The Current Account and Stock Returns

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ABSTRACT

Robert E. Hall (1978. Journal of Political Economy 86(6), 971-987) points out that a stock price is a predictive variable for consumption because it predicts the state of future economy. This paper shows that once a stock return is included in the intertemporal model for the current account, the model performs well in three countries (the U.K., Canada and Japan). My empirical findings indicate that consumption behavior based on the permanent income is affected by stock return since a stock return is an informative variable for permanent income.

JEL Classification Number

F32 Current Account Adjustment; Short-Term Capital Movements

F41 Open Economy Macroeconomics

Keywords: Current Account, Permanent Income, Stock Return

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could be separated into two components: the consumption-smoothing motive and the consumption-tilting motive. The consumption-tilting motive makes a country tilt its consumption toward the present or the future, depending on the magnitude of world interest rates in relation to its subjective discount rate. That is, if the interest rate is higher than the discount rate, the country saves in the international capital market. This indicates the possibility that the change in world interest rates induces the change in consumption. The result is that a change also arises in a current account balance. Bergin and Sheffrin (2000) succeed in accommodating the varying interest rate to their empirical model. Moreover, they find that once the interest rate and exchange rate is included, the fit of the ICA model is improved.

In this study, drawing on Bergin and Sheffrin (2000), I focus on the role of stock return in the ICA. As mentioned after, the ICA model performs well once the return from the world stock market is introduced. If we follow Bergin and Sheffrin (2000)'s interpretation, my empirical results suggest that the return in the world stock market affects the consumption tilting of an agent who invests in the world stock market.

However, extant literature have reported that international portfolio diversification is much lower than optimal one. In other words, investors hold a substantially larger proportion of their wealth portfolios in domestic assets than standard portfolio theory would suggest. This phenomenon is called home bias. The existence of the home bias implies that a representative agent who prefers the domestic capital market is not influenced directly by the return in the world stock market. Unlike Bergin and Sheffrin (2000), my findings cannot be explained by the consumption-tilting motive. One alternative interpretation is that a representative agent uses the stock returns as information to smooth its consumption, even if an agent does not actually access the world stock market.

This paper is organized as follows. I begin by the economic model. Section 3 describes the data used for empirical analysis of this study. The empirical results for tion is written in log form:

$$E_t[\Delta c_{t+1}] = \gamma E_t[r_{t+1}] + cons, \tag{3}$$

where $\gamma = 1/\sigma$, $\Delta c_{t+1} = \ln C_{t+1} - \ln C_t$ and the approximation $\ln(1+r) \approx r$ is used. In equation (3) the variances and covariance are assumed to be constant. γ is the elasticity of intertemporal substitution. Bergin and Sheffrin (2000) consider traded and nontraded goods and show that the optimal consumption profile in equation (3) is influenced by the consumption-based interest rate, which reflects both the real interest rate and the relative price of nontraded goods. In this paper, there exist traded goods alone and hence the stock return does not reflect the relative price of nontraded goods. Moreover output and investment are exogenous variables with the assumption of Fisherian separability.

I define the market discount factor as $R_s = \left\{\prod_{v=1}^{s}(1+r_v)\right\}^{-1}$ and $R_0 = 1$. I rewrite the intertemporal budget constraint (2):

$$B_0 = -(NO_0 + \sum_{s=1}^{\infty} R_s NO_s) + (C_0 + \sum_{s=1}^{\infty} R_s C_s), \tag{4}$$

where B_0 is the initial net foreign asset, NO is net output (net cash flow) defined as $NO_t = Y_t - I_t - G_t$ and the transversality condition $\lim_{t\to\infty} E_0(R_t B_t) = 0$ is imposed. Equation (4) is log linearised [3] and substituting equation (3) into the log linearised equation (4) yields:

$$-E_t \sum_{i=1}^{\infty} \beta^i [\Delta no_{t+i} - \gamma r_{t+i}] = no_t - c_t, \tag{5}$$

where $no_t = \ln NO_t$, $\Delta no_t = \ln NO_t - \ln NO_{t-1}$. All variables are demeaned in this study so that a constant term is ignored. The current account is defined as $CA_t \equiv NO_t - C_t$ and the right hand side of (5) is similar to the definition of the current account, except that its components are in log terms. Following Bergin and Sheffrin (2000), I label this in the first order form (Sargent, 1987, pp.272-273). With equation (7), the infinite sum of equation (6) is expressed as follows:

$$ca_t^* = -(\mathbf{G}_1 - \gamma\mathbf{G}_2)\beta\mathbf{A}(\mathbf{I}-\beta\mathbf{A})^{-1}\begin{bmatrix}\Delta no_t \\ ca_t^* \\ r_t\end{bmatrix}$$

$$= [\Gamma_{no}\ \Gamma_{ca}\ \Gamma_r]\begin{bmatrix}\Delta no_t \\ ca_t^* \\ r_t\end{bmatrix}, \qquad (8)$$

where $\mathbf{G}_1 = [1\ 0\ 0]$ and $\mathbf{G}_2 = [0\ 0\ 1]$. Under the null hypothesis, $[\Gamma_{no}\ \Gamma_{ca}\ \Gamma_r] = [0\ 1\ 0]$ holds in equation (8). Let Γ equal $[\Gamma_{no}\ \Gamma_{ca}\ \Gamma_r]$ and $\tilde{\Gamma}$ be the difference between the actual Γ and $[0\ 1\ 0]$. The value of γ is chosen to minimize the second moment of $\tilde{\Gamma}$. The two weighting matrixes are considered for the GMM: the one is the inverse of variance-covariance matrix for $\tilde{\Gamma}$ and the other is the identity matrix. The first one is the method proposed by Campbell and Shiller (1989) to minimize the Wald statistics $\tilde{\Gamma}((\partial\Gamma/\partial\mathbf{A})\mathbf{V}(\partial\Gamma/\partial\mathbf{A})')^{-1}\tilde{\Gamma}'$, where $\mathbf{V}$ is a variance-covariance matrix of the VAR estimator. The variance-covariance matrix of $\tilde{\Gamma}$ is calculated with the first order approximation. Then the two value for γ is obtained with each weighting matrixes. Finally, with the in-sample test of equation (8), the better γ is selected.

3. Data and unit root test

I test equation (8) using quarterly data from three countries: the UK, Canada and Japan. For all three countries, the data cover the period from 1960-Q1 to 2000-Q4. All data are from the International Financial Statistics. Data details are shown in Table 1.

*****Table 1 around here*****

All variables are adjusted by 99bvr and 99z for each country. I consider two nominal interest rates, one is r_m from money market rates (line 60b) and the other is r_s from stock market returns (calculated from line 62). Comparing them will reveal than the simple model, this means that the effect of the interest rate (stock return) is important factor for the ICA model. Comparing the market and the stock market model will reveal which of interest rate or stock return is more significant information for consumption behavior of an agent.

To test equation (8), it is necessary to estimate two variables ($\Delta no, ca^*$) VAR model and obtain the coefficient matrix **A** for the simple model. Similarly, three variables VARs are estimated for the market and the stock market model. For all countries, the Schwartz information criterion (SIC) suggests that one lag is selected to estimate the VAR system. The estimation results of VAR are shown in Table 3.

*****Table 3 around here*****

Next to VAR estimation, I calculate the current account predicted by each ICA model using an estimated VAR coefficient matrix. The each empirical result of the ICA is summarized in Table 4.

*****Table 4 around here*****

The volatility of the predicted current account ($\hat{ca}^*$) is reported as a ratio to that for the actual data (ca^*) in the third column of Table 4. A variance ratio is used as an index to see whether each model captures the actual change of a current account much well. If that ratio is equal to one, that model captures the volatility of the actual current account perfectly. In all cases the variance ratio is more or less than one, except the cases of stock market model.

In the cases of the simple and the market model for the UK and Japan, variance ratios are more than one. This means that the predicted current account by each model is more volatile than actual current account. In other words, this indicates that an actual current account does not change to allow the optimal behavior of a representative agent. That is, capital mobility is too limited to allow consumption smoothing behavior (Ghosh, 1995).

When a variance ratio is less than one (in the cases of the simple and the market

Japan. Table 5 shows the ratio of equity security to total foreign assets in each country. The ratio is calculated from 1995 to 2000, during which data is available. We see that the ratio for Japan is much lower than that of the other two countries. This makes it difficult to suggest that the reason why the stock market model performs well in Japan is the existence of the representative agent who borrows or lends in the world stock market. Table 6 shows the ratio of debt security to total foreign asset for each country. Debt securities assets in Table 6 cover bonds, money market instruments and so on. In line with consumption tilting-effect suggested by Bergin and Sheffrin (2000), the market model is expected to perform much better than the stock model for three countries because the ratio of debt security to total asset is much higher than that of equity in each countries. That is, since each three country prefers to hold riskless foreign asset rather than equity, the interest rate in the market model is supposed to affect consumption-tilting of three countries much more than the stock return does. Especially in Japan, the ratio of debt security is over three times as large as that of equity security in all years. This indicates that the market model would perform much better if consumption-tilting effect is important. However my empirical results do not support consumption-tilting effect.

An alternative interpretation is suggested as follows. While an agent does not access to the world stock market, it can use the stock return as information for its permanent income. That is, based on the information included in the stock return, an agent makes a decision on its intertemporal consumption. As Hall (1978) suggests, the stock return may be a predictable variable for the consumption since the return includes the information on the future output and so on. Especially in the case of Japan, it seems natural to suggest that an agent behaves optimally based on the information from the world stock market even if the agent actually would not heavily borrow or lend in the stock market.

Appendix

The log-linearization technique is developed by Campbell and Mankiw (1989). Equation (4) is written:

$$\Phi_0 - \Psi_0 = B_0, \tag{A-1}$$

where $NO_0 + \sum_{s=1}^{\infty} R_s NO_s = \Psi_0$ and $C_0 + \sum_{s=1}^{\infty} R_s C_s = \Phi_0$. I divide both sides of (A-1) by Φ_0 and taking logs:

$$\psi_0 - \phi_0 = \ln[1 - \exp(b_0 - \phi_0)], \tag{A-2}$$

where $\ln \Psi_0 = \psi_0, \ln \Phi_0 = \phi_0$ and $\ln B_0 = b_0$. The right hand side of equation (A-2) is approximated around $\bar{b} - \bar{\phi}$, and the following equation is obtained:

$$\psi_0 - \phi_0 \approx \frac{\Lambda - 1}{\Lambda}(b_0 - \phi_0), \tag{A-3}$$

where a constant term is ignored and all approximations below ignore constant terms since I demean all variables in the empirical model. $\Lambda = 1 - \exp(\bar{b} - \bar{\phi})$ and *bar* means steady state level.

Note that $\Phi_{t+1} = (1 + r_t)(\Phi_t - C_t)$ holds for $t \geq 0$, and dividing both sides of this equation by Φ_t and taking logs:

$$\phi_{t+1} - \phi_t = r_t + \ln[1 - \exp(c_t - \phi_t)], \tag{A-4}$$

where $c_t = \ln C_t$, $\ln(1 + r_t) \approx r_t$ and I take a first-order Taylor expansion of $\ln[1 - \exp(c_t - \phi_t)]$ around $\bar{c} - \bar{\phi}$ to yield:

$$\ln[1 - \exp(c_t - \phi_t)] \approx \frac{\rho - 1}{\rho}(c_t - \phi_t), \tag{A-5}$$

where $\rho = 1 - \exp(\bar{c} - \bar{\phi})$. And (A-4) becomes

$$\phi_{t+1} - \phi_t \approx r_t + \frac{\rho - 1}{\rho}(c_t - \phi_t). \tag{A-6}$$

Note that

$$\phi_{t+1} - \phi_t = \Delta c_{t+1} + (c_t - \phi_t) - (c_{t+1} - \phi_{t+1}). \tag{A-7}$$

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Table 1

The data

Category	IFS series
Private Consumption	96f
Investment	93e+93i
Government Expediture	91f
Stock Index	62
Money market rates	60b
Gross Domestic Product	99b
Price Index	64
Population	99z
GDP deflator	99bvr

Note: All data are from the International Financial Statistics CD-ROM. All series are seasonally adjusted at annual rates.

NO (the net output) = 99b-(93e+93i)-91f

ca^* (current account) = ln NO- ln 96f

Table 2

Unit Root Tests

	Lag	1		2		3		4		5	
United Kingdom	Δno	−0.458	***	−0.389	***	−0.356	***	−0.362	***	−0.355	***
	ca^*	−0.103	***	−0.117	***	−0.123	***	−0.125	***	−0.122	***
Canada	Δno	−0.803	***	−0.788	***	−0.538	***	−0.486	***	−0.512	***
	ca^*	−0.070	*	−0.087	**	−0.085	**	−0.079	**	−0.082	**
Japan	Δno	−0.447	***	−0.287	***	−0.197	***	−0.211	***	−0.202	***
	ca^*	−0.108	***	−0.119	***	−0.119	***	−0.115	***	−0.104	***
common variable	r_m	−0.083	**	−0.077	**	−0.090	***	−0.073	**	−0.075	***
	r_s	−0.773	***	−0.690	***	−0.688	***	−0.749	***	−0.821	***

Note: The ADF test is run by regressing

$$\Delta ca_t^* = a\,ca_t^* + \sum_{i=1}^{n} b_i \Delta ca_{t-1}^* + \mu_t .$$

If ca^* is a stationary, a is negative and significantly different from zero.

***, **, * indicate significance at 1, 5, 10% level, respectively.

Table 4

Estimation results

Model	Country	$\mathrm{var}(\hat{ca}^*)/\mathrm{var}(ca^*)$		γ
simple	The UK	5.243	***	
	Canada	0.358	***	
	Japan	15.313	***	
market	The UK	3.152	***	−0.877
	Canada	0.092	***	−0.484
	Japan	10.467	***	−0.688
stock market	The UK	1.163		−0.694
	Canada	0.822		0.120
	Japan	1.015		−0.539

Under the null that the ratio equals unity, $\mathrm{var}(\hat{ca}^*)/\mathrm{var}(ca^*)$ has F distribution with degree of freedom [160, 160] in all cases. *** Reject at 1% or higher.

Table 5

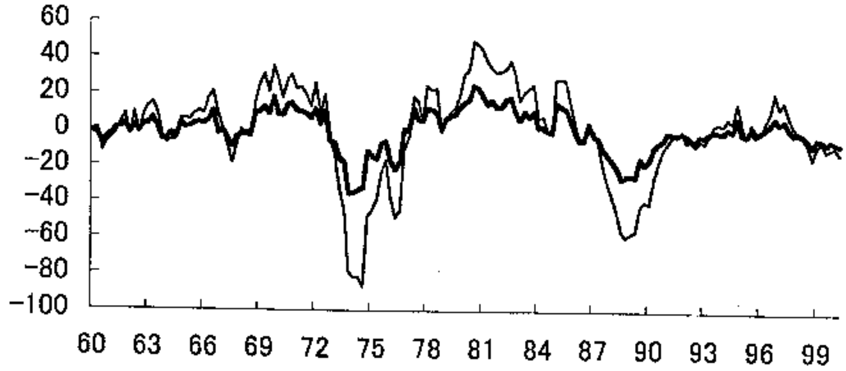
The ratio of equity to total foreign asset

year	The UK	Canada	Japan
1995	14.1%	16.2%	5.6%
1996	14.6%	17.1%	5.8%
1997	14.4%	17.3%	5.8%
1998	14.2%	18.1%	7.0%
1999	17.4%	20.8%	9.5%
2000	14.4%	21.0%	8.8%

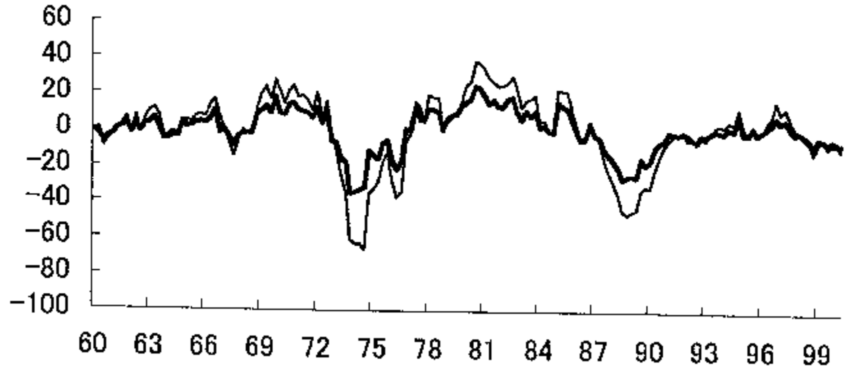
The data is from International Financial Statistics: equity securities asset (line79ad) is divided by total asset (line 79aa).

Figure 1. The United Kingdom

Simple model



Market model

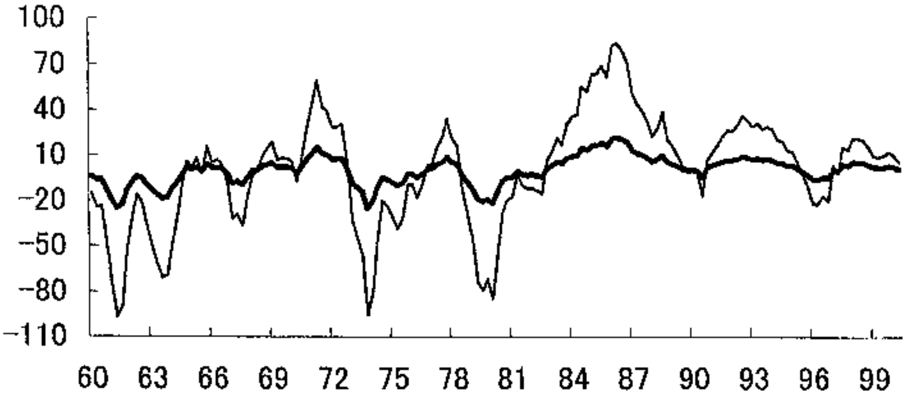


Stock market model

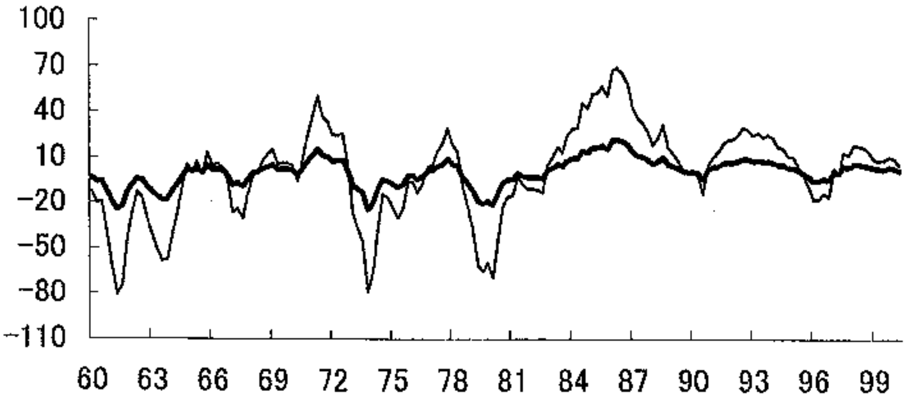
———, predicted; ———, actual.

Figure 3. Japan

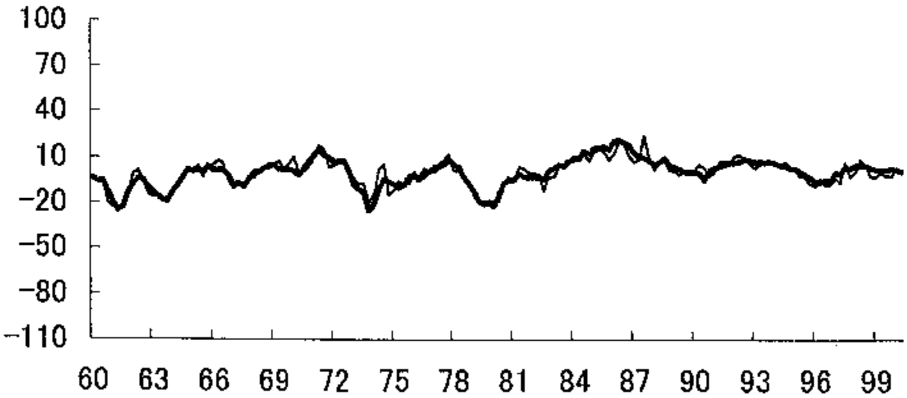
Simple model



Market model



Stock market model



———, predicted; ———, actual.