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Assets Return and Risk and Exchange Rate Trends: An Ex Post Analysis

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Abstract ***

The objective of this analysis is to determine the movements (long-term trend) of the exchange rate by looking at the rate of return and risk that financial assets (3-month T-bills) have in four different economies, for four different investors. Risk averse speculators will try to maximize their return and minimize risk by investing in different countries, and these capital flows will affect the value of the four currencies (their exchange rates). The empirical results show that before 2001 the return in the U.S. was high and the dollar was appreciated; after 2001, the same return became negative and the dollar was depreciated, but after 2004 the returns have growing positively for the U.S. and relatively the same for the U.K.; the returns for the Euro-zone and Japan are falling. So, the dollar is expected to appreciate, the pound might experience a little appreciation and the euro will fall together with the yen. From this ex post analysis, we can conclude that, by forecasting risk and return in countries' assets, we can determine the long-term trend of these currencies (exchange rates) in the future.

Keywords: Estimation, Time-Series Models, Portfolio Choice, Forecasting and Other Model Applications, Foreign Exchange.

JEL Classification: C13, C22, C53, F31, G11.

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1. Introduction

In Europe, on January 4, 1999, the official launch for the single European currency ("euro") took place at the introductory rate of 1.1668 $/euro. Eleven European Union member states elect to participate in this new system; Greece joined the Euro group in 2001. Three years later, on January 1, 2002, euro coins and notes were introduced in the EU-12 (Euro-zone). The euro's value slid steadily following its introduction and reached the value of 0.8813 $/euro on December 31, 2001. Beginning in early 2002, the euro started a strong and steady rise in value, peaking at 1.3646 $/euro on December 30, 2004. After January 2005, the euro is slowly depreciated and became 1.2126 $/euro at the end of January 2006.[1] Today, it has become a popular reserve currency, representing 19.7% of central bank holdings.[2] Apart from issues of exchange rate risk and deeper capital markets, the euro has had bad record of success with regard the growth, the employment, the exports, the investments, the inflation, the loss of monetary policy for the EMU member-states, and its disapproval by the average European citizen.

In the U.S.A., years of large current account deficits, enormous national debt,[3] high real return on U.S. assets, and relatively low risk have left the United States with the world's largest stock of international liabilities. By the end of 2004, foreign net claims on the U.S. amounted to $2.5 trillion, equivalent to 22% of U.S. GDP.[4] This tremendous demand for U.S. assets was expected to appreciate the U.S. dollar relative to euro and the other foreign currencies, but data show exactly the opposite. Then, other factors might have affected the exchange rate between the dollar and the other major currencies, like speculation[5] and uncertainty for the future, due to the Middle East crises (Palestinians and Israelis, Afghanistan, Iraq, Israel's invasion in Lebanon, and the creeping ones in Iran, Syria, and North Korea). It is well established that the volatility of exchange rates[6] displays considerable persistence. That is, large movements in spot rates tend to be followed by more large movements later, which increasing risk and producing serial correlation in real returns. Thus, past and present volatility can be used to predict future volatility and the forward discount or premium of the different currencies. Investors in foreign assets must pay attention not only to the expected return from their investment activity, but also to the risk that they incur.[7] Risk averse investors try to reduce their exposure during periods of high volatility by predicting the return of their investment and the volatility (variance) of this return. This volatility has been forecasted with GARCH (p, q) models[8] or genetic programs,[9] which give broadly similar results. Investors will invest in assets denominated in a currency that its return

[1] See, Kallianiotis (2006b, Table 2).
[2] See, Eiteman, Stonehill, and Moffett (2007, p. 55).
[3] The outstanding national debt was $8.535 trillion on September 13, 2006 (www.brillig.com).
[4] See, Higgins, Klitgaard, and Tille (2005, p. 1).
[5] Speculators (actually, sordid gainers and profiteers) in the oil industry have cause uncertainty in the global economy, too. Some call them "white collar terrorists". Exxon Mobil Corp., the world's biggest oil company, said fourth-quarter profit rose 27% to a record $10.7 billion on surging energy prices, capping the most profitable year for any company in U.S. history. (Bloomberg.com, 1/30/2006 and *The Wall Street Journal*, January 31, 2005, pp. A1 and A3).
[6] Their standard deviations of their fd or fp are: $\sigma_{\$/euro} = \pm 30.00\%$, $\sigma_{\$/pound} = \pm 33.05\%$, $\sigma_{\$/yen} = \pm 27.27\%$, $\sigma_{pound/euro} = \pm 18.58\%$, $\sigma_{yen/euro} = \pm 30.94\%$, $\sigma_{pound/yen} = \pm 26.89\%$.
[7] Muslim countries avoid to invest in U.S. assets after 2003 (invasion in Iraq) because they are afraid that the American government might freeze their funds.
[8] See, Kallianiotis (2004a and b). Here, we use ex post analysis; we do not forecast any variables.
[9] See, Neely and Weller (2002).

will be higher than the others and its risk to be the smallest one. Determining these assets with the highest return and lowest risk, the trend of the exchange rate of this specific country can be determined. An excess demand for the country's assets will appreciate its currency.

Some recent facts ("news") reveal the effect of speculation on the different exchange rates. On Tuesday February 22, 2005, South Korea's Central Bank announced that plans to diversify its foreign exchange reserves, which traders took to mean a slowdown in purchases of dollar-denominated securities. The U.S. dollar fell to $1.3259 per euro and lost value with respect the other major currencies, too. The DJIA slid 174.02 points (1.6%) as concerns about the weak dollar sparked a sell-off of the U.S. currency. Also, Gold surged $7.40 to $434.50 and oil climbed to $51.42 per barrel.[10] In addition, terrorist attacks globally rose in 2004 to about 650 from 175 in 2003, said congressional aides briefed by State Department and intelligence officials.[11] A terrorist attack in London[12] on July 7, 2005 caused stocks worldwide to fall; the London stocks (FTSE 100 index) fell by 200 points, the DJIA fell by 250 points, U.K. pound slumped to $1.7403 from $1.7556, bonds gained (10-year AAA=4.80%), oil in N.Y. fell by $5 to $57, and gold price increased by $4 to $430 per troy ounce; but after this shudder in the markets, they rebounded quickly. On Monday, October 3, 2005, Turkey "invaded" EU and we were expected to see some effects on euro, but nothing happened; it did not change at all.[13] Then, invasions have no effect on exchange rates, only speculations do. Strange world and it is becoming worse every day! Economists and all social scientists will have a very hard time to analyze this fabricated anti-societal world. On November 1, 2005, the FOMC raised the federal funds rate to 4% and instead of having an appreciation of the U.S. dollar, we had the opposite the exchange rate increased to 1.2067 $/euro.[14] On December 13, 2005, Fed raised for 13th time in row the federal funds rate to 4.25% and instead of having an appreciation of the U.S. dollar, it fell to 1.2034 $/euro from 1.1668 $/euro that was on November 17, 2005.[15] At the same time, we read that the U.S. net purchases of overseas stocks during the first 10 months were on a pace to smash the 2003 record of $88.6 billion. At an average of more than $9.5 billion a month, the 2005 total could hit $115 billion.[16] This huge demand for foreign financial assets causes the dollar to depreciate. On February 16, 2006, it has fallen to 1.1877 $/euro.[17]

Although a number of economic models have been used to interpret exchange rate movements, virtually none of the existing models can explain exchange rate behavior well because it is so much speculation and uncertainty in this market that make economic theories useless. Some economists attempt to interpret the phenomenon of deviation of the actual currency values from their fundamental values as speculative bubbles. Particularly, economic agents form their exchange rate expectations based on a certain kind of extrapolative behavior.[18] Thus, favorable changes in financial variables or in the investment environment may tend to generate an exchange rate appreciation that, in turn, may lead to expectations of a further

[10] See, *The Wall Street Journal*, February 23, 2005, pp. A1, C1, C2, and C3; and "Dollar Declines as Bank of Korea Plans to Diversify Currency Reserves", Bloomberg.com, 2/22/2005.
[11] See, *The Wall Street Journal*, April 27, 2005, p. A1.
[12] A group purporting to be the terrorist organization al-Qaeda claimed responsibility for explosions during morning rush hour across London. The public transportation system was shutting down. (Bloomberg.com, July 7, 2005 and *The Wall Street Journal*, July 8, 2005, p. C1).
[13] See, *The Wall Street Journal*, October 4, 2005, pp. A1, A15, and A16.
[14] See, *The Wall Street Journal*, November 2, 2005, p. A1 and Bloomberg.com, 11/2/2005.
[15] See, Bloomberg.com, 12/14/2005.
[16] See, *The Wall Street Journal*, December 15, 2005, pp. A1, C1, and C14.
[17] See, Bloomberg.com, 2/16/2006.
[18] See, Tucker, Madura, and Chiang (1991, p. 52).

appreciation. But, here, especially with the "euro", there were no major changes in fundamentals. The above process continues as long as the market believes the currency price will persist moving in the same direction. Since the actual price moves farther away from the fundamentals as time passes, capital gains would have to be sufficiently large to compensate the risk of a bursting bubble, which it is not obvious for the euro at this moment.

Speculations and speculative bubbles have gained some empirical support in exchange rate determination literature. They were found in the DM/$ and FF/$ rates for the period June to October 1978. Evidence indicates that the German mark was overvalued with respect to its fundamental value by 12% and French franc by 11%.[19] A speculative bubble was also found in the United States, where the dollar appreciated substantially for the period 1980 through 1985. The same seems to be the case with the Euro-zone; the euro has been appreciated without any changes in the fundamentals (except the Iraqi war and the fear of another war in Iran) since the beginning of 2003, reached 1.3646 $/euro on December 30, 2004 and continues to be overvalued.[20] On October 6, 2005 it was 1.2129 $/euro[21] and on January 23, 2006, it was 1.2280 $/euro, which it is unjustifiable according to some researchers.[22] On April 24, 2006, the Secretary of the State (Condoleezza Rice) visited Greece and Turkey asking for their support towards Iran. The dollar devaluated drastically from 1.2307 $/euro to 1.2596 $/euro.[23] The latest U.S. threats towards Iran caused the dollar to fall to 1.2740 $/euro.[24] The Fed raised the Fed Funds rate to 5%, commercial banks raised their prime rate to 8%, the DJIA fell by -141.92 points to 11,500.73, and the Gold jumped to $724.50, its highest close price since September 1980, but the U.S. dollar depreciated to 1.2913 $/euro.[25] The Michigan index of consumer sentiment decreased to 79 in May 2006.[26] Why? The answer is: the global instability. The dollar was headed for its biggest weekly gain since November 2005 against the euro as Federal Reserve speakers suggested they will raise interest rates in June to keep inflation in check. Stock markets around the world plunged amid concern that rates are rising and growth is slowing.[27] Today, their exchange rate is 1.2691 $/euro and the prime rates are: $i_{US} = 8.25\%$, $i_{EU} = 3.00\%$, $i_{UK} = 4.75\%$, and $i_J = 1.625\%$.[28]

Meese and Rogoff (1983) conclude that exchange rate models do a poor job of tracking movements over short horizons. Then, the macroeconomic variables (money supply, income, interest rate, price level, debt, etc.) can explain changes in exchange rate over medium and long horizons. Currency traders, speculators, and other market participants who focus on the short-term horizon look beyond macroeconomic models. They, search for signs (like risk and return) of short-term changes in the demand for currencies (assets denominated in specific currency), using any available measures of market transactions, behavior, and news. It is important for

[19] See, Woo (1987).
[20] Euro was 0.8813 $/euro on December 31, 2001 and has been appreciated by 54.84% in three years. See, Kallianiotis (2005a and 2006b).
[21] Bloomberg.com (10/6/2005).
[22] Kallianiotis (2005b) is predicting an increase in the return on the U.S. T-Bills and an appreciation of the U.S. dollar, but here a new uncertainty appears for the world, the Iranian case.
[23] Bloomberg.com (4/20-28/2006).
[24] Bloomberg.com (5/5/2006) and *Wall Street Journal*, May 8, 2006, p. A1.
[25] Bloomberg.com (5/12/2006) and *Wall Street Journal*, May 11, 2006, p. A1.
[26] This index in April 2006 was 87.4. It is a drastic drop of consumers' confidence. See, Bloomberg.com (5/12/2006).
[27] The U.S. dollar advanced to 1.2636 $/euro. (*Bloomberg.com*, 6/9/2006 and *The Wall Street Journal*, June 9, 2006, p. A1).
[28] *The Wall Street Journal*, September 13, 2006, pp. A1 and C12.

economists to model short-term exchange rate dynamics and determine (forecast) the future value of the different currencies. Speculators in the futures market are constantly interpreting public and private information about ongoing shifts in foreign currency demand as they develop their directional views.[29]

We start, in section 2, with the development of the return domestically and in a foreign country by considering the exchange rate risk, and an investment choice. In section 3, some empirical results are given for the four economies. In section 4, policy implications are discussed for currencies, which deviate from their fundamentals. Lastly, we conclude with a few comments on this analysis.

2. Return, Exchange Rate Risk, and Investment Choice

This analysis includes an international portfolio balance theory and its implications for exchange rates. A starting point is the hypothesis that real money demand depends not only on income, the conventional transactions variable, but also on interest rate and on wealth, the speculative demand.[30] The internationalization of business and investment opportunities induce speculators to diversify their portfolios of assets denominated in a variety of currencies so that they can maximize their wealth (w_t) and minimize its risk (σ_w^2). Many times, we have experienced drastic effects on the value of currencies because these speculators decided to change overnight the content of their portfolios.[31]

These shifts in wealth induced by current account imbalances or portfolio diversification create monetary imbalances leading to adjustments in long-run price level expectations and thus to exchange rate movements. With perfect mobility of capital, these specifications of money demand imply that the real money demand of a country with a surplus or acquiring its assets rises while it falls abroad. The relative price level of the country with a surplus or with a high demand of its assets declines and, therefore, exchange rates for given terms of trade tend to appreciate.

The demand for monies is affected by an international redistribution of wealth. Portfolio effects can arise in the context of imperfect asset substitutability. With uncertain returns, portfolio diversification makes assets imperfect substitutes and gives rise to determinate demands for the respective securities and to yield differentials or a higher risk premium that one currency offers relative to the others.

A portfolio model could provide an explanation of the unanticipated euro appreciation that is only poorly accounted for by speculation, prominent return in Euro-zone market,[32] high

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[29] See, Klitgaard and Weir (2004).

[30] As follows: $\frac{M_t^d}{P_t} = \alpha_0 + \alpha_1 Y_t - \alpha_2 i_t + \alpha_3 w_t + \varepsilon_t$.

[31] In June 1997, the Asian currency crises started. The Thai baht devaluated in July, followed soon after by the Indonesian rupiah, Korean won, Malaysian ringgit, and Philippine peso. Following these initial exchange rate devaluations, Asian economies plummeted into recessions. The Indonesian president went public and blamed speculators (he named even one, George Soros) who shifted their short-term investments out of the country. Next day this poor president was forced to resign. See, Eiteman, Stonehill, and Moffett (2007, p. 44), Rajan and Zingales (1998), and Singal (1999).

[32] On September 20, 2006, at the meeting of the FOMC, the Fed left rates unchanged at 5.25% and the dollar fell with respect to euro, pound, and yen. The DJIA gained 72.28 points. (*The Wall Street Journal*, September 21, 2006, pp. A1, C1, and C2).

risk of holding U.S. dollar assets,[33] future uncertainty, and global instability. The system of flexible exchange, the macroeconomic policies, the disturbances lately,[34] and the new Iranian crisis have created an incentive for portfolio diversification, and that the euro will occupy a larger share in an efficiently diversified portfolio. The resulting portfolio shift or capital flows may account for some of the unanticipated appreciation of this new currency and not the EMU fundamentals.

We would like to measure the returns of four investors (American, European, Briton, and Japanese) on assets denominated in four different currencies (dollar, euro, pound, and yen). The nominal short-term interest rate for a foreign investor must be as follows (with ex post calculation), depending whether the currency is at a forward discount or at a forward premium:

$$i^*_{S-T_t} = i_{S-T_t} + fp^e_t \quad (1)$$

or $$i^*_{S-T_t} = i_{S-T_t} - fd^e_t \quad (2)$$

For a domestic investor, the same rate of interest is decomposed:

$$i_{S-T_t} = r_t + \pi_t \quad (3)$$

These equations can be expanded as,

$$i^*_{S-T_t} = i_{S-T_t} + (f_t - s_t) \quad (1')$$

or $$i^*_{S-T_t} = i_{S-T_t} - (f_t - s_t) \quad (2')$$

and $$i_{S-T_t} = r_t + (p_t - p_{t-1}) \quad (3')$$

By lagging interest rates and exchange rates one period (avoiding their forecasting), we have an ex post measure of the nominal rate of return of an asset,

$$i^*_{S-T_{t-1}} = i_{S-T\,t-1} + (s_t - s_{t-1}) \quad (4)$$

or $$i^*_{S-T_{t-1}} = i_{S-T\,t-1} - (s_t - s_{t-1}) \quad (5)$$

and $$i_{S-T_{t-1}} = r_{t-1} + (p_{t-1} - p_{t-2}) \quad (6)$$

where, i_{S-T}=the nominal short-term interest rate (return), r= the real rate of interest, □=the inflation rate, fd=the forward discount of the currency, fp=the forward premium, p=the ln of

[33] Some "news" were: "Syrians' funds will freeze in the U.S. banks". (TV News, March 6, 2005). "Dollar declined as Bank of Korea plans to diversify currency reserves." (Bloomberg.com, February 22, 2005).

[34] The U.S. Treasury reported the federal deficit hit a monthly record of $113.94 billion in February of 2005. Greenspan told the Council on Foreign Relations deficits pose a bigger risk to the U.S. than trade imbalances or low savings. (*The Wall Street Journal*, March 11, 2005, p. A1).

price index, s=the ln of spot exchange rate, f=the ln of forward exchange rate, "^{e}" the expected value of the variable, and an asterisk denotes the foreign country.

Now, we take the utility function of an investor who wants to maximize his end-of-period real wealth (w) by investing on home (i_{US}^{A}, i_{EU}^{E}, i_{UK}^{B}, i_{J}^{J})[35] and foreign ($i_{US}^{I^*}$, $i_{EU}^{I^*}$, $i_{UK}^{I^*}$, $i_{J}^{I^*}$)[36] securities and to determine the optimal portfolio share of domestic and foreign securities (x_{US}^{I}, x_{EU}^{I}, x_{UK}^{I}, x_{J}^{I}).

$$\text{Max } U = u(\overline{w}, \sigma_{\overline{w}}^{2}) \tag{7}$$

where, U=the utility function, $\overline{w}$=the mean of the end-of-period random wealth, and $\sigma_{\overline{w}}^{2}$=the variance of wealth, x=the optimal portfolio share (weights) on domestic and foreign securities (denominated in different foreign currencies), and I=investors (A, E, B, and J) investing in each one of these four countries (j=U.S., Euro-zone, Britain, and Japan).

The solution of eq. (7) will be to construct four different portfolio of four different assets (i_{US}^{I}, i_{EU}^{I}, i_{UK}^{I}, i_{J}^{I}) for four different investors (I: A=American, E=European, B=Briton, and J=Japanese), which will maximize their returns, $E(R_P)$, and minimize their risks, $\sigma_{R_p}^{2}$. Also, the calculation of the return to variability ratios (RVR) of these sixteen (4x4) investment opportunities can be measured, eq. (8), and invest in countries where the RVR is maximized. If investors would choose to invest in country j, due to high return and low risk, the high demand for this country's assets would increase the demand for its currency and the currency will appreciate.

$$\text{Max} \quad RVR = \frac{i_j^I}{\sigma_{i_j^I}} \tag{8}$$

where, RVR=return to variability ratio, i_j^I=nominal return of asset j (in U.S., EU, U.K., and Japan) for investor I (American, European, Briton, and Japanese), and $\sigma_{i_j^I}$=the standard deviation of the nominal return of asset j for investor I.

The first step in evaluating the strength of any relationship between rate of return and exchange rates is to look for visual evidence. Plotting the levels of the rate of return against exchange rate levels reveals no obvious patterns. However, a fairly clear relationship emerges when looking at changes in the two variables. Knowing the change of the rate of return of a country would have allowed someone to guess correctly only the L-T direction of the U.S. dollar, the euro, the pound, and the yen. Tests show that movements of rate of return and its risk in one country anticipate how speculators change their demand and supply of assets denominated in this specific currency. The nature of exchange rate dynamics could argue about the contemporaneous relationship between return/risk and exchange rates and their future trends.

Furthermore, currency market participants are heterogeneous and act on their own bits of private information, as well as on public information.[37] Examples of private information include participants' expectations of future economic variables, perceptions of public policy, perceptions

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[35] The variables i_j^I can be calculated by using eqs. (3') and (6).

[36] The variables $i_j^{I^*}$ are calculated from eqs. (4) and (5).

[37] See, Evans and Lyons (2002).

of official and private sector demand, and perceptions of developing shifts in global liquidity and risk taking. Speculators act immediately in advance of exchange rate movements in a way that anticipates the direction of exchange rates and the rate of return.

Our objective is to seek data to help us understand what is driving the exchange rate at any given time. Variables that are viewed as fundamental to dictating currency values (relative money supply, output, inflation rates, interest rate differentials, etc.) are constantly analyzed and forecast. Various transaction data are also examined to determine demand changes in different currencies. The results suggest that expected rate of return and risk in different countries merit inclusion in policy analysis and in ongoing research on exchange rate trend, its dynamics, and its determination. A long-term trend of the interest rate (i_j^I) can be derived by using the Hodrick-Prescott (HP) filter[38] (smoothed series, jII), which is presented in eq. (9) below. Then, the exchange rate trend will follow the L-T trend of the rate of return.

The HP filter chooses jII to minimize:

$$\sum_{t=1}^{T}(i_{j_t}^{I} - jII_t)^2 + \lambda\sum_{t=2}^{T-1}[(jII_{t+1} - jII_t) - (jII_t - jII_{t-1})]^2 \qquad (9)$$

The penalty parameter λ controls the smoothness of the series jII. The larger the λ, the smoother the jII. As $\lambda \to \infty$, jII approaches a linear trend. And jII (j country's return for an investor from country I) = USIA, USIE, USIB, USIJ; EUIE, etc.

3. Empirical Results

So far, we have discussed the theoretical part of the rate of return and the risk of an asset denominated in different currencies. The current ex post analysis will measure the rate of return of a portfolio of four assets (U.S. T-bills, EU, U.K., and Japanese ones) in four currencies (dollar, euro, pound, and yen) and four investors (American, European, Briton, and Japanese) by considering the risk of the individual assets return, due to unanticipated exchange rate movements and other socio-economic fundamentals. The data, taken from economagic.com and imfstatistics.org, are monthly from 1999:01 to 2005:12. They comprise spot exchange rate, money supply (M2), consumer price index (CPI), federal funds rate, 3-month T-bill rate, prime rate, government bonds rate, real GDP, real risk-free rate of interest, risk premium (i_{GB}-i_{3MTB}), current account, unemployment rate, budget deficit, national debt, personal saving rate, price of gold, price of oil, and stock market index (DJIA) for these four countries.

Table 1 presents the six exchange rates [USEUS ($/euro), USUKS ($/pound), USJS ($/yen), UKEUS (pound/euro), JEUS (yen/euro), and UKJS (pound/yen)]. The sample is divided into two sub-periods, from 1999:01-2001:12 (before the introduction of the euro-notes) and from 2002:01-2005:12 (after the circulation of the euro-notes). Also, the sixteen rate of returns are calculated by taking into consideration the forward discount (fd) or premium (fp) of the currencies. The return for an American investor investing in EU was -3.76% and for a European investing in U.S. was 13.67%. The highest return was in the U.S., followed by U.K., Japan, and lastly the Euro-zone. During this period the dollar was at a premium; the pound at a discount with respect the dollar and the yen, and at a premium toward the euro; the euro was at a discount towards all the other currencies; the Japanese yen was at a discount with respect the dollar and at

[38] See, Hodrick-Prescott (1997).

a premium with respect the euro and pound. After 2002, the highest return was in Euro-zone, following by U.K. and Japan. The worst return was in the U.S. (-6.12% for a European investing in the U.S.). The dollar was at a discount with respect all the other currencies; it was followed by the yen and the pound. The euro was at a premium with all the currencies.

Table 2 supplies a Granger causality test between the macro-variables (fundamentals) and the exchange rates. Between 1999 and 2001, the variables that caused changes in exchange rate in the U.S. were, inflation, real income growth, and real risk free rate of interest. In the EU, there were no variables causing the $/euro or the pound/euro exchange rates, only the yen/euro rate was caused by money growth, overnight rate, lending rate, risk premium, and unemployment. In the U.K., the T-bill rate and the risk premium were causing the $/pound rate; and the money growth and the current account were causing the pound/yen rate, but no variable was causing the pound/euro rate. In Japan, the risk premium and the current account were causing the $/yen rate; the risk premium, the current account, and the government bond were causing the yen/euro rate; the money supply, the risk free rate of interest, the government bond rate, the risk premium, and the current account are causing the pound/yen exchange rate. After 2002, in the U.S. there was no variable causing the $/euro exchange rate; it was the personal saving rate and the price of gold, which caused the $/pound rate; and the price of gold that caused the $/yen rate. In EU, no variable had caused the $/euro and the pound/euro exchange rates; only the lending rate caused the yen/euro rate. In the U.K., the T-bill, the government bond rate, the risk premium, and the price of gold caused the $/pound rate; also, the risk premium caused the pound/euro rate, but there was no variable to cause the pound/yen rate. In Japan, it was only the real GDP growth that caused the $/yen exchange rate and nothing else shown any causality for yen/euro or pound/yen exchange rates.

Table 3a gives the average return, standard deviation (risk) of the return, and the return to variability ratio. The highest return for this period was for $i_{UK}^{J} = 5.953\%$ and the lowest for $i_{J}^{B} = 0.515\%$. The lowest risk is for a Japanese investor investing in Japanese T-bills ($\sigma_{i_J^J} = \pm 0.159$), the highest risk was for the European investor investing in Japan ($\sigma_{i_J^E} = \pm 31.701$). The return to variability ratio ranks, first $i_{J}^{J} = 11.969$, second $i_{UK}^{B} = 6.095$, third $i_{US}^{A} = 1.731$, and lastly $i_{EU}^{E} = 1.692$.

Table 3b presents the returns, risk, and the return to variability ratios from 1999:01 to 2001:12. The highest return during this period was in the U.S. by a European investor ($i_{US}^{E} = 13.683\%$) and the lowest in the EU for an American investor ($i_{EU}^{A} = -3.764\%$). The risk was smaller in Japan for a Japanese investor ($\sigma_{i_J^J} = 0.093$) and worst in Japan for a European investor ($\sigma_{i_J^E} = 41.000$). The return to variability ratio ranks first Japan for investors (22.151%), second U.K. for Briton investors (8.995%), third U.S. for American investors, and lastly EU for European investors. The best country for foreign investors is the U.S., it is followed by U.K., Japan, and lastly the Euro-zone. This might be the reason that the U.S. dollar was appreciated during that period and the euro was losing value.

Table 3c reveals the return, risk, and return to variability ratio for these investments from 2002:01 to 2005:12. During this period, the highest ratio was for Japanese investors investing in Japan. It follows by Britons investing in the U.K., then Europeans investing in the Euro-zone, and the worst Americans investing in the U.S. For foreigners, the highest return to variability ratios were in EU, following by the U.K., Japan, and the worst in the U.S. Then, the low return in the U.S. for Americans and the negative ones for Europeans, Britons, and Japanese made the

U.S. assets the least attractive and the U.S. dollar declined, due to its low demand by domestic and foreign investors.

Lastly, we did a smooth estimate of the long-term trend of the rate of return in the four different countries by using the Hodrick-Prescott Filter of eq. (9). The results are presented graphically in Figure 1. The first graph shows that the trend for the U.S. assets is positive and increasing. Then, investors will invest in the U.S. and the dollar will appreciate. The second graph points that the trend for foreign investors in EU is becoming negative and the euro will depreciate. The third one gives positive trend for Europeans, Japanese, and Britons investing in U.K. assets, but negative for Americans investing there. Then, the results for the pound are mixed. The last graph displays flat slopes for Europeans, Britons, and Japanese investing in Japan and negative slopes for Americans investing in that country. Then, the Japanese yen is not expected to appreciate.

Since the introduction of the euro, the correlation coefficients are very high for the following rates: $\rho_{\$/euro,\$/pound} = +0.972$, $\rho_{pound/euro,\,yen/euro} = +0.911$, and $\rho_{pound/yen,\,yen/euro} = -0.949$. On the other hand, the correlation coefficients are very small for the following exchange rates: $\rho_{pound/euro,\$/yen} = +0.248$, $\rho_{yen/euro,\$/yen} = +0.052$, and $\rho_{\$/yen,\,pound/yen} = +0.146$. Then, when the U.S. dollar is depreciated, the euro and pound are appreciated; and when the euro is appreciated, the pound and yen are depreciated. Lastly, when the yen is appreciated, the pound and the euro are depreciated.

4. Policy Implications of Currencies deviated from their Fundamentals

Even though that the U.S. dollar has depreciated drastically since 2001 (i.e., -52.66% with respect to euro),[39] the current account deficits have assumed extraordinary proportions.[40] A current account deficit is matched by a capital account surplus. In other words, a country with a current account deficit surrenders claims on future income (physical assets, stocks, and bonds) to foreigners. The ongoing U.S. current account deficit translates into an average of billions dollars in net capital imports per business day. That is, foreign investors have been accumulating U.S. assets at an unusually high rate. Foreign investors might become wary of holding increasingly larger portions of their wealth in U.S. assets. In order to promote continued investment in the United States, U.S. assets would then have to become more attractive. One way of attracting foreign investments is to lower the price of the asset in foreign currency terms. A decline in the foreign exchange value (depreciation) of the dollar would do just that. Therefore, a large current account deficit might be expected to depress the value of the dollar over time.

A reasonable question arises now; but, what about the persistent current account deficit? Indispensably, trade policies must improve it and citizens must make their demands for imports more elastic $(|\varepsilon_M| > 1)$ for their own good (personal interest) and their country's benefits. The following identity holds for an economy,

$$Y - E = T - G + S - I = X - M \tag{10}$$

[39] See, Kallianiotis (2006b, Table 2).

[40] Trade deficit in U.S. widened to a record in 2005 reaching $726 billion, even though that the U.S. dollar was depreciated. (Bloomberg.com, 2/10/2006). In 2006, from January to July, the trade deficit was $453 billion, $55 billion more comparing with the same period in 2005. (Cencus.gov, 9/22/2006).

where, Y=income (GDP), E=expenditures, T=taxes, G=government spending, S=saving, I=investment, X=exports, and M=imports.

If (X-M<0) in the above eq. (10), a devaluation might improve this current account deficit. But, a necessary and sufficient condition (Marshall-Lerner) must hold,

$$|\varepsilon_M| + |\varepsilon_{M^*}| > 1 \tag{11}$$

where, ε_M =the domestic price elasticity of the demand for imports and ε_{M^*} =the foreign price elasticity of demand for their imports.

Then, the process could be as follows (if Marshall-Lerner condition holds):

$$CAD \uparrow \Rightarrow (KAS) \uparrow \Rightarrow EX\ S_{assets} \Rightarrow P_{assets} \downarrow and\ (i_{assets} \uparrow) \Rightarrow to\ promote\ sales\ (S) \uparrow (\$ \downarrow) \Rightarrow CAD \downarrow$$

where, CAD=current account deficit and KAS=capital account surplus.

The current account and capital account are two sides of the same coin. A country that is running a current account deficit $(M_{Goods} > X_{Goods})$ is necessarily also running a capital account surplus $(X_{Financial\ Assets} > M_{Financial\ Assets})$. Foreign-owned assets in the United States increased from less than $2.5 trillion in 1990 to over $10 trillion by the end of 2003. Today, they must be in the area of $12 trillion, due to widened trade deficits.[41] Over the same period, U.S.-owned assets abroad increased from $2.3 trillion to nearly $7.9 trillion.[42]

Even though that the return was lower in the U.S., investors invest here, because of the unparalleled efficiency, stability, transparency, certainty, and liquidity of the U.S. financial markets. Investors find that dollar-denominated claims are an attractive element of any international portfolio. This process of investors seeking the most beneficial combination of risk and return, rebalancing portfolio when opportunities arise, gives rise to a source of capital account dynamics that is unrelated in any direct way to the pattern of trade in goods and services. Figure 1 shows a smoothing of the series (the four returns in U.S., in Euro-zone, in U.K., and Japan that domestic and foreign investors face) by using the Hodrick-Prescott (1997) filter to obtain a smooth estimate of the long-term components of the series (i_j^I's). The graphs reveal that the L-T returns are increasing for all investors investing in the U.S. financial assets. Then, this excess demand for U.S. assets, due to high returns and the tremendous current account deficit in the U.S. will appreciate the U.S. dollar, relative to the other three currencies.[43]

5. Concluding Remarks

The objective of this ex post analysis is to determine the exchange rates (their L-T trend) for four different countries (U.S., Euro-zone, England, and Japan). Since 2003:01, the U.S. dollar is losing value with respect the euro and other major currencies of the world and we want to see

[41] See, www.bloomberg.com, 2/10/2006.

[42] See, Pakko (2004).

[43] The recent exchange rate confirms these predictions; the spot rate fell to S = 1.1877 $/euro on February 16, 2006. (Bloomberg.com, 2/16/2006). But, the Israeli invasion in Lebanon (Summer 2006) with its tremendous destruction of that country and the thousands of war refugees imposed on Cyprus, a plan since 1902, according to historians, and the current Iranian crisis changed the predicted results, due to this growing global instability.

if this depreciation depends on economic fundamentals (lower return in the U.S. and higher risk and on the other macroeconomic variables) or it is just speculation from individuals and countries, which hold large amounts of foreign assets denominated in different currencies or due to the current global instability. The preliminary conclusion from this ex post analysis is, here, that, international investors are investing in countries with higher return and lower risk (exchange rate risk and political risk). This increase in demand for these assets increases the demand for currency in that country and its currency is appreciated. Before 2001, people were invested in the U.S. and Japan, so the U.S. dollar and the Japanese yen were appreciated. After 2001, they invested in Euro-zone and the U.K. and the dollar and yen lost their value. The exchange rate data confirm this relationship between the smooth estimates of the rate of return and currency values. Of course, due to high risk (wars and creeping ones and political conflicts) and low returns many speculators have invested in euros and other currencies, instead in dollars denominated assets. Historically, the American government has frozen the foreign assets inside the U.S. when a conflict arises. The L-T smoothing of these returns shows that they are growing in the U.S and in England, and are declining for Americans investing in the other three countries and for other international investors, so the demand for U.S. investment will increase and the U.S. dollar is expected to appreciate in the future. Investors know what is going on globally and act accordingly, so speculators take advantage of this knowledge. Already, the current data show this trend; the dollar from S = 1.3646 $/euro (12/30/2004) had reached S = 1.1877 $/euro (2/16/2006).[44] Now, with the new Iranian crisis (global instability) the dollar started losing value.

Finally, by constructing a portfolio of different assets, we can maximize the utility function of a speculator by maximizing his return and minimizing his risk. From these returns and risk or the return to variability ratio (RVR), we can conclude if the currency will appreciate or not. High expected return on assets denominated in dollar means that dollar is expected to appreciate. The empirical results are supporting this argument before the 2001 and after. But, the preliminary tests show that economic fundamentals have less effect on exchange rates, lately; then, exchange rates depend mostly on speculation, due to the expected risk (uncertainty) and return. The paper needs some more data and an ex ante analysis (forecasting) of the returns and risks for all the major countries involved in the global trade (or an exchange rate index of the dollar with respect the major currencies) and more statistical and portfolio analysis to give better results for the future trends of the currencies, especially the two major ones, euro and dollar.

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[44] See, bloomberg.com.

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Table 1
Spot Exchange Rates, Rates of Return, Natural Logarithms, and Forward Discounts or Premiums

	(1999:01-2005:12)						(1999:01-2001:12)						(2002:01-2005:12)					
	$\bar{S}$	σ_S	$\bar{s}$	σ_s	fd (+)	σ_{fd}	$\bar{S}$	σ_S	$\bar{s}$	σ_s	fp (-)	σ_{fp}	$\bar{S}$	σ_S	$\bar{s}$	σ_s	fd (+)	σ_{fd}
USEUS	1.069	0.15	0.06	0.14	0.52	30.00	0.956	0.08	-0.05	0.08	-9.01	30.34	1.146	0.13	0.13	0.12	7.06	28.22
USUKS	1.628	0.15	0.48	0.09	0.78	22.05	1.521	0.08	0.42	0.05	-4.63	19.70	1.701	0.14	0.53	0.09	4.49	22.98
USJS	0.009	0.01	-4.74	0.07	-0.48	27.27	0.009	0.01	-4.74	0.06	-4.08	30.47	0.009	0.01	-4.74	0.07	1.98	24.86
UKEUS	0.654	0.03	-0.43	0.05	-0.26	18.58	0.628	0.02	-0.47	0.04	-4.38	20.90	0.672	0.03	-0.40	0.04	2.57	16.43
JEUS	122.05	13.99	4.80	0.12	1.00	30.94	109.28	10.55	4.69	0.09	-4.94	40.99	130.82	8.04	4.87	0.06	5.07	21.05
UKJS	0.005	0.01	-5.22	0.07	-1.26	26.89	0.006	0.01	-5.16	0.06	0.56	33.89	0.005	0.01	-5.27	0.03	-2.51	21.09

	(1999:01-2005:12)				(1999:01-2001:12)				(2002:01-2005:12)			
	$\bar{i}_j^I$	$\sigma_{i_j^I}$	$f\bar{d}$ or $f\bar{p}$	$\sigma_{fd\ or\ fp}$	$\bar{i}_j^I$	$\sigma_{i_j^I}$	$f\bar{d}$ or $f\bar{p}$	$\sigma_{fd\ or\ fp}$	$\bar{i}_j^I$	$\sigma_{i_j^I}$	$f\bar{d}$ or $f\bar{p}$	$\sigma_{fd\ or\ fp}$
i_{US}^A	3.05	1.76			4.67	1.23			1.69	0.80		
i_{US}^E	2.53	30.59	0.52	30.00	13.67	30.50	-9.01	30.34	-6.12	29.21	7.81	28.99
i_{US}^B	2.27	22.64	0.78	22.05	9.30	19.95	-4.63	19.70	-3.59	23.91	5.29	23.68
i_{US}^j	3.53	27.56	-0.48	27.27	8.75	30.39	-4.08	30.47	-1.05	25.09	2.74	24.86
i_{EU}^E	3.37	1.99			5.25	1.40			1.94	0.87		
i_{EU}^A	3.91	30.00	-0.52	30.00	-3.76	30.24	9.01	30.34	9.75	28.77	-7.81	28.99
i_{EU}^B	2.91	18.85	0.26	18.58	0.87	20.98	4.38	20.90	4.46	17.12	-2.52	17.17
i_{EU}^J	4.12	31.51	-1.00	30.94	0.31	40.80	4.94	40.99	7.01	22.09	-5.07	22.11
i_{UK}^B	4.57	0.75			5.20	0.58			4.09	0.46		
i_{UK}^A	5.30	22.26	-0.78	22.05	0.57	19.59	4.63	19.70	9.37	23.61	-5.29	23.68
i_{UK}^E	5.05	19.08	-0.26	18.58	9.58	20.89	-4.38	20.90	1.56	17.23	2.52	17.17
i_{UK}^J	5.95	27.39	-1.26	26.89	4.64	33.83	0.56	33.89	6.63	21.89	-2.55	21.88
i_J^J	1.90	0.16			2.06	0.09			1.79	0.07		
i_J^A	1.25	27.58	0.48	27.27	-2.02	30.47	4.08	30.47	4.53	24.88	-2.74	24.86
i_J^E	1.00	31.70	1.00	30.94	7.00	41.00	-4.94	40.99	-3.28	22.10	5.07	22.11
i_J^B	0.52	27.45	1.26	26.89	2.62	33.89	-0.56	33.89	-0.76	21.88	2.55	21.88

Note: See, Table 2.
Source: Economic Time Series Page by Eveline Tainer at http://www.economagic.com and hhtp://www.imfstatistics.org.

Table 2
Pairwise Granger Causality Tests (1999:01-2001:12)

$X \Rightarrow \dot{S}$	$\dot{m}$	π	i_{FF}	i_{RF}	i_P	i_{GB}	$\dot{q}$	r^*	RP	LCA	u	LND	psr	L P_{Gold}	L P_{oil}	LDJIA
U.S.																
$\dot{S}$ ($/euro)	0.207	3.460**	0.243	0.093	0.529	0.260	1.364	3.313**	0.033	0.610	0.824	1.659	0.403	2.135	0.113	0.506
$\dot{S}$ ($/pound)	0.601	3.356**	0.832	0.540	1.382	0.026	2.223	2.404	0.596	0.297	0.475	1.704	0.199	1.524	0.820	0.345
$\dot{S}$ ($/yen)	1.784	0.006	1.913	1.861	1.408	0.971	4.764**	0.023	0.815	0.602	0.400	0.812	0.435	0.686	2.185	0.293
EU																
$\dot{S}$ ($/euro)	0.097	2.057	0.314	0.538	0.868	0.101	0.963	0.894	0.334	0.627	0.728	-	-	2.135	0.113	-
$\dot{S}$ (pound/euro)	0.623	1.619	0.926	0.173	1.070	0.107	0.335	1.536	0.644	1.182	1.507	-	-	1.091	1.194	-
$\dot{S}$ (yen/euro)	2.973*	1.140	2.911*	0.516	4.285**	1.248	1.990	1.048	2.993*	0.390	3.652**	-	-	0.256	0.869	-
U.K.																
$\dot{S}$ ($/pound)	0.901	0.782	-	2.569*	-	2.481	1.086	0.530	6.073***	0.279	0.332	-	-	1.524	0.820	-
$\dot{S}$ (pound/euro)	1.179	2.382	-	0.228	-	0.120	1.196	2.353	0.048	0.062	1.925	-	-	1.091	1.194	-
$\dot{S}$ (pound/yen)	2.864*	0.129	-	0.343	-	1.319	1.344	0.154	0.049	4.080**	2.419	-	-	0.004	0.923	-
J																
$\dot{S}$ ($/yen)	1.138	0.491	-	1.504	-	1.914	1.422	0.507	3.099*	3.131*	0.916	-	-	-	-	-
$\dot{S}$ (yen/euro)	2.230	0.961	-	2.076	-	3.251*	1.380	1.018	5.610***	8.011***	0.688	-	-	-	-	-
$\dot{S}$ (pound/yen)	4.121**	0.988	-	2.650*	-	5.978***	1.562	1.062	8.883***	8.301***	0.040	-	-	-	-	-

Table 2 (continued)

Pairwise Granger Causality Tests (2002:01-2005:12)

$X \Rightarrow \dot{S}$	$\dot{m}$	π	i_{FF}	i_{RF}	i_P	i_{GB}	$\dot{q}$	r^*	RP	LCA	u	LND	psr	L P_{Gold}	L P_{oil}	LDJIA
U.S.																
$\dot{S}$ ($/euro)	0.133	0.545	0.483	1.576	0.486	1.098	0.003	0.472	1.403	0.017	1.377	1.165	0.481	1.682	0.466	1.061
$\dot{S}$ ($/pound)	0.431	0.700	0.527	2.392	0.516	1.446	0.591	0.523	2.045	0.557	0.630	0.621	2.651*	3.700**	0.535	0.138
$\dot{S}$ ($/yen)	0.510	0.287	0.451	1.990	0.511	1.366	0.790	0.340	1.148	0.262	1.646	0.160	0.936	2.937*	0.205	0.076
EU																
$\dot{S}$ ($/euro)	0.126	0.016	0.492	0.817	0.211	1.439	0.793	0.179	0.579	0.231	0.398	-	-	0.843	0.467	-
$\dot{S}$ (pound/euro)	0.121	1.318	0.860	0.087	0.068	1.133	0.692	1.632	1.007	0.936	0.314	-	-	0.440	0.487	-
$\dot{S}$ (yen/euro)	1.090	1.008	1.153	0.414	2.731*	0.541	1.290	0.979	0.715	0.965	1.311	-	-	0.798	0.560	-
U.K.																
$\dot{S}$ ($/pound)	2.061	0.392	-	2.514*	-	3.621**	1.182	0.616	3.644**	2.288	0.612	-	-	3.700**	0.535	-
$\dot{S}$ (pound/euro)	0.059	1.510	-	0.427	-	1.616	1.752	1.562	2.440*	0.948	0.579	-	-	0.440	0.487	-
$\dot{S}$ (pound/yen)	1.778	0.764	-	0.894	-	0.035	0.500	0.764	0.321	0.292	0.164	-	-	0.070	0.357	-
J																
$\dot{S}$ ($/yen)	0.075	0.665	-	0.321	-	0.112	2.984*	0.664	0.110	2.201	0.605	-	-	-	-	-
$\dot{S}$ (yen/euro)	0.389	0.161	-	0.158	-	2.143	0.467	0.161	2.123	0.141	1.297	-	-	-	-	-
$\dot{S}$ (pound/yen)	0.096	0.002	-	0.007	-	1.028	0.953	0.002	1.029	0.350	0.046	-	-	-	-	-

Note: USEUS=dollar/euro spot exchange rate ($/euro), USUKS=dollar/pound spot ($/pound), USJS=dollar/yen spot ($/yen), UKEUS=pound/euro spot (pound/euro), JEUS=yen/euro spot rate (yen/euro), UKJS=pound/yen spot exchange rate (pound/yen), $\overline{S}$ =the mean spot rate, $\bar{s}$ =the mean of the ln S, σ_S =the standard deviation, fd=the forward discount, fp=the forward premium, i_{US}^{A} =US interest rate for an American, i_{US}^{E} =US interest rate for a European, i_{US}^{B} =US interest rate for a Briton, i_{US}^{J} =US interest for a Japanese, i_{EU}^{E} =EU interest for a European, i_{EU}^{A} =EU interest for an American, i_{EU}^{B} =EU interest for a Briton, i_{EU}^{J} =EU interest for a Japanese, i_{UK}^{B} =UK interest for a Briton, i_{UK}^{A} =UK interest for an American, i_{UK}^{E} =UK interest for a European, i_{UK}^{J} =UK interest for a Japanese, i_{J}^{J} =Japanese interest for a Japanese investor, i_{J}^{A} =Japanese interest for an American, i_{J}^{E} =Japanese interest for a European, and i_{J}^{B} =Japanese for a Briton; $X \Rightarrow \dot{S}$ = X causes $\dot{S}$, $\dot{S}$ =the growth of the spot exchange rate, Numbers are F-Statistics, *** =significant at the 1% level, **= significant at the 5% level, and *= significant at the 10% level.

Source: See, Table 1.

Table 3a
Investments in U.S., Euro-zone, U.K., and Japanese Assets:
Return, Risk, and Return to Variability Ratio (1999:01-2005:12)

	i_{US}^{A}	i_{US}^{E}	i_{US}^{B}	i_{US}^{J}	i_{EU}^{E}	i_{EU}^{A}	i_{EU}^{B}	i_{EU}^{J}	i_{UK}^{B}	i_{UK}^{A}	i_{UK}^{E}	i_{UK}^{J}	i_{J}^{J}	i_{J}^{A}	i_{J}^{E}	i_{J}^{B}
$\bar{x}$	3.050	2.534	2.274	3.533	3.371	3.912	2.911	4.117	4.565	5.301	5.053	5.953	1.903	1.251	1.004	0.515
σ_x	1.762	30.591	22.638	27.563	1.992	29.997	18.848	31.513	0.749	22.264	19.076	27.388	0.159	27.584	31.701	27.454
$\frac{i_x}{\sigma_x}$	1.731	0.083	0.100	0.128	1.692	0.130	0.154	0.131	6.095	0.238	0.265	0.217	11.969	0.045	0.032	0.019

Table 3b
Investments in U.S., Euro-zone, U.K., and Japanese Assets:
Return, Risk, and Return to Variability Ratio (1999:01-2001:12)

	i_{US}^{A}	i_{US}^{E}	i_{US}^{B}	i_{US}^{J}	i_{EU}^{E}	i_{EU}^{A}	i_{EU}^{B}	i_{EU}^{J}	i_{UK}^{B}	i_{UK}^{A}	i_{UK}^{E}	i_{UK}^{J}	i_{J}^{J}	i_{J}^{A}	i_{J}^{E}	i_{J}^{B}
$\bar{x}$	4.672	13.683	9.304	8.748	5.248	-3.764	0.869	0.312	5.199	0.567	9.578	4.642	2.060	-2.015	6.996	2.617
σ_x	1.231	30.495	19.947	30.385	1.398	30.244	20.982	40.801	0.578	19.593	20.892	33.829	0.093	30.475	41.000	33.893
$\frac{i_x}{\sigma_x}$	3.795	0.449	0.466	0.288	3.754	-0.124	0.041	0.008	8.995	0.029	0.458	0.137	22.151	-0.066	0.171	0.077

Table 3c
Investments in U.S., Euro-zone, U.K., and Japanese Assets:
Return, Risk, and Return to Variability Ratio (2002:01-2005:12)

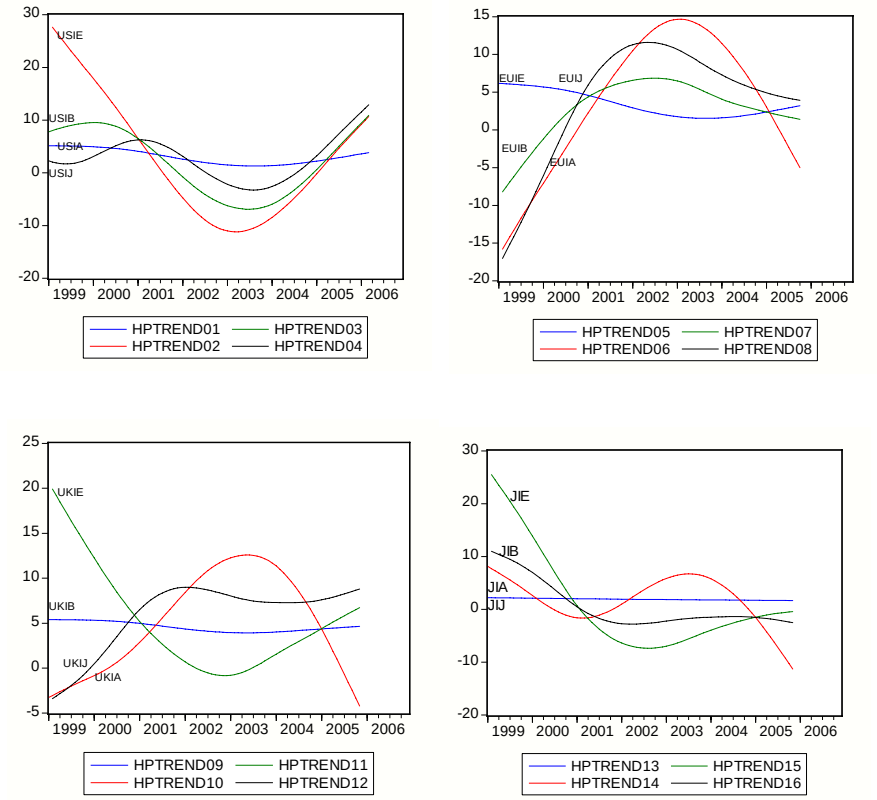
	i_{US}^{A}	i_{US}^{E}	i_{US}^{B}	i_{US}^{J}	i_{EU}^{E}	i_{EU}^{A}	i_{EU}^{B}	i_{EU}^{J}	i_{UK}^{B}	i_{UK}^{A}	i_{UK}^{E}	i_{UK}^{J}	i_{J}^{J}	i_{J}^{A}	i_{J}^{E}	i_{J}^{B}
$\bar{x}$	1.692	-6.117	-3.595	-1.048	1.943	9.752	4.465	7.012	4.086	9.372	1.564	6.633	1.789	4.529	-3.280	-0.758
σ_x	0.797	29.211	23.905	25.089	0.869	28.774	17.124	22.086	0.459	23.610	17.226	21.887	0.068	24.881	22.104	21.878
$\frac{i_x}{\sigma_x}$	2.123	-0.209	-0.150	-0.042	2.236	0.339	0.261	0.317	8.902	0.397	0.091	0.303	26.309	0.182	-0.148	-0.035

Note: See, Tables 1 and 2; $\dot{S}$ = growth of the U.S $/euro exchange rate ($\dot{S} \uparrow \Rightarrow \$ \downarrow$), and $\frac{i_x}{\sigma_x}$ = the return to variability ratio.

Source: See, Table 1.

Figure 1

Smooth Estimate of the L-T Trend of the Rates of Return in the U.S., the Euro-zone, the U.K., and in Japan: (Hodrick-Prescott Filter)



Note: USIA (i_{US}^{A})=the U.S. interest rate (nominal return) for an American investor, USIE(i_{US}^{E})=the U.S. return for a European investor, USIB (i_{US}^{B})=the U.S. return for a Briton investor, and USIJ (i_{US}^{J})=the U.S. return for a Japanese investor, EUIE (i_{EU}^{E})=the Euro-zone interest rate (nominal return) for a European investor, EUIA (i_{EU}^{A})=the Euro-zone return for an American investor, EUIB(i_{EU}^{B})=the Euro-zone return for a Briton investor, and EUIJ (i_{EU}^{J})=the U.S. return for a Japanese investor, UKIB (i_{UK}^{B})=the U.K. interest rate (nominal return) for a Briton investor, UKIA (i_{UK}^{A})=the U.K. return for an American investor, UKIE (i_{UK}^{E})=the U.K. return for a European investor, and UKIJ (i_{UK}^{J})=the U.K. return for a Japanese investor, JIJ (i_{J}^{J})=the Japanese interest rate (nominal return) for a Japanese investor, JIA (i_{J}^{A})=the Japanese return for an

American investor, JIE (i_J^E)=the Japanese return for a European investor, and JIB (i_J^B)=the Japanese return for a Briton investor, HPTREND=the Hodrick-Prescott filter, which shows a smooth estimate of the long-term trend of the interest rate.
Source: Economic Time Series Page by Eveline Tainer at http://www.economagic.com and hhtp://www.imfstatistics.org, and Kallianiotis (2006a).