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Consumption, Aggregate Wealth, and Expected Stock Returns in Japan

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Abstract

This paper studies the role of fluctuations in the aggregate consumption–wealth ratio for predicting stock returns in Japan. Using quarterly Japanese stock market data, we find three main results that are different from US evidence. First, unlike in the US, fluctuations in Japan in the consumption–wealth ratio are not strong predictors of real and excess stock returns. Second, we find that the dividend yield is a much better forecaster of future stock returns at short and intermediate horizons than is the consumption–wealth ratio in Japan. This is also a different result than from the US. Third, as opposed to the US again, the relative risk-free rate in Japan shows almost no ability to predict excess stock returns in Japan, while the corresponding relative T-bill rate exhibits rather strong forecasting power for excess stock returns in the US.

Keywords: Consumption–wealth ratio, Dividend yields, Excess stock returns, Payout ratios, Real stock returns

1. Introduction

The aggregate consumption–wealth ratio, investigated by the influential study of Lettau and Ludvigson (2001a), is an interesting variable to financial economists for understanding the theoretical and empirical linkages between macroeconomic variables and financial markets. Lettau and Ludvigson (2001a) demonstrated the strong forecast power of the consumption–wealth ratio for log excess stock returns using US data; thus, it is important to test its forecast power in other countries using country-specific data sets from an independent point of view. In the US, many studies, such as Campbell (1987), Sundaresan (1989), Constantinides (1990), and Campbell and Cochrane (1999), researched the cyclical variation of stock returns. Furthermore, regarding the consumption–wealth ratio, many studies in the US, (other than Lettau and Ludvigson (2001a)) such as Campbell and Mankiw (1989), Lettau and Ludvigson (2001b), Rangvid (2006), Lewellen and Nagel (2006), Guo (2006), and Ludvigson and Ng (2007), used this ratio in their studies. (Note 1) However, in Japan, studies on the consumption–wealth ratio are limited. (Note 2) Based on this motivation, our objective in this paper is to examine the forecast power of the aggregate consumption–wealth ratio for stock returns in Japan.

Our contributions are as follows. First, we show that the forecast power of the consumption–wealth ratio is very weak in Japan. At longer horizons, it shows some forecast power for excess stock returns in Japan. However, in contrast to the strong forecast power of the ratio in the US demonstrated by Lettau and Ludvigson (2001a), the degree of forecast power is much weaker in Japan than in the US.

Second, we find that in Japan, dividend yields demonstrate stronger predictability for excess stock returns than the consumption–wealth ratio. When dividend yields are included with the ratio in the same regression, the former almost always dominates the latter.

Third, again in comparison with the US, the relative risk-free rate has almost no forecast power for excess stock returns in Japan, while the corresponding relative bill rate shows rather strong predictability for excess stock returns in the US.

Furthermore, we focus on the reason why the return predictability of the consumption–wealth ratio is much weaker in Japan. Our detailed economic interpretation of this issue is also a significant contribution of this paper.

The rest of this paper is organized as follows. Section 2 very briefly reviews the theoretical framework linking consumption, aggregate wealth, and expected returns. Section 3 reviews the methodology for obtaining estimates of the consumption–wealth ratio from the observed values of consumption, labor income, and asset holdings. In Section 4, we explain the other financial variables used in this paper. We then test the one-quarter-ahead forecast power of the consumption–wealth ratio while including the other financial market variables from Section 5. Section 6 documents the long-horizon forecast power of the consumption–wealth ratio, Section 7 presents our interpretation of the results, and

Section 8 concludes the paper.

2. Theory and the Consumption–Wealth Ratio

Lettau and Ludvigson (2001a) presented a general framework linking consumption, asset holdings, and labor income with expected returns.

First, they documented the relation between consumption, wealth, and expected returns, as follows:

$$c_t - w_t = E_t \sum_{i=1}^{\infty} \rho_w^i \left(r_{w,t+i} - \Delta c_{t+i} \right), \tag{1}$$

where E_t is the expectation operator conditional on information available at time t. In addition, c denotes the logarithm of aggregate consumption, w denotes the logarithm of aggregate wealth, and according to their theory, ρ_w is the steady-state ratio of new investment to total wealth. In addition, $r_w \equiv \log(1 + R_w)$ and Δc is the one-period difference of log consumption, where R_w is the net return on aggregate wealth. Equation (1) implies that the aggregate consumption–wealth ratio can only vary if consumption growth or returns (or both) are predictable: namely, the consumption–wealth ratio is a function of expected future returns of the market portfolio.

By further analysis, Lettau and Ludvigson (2001a) derived the following equation, which describes the log consumption–wealth ratio using only observable variables on the left-hand side:

$$c_t - \omega a_t - (1-\omega) y_t = E_t \sum_{i=1}^{\infty} \rho_w^i \left[\left\{ \omega r_{a,t+i} + (1-\omega) r_{h,t+i} \right\} - \Delta c_{t+i} \right] + (1-\omega) z_t, \tag{2}$$

where a is the logarithm of aggregate asset holdings, y is the logarithm of aggregate labor income, ω is the average share of asset holdings in total wealth, r_a is asset returns, r_h is returns on human capital, and z is a mean zero stationary random variable, according to the definitions of Lettau and Ludvigson (2001a). (Note 3) In equation (2), they denoted the trend deviation term $c_t - \omega a_t - (1-\omega) y_t$ as the consumption–wealth ratio, cay_t.

Lettau and Ludvigson (2001a) also stated equation (2) implies that "cay_t will be a good proxy for market expectations of future asset returns, $r_{a,t+i}$, as long as expected future returns on human capital, $r_{h,t+i}$, and consumption growth, Δc_{t+i}, are not too variable, or as long as these variables are highly correlated with expected returns on assets" (pp. 821).

3. Estimating the Trend Relationship among Consumption, Labor Income, and Asset Holdings

To estimate the consumption–wealth ratio, Lettau and Ludvigson (2001a) employed the following Stock and Watson (1993) dynamic least squares (DLS) technique: (Note 4)

$$c_{n,t} = \alpha + \beta_a a_t + \beta_y y_t + \sum_{i=-k}^{k} b_{a,i} \Delta a_{t-i} + \sum_{i=-k}^{k} b_{y,i} \Delta y_{t-i} + \varepsilon_t, \tag{3}$$

where $c_{n,t}$ is the log of nondurables consumption at time t, and Δ is the first difference operator; and they defined the estimated trend deviation, cay_t, using the actual data as $c_{n,t} - \hat{\beta}_a a_t - \hat{\beta}_y y_t$ (pp. 823). (Note 5) Furthermore, as before, a_t is the logarithm of aggregate asset holdings at time t and y_t denotes the logarithm of aggregate labor income at time t.

To obtain estimates of cay_t in Japan, we first use the sum of the 'nondurable goods' and 'services' consumption expenditure series of households as nondurables consumption. (Note 6) These two series are published by the Government of Japan in real terms, so we seasonally adjust the sum of the two series using the census X-12 filter method. Next, for asset holdings, we use the sum of 'financial assets, personal' and 'financial assets, households' from the Bank of Japan. Both are published in nominal terms; thus, we construct real values by deflating the series by the personal consumption expenditure (PCE) deflator from the Government of Japan, and then seasonally adjusting the deflated series using the census X-12 filter method. Furthermore, for labor income, we employ the nominal series of 'compensation of employees' from the Government of Japan. We deflate the series by the above PCE deflator, and then seasonally adjust the deflated series using the census X-12 filter method.

To view the estimates of cay_t graphically, we show the time series of cay_t with excess stock returns in Japan in Figure 1. Both series are normalized to an average of 0 and a standard deviation equal to 1.

4. Financial Data and Summary Statistics

Our quarterly financial data include real stock returns r_t, excess stock returns $r_t - r_{f,t}$, dividend yields (Note 7) $d_t - p_t$, the dividend–earnings ratio (Note 8) $d_t - e_t$, and the relative risk-free rate $RREL_t$, in addition to the estimates of cay_t mentioned previously. The sample period is from the second quarter of 1980 to the third quarter of 2002 throughout the paper.

First, r_t is constructed by using the value-weighted average return of the Tokyo Stock Exchange (TSE) First Section listed stocks (from the Japan Securities Research Institute (JSRI)), and we deflate the series by the consumer price index (CPI) (from the Statistics Bureau, Ministry of Internal Affairs and Communications). Next, $r_t - r_{f,t}$ is the abovementioned return data from the JSRI minus the risk-free rate, for which we use the yields of traded bonds with repurchase agreements (from the Japan Securities Dealers Association) (Note 9) from the second quarter of 1980 to the second quarter of 1984, and the one-month median rate of the negotiable time certificate of deposit (CD) (from the Bank of Japan) from the third quarter of 1984 to the third quarter of 2002. (Note 10) Furthermore, $d_t - p_t$ is the log of the dividend yields for TSE First Section stocks (from the TSE), and $d_t - e_t$ is the log of the dividend yields for TSE First Section stocks (from the TSE) minus the log of the earnings for TSE First Section stocks (from the TSE). Furthermore, $RREL_t$ is the above risk-free rate minus its 12-month backward moving average. (Note 11)

Table 1 displays the summary statistics for the abovementioned financial variables. In this paper, our focus is on the estimated trend deviation variable, *cay*, in Japan. Thus, we here describe the situation by focusing on *cay* in Japan. This variable is contemporaneously positively correlated with the dividend–price ratio and the dividend–earnings ratio, as in the US. Furthermore, as in the US, *cay* has a contemporaneously negative correlation with the relative risk-free rate in Japan. However, *cay* has little contemporaneous correlation with excess stock returns in Japan, while it is positively correlated with excess stock returns in the US.

5. Quarterly Forecasting Regressions

We next assess the forecasting power of *cay* for asset returns. Table 2 shows a typical set of results using the lagged trend deviation, cay_t, as a predictive variable. The table reports one-quarter-ahead forecasts of the log real return and log excess return on TSE First Section stocks. In all of the regressions in Tables 2 and 3, we report the corrected *t* statistic using the Newey and West (1987) method. Describing the results for TSE First Section real stock returns (panel A of Table 2) first, neither the lag of real returns nor *cay* show forecast power. This is very different from the case in the US, where both variables displayed forecast power for real returns.

Next, for the TSE First Section log excess returns (panel B of Table 2), in Japan, as in regression 5, the first lag of *cay* shows very weak forecasting power. This is again very different from the case in the US, where Lettau and Ludvigson (2001a) demonstrated the significant forecast power of *cay* in the US in their Table III (pp. 828).

Finally, when we include the control variables (Note 12) in regressions following Lettau and Ludvigson (2001a) (panel C of Table 2), only the dividend–price ratio exhibits forecast power for log excess returns for the TSE First Section stocks, and again this is a very different result from the US case. The very weak forecast power of *cay* shown in panel B disappears under the effect of control variables. Hence, we conclude that only very limited stock return predictability is evident in the consumption–wealth ratio in Japan, using the one-quarter-ahead forecast tests following Lettau and Ludvigson (2001a).

6. Long-Horizon Regressions

Next, again following Lettau and Ludvigson (2001a), we test the return predictability of *cay* for the long horizon. Table 3 reports the results from the long-horizon regressions of log excess returns on the lagged variables. *H* denotes the return horizon in quarters. The dependent variable in panel A is *H*-period total consumption growth $\Delta c_{t+1}+ ...+ \Delta c_{t+H}$, and in panel B, the dependent variable is *H*-period nondurable consumption growth $\Delta c_{n,t+1}+ ...+ \Delta c_{n,t+H}$. Furthermore, in panel C, the dependent variable is the sum of *H* log excess returns on TSE First Section stocks, $r_{t+1} - r_{f,t+1} + ... + r_{t+H} - r_{f,t+H}$. The regressors are cay_t, the dividend yield, the dividend–earnings ratio, the detrended short-term interest rate, and combinations thereof.

Table 3 shows the results of the long-horizon forecasting regressions. First, panels A and B show that lagged *cay* is correlated negatively with both future total and nondurable consumption growth in Japan. Second, as regression number 3 shows, *cay* demonstrates weak forecast power for the future log excess stock returns in Japan. However, as the horizon increases, the forecast power of *cay* improves. Furthermore, as regression number 4 shows, the dividend yield again shows stronger forecast power than *cay*. When we use *cay* and the dividend yield as regressors simultaneously, as in regression number 5, the dividend yield demonstrates statistically significant and strong forecast power, while the weak forecast power of *cay* is mostly dominated and disappears. (Note 13) Similar to the results in Table 2, regressions number 6 and 7 show the dividend–earnings ratio and the detrended short-term interest rate again display almost no forecast power in Japan. Finally, when all four financial variables are included in one regression, only for the very long horizon such as $H = 8$ or 12 does *cay* show some forecast power for excess stock returns in Japan. However, this result is very different from the case in the US, where *cay* displayed very strong forecast power for excess stock returns by dominating other financial variables, as emphasized by Lettau and Ludvigson (2001a) (see Table VI, pp. 840).

Finally, Table 4 investigates the forecast power of the full VAR counterpart to the equations analyzed previously for long-horizon returns. Table 4 presents the results from estimating two first-order VARs. The first system is a four-variable VAR that includes the log excess returns for the TSE First Section stocks, the relative risk-free rate, the log dividend–price ratio, and the log dividend–earnings ratio. The second is a five-variable VAR that adds *cay* to the previous system.

Panel A of Table 4 shows that, in the four-variable VAR system, only the dividend yield has forecast power for the log excess returns in Japan. Furthermore, panel B of the table displays that, again, *cay* does not show clear stock return forecast power in the five-variable VAR system.

7. Interpretation: Why is the Return Predictability of the Consumption–Wealth Ratio Weak in Japan?

This section interprets our empirical results. In particular, we attempt to clarify why the return predictability of the consumption–wealth ratio in Japan is much weaker than in the US. We address this issue from two perspectives. First, we consider the difference in the economic structure between Japan and the US. Second, we examine the difference in consumption behavior between Japan and the US.

7.1 The role of consumption in the macroeconomy in Japan and the US

First, we consider the difference in the role of consumption in Japan and the US from a macroeconomic viewpoint.

To consider this issue, we employ the following six additional variables: JGDP, JCONS, JINV, UGDP, UCONS, and UPDI. In order, JGDP denotes the quarterly log growth rate of real GDP in Japan; JCONS denotes the quarterly log growth rate of real consumption (nondurables and services) in Japan; and JINV denotes the quarterly log growth rate of real gross domestic investment in Japan. Similarly, UGDP denotes the quarterly log growth rate of real GDP in the US; UCONS denotes the quarterly log growth rate of real consumption (nondurables and services) in the US; and UPDI denotes the quarterly log growth rate of real gross private domestic investment in the US.

The data sources are the Government of Japan for JGDP, JCONS, and JINV, and the US Department of Commerce for UGDP, UCONS, and UPDI. The sample period is again from the second quarter of 1980 to the third quarter of 2002, for uniformity.

To obtain economic insights, in Table 5, we display the results of Granger causality tests for JGDP, JCONS, and JINV for Japan (panel A) and for UGDP, UCONS, and UPDI for the US (panel B).

Most importantly, consumption leads real GDP in the US; however, in contrast, consumption lags real GDP in Japan. In general, asset prices such as stock prices are forward-looking; thus, stock returns are expected to lead real GDP. However, in Japan, consumption lags real GDP; hence, consumption is considered to have little forecasting power for future stock returns in Japan. Therefore, from the lead–lag relationship, we can assume that the consumption–wealth ratio does not forecast future stock returns in Japan.

In contrast, in the US, consumption strongly leads the dynamics of the macroeconomy; thus, it is understandable that the consumption-based ratio, the consumption–wealth ratio, has good forecast power for future stock returns in the US, as Lettau and Ludvigson (2001a) demonstrated.

Furthermore, our Granger causality tests imply that investment, JINV, plays a more important role for the Japanese macroeconomy than consumption (in the case of one lag in panel A, JINV significantly affects the next quarter's GDP in Japan).

From the above results, we conclude that the Japanese economy is driven by investment, while the US economy is strongly driven by consumption; thus, the economic structure is clearly different between Japan and the US. Therefore, the difference in the role of consumption produces the difference in the forecast power of the consumption-based ratio, the consumption–wealth ratio, in the two countries.

7.2 Consumption smoothing behavior in Japan and the US

Next, we discuss the difference in consumer behavior in Japan and the US. More specifically, we focus on consumption smoothing behavior in Japan and the US.

To address this issue, we show the time-series trends of conditional volatility of JCONS and UCONS, which are derived via the EGARCH model, in Figure 2. Figure 2 suggests that (1) consumption volatility fluctuates much more drastically in Japan than in the US, and (2) the average level of the consumption volatility is much higher in Japan than in the US.

These results suggest that Japanese investors undertake consumption-smoothing behavior much less than US investors. In famous consumption-based asset pricing models (Lucas (1978), Breeden (1979), amongst others), investors are assumed to attempt to reduce their future consumption risk via consumption smoothing. However, Japanese investors' actual behavior, which is inferable from real data, does not fit this idea or assumption well.

As Table 5 indicates, Japanese consumption lags the business cycle. Hence, taking both this fact and the volatile consumption in Japan in Figure 2 into consideration, we conclude that Japanese investors momentarily consume more (less) after confirming economic expansions (recessions) without considering intertemporal smoothing of their consumption.

Hence, the above interpretation means that Japanese investors do not consume with much consideration for future economic conditions; thus, a consumption-based ratio, such as the consumption–wealth ratio, does not forecast future stock returns well in Japan.

8. Conclusions

This paper investigated the forecast power of the consumption–wealth ratio for stock returns in Japan. Our careful examination demonstrated very different results from Lettau and Ludvigson (2001a), the first authors to use the consumption–wealth ratio, as follows.

First, the forecast power of the consumption–wealth ratio is very weak in Japan. For the long horizon, it showed some forecast power for excess stock returns in Japan. However, the degree of the forecast power is much weaker than that found in the US by Lettau and Ludvigson (2001a).

Second, in Japan, dividend yields demonstrated much stronger forecast power for excess stock returns than *cay*. When the dividend yield is included with *cay* in the same regression, it almost always dominated the forecast power of *cay*.

Third, again in contrast to the US, the relative risk-free rate showed almost no forecast power for the excess stock returns in Japan. According to Lettau and Ludvigson (2001a), Campbell (1991) and Hodrick (1992), the corresponding relative bill rate showed rather strong forecast power for stock returns in the US.

As mentioned above, in Japan, the consumption–wealth ratio, *cay*, did not show strong return forecast power, as opposed to the evidence from the US.

In addition, we consider in detail the reason why the return predictability of the consumption–wealth ratio is so weak in Japan. This is a worthwhile contribution to the literature because due to this interpretation, our findings provide more convincing and meaningful evidence from Japan.

We also note that recently, even in the US, arguments on return predictability are continuing. Welch and Goyal (2008) and Boudoukh et al. (2008) present the view and evidence that return predictability in the US is not robust; Campbell and Thompson (2008) again provide evidence that supports return predictability of the traditional financial variables in the US; while Lettau and Nieuwerburgh (2008) attempt to reconcile these contrasting views on return predictability in the US.

In general, as our research revealed, the case of stock return prediction in other international markets seems to be very different from that in the US. As our additional analysis in Section 7 illustrated, because the structure of the economy or financial markets and investors' behaviors are different in every country, the relation between the macroeconomy and stock markets should be independently and carefully researched in every country, using each country's data.

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Notes

Note 1. Recently in the US, many other studies also used the consumption–wealth ratio, such as Dammon et al. (2001), Maenhout (2004), McQueen and Vorkink (2004), Peress (2004), Chacko and Viceira (2005), Lettau and Ludvigson (2005), Yao and Zhang (2005), Santos and Veronesi (2006), Lustig and Nieuwerburgh (2008), Campbell and Thompson (2008), Ghattassi (2008), Møller (2008), and Welch and Goyal (2008), among others.

Note 2. As far as the authors know, only Iwaisako and Aono (2007) appear to compute this ratio using Japanese data. However, we compute and analyze this ratio quite independently from their research.

Note 3. For discussions on the relation of aggregate labor income and human capital, see, for example, Campbell (1996) and Jagannathan and Wang (1996).

Note 4. Following Lettau and Ludvigson (2001a), we used the value of $k = 8$ in the estimation.

Note 5. Ludvigson and Steindel (1999) also investigated the relation among consumption, asset wealth, and labor income.

Note 6. Following Lettau and Ludvigson (2001a), we used nondurables consumption in estimating *cay*. For example, Blinder and Deaton (1985) and Gali (1990) assumed that total consumption is a constant multiple of nondurable and services consumption in their analysis.

Note 7. Other studies using dividend yields are, for example, Campbell (1991), Campbell et al. (1997), and Cochrane (1991, 1994, 1997), among others.

Note 8. Other studies, such as Lamont (1998), refer to these ratios as payout ratios.

Note 9. Hamao (1988) used these data as the Japanese risk-free rate to analyze the Japanese stock market, because in Japan there exists no rate corresponding to the US 30-day treasury bill rate.

Note 10. The one-month CD rate is unavailable until around June 1984 in Japan.

Note 11. Campbell (1991) and Hodrick (1992) used the relative treasury bill rate to forecast returns. Lettau and Ludvigson (2001a) computed $RREL_t$ as the 30-day treasury bill rate minus its 12-month backward moving average and they used this 30-day treasury bill rate as the risk-free rate in their analysis. Thus, we compute this rate using our risk-free rate.

Note 12. These variables are used in preceding studies such as Shiller (1984), Campbell and Shiller (1988), and Fama and French (1988, 1989). Control variables here include TRM_t and DEF_t. TRM_t is the term spread, the difference between the 10-year government bond yield (from the Bank of Japan) and the risk-free rate. DEF_t is the yield of the Nikkei Bond Index (long-term) (from Nikkei, Inc.) minus the 10-year government bond yield.

Note 13. Campbell and Shiller (1988) showed that the log dividend–price ratio may be written as $d_t - p_t = E_t \sum_{j=1}^{\infty} \rho_a^j \left(r_{a,t+j} - \Delta d_{t+j} \right)$, where $\rho_a = P/(P+D)$, P is the stock price and D is the dividend.

This 'dynamic dividend growth model' explains the linkage between the dividend–price ratio and expected future asset returns.

Table 1. Summary statistics

	$r_t - r_{f,t}$	$d_t - p_t$	$d_t - e_t$	$RREL_t$	cay_t
			Panel A: Correlation matrix		
$r_t - r_{f,t}$	1.000	−0.049	−0.042	−0.124	−0.001
$d_t - p_t$		1.000	−0.179	−0.079	0.483
$d_t - e_t$			1.000	0.012	0.418
$RREL_t$				1.000	−0.032
cay_t					1.000
			Panel B: Univariate summary statistics		
Mean	−0.001	−5.265	−0.471	−0.001	3.542
Standard dev.	0.113	0.396	1.243	0.003	0.012
Skewness	−1.261	0.550	2.347	0.896	0.061
Kurtosis	5.788	2.652	8.323	7.646	2.810

Notes: $r_t - r_{f,t}$ is quarterly log excess returns of the Tokyo Stock Exchange First Section; $d_t - p_t$ is the log dividend yield; $d_t - e_t$ is the log dividend payout ratio; $RREL_t$ is the relative risk-free rate; cay_t is the consumption–wealth ratio. The statistics are computed for the largest common span of available data for all the variables. The sample period is the second quarter of 1980 to the third quarter of 2002.

Table 2. Forecasting quarterly stock returns

No		Constant	*lag*	*cay*	$d_t - p_t$	$d_t - e_t$	$RREL_t$	TRM_t	DEF_t	Adj.R^2
				Panel A: Real returns; 1980:2−2002:3						
1	Coefficient	0.006	0.011							−0.011
	t statistic	0.467	0.112							
2	Coefficient	−6.183		1.748						0.023
	t statistic	−1.657		1.660						
3	Coefficient	−6.177	0.006	1.746						0.011
	t statistic	−1.637	0.060	1.640						
				Panel B: Excess returns; 1980:2−2002:3						
4	Coefficient	−0.001	0.000							−0.011
	t statistic	−0.086	−0.001							
5	Coefficient	−6.429*		1.815*						0.025
	t statistic	−1.681		1.682						
6	Coefficient	−6.435	−0.006	1.817						0.013
	t statistic	−1.657	−0.059	1.659						
				Panel C: Additional controls; excess returns; 1980:2−2002:3						
7	Coefficient	0.332**			0.063**					0.039
	t statistic	2.124			2.067					
8	Coefficient	−3.249		0.989	0.048					0.035
	t statistic	−0.754		0.828	1.469					
9	Coefficient	0.329*			0.063*	−0.215				0.027
	t statistic	1.909			1.893	−0.001				
10	Coefficient	−4.875		1.431	0.038	−0.007				0.028
	t statistic	−1.024		1.096	0.931	−0.684				
11	Coefficient	−5.785	−0.020	1.679	0.030	−0.006	−5.045	−0.003	−0.024	−0.009
	t statistic	−1.081	−0.154	1.141	0.746	−0.616	−0.685	−0.191	−0.445	

Notes: The table reports estimates from OLS regressions of stock returns on lagged variables named at the head of each column. All returns are in logs and are constructed by using the returns of the Tokyo Stock Exchange First Section stocks. The regressors are all one-period lag variables and are as follows: *lag* denotes a one-period lag of independent variables; cay_t is the consumption–wealth ratio; $d_t - p_t$ is the log dividend yield; $d_t - e_t$ is the log dividend–payout ratio; $RREL_t$ is the relative risk-free rate; TRM_t is the term spread, the difference between the 10-year government bond yield and the risk-free rate; and DEF_t is the yield of the Nikkei Bond Index (long-term) minus the 10-year government bond yield. All *t* statistics are Newey–West corrected *t* statistic values. Significant coefficients at the five (10) percent level are identified by **(*). Regressions use data from the second quarter of 1980 to the third quarter of 2002.

Table 3. Long-horizon regressions

		Forecast horizon H						
No.	Regressors	1	2	3	4	8	12	16
		Panel A: Consumption growth (total consumption)						
1	*cay*	−0.344**	−0.481**	−0.541**	−0.567**	−0.370	0.027	0.661
	t statistic	−3.918	−5.606	−4.221	−3.114	−1.044	0.050	0.986
	Adj.R^2	0.190	0.212	0.160	0.114	0.006	−0.013	0.005
		Panel B: Consumption growth (nondurable consumption)						
2	*cay*	−0.302 **	−0.450**	−0.528**	−0.616**	−0.581**	−0.487	0.123
	t statistic	−4.284	−6.171	−5.871	−5.024	−2.266	−1.381	0.305
	Adj.R^2	0.197	0.270	0.269	0.258	0.093	0.028	−0.012
		Panel C: Excess stock returns						
3	*cay*	1.813*	3.635	5.650 *	8.746 *	14.752 **	18.420**	25.714**
	t statistic	1.681	1.588	1.831	2.380	3.203	2.766	3.154
	Adj.R^2	0.025	0.057	0.095	0.168	0.241	0.252	0.317
4	$d_t - p_t$	0.063**	0.126 **	0.192 **	0.260 **	0.512 **	0.766 **	1.028**
	t statistic	2.065	2.395	2.560	2.791	3.786	5.070	7.139
	Adj.R^2	0.038	0.089	0.142	0.189	0.376	0.557	0.715
5	*cay*	0.989	1.836	2.874	5.332	6.936 *	4.419	3.445
	t statistic	0.828	0.694	0.821	1.320	1.821	1.095	0.729
	$d_t - p_t$	0.048	0.099	0.149 *	0.180 *	0.408 **	0.694 **	0.970**
	t statistic	1.467	1.584	1.711	1.748	2.809	4.502	5.744
	Adj.R^2	0.035	0.091	0.151	0.228	0.409	0.562	0.715
6	$d_t - p_t$	0.063*	0.124 **	0.187**	0.253 **	0.488 **	0.760 **	1.030**
	t statistic	1.890	2.157	2.285	2.487	3.367	4.806	7.451
	$d_t - e_t$	−0.001	−0.004	−0.009	−0.013	−0.045	−0.042	0.070 0.502
	t statistic	−0.074	−0.230	−0.359	−0.485	−1.456	−0.745	0.713
	Adj.R^2	0.027	0.079	0.134	0.183	0.389	0.556	−26.259
7	$RREL_t$	−4.403	−8.080	−10.325	−11.340	−32.355	−26.321	−0.974
	t statistic	−0.849	−0.874	−0.792	−0.795	−1.565	−1.033	0.007
	Adj.R^2	−0.002	0.005	0.006	0.004	0.051	0.016	3.085
8	*cay*	1.438	2.716	4.243	7.524	11.373**	7.226 *	0.620
	t statistic	1.105	0.844	0.972	1.451	2.503	1.683	0.970**
	$d_t - p_t$	0.035	0.073	0.109	0.118	0.278 *	0.627 **	5.848
	t statistic	0.899	0.927	1.001	0.934	1.901	3.892	0.028
	$d_t - e_t$	−0.008	−0.016	−0.027	−0.044	−0.093**	−0.096*	0.201
	t statistic	−0.710	−0.820	−1.070	−1.595	−3.165	−1.679	−14.775
	$RREL_t$	−3.680	−6.612	−8.079	−8.271	−27.257*	−19.945	−0.864
	t statistic	−0.767	−0.818	−0.778	−0.791	−1.780	−1.039	0.714
	Adj.R^2	0.024	0.090	0.159	0.251	0.508	0.582	

Notes: The table reports results from long-horizon regressions of excess returns on lagged variables. H denotes the return horizon in quarters. The dependent variable in Panel A is H-period total consumption growth $\Delta c_{t+1} + ... + \Delta c_{t+H}$. In Panel B, the dependent variable is H-period nondurable consumption growth $\Delta c_{n,t+1} + ... + \Delta c_{n,t+H}$. In Panel C, the dependent variable is the sum of H log excess returns on Tokyo Stock Exchange First Section stocks, $r_{t+1} - r_{f,t+1} + ... + r_{t+H} - r_{f,t+H}$. The regressors are the consumption–wealth ratio *cay*, the log dividend yield $d_t - p_t$, the dividend–earnings ratio $d_t - e_t$, the detrended short-term interest rate $RREL_t$, and combinations thereof. For each regression, the table reports OLS estimates of the regressors, Newey–West corrected t statistics, and adjusted R^2 values. Significant coefficients at the five (10) percent level are identified by **(*). The sample period is the second quarter of 1980 to the third quarter of 2002.

Table 4. Vector autoregression of excess returns

Dependent variable	Constant	$r_t - r_{f,t}$	$RREL_t$	$d_t - p_t$	$d_t - e_t$	cay_t	Adj. R^2
Panel A: Excluding consumption–wealth ratio							
$r_{t+1} - r_{f,t+1}$	0.318*	0.000	−3.655	0.061*	−0.001		0.011
t statistic	1.931	0.003	−0.766	1.973	−0.082		
$RREL_{t+1}$	−0.006**	−0.001	0.696**	−0.001**	0.000		0.658
t statistic	−2.884	−0.458	12.390	−2.792	0.522		
$d_{t+1} - p_{t+1}$	−0.346**	−0.008	3.569	0.936**	−0.003		0.919
t statistic	−2.147	−0.075	0.764	30.934	−0.292		
$d_{t+1} - e_{t+1}$	0.238	0.575	−3.005	0.040	0.946**		0.775
t statistic	0.276	1.020	−0.120	0.250	17.236		
Panel B: Including consumption–wealth ratio							
$r_{t+1} - r_{f,t+1}$	−4.949	−0.010	−3.739	0.035	−0.008	1.448	0.012
t statistic	−0.978	−0.089	−0.784	0.889	−0.620	1.041	
$RREL_{t+1}$	−0.094	−0.001	0.695**	−0.001**	0.000	0.024	0.663
t statistic	−1.594	−0.592	12.455	−3.133	−0.347	1.500	
$d_{t+1} - p_{t+1}$	6.303	0.005	3.431	0.969**	0.006	−1.828	0.920
t statistic	1.278	0.044	0.790	25.091	0.464	−1.348	
$d_{t+1} - e_{t+1}$	−65.576**	0.451	−4.051	−0.282	0.861**	18.093**	0.789
t statistic	−2.549	0.823	−0.167	−1.400	13.756	2.559	
cay_{t+1}	1.814**	0.004	−0.412	0.008**	0.002**	0.500**	0.520
t statistic	4.738	0.524	−1.141	2.711	2.511	4.755	

Notes: The table reports coefficient estimates from vector autregressions (VARs) of log excess returns, relative risk-free rate, dividend-yield, dividend–payout ratio, and the trend deviation term. $r_{t+1} - r_{f,t+1}$ is quarterly log excess returns on Tokyo Stock Exchange First Section stocks; $RREL_t$ is the relative risk-free rate; $d_t - p_t$ is the log dividend yield; $d_t - e_t$ is the log dividend–payout ratio. All t statistics are Newey–West corrected t statistic values. Significant coefficients at the five (10) percent level are identified by **(*). The sample period is the second quarter of 1980 to the third quarter of 2002.

Table 5. Granger causality tests for real GDP, real consumption, and real investment

Panel A The case of Japan

The case of lag = 1

Cause	Statistic	Result: JGDP	JCONS	JINV
JGDP	F statistic	—	15.009**	1.598
	p value	—	0.000	0.210
JCONS	F statistic	2.570	—	0.709
	p value	0.113	—	0.402
JINV	F statistic	6.113**	7.220**	—
	p value	0.015	0.009	—

The case of lag = 2

Cause	Statistic	Result: JGDP	JCONS	JINV
JGDP	F statistic	—	6.515**	0.645
	p value	—	0.002	0.527
JCONS	F statistic	2.008	—	0.225
	p value	0.141	—	0.799
JINV	F statistic	2.088	3.293**	—
	p value	0.130	0.042	—

Panel B The case of USA

The case of lag = 1

Cause	Statistic	Result: UGDP	UCONS	UPDI
UGDP	F statistic	—	2.347	19.796**
	p value	—	0.129	0.000
UCONS	F statistic	19.881**	—	23.341**
	p value	0.000	—	0.000
UPDI	F statistic	1.901	1.158	—
	p value	0.172	0.285	—

The case of lag = 2

Cause	Statistic	Result: UGDP	UCONS	UPDI
UGDP	F statistic	—	1.456	8.317**
	p value	—	0.239	0.001
UCONS	F statistic	9.873**	—	9.742**
	p value	0.000	—	0.000
UPDI	F statistic	2.985*	0.580	—
	p value	0.056	0.562	—

Notes: JGDP denotes the quarterly log growth rate of real GDP in Japan; JCONS denotes the quarterly log growth rate of real consumption (nondurables and services) in Japan; JINV denotes the quarterly log growth rate of real gross domestic investment in Japan; UGDP denotes the quarterly log growth rate of real GDP in the US; UCONS denotes the quarterly log growth rate of real consumption (nondurables and services) in the US; and UPDI denotes the quarterly log growth rate of real gross private domestic investment in the US. The null hypothesis is that 'Cause' variables do not Granger cause the 'Result' variables. Significant *F* statistics that statistically reject the null hypothesis at the five (10) percent level are identified by **(*). The sample period is the second quarter of 1980 to the third quarter of 2002.

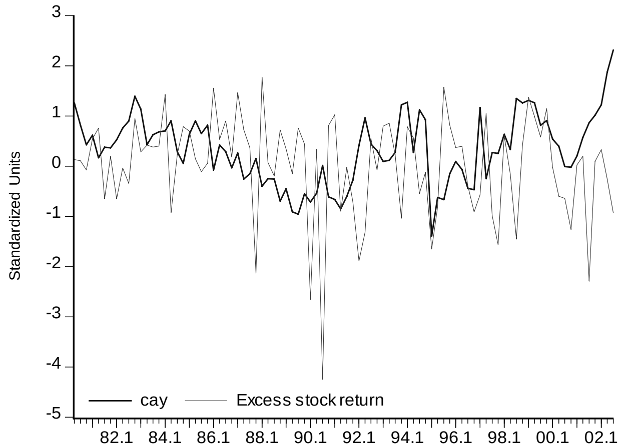

Figure 1. Excess Stock Returns and the Trend Deviations, *cay*, in Japan

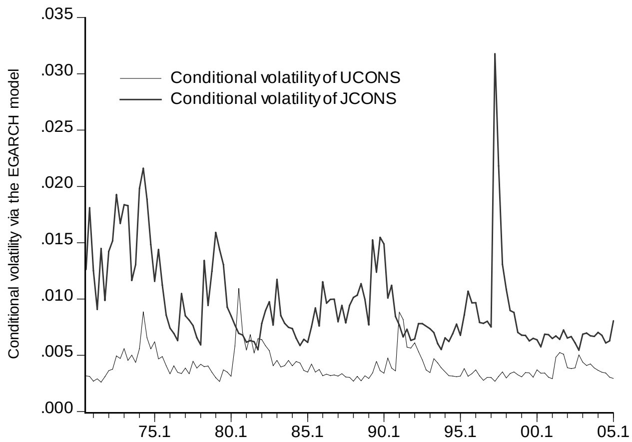

Figure 2. Conditional Volatility of Consumption in the US and Japan