Asian Review of Financial Research Vol. 30 No. 2 (May 2017)

Discretionary Consumption and the Equity Premium: Evidence from Korea

Jaehoon Hahn* Associate Professor, School of Business, Yonsei University
Yong Joo Kang Doctoral Student, School of Business, Yonsei University
Yuna Sohn Doctoral Student, School of Business, Yonsei University

Abstract

Aït-Sahalia, Parker, and Yogo (2004) suggest using luxury goods retail sales data as an alternative measure of consumption to obtain more reasonable estimates for the coefficient of relative risk aversion that better match the observed equity premium. We apply their novel idea of using data that reflect discretionary consumption by the wealthy to the Korean context by using sales revenue of three largest sellers of high-end whisky and two major airlines as proxies for discretionary consumption that are more likely to respond to movements in the stock market. When theses proxies for discretionary consumption are used in place of standard consumption, the estimates for relative risk aversion are an order of magnitude smaller and economically plausible, similar to the findings reported by Aït-Sahalia et al. (2004) for the United States.

Keywords Coefficient of Relative Risk Aversion, Equity Premium Puzzle, Discretionary Consumption, Luxury Goods, Method of Moments

Received 09 Jan. 2017
Revised 22 Feb. 2017
Accepted 22 Mar. 2017

* **Address:** School of Business, Yonsei University, 50 Yonsei-ro, Seodaemun-gu, Seoul, 03722, S. Korea;
E-mail: hahnj@yonsei.ac.kr; **Tel:** 82-2-2123-5457.

Ⅰ. Introduction

Aït-Sahalia, Parker, and Yogo (2004) suggest the use of luxury goods consumption data for tackling the equity premium puzzle of Mehra and Prescott (1985) by specifying utility as a nonhomothetic function that incorporates both basic and luxury consumption goods. They demonstrate that consumption of luxury goods generates risk aversion parameter values that are an order of magnitude lower than those implied by using aggregate consumption data. In essence, Aït-Sahalia et al. (2004) dealt with the inadequacies of the standard consumption-based asset pricing model for resolving the equity premium puzzle using a dual-pronged approach. First, they modified the specification of the investor's marginal utility by dropping the assumption that the period utility function is homothetic across luxury and basic consumption goods. Second, they choose to model the market such that only a subset of households, namely the wealthy, bears the aggregate risk of the market as per Mankiw and Zeldes (1991).

The choice of using luxury goods as an alternative measure of consumption is well supported by the high observed correlation between sales of luxury goods and movements in the stock market. This high correlation stems from the fact that wealthier households tend to hold most of the equity assets,[1] which in turn implies that wealth shocks in the stock market would be reflected by adjustments in luxury goods consumption rather than basic goods and services, strengthening the argument that luxury goods consumption is indeed discretionary in nature. While this argument is intuitively appealing and persuasive, whether luxury consumption is the best alternative consumption measure for capturing the true volatility of consumption and its covariance with stock returns compared to aggregate

1) For the United States, the top 5% of households ranked by wealth hold over 80% of all privately held wealth, which accounts for about 75% of the stock wealth not held by pensions. These numbers are obtained from the 1998 Survey of Consumer Finances, calculated and reported in Poterba (2000).

consumption requires further empirical analysis.[2)]

Inspired by the idea of Aït-Sahalia et al. (2004), we investigate the link between discretionary consumption and the equity premium in Korea employing their utility specification and empirical methodologies. More specifically, since the data on typical luxury goods consumption as used by Aït-Sahalia et al. (2004) are not readily available in Korea, we focus on available data that reflect discretionary consumption that responds to wealth shocks, namely spending on high-end whiskey and airline tickets.[3)] The choice of high-end whiskey and airline tickets as representative luxury consumption is due to their unique status within Korea's culture and consumption behavior. In Korea, there exists a widespread culture of alcohol consumption, be it between friends, colleagues, or for corporate meetings with clients. In particular, given its high cost, whisky is considered the drink of choice for people of stature, which leads to whiskey's status as a luxury alcoholic drink. Hence, whiskey is predominantly consumed by the wealthy in social settings and also by corporations in their meetings with clients. With regard to spending on airline tickets, air travel in the U.S. represents not only a means of luxury vacation but also just another mode of transportation. But in a small country like Korea, spending on airline tickets can be classified as luxury consumption because air travel is usually associated with vacations, be it domestic or international. Our main task is to compare the risk aversion parameter obtained from nondurables and services consumption data to the risk aversion parameter obtained from luxury goods consumption data.

---

2) Alternative measures of consumption, besides luxury goods, that have been proposed for purposes of resolving the equity premium puzzle include the use of garbage (Savov, 2011), carbon dioxide emissions (Chen and Lu, 2015), and electricity consumption (Da, Yang, and Yun, 2016), among others.

3) Besides high-end whiskey and airline tickets, we have also looked at imported cars (Mercedes-Benz Korea, BMW Korea, Audi-Volkswagen Korea), imported luxury fashion brands (Louis Vuitton Korea, Prada Korea, Gucci Korea, and Burberry Korea), and imported watches (Rolex Korea, and Swatch Group Korea Ltd.) but we chose to exclude them from the analysis due to the short sample period of available data (less than 10 years of annual data).

It should be noted that the existence of the equity risk premium puzzle in Korea has been somewhat contested. Dokko, Park, and Cho (2001) find that the observed equity premium in Korea can be rationalized using a coefficient of relative risk aversion between 6 and 7 when a recursive preference specification is used. On the other hand, Kim and Hong (2008) report that it is not possible to reach a decisive conclusion regarding the presence of the equity premium puzzle in South Korea due to the lack of data availability and they also argue that realized stock returns are likely to be biased downward relative to expected returns in Korea. However, recent studies are more supportive for the existence of the equity risk premium puzzle as indicated by Choi (2011) and Son, Hwang, and Binh (2012), who find that the coefficient of relative risk aversion that is implied by the standard model is at least 22 and 40, respectively.[4)]

Ⅱ. Methodology

Aït-Sahalia et al. (2004) specify utility as a function of two goods: basic goods, denoted by C, and luxury goods, denoted by L. Basic goods are the standard bundle of goods that an average household would consume on a regular basis while luxury goods are assumed to be consumed only by the wealthy. Hence, the total consumption in a given period is given by $X = C + PL$, where P is the relative price of luxury goods. Assuming that the utility function $v(C, L)$ is additively separable, it is specified as:

$$v(C, L) = \frac{(C-a)^{1-\phi}}{1-\phi} + \frac{(L+b)^{1-\psi}}{1-\psi} \quad (1)$$

4) Choi (2011) find that a much lower risk aversion coefficient of 6 is implied by the model when a utility specification that incorporates habit formation is used. Son et al. (2012) find that the risk aversion coefficient could be lowered to around 10 if long-run consumption risk measures are used.

where $a, b, \phi,$ and ψ are positive and $\phi > \psi$. This implies that the basic goods subsistence level, denoted by a, is positive while the luxury goods subsistence level, denoted by $-b$, is negative for $C > 0$ and $L > 0$. Essentially, this specification ensures that luxury goods are not consumed by the poor and that luxury goods are consumed primarily by the wealthy. Furthermore, the assumption that $\phi > \psi$, where ϕ and ψ are the *coefficients of relative risk aversion* for the non-wealthy and the wealthy respectively, means that when the marginal utility of wealth approaches zero, the budget share of the luxury goods approaches one.[5)]

By defining the utility function as above, we are essentially implying that a household's risk aversion is a function of its total consumption, X. Since the proportion of consumption in luxury goods will increase as total consumption, or wealth, increases, the risk aversion parameter will similarly approach ψ for large values of X. Hence, the estimated value for ψ will be the lower bound for the risk aversion parameter. As explained by Aït-Sahalia et al. (2004), this specification contains two additional appealing properties whereby the wealthy tend to hold a larger proportion of their wealth in stocks and aggregate consumption is dominated by the consumption of the less wealthy. Based on these reasons, the focus of our analysis will be on the estimation of the coefficient of risk aversion for the wealthy, ψ, using proxies for luxury consumption.

Substituting the above defined nonhomothetic utility function into the usual household utility maximization formula derived from the classical consumption-based asset pricing models for a given level of initial wealth, and applying the first-order and envelope conditions for the choice of C and L gives the two conditional Euler equations for basic goods and luxury goods.[6)] By linearizing the unconditional version of the Euler equation for

5) Aït-Sahalia et al. (2004) provides the proof in Section A of Appendix A in their paper.
6) For more details, refer to Lucas (1978) and Breeden (1979).

luxury goods using the methodology described by Campbell (1999), Aït-Sahalia et al. (2004) obtain the risk aversion for the wealthy as a function of the population moments as shown below:

$$\psi = \frac{E[(R_{t+1} - R_{t+1}^{f}) P_t / P_{t+1}]}{Cov[\Delta l_{t+1}, (R_{t+1} - R_{t+1}^{f}) P_t / P_{t+1}]} \tag{2}$$

where Δl_{t+1} denotes the growth rate of luxury goods consumption, $R_{t+1} - R_{t+1}^{f}$ denotes the equity premium, and P_t denotes the relative price of luxury goods. The risk aversion parameter is estimated using the method of moments by substituting the population moments in Equation (2) with their sample counterparts while the standard errors of the estimates are obtained using the delta method.

When estimating ψ using Equation (2), we need to be mindful of two practical issues. The first issue relates to the timing convention used when converting the time average of expenditures into consumption flows. For purposes of the two luxury goods, high-end whiskey and airline tickets, we use the beginning-of-period timing convention as per Campbell (1999) as it produces higher contemporaneous correlation between consumption and stock returns. The second issue arises due to the fact that consumption data are averaged over quarters or years and not the instantaneous flow at a point in time. Breeden, Gibbons, and Litzenberger (1989) show that this time aggregation of the consumption data causes the estimated covariance in the denominator of Equation (2) to be biased downward by a factor of ½, which in turn would bias the estimated risk aversion parameter upward by a factor of 2. Given these facts, we report both the conventional and time-aggregation corrected estimates of the risk aversion parameter.[7] Hence, looking at the conventional estimate of the risk aversion parameter

7) It should be noted, however, that the *Q4-Q4* measure proposed by Jagannathan and Wang (2007) uses the data from nonconsecutive quarters, which makes the measure closer to a spot measure.

would be more accurate for this measure. Furthermore, since data for the relative price of luxury goods, P, is difficult to come by, we approximate it using the relevant CPI for the specific category.

Ⅲ. Data

We use the Korea Composite Stock Price Index (KOSPI) for calculating the aggregate stock return and equity premium. The KOSPI data from 1986 to 2010 are obtained from *FnGuide* while the aggregate dividend yield, and Consumer Price Index (CPI) data are obtained from the Bank of Korea's Economic Statistics System (ECOS) database.[8] We use the interest rate on 1-year time deposit as a proxy for the risk-free rate as it allows us to use the full sample of annual luxury goods consumption data available from 1986.[9] Data for the 1-year time deposit rate are from the Bank of Korea's ECOS database for the 1986 to 1995 period and from the Korean Statistical Information Service (KOSIS) statistical database for the 1996 to 2010 period.[10] The KOSPI index return and the 1-year time deposit rate are deflated using the Consumer Price Index (CPI).

Aggregate consumption and population data are obtained from the KOSIS statistical database. The sub-category CPI for nondurable goods and services based on the Classification of Individual Consumption by Purpose (COICOP) is used to obtain the growth in real per capita consumption of nondurable goods and services. Similar to Savov (2011), we construct two additional

8) The aggregate dividend yield is calculated as the ratio of total cash dividend to total market capitalization. Bank of Korea Economic Statistics System website: http://ecos.bok.or.kr/.

9) Kim and Hong (2008) analyze various proxies of the risk-free rate in Korea, namely the 91-day Certificate of Deposit (CD) yield, the Monetary Stabilization Bond (MSB) yield and the 1-year time deposit rate. Data for the 91-day CD is available from 1991 and that for MSB from 1987, while the 1-year time-deposit rate is available prior to 1987.

10) Korean Statistical Information Service (KOSIS) website: http://kosis.kr/.

measures of consumption growth: (1) the *P-J* long-run consumption measure, proposed by Parker and Julliard (2005), which is the 3-year nondurables growth rate, and (2) the *Q4 - Q4* measure, proposed by Jagannathan and Wang (2007), which is the year-over-year growth rate in fourth quarter expenditures. The real growth rates for these two additional measures are obtained by using the CPI measures for nondurables and services.

As proxies for luxury consumption in Korea, we focus on two series with the longest available sample period. The first proxy is the sales revenue data for the three largest importer/seller of high-end whiskey. We combine the annual sales revenue of Diageo Korea, Pernod-Ricard Korea, and Pernod-Ricard Korea Imperial, and calculate the real per capita growth in the combined annual sales revenue as a proxy for luxury consumption. The second proxy is the sales revenue data for the two major airlines. We combine the sales revenue of Korean Air and Asiana Airlines, and calculate the real per capita growth in the combined annual and quarterly sales revenue as a proxy for luxury consumption. The final obtained luxury goods consumption data for Korea spans 25 years of annual data (1986 to 2010) and 42 quarters of quarterly data (2000 Q2 to 2010 Q3). The sales revenue data are obtained from KISVALUE.

Ⅳ. Empirical Results

1. Descriptive Statistics for the Equity Premium

<Table 1> presents the descriptive statistics for the equity return, the risk-free rate, and the equity premium using all of the available annual and quarterly datasets in Panels A and B. From Panel A and Panel B we observe that the average equity premium is 11.43% and 9.74% respectively

for the annual (1985 to 2010) and quarterly (2000 Q2 to 2010 Q3) sample periods. We also observe that the standard deviation for the equity premium is significantly large for the Korean stock market with estimated values of 38.53% and 29.76% for the annual and quarterly data respectively. Even if we take into account of the fact that the equity return used in our analysis includes the aggregate dividend yield, it is still many times larger than the numbers reported by Kim and Hong (2008) and Choi (2011), which were 5.32% for the 1980 to 2004 period and 3.37% for the 1965 to 2007 period respectively. This suggests that the potential for the existence of the equity premium puzzle in Korea is similarly high as that for the other developed countries.

<Table 1> Descriptive Statistics for Equity Premium

The table reports average returns and standard deviations for equity return (KOSPI), risk-free rate (interest rate on 1-year time deposit) and equity premium in percent. Panel A is calculated at an annual frequency (1986~2010; 25 observations). Panel B report annualized values of average returns and standard deviations calculated at a quarterly frequency (2000 Q2~2010 Q3; 42 observations). The sample periods are restricted by the availability of luxury goods consumption data. All returns are deflated by CPI.

Panel A: Annual Data (1986~2010)

	Equity Return	Risk-free Rate	Equity Premium
Mean	14.57	3.14	11.43
StDev	38.92	2.2	38.53

Panel B: Quarterly Data (2000 Q2~2010 Q3)

	Equity Return	Risk-free Rate	Equity Premium
Mean	10.72	0.92	9.74
StDev	29.77	1.17	29.76

2. Implied Risk Aversion from Basic and Luxury Goods Consumption

Panel A of <Table 2> shows the implied coefficient of relative risk aversion, ψ, that is obtained via the method of moments using annual data for aggregate and luxury goods consumption in Korea. As shown

<Table 2> Risk Aversion Implied by Annual Consumption Data

The table reports the descriptive statistics for consumption growth using various consumption measures and luxury goods data available at annual frequency. Panel A reports the results for the sample period 1986~2010. Correlation is with respect to excess stock returns deflated by the CPI. St Dev denotes standard deviation. The last two columns report the coefficient of relative risk aversion estimated by the method of moments, with standard errors in parentheses. The first estimate is obtained using the conventional method that uses the sample covariance, while the second estimate corrects for time aggregation in consumption data by a factor of 1/2. NDS denotes the growth in real per capita consumption of nondurable goods and services. P-J is the 3-year growth rate in real per capita consumption of nondurable goods (Parker and Julliard, 2005). Q4-Q4 calculates the real per capita consumption growth rate using nondurables and services consumption data for the fourth quarter in every year (Jagannathan and Wang, 2007). Whiskey denotes the real per capita growth in the combined sales revenue of three major importer/sellers of high-end whiskey in Korea. Air denotes the real per capita growth in the combined sales revenue of two major airlines in Korea. Panel B reports selected results from Aït-Sahalia et al. (2004). NDS denotes the growth in real per capita consumption of nondurable goods and services in the U.S., and Luxury retail sales denotes the growth rate of the combined annual sales revenue of seven major luxury retailers.

Panel A: Annual Data (1986~2010; 25 observations)

Series	Correlation	StDev	Risk Aversion	
			Sample	Corrected
NDS	0.30	0.04	25.07 (26.48)	12.53 (13.24)
P-J	0.25	0.07	17.27 (14.91)	8.64 (7.46)
Q4-Q4	0.30	0.04	22.81 (24.12)	11.40 (12.06)
Whisky	0.32	0.42	2.03 (1.99)	1.01 (0.99)
Air	0.27	0.07	16.00 (18.49)	8.00 (9.25)

Panel B: Annual Data Results from Aït-Sahalia et al. (2004)

Series	Correlation	StDev	Risk Aversion	
			Sample	Corrected
NDS (1930~2001; 72 Obs)	0.17	0.02	100.03 (118.07)	50.02 (59.04)
Luxury retail sales (1961~2001; 41 Obs)	0.30	0.10	13.98 (11.15)	6.99 (5.58)

in Panel A, all three aggregate consumption measures, NDS, P-J, and Q4-Q4, produce the corrected coefficient of relative risk aversion that are of similar magnitude, which are 12.53, 8.64, and 11.40 respectively.[11] These values

11) The corrected coefficient of relative risk aversion corrects for time aggregation in consumption by a factor of ½ as suggested by Breeden et al. (1989).

are much lower than the values obtained for the U.S. by Aït-Sahalia et al. (2004), which are presented in Panel B of <Table 2>. They report implied coefficient of relative risk aversion of 50.02 for NDS. This big difference appears to be due to the relatively high correlation between consumption growth and stock returns in Korea: the correlation is 0.30 in Korea, while it is only 0.17 in the U.S.

<Figure 1> displays the annual growth rates for NDS (Panel A) and luxury goods consumption in Korea (Panels B and C). As shown, although the correlations obtained for NDS and luxury goods consumption with stock returns in <Table 2> appear to be similar in magnitude, luxury goods consumption displays higher volatility and comovement with excess stock returns than NDS.

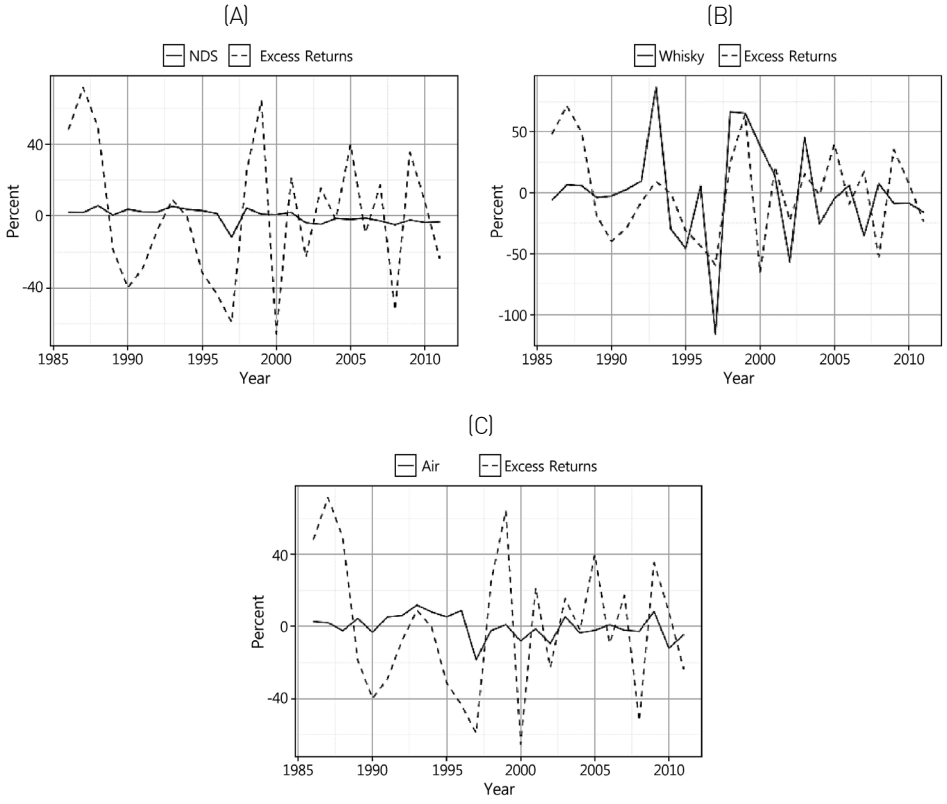
The main finding by Aït-Sahalia et al. (2004) is that using luxury goods consumption data produces a much lower and plausible estimate of risk aversion parameter. As presented in Panel B, they report the estimated risk aversion of 6.99 for luxury consumption data, which is much lower than 50.02 for standard consumption data. We also find that using luxury goods consumption data generates a much lower and plausible estimate of risk aversion parameter: the estimates are only 1.01 for Whiskey and 8.00 for Air, both of which are much lower than 12.53 for NDS. While our findings are qualitatively similar to Aït-Sahalia et al. (2004), our results are mainly driven by the higher volatility of luxury goods consumption data (particularly for Whiskey with the volatility of 0.42) rather than higher correlation with stock returns. The correlations with stock returns are 0.32 for Whiskey and 0.27 for Air, which are not much different from 0.30 for NDS. On the other hand, luxury retails sales data used by Aït-Sahalia et al. (2004) shows the correlation of 0.30 with stock returns, which is much higher than the correlation of 0.17 for NDS. Thus, our

results from annual data do not bode well with the main intuition behind using luxury goods consumption data for estimating risk aversion parameter.

When we use quarterly data, however, the results are more supportive of the main idea for using luxury goods consumption data. As shown in Panel A of <Table 3>, the corrected coefficients of relative risk aversion are 57.6 and 16.2 for the NDS and P-J measures respectively, which are unreasonably high. Because data on whiskey are available only for annual frequency, we can report the quarterly results only for Air,

<Figure 1> Response of Luxury Consumption to Stock Returns (Annual)

Shown here is a time series plot of excess stock returns (KOSPI over 1-year time deposit rate) and the annual growth rate for (A) real consumption of nondurable goods and services (NDS), (B) the combined sales revenue of three major importer/sellers of high-end whisky in Korea (Whisky), and (C) the combined sales revenue of two major airlines in Korea (Air). All series are normalized to have zero mean and are reported in percent.



which shows the estimate for the corrected coefficient of relative risk aversion to be only 4.1. These estimates are in line with the results from Aït-Sahalia et al. (2004), presented in Panel B: the corrected coefficients of relative risk aversion are 173.28 for NDS and 7.17 for luxury retail sales. Moreover, the differences in correlations and volatilities across standard and luxury consumption data are in comparable magnitudes. The correlations with stock returns are 0.15 for NDS and 0.28 for Air in

<Table 3> Risk Aversion Implied by Quarterly Consumption Data

The table reports the descriptive statistics for consumption growth using various consumption measures and luxury goods data available at quarterly frequency. Panel A reports the results for the sample period 2000: Q2~2010: Q3. Correlation is with respect to excess stock returns deflated by the CPI. StDev denotes annualized standard deviation. The last two columns report the coefficient of relative risk aversion estimated by the method of moments, with standard errors in parentheses. The first estimate is obtained using the conventional method that uses the sample covariance, while the second estimate corrects for time aggregation in consumption data by a factor of 1/2. NDS denotes the growth in real per capita consumption of nondurable goods and services. P–J is the 3–year growth rate in real per capita consumption of nondurable goods (Parker and Julliard, 2005). Air denotes the real per capita growth in the combined sales revenue of two largest airlines in Korea. Panel B reports selected results from Aït–Sahalia et al. (2004). NDS denotes the growth in real per capita consumption of nondurable goods and services in the U.S., and Luxury retail sales denotes the growth rate of the combined quarterly sales revenue of seven luxury retailers.

Panel A: Quarterly Data (2000 Q2-2010 Q3; 42 observations)

Series	Correlation	StDev	Risk Aversion	
			Sample	Corrected
NDS	0.15	0.02	115.27 (158.80)	57.64 (79.40)
P-J	0.20	0.05	32.32 (47.72)	16.16 (23.86)
Air	0.28	0.14	8.26 (9.27)	4.13 (4.63)

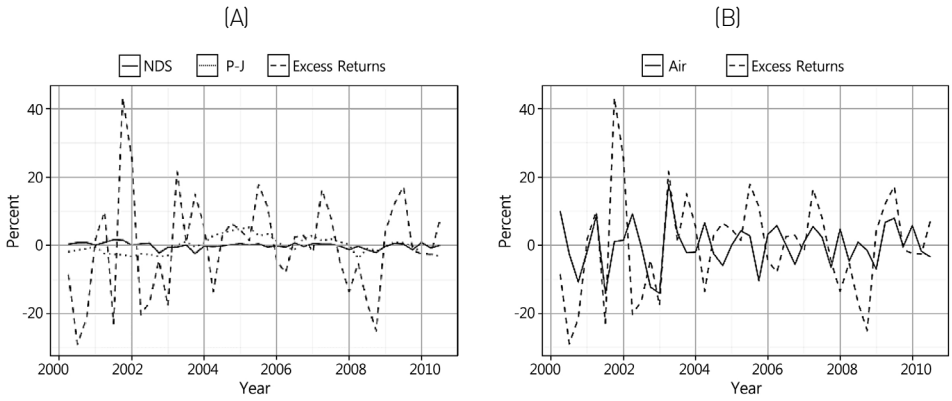
Panel B: Quarterly Data Results from Aït-Sahalia et al. (2004)

Series	Correlation	StDev	Risk Aversion	
			Sample	Corrected
NDS (1947~2001; 219 Obs)	0.14	0.01	346.56 (185.75)	173.28 (92.87)
Luxury retail sales (1987~2001; 60 Obs)	0.20	0.20	14.34 (13.69)	7.17 (6.84)

Korea, while they are 0.14 for NDS and 0.20 for luxury retail sales in the U.S. The volatilities are 0.02 for NDS and 0.14 for Air in Korea, while they are 0.01 for NDS and 0.20 for luxury retail sales in the U.S. <Figure 2>, which displays the quarterly time series plot of luxury goods consumption growth against excess returns, also highlights the stronger comovement with excess returns for luxury goods consumption compared to that for NDS.

<Figure 2> Response of Luxury Consumption to Stock Returns (Quarterly)

Shown here is a time series plot of excess stock returns (KOSPI over 1-year time deposit rate) and (A) the quarterly and 3-year growth rate for real consumption of nondurable goods and services (NDS and P-J, respectively), and (B) the combined quarterly sales revenue of two major airlines in Korea (Air). All series are normalized to have zero mean and are reported in percent.



It should be noted, however, that we have up till now ignored the issue of statistical significance of the estimates. Given the high standard errors, most of the estimates are statistically insignificant. As this insignificance is consistent for both the nondurables and services as well as the luxury goods consumption data, the issue of significance is not likely due to our use of luxury goods consumption data. Rather, this issue appears to be caused by the small sample size of 25 and 42 observations respectively

for the case of annual and quarterly data. Since the estimates of the coefficient of relevant risk aversion we have obtained seem to be relatively stable in magnitude across different consumption measures, we can attest to the robustness of the estimates and be somewhat reassured that the qualitative conclusions made in this paper are still valid. Moreover, the low statistical significance for the risk aversion coefficient estimates are in line with the results presented by Aït-Sahalia et al. (2004). For example, the corrected

<Table 4> Cross-Sectional Asset-Pricing Test

The table reports the cross-sectional tests of the CAPM, the Fama-French three-factor model, the CCAPM, and the luxury CCAPM using quarterly data from 2000: Q2~2010: Q3. Luxury consumption is measured by the combined sales revenue of two largest airlines in Korea. The test assets are the 25 Fama-French portfolios sorted by size and book-to-market equity as in Hahn and Yoon (2016). The first five rows report the factor risk premia estimated from a cross-sectional regression of average returns onto the estimated betas. The sixth row reports the intercept, if included in the regression. The Shanken (1992) corrected standard errors are shown in parentheses. The last two rows report the mean-absolute-pricing error (MAE) and the root-mean-squared-pricing error (RMSE). All pricing errors-Intercepts, MAE, and RMSE-are shown in percent (%).

Quarterly Data (2000 Q2~2010 Q3)								
Factor	CAPM		Three-Factor		CCAPM		Luxury	
Market	0.035 (0.027)	0.027 (0.045)	0.023 (0.030)	0.045 (0.048)				
SMB			-0.017 (0.028)	-0.016 (0.029)				
HML			0.052 (0.016)	0.054 (0.017)				
Basic Consumption					0.004 (0.004)	-0.002 (0.002)		
Luxury Consumption							0.041 (0.043)	-0.044 (0.025)
Intercept (%)		0.757 (4.434)		-2.459 (3.605)		4.111 (2.569)		5.708 (2.960)
MAE (%)	2.183	2.171	1.226	1.217	2.804	2.149	2.631	1.964
RMSE (%)	2.545	2.542	1.623	1.604	3.523	2.489	3.307	2.321

coefficient of relative risk aversion obtained for the quarterly luxury retail sales (Panel B of <Table 3>) is 7.17 with the associated standard error of 6.84. As a comparison, the corrected coefficient of relative risk aversion obtained for Air is 4.13 with the corresponding standard error of 4.63. Clearly, the relative magnitudes of the standard errors with respect to the estimated risk aversion parameters for our luxury consumption measures are similar to those obtained by Aït-Sahalia et al. (2004).

As both an extension of our findings as well as a robustness check, we conducted cross-sectional asset-pricing tests using various factor models, including our measure of luxury consumption. If luxury consumption is indeed a better measure of stockholders' marginal utility than NDS, then it should be able to better explain the observed differences in average returns across the different stock portfolios. We use quarterly data to construct the 25 Fama-French test asset portfolios sorted by size and book-to-market equity as in Hahn and Yoon (2016) and compare across several linear factor models as per Aït-Sahalia et al. (2004), namely the CAPM, the Fama-French three-factor model, the nondurable CCAPM, and the luxury CCAPM.

<Table 4> reports the estimated risk premium, the Shanken (1992) corrected standard errors, and the fit of the equation in terms of pricing errors via the intercept, the mean-absolute-pricing error (MAE) and the root-mean- squared-pricing error (RMSE). The second column of results for each model tests the model with the intercept term. As shown, the luxury CCAPM prices the returns on the Fama-French portfolios better than the nondurable CCAPM in terms of MAE and RMSE. While the estimated risk premium for the nondurable and luxury CCAPM models are both positive and insignificant, the estimated coefficient for the luxury CCAPM model is about 10 times higher in magnitude.

V. Conclusions

Our empirical results indicate that using proxies for luxury goods consumption produces risk aversion parameter estimates that are far more economically plausible than using standard consumption data in Korea. As proxies for luxury consumption in Korea that capture the discretionary consumption by the wealthy, we use whisky and airline ticket sales data, which have relatively long sample periods. Consistent with the findings by Aït-Sahalia et al. (2004) for the United States, our main findings lend further support for the use of luxury goods consumption as an alternative measure of consumption that produces more reasonable estimates for the coefficient of relative risk aversion.

References

Aït-Sahalia, Y., J. A. Parker, and M. Yogo, "Luxury Goods and the Equity Premium," *Journal of Finance*, Vol. 54, No. 6 (2004), pp. 2959-3003.

Breeden, D., "An Intertemporal Asset Pricing Model with Stochastic Consumption and Investment Opportunities," *Journal of Financial Economics*, Vol. 7, No. 3 (1979), pp. 265-296.

Breeden, D., M. Gibbons, and R. Litzenberger, "Empirical Test of the Consumption-Oriented CAPM," *Journal of Finance*, Vol. 44, No. 2 (1989), pp. 231-262.

Campbell, J. C., "Asset Prices, Consumption, and the Business Cycle," in John B. Taylor and Michael Woodford, eds. *Handbook of Macroeconomics*, Elsevier Science Publishers, New York, 1999.

Chen, Z. and A. Lu, "Seeing the Unobservable from the Invisible: The Role of CO2 in Measuring Consumption Risk," *Working Paper*, PBCSF-NIFR Research Paper No. 12-03 (2015), Available at SSRN: https://ssrn.com/abstract=2130823.

Choi, W. H., "The Habit Formation and the Equity Premium Puzzle in Case of Korea," *Korean Journal of Financial Studies*, Vol. 40, No. 2 (2011), pp. 261-285 (in Korean).
최원호, "소비습관과 주식수익률 프리미엄 현상: 한국증권시장에서의 검증," 한국증권학회지, 제40권 제2호 (2011), pp. 261-285.

Da, Z., W. Yang, and H. Yun, "Household Production and Asset Prices," *Management Science*, Vol. 62, No. 2 (2016), pp. 387-409.

Dokko, Y., J. Park, and J. Cho, "A Study on the Equity Premium in the Korean Stock Market," *Asian Review of Financial Research*, Vol. 14, No. 1 (2001), pp. 1-22 (in Korean).
독고윤, 박종원, 조재호, "한국 주식시장의 수익률 프리미엄에 관한 연구,"

재무연구, 제14권 제1호 (2001), pp. 1-22.

Hahn, J. and H. Yoon, "Determinants of the Cross-Sectional Stock Returns in Korea: Evaluating Recent Empirical Evidence," *Pacific-Basin Finance Journal*, Vol. 38 (2016), pp. 88-106.

Jagannathan, R. and Y. Wang, "Lazy Investors, Discretionary Consumption, and the Cross-Section of Stock Returns," *Journal of Finance*, Vol. 62, No. 4 (2007), pp. 1623-1661.

Kim, I. and C. Hong, "Equity Premium Puzzle in Korean Stock Market," *Asian Review of Financial Research*, Vol. 21, No. 1 (2008), pp. 1-32 (in Korean).
김인수, 홍정훈, "우리나라 주식시장에서 주식프리미엄 퍼즐에 관한 연구," 재무연구, 제21권 제1호 (2008), pp. 1-32.

Lucas, R. E. Jr., "Asset Prices in an Exchange Economy," *Econometrica*, Vol. 46, No. 6 (1978), pp. 1429-1445.

Mankiw, G. N. and S. P. Zeldes, "The Consumption of Stockholders and Nonstockholders," *Journal of Monetary Economics*, Vol. 29, No. 1 (1991), pp. 97-112.

Mehra, R. and E. C. Prescott, "The Equity Premium: A Puzzle," *Journal of Monetary Economics*, Vol. 15, No. 2 (1985), pp. 145-161.

Parker, J. A. and C. Julliard, "Consumption Risk and the Cross-Section of Expected Returns," *Journal of Political Economy*, Vol. 113, No. 1 (2005), pp. 185-222.

Poterba, J., "Stock Market Wealth and Consumption," *The Journal of Economic Perspectives*, Vol. 14, No. 2 (2000), pp. 99-118.

Savov, A., "Asset Pricing with Garbage," *Journal of Finance*, Vol. 66, No. 1 (2011), pp. 177-201.

Shanken, J., "On the Estimation of Beta-Pricing Models," *Review of Financial Studies*, Vol. 5, No. 1 (1992), pp. 1-33.

Son, S. H., S. Hwang, and K. B. Binh, "Business Cycle Implication of Long-Run Risk Consumption CAPM: Korean Stock Market Evidence," *Korean Journal of Futures and Options*, Vol. 20, No. 3 (2012), pp. 265-295 (in Korean).

손삼호, 황세운, 빈기범, "한국 주식시장에서 장기소비위험 모형의 유효성과 경기변동에 대한 시사점," 선물연구, 제20권 제3호 (2012), pp. 265-295.