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A Stocks, Bonds, Consumers Leading Index (SBCLI)

By

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Abstract

Real, total consumption growth deviations from normal stock market wealth effects lead economic growth in advanced economies in the Americas, in Europe and in AustralAsia, as shown by Breeden (2012). Consumers' expenditures reflect their information about employment opportunities and future real wage growth, as well as information about the volatility of future investment returns. Previous research has shown that stock prices and the slope of the term structure of interest rates reflect forecasted economic growth and profits. In this applied article, we put together the readings of stock market investors, bond market investors and issuers, and consumers (each rated by their Z-scores measuring standardized movements) in a simple, economically intuitive and powerful leading index of economic growth. It is shown that consumption deviations improve upon the signals given by the term structure and stock returns, and the combined readings of the "Stocks, Bonds and Consumers Leading Index" (SBCLI) developed here are quite competitive with more complex widely used indexes of leading economic indicators published by the Conference Board and the OECD.

I. Introduction

Forecasting economic growth is crucial to consumers, investors and governments, as many plans are better made if they are well-adapted to the likely future environment. Indeed, the need for understanding the likely economic environment is so widespread and includes so many who are not economic experts that there is virtue in a simple, intuitive, yet economically strong model that can be communicated to a broad audience. Researchers on decision making have shown that individuals have great difficulty in making good decisions and forecasts with large numbers of factors to consider, as in the Conference Board's Index of 10-11 Leading Economic Indicators (LEI) and in Hatzius, et. al.'s (2010) recent "Financial Conditions Index" of 43 financial and economic variables. Those difficulties of decision making are greatly compounded when some factors have positive influences on the prediction and some have negative influences.

Simon (1978) has argued that attention is the scarce cognitive resource in decision making. Consequently, understanding what drives selective attention in decision-making is one of the most critical tasks for a researcher. Slovic, et. al. (2002) have shown that "the weight of a stimulus attribute in an evaluative judgment or choice is proportional to the ease or precision with which the value of that attribute (or a comparison of that attribute across alternatives) can be mapped onto an affective impression." More specifically, information will receive weight as an increasing function of the affective ease of processing that information. Cox and Payne (2005) use this insight in their proposals for mutual fund disclosures.

This paper builds on the results of Breeden (2012), which showed that three key variables were able to forecast key macro variables' movements in the next 6 months or 2 quarters nearly as well as (and often better than) the venerable indexes of leading economic indicators by the Conference Board and by the OECD. The three variables are (1) the stock market's real return, (2) the bond market's slope of the term structure of interest rates, and (3) consumers' real expenditure growth deviations from those predicted by stock market moves, $c^{\perp}$ or "c-perp." Each of these variables has quite substantial economic reason to be informative. For the first key factor, it is well known (see Fama 1981) that stock prices are forward-looking, in that they reflect forecasted earnings, which are positively related to forecasted economic growth. For the second

factor, Breeden (1986) demonstrated that the term structure of interest rates should reflect the term structures of forecasted consumption growth and its volatility, as well as the term structure of forecasted inflation. Harvey's empirical tests of this theory (1988, 1989, 1991) showed that the slope of the term structure leads changes in economic growth, both in the U.S. and globally. Steeper slopes portend increasing growth, and downward sloping term structures portend declining growth or even recession, holding the term structures of volatility and inflation constant.

The reasoning for consumption deviations goes back to the early multiperiod and continuous time works of Merton (1969, 1971, 1973), Fama (1970), Hakansson (1970) and Breeden (1979, 1984). These authors modeled consumption as a function of wealth and the vector of state variables which represent investment and job opportunities. Breeden (1984) proved that if relative risk aversion was greater than with log utility, as is widely believed, optimal consumption will be increasing in the value of the opportunity set, as measured by compensation variations in wealth required for changes in the state vector for opportunities in Merton's continuous-time model. Holding wealth constant, higher consumption was shown to indicate a better opportunity set. This was confirmed in the statistical analysis of Breeden (2012).

This paper seeks to develop a simple index for each country, a "Stocks/Bonds/Consumers Leading Index (SBCLI), with readings from approximately -10 to +10 in the past 50 years that predict below trend (SBCLI<0) or above trend growth (SBCLI>0). It is shown that the subsequent real growth of GDP and of industrial production are highly correlated with current values of the index. Also, the index successfully forecasts changes in the unemployment rate and job growth in all of the major economies examined. All three key variables are statistically significant in multiple regressions and out-of-sample simulations and have a combined explanatory power that rivals the Conference Board's (and OECD's) venerable Index(es) of Leading Economic Indicators (LEI). All three variables are well-grounded in economic theory and intuition and quite understandable to many. All three have positive, monotonic relationships to future economic growth. Presumably, with greater understanding of this index and less of being a seeming "black box," consumers and other decision makers might make better coordinated economic decisions.

As would be expected if this is a good index, our SBCLI is highly correlated with the Conference Board's Index of Leading Economic Indicators, which has 10 economic variables measured with continuous distributions. The LEI has had enormous sums of money and talent used in its development over the past 50 years or so and it is relatively good at forecasting short-term economic growth. The stock market return has been in the LEI since its inception and the slope of the term structure has been included since 1996, after Harvey's research demonstrated its usefulness. Of course, consumption expenditures are also correlated with the other variables in the LEI. Just as Lettau and Ludvigson (2001b) found *cay* to be a very useful "scaling variable" for modeling conditional variation in stock risks and returns in their tests of the CCAPM, this stocks, bonds and consumers leading index might also be useful as a scaling variable.

II. C-perp: Real Consumption Growth Deviations from Stock Market Wealth Effects

In this section, we examine macroeconomic data for large, advanced economies in the Americas, Europe and AustralAsia, drawn primarily from the Organization for Economic Cooperation and Development (OECD) website, as well as from the International Monetary Fund's International Financial Statistics (IFS) database. Global Insight and DataStream were also helpful in finding some of the data. Data for 13 advanced economies are represented in three composites for these mega-economies: (1, 2) USA and Canada are the trillion dollar advanced economies in the Americas; (3-7) Germany, France, United Kingdom, Italy and Spain are the 5 trillion dollar advanced economies in Europe; and (8-13), Japan, Australia (1970 on) and South Korea, Hong Kong, Singapore and Taiwan (all 1990 onward) make up the AustralAsia composite. Each of these economies has $1 trillion of GDP in US dollars in 2012, with Hong Kong, Singapore and Taiwan combined to get one trillion dollar economy. The GDP weights in 1970, 1990 and 20120 for the three global mega-economy composites are given in Figure 1:

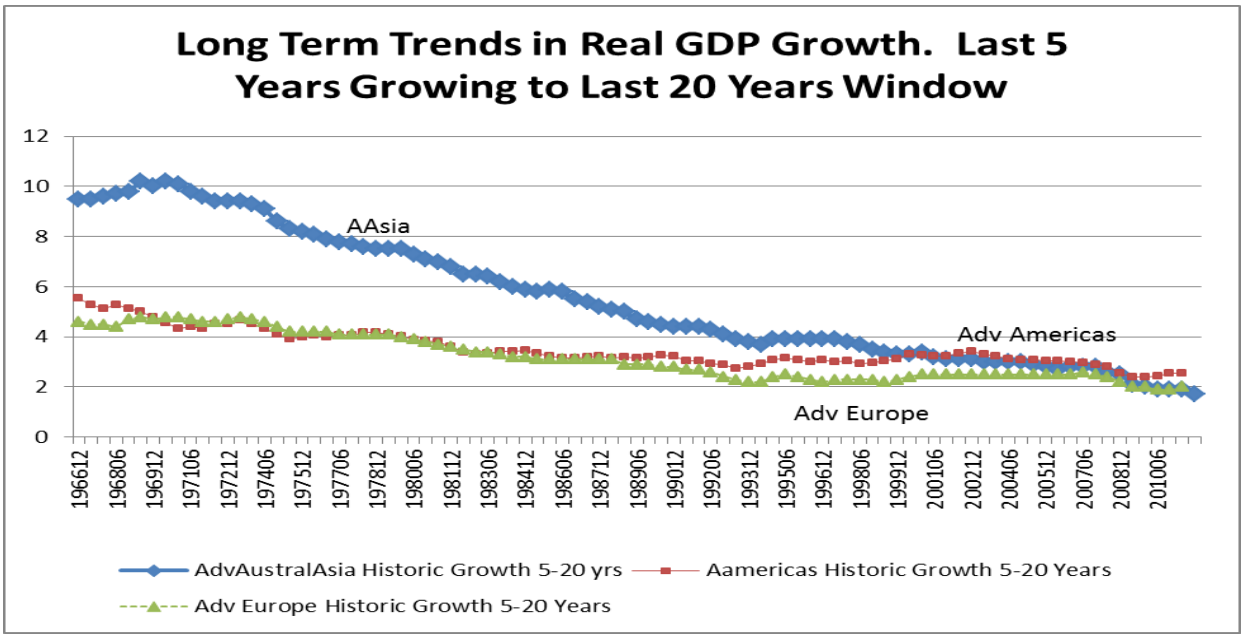
Figure 1

3 Global Mega-Economy Composites: Percentage Weights
Trillion Dollar Economies (TDEs) with GDP/Capita>$US 10,000

	1970	1990	2010
Advanced America TDEs	100.0%	100.0%	100.0%
United States	90.3	89.8	90.0
Canada	9.7	10.2	10.0
Advanced Europe TDEs	100.0%	100.0%	100.0%
United Kingdom	47.3	20.8	22.4
Germany	18.5	27.2	28.2
France	14.8	22.1	21.1
Italy	11.6	19.9	16.9
Spain	7.9	9.9	11.3
Advanced AustralAsia TDEs	100.0%	100.0%	100.0%
Japan	90.4	77.7	63.6
Australia (added 1970)	9.6	8.2	14.4
South Korea (added 1990)	0.0	7.0	11.8
Hong Kong, Singapore, Taiwan (1990)	0.0	7.1	10.2

The historic growth rate trends for real GDP have diminished substantially as they developed over the past 50 years in the advanced Americas, Europe and AustralAsia, as shown in Figure 2:

Figure 2



Breeden's (2012) consumption deviation variable, c-perp, for each global mega-economy is the residual from the following regressions of 2-quarter, annualized real consumption growth on the real GDP growth historic time trend and the contemporaneous real stock return and two lags of the stock return. Figure 3 has the results from non-overlapping data for the last approximately 50 years: (Note that key macro data for Europe was not available for the first year, and also note that the AustralAsia regressions were ended in 2010, due to the earthquake, tsunami and nuclear meltdown in Japan in March 2011.)

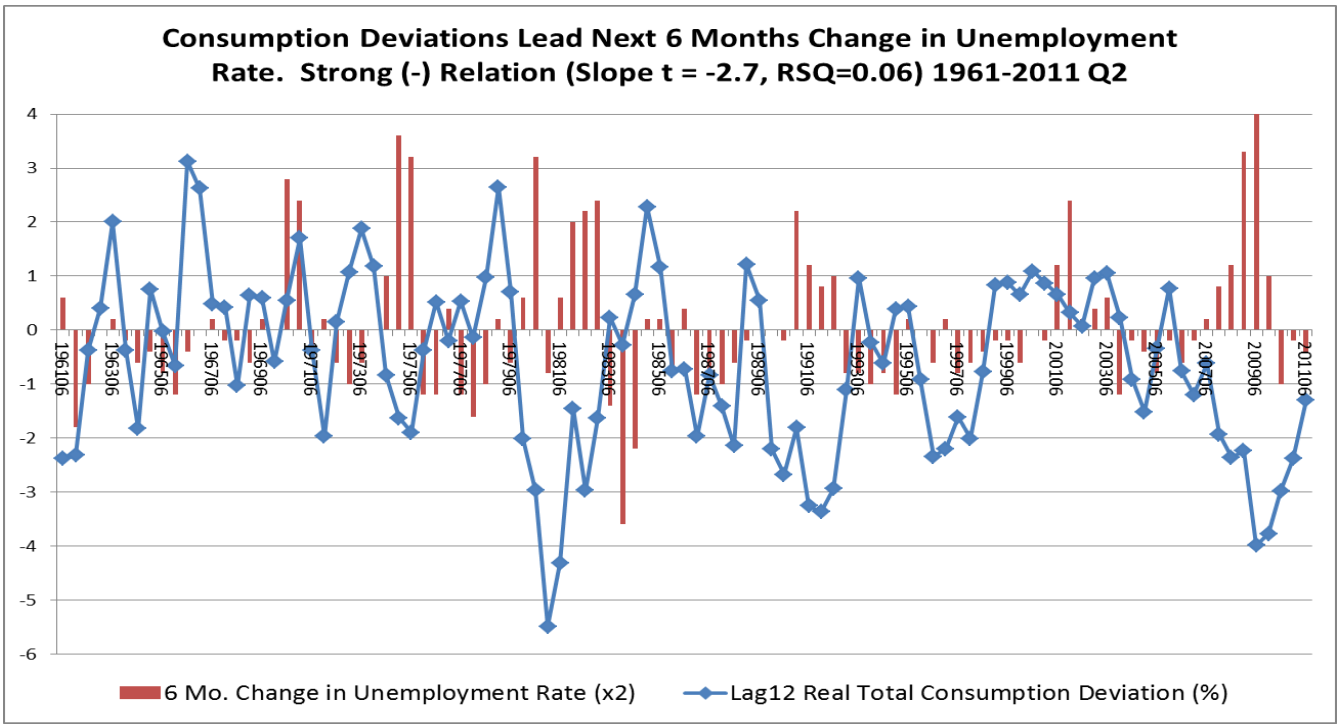
Figure 3

3 Mega-Economies: Removing the Wealth Effect from Consumption:
Real Consumption Growth Predicted by Stock Returns
2 Quarter Changes (Q2-Q4-Q2). 50 Years: 1961 – Q2/2011

Dependent Var Real Total Consumption Growth (2Q%, Annlzd)	Real Stock Return 2Q% Current	Real Stock Return 2Q% Lag1	Real Stock Return 2Q% Lag 2	20 Yr Historic Trend Growth Rl GDP	Const	**Corr RSQ**
Advancd Americas	**0.093**	**0.058**	**0.041**	**0.87**	**-0.29**	**0.39**
1961Q2-2011Q2	**t=5.4**	**t=3.3**	**t=2.4**	**t=4.6**	**t= -0.4**	**N=101**
Advanced Europe	**0.035**	**0.032**	**0.017**	**1.15**	**-1.15**	**0.41**
1962Q2-2011Q2	**t=3.0**	**t=2.7**	**t=1.4**	**t=7.9**	**t= -2.2**	**N=97**
Advanced AusAsia	**0.051**	**0.025**	**0.022**	**0.83**	**-0.93**	**0.46**
1961Q2-2010Q4	**t=2.6**	**t=1.3**	**t=1.1**	**t=8.5**	**t= -1.5**	**N=100**

Figure 4 plots the consumption deviation variable for the USA versus the change in the unemployment rate in the following 6 months and shows visually that positive consumption deviations lead drops in the unemployment rate, and negative ones lead increases in the unemployment rate. With a t-statistic of -2.7 in this simple relationship, we see that consumers do appear to have significant information about the job market to use in their spending decisions.

Figure 4



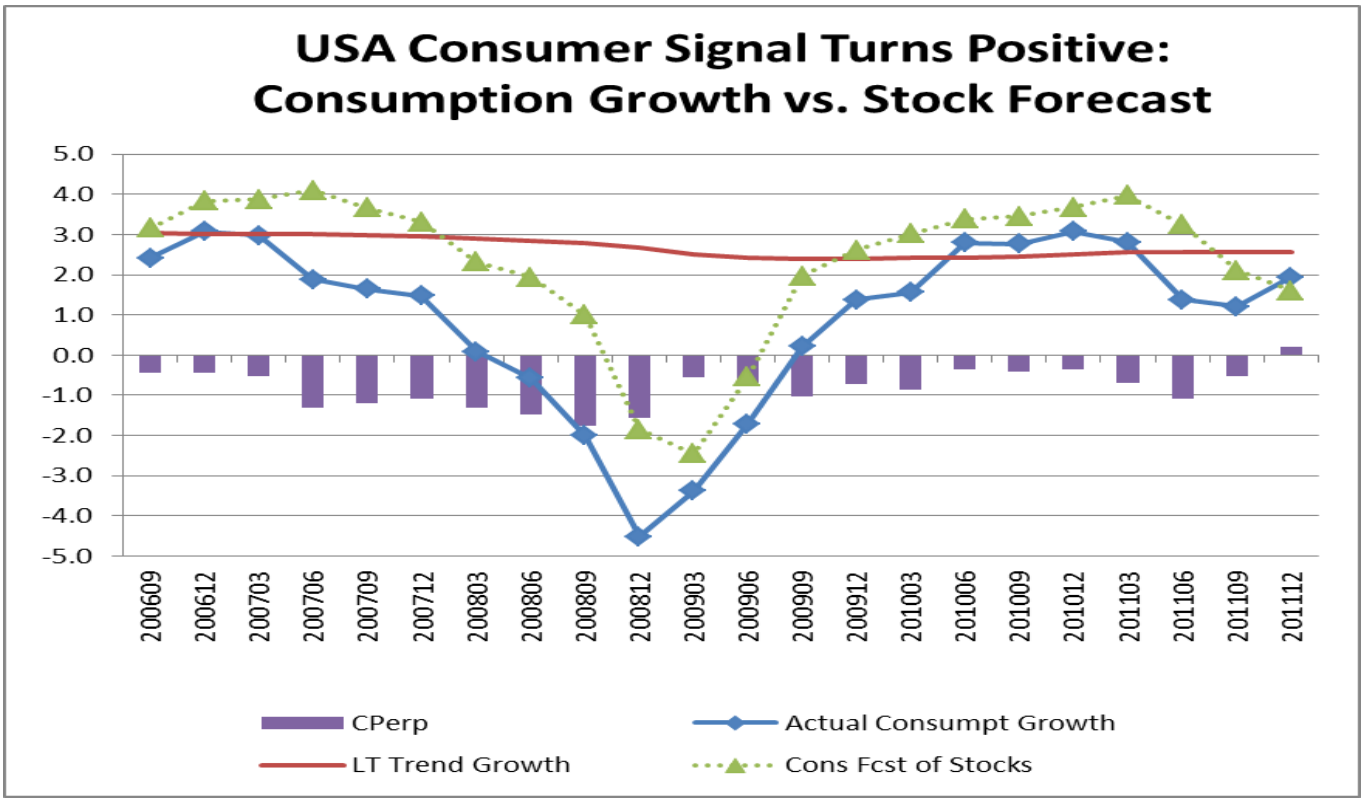
To develop our "Stocks, Bonds, Consumers LeadingIndex" (SBCLI), we first transform all readings at time t of the key variables (stocks, bonds, consumers), k=1-3, into their standardized Z-scores, which are defined as:

$$Z_{kt} = \frac{(x_{kt} - \mu_k)}{\sigma_k} \{\text{for } k = 1, 2,3\} \qquad (1)$$

These Z-scores have the intuitive interpretation of measuring the number of standard deviations the observation is from the mean for each variable. Thus, with a normal distribution, Z-scores should exceed 1.0 in absolute value approximately 1/3 of the time, and should exceed 2.0 in absolute value approximately 5% of the time. As Z-scores are linear in the original independent variables, in typical OLS regressions with constant terms, using Z-scores gives R-squareds and t-statistics that should be identical to regressions with the same underlying variables (see Cramer's *Econometrics* (1972)). Thus, this transformation is done to build an intuitive index, rather than for statistical power.

The Z scores for stocks, bonds and consumers likely forecast deviations from long-term trend growth rates for the macro variables, in that a strong stock market should precede a positive deviation from trend growth of GDP or industrial production or employement growth. Thus, the 20-year trend growth rate of real GDP (Figure 2) is included, as growth has slowed considerably in the 50-year period from 1961 to 2011 for advanced economies, and real consumption growth slowed, too.Figure 5 shows how the consumption deviation signal, c-perp, has moved in the past 5 years that cover the year before the Great Recession, 2006-2007, the recession of 2008/2009, and the tepid recovery from 2009-2011. Figure 5 plots for the United States (1) the trend growth rate of real GDP (now 2.6%), (2) the real consumption growth rate predicted by current and past real stock returns using the coefficient estimates in Figure 3, (3) the actual 2-quarter annualized real consumption growth rate, and (4) the deviation of actual minus forecast growth, normalized by dividing by its volatility (c-perp): Corresponding graphs of consumption deviations for all of the world's 16 Trillion Dollar Economies (TDEs) are in Appendix 1, plus for Hong Kong, Singapore and Taiwan, together a TDE.

Figure 5



Note that the growth rate of consumption that is forecasted from real stock returns varies quite a lot. While historic trend growth was 3.0% in mid-2007, the stock market had been strong, hitting a record high over 1500 in mid-2007 on the S&P 500, so forecasted growth for consumption was about 4.0%. However, consumers held back, with real consumption growth of only 2.0%, a deviation of *minus*2.0% in mid-2007, giving a Z-score of approximately -1.2 standard deviations. Consumers were prescient, as the economy fell into recession within 6 months and the unemployment rate surged to 10% in the Great Recession. Note that consumers were negative in mid to late 2007, precisely when the stock market was hitting new highs. Real estate prices had begun to fall in some places and debt loads were pinching, which led to an increase in delinquencies on consumer loans and mortgages. Consumers likely started reducing spending growth as their home equity dwindled and to increase savings and reduce debt.

Later, when Lehman Brothers fell in September 2008, c-perp was almost minus 2 standard deviations, as consumers were very likely reflecting in their spending cuts the surge in layoffs and unemployment and the very poor prospects for real wage growth. As the stock market came roaring back from March 2009 to the end of 2009, real consumer spending growth increased, but less than expected, as consumers continued to restrain their spending growth, likely with knowledge of the continuing weak job market, the worst since the Great Depression of the 1930s. Finally, at the end of 2011, when the stock market fell with the budget impasse and European worries were very high, consumer spending growth held and even increased, giving the first positive consumption deviation in the past 5 years in the USA. This is consistent with the improving job market and the falling unemployment rate, as well as with the reduced debt service ratios (with lower interest rates) and reduced loan delinquencies.

Globally, a review of the graphs of consumption deviations in Appendix 1 for major countries show that Germany and Japan are positive, so the old Big 3 advanced economies of 1950-2000 (USA, Japan, and Germany) appear to be healthier than some economies, as far as the consumer signal is concerned. Japan's data is impacted by the March 2011 earthquake and tsunami, so this may just be a bounce back from that disaster. However, do note that Japan's consumers were predominantly sending positive signals prior to the earthquake, so it is plausible that this will remain positive, especially as the unemployment rate is well off its high levels.

China's real retail sales growth, which had been sending very positive signals versus stock returns in most of the past 5 years, has now slowed to growth nearer forecast, given stock returns, still growing at a rapid rate. India's consumers appear to be holding back, in that their spending growth in the past year has generally not been as rapid as expected, given stock returns.

The most strongly negative signals come from Spain and Italy, Europe's two large economies that have the most serious concerns at present. Spain's unemployment rate is 23% and consumers have been consistently negative for the past 3-1/2 years, as unemployment soared. There are great concerns about Italy's debt load, too, and rates on Italian government bonds have increased substantially. However, recent market liberalizations have given greater hope for Italy's economy, which may show up in stronger consumption growth in coming quarters. France had significantly negative consumption growth deviations in 2011, reflecting consumers' uncertainties there, both from the weak economy and from political uncertainty. The United Kingdom, which has been hard hit, has had negative consumption growth signals since 2008 relative to stock returns, but these negative deviations now have narrowed substantially as the U.K. appears to be getting through the recession.

III. A Stocks, Bonds and Consumers' Leading Indicator (SBCLI)

In the previous section, we focused on the real consumption growth deviation variable. However, Breeden (2012) also showed that stock returns and the term structure slope have predictive power as well, reflecting the information held by stock market investors and bond market borrowers and lenders. In this section, we develop a composite index of these three variables, a Stocks, Bonds, Consumers Leading Index (SBCLI).

The regression results for (1) real GDP growth, (2) industrial production growth, (3) changes in the unemployment rate, and (4) growth in the total number of jobs regressed on the Z-scores for real stock returns, the slope of the term structure and the consumption deviation for the Americas, Europe and AustralAsia are in Figures 6-8.

Figure 6

Advanced Americas: Macroeconomic Variables Related to Z Scores for Lagged Stock Returns, Lag of Term Structure Slope, and Lagged Avg *Total* Consumption Deviations

2-Quarter Changes (Q2-Q4-Q2) 1962-2011 Q2. Nonoverlapping data. Nobs=99.

Variable (Y_t)	Con-stant	Historic GDP Trend Growth	Lag Y_{t-1}	Real Stock Return Lag 1	Real Stock Return Lag 2	Treas Slope 10y-3m, Lag 1	Total Real Consumption Deviation Lag 1 or *Lag 1,2 Avg	Corr. R^2
Real GDP 2Q Ann%Chg	-2.13 (t=-2.5)	1.40 (t=6.2)		1.23 (t=6.7)	0.59 (t=3.3)	0.88 (t=4.2)	0.61 (t=3.1)	0.56
Industrial Production 2QAnn%Chg	-7.58 (t=-5.0)	2.80 (t=7.0)		3.00 (t=9.1)	1.25 (t=3.9)	2.02 (t=5.4)	0.88 (t=2.5)	0.65
Unemploymt Rate* 2Q Change	0.62 (t=3.9)	-0.16 (t=-3.8)	0.19 (t=2.2)	-0.32 (t=-9.2)	-0.13 (t=-2.8)	-0.18 (t=-4.6)	-0.16* (t=-3.1)	0.70
Total Employmnt* 2Q Ann%Chg	-1.43 (t=-2.9)	0.72 (t=5.2)	0.21 (t=2.4)	0.65 (t=6.0)	0.43 (t=3.5)	0.32 (t=2.5)	0.61* (t=3.6)	0.63

Figure 7

Advanced Europe: Macroeconomic Variables Related to Z Scores for Lagged Stock Returns, Lagged Term Structure Slope, and Lagged Avg *Total* Consumption Deviations

2-Quarter Changes (Q2-Q4-Q2) 1963-2011 Q2. Nonoverlapping data. Nobs=97.

Variable (Y_t)	Con-stant	Historic GDP Trend Growth	Lag Y_{t-1}	Real Stock Return Lag 1	Real Stock Return Lag 2	Treas Slope 10y-3m, Lag 1	Total Real Consumption Deviation Lag 1 or *Lag 1,2 Avg	Corr. R^2
Real GDP 2Q Ann%Chg	-0.53 (t=-1.0)	1.00 (t=6.8)		0.85 (t=6.0)	0.38 (t=2.7)	0.48 (t=3.2)	0.66 (t=4.7)	0.60
Industrial Production 2QAnn%Chg	-1.7 (t=-1.3)	1.27 (t=3.4)		1.86 (t=5.2)	1.06 (t=3.0)	1.68 (t=4.5)	1.26 (t=3.6)	0.52
Unemploymt Rate 2Q Change	0.01 (t=0.1)	0.01 (t=0.3)	0.436 (t=5.2)	-0.109 (t=-4.4)	-0.058 (t=-2.2)	-0.060 (t=-2.2)	-0.100 (t=-3.5)	0.60
Total Employmnt 2Q Ann%Chg	0.68 (t=2.2)	-0.14 (t=-1.7)	0.49 (t=5.7)	0.26 (t=3.1)	0.19 (t=2.3)	0.16 (t=1.7)	0.26 (t=2.8)	0.54

Figure 8

Advanced AustralAsia: Macroeconomic Variables Related to Z Scores for Lagged Stock Returns, Lagged Term Structure Slope, and Lagged Avg *Total* Consumption Deviations

2-Quarter Changes (Q2-Q4-Q2) 1962-2010 Q4. Nonoverlapping data. Nobs=98.

Variable (Y_t)	Con-stant	Historic GDP Trend Growth	Lag Y_{t-1}	Real Stock Return Lag 1	Real Stock Return Lag 2	Treas Slope 10y-3m, Lag 1	Total Real Consumption Deviation Lag 1 or *Lag 1,2 Avg	Corr. R^2
Real GDP 2Q Ann%Chg	-0.85 (t=-1.2)	0.88 (t=7.9)		1.05 (t=3.5)	0.098 (t=0.3)	-0.027 (t=-0.1)	0.72 (t=2.4)	0.45
Industrial Production 2QAnn%Chg	-2.8 (t=-2.0)	1.24 (t=5.6)		3.27 (t=5.4)	0.85 (t=1.4)	1.77 (t=2.9)	2.66 (t=4.5)	0.51
Unemploymt Rate* 2Q Change	0.038 (t=0.9)	-0.002 (t=-0.2)	0.119 (t=1.2)	-0.072 (t=-4.1)	-0.051 (t=-2.6)	-0.015 (t=-0.8)	-0.046* (t=-2.0)	0.30
Total Employmnt YoY %Chg	0.110 (t=0.9)	0.044 (t=2.1)	0.58 (t=8.4)	0.18 (t=3.5)	0.17 (t=3.2)	0.036 (t=0.7)	0.134 (t=2.6)	0.63

Perusing Figures 6-8 for the in-sample results, one can see that the Z-score signals from the stock market, the bond market and from consumers are all normally quite helpful (significant t-statistics and R^2) in each mega-economy in explaining in-sample variation in real GDP growth, in industrial production growth, changes in the unemployment rate and the growth rate of total employment. Stepwise in-sample regression results and out-of-sample simulation results are in Appendix 2. Real consumption deviations appear to be helpful in explaining subsequent macro variable moves in each of the mega-economies and for each of the four macro variables. Breeden also confirmed that these variables were quite powerful in out of sample simulations, as well as in the in-sample regressions. See Apendix 2A and 2B for those results. The term structure slope Z-score has solid results and the expected positive sign in the Americas and in Europe, but mixed to weak results in AustralAsia.

The stock market return variable is most influential over the 50 year period studied for each mega-economy. The stock market appears to have explanatory power up to 4 quarters in advance, with the greatest weight being the most recent 2-quarter real return, but also with significant weight on the prior nonoverlapping 2-quarter real return. For the term structure variable, only the most recent lagged reading is significant. And for consumption deviations, c-

perp appears to lead real GDP growth and the growth of industrial production by only one 2-quarter period. In contrast, employment growth and unemployment rate changes appear to be more slow-moving, and c-perp leads those typically by 4 quarters in the Americas, so an average of 2 lags of c-perp are included in those regressions.

In Figure 9, as the stock market returns have the highest coefficients in all economies, the standardized coefficients for the term structure slope and for consumption deviations are shown also scaled by dividing by the total of stock market coefficients. As seen in Figure 9, the coefficients for consumption deviations and the term structure slope are roughly half the size of the coefficients for the real stock return, averaging over the three economies. In the Advanced Americas economies, the slope variable had a higher scaled coefficient than did c-perp, whereas in Advanced European economies and advanced AustralAsian economies, consumption deviations were more helpful than were the term structure slopes. Considering the results from all three global mega-economies, we will treat the term structure slope and the consumption deviation Z-scores as having similar influence in forecasting macroeconomic variables.

Figure 9

Coefficients from Regressions with Z-Scores (1962 Q2 or 1963 Q2 to 2011Q2)

	Advanced Americas				Advanced Europe				Advanced AustralAsia			
	Lg1Stocks	Lg2Stocks	Lg1Slope	Lg1CPerp	Lg1Stocks	Lg2Stocks	Lg1Slope	Lg1CPerp	Lg1Stocks	Lg2Stocks	Lg1Slope	Lg1CPerp
Regression Coefficients with Z-Score Variables												
Real GDP Growth	1.23	0.59	0.88	0.61	0.85	0.38	0.48	0.66	1.05	0.10	-0.03	0.72
Industrial Production	3.00	1.25	2.02	0.88	1.86	1.06	1.68	1.26	3.27	0.85	1.77	2.66
Unemployment Rate Change	-0.32	-0.13	-0.18	-0.16	-0.11	-0.07	-0.07	-0.12	-0.07	-0.05	-0.02	-0.05
Employment Growth	0.65	0.43	0.32	0.61	0.25	0.21	0.18	0.28	0.18	0.18	0.03	0.15
Scaled Coefficients Relative to Total Stock Market Coefficient												
Real GDP Growth	1.00		0.48	0.34	1.00		0.39	0.54	1.00		-0.03	0.63
Industrial Production	1.00		0.48	0.21	1.00		0.58	0.43	1.00		0.43	0.65
Unemployment Rate Change	1.00		0.40	0.36	1.00		0.38	0.72	1.00		0.12	0.38
Employment Growth	1.00		0.30	0.56	1.00		0.39	0.61	1.00		0.08	0.42
Average Scaled Coefficients	**1.00**		**0.41**	**0.37**	**1.00**		**0.43**	**0.57**	**1.00**		**0.15**	**0.52**
Grand Means of Scaled Coeffs	**1.00**		**0.33**	**0.49**								
	Stocks		**Slope**	**Cperp**								

As our desire is to build a simple, robust index of the information held by stock and bond market investors and consumers, we will define our "Stocks, Bonds and Consumers Leading Index" (SBCLI) as simply the sum of the Z-scores for the term structure and for consumption deviations, plus **double** the Z-score for the real stock return. This reflects the significantly larger explanatory power of real stock returns that we find. So, we have:

$$SBCLI = 2\ Z_{RStock} + 1\ Z_{Slope} + 1\ Z_{Cperp}$$

Of course, one can get better explanatory power by letting the coefficients of these variables vary, but then one has to worry more about data mining and whether those coefficients could be estimated precisely in advance. Figure 10 shows a worksheet with these calculations for the USA in the past 5 years, with comparison values for macro variables in the right hand columns:

Figure 10

Stocks, Bonds, Consumers Leading Indicator (SBCLI) — ***United States***

Douglas T. Breeden, March 2012

Massachusetts Institute of Technology and Duke University

1 Quarter Prior SBCLI Forecast Correlations

SBCLI Correl= **0.79** **0.84**

SBCLI MA2 **0.79** **0.89**

2 Quarters Prior SBCLI Forecast Correlations

SBCLI Correl= **0.68** **0.81**

SBCLI MA2 **0.61** **0.73**

1961 to 2	RlStok	Slope	Cperp	LEI
Mean	2	1.18	0	2.9
StdDevr	11.4	1.23	1.7	6.0

Real Consumption Growth From 2Q Stock Returns:

Const	Trend	RlStock	Lg1Stoc	Lg2 Stock
-0.38	1	0.093	0.058	0.041

	Stock Market				**Bond Market**				**Consumers (Total)**					**SBCLI**		**Macroeconomic Data**			
					Yield	Yield	Yield	Yield	RealTot	20 Yr	Expecte	Consumption		SBCLI	SBCLI	Real			
		Inflation	Stocks	Real	Treasy	Treasy	Curve	Curve	Consum	Real	RlGrowt	Deviatic	PCETotal		MA2	GDP	Indust	Employn	Unemply
	OECD	OECD	RealRet	StkRet	Short	LongRa	Slope	Slope	Growth	Growth	PCETot	PCETotal		Total	Total	Growth	Prodn	Growth	Rate
Quarter	QAvg	YoY	L 2Qtrs	Zscore	MoAvg	MoAvg		Zscore	2Q%Anr	Trend	FromStk	2Q%Anr	Zscore	Zscore	Zscore	2QAnn%	2QAnn%	2QAnn%	%
200612	120.6	1.9	6.8	**0.4**	5.32	4.63	-0.69	**-1.5**	**3.1**	3.0	3.8	-0.8	**-0.4**	**-1**	**-2**	1.4	1.4	2.2	4.4
200703	125.2	2.4	10.2	**0.7**	5.31	4.68	-0.63	**-1.5**	3.0	**3.0**	3.9	-0.9	**-0.5**	**-1**	**-1**	1.6	2.7	2.2	4.5
200706	132.8	2.7	8.7	**0.6**	5.32	4.85	-0.47	**-1.3**	1.9	3.0	4.1	-2.2	**-1.3**	**-1**	**-1**	2.1	4.5	0.4	4.5
200709	132.5	2.4	4.6	**0.2**	5.42	4.73	-0.69	**-1.5**	1.7	3.0	3.7	-2.0	**-1.2**	**-2**	**-2**	3.3	2.8	-0.2	4.7
200712	134.7	4.0	-0.5	**-0.2**	5.02	4.26	-0.76	**-1.6**	1.5	3.0	3.3	-1.8	**-1.1**	**-3**	**-3**	2.3	0.6	0.6	4.8
200803	122.4	4.1	-9.7	**-1.0**	3.23	3.66	0.43	**-0.6**	0.1	2.9	2.3	-2.2	**-1.3**	**-4**	**-4**	0.0	-0.5	0.4	5.0
200806	125.2	4.4	-9.3	**-1.0**	2.76	3.89	1.13	**0.0**	-0.6	2.9	1.9	-2.5	**-1.5**	**-4**	**-4**	-0.2	-4.0	-0.4	5.3
200809	111.9	5.3	-11.2	**-1.2**	3.06	3.86	0.81	**-0.3**	-2.0	2.8	1.0	-3.0	**-1.8**	**-4**	**-4**	-1.2	-9.7	-1.4	6.0
200812	77.9	1.6	-38.5	**-3.6**	2.82	3.25	0.44	**-0.6**	-4.5	2.7	-1.9	-2.7	**-1.6**	**-9**	**-7**	-6.4	-14.5	-2.7	6.9
200903	69.3	0.0	-38.1	**-3.5**	1.08	2.74	1.65	**0.4**	-3.4	2.5	-2.5	-0.9	**-0.5**	**-7**	**-8**	-7.9	-18.1	-5.1	8.3
200906	77.8	-1.2	0.4	**-0.1**	0.62	3.31	2.70	**1.2**	-1.7	2.4	-0.5	-1.2	**-0.7**	**0**	**-3**	-3.8	-15.9	-5.1	9.3
200909	88.2	-1.6	28.2	**2.3**	0.30	3.52	3.22	**1.7**	0.2	2.4	2.0	-1.8	**-1.0**	**5**	**3**	0.5	-3.5	-3.2	9.6
200912	96.3	1.4	23.1	**1.9**	0.22	3.46	3.24	**1.7**	1.4	2.4	2.6	-1.2	**-0.7**	**5**	**5**	2.7	5.4	-2.8	9.9
201003	97.8	2.4	9.7	**0.7**	0.21	3.72	3.51	**1.9**	1.6	2.4	3.0	-1.4	**-0.9**	**2**	**4**	3.8	6.7	-1.0	9.8
201006	97.0	1.8	-0.2	**-0.2**	0.42	3.49	3.07	**1.5**	2.8	2.4	3.4	-0.6	**-0.3**	**1**	**2**	3.8	7.5	1.4	9.6
201009	94.7	1.2	-3.7	**-0.5**	0.34	2.79	2.45	**1.0**	2.8	2.5	3.4	-0.7	**-0.4**	**0**	**0**	3.1	6.8	1.0	9.5
201012	104.0	1.3	6.6	**0.4**	0.28	2.86	2.58	**1.1**	3.1	2.5	3.7	-0.6	**-0.4**	**2**	**1**	2.4	4.8	-0.4	9.6
201103	112.2	2.1	17.4	**1.3**	0.28	3.46	3.18	**1.6**	2.8	2.6	4.0	-1.2	**-0.7**	**4**	**3**	1.3	3.9	0.4	9.0
201106	113.4	3.4	7.3	**0.5**	0.22	3.21	2.99	**1.5**	1.4	2.6	3.2	-1.9	**-1.1**	**1**	**2**	0.8	2.7	0.8	9.0
201109	103.2	3.8	-10.0	**-1.0**	0.29	2.43	2.14	**0.8**	1.2	2.6	2.1	-0.9	**-0.5**	**-2**	**0**	1.6	3.4	0.2	9.1
201112	99.7	3.3	-13.7	**-1.4**	0.42	2.05	1.62	**0.4**	1.9	2.6	1.6	0.3	**0.2**	**-2**	**-2**	2.3	5.0	1.4	8.7
201203			15.2	**1.2**	0.47	2.28	1.81	**0.5**		2.6	3.7		*0.2*	***3***	***0***				8.3

From Figure 10 for the USA, the SBCLI was -2 to -3 prior to the recession start in December 2007, and dropped to -9 at the height of the Great Recession in December 2008, reflecting the negative signals from each of stocks, bonds and consumers at that time. As the stock market rallied sharply (over 50%) from March to December 2009, the SBCLI turned positive to a +5 reading in December 2009, held back only by a still-negative consumption deviations signal. That was appropriate, as the recovery in 2010 and 2011 has been tepid. Correlations of the SBCLI with subsequent growth of real GDP and industrial production are shown in the top right of Figure 10 to be in the 0.61 to 0.84 range for the next 1 and 2 quarters of growth, a good correlation of forecasts with subsequent short-term actual results.

To get a longer term perspective on the movements in the SBCLI calculations for the three mega-economies, Figures 11A and 11B give plots for the Americas, Europe and AustralAsia, with the first 25 years (1961-1986) in the first graph, and the most recent 25 years (1986-2011) in the second graph. The range is typically between plus 10 and minus 10, with the severe 1974-1975 recession and the recent "Great Recession" of 2008/2009 getting the largest negative rating at -9. Correlations of the SBCLI with the OECD's indexes of leading economic indicators are 0.74 for the Americas, 0.74 for Europe, and 0.67 for AustralAsia, so they are very similar, yet different measures. Please note that the recessions of 1974-1975, 1981-1982, 1991-1992, 2001-2002 and 2008-2009 are clearly visible in our leading indiator, SBCLI. Also, the Asian currency crisis is evident in the SBCLI for Australasia in 1997-1998, as it fell to a -3 reading while the Americas and Europe were +2 to +3 at that time.

Figure 11A

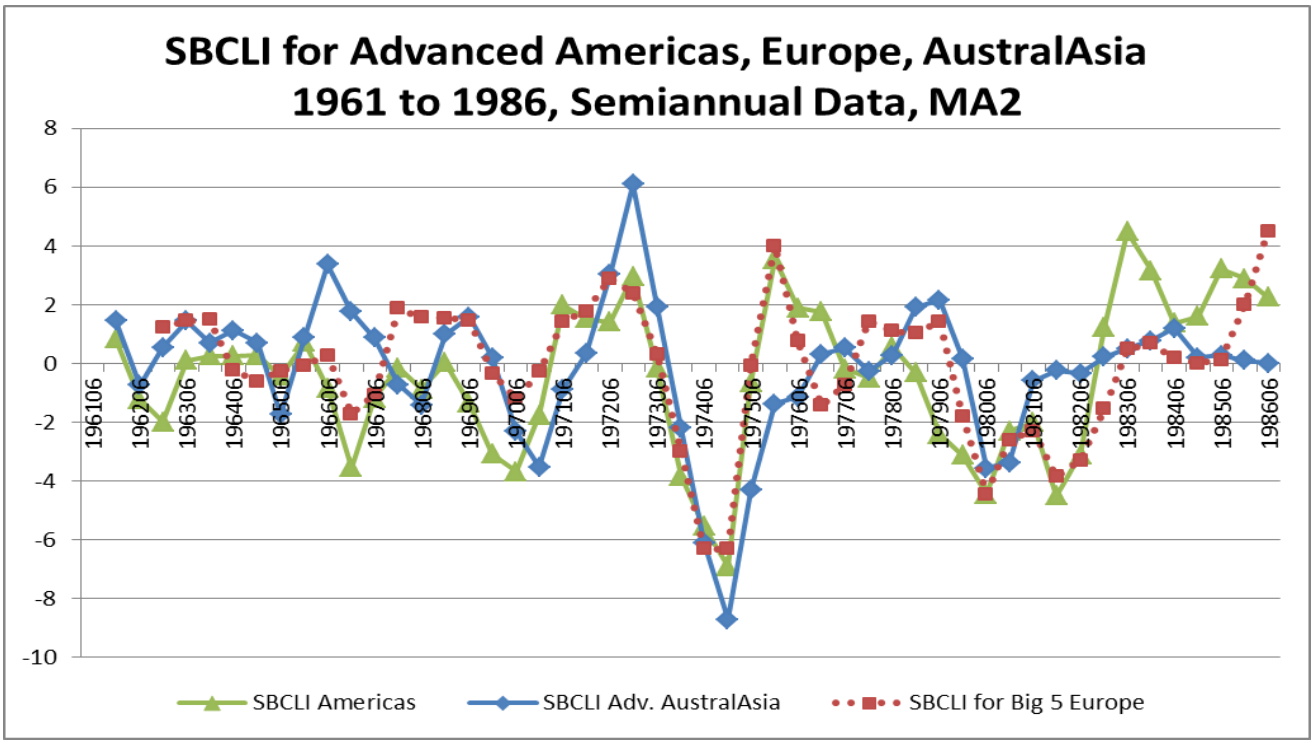
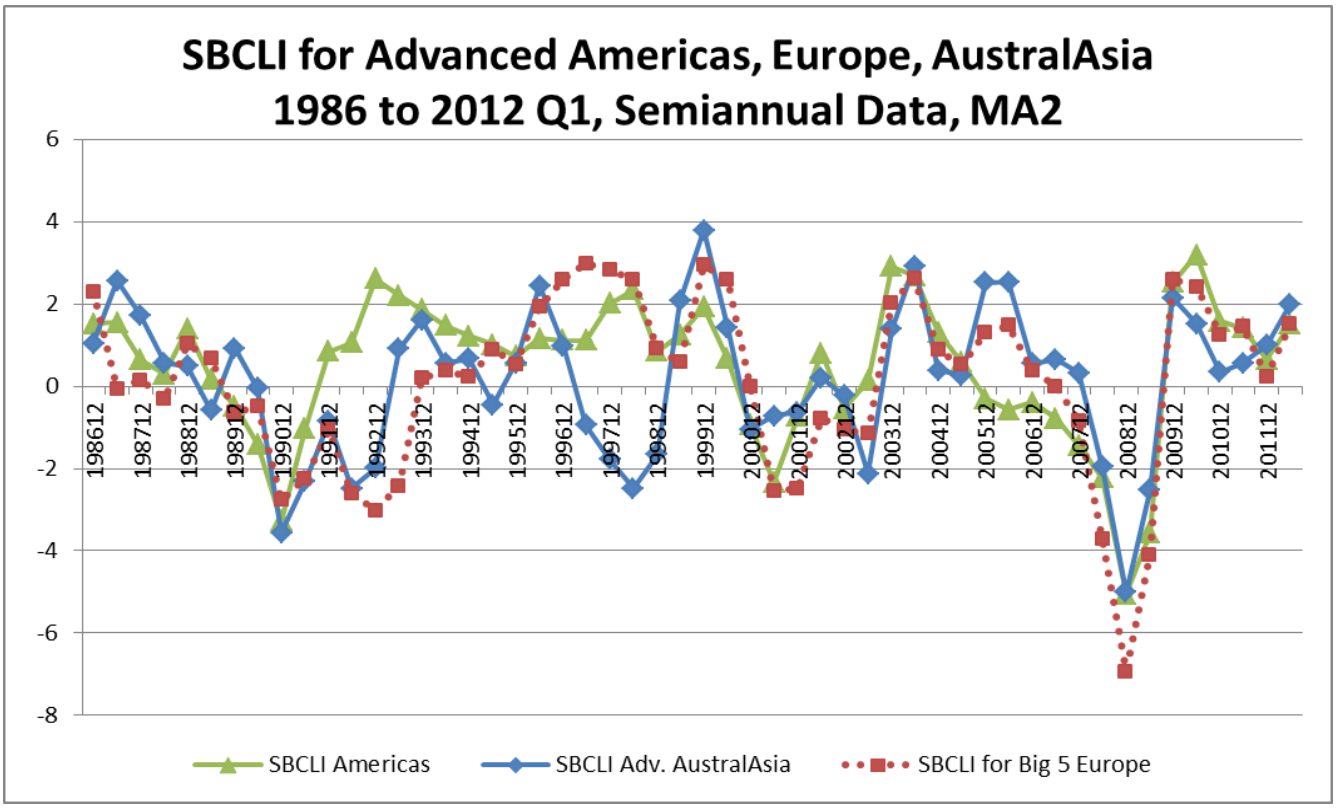


Figure 11B



From these graphs, the timing of the SBCLI as a leading indicator is not easy to see. To see this, Figures 12A to12D show the SBCLI at quarter t versus the real GDP and industrial production growth in the next 2 quarters, t+1. The strong leading relationships are evident, and are verified by the high t-statistics (7 to 10 in many cases) for the slopes in these graphs:

Figure 12A

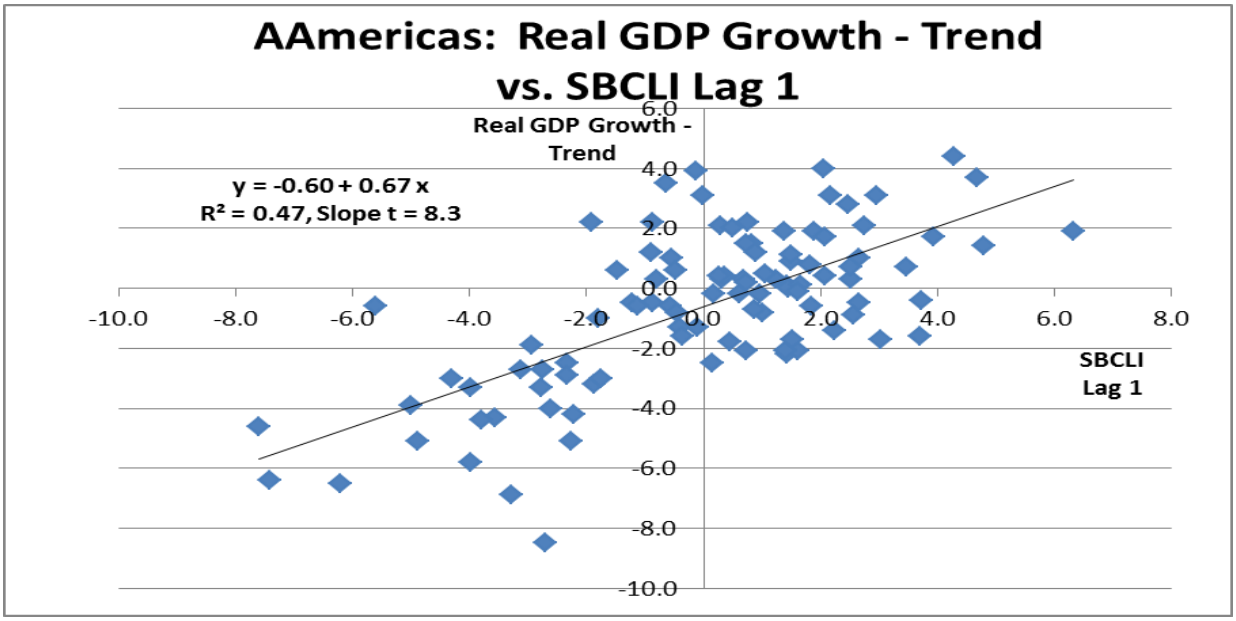


Figure12B

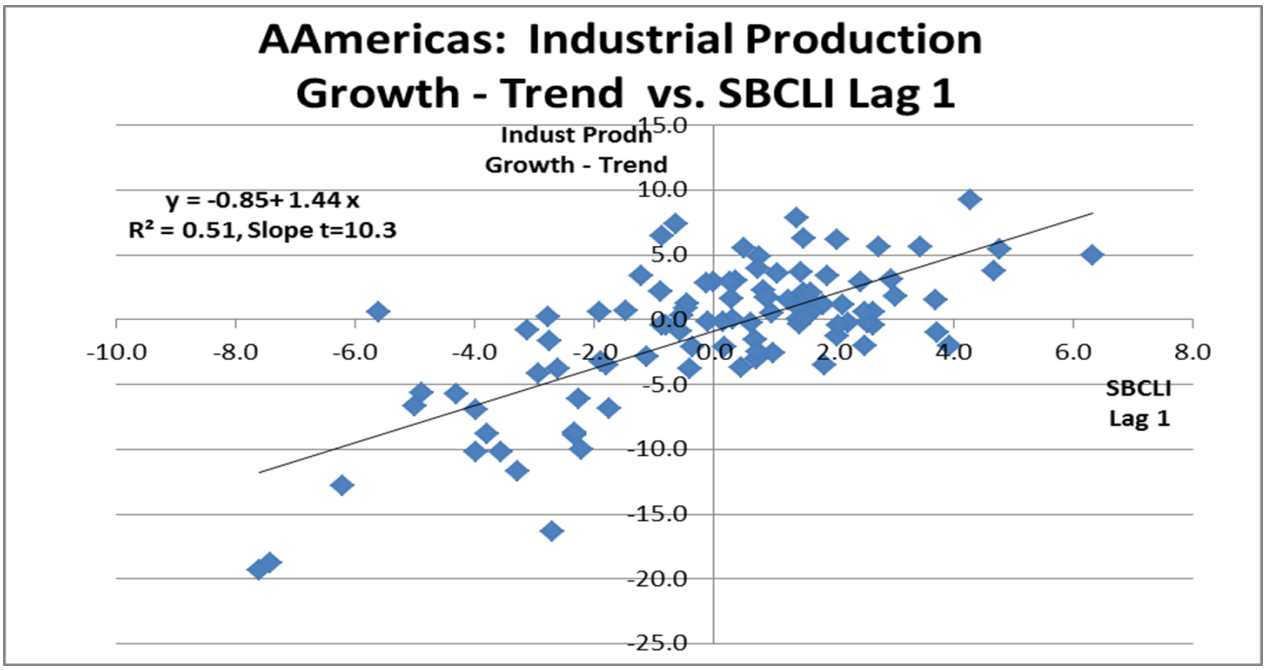


Figure12C

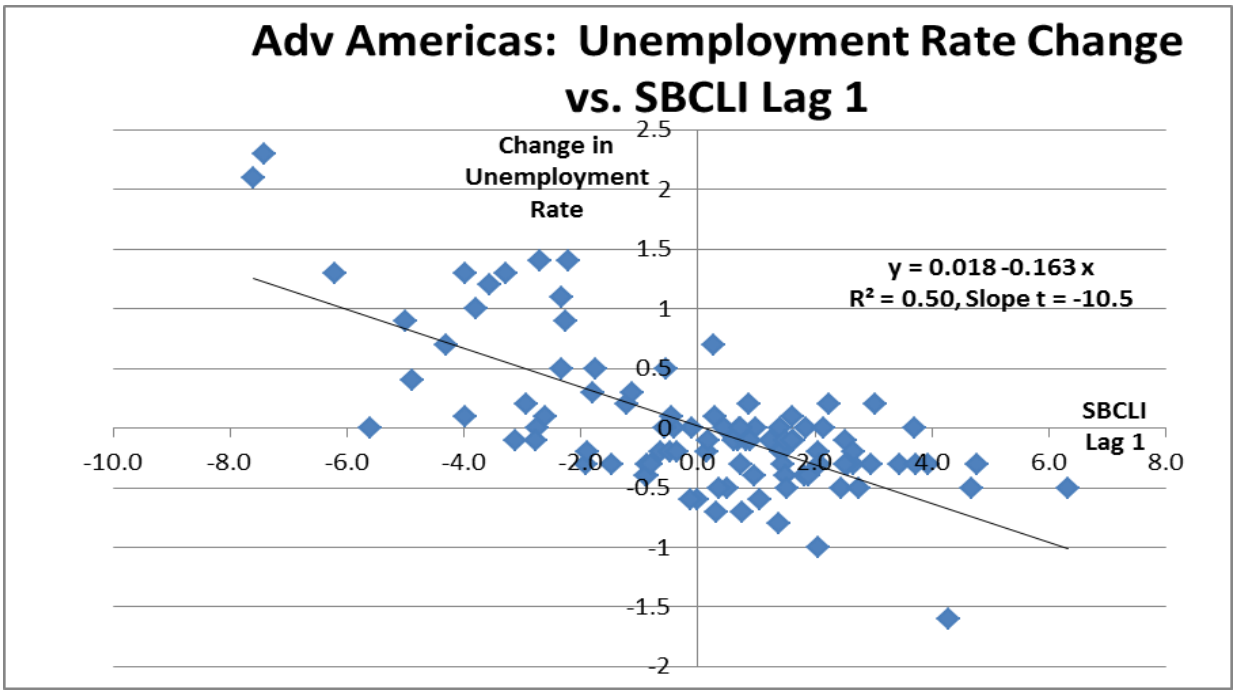
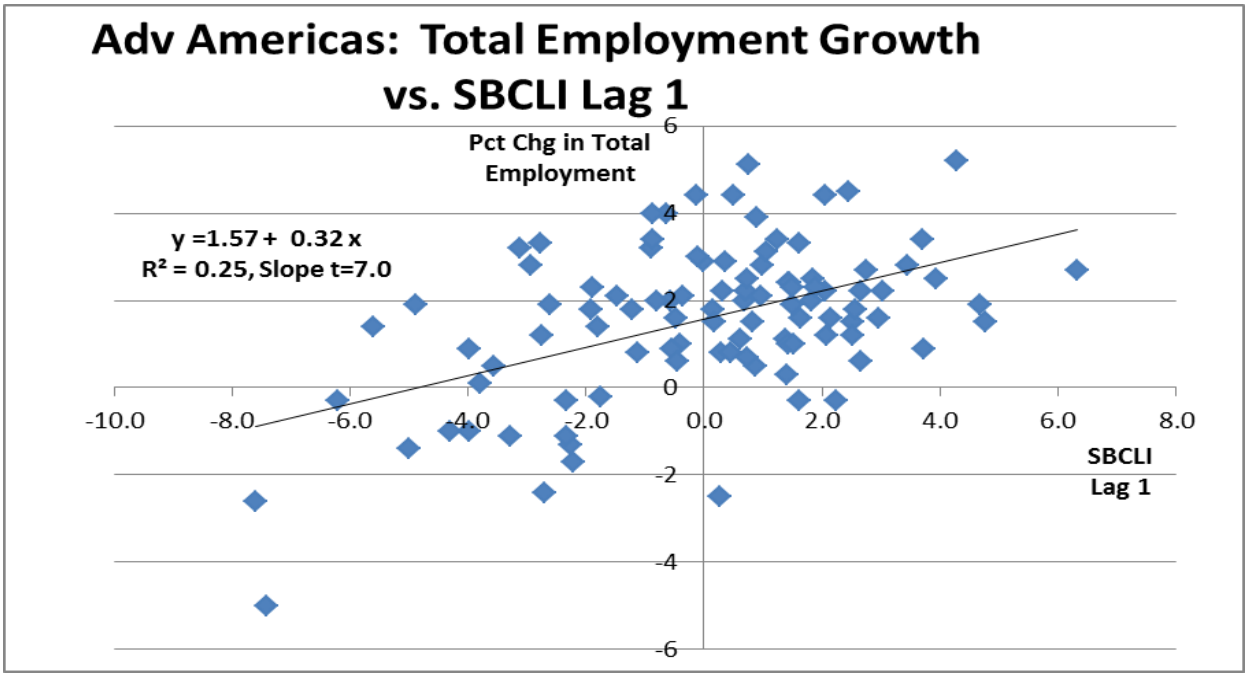


Figure 12D



The comparable results for Europe and AustralAsia are shown in Figures 13A-13F:

Figure 13A

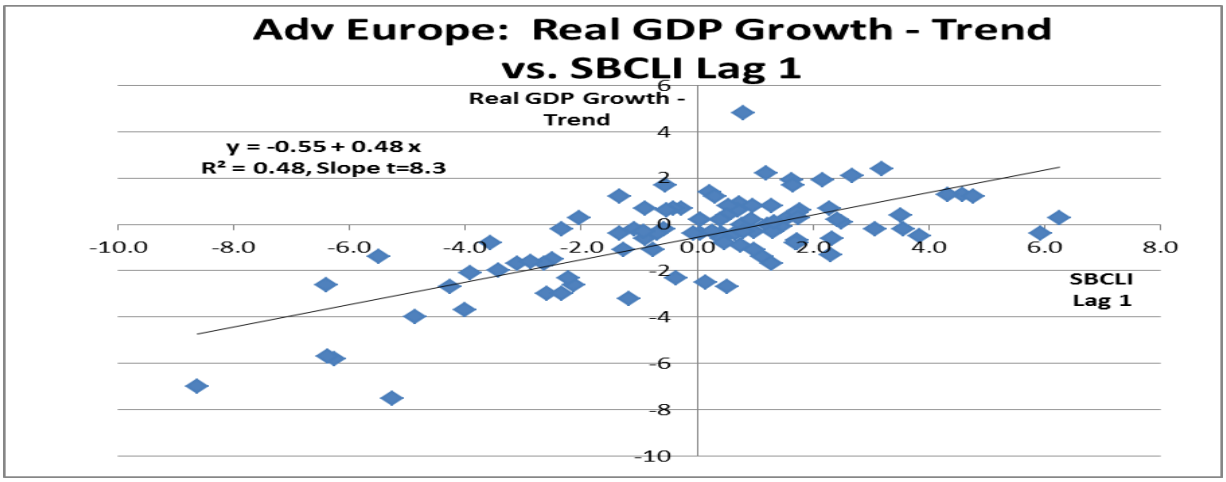


Figure13B

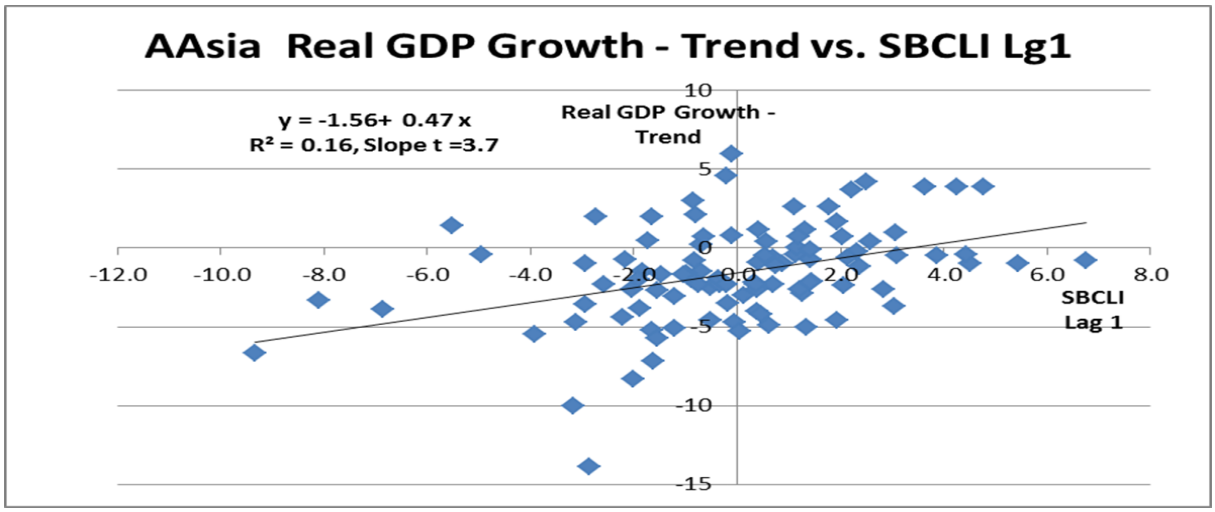


Figure13C

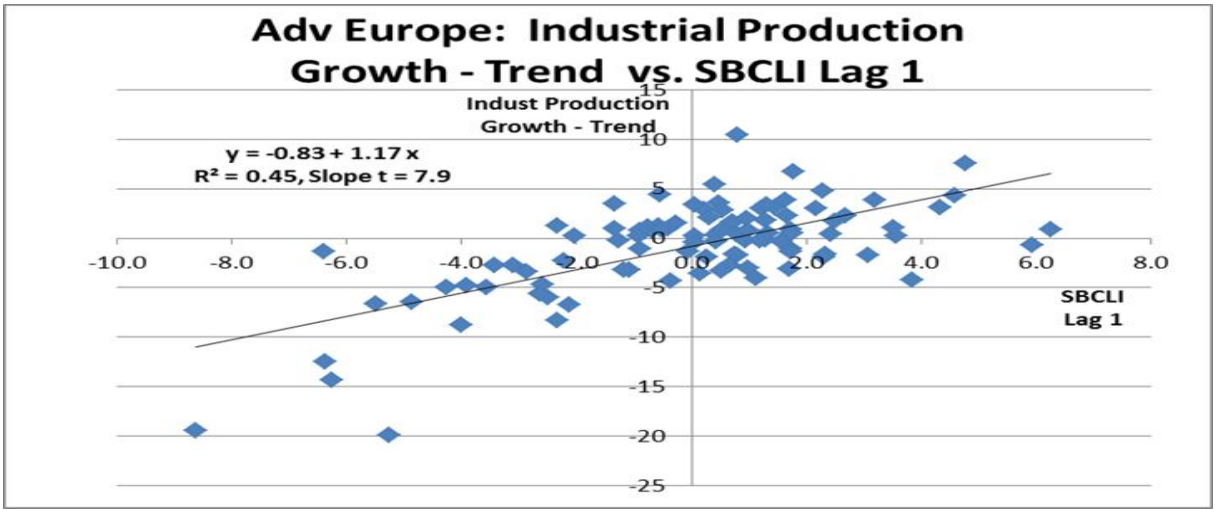


Figure 13D

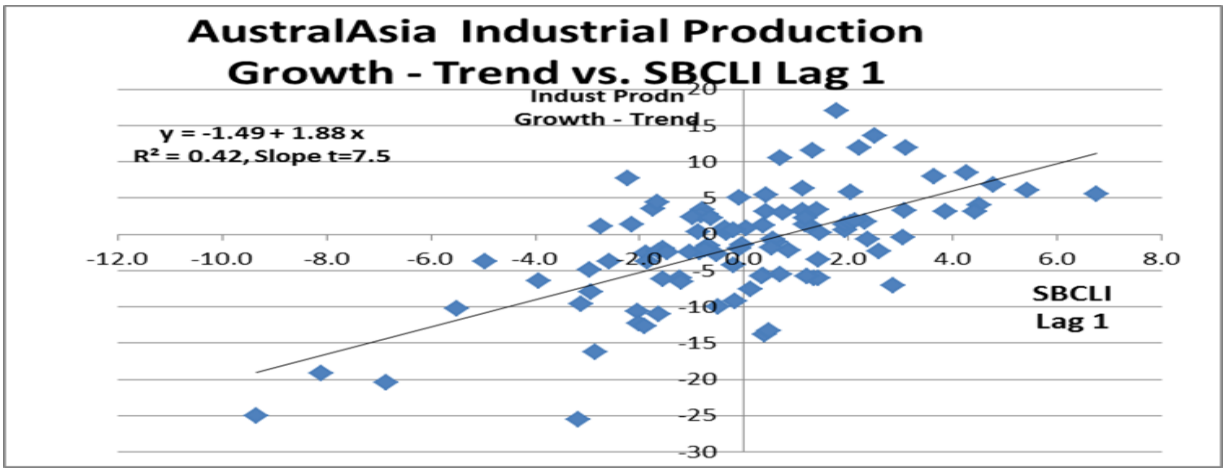


Figure 13E

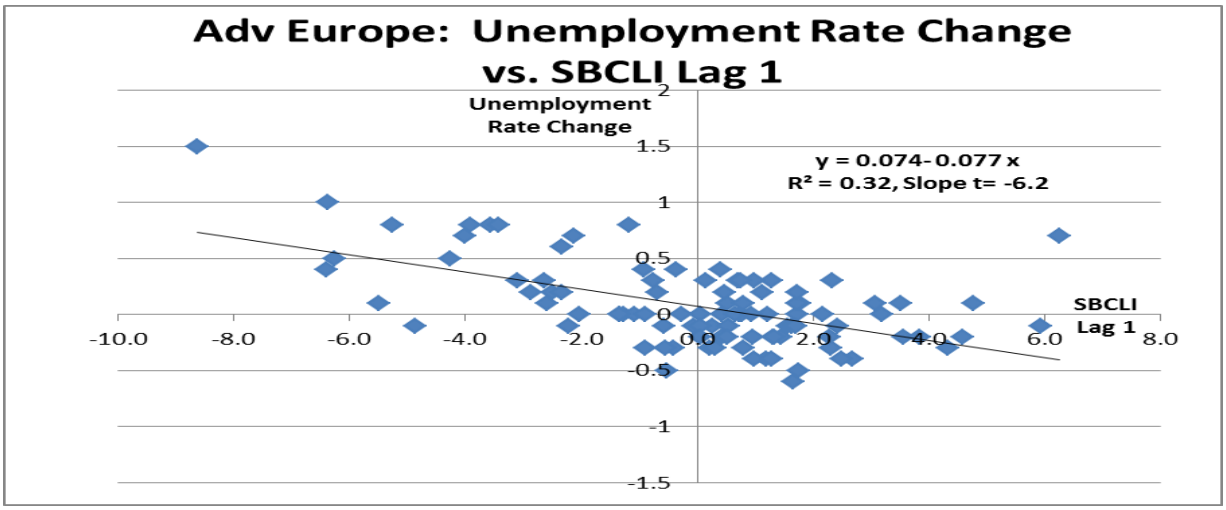
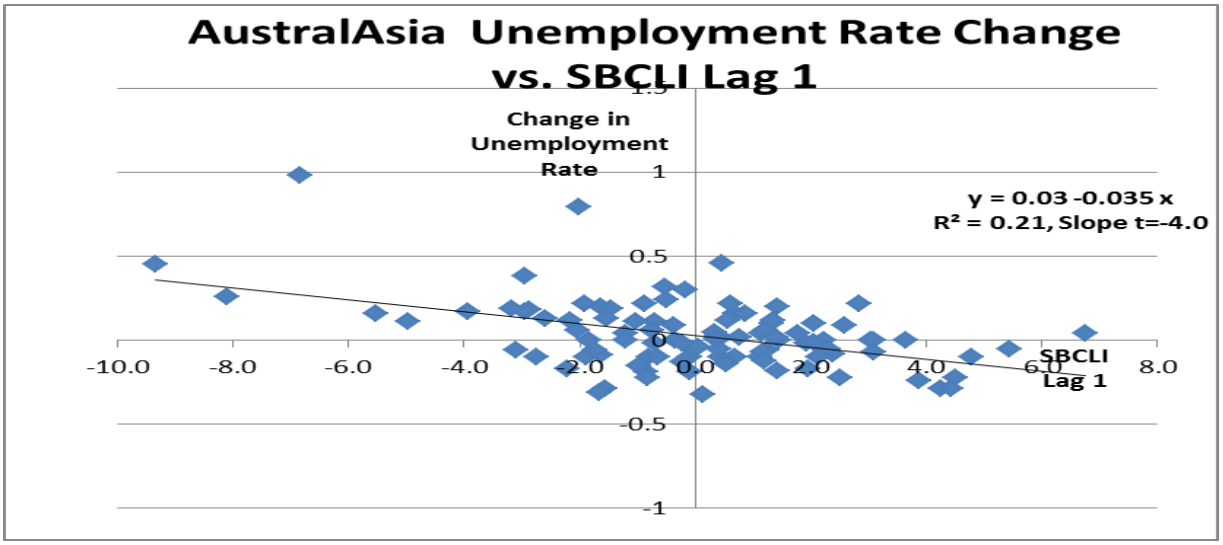


Figure 13F



These graphs demonstrate that the Stocks, Bonds, Consumers Leading Indicator does lead short-term economic growth and unemployment rate changes in all three of the world's advanced global mega-economies.

IV. SBCLI Comparisons with Conference Board (USA) and OECD Leading Indicators

Next, we look at how the SBCLI compares to the Conference Board's Index of Leading Economic Indicators for the USA, as well as to the OECD's Leading Index for the Americas (weighted average of USA and Canada) in explaining macroeconomic moves in the Advanced Americas. Figure 14A first gives the in-sample regression results for the Americas. We will then look at out-of-sample simulation performance, as well as at results for Advanced Europe and Advanced AustralAsia, using the OECD's global indexes of leading indicators.

First, Figures 14A and 14B present the in-sample regression results and out-of-sample simulation results for the SBCLI from Section III and the indexes of leading economic indicators for the Americas. For the USA, we have both the Conference Board's index results and the OECD's leading index results. These figures show that in-sample the SBCLI does better than the leading indicators for all four major macro variables. In out-of-sample simulations, using the first 14 years (1962-1975) for a training period for the regressions, and then expanding windows of data, the SBCLI is better than LEI in simulating real GDP growth and unemployment rate changes over the next 2 quarters. For industrial production and total jobs growth, the LEI and SBCLI are roughly tied in out of sample performance.

For advanced European economies, Figures 15A and 15B show that SBCLI and LEI are approximately equal both in-sample and out-of-sample R^2, with the OECD's leading indexes doing better on industrial production growth and slightly better on unemployment rate changes, but the SBCLI doing better on real GDP growth and total jobs growth.

Figure14A

Americas: Macro Variables Regressed on SBCLI and LEI Lagged Z-Scores:
Stocks, Bonds, Consumers vs. USA & OECD Leading Indicators 1962-2011, Semiannual

Macro Var = Y_t	Indicator Name	Constnt	Y_{t-1}	t-stat	Trend Real Growth	t-stat	Indic Lag 1 Coef = X_{t-1}	t-stat	Indic Lag 2 Coef = X_{t-2}	t-stat	Corr. R^2
Rl GDP 2Q %Chg	SBCLI LEI USA LEI OECD	-1.97 -0.04 1.60			1.36 0.87 0.40	6.7 3.9 1.8	0.61 1.68 1.75	8.3 7.2 8.3	0.24 0.18 0.18	3.4 0.8 0.8	.57 .47 .50
IndProdn 2Q %Chg	SBCLI LEI USA LEI OECD	-6.85 -2.54 1.39			2.60 1.50 0.38	7.1 3.8 1.0	1.35 3.77 4.02	10.3 9.0 11.0	0.50 0.55 0.59	3.8 1.3 1.6	.65 .57 .63
d Unem-ploymen t Rate 2Q	SBCLI LEI USA LEI OECD	0.65 0.15 -0.23	0.14 0.23 0.23	1.6 2.3 2.4	-0.17 -0.04 0.07	-4.2 -0.9 1.5	-0.14 -0.38 -0.41	-10.5 -8.3 -9.8	-0.07 -0.04 -0.03	-3.5 -0.6 -0.5	.70 .59 .63
Employ-ment 2Q %Chg	SBCLI LEI USA LEI OECD	-1.64 -0.47 0.37	0.23 0.38 0.35	2.8 4.2 3.9	0.77 0.41 0.18	5.7 2.9 1.4	0.30 0.94 1.01	7.0 6.8 8.4	0.19 -0.06 -0.02	3.7 -0.4 -0.1	.64 .55 .61

Figure 14B

Americas: Comparison of Out of Sample Forecast Simulations for Macro Variables: Stocks, Bonds, Consumers Index vs. Leading Indicators: 1976-2011Q (71 Observs)

Macro Variable = Y_t	RMSE Using Historic Mean Fcst	RMSE SBCLI	Implied RSQ vs. Historic Mean RMSE for SBCLI	RMSE For LEI	Implied RSQ vs. Historic Mean RMSE for LEI
Rl GDP Growth 2Q %Chg	2.64	1.78	0.54	2.04 OECD 2.10 USA	0.40 OECD 0.37 USA
IndProdn 2Q %Chg	5.17	3.51	0.54	3.52 OECD 3.94 USA	0.54 OECD 0.42 USA
dUnemploymnt Rate, 2Q	0.61	0.37	0.63	0.41 OECD 0.45 USA	0.54 OECD 0.45 USA
Employment Growth%2QAnn	1.86	1.20	0.59	1.20 OECD 1.34 USA	0.59 OECD 0.49 USA

Figure 15A

Europe: Macro Variables Regressed on SBCLI and LEI Lagged Z-Scores:
Stocks, Bonds, Consumers vs. USA & OECD Leading Indicators 1963-2011, Semiannual

Macro Var = Y_t	Indicator Name	Constnt	Y_{t-1}	t-stat	Trend Real Growth	t-stat	Indic Lag 1 Coef = X_{t-1}	t-stat	Indic Lag 2 Coef = X_{t-2}	t-stat	Corr. R^2
RI GDP 2Q %Chg	SBCLI LEI OECD	-0.36 0.90			0.95 0.55	6.9 3.6	0.43 1.22	8.3 7.6	0.18 0.27	3.4 1.6	.61 .56
IndProdn 2Q %Chg	SBCLI LEI OECD	-1.76 1.41			1.29 0.30	3.7 0.9	1.05 3.54	7.9 9.8	0.42 0.26	3.1 0.7	.53 .59
d Unem-ploymen t Rate 2Q	SBCLI LEI OECD	-0.02 -0.18	0.44 0.59	5.6 7.8	0.02 0.07	0.7 2.7	-0.057 -0.19	-6.2 -7.4	-0.027 -0.00	-2.5 -0.1	.61 .64
Employ-ment 2Q %Chg	SBCLI LEI OECD	0.78 1.08	0.48 0.58	6.1 7.2	-0.17 -0.28	-2.1 -3.1	0.14 0.39	4.4 4.1	0.09 0.12	2.5 1.2	.55 .51

Figure 15B

Europe: Comparison of Out of Sample Forecast Simulations for Macro Variables: Stocks, Bonds, Consumers Index vs. Leading Indicators: 1977-2011Q (69 Observs)

Macro Variable = Y_t	RMSE Using Historic Mean Fcst	RMSE SBCLI	Implied RSQ vs. Historic Mean RMSE for SBCLI	RMSE For LEI	Implied RSQ vs. Historic Mean RMSE for LEI
RI GDP Growth 2Q %Chg	2.11	1.38	0.57	1.46 OECD	0.52 OECD
IndProdn 2Q %Chg	4.87	3.67	0.43	3.36 OECD	0.52 OECD
dUnemploymnt Rate, 2Q	0.39	0.25	0.58	0.25 OECD	0.59 OECD
Employment Growth%2QAnn	1.17	0.69	0.65	0.76 OECD	0.58 OECD

Figure 16A

AustAsia: Macro Variables Regressed on SBCLI and LEI Lagged Z-Scores:
Stocks, Bonds, Consumers vs. USA & OECD Leading Indicators 1962-2010, Semiannual

Macro Var = Y_t	Indicator Name	Constnt	Y_{t-1}	t-stat	Trend Real Growth	t-stat	Indic Lag 1 Coef = X_{t-1}	t-stat	Indic Lag 2 Coef = X_{t-2}	t-stat	Corr. R^2
Rl GDP 2Q %Chg	SBCLI LEI OECD	-1.00 0.90			0.90 0.55	8.2 3.6	0.44 1.22	3.7 7.6	0.02 0.27	0.2 1.6	.45 .56
IndProdn 2Q %Chg	SBCLI LEI OECD	-2.90 1.41			1.25 0.30	5.7 0.9	1.77 3.54	7.5 9.8	0.38 0.26	1.7 0.7	.51 .59
d Unem-ployment Rate 2Q	SBCLI LEI OECD	0.05 -0.08	0.15 0.14	1.5 1.4	-0.003 0.019	-0.5 2.5	-0.028 -0.108	-4.0 -4.9	-0.016 -0.019	-2.1 -0.7	.27 .32
Employ-ment 2Q%Ann	SBCLI LEI OECD	0.17 0.65	0.14 0.12	1.3 1.2	0.10 0.02	2.9 0.5	0.13 0.39	3.7 3.5	0.04 0.09	1.1 0.7	.26 .27
Employ-ment YoY%Chg	SBCLI LEI OECD	0.08 0.44	0.59 0.63	8.2 8.6	0.05 -0.02	2.3 -0.9	0.082 0.324	3.9 4.9	0.052 0.037	2.4 0.5	.62 .64

Figure16B

AustralAsia: Comparison of Out of Sample Forecast Simulations for Macro Variables: Stocks, Bonds, Consumers Index vs. Leading Indicators: 1977-2010 (68 Observs)

Macro Variable = Y_t	RMSE Using Historic Mean Fcst	RMSE SBCLI	Implied RSQ vs. Historic Mean RMSE for SBCLI	RMSE For LEI	Implied RSQ vs. Historic Mean RMSE for LEI
Rl GDP Growth 2Q %Chg	3.72	2.89	0.40	2.89 OECD	0.40 OECD
IndProdn 2Q %Chg	7.56	5.77	0.42	5.73 OECD	0.43 OECD
dUnemploymnt Rate, 2Q	0.22	0.196	0.21	0.193 OECD	0.23 OECD
Employment Growth% YoY Growth% 2QAnn	0.80 0.91	0.48 0.81	0.65 0.21	0.48 OECD 0.85	0.64 OECD 0.13

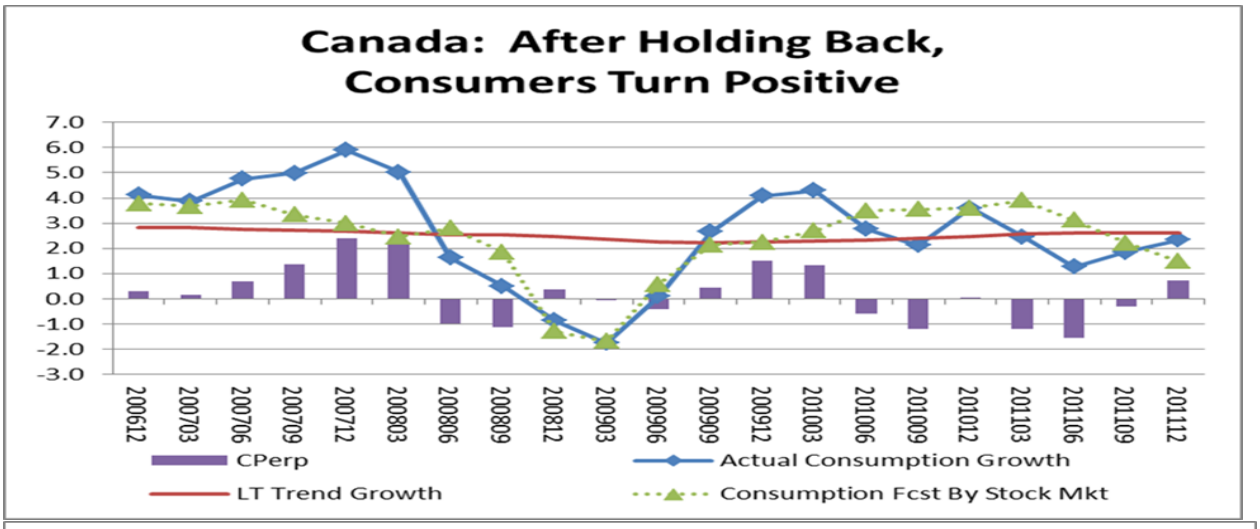
Figures 16A and 16B show that in AustralAsia the OECD's leading indicators do better in-sample on all four major macro variables, probably due to the poor performance of the term structure slope variable in Asia in the recent period, when Japan's economy endured the "lost decades" of weak growth after the real estate bubble was pricked. However, out-of-sample the performance of SBCLI and the OECD's leading indicators was almost identical, so there must have been even more parameter estimation difficulty with the OECD's leading indicators in AustralAsia than for the SBCLI.

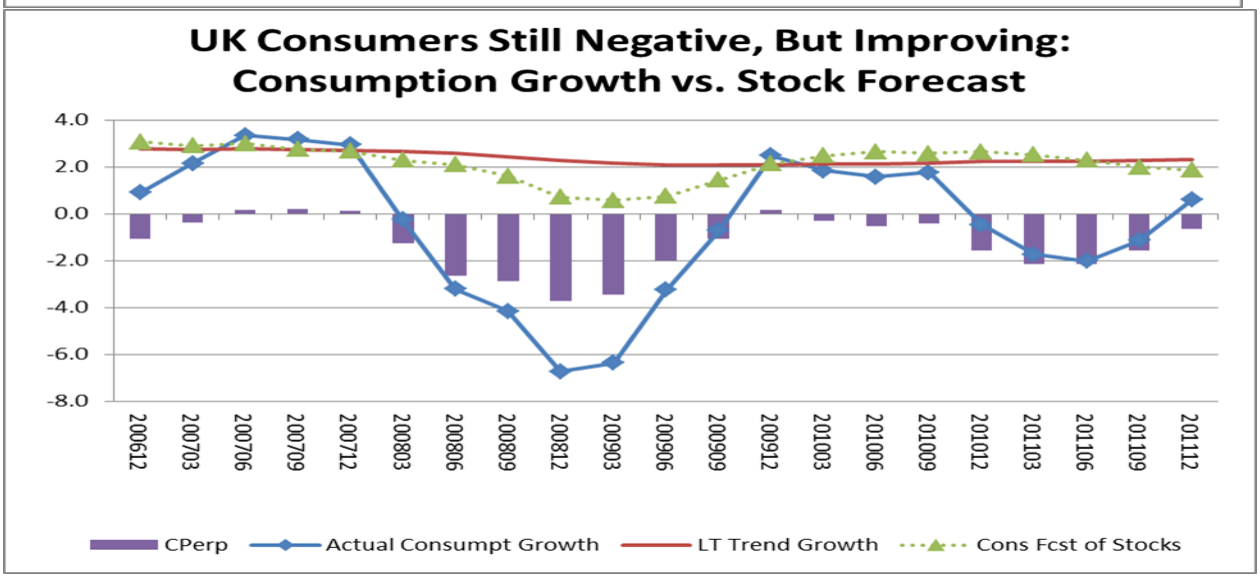
V. Conclusion

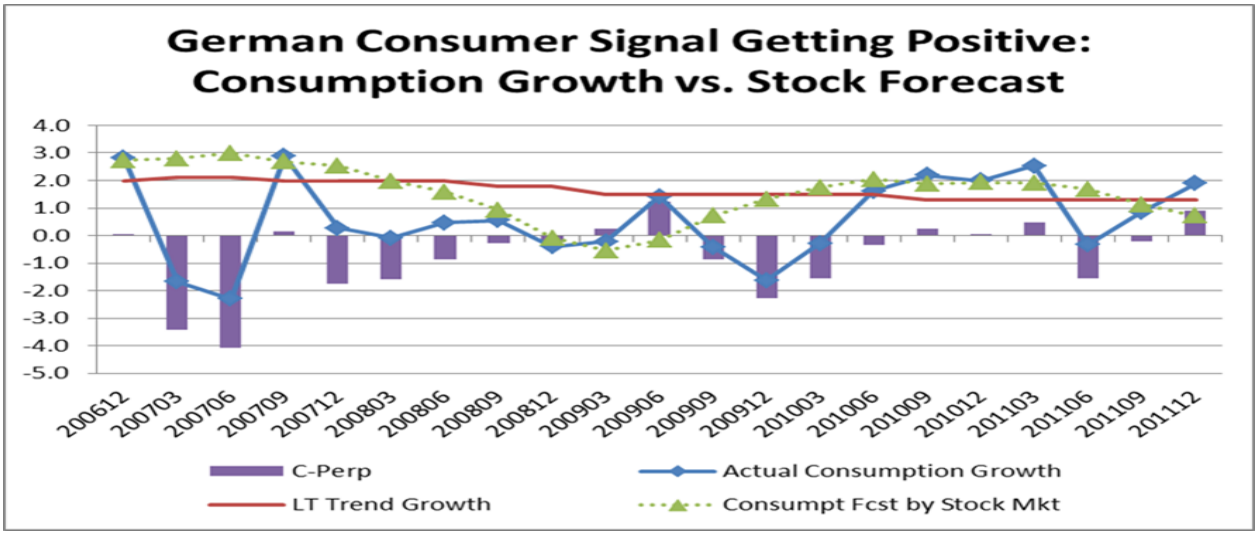
In summary, what is striking from these results from around the globe is that the relatively simple 3-variable, SBCLI indexes (with fixed weights on stocks, bonds and consumption deviations) do well on these tests in comparison to the LEI, which is a composite of 10-12 economic variables with relatively continuous weights. Overall, the performance of the indexes is quite similar. On an absolute basis, all three indexes are significant in helping to explain subsequent short-term moves in the macro variables, with strong t-statistics and R-squared values, both for in-sample estimations and in simulated out-of-sample tests. Of course, short-term economic forecasting is quite hazardous, as even with the best of forecasts, the errors are often economically large. And longer term forecasting is even more difficult than short-term forecasts.

The intuitive nature and relative simplicity of the three major variables in the SBCLI should make it possible for business, government and nonprofit employees to understand the genesis of the forecasts of this indicator, as well as to do their own updating of forecasts relatively easily, just by observing real stock returns, the slope of the (real) term structure, and whether or not consumers are spending more or less than expected, given stock market movements.

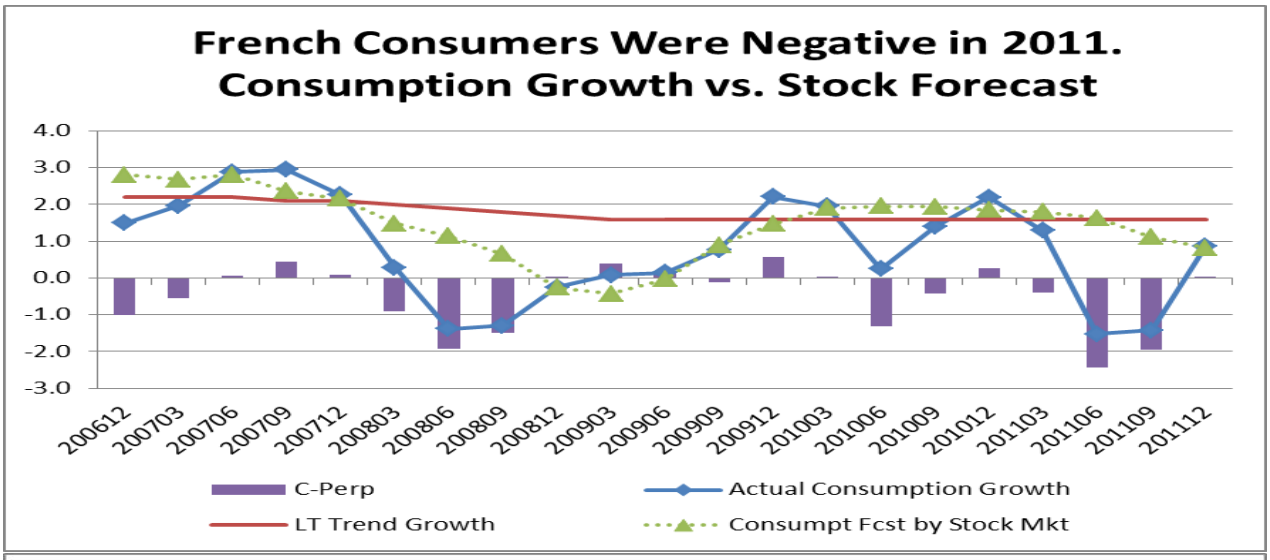
Appendix 1: Consumption Deviations for Trillion Dollar Economies

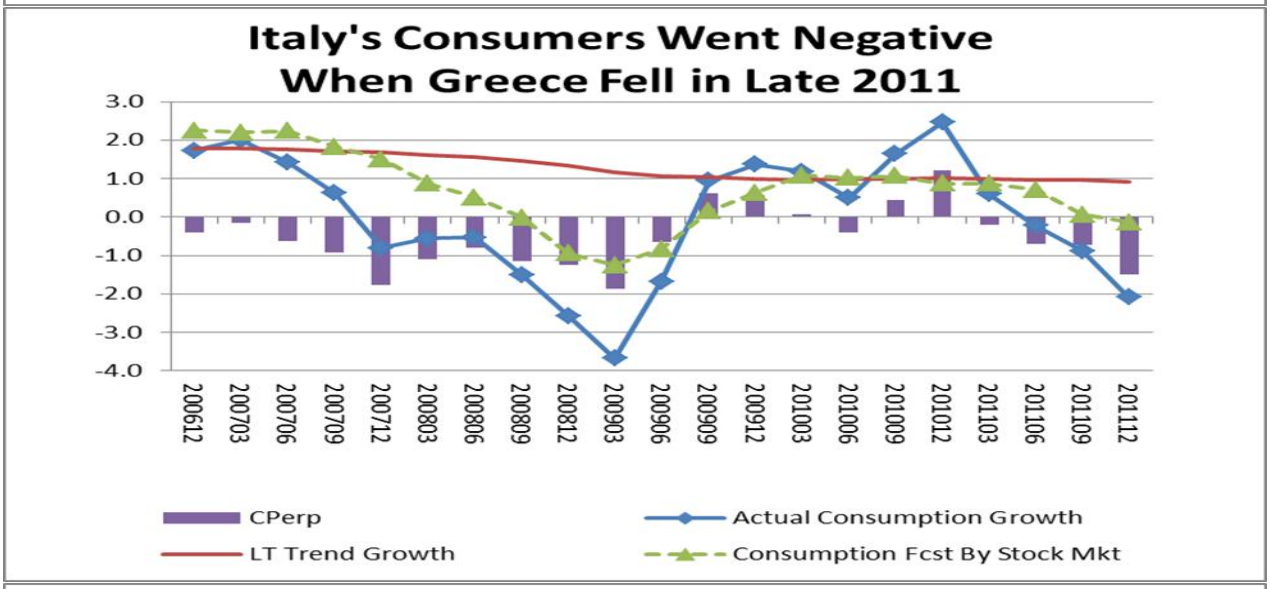


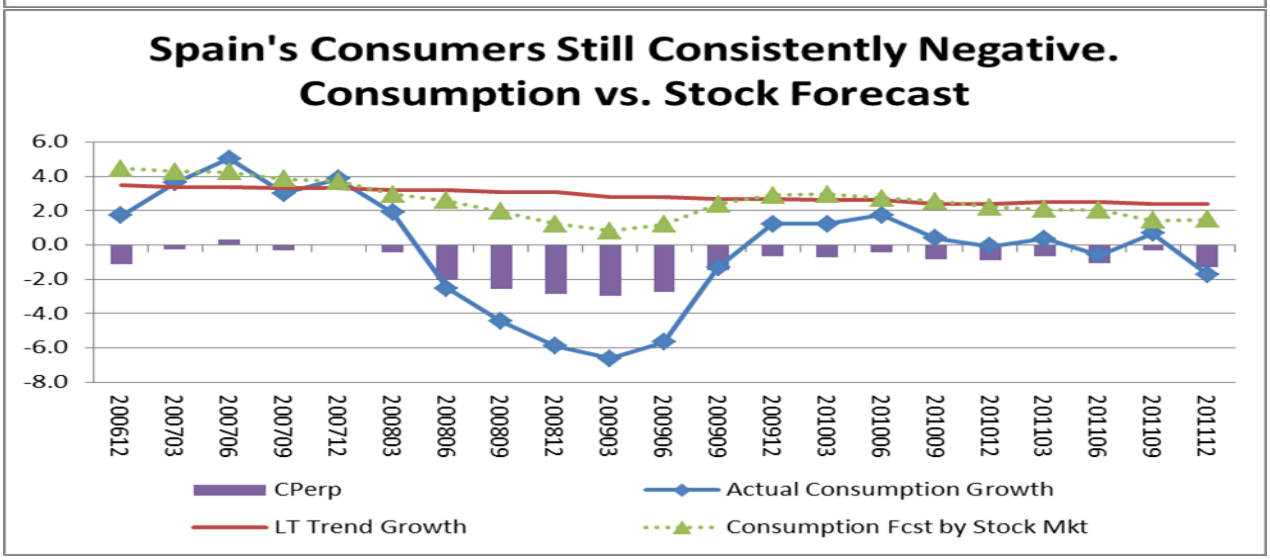




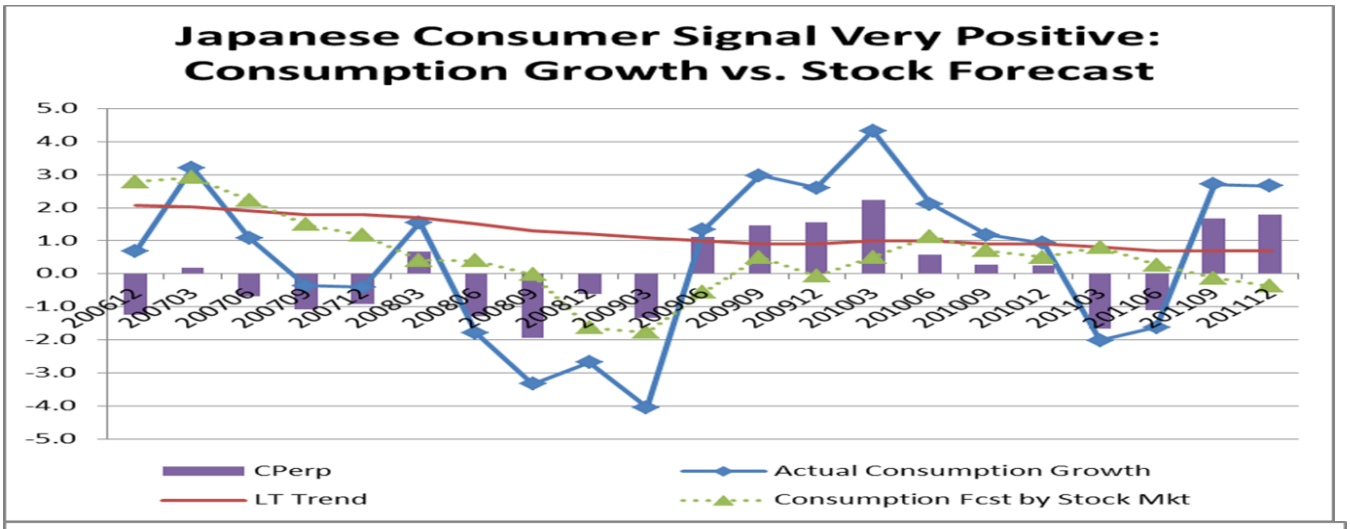
Appendix 1: Consumption Deviations for Trillion Dollar Economies (cont)

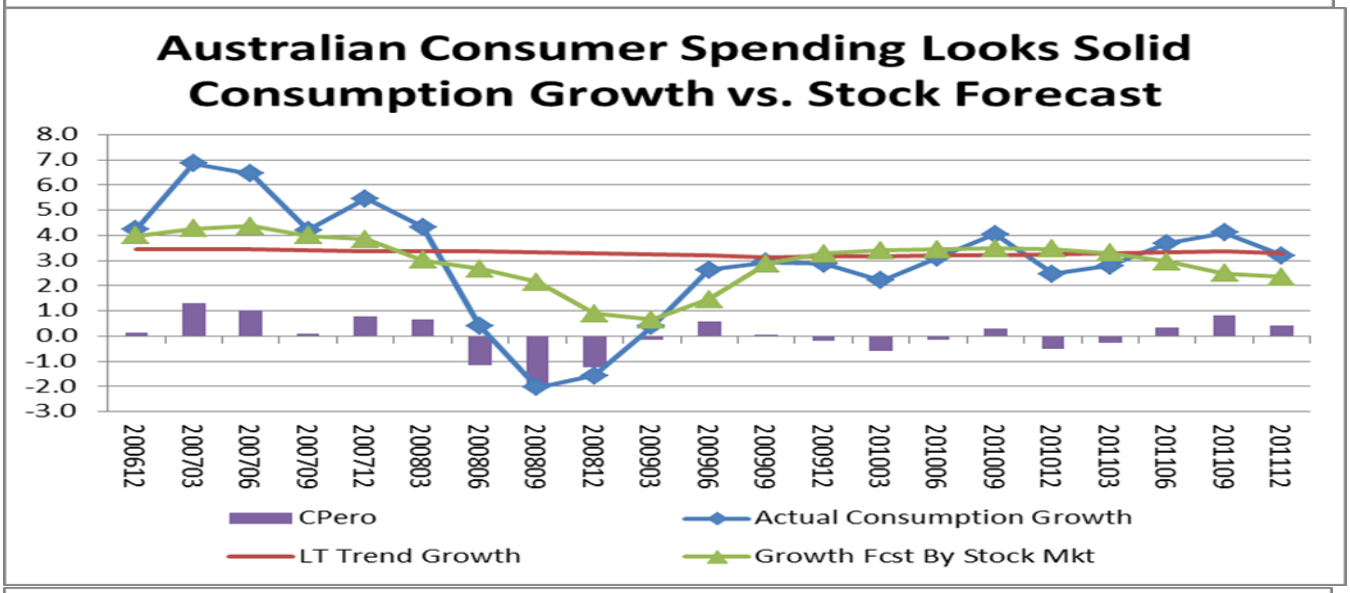


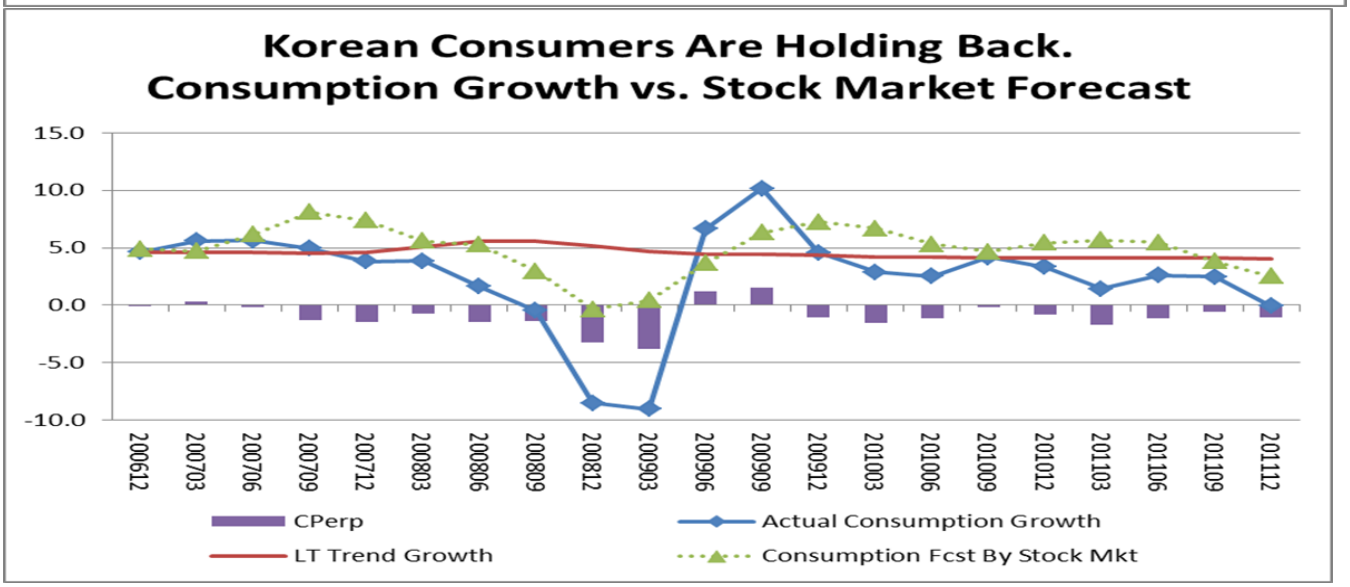




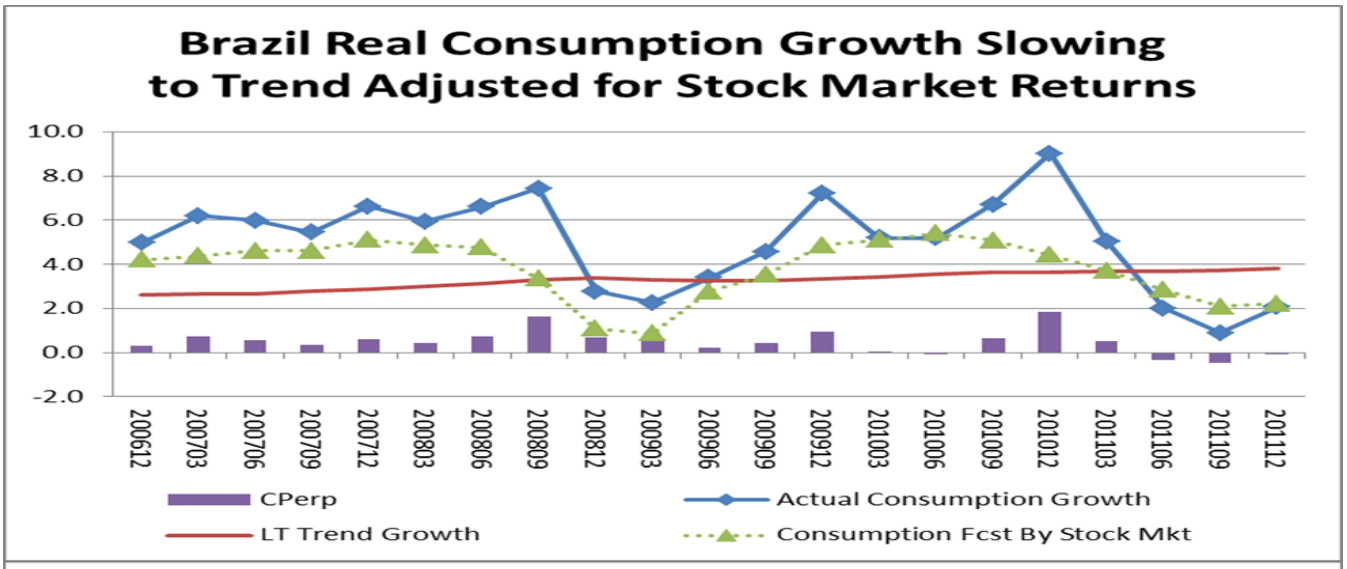
Appendix 1: Consumption Deviations for Trillion Dollar Economies (cont)

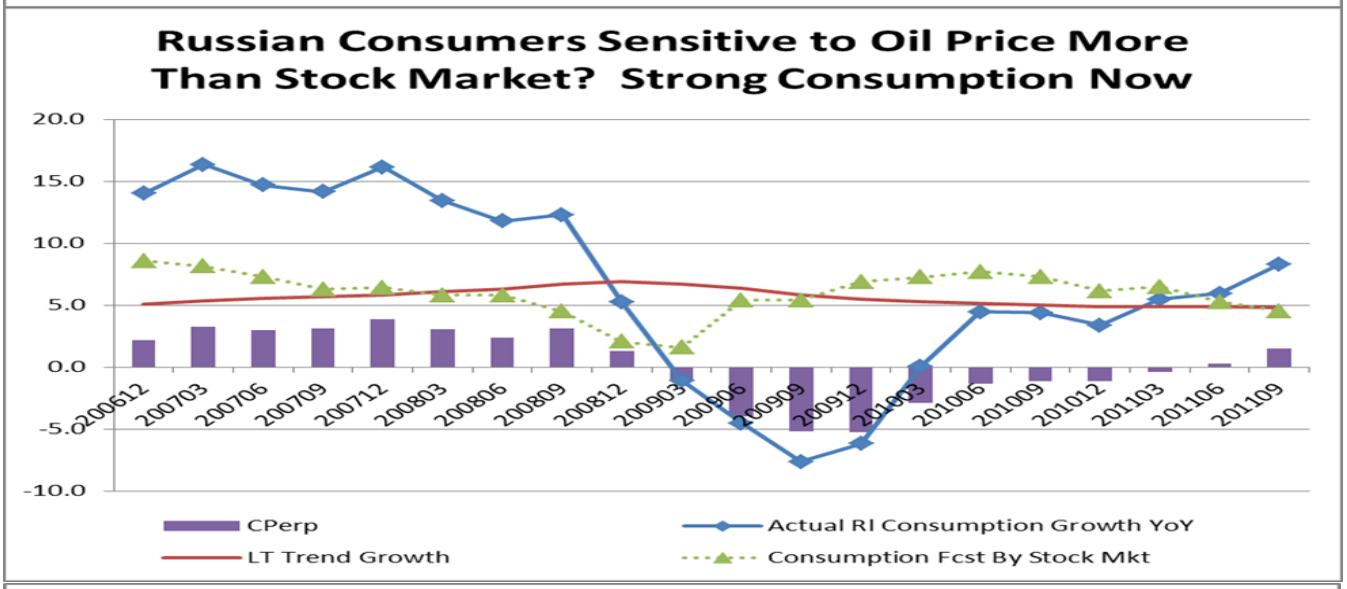




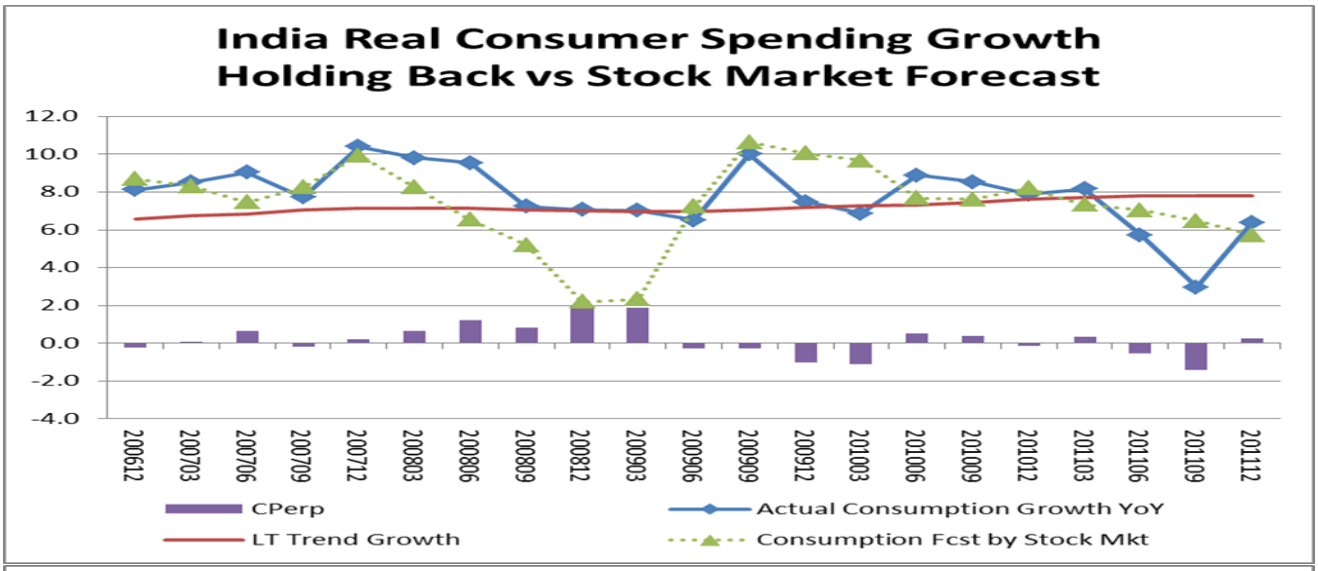


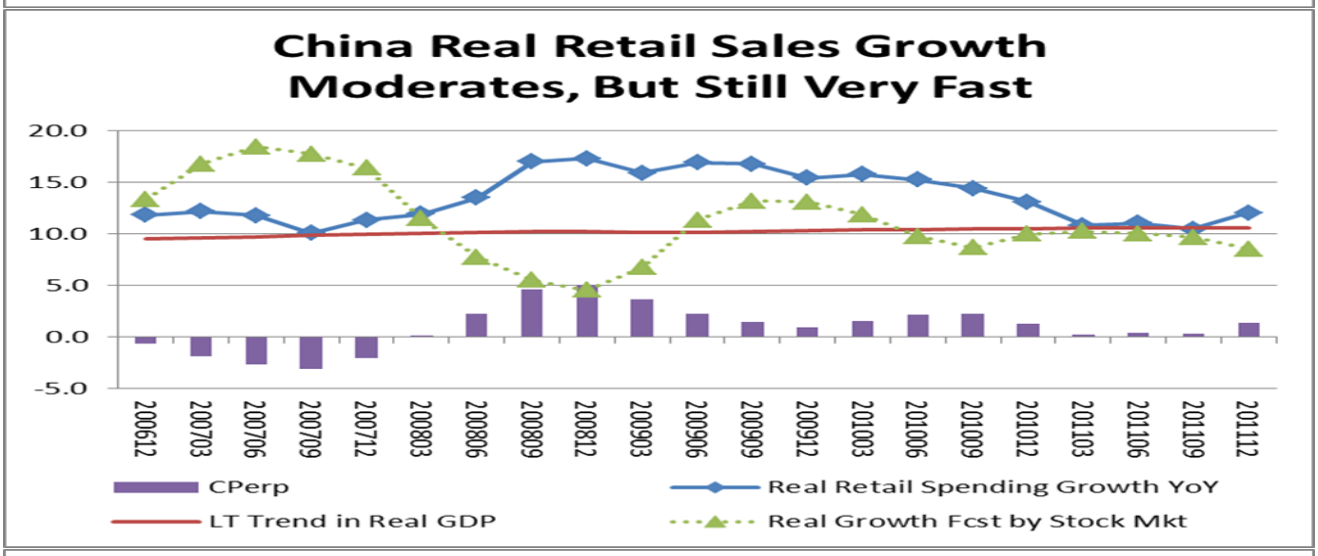
Appendix 1: Consumption Deviations for Trillion Dollar Economies (cont)

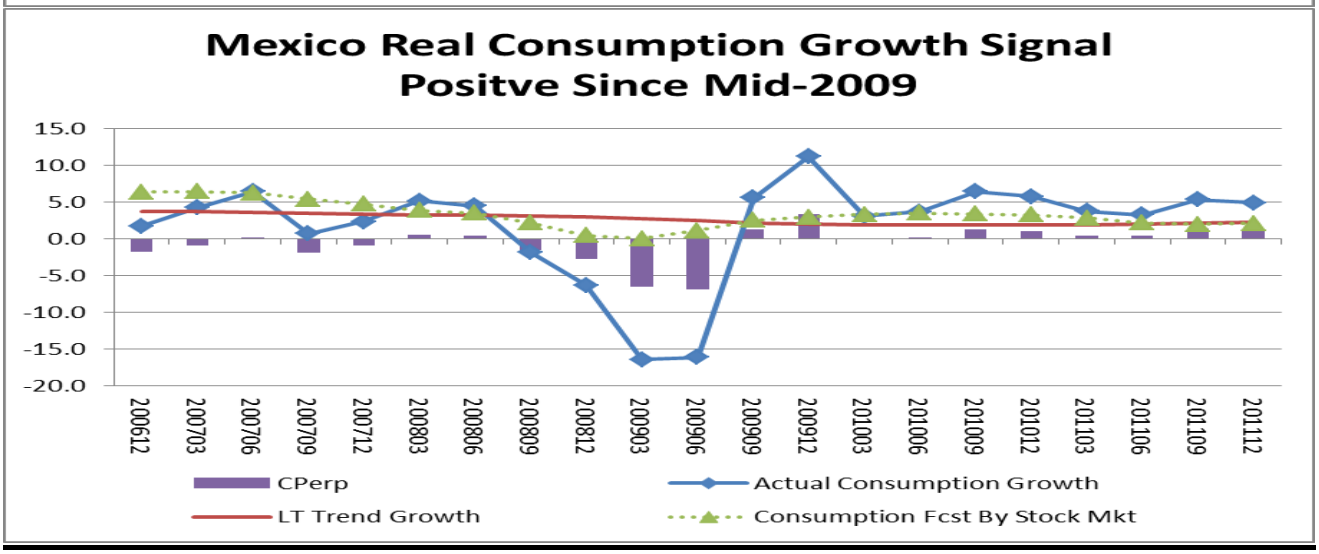




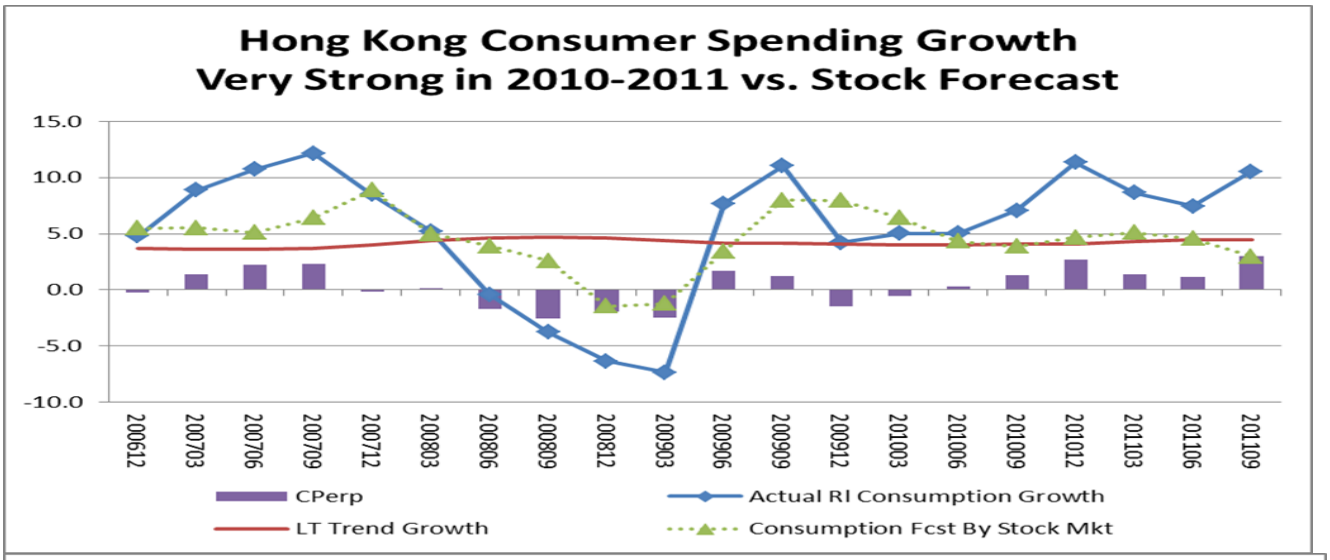
Appendix 1: Consumption Deviations for Trillion Dollar Economies (cont)

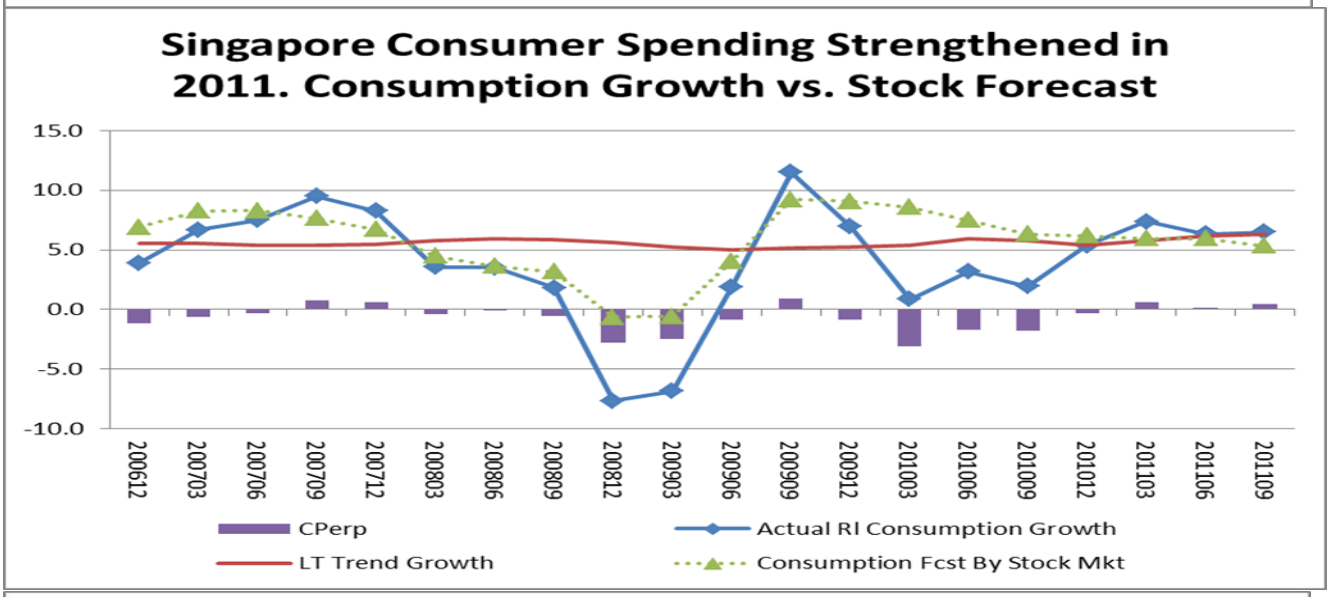


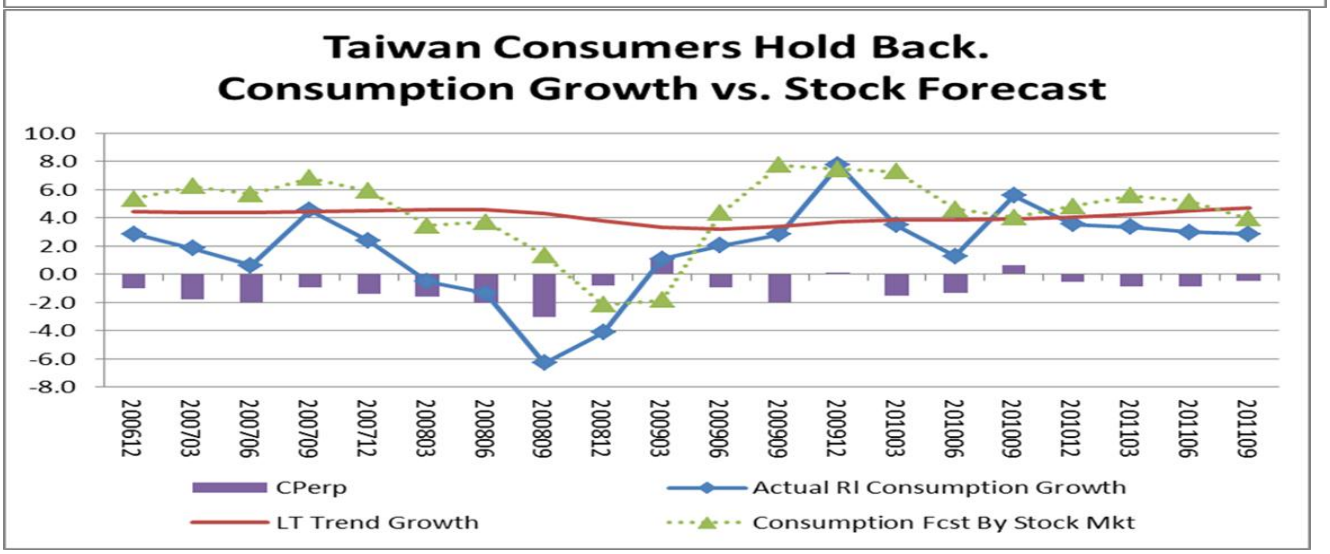




Appendix 1: Consumption Deviations for Trillion Dollar Economies (cont)







Appendix 2A: In-Sample Stepwise Regressions

Global Stepwise Regressions: Corrected R^2 of Macro Variables on Lagged Stock Returns, Term Structure Slope, and Real Consumption Deviations, Semiannual 1962-2011

Variable (Y_t)	Historic 20 Yr GDPTrend In all Regs	Slope 10Y-3m Only Lag 1	RIStock Return Only, Lg1,Lg2	Stock Lg12 + Slope Lag 1	Stock Lg12 + PCETot Dev Lg1	Stock L12 Slope Lg1 PCETot Devn, Lg1	Leading Economic Indicators, Lg1, Lg2
Real GDP , 2Q% Chg							
Advanced Americas 1962 Q2 - 2011 Q2	0.09	0.24	0.38	0.52	0.48	0.56	0.50 OECD 0.48 USA
Advanced Europe 1963Q2 to 2011 Q2	0.18	0.31	0.42	0.51	0.56	0.60	0.56
Advanced AustralAsia 1962Q2 to 2010 Q4	0.37	0.36	0.43	0.42	0.43	0.45	0.51
Indust. Prod'n, 2Q%Chg							
Advanced Americas 1962 Q2 - 2011 Q2	0.07	0.24	0.48	0.64	0.55	0.66	0.63 OECD 0.58 USA
Advanced Europe 1963Q2 to 2011 Q2	0.06	0.26	0.31	0.46	0.42	0.52	0.58
Advanced AustralAsia 1962Q2 to 2010 Q4	0.15	0.26	0.34	0.41	0.47	0.51	0.61

Global Stepwise Regressions: Corrected R^2 of Macro Variables on Lagged Stock Returns, Term Structure Slope, and Real Consumption Deviations, Semiannual 1962-2011

Variable (Y_t) (All Employment and unemployment rate change regressions have lagged dependent var.)	Historic 20 Yr GDP Trend In all Regs	Slope 10Y-3m Only Lag 1	RIStock Return Only, Lg1,Lg2	Stock Lg12 + Slope Lag 1	Stock Lg12 + PCETot Dev Lg12	Stock L12 Slope Lg1 PCETot Devn Lg1 *Lg12 Avg	Leading Economic Indicators, Lg1, Lg2
Unemploy Rate , 2Q Chg							
Advanced Americas 1962 Q2 - 2011 Q2	0.27	0.39	0.55	0.67	0.63	0.70	0.64 OECD 0.59 USA
Advanced Europe 1963Q2 to 2011 Q2	0.38	0.48	0.50	0.55	0.59 Lg1 0.57 Lg12	0.60 Lg1 0.60 Lg12	0.64
Advanced AustralAsia 1962Q2 to 2010 Q4	0.09	0.12	0.27	0.27	0.29	0.29	0.32
Employmnt 2Q%Chg							
Advanced Americas* 1962 Q2 - 2011 Q2	0.31	0.40	0.51	0.58	0.61 Lg12	0.63 Lg12	0.61 OECD 0.56 USA
Advanced Europe 1963Q2 to 2011 Q2	0.38	0.44	0.46	0.50	0.53 Lg1 0.51 Lg12	0.54 Lg1 0.52 Lg12	0.51
Advanced AustralAsia 1962Q2 to 2010 Q4, YoY	0.51	0.52	0.61	0.61	0.63 Lg1 0.63 Lg12	0.63 Lg1 0.62 Lg12	0.64

Source: Breeden (2012)

Appendix 2B: Out-of-Sample Stepwise Simulations

Out of Sample Global Stepwise Simulations: Implied R^2 of Macro Variables on Lagged Stock Returns, Term Structure Slope, and Real Consumption Deviations, Semiannual 1977-2011

Variable (Y_t)	Historic 20 Yr GDP Trend In all Regs	Slope 10Y-3m Only Lag 1	RIStock Return Only, Lg1,Lg2	Stock Lg12 + Slope Lag 1	Stock Lg12 + PCETot Dev Lg1	Stock L12 Slope Lg1 PCETot Devn, Lg1	Leading Economic Indicators, Lg1, Lg2
Real GDP , 2Q% Chg							
Advanced Americas 1977 Q2 - 2011 Q2	-0.04	-.01	0.26	0.42	0.41	0.47	0.41 OECD 0.37 USA
Advanced Europe 1977Q2 to 2011 Q2	0.02	0.15	0.20	0.34	0.40	0.47	0.52
Advanced AustralAsia 1977Q2 to 2010 Q4	0.28	0.25	0.38	0.33	0.44	0.39	0.39
Indust. Prod'n, 2Q%Chg							
Advanced Americas 1977 Q2 - 2011 Q2	-0.08	-0.05	0.32	0.56	0.40	0.55	0.54 OECD 0.42 USA
Advanced Europe 1977Q2 to 2011 Q2	0.00	0.11	0.01	0.24	0.16	0.32	0.51
Advanced AustralAsia 1977Q2 to 2010 Q4	0.04	0.09	0.23	0.28	0.34 Lg1 0.39 Lg12	0.39 Lg1 0.42Lg12	0.42

Out of Sample Global Stepwise Simulations: Implied R^2 of Macro Variables on Lagged Stock Returns, Term Structure Slope, and Real Consumption Deviations, Semiannual 1977-2011

Variable (Y_t) (All employment and unemployment rate change regressions have lagged dependent var.)	Historic 20 Yr GDP Trend In all Regs	Slope 10Y-3m Only Lag 1	RIStock Return Only, Lg1,Lg2	Stock Lg12 + Slope Lag 1	Stock Lg12 + PCETot Dev Lg12	Stock L12 Slope Lg1 PCETot Devn, Lg12 Avg	Leading Economic Indicators, Lg1, Lg2
Unemploy Rate , 2Q Chg							
Advanced Americas 1977 Q2 - 2011 Q2	0.20	0.23	0.41	0.57	0.52	0.60	0.55 OECD 0.47 USA
Advanced Europe 1977Q2 to 2011 Q2	0.31	0.46	0.36	0.44	0.50 Lg1 0.48 Lg12	0.52 Lg1 0.50 Lg12	0.57
Advanced AustralAsia 1977Q2 to 2010 Q4	0.06	0.02	0.21	0.17	0.24	0.19	0.23
Employmnt 2Q%Chg*							
Advanced Americas 1977 Q2 - 2011 Q2	0.33	0.36	0.44	0.52	0.54	0.55	0.59 OECD 0.49 USA
Advanced Europe 1977Q2 to 2011 Q2	0.37	0.46	0.45	0.46	0.55 Lg1 0.48 Lg12	0.53 Lg1 0.47 Lg12	0.55
Advanced AustralAsia* 1977Q2 to 2010 Q4, YoY	0.59	0.52	0.68	0.64	0.69	0.66	0.64

Source: Breeden (2012)

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