dot point refers to data from 2001 instead of 2000. Source: OECD statistical insights<sup>2</sup>.

Figure 1. Trends in Household Indebtedness



Source: IMF<sup>3</sup>.

Figure 2. Household Debt as a Percentage of GDP

the negative house price shock. In the case of recourse loans, wherein the lender can confiscate other assets to recover the value of the loan, poorer households with limited assets may have an automatic limited liability as they have nothing more to offer against the loan repayment (Basu 2011).

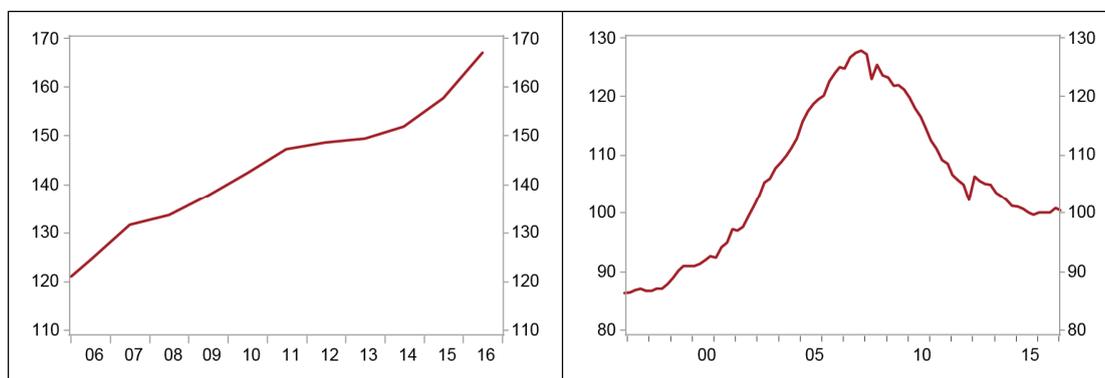
The question that arises next is: How can lending

quality be improved to avoid the risk of default on debt? In this paper, we address this issue in the context of borrowings undertaken by households. We derive stability conditions for lending to households to avoid debt overhang. We start with a simple utility function with

<sup>1</sup> Estimates have been obtained from the Census and Economic Information Center (CEIC) database.

<sup>2</sup> See <https://www.oecd.org/sdd/na/statisticalinsightswhatdoeshouseholddebtsayaboutfinancialresilience.htm>.

<sup>3</sup> See <https://blogs.imf.org/2017/10/03/rising-household-debt-what-it-means-for-growth-and-stability/>.



Source: Haver Analytics Database

**Figure 3.** Ratio of Household Debt to Disposable Income in the Republic of Korea (left) and the US (right)

two components, consumption and debt. With a given condition that consumption equals income (and debt), households maximize their utility. Solving the Lagrangian condition, we obtain the theoretical stability conditions for household debt.<sup>4</sup> For our empirical analysis, we use data from India to model stability conditions using different interest rates, periods of lending, and parameters of the household utility function and obtain the ceiling loan-to-income ratio below which households' borrowing should fall in order to avoid debt overhang.

We focus on India for three main reasons. Firstly, there has been a steady rise in household indebtedness in India. The GDP growth in India has been primarily consumption led, more so during the periods 2013-14 and 2016-17 (RBI 2017). Results from the 70th round of the National Sample Survey suggest rises in household indebtedness in India from 26.5% in rural households and 17.8% in urban households in 2002 to 31.4% and 22.4%, respectively, in 2013. In the case of rural households, 35% of cultivator households reported being in debt compared to 25.9% in 1991. And in the case of urban households, nearly one in five households were reported to be in debt in 2013.

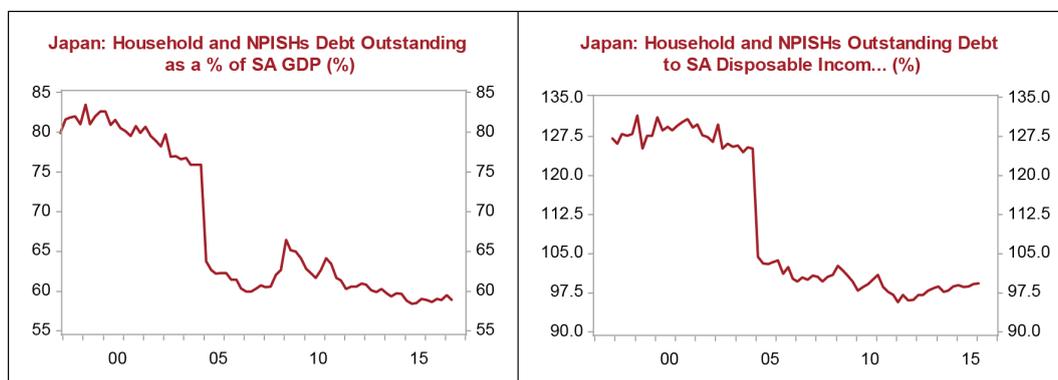
Secondly, in recent years, India's banking sector has also seen a steep rise in its gross nonperforming assets (NPAs) due to bad loans, which stood at Rs7.29 lakh crore, or about 5% of GDP, in March 2017 and accounted for 9.6% of banking assets. As a result, India ranks second

in terms of its ratio of NPAs among the major economies of the world after Italy, whose NPA stood at 16.4%. While household loans are not the biggest contributor to these NPAs, their contribution remains significant. In the case of housing loans below Rs.2 lakh, gross NPAs for all public sector banks stood at 12% in 2015-16. The NPA levels for some banks were reported to be as high as 40%-50%. Rising indebtedness and high NPAs suggest a potential crisis in the financial sector that needs to be urgently resolved.

Lastly, with the balance sheets of leading banks being badly affected by bad loans, alternate sources of credit have been seen to have increased their contribution to credit funding in India. The 2017 financial year marked a watershed in this regard, with banks' share of new credit slumping from a historical 50% to 35%, while funding from nonbank sources rose to 65% (RBI). Assessing creditworthiness has been an uphill task for lenders given that data on income from sources such as income tax returns are not considered particularly reliable. In the case of lending to rural households, institutional lending is limited and almost a quarter of all debt is still owed to moneylenders for short- or medium-term loans with compound interest rates as high as 40%. Furthermore, institutional borrowing by young households is very low in India, and rises for older households. The predominant reasons for borrowing include buying real estate, funding medical emergencies, and purchasing gold for children's marriages. A lack of retirement pension and health coverage often leaves these older households at risk of debt overhang.

The major finding of this paper is that household debt

<sup>4</sup> This estimation approach can also be applied to the case of Small and Medium Enterprise (SME) borrowing which is a plausible future extension of this paper.



Source: Haver Analytics.Database

**Figure 4.** Ratio of Household Debt to Disposable Income (Japan)

stability is a function of five factors: (1) interest rate, (2) period of lending, (3) income growth, (4) household disutility from borrowing, and (5) loan-to-income ratio. The chances of debt overhang increase with rises in interest rate, as expected, and fall with increases in lending period, income growth, loan-to-income ratio, and household disutility from borrowing.

Our theoretical and empirical findings suggest that with a given income growth, interest rate period of lending, and utility function, if the lending was restricted below our ceiling estimates, this could avoid situations of debt default or debt overhang for households and small businesses. Our paper provides estimates for various lending conditions and the estimated ceiling borrowing ratio. While these calculations have been undertaken for interest rates, lending periods, and economic growth rates relevant to India, the model can be easily replicated for any economy by altering the parameters of the stability conditions.

The rest of the paper is organized as follows. Section II discusses the case of Japan. In Section III we derive the stability conditions, while Section IV covers the empirical analysis with respect to India, and Section V concludes.

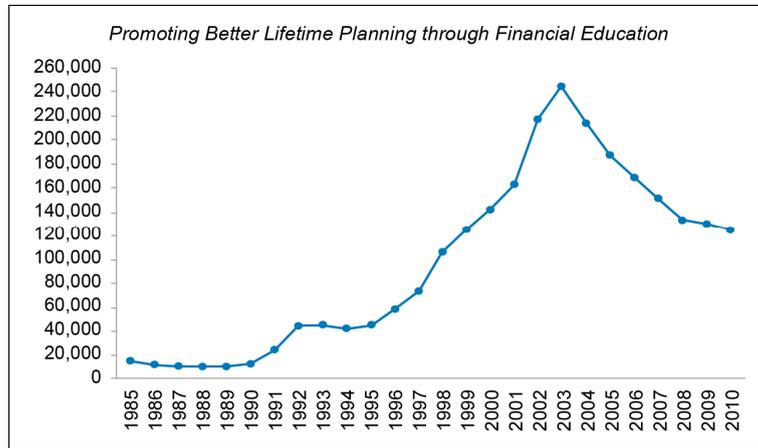
## II. Conceptual Framework

Our estimation strategy draws inspiration from the nonbank moneylending regulation in Japan. In the postwar period, the moneylending industry remained largely de-regulated in Japan. Lending to small-scale and me-

dium-sized enterprises in Japan is covered under the Small and Medium Enterprise Basic Law of 1963 (revised in 1999). This law covers microbusinesses such as restaurants, shops etc. that are operated by only one or two persons or by the owners themselves. Household debt, until the early 2000s, as a percentage of disposable income stood as high as 130% (see Figure 4). In 2007, the Financial Services Agency (FSA) council passed a new regulation to amend the moneylending industry laws and prevent borrowers from becoming heavily indebted. The key features of the law are briefly outlined below<sup>5</sup>:

- a. Ceiling on borrowing ratio: Under the new law, the total amount of borrowing available to a household was capped at one-third of household income. This ceiling was established to ensure that households do not borrow beyond their repayment capacity and hence avoid heavy indebtedness.
- b. Interest rate ceiling: Prior to the law, interest rates in the Japanese moneylending industry stood above 100%. This was first reduced to 29% and further to 20% under the new law.
- c. Borrowers' information: The law required all individual borrowing within a household to be aggregated to obtain the total household borrowing, which was regulated by law.
- d. Self-regulatory association of moneylenders: A self-regulatory association of moneylenders was established to supervise the functioning of the moneylending industry.

<sup>5</sup> The information has been drawn from the FSA council report chaired by Naoyuki Yoshino (see Yoshino 2006).



Source: FSA.

**Figure 5.** Household Default in Japan

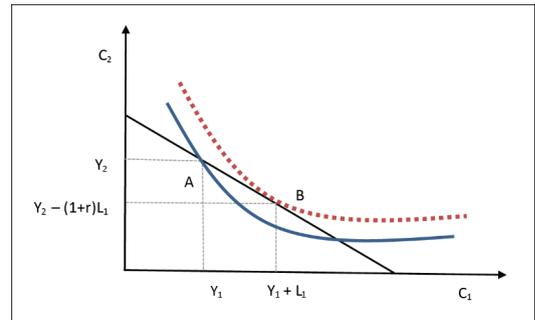
- e. Consumer care hotline: A consumer care hotline was established to empower consumers to report complaints with respect to disputed/unfair money-lending conditions.

Following this, as the regulation fixed a ceiling on borrowing ratios, interest rates, and other regulatory processes discussed above, a sharp decline was seen in the household default rate, with the number falling from 240,000 in 2002 to around 120,000 in 2010 (see Figure 5). This suggests that fixing a ceiling on the loan-to-income ratio along with other regulatory checks and balances reduced the defaults on household borrowings in the case of Japan. Drawing on these results, we proceed to building a simple theoretical model for lending to households and small businesses and we obtain the stability conditions required to avoid the situation of debt overhang. Our model can be easily applied to any economy, and in this paper we derive the conditions using data from India.

### III. Modeling Stability Conditions for Household Debt

#### A. Household Borrowing

We start with a two-period model. Suppose in case I there is no loan, such that household consumption is



**Figure 6.** Household Borrowing and Utility Function

equal to its income, that is,  $C_1 = Y_1$  and  $C_2 = Y_2$ . In this case (see Figure 6), the household utility level will stand at suboptimal point A. However, in case II, we assume that the household is able to borrow  $L_1$ , say for the purpose of buying a house, such that it increases its consumption in period 1 and repays the loan in period 2. In this case  $C_1 = Y_1 + L_1$  and  $C_2 = Y_2 - (1+r)L_1$ . In this case, the utility of the household will move from A to a higher level at optimal point B.<sup>6</sup> This figure thus explains how borrowing in one period may help a household move to a higher utility curve.

We now move on to deriving the stability conditions for borrowing. We begin by assuming a simple utility function for households:

<sup>6</sup> This is a simple case where we assume that the household repays the loan in period 2. The model can also be easily extended to the case where the household borrows in period 1 and repays it over  $n$  periods.

$$U(C,L) = \log C_t - \beta \log L_t \quad (1)$$

Here,  $C_t$  is the household consumption at time  $t$ ,  $L_t$  is the amount of loan outstanding at time  $t$ , and  $\beta$  is the coefficient that measures the disutility of indebtedness. We assume that households borrow in each period and hence their consumption  $C_t$  in time period  $t$  equals income  $Y_t$  in time period  $t$ , plus a loan taken in time period  $t$  minus a loan taken in time period  $t-1$  along with interest at the rate of  $r\%$ .<sup>7</sup>

$$C_t = Y_t + (L_t - L_{t-1}) - rL_{t-1} \quad (2)$$

The household utility maximization problem can hence be written as follows:

$$\begin{aligned} \text{Max } U(C,L) &= \log C_t - \beta \log L_t \\ \text{s.t } rL_{t-1} + C_t &= Y_t + (L_t - L_{t-1}) \end{aligned} \quad (3)$$

We obtain the Lagrangian equation as follows:

$$L = \log C_t - \beta \log L_t - \lambda(rL_{t-1} + C_t - Y_t - (L_t - L_{t-1})) \quad (4)$$

Differentiating the above with respect to  $C_t$ ,  $L_t$ , and  $\lambda$ , respectively

$$\frac{\partial L}{\partial C_t} = \frac{1}{C_t} - \lambda = 0 \quad (5)$$

$$\frac{\partial L}{\partial L_t} = -\frac{\beta}{L_t} + \lambda = 0 \quad (6)$$

$$\frac{\partial L}{\partial \lambda} = rL_{t-1} + C_t - Y_t - (L_t - L_{t-1}) = 0 \quad (7)$$

From (2) and (3), we obtain the optimal  $C_t$  as follows:

$$C_t = \frac{L_t}{\beta} \quad (8)$$

Substituting  $C_t$  from (8) into (7):

$$rL_{t-1} + \frac{L_t}{\beta} - Y_t - (L_t - L_{t-1}) = 0,$$

$$L_t \left( \frac{1}{\beta} - 1 \right) + (1+r)L_{t-1} = Y_t$$

we obtain the optimal amount of  $L_t$  as follows:

$$L_t = -\frac{(1+r)}{\frac{1}{\beta} - 1} L_{t-1} + \frac{Y_t}{\frac{1}{\beta} - 1} \quad (9)$$

Next, we assume that income grows at a constant rate “ $a$ ” such that  $Y_t$  can be written as:

$$\begin{aligned} Y_t &= (1+a)Y_{t-1} \\ \Rightarrow Y_t &= (1+a)^t Y_0 \end{aligned} \quad (10)$$

Substituting  $Y_t$  from (10) into equation (9) we obtain:

$$L_t + \frac{(1+r)\beta}{1-\beta} L_{t-1} = \frac{\beta(1+a)^t Y_0}{1-\beta} \quad (11)$$

Solving the above first-order difference equation we can rewrite (11) as follows<sup>8</sup>:

$$\begin{aligned} L_t &= \left( \frac{-(1+r)\beta}{1-\beta} \right)^t L_0 + \frac{\beta(1+a)^t Y_0}{1 + \frac{(1+r)\beta}{1-\beta}} \left( 1 - \left( \frac{-(1+r)\beta}{1-\beta} \right)^t \right) Y_0 < 0 \\ \frac{L_0}{Y_0} &< \frac{-\beta(1+a)^t}{(1+r)\beta} \left( \frac{-(1-\beta)}{-(1+r)\beta} \right)^t \left( 1 - \left( \frac{-(1+r)\beta}{1-\beta} \right)^t \right) \end{aligned} \quad (12)$$

We use the condition in equation (12) to model stability conditions for household debt.

## B. Consumption Function and Marginal Propensity to Consume

We obtained from equations (8) and (9),

$$C_t = \frac{L_t}{\beta} \quad \text{and} \quad L_t = -\frac{(1+r)}{\frac{1}{\beta} - 1} L_{t-1} + \frac{Y_t}{\frac{1}{\beta} - 1}$$

Let  $\phi = \frac{1-\beta}{\beta}$ , then equation (9) can be rewritten as follows:

$$L_t = -\frac{(1+r)}{\phi} L_{t-1} + \frac{Y_t}{\phi} \quad (13)$$

<sup>7</sup> In this paper we assume static maximization, however this utility maximization problem can also be extended to dynamic optimization. The derivation assuming a dynamic household budget constraint is available from the authors.

<sup>8</sup> See Chiang (1984).

Substituting  $L_t$  in equation (8), we obtain  $C_t$  as follows:

$$\begin{aligned} C_t &= \frac{1}{\beta} \left( -\frac{(1+r)}{\Phi} L_{t-1} + \frac{Y_t}{\Phi} \right) \\ &= \frac{Y_t}{\beta\Phi} - \frac{1}{\beta} \frac{(1+r)}{\Phi} L_{t-1} \\ &= \frac{Y_t}{1-\beta} - \frac{(1+r)}{1-\beta} L_{t-1} \end{aligned} \quad (14)$$

Using the above equation, we next proceed to estimate the marginal propensity to consume (MPC). Substituting (13) in (14), we get the following:

$$\begin{aligned} C_t &= \frac{Y_t}{1-\beta} - \frac{(1+r)}{1-\beta} \left[ -\frac{(1+r)}{\beta} L_{t-2} + \frac{Y_{t-1}}{\beta} \right] \\ \Rightarrow C_t &= \frac{Y_t}{1-\beta} - \frac{(1+r)\beta}{(1-\beta)^2} Y_{t-1} + (-1)^2 \left[ \frac{(1+r)}{1-\beta} \right]^2 \beta L_{t-2} \\ \Rightarrow C_t &= \frac{Y_t}{1-\beta} - \frac{(1+r)\beta}{(1-\beta)^2} Y_{t-1} + (-1)^2 \left[ \frac{(1+r)}{1-\beta} \right]^2 \beta \left[ \frac{(1+r)}{1-\beta} L_{t-3} + \frac{Y_{t-2}}{\beta} \right] \\ \Rightarrow C_t &= \frac{Y_t}{1-\beta} - \frac{(1+r)\beta}{(1-\beta)^2} Y_{t-1} + (-1)^2 \frac{(1+r)^2\beta}{(1-\beta)^2} Y_{t-2} + (-1)^2 \left[ \frac{(1+r)}{1-\beta} \right]^3 \beta L_{t-3} \end{aligned} \quad (15)$$

Assuming that in the long run  $Y_t = \bar{Y}$

$$\begin{aligned} C_t &= \frac{\bar{Y}}{1-\beta} - \frac{(1+r)\beta}{(1-\beta)^2} \bar{Y} + (-1)^2 \frac{(1+r)^2\beta}{(1-\beta)^2} \bar{Y} + (-1)^2 \frac{(1+r)^3\beta}{(1-\beta)^2} \bar{Y} \\ &+ \dots \dots (-1)^n \left[ \frac{(1+r)}{1-\beta} \right]^n \beta^{n-1} L_{t-n} \end{aligned} \quad (16)$$

The sum of the series can be expressed as

$$\begin{aligned} C_t &= \frac{\bar{Y}}{1-\beta} \left[ 1 + \frac{(-1)(1+r)\beta}{1-\beta} + \left( \frac{(-1)(1+r)\beta}{1-\beta} \right)^2 + \left( \frac{(-1)(1+r)\beta}{1-\beta} \right)^3 + \dots \left( \frac{(-1)(1+r)\beta}{1-\beta} \right)^n \right] \\ &+ (-1)^n \left[ \frac{(1+r)}{1-\beta} \right]^n \beta^{n-1} L_{t-n} \\ \Rightarrow C_t &= \frac{1}{1-\beta} \left[ 1 - \left( \frac{(-1)(1+r)\beta}{1-\beta} \right)^n \right] \bar{Y} + (-1)^n \left[ \frac{(1+r)}{1-\beta} \right]^n \beta^{n-1} L_{t-n} \end{aligned} \quad (17)$$

$$\text{For large } n, \left( \frac{(-1)(1+r)\beta}{1-\beta} \right)^n \rightarrow 0 \quad (18)$$

Then the coefficient of  $\bar{Y}$  reduces to  $\frac{1}{1+r\beta}$ , which equals the long-run MPC. Hence we obtain the following equation:

$$\bar{C} = \frac{1}{1+r\beta} \bar{Y} \quad (19)$$

## IV. Empirical Analysis for India

### A. Estimating Marginal Propensity to Consume

We begin our analysis by estimating the marginal propensity to consume using the simple econometric technique of regressing final consumption expenditure on real GDP and lagged consumption expenditure for the period 1967-2017. The data for the same have been obtained from the RBI's DBIE database. The regression results are displayed in Appendix Table A1. We estimate two models with one-year and two-year lagged consumption expenditure on the right-hand side; both the models yield MPC of around 0.81. For the condition in (18)  $\left( \frac{(-1)(1+r)\beta}{1-\beta} \right)^n \rightarrow 0$  to hold, we require that  $\frac{(-1)(1+r)\beta}{1-\beta} < 0$ . Hence for a given  $r$ , this condition gives us the plausible values of  $\beta$ . For example, if  $r = 0.05$ ,  $\beta > 0.49$ , or for  $r = 0.15$ ,  $\beta > 0.46$ .

Assuming  $r = 0.05$  and  $\beta = 0.4$ , MPC, which is estimated as  $\frac{1}{1+r\beta}$ , stands at 0.98. Similarly, if  $r = 0.15$  and  $\beta = 0.4$ , MPC equals 0.93. This is expected to be higher than the estimated national average MPC that covers people from all income levels. However, the MPC of households who face the risk of debt default is expected to be higher than the national average MPC. In the case of India, our estimated MPC using aggregate data equals 0.81; in this case, to obtain a value of  $\beta$  such that  $0 < \beta < 1$  the value of  $r$  must be very high, i.e. of a magnitude greater than 0.24.

**Table 1.** Estimated Values of  $\beta$  and MPC for Given  $r$

| $r$ (given) | $\beta >$ (estimated) | MPC (estimated) |
|-------------|-----------------------|-----------------|
| 0.05        | 0.49                  | 0.98            |
| 0.08        | 0.48                  | 0.96            |
| 0.1         | 0.48                  | 0.95            |
| 0.12        | 0.47                  | 0.95            |
| 0.14        | 0.47                  | 0.94            |
| 0.16        | 0.46                  | 0.93            |
| 0.2         | 0.45                  | 0.92            |
| 0.3         | 0.43                  | 0.88            |

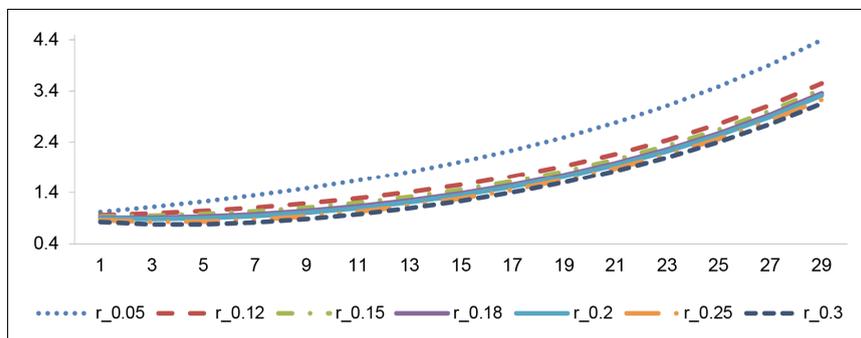


Figure 7. Borrowing Ratio for Varying  $r$  ( $\beta = 0.5$ ,  $a = 7\%$ )

### B. Calculating Stability Conditions to Avoid Household Debt Overhang

We use equation (12) to obtain the stability conditions for household borrowing in the case of India. To start with, we assume  $a$ , the rate of growth of income equal to the GDP growth rate of the economy for the past decade, although this assumption can be easily relaxed.<sup>9</sup> The rate of interest  $r$  varies between 5% and 30% in our simulations while the period of lending varies from one to 15 years.

For our simulation, we use the range of lending rates prevalent in India. Lending rates (or bank lending rates) in India vary across a wide range based on the purpose of the loan. Housing loans have the lowest interest rates, which ranged between 7.5% and 13% in the period 1991-1992 to 2007-2008.<sup>10</sup> Based on the latest available data from the website of a leading public sector bank, namely the State Bank of India, the rate of interest on housing loans stands at around 8.3%. For other loan categories such as for the purchase of consumer durables such as automobiles or gold and other personal loans, the interest rates lie in the range of 14% and above.<sup>11</sup> We use the wide range of interest rates commonly applicable in India for the purpose of our estimation, and in Table 2 we provide estimates of ceiling ratios for varying  $r$  (5%, 8%, 10%, 12%, 14%, 16%, 20%, and 30%, respectively)

Table 2. Estimated Borrowing Ratio for Different Values of  $r$

| $r$  | $\beta$ | $a$  | $n$ | $L_0/Y_0$ |
|------|---------|------|-----|-----------|
| 0.05 | 0.5     | 0.07 | 15  | 2.01      |
| 0.08 | 0.5     | 0.07 | 15  | 1.76      |
| 0.1  | 0.5     | 0.07 | 15  | 1.64      |
| 0.12 | 0.5     | 0.07 | 15  | 1.55      |
| 0.14 | 0.5     | 0.07 | 15  | 1.48      |
| 0.16 | 0.5     | 0.07 | 15  | 1.43      |
| 0.2  | 0.5     | 0.07 | 15  | 1.35      |
| 0.3  | 0.5     | 0.07 | 15  | 1.23      |

assuming  $a = 7\%$ ,  $n = 15$  years, and  $\beta = 0.5$ . Hence, when the interest rate is 8%, the loan should be less than 1.76 times the household income at the time of lending. If the interest rate is increased to 20%, then the ceiling ratio falls to 1.35 times the household income.

In Figure 7, we simulate the results with varying values of  $r$  (5%, 12%, 15%, 18%, 20%, 25%, and 30%, respectively) as well as varying  $n$  (1-15 years),  $a$  is assumed to be 0.07, and  $\beta$  is fixed at 0.5.

In Table 3, we provide ceiling ratio estimates for varying values of  $\beta$  (0.5, 0.51, 0.52, 0.55, 0.6, 0.7, and 0.8, respectively) given that  $a = 7\%$ ,  $n = 15$  years, and  $r = 0.15$ . We find that the borrowing ratio increases with rise in disutility of indebtedness ' $\beta$ '. This suggests that households that attribute greater disutility to indebtedness can borrow at higher levels since their higher disutility coefficient nudges them to repay without defaulting given everything else remains the same. Further, in Figure 8 we estimate the borrowing ratio ceiling for varying values of  $\beta$  (0.50, 0.51, 0.52, 0.55, 0.6, 0.7, and 0.8, respectively), and varying  $t$  (1-30 years) for each simulation  $a$  is assumed

<sup>9</sup> Fixing  $a$ , which is the expected rate of growth of income of the household, can be a challenging task that will vary from case to case and will require judgement on the part of the loan provider. In our paper, we provide simulation estimates for various ranges of income growth.

<sup>10</sup> Source: <https://www.bis.org/review/r100617d.pdf>.

<sup>11</sup> Source: <https://rbi.org.in/scripts/PublicationReportDetails.aspx?UrlPage=&ID=565>.

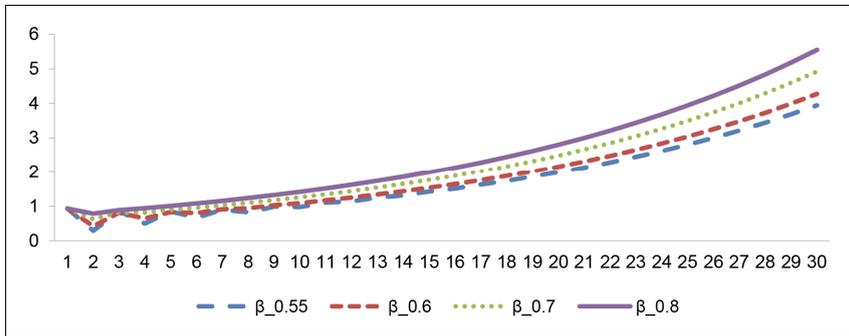


Figure 8. Borrowing Ratio for Varying  $\beta$  ( $r = 15\%$ )

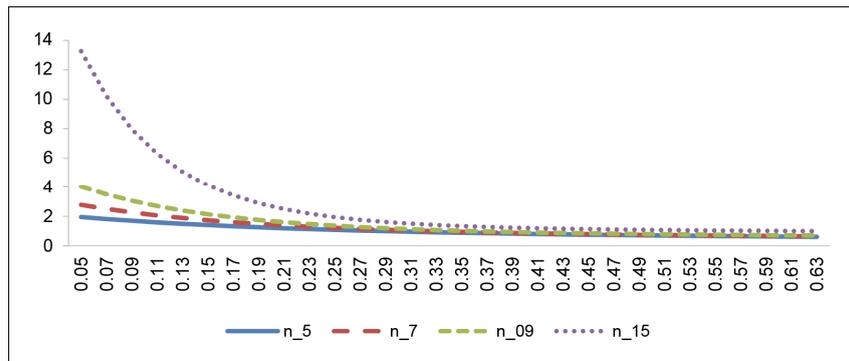


Figure 9. Borrowing Ratio for Varying  $n$  ( $a = 7\%$ ,  $\theta = 0.45$ )

Table 3. Estimated Borrowing Ratio for Varying  $\beta$

| $\beta$ | $a$  | $n$ | $r$  | $L_0/Y_0$ |
|---------|------|-----|------|-----------|
| 0.50    | 0.07 | 15  | 0.15 | 1.46      |
| 0.51    | 0.07 | 15  | 0.15 | 1.41      |
| 0.52    | 0.07 | 15  | 0.15 | 1.39      |
| 0.55    | 0.07 | 15  | 0.15 | 1.42      |
| 0.6     | 0.07 | 15  | 0.15 | 1.53      |
| 0.7     | 0.07 | 15  | 0.15 | 1.77      |
| 0.8     | 0.07 | 15  | 0.15 | 1.97      |

Table 4. Estimated Borrowing Ratio for Varying  $n$

| $n$ | $r$  | $\beta$ | $a$  | $L_0/Y_0$ |
|-----|------|---------|------|-----------|
| 1   | 0.15 | 0.5     | 0.07 | 0.93      |
| 3   | 0.15 | 0.5     | 0.07 | 0.95      |
| 5   | 0.15 | 0.5     | 0.07 | 0.98      |
| 7   | 0.15 | 0.5     | 0.07 | 1.03      |
| 9   | 0.15 | 0.5     | 0.07 | 1.10      |
| 11  | 0.15 | 0.5     | 0.07 | 1.20      |
| 13  | 0.15 | 0.5     | 0.07 | 1.31      |
| 15  | 0.15 | 0.5     | 0.07 | 1.45      |

to be 7%.

In Table 4, we provide estimates of the ceiling ratio for varying values of  $n$  (1, 3, 5, 7, 9, 11, 13, and 15, respectively) given that  $a = 7\%$ ,  $\beta = 0.5$ , and  $r = 15\%$ . The results demonstrate that, for example, when  $n = 3$  years the ceiling ratio estimate is 0.95; when  $n$  is increased to 15 the ceiling ratio rises to 1.45.

In Figure 9, we plot the borrowing ratio estimates for varying values of  $t$  (5, 7, 9, and 15 years, respectively)

and  $r$  (5% to 65%) for each assuming  $a = 0.07$ .

In Appendix Tables A2-A3, we provide additional ceiling borrowing ratio estimates for different combinations of interest rates, periods of lending, income growth, and  $\beta$ . For example, in Table A2, when  $r$  is assumed to be 15%, income growth is 7%, and  $\beta$  is 0.5, a loan with a repayment period of 3 years should have a loan-to-income ratio or borrowing ratio of less than 0.95. This implies

that if the loan value is less than 0.95 times the income of the household/enterprise, it is highly likely that the household will be able to repay the same without defaulting. Similarly, if, with the same conditions, the period of lending is 15 years, the borrowing ratio should be less than 1.46. In Table A3, we alter the interest rate to 10%, and the borrowing ratio for the 15-year period is estimated to be 1.64.

## V. Conclusion

In this paper, we derive stability conditions for households and small enterprises so that they can borrow from the market without running into debt overhang. We use data from India to derive the empirical estimates. We develop a model that can be easily replicated for other economies for estimating lending conditions to avoid the risk of debt overhang. Our theoretical framework suggests that simply fixing a maximum rate of interest and hence “one size fits all” is not the approach for handling household debt overhang. The stability condition for borrowing such that borrowers do not go into debt overhang is a function of five parameters, namely the (1) rate of interest, (2) income growth, (3) coefficient of disutility from borrowing, (4) loan-to-income ratio, and (5) period of borrowing. Further, using data from India we simulate the ceiling loan-to-income ratios for varying values of the other parameters.

In terms of policy recommendation, this paper serves a dual purpose. Firstly, it may be useful for households and small enterprises to know their borrowing limit beyond which they can run into the risk of debt overhang. Secondly, it may be helpful for banking and nonbanking lending institutions to fix lending limits within the range as estimated from the stability conditions in this paper, wherein we use the household utility function to analyze the stability conditions from the household side. Understanding the stability conditions from the lender’s side is a topic for future research.

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## Appendix

$$C_t = 526.9 + 0.308 Y_t + 0.619 C_{t-1} + \epsilon_t \quad (1a)$$

In the long run if we assume  $C_t = C_{t-1} = C$ , then equation 1a can be rewritten as:

$$\begin{aligned} C &= 526.9 + 0.308 Y_t + 0.619 C + \epsilon_t \\ C &= 1382.94 + 0.808 Y_t + \epsilon_t \end{aligned} \quad (1b)$$

**Table A1.** Estimation of Marginal Propensity to Consume

| Variable                                     | Model 1              | Model 2              |
|--|----------------------|----------------------|
| Y  | 0.308***<br>(0.0369) | 0.438***<br>(0.0357) |
| C <sub>1</sub> (one-year lagged consumption) | 0.619***<br>(0.0548) |                      |
| C <sub>2</sub> (two-year lagged)             |                      | 0.458***<br>(0.0573) |
| Constant                                     | 526.9***<br>(108.8)  | 753.6***<br>(127.6)  |
| Observations                                 | 49                   | 49                   |
| R-squared                                    | 0.99                 | 0.99                 |

Standard errors in parentheses, \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1. Dependent variable is final consumption, Y = income, C<sub>1</sub> is one-year lagged consumption, C<sub>2</sub> is two-year lagged consumption. Note: Calculation of MPC from the above table (Model 1).

**Table A2.** Ceiling Borrowing Ratio for  $r = 15\%$ ,  
 $a = 7\%$ ,  $\beta = 0.5$ 

| Year | r   | a  | $\beta$ | Borrowing Ratio |
|------|-----|----|---------|-----------------|
| 1    | 15% | 7% | 0.5     | 0.93            |
| 3    | 15% | 7% | 0.5     | 0.95            |
| 5    | 15% | 7% | 0.5     | 0.98            |
| 7    | 15% | 7% | 0.5     | 1.03            |
| 9    | 15% | 7% | 0.5     | 1.10            |
| 11   | 15% | 7% | 0.5     | 1.20            |
| 13   | 15% | 7% | 0.5     | 1.31            |
| 15   | 15% | 7% | 0.5     | 1.46            |

**Table A3.** Ceiling Borrowing Ratio for  $r = 10\%$ ,  
 $a = 7\%$ ,  $\beta = 0.5$ 

| Year | r   | a  | $\beta$ | Borrowing Ratio |
|------|-----|----|---------|-----------------|
| 1    | 10% | 7% | 0.5     | 0.97            |
| 3    | 10% | 7% | 0.5     | 1.02            |
| 5    | 10% | 7% | 0.5     | 1.09            |
| 7    | 10% | 7% | 0.5     | 1.16            |
| 9    | 10% | 7% | 0.5     | 1.25            |
| 11   | 10% | 7% | 0.5     | 1.36            |
| 13   | 10% | 7% | 0.5     | 1.49            |
| 15   | 10% | 7% | 0.5     | 1.64            |



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### Welfare implications of credit rationing for financial consumers: An empirical investigation on the case of the Korean residential mortgage sector

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#### ABSTRACT

Credit rationing through borrowing constraints has long been an important research topic in the literature, in the context of managing financial risks (i.e., financial stability) as well as of expanding financial service to more marginal borrower segments (i.e., financial inclusion). This study empirically investigates the role of borrowing constraints in the residential mortgage lending sector in Korea, by utilizing a discrete tenure choice model to test the constraining effects of two particular lending restrictions on households' home owning decisions - the wealth and income constraints as measured by the maximum loan-to-value (LTV) ratio and that of debt-to-income (DTI) ratio. Using the household-level micro data from Korea, we report that: the lending restrictions exhibit negative effects on the propensity to own; those constraining effects are also shown to increase for younger borrower cohorts; and, the magnitude of the effect of wealth constraint is larger than that of the income constraint, which is consistent with the findings from the prior studies. Using the empirical findings, we discuss policy implications of relevancy, in particular, as to how to balance between two often competing policy objectives - ensuring financial stability and extending financial inclusion - in the context of the residential mortgage lending sector in Korea.

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*Keywords: Credit rationing, borrowing constraints, housing tenure choice, and consumer welfare*

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#### 1. Introduction

Credit rationing by financial service providers to deal with the problem of information asymmetry, and resulting exclusion of certain consumer segments from a particular lending sector, have long been a topic of investigation in the economic literature.<sup>1</sup> The rationing, caused by the information asymmetry as to the creditworthiness of borrowers, is generally implemented through imposing various underwriting criteria such as consumer credit scores, maximum loan-to-value (LTV) and debt-to-income (DTI)

ratios along with other lending restrictions. In the residential mortgage lending sector, there has also been a series of studies that empirically test the effects of borrowing constraints on households' tenure decisions (Linneman and Wachter (1989), Duca and Rosenthal (1994), Linneman et al. (1997), Gyourko et al. (1999), Barakova et al. (2003), Dieleman et al. (2003), Dawkins (2005), and Boehm and Scholtzman (2009), Johnson and Li (2010), Andrew (2012), Barakova et al. (2014), and Acolin et al. (2016)). Three typical constraints examined by these studies include the wealth constraint (caused by an LTV cap), the income constraint (driven by a DTI cap), and that caused by the creditworthiness constraint (set by a limit in minimum consumer credit score). The main hypothesis tested by this strand of the literature is that, *ceteris paribus*, those credit constraints tend to reduce the propensity to own, and that the wealth constraint generally exhibits a larger

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constraining effect on the ownership decision.

Given this backdrop, this study aims to investigate and document the effects of borrowing constraints in an emerging market context by utilizing a household-level data set from Korea. In so doing, we attempt to institute several enhancements in performing the empirical investigation in this line of research: first, a constant-quality housing is assumed in formulating some of the key variables (e.g., the relative costs of owning vs. renting); second, differential effects of the constraints across different consumer cohorts (i.e., different age and income groups) are estimated to examine cohort-specific effects of the lending restrictions included; and, the interactive effects of the wealth constraint (measured via LTV) and of income constraint (via DTI) are also explored. The results of our empirical analyses show that: two borrowing constraints tested show binding effects on the propensity to own, that is, compared to the unconstrained households both the moderately- and highly-constrained households exhibit the lower propensities to own; as indicated by the regression coefficients, the magnitudes of the wealth effects are far larger than those of income constraints; and, when interacted with the age cohorts, the effect of the wealth constraint shows a larger impact on the young borrower cohorts. The usual determinants of the propensity to own show the expected signs with statistically- significant coefficients: the higher the permanent income, the larger the family size, the older the age cohort, the propensity to own gets higher; on the other hand, the higher the user cost (or relative cost of owning), the lower the propensity becomes. However, contrary to our expectation, the latter year cohort (i.e., year 2014) shows the lower propensities own, ceteris paribus, compared to the earlier one (i.e., year 2006), despite the fact that the residential mortgage market in Korea experienced a substantial growth during the time period.

Our results indicate that the policy makers should be cognizant, and should attempt to balance, two policy objectives that are often competing to each other: ensuring financial stability vs. extending financial inclusion. During the last two decades, the Korean government has been using LTV and DTI caps as important policy instruments to stabilize the housing and mortgage markets in Korea, which are nearly universally applied to all consumers

cohorts in a given geographical area. The level of the maximum lending level specified by the regulation is often very restrictive. For example, a 40 percent maximum LTV in certain locations defined as “speculative zones” (the areas designated by the regulators as the real estate markets being overheated) is applicable regardless of income or wealth level of a particular borrower and of whether one is a first-time home buyer or not. The main implications of our findings are: first, the market stability driven lending restrictions, as those in Korea, can work as an unnecessarily high constraint for less wealthy and younger consumer cohorts for them to become home owners; and, there should be a more elaborate policy design such that those two competing policy objectives can be balanced between those two dimensions - financial and real estate market stability and inclusion of marginal consumer cohorts to the financial service sector.

The rest of the paper consists of the following four sections: a critical survey of prior studies (Section 2); the empirical analysis (data and variables, testing model, and results); a policy implication as to the optimal LTV level; and, concluding remarks.

## II. Literature Survey

### A. Theoretical Underpinning

In a dynamic sense, household’s tenure decision is made in a highly complex utility maximization framework. Following Cho (2017), a representative consumer with perfect foresight maximizes a forward-looking expected utility function with two arguments - housing as a durable good,  $h$ , and a non-durable consumption good,  $c$  (a numeraire) - subject to a series of constraints:

$$\max_{c, h} E_t \left[ \sum_{i=1}^{\infty} \beta^i u(c_{t+i}, h_{t+i}) \right] \quad (1)$$

$$C_{t+i} + R_{t+i}h_{t+i} + S_{t+i} \leq y_{t+i} + \sum_j \alpha_{t+i}^j \cdot W_{t+i}^j, \quad (2)$$

$$M_{t+i}^* \leq M_{t+i}^{\max}(BC_{t+i}^{LTV}, BC_{t+i}^{DTI}, \Phi_{t+i}) \text{ iff } \tau=1 \quad (3)$$

$$l_{t+i} = 0 \text{ if } t+i > \tilde{T}; \text{ otherwise } l_{t+i} > 0 \quad (4)$$

where  $\beta$  is a discount factor. The housing consumption at a given future time period  $i$ ,  $h_{t+i}$ , is a weighted average

<sup>1</sup> See Stiglitz and Weiss (1981), de Meza and Webb (1987), and Waller and Lewame (1994) for theoretical exposition related to the credit rationing.

housing consumption between owning with the propensity to own,  $\tau$ , and renting with probability  $(1 - \tau)$ , i.e.,  $h_{t+i} = \tau \cdot h_{t+i}^o + (1 - \tau) \cdot h_{t+i}^r$ .<sup>2</sup> The optimization is subject to three constraints.

First, the budget constraint (equation (2)) consists of three arguments - consumption (housing rent,  $R$ , per-period per-unit rental price of housing service, multiplied by quantity of housing service,  $h$ ), and savings; The three terms in the left-hand-side should be equal or less than labor income ( $y_{t+i} = l_{t+i} \cdot w_{t+i}$  with  $l$  and  $w$  being labor supply and market wage) and return from accumulated wealth from both housing and non-housing assets ( $W_{t+i}^j = W_{t+i}^h + W_{t+i}^n$ ,  $j = h, n$ ). Under no leverage (at this point), the housing wealth is equivalent to per-unit asset price of housing,  $P^h$ , multiplied by its quantity,  $W_{t+i}^h = P_{t+i}^h \cdot h_{t+i}$ .

Second, the tenure decision is influenced by borrowing constraints (equation (2)). That is, given optimal housing demand,  $h^*$ , the leverage amount  $M^*$  is determined, which should be less than or equal to the maximum loan amount,  $M^{\max}$ , set by three particular borrowing constraints (BC). Two particular BC relevant to this study are a maximum collateral rate (or a maximum loan-to-value, LTV, ratio),  $BC_{t+i}^{LTV}$ , and a maximum debt (or mortgage) payment to income ratio (or per-period debt payment-to-income, DTI, ratio),  $BC_{t+i}^{DTI}$ , which is determined by the risk appetite of mortgage lenders or by the regulatory constraints as was the case in Korea. There is a set of other mortgage underwriting criteria,  $\Phi_{t+i}$ , (other than the LTV and DTI limits) such as mortgage products offered, consumer credit ratings, and documentation requirements to verify income, wealth, and employment.<sup>3</sup>

Third, there is a labor supply constraint (equation (4)) such that, upon reaching a retirement age  $\bar{T}$ , the labor supply (and, hence, the wage income) becomes zero and the consumer will have to be dependent upon other income sources (e.g., public and private pensions, or self-financing out of accumulated wealth).

## B. Empirical Literature

Empirical implementation of the consumer's choice as to housing tenure, i.e., owning vs. renting, involves with estimation of a discrete choice model, usually in a static sense, with several sets of typical explanatory variables, including the relative price factors (e.g., user cost of capital for owning or price-to-rent ratio), the income variables (a permanent, rather than transient, household income), and the demographic variables (e.g., household head's personal attributes such as age, birth-year, marital status, and education level, as well as family size).

As to the role of borrowing constraints, Linneman and Wachter (1989) demonstrate that the households' tenure choice is influenced by permanent income, relative cost (i.e., user cost of capital for owning), demographic variables (marital status, size of household, and so on), as well as borrowing constraints (both wealth and income constraints in purchasing or refinancing home mortgage). Subsequent studies use a similar model to further investigate effects of various socio-economic factors on ownership decisions (Gyourko et al. (1999), Linneman et al. (1998), Megbolugbe and Cho (1996), Goodman and Kawai (1988)).

There are two strands of micro studies from the above first-generation literature. First, a series of studies attempt to explain the observed gap in owning propensity between racial groups. (Dawkins (2005), and Gyourko et al. (1999)) For example, Gyourko et al. report that substantial differences in homeownership rates among racial groups (white vs. African American in particular) are explained by the differences in proportions of wealth-constrained households and in locations of residence (central cities vs. suburbs in particular); Gabriel and Rosenthal provide evidence that household characteristics, rather than borrowing constraints, are dominant factors producing the ownership gaps, and suggest that improving financing options would be less likely to be effective in eliminating the gap. Dawkins finds that location characteristics associated with the supply of affordable owner-occupied housing directly affect the racial gaps in owning.

Second, a number of studies investigate tenure transition patterns of different consumer cohorts, e.g., from renting to first-time owning, from owning back to renting, from owning low-quality housing to high-quality (i.e., filtering up), and so on. (Boehm and Scholtzman (2009) and (2004)), and Dieleman, Clark, and Dierlou (1995)) Dieleman et al. (1995), one of the first in this line of

<sup>2</sup>  $\tau$  is a latent variable, which is proxied as one if a household owns in empirical study on the tenure choice.

<sup>3</sup> It is well-documented in the recent literature that these leverage constraints tend to be pro-cyclical, i.e., being relaxed in an ebullient stage of housing market cycle but becoming more stringent in a crisis stage.

research, provide evidence that age, family status (marital and presence of children), income, and employment status impact transition probabilities of returning to rental tenure and, subsequently, their likelihood of becoming homeowners again. Boehm and Scholtzman (2009) and (2004) provide further evidence, using a more sophisticated econometric model along with two eleven year longitudinal compilations of households from the Panel Study of Income Dynamics, that the observed differences in tenure transition probabilities between white vs. non-white households largely disappear after controlling for gaps in education, income, net worth and savings.

Linneman et al. (1997) study the impact of borrowing constraints with micro-simulation estimates. Besides the income and wealth constraints, market variables such as income, household head age, race, marital status, and family size are used. Similar to previous studies it concludes that wealth constraints have a bigger impact on homeownership than borrowing constraints. The simulation analysis shows the effect of changing the wealth constraint is nonlinear and larger at higher LTV levels and income ratios. Min et al. (2012) did an empirical study of the impact of borrowing constraint, specifically in Korea. By using household level micro data with variables of housing price-rental deposit ratio, income, age of household age, and family size, it concludes that income or/and wealth constrained households show a lower tendency of owning, and the wealth constraint has a stronger impact on homeownership as in previous studies. In policy simulations, they find that relaxing the LTV ratio will have a greater increase on the probability of owning than easing the income constraint.

Bourassa and Yin (2006) research tenure choice differences between the U.S. and Australia, focusing on subsidy policies. Key explanatory variables are housing cost, household characteristics, and subsidies. Results show that the former two variables do not explain differences in homeownership rates. On the other hand, subsidy policies have only a minor impact. Bourassa et al. (2013) researched the impact of mortgage interest deduction policies on homeownership. This study quantifies the effect of the mortgage interest deduction and imputed rent taxation and uses the relative cost of owning and renting, borrowing constraints, real income, and tastes as control variables. It concludes that mortgage interest deduction generally does not improve the homeownership rate, as it is capitalized into the housing price, especially when

supply is inelastic.

### III. Empirical Analyses

#### A. Data and Summary Statistics

The main data source used is the Korea Housing Survey for three years- 2006, 2010, and 2014, the bi-annual survey on housing characteristics published by the Ministry of Land, Infrastructure and Transport. The home price indexes and average mortgage rates are from Korea Appraisal Board; And all monetary values are translated to the real values as of the end of 2006 based on the consumer price indices (CPI) published by Bank of Korea. The list of all the variables used along with description of each is in Table 1, and summary statistics thereof are in Table 2.

#### B. Construction of Key Variables

Following the estimation procedures of the existing literatures, two prior steps before estimating the tenure choice equation are done. First, the permanent income(*pin*) equation is estimated based on the specification below:

$$\ln\_hinc = f(\text{fsize}, \text{age}, \text{age}^2, \ln\_wealth, D_{region}, D_{edu}, D_{occu}, D_{job\_type}, D_{sex}) \quad (5)$$

Current income can be biased as it can include a transient component in individuals' eaming, and the home purchase ability is likely to be correlated with life-long potential income. The log of household income is regressed on family size, house head age and square of age, natural log of net house wealth, region, degree of education, sort of occupation, type of jobs, and sex of house head. We estimated the natural log of house income, ' $\widehat{\ln\_hinc}$ ', using equation(6).

Second, the borrowing constraint variables ( $BC_i$ ) are constructed, for which the optimal home value ( $HV_i^*$ ) is estimated to discern constrained vs. unconstrained households. The specific steps are as follows. First, the income constraint ( $LC_i^I$ ) and wealth constraint ( $LC_i^W$ )

**Table 1.** Variable Descriptions

| Variable    | Definition   |
|-------------|--|
| Year        | year of survey sample (2006, 2010, 2014)   |
| region      | region of household (17 regions at city and province level)  |
| ownership   | house ownership (binomial variable, renter = 0, home owner=1)  |
| Hinc        | house income   |
| Pinc        | permanent income (estimated)   |
| hprice      | house price  |
| rent_area   | rent price per area(in square meters)  |
| nwealth     | net wealth of household  |
| htype       | house types (1= detached, 2=multi-family detached, 3=detached with small business 4=apartment, 5=townhouse, 6=multiplex, 7=commercial building, 8=studio, 9=shanty, 10=others) |
| Fsize       | number of family in household  |
| Age         | age of house head  |
| Sex         | gender of house head   |
| young       | young house head cohort (house head older than 40 =0, under 40 =1)   |
| education   | degree of education (elementary=1, middle=2, high=3, over university degree=4)   |
| occu        | form of job occupation of house head   |
| gap_inc     | degree of income constraint (unconstrained =1, moderately constrained =2, highly constrained =3)   |
| gap_wealth  | degree of wealth constraint (unconstrained =1, moderately constrained =2, highly constrained =3)   |
| own_to_rent | ratio of owner's cost to rent cost (calculated based on individual region and year)  |

**Table 2.** Selected summary statistics

| Variable  | Obs    | Mean    | Std.    | Min      | Max       |
|-----------|--------|---------|---------|----------|-----------|
| Ownership | 83,406 | 0.5929  | 0.4912  | 0        | 1         |
| Hinc      | 78,625 | 269.88  | 345.85  | 0        | 21,650    |
| hprice    | 48,539 | 17,311  | 2,1814  | 20       | 403,850   |
| rent_area | 22,573 | 7.2035  | 8.0907  | 0.01     | 210.02    |
| Nwealth   | 80,929 | 16,199  | 41,026  | -242,310 | 6,100,000 |
| Fsize     | 83,406 | 2.8904  | 1.3318  | 1        | 15        |
| Age       | 83,366 | 53.3775 | 15.5059 | 1        | 102       |
| Sex       | 83,405 | 0.1949  | 0.3961  | 0        | 1         |
| Young     | 83,406 | 0.2136  | 0.4098  | 0        | 1         |

variables are built based on the formula below:

$$LC_i^I = \frac{\delta \times Y_0}{i \times \alpha_m} \quad \text{and} \quad LC_i^W = \frac{W_0}{1 - \alpha_m} \quad (6)$$

$\delta$  = front end ratio (marginal debt payment to income)

$i$  = mortgage (interest) rate

$\alpha_m$  = LTV ratio

$Y_0$  = current income

$W_0$  = current net wealth

The wealth constraint ( $LC_i^W$ ) implies the maximum value of house that a person can purchase, investing net asset as an equity and LTV ratio of purchase price as a mortgage loan. As a same context, the income constraint ( $LC_i^I$ ) implies the maximum value of house that a person can purchase, using a capitalized permanent income.

Third, a sub-sample of households is created such that their observed home values are less than the maximum values given the two borrowing constraints defined above - the wealth and income constraints.

$$HV_i \leq BC_i \quad (7)$$

where,  $BC_i = \min(LC_i^I, LC_i^W)$

Fourth, we build the optimal house value ( $HV_j^*$ ) equation ( $HV_j^* = \pi(Z_j, \phi_j; v_j)$ ) based on the subsample (j) in which households are not constrained by borrowing constraint( $BC_i$ ). Specifically, we regressed the log of home price on the log of permanent income, age of house head, family size, ratio of ownership cost to rent, level of education, sex of house head, type of house, region, occupation of house head, and job type of house head as equation (8).

$$\ln\_hprice = f(\ln\_pinc, age, fsize, own\_to\_rent, D_{edu}, D_{sex}, D_{type}, D_{region}, D_{occu}, D_{job\_type}) \quad (8)$$

Fifth, we calculate the optimal home value  $HV_i^*$  that meets the needs of individual family characteristics assuming they don't have financing constraints:  $HV_i^* = \widehat{H}_i = \pi(Z_i, \phi_i; v_i)$ , where,  $Z_i$  is a set of explanatory variables,  $\phi$  is a vector of regressions, and  $v_i$  is random disturbance. The regression is based on households that has no borrowing constraints ( $HV_i < BC_i$ ).

$$BC_i^I = g(HV_i^* - LC_i^I) \text{ and } BC_i^W = g(HV_i^* - LC_i^W) \quad (9)$$

Finally, the degrees of income and wealth constraint variables ( $BC_i^I$  and  $BC_i^W$ ) for all households are defined as the following three levels - highly constrained (3), moderately constrained (2), and unconstrained (1), as shown below:

|  |  |                           |
|--|--|---------------------------|
| degree of income constraint ( $gap\_i$ ) | $HV_i^* > LC_i^I$                      | highly constrained =3     |
|  | $0.7 \times LC_i^I < HV_i^* \leq LC_i$ | moderately constrained=2  |
|  | $HV_i^* \leq 0.7 \times LC_i^I$        | unconstrained =1          |
| degree of wealth constraint ( $gap\_w$ ) | $HV_i^* > LC_i^W$                      | highly constrained =3     |
|  | $0.7 \times LC_i^W < HV_i^* \leq LC$   | moderately constrained =2 |
|  | $HV_i^* \leq 0.7 \times LC_i^W$        | unconstrained =1          |

### C. Empirical model and estimation results

The tenure choice equation of the following probit model is estimated as below:

$$Probit(own = 1) = f(X_i, gap_i, gap_w; \beta) + \epsilon_i \quad (10)$$

$X_i$  : set of variables

$gap\_i$  : degree of income constraint

$gap\_w$  : degree of wealth constraint

(1= unconstrained, 2= moderately constrained 3= highly constrained)

Three model outcomes are shown in the Table 3 as the main results. Model (1) includes all the control variables along with two time dummies (one for year 2010, another for year 2016, and 2006 data being the reference group) but without the borrowing constraint variables. Model (2) includes all the controls plus both income-constraint and wealth-constraint variables but without time dummies. Model (3) includes all the variables in the second model plus the two time dummies.

Remaining two model outcomes are summarized in the Table 4. The model (4) includes the wealth-constraint variables interacted with the age group cohorts without the permanent income variable. The Model (5) includes the wealth-constraint variables interacted with the year cohorts. However, interpreting the interaction terms of probit models is not straightforward because it is non-linear: the marginal effect of interacted variables is not equal to the correlation coefficient of interaction term. The statistical significance cannot be determined from the z-statistic reported in the regression output, either. That is why we made linear OLS estimations for model (4) and (5), with which we can investigate the impact of interaction terms.

All the usual determinants of the propensity to own show the expected signs that are statistically significant: as shown in Table 3, the higher the permanent income and the larger size of family number, the higher is the propensity to own. On the other hand, the higher user cost (or relative cost of owning) and the younger the age cohort, the lower the propensity becomes. Contrary to our expectation, the two latter year subsamples (2010 and 2016) show lower ownership propensities compared to the 2006 subsample, which is consistent in all three models (Models 1, 3, and 4). As a possible reason for the last result, we conjecture that, although the mortgage market expanded during our study period (which should lower the user cost for average consumer), the market-wide lending restrictions through LTV-DTI caps along with the location-driven regulations (“speculative zones”) might have lowered the propensity over time.

As expected, the borrowing constraint variables reduce the propensity to own. Compared to the unconstrained

**Table 3.** The impact of borrowing constraint to tenure choice(Probit Models)  
 (Dependent variable: Tenure status, one if owning; Pooled sample estimation with 2006, 2010, and 2014 surveys)

| VARIABLES    | Model (1)              |                           | Model (2)               |                         | Model (3)               |                          |
|--------------|------------------------|---------------------------|-------------------------|-------------------------|-------------------------|--------------------------|
|              | ownership              | marginal effect           | ownership               | marginal effect         | ownership               | marginal effect          |
| ln_pinc      | 0.544***<br>(0.0167)   | 0.158***<br>(0.00552)     | 0.0443*<br>(0.0232)     | 0.000936<br>(0.00820)   | 0.141***<br>(0.0241)    | 0.0301***<br>(0.00848)   |
| own_to_rent  | -0.131***<br>(0.00820) | -0.0502***<br>(0.00292)   | -0.115***<br>(0.00888)  | -0.0497***<br>(0.00336) | -0.115***<br>(0.00901)  | -0.0423***<br>(0.00330)  |
| Fsize        | 0.0237***<br>(0.00599) | 0.0247***<br>(0.00215)    | 0.173***<br>(0.00697)   | 0.0727***<br>(0.00262)  | 0.148***<br>(0.00714)   | 0.0649***<br>(0.00268)   |
| Age          |                        |                           | 0.0404***<br>(0.000688) | 0.0154***<br>(0.000255) | 0.0443***<br>(0.000722) | 0.0168***<br>(0.000266)  |
| Sex          |                        |                           | -0.192***<br>(0.0220)   | -0.0788***<br>(0.00822) | -0.152***<br>(0.0223)   | -0.0683***<br>(0.00831)  |
| 1.gap_inc    |                        |                           | -                       |                         | -                       |                          |
| 2.gap_inc    |                        |                           | -0.0290<br>(0.0226)     |                         | -0.127***<br>(0.0232)   |                          |
| 3.gap_inc    |                        |                           | 0.0499**<br>(0.0243)    |                         | -0.0868***<br>(0.0252)  |                          |
| gap_inc      |                        |                           |                         | -0.0199***<br>(0.00410) |                         | -0.0478***<br>(0.00432)  |
| 1.gap_wealth |                        |                           | -                       |                         | -                       |                          |
| 2.gap_wealth |                        |                           | -0.838***<br>(0.0235)   |                         | -0.843***<br>(0.0236)   |                          |
| 3.gap_wealth |                        |                           | -1.753***<br>(0.0233)   |                         | -1.711***<br>(0.0234)   |                          |
| gap_wealth   |                        |                           |                         | -0.357***<br>(0.00425)  |                         | -0.351***<br>(0.00428)   |
| 6.year       | -                      |                           |                         |                         | -                       |                          |
| 10.year      | -0.315***<br>(0.0138)  |                           |                         |                         | -0.338***<br>(0.0159)   |                          |
| 14.year      | -0.218***<br>(0.0160)  |                           |                         |                         | -0.412***<br>(0.0190)   |                          |
| year         |                        | -0.00703***<br>(0.000720) |                         |                         |                         | -0.0196***<br>(0.000876) |
| Young        | -0.851***<br>(0.0135)  | -0.340***<br>(0.00466)    |                         |                         |                         |                          |
| htype(note2) | controlled             | controlled                | controlled              | controlled              | controlled              | controlled               |
| Constant     | -1.545***<br>(0.0739)  |                           | -1.701***<br>(0.133)    |                         | -2.081***<br>(0.137)    |                          |
| Observations | 56,516                 | 56,516                    | 56,516                  | 56,516                  | 56,516                  | 56,516                   |

Note1) Robust standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note2) We controlled house types, which coefficients are statistically significant under 99% of confidence level

**Table 4.** The impact of borrowing constraint to tenure choice (Linear OLS Models)  
 (Dependent variable: Tenure status, one if owning; Pooled sample estimation with 2006, 2010, and 2014 surveys)

| VARIABLES              | Model(4)                |                         | Model(5)                |                         |
|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|                        | Probit<br>ownership     | OLS<br>ownership        | Probit<br>ownership     | OLS<br>ownership        |
| ln_pinc                |                         |                         | 0.117***<br>(0.0241)    | 0.0422***<br>(0.00539)  |
| own_to_rent            | -0.0881***<br>(0.00676) | -0.0263***<br>(0.00209) | -0.111***<br>(0.00915)  | -0.0277***<br>(0.00230) |
| Fsize                  | 0.0455***<br>(0.00423)  | 0.0130***<br>(0.00126)  | 0.152***<br>(0.00713)   | 0.0331***<br>(0.00163)  |
| Age                    |                         |                         | 0.0436***<br>(0.000712) | 0.0106***<br>(0.000165) |
| Sex                    | -0.192***<br>(0.0133)   | -0.0590***<br>(0.00414) | -0.160***<br>(0.0225)   | -0.0255***<br>(0.00504) |
| 6.year x 1.gap_wealth  |                         |                         | -                       | -                       |
| 6.year x 2.gap_wealth  |                         |                         | -0.648***<br>(0.0342)   | -0.224***<br>(0.0114)   |
| 6.year x 3.gap_wealth  |                         |                         | -1.481***<br>(0.0312)   | -0.468***<br>(0.00749)  |
| 10.year x 1.gap_wealth |                         |                         | -0.232***<br>(0.0175)   | -0.0567***<br>(0.00456) |
| 10.year x 2.gap_wealth |                         |                         | -1.263***<br>(0.0398)   | -0.415***<br>(0.0116)   |
| 10.year x 3.gap_wealth |                         |                         | -2.090***<br>(0.0340)   | -0.565***<br>(0.00622)  |
| 14.year x 1.gap_wealth |                         |                         | -0.277***<br>(0.0201)   | -0.0702***<br>(0.00520) |
| 14.year x 2.gap_wealth |                         |                         | -1.263***<br>(0.0539)   | -0.419***<br>(0.0160)   |
| 14.year x 3.gap_wealth |                         |                         | -2.340***<br>(0.0522)   | -0.610***<br>(0.00715)  |
| 6.year                 | -                       | -                       |                         |                         |
| 10.year                | -0.361***<br>(0.0116)   | -0.105***<br>(0.00339)  |                         |                         |
| 14.year                | -0.237***<br>(0.0132)   | -0.0698***<br>(0.00393) |                         |                         |
| 0.young x 1.gap_wealth | -                       | -                       |                         |                         |
| 0.young x 2.gap_wealth | -0.980***<br>(0.0271)   | -0.329***<br>(0.00980)  |                         |                         |
| 0.young x 3.gap_wealth | -0.794***<br>(0.0119)   | -0.264***<br>(0.00370)  |                         |                         |

Table 4. Continued

| VARIABLES              | Model(4)              |                        | Model(5)             |                     |
|------------------------|-----------------------|------------------------|----------------------|---------------------|
|                        | Probit<br>ownership   | OLS<br>ownership       | Probit<br>ownership  | OLS<br>ownership    |
| 1.young x 2.gap_wealth | -1.601***<br>(0.0368) | -0.538***<br>(0.0106)  |                      |                     |
| 1.young x 3.gap_wealth | -2.108***<br>(0.0232) | -0.622***<br>(0.00462) |                      |                     |
| htype(note2)           | controlled            | controlled             | controlled           | controlled          |
| Constant               | 1.530***<br>(0.0214)  | 0.990***<br>(0.00568)  | -2.013***<br>(0.136) | 0.00499<br>(0.0313) |
| Observations           | 83,405                | 83,405                 | 56,516               | 56,516              |
| R-squared              |                       | 0.258                  |                      | 0.396               |

Note1) Robust standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note2) We controlled house types, which coefficients are statistically significant under 99% of confidence level

households ('1.gap\_w' for the wealth constraint, the reference group), both the moderately- and highly-constrained households exhibit lower ownership propensities. In Model (2) and (3), the coefficients for wealth-constrained households are around -0.8 for '2.gap\_w' and -1.7 for '3.gap\_w'. When year is not controlled, the income constraint seems not binding as shown in model (2), whereas it becomes significant when it is controlled as shown in model (3): -0.127 for '2.gap\_i' and -0.086 for '3.gap\_i' for the income-constrained households<sup>4</sup>. As indicated by the coefficients, the magnitudes of the wealth effects are far larger and effective than those of the income constraints.

When interacted with the age dummy, it is also shown that the wealth constraints have a larger impact on young borrowers. In Model (4), the variable '0.young x 1.gap\_w' is an interaction of 'old (not young) cohort' with the '1.gap\_w' (unconstrained borrowers) is the reference group used. The impacts of wealth constraint in young cohort at all three constraint levels, [-0.266, -0.538, -0.622], are shown to be higher than those of old cohort, [0, -0.329, -0.264], based on which we conclude that the wealth constraints tend to have different effects for consumer cohorts with different lifecycle stages, and that they tend to create a larger binding constraint for young households in their tenure decisions. One result to note is that for old age cohorts the mild wealth constraint

in fact inflicts a bigger negative impact (the coefficient -0.329) than that of the high constrained (the coefficient -0.264), which may imply that older-age borrowers tend to have a relatively more extensive social or business network that can mitigate the borrowing constraint. Conceptually, the wealth constraint should be less binding as the net wealth increases, which our data confirms: while the average net worth of the old age cohorts amounts to 181 thousand KRW, that of the young cohorts is only 92 thousand KRW.

When interacted with the survey years, it is shown that the impact of the wealth constraint becomes larger in 2010 compared to the base year of 2006 ('6.year x 1.gap\_w' in Model (5)). Specifically, the coefficient for '10.year x 1.gap\_w' is -0.0567, implying that those households with no wealth constraint have a lower propensity to own in 2010 than in 2006. Between the two later years in our sample, the sizes of impact are similar: [-0.0567, -0.415, -0.565] for 2010 vs. [-0.0702, -0.419, -0.610] for 2014. As expected, the more constrained, the higher the reduction in the propensity: [-0.224] for the moderately-constrained (6.year x 2.gap\_w) and [-0.486] for the highly-constrained (6.year x 3.gap\_w). In sum, our results indicate that there is no statistically valid evidence of reductions in the impacts of borrowing constraints as the residential mortgage market expands, as in the case of Korea during our study period.

<sup>4</sup> The DTI was selectively adopted from 2009 in Korea, and thus the effect of income constraint may not be consistent to ownership rate.

#### IV. Discussion and policy implications

For the purpose of taming the housing price boom-busts, the Korean government has long been instituting a series of policy measures to stabilize the real estate markets since the take-off stage of the sustained economic growth from 1960s. Those anti-speculation measures include the tax regime (for purchasing, holding, and reselling housing and other real estate assets), the rationing mechanisms for newly-constructed housing units, and even the price regulations on new apartment (or multi-unit) properties. After the Asian Financial Crisis, the lending restrictions in the residential mortgage sector become a new policy instrument employed by the government, implemented in combination with the geographically-designated “speculative zones” (i.e., Seoul and other urban areas for which the government suspects an overheated housing market). For example, there are nationwide LTV caps, 60% for the commercial banks and other lenders and 70% for the government agency that securitizes the fixed-rate residential mortgages, which become more restrictive with a 40% maximum in the speculative zones. The DTI restrictions, which vary between 40% to 60%, also work similarly in that they get more restrictive in the seemingly overheated housing markets. Both LTV and DTI constraints also interact with other factors, such as lender type (commercial banks vs. mutual savings banks), mortgage product types (fixed-rate vs. adjustable rate; amortizing vs. non-amortizing), and property type (high-priced property vs. medium-/low-priced property).

Our results indicate that both lending restrictions have a negative impact on the consumers’ propensity to own with the LTV constraint having a larger detrimental effect for the wealth-constrained financial consumers, and that the magnitudes of their impacts grow over time and inflict a bigger constraining effect on the owning propensity for the constrained households. That is, the effect of the borrowing constraint as the binding restriction on consumers’ decision to own did not diminish despite the fact that of the Korean -mortgage market increased its size quite dramatically during our study period. To the contrary, it is proved that the mortgage rationing became worse for the wealth constrained groups and younger households. These findings bring our attention to a potential social cost of the way that those lending restrictions are implemented in Korea. That is, those restrictions are not

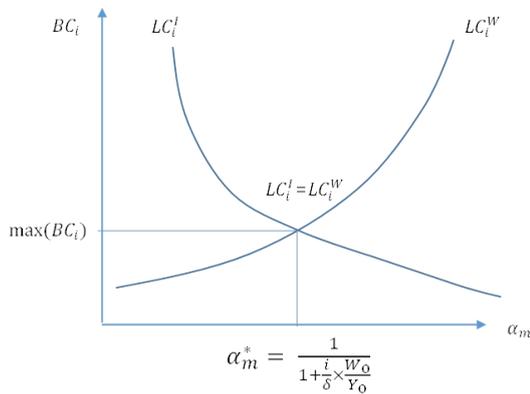
only very much constraining, particularly for those young households who do not accumulate enough wealth, but also making no differentiation based on socio-economic characteristics of consumers (e.g., their life-cycle stages, previous home ownership experience - or first-time home-buyer status, and income and other conditions). Hence, given these implications of our results, we propose a more refined regulatory approach that can be suitable to different consumer cohorts.

It is generally the case that younger house heads have smaller net assets and thus, tend to have bigger constraint than older ones, while they tend to have higher current income and longer remaining career. As a result, a proper policy design in regulating those borrowing constraints should reflect applying optimum level of LTV ratio ( $\alpha_m$ ) to individual mortgage lenders, especially to younger house heads, considering the income and wealth prospects in life cycle. To further investigate this issue, we show below that the degree of borrowing constraint for a household is determined by the smaller of the wealth and income constraints as shown in equation (6). The amount of income constraint decreases, whereas that of wealth constraint increases as the LTV ratio ( $\alpha_m$ ) increases based on the equation (7). As a result, the borrowing constraint amount reaches the highest level when the LTV ratio ( $\alpha_m$ ) makes the two constraints equal ( $LC^I = LC^W$ ), which is illustrated in Figure 1. That is why the optimal (or minimum) level of constraint occurs where the two curves intersect, from which we can derive the optimal LTV numerically as follows:

$$\alpha_m^* = \frac{1}{1 + \frac{i}{\delta} \times \frac{W_0}{Y_0}} \quad (11)$$

Using the summary statistics from our testing sample (for mortgage interest rate, household income and wealth, and mortgage payment amount), the optimal LTV ratio ( $\alpha_m^*$ ) computed are 0.83 and 0.71 for young and old cohort respectively<sup>5</sup>. This result suggests a financial policy that a higher LTV level (hence, less constraining lending

<sup>5</sup> The young and old house heads have average household incomes of 33.0mil and 32.16mil KRW, the average net wealth of 92.46mil and 180.91mil KRW respectively based on the subsample. We used the summary statistics together with average front-end ratio of 35% and 2.5% of borrowing rate to calculate the optimum LTV ratio of 0.83 and 0.71 for young and old house heads.



**Figure 1.** Determining the optimal LTV level

restriction) supposed to be applied to the younger households compared to the older consumer cohorts to optimize the level of the borrowing constraint.

Second, in terms of regulating the mortgage lending sector, our results imply that the policy makers should be cognizant, and should attempt to balance, two policy objectives that are often competing with each other, namely, ensuring financial stability versus extending financial inclusion. During the last two decades, the Korean government has taken a very hands-on approach in using LTV and DTI caps as important policy instruments in the mortgage market. The regulatory approach has been tilting toward stabilizing the housing and mortgage markets in Korea. That is, highly restrictive lending limits were universally applied to all consumer cohorts in a given geographical area, with the very constraining LTV maximum, e.g., the 40 percent maximum LTV in certain locations as defined as “speculative zones”, which is applicable regardless of income or wealth of the borrower and of whether one is a first-time homebuyer. Our empirical results indicate that those regulations were overly restrictive for less wealthy and younger consumers for them to realize their dream of home ownership, suggesting that there should be a more elaborate policy design such that those two competing policy objectives can be balanced between those two dimensions - financial and real estate market stability and inclusion of marginal consumer cohorts in the financial service sector.

## V. Concluding remarks

Housing is a special economic commodity, not only because it represents one of the most basic necessities (offering shelter services) but because it can have a positive externality by making its owner more caring citizen about his or her community.<sup>6</sup> In that sense, the borrowing constraints in the residential mortgage lending sector have welfare implications for financial consumers given that those restrictions essentially define a threshold as to whom can be served by credit suppliers in the sector. In this study, we empirically investigate the combined role of two borrowing constraints in housing tenure decisions and show that lending restrictions exhibit negative effects on the propensity to own, which tends to increase for younger and less wealthy borrower cohorts. In addition, despite the fact that the residential mortgage lending sector of the country experienced substantial growth during our study period (2006 to 2014), the effects of the wealth constraints are shown to increase over time, indicating that the mortgage market does not seem to expand to more marginal borrower groups. Using these findings, we argue that the direction for public policy in this sector should be a more elaborate policy design to strike an appropriate balance between two competing policy objectives - financial and real estate market stability and inclusion of marginal consumer cohorts in the financial service sector.

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<sup>6</sup> See Green et al. (2012) and Yun and Evangelou (2016) for this argument along with the literature in this vein.

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## Credible or Biased? An Analysis of Insurance Product Ratings in Germany

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### ABSTRACT

Instruments such as product ratings can help to overcome information asymmetries in retail financial markets. However, the capacity of ratings to promote market transparency and consumer awareness depends critically on whether they are credible. This article provides an empirical investigation of insurance product ratings in Germany, with an emphasis on the potential sources of bias that could undermine rating credibility. The analysis employs a panel dataset containing ratings for disability insurance products from two rating agencies over a 15-year period. Using the existing literature as a guide, we test a series of hypotheses regarding factors that may explain the variation in rating outcomes over time and across rating agencies. Our results suggest no major concerns regarding the credibility of insurance product ratings.

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*Keywords: product ratings, insurance, ratings bias*

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## 1. Introduction

Insurance products, especially those for life, health and disability coverages, are widely recognized for their complexity, and the difficulty of judging product quality is a central information problem facing consumers in these markets. Transparency of product features is important to ensuring optimal market outcomes by enabling consumers to accurately assess their need for coverage, and their willingness to pay for certain features. A variety of regulatory measures are used in insurance markets around the globe to address transparency concerns, including in some cases explicit regulation of product features. However, markets regulated to such an extent lose the potential benefits of free competition. Information markets, for example the provision of product ratings, are

an alternative approach to promoting transparency in unregulated product markets. This has been the approach used in Europe since European Union Directives deregulated insurance product markets in 1994. Insurance product features are no longer subject to regulatory prior approval before market launch, but consumers are able to compare the quality of insurance products using product ratings provided by government and private raters.

The idea that quality certifications (e.g. ratings) by information intermediaries may remedy information asymmetries has a long history in the economics literature (Viscusi, 1978; Leland, 1979). The net welfare effects of adding quality certifications to a market depend critically, however, on the characteristics of the certifications themselves. In a comprehensive review of the literature on this subject, Dranove and Jin (2010) argue that two failures of certifications may reduce their usefulness in improving market performance: bias and imprecision. A large set of market characteristics can lead to incentives for rating bias and imprecision, and the mere existence of a ratings market does not assure informational efficiency.

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An important source of bias in privately provided ratings stems from the raters' financial incentives: the opportunity to make money from providing a rating now, as well as the opportunity for future revenue from providing subsequent ratings. In many market settings, financial incentives are structured to reward upwardly biased ratings. Using data from the market for insurance product ratings in Germany, this study examines whether upward rating bias appears to exist for insurance product ratings in that country.<sup>1</sup>

The study contributes to the literature in two main ways. First, it provides new evidence on the validity of product ratings, albeit in a specific context. Second, the evidence produced here may inform the academic debate on insurance market transparency and product regulation more generally. There is currently no similar market for insurance product ratings in the U.S., for example, although the products are no less complex than in Germany.<sup>2</sup> If an information market can provide valid, unbiased ratings of products, the need for government intervention in the form of strict product regulation may be reduced.

The remainder of the paper proceeds as follows: The next section provides background on the market for insurance product ratings in Germany. We explain the nature of the product ratings and describe the rating market structure. In section III we describe the dataset on product ratings and the supplemental data used to complete our analysis. We then develop testable hypotheses by drawing on previous literature and the institutional features of the rating market in section IV, discuss empirical methodology in section V, and present results in section VI. A final section discusses our findings and provides policy implications.

## II. Background

### A. The Product Rating Market

Insurance product ratings are external assessments of

the quality of a specific contract that an insurer provides, based on features such as the terms and conditions of coverage, clarity of sales documents and the application form and process. Such ratings are distinct from financial strength ratings or credit ratings, which focus on the financial and other quality aspects at the enterprise level using balance sheet, income, and operating performance data. There are some common considerations in the two types of ratings, of course. For example, product ratings often weight enterprise characteristics that bear on the insurer's fitness as the provider of a specific insurance product; and, financial strength ratings take account of product related factors such as claims payment processes of the insurer.<sup>3</sup>

Product rating agencies began to enter the German insurance market in 1995, the year after implementation of the European Union's Third Insurance Directives, which deregulated several European insurance markets.<sup>4</sup> Ratings have become an important fixture in the German market. Rating seals that identify the rating(s) of a product are typically used as one component of insurers' advertising - they are shown prominently in brochures and on websites - and brokers use the seals to identify products they prefer to sell as well as to justify their advice. Additionally, product ratings are published in consumer magazines and in online product comparisons. According to Romeike (2004), German consumers are very likely to consult ratings before choosing an insurance company (72%). A survey by Assekurata (2006) suggests that more than 80% of German consumers at least occasionally consult product ratings when they search for information on insurance products. Hülsken (2010) found that over 80% of sales intermediaries use product ratings as a basis for advice they give on life insurance and health insurance purchases.

Insurance product ratings in Germany are provided by several private agencies as well as by one government foundation.<sup>5</sup> Private and public agencies show significant differences in objectives, groups targeted by the ratings, and revenue sources. While private agencies' primary goal is profit maximization, more consumer-orientated objectives direct the actions of the government agency.<sup>6</sup>

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<sup>1</sup> See Meyr and Tennyson (2015) for more details on the development and operation of this market.

<sup>2</sup> In the U.S., the Health Plan Report cards provided by the National Committee for Quality Assurance might come closest to the idea of insurance product ratings as provided in the German market.

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<sup>3</sup> See for example the "Guide to Best's Financial Strength Ratings".

<sup>4</sup> See Berry-Stölzle and Born (2012) for a description of the deregulation in Germany.

<sup>5</sup> Rating agencies providing insurance product ratings are not affected by the European regulation of rating agencies.

Government raters have no financial incentives to produce upwardly biased ratings. However, the lack of financial incentives may reduce the raters' effort and thus the quality of their ratings (Dranove and Jin, 2010). Berger et al. (2000) found that in markets where both government raters and private raters operate—for example, in banking—there is exchange of information between the two groups and this may improve the accuracy of their ratings.

In contrast to credit ratings, insurance product ratings in Germany are not commissioned or paid for by the insurance companies. Most rating agencies assess the products' quality on their own initiative and choice, and many product ratings use only publicly available information (so-called PI-ratings). Nonetheless, some product ratings rely in part on internal information provided by the insurer (so-called interactive ratings), and thus do require the insurer's cooperation to produce. The use of product ratings in insurance brokerage is not required by law (in contrast to credit ratings or bond ratings, which need to be consulted for specific investment decisions). Thus, insurance product rating agencies depend greatly on customers' and brokers' awareness.

## B. Ratings for Occupational Disability Products

In this paper, we concentrate on ratings for occupational disability products. These products provide coverage for loss of earnings caused by health restrictions. Although this is only a subset of product ratings, it provides a useful case study. Occupational disability plans account for significant proportions of the life insurance business in Germany, as social security reforms in 2001 privatized disability risk. Due to product complexity and the importance of these products for consumers, ratings on these products are quite common and provided by almost every rating agency in the German market. Additionally, ratings for these products have been provided continuously over the years, while fundamental product characteristics have remained quite stable. This makes examination of ratings over time a meaningful exercise. Moreover, the characteristics of ratings for these products should be representative

of those for other insurance products since the rating systems consider factors also used in ratings of life, health and property-casualty insurance products. This is to be expected, because occupational disability insurance combines characteristics of life insurance products with the more complex contractual terms regarding obligations and conditions for claim payments that are seen in health and property-casualty insurance.

We base our analysis on the ratings of two important agencies: Morgen & Morgen GmbH, a private rating agency, and Stiftung Warentest, a government foundation that provides the so-called Finanztest ratings. Profit-maximizing motives for upward bias in product ratings should be relevant only for the for-profit rating agency (Morgen & Morgen), and not for the government agency (Stiftung Warentest). Thus, we compare the ratings of the two agencies to look for differences that may indicate upward bias in for-profit ratings.

The Morgen & Morgen ratings are interactive ratings, since one subset of rating factors is obtained from a survey of insurers. The Finanztest ratings are PI-ratings, but Stiftung Warentest relies on insurance companies to deliver the data, and thus the rating is effectively interactive. Morgen & Morgen has provided product ratings for most occupational disability products in all years. Stiftung Warentest has not maintained a consistent approach over time with their Finanztest ratings. In some years the Finanztest ratings focused on particular aspects or target groups of occupational disability insurance products; in other years, the foundation decided to rate products that could provide alternative solutions to cover disability risks. For Stiftung Warentest we therefore restrict our analyses to years in which they rated occupational disability products and targeted the majority of consumers, and we drop years with special focuses (2002, 2012).

## C. Product Rating Data

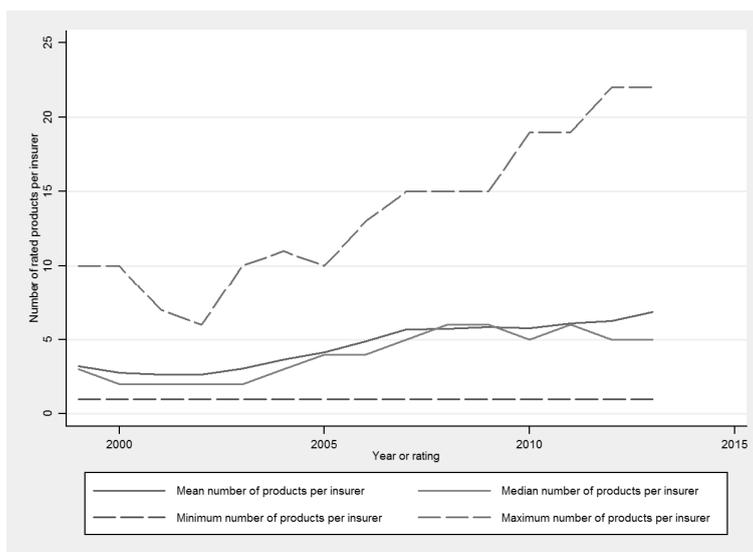
We construct a hand-collected dataset of 4,244 observations for Morgen & Morgen ratings in the years 1999 to 2013 and 1,004 observations for Finanztest ratings from years between 2000 and 2013. The ratings are issued for 873 distinct occupational disability products. The sample of observations is larger for Morgen & Morgen because the company rates all products in the market in every year, while Finanztest typically rates only a subset of

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<sup>6</sup> The purpose of the governmental foundation Stiftung Warentest outlined in their statutes reads as follows: "The foundation works selflessly; it does not primarily pursue its own financial interests. Purpose of the foundation is to foster consumer protection...".

**Table 1.** Sample Characteristics: Rating Data

| No. of Products | Year of Rating |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|-----------------|----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                 | 1999           | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| Morgen & Morgen | 246            | 183  | 188  | 178  | 193  | 229  | 265  | 303  | 342  | 348  | 361  | 352  | 344  | 356  | 356  |
| Finanztest      | 0              | 110  | 106  | 0    | 93   | 138  | 89   | 83   | 85   | 55   | 78   | 39   | 54   | 0    | 74   |
| Total           | 246            | 293  | 294  | 178  | 286  | 367  | 354  | 386  | 427  | 403  | 439  | 391  | 398  | 356  | 430  |



**Figure 1.** Number of Rated Products per Insurer and Year

products. The number of products rated in each year, for each agency, is shown in Table 1.

Figure 1 displays the mean, median, minimum and maximum numbers of products rated by at least one agency on the insurer-year-level. Since Morgen & Morgen aims to provide a comprehensive reflection of the considered market, the data provides evidence of an increasing number of products per insurer over time. This suggests an increase in complexity of the market over time.

Figure 2 shows the distribution of rating values published by Morgen & Morgen for our sample period. Morgen & Morgen issues ratings on a five-point-scale in which higher values indicate higher product quality. While in the beginning of our sample it appears that they awarded an increasing number of highest ratings (5) over time, Morgen & Morgen revised its rating system in 2003, with the consequence that the proportion of these highest ratings is less than 40 percent after that.

Similarly, Figure 3 shows the distribution of product

ratings by Finanztest for the period 2000 to 2013. Finanztest ratings are originally published on a continuous scale from 0.5 for the best product quality to 5.5 for the worst product quality. However, to facilitate readability Stiftung Warentest clusters their numeric ratings into five quality groups (“very good”, “good”, “satisfactory”, “sufficient” and “defective”). We translate these five quality groups into a five-point increasing scale as used by Morgen & Morgen, with “defective” denoted by 1 and “very good” denoted by 5.<sup>7</sup> The Finanztest data suggest an overwhelming proportion of highest ratings since 2009. In 2010, for example, only one product received a rating of 4 while all others (38) received a 5.

<sup>7</sup> This method of ratings scale transformation follows the approach used by Pottier and Sommer (1999). This one-to-one mapping is appropriate because the descriptions of the Morgen & Morgen rating categories almost exactly correspond to the Finanztest category descriptions (e.g. Morgen & Morgen’s category three is “average” where Stiftung Warentest refers to this as “satisfactory”).

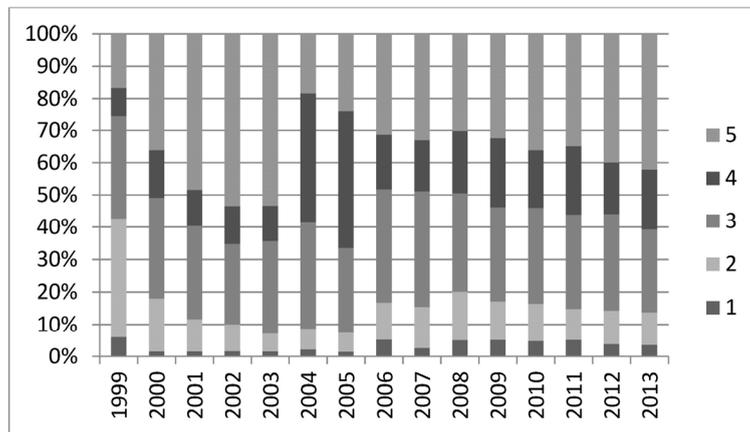


Figure 2. Distribution of Morgen & Morgen Ratings, 1999-2013

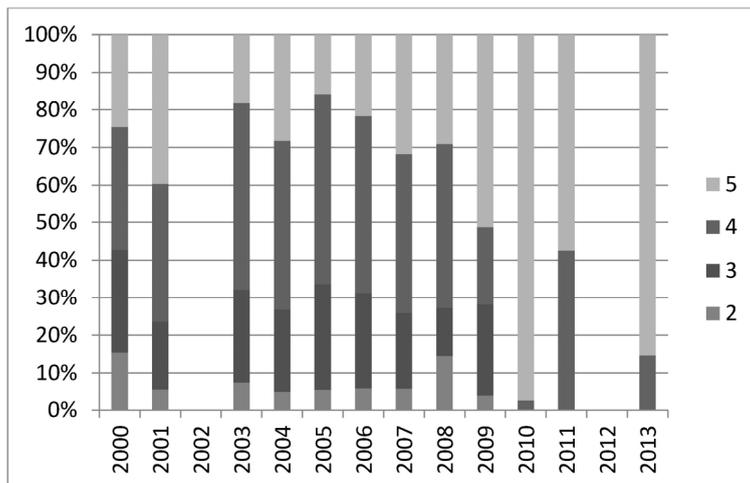


Figure 3. Distribution of Finanztest Ratings, 2000-2013

### III. Development of Hypotheses

The literature on rating markets notes that the design of contractual relationships between rating agencies and rated companies and the consequential cash flows are a major source of potential conflicts of interest for raters. One concern is collusion between rating agencies and the companies that they rate, especially in markets where ratings are solicited and paid for by the rated company. Since a rating agency's interest is to maximize profit, in their attempt to attract the maximum number of products to rate they may have an incentive to offer upwardly

biased initial ratings. If there are weak reputational penalties for inaccurate ratings, no incentives exist to correct the over-rating in subsequent periods (Strier, 2008).

Some empirical studies of credit ratings yield evidence of upward bias due to collusion. For example, Poon (2003) examines the effects of rating commissioning on credit ratings using 2-year panel data on ratings of 15 countries. Her results indicate that ratings are lower for unsolicited quality assessments, which suggests an upward bias in commissioned ratings due to collusion between rating agencies and rated companies.<sup>8</sup> Covitz and Harrison (2003) argue, however, that competition in rating markets will reduce the potential for collusion. Rating agencies are

naturally led by an objective to gain and keep a high level of reputation. The ability of the users of ratings to evaluate rating agencies' credibility by comparing the quality of their ratings grows with the number of competitors providing ratings. As a consequence, the importance of reputation increases with the level of competition in the rating market.

Market discipline from competition is not likely to be strong in the market for insurance product ratings because rating accuracy is difficult to measure, even with the passage of time. Unlike for bond or credit ratings, where ex-post performance measures of the rated instrument or firm are available (e.g., failure rate or market performance), information about an insurance product's "true" quality is nearly impossible to discern. Even though a greater number of ratings per product permit consumers of ratings to compare the recommendations of different raters, this provides only relative information about raters and product ratings. For these reasons the insurance product rating market may have weak reputational penalties for inaccurate ratings.

Insurers do not typically commission product ratings, and rating agencies generally choose which products to rate. As discussed by Meyr and Tennyson (2015), the main source of revenue for private insurance rating agencies is from the provision of databases and software solutions to brokers to assist them with product comparisons. These characteristics of the market reduce the potential for rating bias (Bolton, Freixas and Shapiro, 2012). Nonetheless, there remains a profit incentive for upward bias in product ratings because insurers are more likely to purchase the rating seals of more highly rated products. The incentive to maximize the number of rating seals sold might motivate rating agencies to adjust their ratings upward. This could lead to upward bias in ratings and to little incentive for rating agencies to correct the upward bias over time.

Other considerations lead to predictions about specific patterns of potential ratings bias. First, insurers that offer a larger product portfolio might receive higher ratings as they could potentially buy a greater number of rating seals. In addition, larger insurance companies are usually

more familiar to customers and brokers and can therefore make a greater contribution to increasing a rating agency's prominence by the use of their rating seals in marketing. The desire to attract these larger insurers and keep them as customers could provide particular incentives to inflate ratings for products offered by larger insurers.<sup>9</sup> Finally, long-term relationships may lead to ratings bias. The longer the duration of the business relationships between rating agencies and insurers, the larger the potential incentives for upward bias as the agency does not want to endanger loyal sources of revenue.

Competitive dynamics in the product ratings market could also lead to upward bias. The desire to maintain relationships with insurers or to maximize the number of rating seals sold might motivate rating agencies to adjust their ratings in response to a competitor's assessment. Specifically, agencies may have profit incentives to follow a competitor's upgrade of a product rating but may have profit incentives not to follow a competitor's downgrade of a product rating. Maintaining a higher rating by not following a downgrade - especially if the product currently receives one of the highest ratings - will increase the likelihood of the rating seal being purchased and of receiving cooperation with future ratings. Similarly, following a competitor's upgrade will prevent the competitor from gaining a competitive advantage in rating seal purchases or future cooperation - especially if the upgrade moves the product into one of the highest ratings.

Based on the above reasoning, we propose several related hypotheses regarding bias in insurance product ratings.

- H1:** For-profit rating agencies will provide higher product ratings than a government rating agency.
- H2:** Product ratings increase with the number of products provided by an insurance company, all other factors held constant.
- H3:** Larger insurance companies receive higher product ratings, all other factors held constant.
- H4:** Product ratings increase with the number of years a product has been rated by an agency, all other factors held constant.

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<sup>8</sup> Lower ratings for unsolicited quality assessments could also result from sample selection bias or the rating procedure applied. Poon's (2003) results still hold when controlling for financial factors characterizing the rated companies.

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<sup>9</sup> Insurer size and numbers of products provided by the insurer is not necessarily positively correlated. Smaller insurers might for example be specialists for a particular product type and therefore offer a broader spectrum. With Pearson's correlation coefficient being 0.3592 we do also not find a strong interrelationship between net premiums and number of products provided by an insurer in our data set.

- H5a:** Ratings downgrades from agency A are not followed by downgrades from agency B.
- H5b:** Ratings upgrades from agency A are followed by upgrades from agency B.

#### IV. Empirical Analysis of H1

Table 2 provides summary data on the relationship

between ratings provided by Morgen & Morgen and Stiftung Warentest, and includes only products rated by both agencies. Morgen & Morgen generally publishes their ratings in April whereas Finanztest ratings are normally published in July. The first panel of the table compares the Finanztest ratings to the Morgen & Morgen ratings published three months earlier. The second panel compares the Morgen & Morgen ratings to the Finanztest ratings published nine months earlier. The table categorizes the relative ratings into groups, as follows. For each agency and product, we catalog whether the rating is less than

**Table 2.** Differences between Morgen & Morgen and Finanztest Ratings

| Panel A: Comparison of MM ratings with following FT ratings of the same year |                |              |              |              |              |              |              |              |              |              |              |              |               |
|--|----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
|  | Year of rating |              |              |              |              |              |              |              |              |              |              |              |               |
|  | 2000           | 2001         | 2003         | 2004         | 2005         | 2006         | 2007         | 2008         | 2009         | 2010         | 2011         | 2013         | Total         |
| MM <sub>t</sub> smaller than FT <sub>t</sub> by 2                            | 3<br>(3.5)     | 1<br>(1.1)   | 0<br>(0.0)   | 0<br>(0.0)   | 1<br>(1.4)   | 0<br>(0.0)   | 1<br>(1.3)   | 0<br>(0.0)   | 2<br>(2.7)   | 1<br>(2.9)   | 1<br>(2.0)   | 3<br>(4.5)   | 13<br>(1.5)   |
| MM <sub>t</sub> smaller than FT <sub>t</sub> by 1                            | 14<br>(16.1)   | 14<br>(15.1) | 5<br>(6.4)   | 33<br>(28.7) | 12<br>(16.4) | 15<br>(21.4) | 17<br>(22.1) | 12<br>(25.5) | 22<br>(30.1) | 7<br>(20.6)  | 8<br>(16.3)  | 17<br>(25.4) | 176<br>(20.4) |
| MM <sub>t</sub> and FT <sub>t</sub> equal                                    | 48<br>(55.2)   | 59<br>(63.4) | 31<br>(39.7) | 60<br>(52.2) | 36<br>(49.3) | 37<br>(52.9) | 46<br>(59.7) | 21<br>(44.7) | 42<br>(57.5) | 26<br>(76.5) | 29<br>(59.2) | 45<br>(67.2) | 480<br>(55.6) |
| MM <sub>t</sub> exceeding FT <sub>t</sub> by 1                               | 22<br>(25.3)   | 19<br>(20.4) | 42<br>(53.9) | 20<br>(17.4) | 23<br>(31.5) | 17<br>(24.3) | 12<br>(15.6) | 14<br>(29.8) | 6<br>(8.2)   | 0<br>(0.0)   | 11<br>(22.5) | 2<br>(3.0)   | 188<br>(21.8) |
| MM <sub>t</sub> exceeding FT <sub>t</sub> by 2                               | 0<br>(0.0)     | 0<br>(0.0)   | 0<br>(0.0)   | 2<br>(1.7)   | 1<br>(1.4)   | 1<br>(1.4)   | 1<br>(1.3)   | 0<br>(0.0)   | 1<br>(1.4)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 6<br>(0.7)    |
| Total number of commonly rated products                                      | 87             | 93           | 78           | 115          | 73           | 70           | 77           | 47           | 73           | 34           | 49           | 67           | 863           |

| Panel B: Comparison of FT ratings and following MM ratings of the next year |                   |              |              |              |              |              |              |              |              |              |              |             |               |
|---|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|---------------|
|   | Year of FT rating |              |              |              |              |              |              |              |              |              |              |             |               |
|   | 2000              | 2001         | 2003         | 2004         | 2005         | 2006         | 2007         | 2008         | 2009         | 2010         | 2011         | 2013        | Total         |
| MM <sub>t</sub> smaller than FT <sub>t-1</sub> by 4                         | 0<br>(0.0)        | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 1<br>(4.6)  | 1<br>(0.1)    |
| MM <sub>t</sub> smaller than FT <sub>t-1</sub> by 3                         | 0<br>(0.0)        | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)   | 7<br>(31.8) | 7<br>(0.9)    |
| MM <sub>t</sub> smaller than FT <sub>t-1</sub> by 2                         | 1<br>(1.1)        | 1<br>(1.2)   | 1<br>(1.3)   | 2<br>(1.7)   | 2<br>(2.9)   | 0<br>(0.0)   | 2<br>(2.9)   | 0<br>(0.0)   | 2<br>(3.0)   | 1<br>(2.9)   | 2<br>(4.2)   | 8<br>(36.4) | 22<br>(2.8)   |
| MM <sub>t</sub> smaller than FT <sub>t-1</sub> by 1                         | 9<br>(9.6)        | 9<br>(10.5)  | 10<br>(13.2) | 23<br>(20.0) | 13<br>(18.8) | 13<br>(18.8) | 16<br>(22.9) | 10<br>(21.7) | 16<br>(23.9) | 9<br>(26.5)  | 5<br>(10.4)  | 1<br>(4.6)  | 134<br>(16.9) |
| FT <sub>t-1</sub> and MM <sub>t</sub> equal                                 | 48<br>(51.1)      | 53<br>(61.6) | 51<br>(67.1) | 66<br>(57.4) | 35<br>(50.7) | 37<br>(55.1) | 37<br>(54.3) | 23<br>(50.0) | 40<br>(59.7) | 24<br>(70.6) | 29<br>(60.4) | 5<br>(22.7) | 448<br>(56.4) |
| MM <sub>t</sub> exceeding FT <sub>t-1</sub> by 1                            | 28<br>(29.8)      | 22<br>(25.6) | 14<br>(18.4) | 22<br>(19.1) | 17<br>(24.6) | 17<br>(24.6) | 14<br>(20.0) | 13<br>(28.3) | 8<br>(11.9)  | 0<br>(0.0)   | 12<br>(25.0) | 0<br>(0.0)  | 167<br>(21.0) |
| MM <sub>t</sub> exceeding FT <sub>t-1</sub> by 2                            | 8<br>(8.5)        | 1<br>(1.2)   | 0<br>(0.0)   | 2<br>(1.7)   | 2<br>(2.9)   | 1<br>(1.5)   | 0<br>(0.0)   | 0<br>(0.0)   | 1<br>(1.5)   | 0<br>(0.0)   | 0<br>(0.0)   | 0<br>(0.0)  | 15<br>(1.9)   |
| Total number of commonly rated products                                     | 94                | 86           | 76           | 115          | 69           | 68           | 69           | 46           | 67           | 34           | 48           | 22          | 794           |

Numbers in parentheses indicate percentage shares.

the competitor rating by 4, 3, 2, or 1; whether both agency ratings are equal; and whether the agency rating is greater than the competitor rating by 1, 2, 3, or 4. The table displays the number of product ratings that fall into each grouping for each year and for the sample period as a whole, and shows in parentheses below this number the percent of ratings that fall in the grouping in parentheses. To conserve space, the table displays only the comparison groups for which there is a non-zero entry in at least one year of the sample period.

The data reveal that for the sample period as a whole, the majority of ratings provided by each agency are the same as the ratings published by the other agency. Specifically, 56 percent of ratings are equal when comparing Morgen & Morgen ratings with following Finanztest ratings, and 57 percent of ratings are equal when comparing Finanztest ratings with Morgen & Morgen ratings following in the next period. There is also no strong pattern in the direction of differences: 24 percent of Finanztest ratings are lower than the previous Morgen & Morgen rating and 25 percent are higher; 21 percent of Morgen & Morgen ratings are lower than the previous Finanztest rating and 23 percent are higher.

However, looking at individual years in the sample period, the data indicate a change in the patterns over time. Comparing the first six sample years to the second six, there is an increasing tendency for Finanztest ratings to match the previous Morgen & Morgen rating in the latter period. For years 1999-2005, 46 percent of Finanztest ratings are the same as the rating provided by Morgen & Morgen in the previous publication, but for years 2006-2012 Finanztest ratings match the previous Morgen & Morgen rating 58 percent of the time. The data also show that this is due to a reduction in Stiftung Warentest's propensity to provide a lower rating than Morgen & Morgen: this occurred for 31 percent of products during 1999-2005 but for only 15 percent of products during 2006-2012. Thus, the Finanztest ratings appear increasingly to match those of Morgen & Morgen over time. These patterns fail to support the hypothesis that profit incentives lead to upward bias in Morgen & Morgen ratings and are more consistent with the Berger et al. (2000) observation that government raters may rely on information from private raters.

## V. Empirical Analysis of H2-H4

### A. Data and Variables

This analysis uses the panel data set of product rating data combined with insurance company data for the German life insurance market. We match each observed product rating in our data with company-specific information on the insurer that provides the rated product. Insurer data are obtained from Bisnode, a private provider of data on financial company characteristics and financial performance measures in Germany. Our resulting dataset includes company-specific data for 141 German life insurance companies in all years of our rating sample period. We are unable to obtain financial data for all insurers that offer disability insurance products, and as a result the merged dataset with rating data and insurance company data includes 3,383 ratings observations by Morgen & Morgen and 802 ratings observations by Stiftung Warentest.

Data on insurance companies include age, organizational form, ownership form, balance sheet and underwriting data; data on product offerings including average insured amount per contract; and selected performance indicators including the loss ratio and the contract cancellation rate. Table 3 presents summary statistics for the insurance company variables included in our analysis.

Several of the variables are used to provide key information about the effects of provider-specific characteristics on product ratings. The insurer's size is characterized by the natural log of *net premiums* in a year.<sup>10</sup> The size of the insurer's product portfolio is captured by the *number of rated products* in a year. This variable is specific to each rating agency. The duration of the agency-insurer business relationship is measured by the *number of years rated in a row*. This variable counts the number of consecutive ratings by an agency for a particular product before the current rating.<sup>11</sup>

In addition to these three key variables, our models incorporate several other insurer characteristics as controls. We expect that older companies are more likely to provide

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<sup>10</sup> Results do not change when alternative measures of company size (total assets and equity capital) are used.

<sup>11</sup> Results do not change when we instead include an indicator of a long-term relationship. We tested alternative definitions of a long-term relationship as three years of rating in a row or five years of rating in a row, with similar results.

**Table 3.** Summary Statistics for Insurance Company Variables

| Variable                                 | Obs  | Mean              | Std. Dev.       | Min                       | Max                              |
|--|------|-------------------|-----------------|---------------------------|----------------------------------|
| Age of insurance company                 | 987  | 75.28             | 51.06           | 7                         | 208                              |
| Log net premium (TEUR)                   | 986  | 12.58             | 1.58            | 6.03                      | 16.60                            |
| Number of rated products                 | 989  | 3.59              | 2.86            | 1                         | 22                               |
| Loss ratio (in %)                        | 987  | 68.31             | 34.59           | 1                         | 219                              |
| Cancellation quota (in %)                | 955  | 5.10              | 2.70            | 1                         | 45                               |
| Average sum insured per contract (TEUR)  | 957  | 31.14             | 19.06           | 0.024                     | 110.59                           |
|  |      | Stock company     | Mutual          | Public-service enterprise | Establishment of foreign company |
| Organizational form of insurance company | 3485 | 2,483<br>(71.23%) | 809<br>(23.21%) | 113<br>(3.24%)            | 8<br>(2.30%)                     |

Notes: The table reports descriptive statistics on insurance company data contained in the 1999-2013 panel data-set. All variables are indicated on the insurer-year-level except of data on the insurers' organizational form, which is presented on the product-year-level.

well-known brands and may have advantages in product design and distribution. The variable *company age* is included to control for these influences arising from a company's experience and establishment. We also consider the legal form of the insurance company which could be stock, mutual, public-service enterprise, or a foreign insurance company.<sup>12</sup> Special characteristics of the different legal forms regarding target groups, financing or decision-making might influence product design. As just one example, mutual insurers are owned by policyholders and could be expected to design products of better quality compared to stock companies. We include three indicator variables - *public*, *mutual* and *foreign* - in our models, with stock companies serving as the reference group.

Additionally, we include several measures of operating results as control variables. The *change in loss ratio* measures the annual change in the ratio of incurred losses to earned premiums. We expect a positive relationship between this variable and product ratings, since an increasing loss ratio indicates that policyholders are receiving an increasing level of claims payments per dollar of premiums paid. The *cancellation rate* of policies for each insurer in a year provides an indication of general consumer satisfaction with the insurer's products. We expect that product ratings are negatively associated with cancellation rates. Finally, the model includes the *average sum insured per contract* for an insurer in a year. Insurance companies with

larger exposures may be expected to have a clientele that demands higher product quality and therefore receive higher quality ratings than companies with smaller exposures.

## B. Methodology

For our empirical analysis, we utilize an ordered multinomial model using data for each product and year.<sup>13</sup> The rating outcome for product *i* in year *t*, denoted by  $R_{it}$ , will serve as the dependent variable. Possible outcomes correspond to the rating scale and therefore can take ordinal values from 1 (poor quality) to 5 (very good quality). The model can be derived from the following latent variable model where  $\mu_1$  to  $\mu_5$  represent unknown thresholds for the observed rating categories:

$$R_{it} = \begin{cases} 1 & \text{if } R_{it}^* < \mu_1 \\ 2 & \text{if } \mu_1 \leq R_{it}^* < \mu_2 \\ 3 & \text{if } \mu_2 \leq R_{it}^* < \mu_3 \\ 4 & \text{if } \mu_3 \leq R_{it}^* < \mu_4 \\ 5 & \text{if } R_{it}^* \geq \mu_4 \end{cases}$$

We estimate the model using an ordered probit regression that examines the influence on the rating outcome of insurance company size, number of products in its portfolio and length of business relationship, after accounting for effects of the control variables. Standard errors are clustered at the insurer level to account for within-firm

<sup>12</sup> According to the national Insurance Supervision Act insurance companies in Germany are restricted to these four organizational forms. Besides stock and mutual insurers, companies established under public law have a long tradition as insurance providers in Germany.

<sup>13</sup> The model design is based on Blume et al. (1998).

**Table 4.** Ordered Probit Estimates for Hypotheses 2 to 4

| Full sample                      | Morgen & Morgen |          |             |         | Finanztest  |          |             |          |
|----------------------------------|-----------------|----------|-------------|---------|-------------|----------|-------------|----------|
|                                  | Model IA:       |          | Model IB:   |         | Model IA:   |          | Model IB:   |          |
|                                  | coefficient     | p-value  | coefficient | p-value | coefficient | p-value  | coefficient | p-value  |
|                                  | N = 3,225       |          | N = 3,225   |         | N = 766     |          | N = 766     |          |
| Log net premium                  | 0.237           | 0.007*** | 0.238       | 0.020** | 0.328       | 0.000*** | 0.258       | 0.003*** |
| Number of rated products         | -0.068          | 0.025**  | -0.050      | 0.094*  | -0.044      | 0.297    | -0.114      | 0.024**  |
| Number of years rated in a row   | 0.001           | 0.968    | -0.042      | 0.289   | -0.098      | 0.020**  | -0.024      | 0.687    |
| Age of company                   | 0.006           | 0.093*   | 0.008       | 0.066*  | 0.006       | 0.159    | 0.008       | 0.039**  |
| Mutual company                   | 0.145           | 0.751    | 0.095       | 0.853   | -0.813      | 0.053*   | -0.930      | 0.017**  |
| Public organization              | -1.135          | 0.000*** | -0.846      | 0.018** | 0.944       | 0.001*** | 0.677       | 0.027**  |
| Establishment of foreign insurer | 0.742           | 0.024**  | 0.762       | 0.037** | 1.534       | 0.000*** | 0.598       | 0.139    |
| Change in loss ratio             | 0.038           | 0.468    | -0.023      | 0.749   | 0.374       | 0.022**  | 0.261       | 0.021**  |
| Cancellation ratio               | 0.019           | 0.508    | 0.034       | 0.264   | 0.003       | 0.958    | 0.061       | 0.330    |
| Average sum insured per contract | 0.019           | 0.009**  | 0.019       | 0.036** | 0.035       | 0.000*** | 0.024       | 0.004*** |
| Year dummies                     | No              |          | Yes         |         | No          |          | Yes         |          |

Notes: Standard errors are clustered at the insurer level. \*\*\* Indicates the difference from zero is statistically significant at the 1% confidence level; \*\* 5% confidence level and \*10% confidence level.

correlation over time. To control for unobservable year-specific effects in the 15 years of our sample, some versions of the estimates include year dummies.<sup>14</sup> The ordered probit model is described by the following equation:

$$Pr(R_{it} = j|\theta) = \begin{cases} Pr(\beta_0 + \beta' X_{it} + \epsilon_{it} \geq \mu_1|\theta) & \text{if } j=5 \\ Pr(\mu_j > \beta_0 + \beta' X_{it} + \epsilon_{it} \geq \mu_{j-1}|\theta) & \text{if } j=4,3,2 \\ Pr(\mu_1 > \beta_0 + \beta' X_{it} + \epsilon_{it}|\theta) & \text{if } j=1. \end{cases}$$

Since information on the “true” quality of products is not available, interpreting the effects per rating agency alone cannot provide sufficient information as to whether there is a rating bias or not. Comparing the effects of the two agencies on the basis of direction and significance<sup>15</sup>, however, makes it possible to use such interpretations as measures of a potential rating bias. These interpretations may also be informed by the fact that the regression analysis is based on one private and one governmental rating agency, each of which may be influenced by different incentives.

<sup>14</sup> The year dummies also help control for potential effects on ratings of the rating system change by Morgen & Morgen in 2004. In an alternative specification, a single dummy variable representing the pre reform period was found to be a significant determinant of ratings. However, this change has no effect on the other variables of interest.

<sup>15</sup> In the case of the ordered probit model applied here a direct comparison of the magnitude of the respective effects is not possible because of differing variances in the latent variable  $\mu_{it}$  between models.

### C. Estimation Results

Table 4 reports the results of the ordered probit estimation for the two rating agencies, Morgen & Morgen and Stiftung Warentest, separately. The estimates show that the effect of company size on a product rating is significant and positive for both rating agencies. The number of rated products for an insurance company is negatively associated with the rating, and this relationship is statistically significant for Morgen & Morgen ratings. The effect of the number of years a product has been rated in a row is negative and significant for Stiftung Warentest ratings, and positive but not statistically significant for Morgen & Morgen ratings. These results provide distinctly mixed evidence with respect to our hypotheses regarding the insurance company features that could produce upwardly biased ratings due to the rating agency’s desire to generate more revenue directly (through sales of certificates) or indirectly (through publicity from the rating seals).

The only result that is clearly supportive of the hypothesized effects is a positive and significant relationship between net premiums of the insurer and the product rating. However, there is no difference in the direction or statistical significance of these effects between the private agency and the government agency, so there is no strong indication of a rating bias. This result seems more consistent with the literature on industrial organ-

**Table 5.** Up- and downgrades for commonly rated products

|   | Downgrades    | Upgrades      | No rating change | Total           |
|---|---------------|---------------|------------------|-----------------|
| Morgen & Morgen   | 53<br>(12.27) | 33<br>(7.64)  | 346<br>(80.09)   | 432<br>(100.00) |
| Stiftung Warentest<br>(when comparison based on MM <sub>t</sub> )   | 76<br>(15.90) | 74<br>(15.48) | 328<br>(68.62)   | 478<br>(100.00) |
| Stiftung Warentest<br>(when comparison based on MM <sub>t-1</sub> ) | 73<br>(16.04) | 71<br>(15.60) | 311<br>(68.35)   | 455<br>(100.00) |

Notes: Numbers in parentheses indicate percentage shares.

ization and strategic management, which suggest that larger firm size may reflect higher productivity or other competitive advantages (e.g., Barney 2001). That is, it is possible that larger firms simply offer better products.

Examining estimated effects of the control variables, we see that for both rating agencies, insurance company age and average contract size are positive and statistically significant. Although less robust in statistical significance, products offered by subsidiaries of foreign insurers also receive higher ratings. These results suggest that products offered by larger and more-established insurers tend to be higher quality. Products offered by mutual insurers receive significantly lower ratings from Stiftung Warentest but there is no statistically significant effect of ownership form on Morgen & Morgen ratings. Interestingly, the effect of an insurer being a public-service enterprise is negative and statistically significant in Morgen & Morgen ratings, but positive and statistically significant in Stiftung Warentest ratings. Stiftung Warentest ratings are also sensitive to the change in loss ratio, showing the hypothesized effect that increases in the loss ratio lead to higher product ratings. These findings suggest rating system differences under which the public rating agency may favor public institutions and products with lower expense charges.

## VI. Empirical Analysis of H5

### A. Data and Variables

To investigate whether raters adjust product ratings in response to a competitor's changes, we begin with the sample of products that are rated by both Morgen & Morgen and Stiftung Warentest. To be included in

this analysis a product must be rated by both agencies over at least two consecutive periods, so that we are able to observe situations where both agencies decide on upgrades and downgrades. Additionally, data must be available for at least three periods in a row for the earlier publishing agency, because the comparison point in period  $t-1$  is a rating change instead of an absolute rating.

In this analysis, we make use of differences in the two agencies' ratings publication dates. As noted previously, Morgen & Morgen usually publishes their ratings in April while Stiftung Warentest publishes their Finanztest ratings in July. Morgen & Morgen is the following agency in April of year  $t$  compared with Stiftung Warentest's leading ratings published in July of year  $t-1$ . Stiftung Warentest is the following agency in July of year  $t$  compared with Morgen & Morgen's leading ratings published in April of year  $t$ .<sup>16</sup> There are 478 situations in our dataset for which Stiftung Warentest might be in the position to decide whether to follow a change in the Morgen & Morgen rating published only some months before ( $t$ ) and 455 situations where Stiftung Warentest could decide whether to follow a rating change by Morgen & Morgen made in April of the preceding year ( $t-1$ ). Morgen & Morgen faces 432 situations in which they could adjust their rating in response to a ratings change by Stiftung Warentest. Table 5 provides details on the distribution of observations with regard to upgrades and downgrades within the sample of products rated by both agencies.

<sup>16</sup> It seems possible that Stiftung Warentest might not be able to incorporate observations of the April Morgen & Morgen rating into their own July rating, due to the short notice. For this reason we also estimated models with Stiftung Warentest as the "following" agency in July of year  $t$  that include Morgen & Morgen's "leader" ratings in April of year  $t-1$ . This reduces the number of observations available, but inferences remain similar.

## B. Methodology

Using the observations in Table 5 as our database, we examine the influence of competitor downgrades and upgrades on each agency's own rating decisions. We estimate two probit models, one for ratings downgrades and one for ratings upgrades. In accordance with our hypotheses, we test whether changes in product ratings depend on previous rating changes of the competitor.<sup>17</sup> Each model is estimated separately for each rating agency in the role of the following agency. We do not include insurance company control variables in these models. Standard errors are clustered at the insurer level to account for within-insurer correlation in ratings changes across products.<sup>18</sup>

We denote rating upgrades and downgrades of the later-publishing agency by agency B in the empirical models. The change rating for product  $i$  in period  $t$  serve as dependent variables in our estimated models ( $B\_Down_{it}$  respectively  $B\_Up_{it}$ ). Possible outcomes are binary.  $B\_Down_{it}$  takes the value of 1 whenever a product  $i$  receives a lower rating in period  $t$  as compared to period  $t-1$  by the agency issuing the later rating (agency B) in period  $t$ . It takes the value of 0 if the rating for product  $i$  is higher or equal in period  $t$  as compared to period  $t-1$  by the same agency (non-downgrade).  $B\_Up_{it}$  takes the value of 1 whenever a product  $i$  receives a higher rating in period  $t$  as compared to period  $t-1$  by the agency (B) issuing the later rating in period  $t$ . It takes the value of 0 if the rating for product  $i$  is lower or equal in period  $t$  as compared to period  $t-1$  by the same agency (non-upgrade).

Our models also include an indicator for the level of the product rating before the change. As noted previously, insurance companies use rating seals for advertising but normally buy only the seals for good ratings. A product rating lower than 4 is typically not used in advertising. Thus, for rating downgrades a change of rating from a starting point of 4 or 5 is more consequential (negatively so) than a downgrade from a starting point of 3 or below. For rating upgrades, a change of rating

from a starting point of 3 or 4 is more consequential (positively so) than a change from any other starting point. Thus, indicators for these critical starting points provide additional evidence of whether an agency's reactions to competitor ratings seem more like strategic responses, in contrast to adjustments following real product enhancements or quality declines that are recognized by both agencies.<sup>19</sup>

The model specification for rating downgrades is shown in the equation below.  $B\_Down_{it-1}$  is an indicator of a rating downgrade (or not) of product  $i$  in the previous year by the following firm, and  $B\_45_{it-1}$  is an indicator of product  $i$  receiving a rating of 4 or above in the previous year from this same firm.  $A\_Down_{it-1}$  is an indicator of a rating downgrade (or not) of product  $i$  in the previous year by the leader firm (agency A), and  $A\_45_{it-1}$  is an indicator of product  $i$  receiving a rating of 4 or above in the previous year from the leader firm. If raters are changing their ratings strategically, we expect to observe a smaller likelihood of downgrades from high ratings ( $\beta_1 < 0$ ) and no follower response to leader downgrades ( $\beta_2 = 0$ ).

$$\Pr(B\_Down_{it} = 1) = \Pr(\alpha_i + \beta_1 B_{45_{it-1}} + \beta_2 A\_Down_{it-1} + \beta_3 A_{45_{it-1}} + \epsilon_{it})$$

The estimation model for product rating upgrades is constructed analogously.  $B\_Up_{it}$  and  $A\_Up_{it}$  take the value of one if the considered product  $i$  receives a higher rating in period  $t$  than in period  $t-1$ , by the follower firm (agency B) and the leader firm (agency A), respectively:  $B\_34_{it-1}$  is an indicator of product  $i$  receiving a rating of 3 or 4 in the previous year from the following agency, and  $A\_34_{it-1}$  is an indicator of product  $i$  receiving a rating of 3 or 4 in the previous year from the leader firm. If raters are changing their ratings strategically, we expect to observe a higher likelihood of upgrades from midlevel ratings ( $\beta_1 > 0$ ) and a positive follower response to leader upgrades ( $\beta_3 > 0$ ).

$$\Pr(B\_Up_{it} = 1) = \Pr(\alpha_i + \beta_1 B_{34_{it-1}} + \beta_2 A\_Up_{it-1} + \beta_3 A_{34_{it-1}} + \epsilon_{it})$$

<sup>17</sup> The model is built on the idea of Beaver et al. (2006) where they apply a so called Granger causality test (Granger, 1969) in order to examine whether credit rating changes issued by one agency can contribute to predict the changes in ratings issued by another agency.

<sup>18</sup> To test for robustness, we also estimated models that include year dummies, with no change in results.

<sup>19</sup> Percentage shares of products in more profit relevant rating categories (4 and 5) as well as in less profit relevant rating categories (3 and below) are quite similar between the two rating agencies. Morgen & Morgen assigns high ratings to 74.69 percent of the 478 repeatedly and commonly rated products over the years and 25.31 percent of them receive ratings in the categories 3 and below. Stiftung Warentest assigns high ratings to 78.45 percent of the same products and rate 21.55 percent of these products with 3 and below.

C. Estimation Results

Table 6 reports the results of the probit estimation for the downgrade models. The agency listed in the header row takes the role of the later-publishing rating agency (agency B). The estimates reveal no relationships that suggest strategic changes to product ratings. For Morgen & Morgen, we find a highly significant positive relationship between own downgrades in the current rating period and downgrades of Stiftung Warentest in the period before. Stiftung Warentest’s rating downgrades are significantly influenced by Morgen & Morgen ratings of period  $t-1$ , and again we observe a positive relationship instead of the hypothesized negative relationship. For both agencies, counter to the predictions of the strategic rating hypothesis, highly-rated products are more likely to receive a downgrade. There are no statistically significant effects on downgrades of the competitor’s previous high or low rating for a product.

In sum, in downgrading product ratings, the rating agencies appear to move their own ratings in the same direction as their competitor - for both high-rated and low-rated products. These results are more consistent with actual declines in product quality or changing quality

requirements leading to new ratings, rather than strategic changes in ratings due to raters’ financial interests.

Table 7 reports the results of the probit estimation for the ratings upgrade models.

Results of estimation reveal that a competitor’s previous upgrade is not a statistically significant covariate in the models of rating upgrades. This is true for both rating agencies. Additionally, there is no effect of the absolute level of the competitor’s ratings: products with midlevel ratings by the competitor are no more likely to receive an upgrade than products rated lower by the competitor. Taken together, these suggest that the rating agencies do not strategically follow their competitor’s rating upgrades. Interestingly, however, we do find that the absolute level of rating from which an upgrade is taken plays a role for both agencies. Products that would come into a saleable rating category after upgrading are significantly more likely to receive an upgrade than ratings ranging in the categories 1 or 2. This could be an indicator of upward bias in ratings driven by financial interests of the private rating agency in selling rating seals to insurers. However, given that there are no significant differences between the private rating agency Morgen & Morgen and the non-profit organization Stiftung Warentest, these

**Table 6.** Probit Estimates for Follower Downgrades

|   | Morgen & Morgen |          | Stiftung Warentest |         |
|---|-----------------|----------|--------------------|---------|
|   | N = 432         |          | N = 355            |         |
|   | coefficient     | p-value  | coefficient        | p-value |
| Downgrade by agency A in period t-1                 | 0.855           | 0.000*** | 0.541              | 0.028** |
| Rating of agency B in category 4 or 5 in period t-1 | 0.638           | 0.057*   | 0.796              | 0.033** |
| Rating of agency A in category 4 or 5 in period t-1 | -0.079          | 0.771    | -0.120             | 0.702   |
| Pseudo R <sup>2</sup>                               | 0.0944          |          | 0.0559             |         |

Notes: Standard errors are clustered at the insurer level. \*, \*\* and \*\*\* indicate significance at the 10%, 5% and 1% level respectively.

**Table 7.** Probit Estimates for Follower Upgrades

|   | Morgen & Morgen |          | Stiftung Warentest |          |
|---|-----------------|----------|--------------------|----------|
|   | N = 432         |          | N = 355            |          |
|   | coefficient     | p-value  | coefficient        | p-value  |
| Upgrade by agency A in period t-1                   | 1.293           | 0.615    | 0.266              | 0.177    |
| Rating of agency B in category 3 or 4 in period t-1 | 1.217           | 0.000*** | 1.276              | 0.000*** |
| Rating of agency A in category 3 or 4 in period t-1 | -0.230          | 0.389    | -0.183             | 0.318    |
| Pseudo R <sup>2</sup>                               | 0.1311          |          | 0.1220             |          |

Notes: Standard errors are clustered at the insurer level. \*, \*\* and \*\*\* indicate significance at the 10%, 5% and 1% level respectively.

results may also indicate that insurers have financial incentives to improve the quality of their products to a level just below that needed for a rating that would justify advertising via the seal. To identify which effect these results indicate, more data are necessary.

## VII. Discussion and Policy Implications

Based on panel data of ratings published by two German product rating agencies and data on the insurance companies providing the rated products for years 1999 to 2013, our estimates provide no strong evidence of systematic rating bias. Nevertheless, our results show that products sold by larger insurance companies receive higher ratings. This finding could indicate that the ratings of products supplied by big players in the insurance market are biased upward, because this outcome is observed in the ratings of both the for-profit Morgen & Morgen agency and for the government agency, Stiftung Warentest. However, it is also possible that larger insurers simply offer higher quality products. Our analysis also did not yield any evidence that rating agencies respond strategically to changes in ratings published by their competitor. However, there is some evidence that an agency is more likely to upgrade a product when this product receives one of the two highest ratings as a result of an upgrade. Because insurers usually buy rating seals only their products that receive high ratings, this rating pattern could indicate upward bias in ratings. Again, however, our results show this pattern for both agencies, suggesting that the incentives may come from the insurers' side - to improve products that are marginally below the rating level for which the seal would have value.

Our results also show no strong divergence of product ratings between the private agency Morgen & Morgen and the government agency Stiftung Warentest. This, and the lack of evidence of upward bias, implies that insurance brokers and consumers in Germany could be reasonably confident that such ratings can be used in individually appropriate consulting situations and purchase decisions. This positive outlook may be due to the governance features of this market, in which insurance companies do not commission or pay for product ratings. The primary clients of the private product rating agencies are insurance

agents and brokers, who purchase software licenses and consulting support from the agencies.

To further evaluate the contribution of insurance product ratings to enhance the functioning of insurance markets, consumer awareness and the influence of ratings on the demand for insurance contracts should be taken into account in additional research. Research into the capability of insurance product ratings to enhance consumer decision making is also needed. Since we do not have data on how consumers use the ratings, or data on other indicators of product quality beyond the ratings themselves, we cannot comment on the implications for consumers' decision making. Experimental data or data on consumer complaints may provide an avenue for further study of this important question.

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## **Editorial Principles**

### 1. Mission

**The International Review of Financial Consumers (IRFC)** aims to offer a communication platform for scholars, regulators, and practitioners to share their latest academic research on financial consumers and related public policy issues in both advanced economies and emerging market countries. All theoretical, empirical, and policy papers of relevancy are welcome, with the following as the topics to cover:

- ① protection for financial consumers
- ② business ethics of financial institutions
- ③ market discipline of financial industries
- ④ corporate social responsibility of financial institutions
- ⑤ renovation or innovation of law and regulations related to financial consumption
- ⑥ public policies for financial consumption
- ⑦ fair trading of financial products
- ⑧ dispute resolution for financial consumption
- ⑨ case studies of best practices for financial consumption
- ⑩ international comparison on any of the above topics

### 2. Publication schedule and contents

**IRFC**, the affiliated journal of the International Academy of Financial Consumers (IAFICO), will be published twice a year - April and October each year - and will pursue to be the first international academic journal focusing on the research related to financial consumers. As the contribution of financial consumption becomes increasingly important to the national economy for most countries, how to maintain an efficient and equitable financial market is an imminent issue for research. The trend of globalization and liberalization policies has reinforced the challenges in financial markets. Not only the financial instruments become more complicated and hard to understand by the public, but also the frequent changes in regulations and business practices cause confusions to the financial consumers. Consumption disputes regarding the financial products have drawn attention by the media in recent years. IRFC attempts to serve as a forum to publish and share original and innovative research, both academic and policy-oriented, on all the above issues.

### 3. On ethics for research

The range of research misconducts

① Misconducts related to academic research (“misconducts” hereafter) means that fabrication, falsification, plagiarism, unfair showing of papers' author, during research proposal, research performing, research report and research presentation,

etc. It is as follows.

- 1) "Fabrication" is the intentional misrepresentation of research results by making up data or research result.
- 2) "Falsification" is the distortion of research contents or results by manipulating research materials, equipment and processes, or changing or omitting data or results.
- 3) "Plagiarism" is the appropriation of another person's ideas, processes or results, without giving appropriate approval or quotation.
- 4) "Self-plagiarism" is the reusing a large portion of their own previously written research.
- 5) "Unfair showing of papers' author" is not qualifying people, who have been contributing to research contents or results scientifically, industrially and politically, as an author without just reason, or qualifying people, who have not been contributing the same, as an author with an expression of thanks or respectful treatment.
- 6) Obstructing investigation about misconducts of their own or others, or harming an informant.
- 7) Action which is out range of usually acceptable in the course of the research.
- 8) Action which is suggestion, pressure or threat to others to do the above things.

#### 4. On plagiarism

Types of plagiarism

Following two forms are defined the representative action of research misconducts (Plagiarism).

- ① Using the original author's idea, logic, unique terms, data, system of analysis without indicate the source.
- ② Indicating the source but copying the original paper's words, idea, data and so on without quotation marks.

## **Author Guidelines**

### **General**

The IRFC publishes rigorous and original research related to protection of financial consumers. IRFCs shall be published twice a year, in April and in October. Papers submissions shall be accepted throughout the year. Editorial Board will evaluate manuscripts in terms of research contribution to the field and paper's quality. Research area includes but is not limited to the following topics:

1. Protection for financial consumers
2. Business ethics of financial institutions
3. Market discipline of financial industries
4. Corporate social responsibility of financial institutions
5. Renovation or innovation of law and regulations related to financial consumption
6. Public policies for financial consumption
7. Innovation or fair trading of financial products
8. Dispute resolution for financial consumption
9. Case studies of best practices for financial services or their consumption
10. International comparison of protection for financial consumers.

### **Publication Ethics**

When authors submit their manuscripts to IRFC for publication consideration, they agree to abide by IRFC's publication requirements. In particular, authors confirm that:

- The manuscript is not under review for publication elsewhere, and will not be submitted to another publication entity during the review period at IRFC
- The empirical results of the manuscript have not been previously published.
- The manuscript has not previously been submitted to IRFC for review. Submission of manuscripts previously presented at a conference or concurrently considered for presentation at a conference does not disqualify a manuscript from submission to IRFC.
- Working papers, prior drafts or final versions of the submitted manuscripts posted on a website will be taken out of it during the review process for the purposes of blind review.

### **Submission Fee**

There is no fee for a submission of an article at the IRFC journal.

## Preparing a Manuscript for Submission

1. Papers must be submitted in Microsoft Word format. The structure of the work should be as suggested by the Publication Manual of the American Psychological Association 6 edition:
  - Title
  - Author's name and institutional affiliation
  - Author note
  - Abstract
  - Introduction
  - Method
  - Results
  - Discussion
  - References
  - Appendices and supplemental materials.
2. Manuscripts should be written as concisely as possible without sacrificing meaningfulness and clarity. They should be no longer than 40 double-spaced pages with one-inch margins and Times New Roman 12-point font, including references, tables, figures and appendixes.
3. Submitted papers should be in English, with grammar, spelling and punctuation thoroughly checked.
4. Make sure lettering and sizing of your manuscript, as well as bullet points and numerals are uniform.
5. The title page must include the title of the paper and an abstract of no more than 200 words. Indicate not more than seven key words after the abstract.
6. Please provide author name(s) contact information in a separate page.
7. Sections, including introduction, should be numbered in Roman numerals. Subsection headings should be in letters, e.g. A, B, C.
8. Tables must be typewritten, not in the form of pictures, and given Arabic numerals. They should have a descriptive name following the table number. Tables can be placed either after the text in the paper or in appendix section, if too detailed.
9. Figures must be given Arabic numbers as well and must not include any explanatory materials, which should go to the legend or to the caption. Captions should include a brief description of the figure. Please ensure that figures are of as high quality as possible.
10. The last section of a paper should include main conclusions of the research.
11. References should be placed at the end of the paper. All references must be in the style of American Psychological Association 6<sup>th</sup> edition, the basics can be found here. Make sure all in-text citations are presented in the reference list. The examples of reference entries are as follows:

*For monographs:*

Henderson, J. (2012). *Health economics and policy* (5th ed.). Mason, OH: South-Western, Cengage Learning.

*For contributions to collective works:*

Leonidou, L. (Eds.). (2018). *Advances in global marketing: A research anthology*.

*For periodicals:*

Nam, S. (2006). A study on the causality between the insurance and economic growth, *Korea Insurance Journal* 74, 169-197.

## Communication

With any issues regarding the publication of your paper, please email the IRFC Editor, Professor Sharon Tennyson, at [irfc@cornell.edu](mailto:irfc@cornell.edu).

## Review Process

- Initial review process

When a manuscript is first received, the editor makes a preliminary screening of a manuscript to assess whether it fits the criteria of IRFC's mission and publication principles.

- Normal review process

For each manuscript that passes the initial review stage, the editor assigns one qualified reviewer from the IRFC's Editorial Board and one other qualified reviewer. All submissions will be blind reviewed.

## **Research Ethics**

We are committed to publishing only high quality research. Our policy on research ethics is based on recommendations of the Committee on Publication Ethics (COPE). COPE is an internationally recognized non-profit organization, dedicated to educating editors and publishers in publication ethics. Hence, authors are encouraged to study the IRFC's ethics principles and abide by them.

### **Authorship and Contributorship**

Authorship misconducts (or "misconducts") may include fabrication, falsification, plagiarism, unfair representation of some authors. Misconduct may occur during research proposal, research performing, and research report and research presentation. By submitting their manuscript, authors confirm they are not engaged in any of these actions:

- 1) Fabrication is the intentional misrepresentation of research results by making up data or research result.
- 2) Falsification is the distortion of research contents or results by manipulating research materials, equipment and processes, or changing or omitting data or results.
- 3) Plagiarism is the appropriation of another person's ideas, processes or results, without giving appropriate approval or quotation. We define two types of plagiarism:
  - 3.1) Using the original author's idea, logic, unique terms, data, system of analysis without indicating the source.
  - 3.2) Indicating the source but copying the original paper's words, ideas, data and so on without quotation marks.
- 4) Self-plagiarism is the reusing of a large portion of author's own previously written research.

**Other misconducts include:**

- 5) Indicating as authors those who did not contribute but are credited ("guest", or "gift" authorships), and those who contributed but are not credited ("ghost" authors).
- 6) Obstructing investigation of their own or other authors' misconducts.
- 7) Pressure on, suggestion or threat to others to do the above things.
- 8) Any other action which is usually unacceptable in the course of research.

In case that the Editorial Board reveals or suspects any misconduct, it will contact the author for clarification or contact an author's institution for further investigation. Allegations of ethical misconducts may lead to rejection of the manuscript submitted for publication. If an ethical misconduct is revealed after publication of a manuscript, the article may be retracted or removed. We encourage authors and readers of the Journal to notify the Editorial Board of any alleged misconducts. The Board will keep the names of those who have notified anonymous.

## Conflict of Interest

We are committed to identifying a conflict of interest whenever it arises. IRFC policies on the conflict of interest include responsibilities for authors, editors, board members and reviewers.

Conflict of interest arises whenever a personal interest of an author, editor, board member or reviewer may affect objectivity of the research or the fulfillment of journal related obligations. This may include financial (e.g. employment, stock ownership, providing consulting services), intellectual (e.g. patent ownership), political, religious or other personal interests. Authors should disclose their conflict of interest in a Manuscript submission form when sending their manuscript. Editors, editorial board members and reviewers should submit a statement prior to engaging in these roles for a manuscript.

Funding information is considered separately from conflicts of interest. IRFC requires authors to whether funding has been received for research, as well as funding sources.

## Complaints and appeals

If you are a Journal reader and recognize any thoughts, ideas or other materials that are used in a published IRFC article without giving credit to the initial author, we encourage you to notify the Editorial Board. Authors who contributed to the published research but were not given credit for it should also contact the Journal's Board. The Board will reply to all complaints and notify the complainant of its decision and following actions. The Board shall not reveal any information on those who notify it on possible misconducts. All notifications will be considered and investigated.

In case of any complaints against the Journal, its staff or Editorial Board members, you should submit your statement to the Board explaining your position and reasoning. Staff or Board members against whom a complaint is submitted will not participate in further investigation and consideration of the case.

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The Journal may ask authors to provide any raw data necessary to understand and assess the research, including input data and computer codes. Any restrictions and objections to this policy should be disclosed when submitting the article, otherwise will not be considered as valid later.

## Research Ethics

Authors should comply with all standards adopted by their institution and industry in relation to research involving hazards, human or animal objects. If a manuscript contains images or personal data of individuals participating in the research, authors should have individuals' consent and ethics committee approval. When submitting an article,

an author should provide necessary statements of compliance.

## Fundamental Errors

If an author identifies any significant error in their paper after its publication, it is the author's responsibility to notify the Editorial Board promptly. Authors should provide their assistance in implementing retractions or corrections of the paper. We also encourage readers to notify the Board should they identify any errors in the published materials.

# **Bylaws of the International Academy of Financial Consumers (IAFICO)**

March 31, 2015

First revision on April 19, 2016

Second revision on September 30, 2019

## **Section 1 General Provisions**

### **Article 1 (Official Name)**

The official name of this academic society shall be the “International Academy of Financial Consumers (IAFICO hereafter)”.

### **Article 2 (Registered office and Branch offices)**

The registered office is to be in Seoul, South Korea. Branch offices may be established in provincial cities in Korea or overseas should the need arise.

## **Section 2 Objectives and Undertakings**

### **Article 3 (Objectives)**

\*Pending

The IAFICO is a non-profit association aiming at promoting and developing at an international level collaboration among its members for the study of various issues relating to financial consumers, including its education, legislation, creation of best practices, supervision, and policy advancement to contribute to the development of the global economy and financial market, through investigation or research into financial consumers, and other academic activities.

### **Article 4 (Undertakings)**

The following activities shall be carried out in order to achieve the objectives of the IAFICO.

1. Publication of journal and other literature
2. Hosting of academic conferences
3. Additional undertakings corresponding to the objectives of the academic society which are deemed necessary at the board of directors meeting or the general meeting

## Section 3 Membership

### Article 5 (Requirements and Categories)

The IAFICO shall have following categories of membership:

#### ① Individual member

Individual members are categorized further into a regular member or an associate member.

1. Regular member shall be a specialist in the area such as finance, consumer studies, economics, management, law, or education etc, and must be a full-time instructor at a domestic or overseas university, a researcher at a research institute with equivalent experience, or should hold equal credentials to those mentioned previously, and shall become its member by the approval of the board of directors. Regular members attend general meetings and may participate in discussions, hold the right to vote, and are eligible to be elected to a director or other status of the IAFICO.
2. Associate members shall be divided into either a student member, who is a current domestic or overseas graduate school student, or an ordinary member, who works for a financial institution or a related organization. Associate members do not hold the right to vote and are not eligible to be elected to a director or other status of IAFICO.
3. Both regular member and associate member must pay the membership fee to the IAFICO every year.
4. In the case that a decision is made by the Board of Directors to expel a member due to a violation of the objective of the society, or demeaning the society, or in the case that a member fails to pay the membership fees for two years continuously without prior notice, their membership shall be revoked.

#### ② Institutional member

1. Institutional member shall be organizations related to financial consumers who do not damage the impartiality of the IAFICO subject to approval of the Board of Directors. Institutional members do not hold the right to vote and are not eligible for election.
2. Institutional member must pay its membership fee to the IAFICO every year.

## Section 4 Organization

### Article 6 (Designation of Board of Director)

The following Directors are designated to constitute the Board of Directors to run the IAFICO.

1. Chairperson
2. Vice-Chairperson
3. President
4. Vice-President
5. ordinary Directors
6. Auditor

#### Article 7 (Election of Board Members and Director)

- ① The Chairperson, Directors, and Auditors shall be elected or dismissed at the general meeting.
- ② Appointment of the Directors may be entrusted to the Chairperson pursuant to the resolution of the general meeting.
- ③ The Vice-Chairperson, President, and Vice-President shall be appointed and dismissed by the Board of Directors.

#### Article 8 (General Meetings)

- ① General meeting shall decide following matters relating to the activities of the IAFICO.
  1. Amendments to the Bylaws
  2. Approval of the budget and settlement of accounts
  3. Election or Dismissal of the Chairman
  4. Election or dismissal of Auditors
  5. Regulations concerning the duty and rights of members
  6. Resolutions regarding items submitted by the President or Board of Directors
  7. Other important matters
- ② The Chairperson must call a regular general meeting at least once a year and report on the undertakings of the IAFICO. Provisional general meetings may also be held by the call of the Chairperson, or at the request of at least a quarter of current regular members, or according to the resolution of the Board of Directors.
- ③ At a general meeting, a quorum is formed by one third of regular members. However, regular members who are not able to participate in the general meeting in person may be represented by proxy, by entrusting a specific regular member attending the general meeting with their attendance or voting right. In this case the letter of proxy is included in the number of attendees.
- ④ Resolutions at the general meeting will be made according to the majority vote of the attending members who hold the right to vote.
- ⑤ In principle, the general meeting shall be held with face-to-face meeting, however, it may be held web-based meeting when needed.

#### Article 9 (Auditors)

- ① The auditors shall audit financial affairs, accounts and other transactions of IAFICO, shall participate in, and may speak at board meeting, and must present an auditor's report at the regular general meeting.
- ② There shall be two appointed auditors.
- ③ Auditors are elected at the general meeting.
- ④ An auditor shall serve a term of two years and may be reappointed.

#### Article 10 (Board of Directors)

- ① The Board of directors shall be made up of chairperson and fewer than 80 directors.
- ② The Board of Directors shall decide a plan of operation and establish the budget, in addition to matters on the running of IAFICO.
- ③ Board meeting requires a quorum of at least one third of current board members. Resolutions at the Board meeting will be made according to the majority vote of the attending members. However, board members

who are not able to participate in the board meeting in person may be represented by proxy, by entrusting another specific board member attending the board meeting with their attendance or voting right.

- ④ A board member shall serve a term of two years, with a possibility of serving consecutive terms.
- ⑤ A number of sub-committees or branches in each country or region may be set up under the Board of Directors to support the running of the IAFICO.

#### Article 11 (Steering Committee)

- ① The Board of Directors may entrust some decisions relating to the conducting of business to the Steering Committee.
- ② The Steering Committee shall be comprised of the Chairperson, Vice-Chairperson, President, and the heads of each subcommittee.
- ③ Temporary task forces may be established by the Steering Committee when necessary to run the business of the Steering Committee.

#### Article 12 (Chairperson)

- ① The Chairperson shall represent the IAFICO and chair its general meeting and board meeting.
- ② There shall be one appointed Chairperson who serves a term of three years.
- ③ In the case of an accident involving the Chairperson, the Vice-Chairperson shall complete the remaining term of office of less than one year. If it lasts longer than one year, a new Chairperson shall be elected at the general meeting.
- ④ A new Chairperson should be elected at the general meeting one year prior to the end of the current Chairperson's term of office.
- ⑤ Should it be judged that it is difficult for the Chairperson to carry out their duty any longer, he or she may be dismissed from their post by the decision of the Board of Directors and general meeting.

#### Article 13 (Vice-Chairperson)

- ① The Vice-Chairperson shall assist the Chairperson, and serve as a member of the Board of Directors.
- ② The Vice-Chairperson shall serve a term of two years, or the remaining term of office of the Chairperson, whichever is shortest.
- ③ The Vice-Chairperson shall be elected from one of the regular members at a meeting of the Board of Directors, according to the recommendation of the Chairperson.
- ④ The Vice-Chairperson may be reappointed.

#### Article 14 (President)

- ① During its term of office, the President shall become the head of the organizing committee supervising international conferences, and serves for a term of one year. The President shall attend the board meeting as a member of the Board of Directors.
- ② The succeeding President shall be elected by the Board of Directors after considering their ability to organize and host the following year's conferences. The succeeding President shall also attend board meeting as a member

of the Board of Directors.

- ③ The Board of Directors may elect the next succeeding President should the need arise. The next succeeding President shall also attend board meeting as a member of the Board of Directors.
- ④ The President, succeeding President, and the following President may appoint a Vice- President respectively by obtaining approval of the Board of Directors.
- ⑤ The appointment and dismissal of the President is decided at the board meeting.

#### Article 15 (Vice-President)

- ① A Vice-President is a member of the Board of Directors and shall assist the President, supervise applicable international conferences.
- ② A Vice-President is recommended by the President and shall be approved by the Board of Directors.
- ③ Multiple Vice-Presidents may be appointed.
- ④ A vice-President shall serve a term of one year, the same as the term of President.
- ⑤ In the event of an accident involving the President, a Vice-President shall fulfil the President's duties during the remaining term of office.

#### Article 16 (Editorial Board)

- ① The Editorial Board shall be responsible for editing of journals and other materials to be published by the IAFICO.
- ② The head of the Editorial Board shall be appointed by the Board of Directors, and shall serve a term of office decided by the Board of Directors.
- ③ The head of the Editorial Board shall be a member of the Board of Directors.
- ④ Additional matters concerning the running of the editorial board shall be decided separately by the Board of Directors.

#### Article 17 (Advisory Board and Consultants)

- ① The Chairperson may select individuals who could make a large contribution to the development of the IAFICO, and appoint them as advisors subject to the approval of the Board of Directors.
- ② The Chairperson may appoint consultants subject to the approval of the Board of Directors in order to receive advice relating to all business matters of the IAFICO, such as development strategies, conferences, research plans, and research projects etc.
- ③ Advisors and consultants shall serve terms of one year and may be reappointed.

### Section 5 Financial Affairs

#### Article 18 (Accounting and Revenue)

- ① The fiscal year of the IAFICO shall run from the 1st of January to the 31st of December each year.

- ② The finance required to operate the IAFICO shall be sourced from membership fees, member contributions, society participation fees, and other incomes. Related matters shall be decided by the Board of Directors or the Steering Committee.
- ③ Should the need arise, the IAFICO may accept sponsored research, donations or financial support from external parties in order to support the business performance of the IAFICO. The Chairperson shall report the details of these at the board meeting.
- ④ Chairperson should report all the donation from outside and their usage of the year at the IAFICO homepage by the end of March of the next accounting year.

## Section 6 Supplementary Rules

### Article 19 (Revision of the Bylaws)

- ① Any other matters not stipulated by this Bylaws shall be resolved by the Board of Directors.
- ② Revision of the Bylaws shall be carried out, by the proposition of the Board of Directors, or at least one-tenth of regular members, at a general meeting where at least one-third of the total regular members are in attendance, or at a provisional general meeting, with the agreement of at least two-thirds of current members.

### Article 20 (Dissolution)

Should the IAFICO intend to be dissolved, it must be decided upon at a general meeting with the agreement of at least two-thirds of current members, and permission must also be received from the Fair Trade Commission. Except for bankruptcy, the dissolution must be registered and reported to the Ministry of Strategy and Finance within three weeks, accompanied by a certified copy of register.

### Article 21 (Residual Property upon Dissolution)

Should the IAFC be dissolved, according to article 77 of the Korean civil law, all remaining assets of IAFICO shall belong to the state, local government, or other non-profit corporations carrying similar objectives.

### Additional Clause

These Bylaws shall become effective from the 1st April 2015

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