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Interest Rate Insurance Prices Implicit in Option Prices

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European economies showed increasing strength in the past 2 months. ECB President Draghi said deflation is no longer a risk, given solid growth, though he wishes to maintain "low for long" rates. The US Fed raised rates ¼ in June, crossing the 1.0% barrier on T-bill rates for the first time in 9 years. US growth is solid, as is growth in Asia. Brazil and Russia showed weakness, given corruption scandals and prior recessions. While the Bank of Japan remains intransigent, Japan is also doing fine and markets are expecting less of the massive easing attempted there. Normalization is beginning all over the world. It's about time!

I. Overview of Recent Events and Macroeconomic Conditions.

First, please note that I have added several new macro graphs to my usual analysis. Figures 1A and 1B show real GDP growth in the Americas, Europe, Asia Pacific and Latin America, the largest global economies. Growth is solid or improving almost all over the world. Growth in Europe has slightly surpassed that of the USA. China and India and other Asian economies continue to grow the most rapidly of large economies. Brazil and Russia are the only major countries with significant downticks, as new President Temer of Brazil is now embroiled in a corruption scandal, and Russia is implicated in meeting with President Trump's immediate family prior to the 2016 election and attempting to influence the US election.

Inflation remains quiescent in advanced economies, but as ECB President Draghi stated, he is no longer concerned about the threat of deflation. See Figures 2A and 2B for data. Reflation is becoming the new watchword. However, both UK and USA economies showed a downtick in core inflation in the last month or two, so inflation remains quite tame and is being used by central banks to justify their decisions and plans to continue massive monetary stimulus and have rates remain at extremely low rate levels. The US core inflation rate (excluding notably volatile components for food and energy) dropped from just above 2.0% year over year to just below 2.0%, not a significant move in my view. The US Fed increased rates again in June but, given the recent inflation downtick, Chair Yellen said it will be a very gradual hiking process. Britain has also had a downtick from the rapid inflation experienced after the BREXIT vote dropped the Pound's value and caused a surge in inflation to over 2.5%. This data is being used by Bank of England Governor Mark Carney to continue to oppose liftoff in the UK. However, bond markets in the Euro Area, the UK, and in Japan as well, are beginning to think that central banks are well behind the curve and will be eventually forced by logic and reasonable economic conditions to start getting out of the markets and away from massive monetary stimulus. Massive stimulus seems quite unwarranted by the low unemployment conditions. Better to normalize and build up some dry powder for the next big jolts, in my view. At least I am consistent in this view!

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[1] I thank Song Xiao and Gloria Zeng of Duke for excellent research assistance.

Movements in nominal rates, the bond market's pricing of inflation expectations and resulting real rates are in Figures 3A-3C. As mentioned, given increasingly clear strength in Europe, the USA, China, India, Japan and other global economies, interest rates increased in the past 2 months, with the German 10-year bund yield increasing 17 basis points from 0.42% in May to 0.59% in July. The 10-year British gilt jumped 23 bp from 1.08% to 1.31%, and the US 10-year note rose from 2.22% to 2.33%. Figure 3B shows that the breakeven inflation rate in the USA that is reflected in the difference between nominal yields on Treasurys and the yields on inflation-protected TIPS dropped, as slightly weaker inflation data came in. Given higher nominal rates and lower inflation expectations, real rates increased in the USA, consistent with solid real growth expectations.

Volatility is at historically low levels, with the VIX down to 9.5% in July. This is causing concern among the central banks and some market participants, as the last time it was so low was in 2005-2006, and we all know what happened after that. Economists and the Fed worry that investors are too confident of growth and might not be prepared for the inevitable bumps in the road to growth.

As Table 1 shows, stock prices have hit record highs in many parts of the world, especially in the USA, Mexico, Germany, Turkey, South Korea, India and Indonesia. Forecasted earnings for the next 12 months have grown quite a lot, a median of 13% since November 2016. So, despite good stock price gains, forward P/E ratios have not increased much on average, actually dropping from 14.5 to 14.3 on the worldwide median in the past year. Turkey, South Korea, Mexico and India stand out for stock market performance in the past two months, and all four of those economies seem strong. Brazil stocks bounced back a bit, too, after the outbreak of the most recent Presidential scandal hit two months ago.

Figure 1A

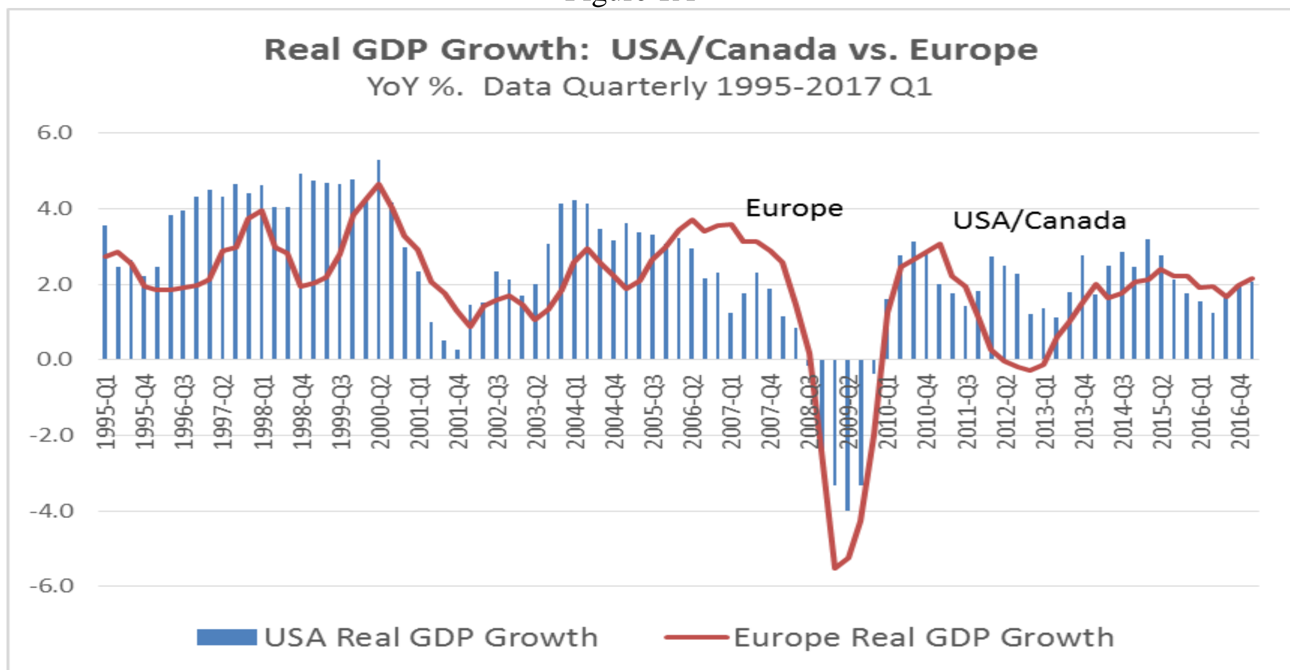


Figure 1B

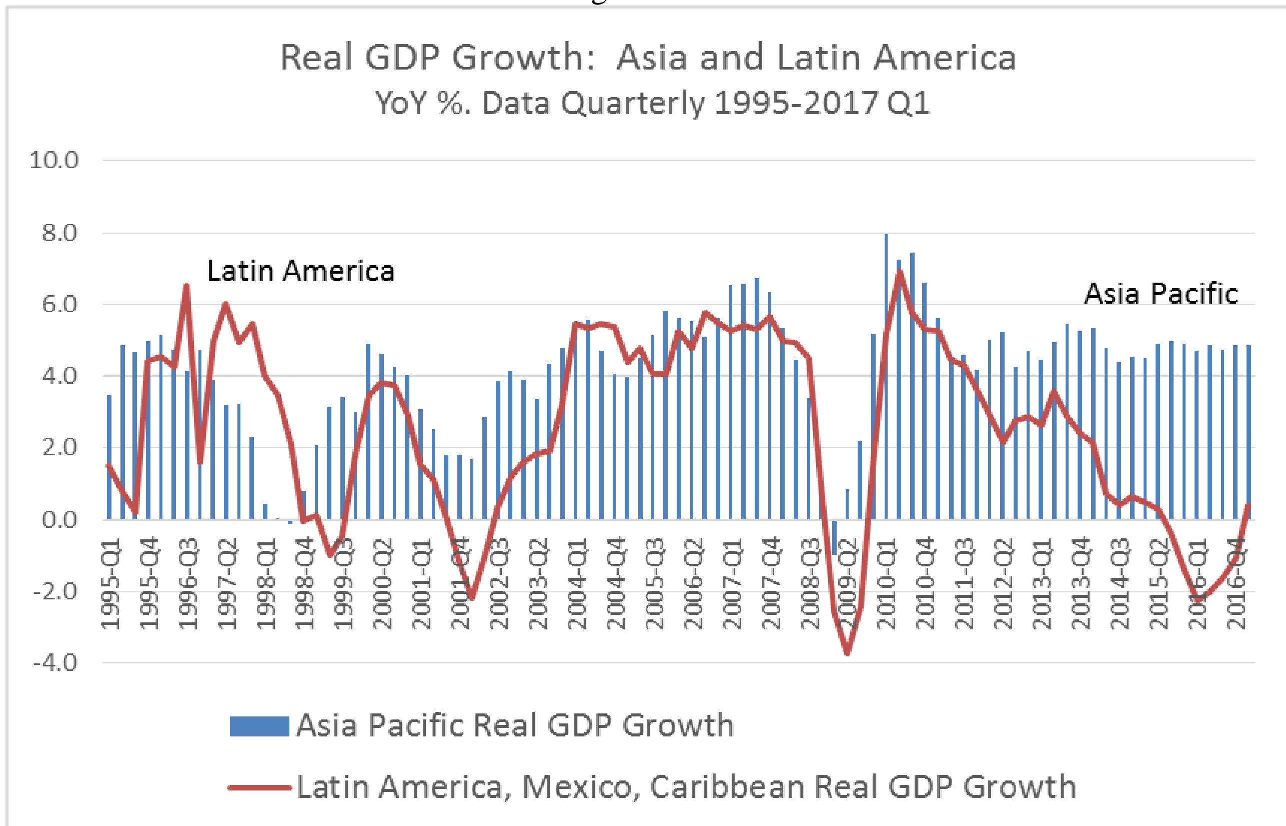


Figure 2A

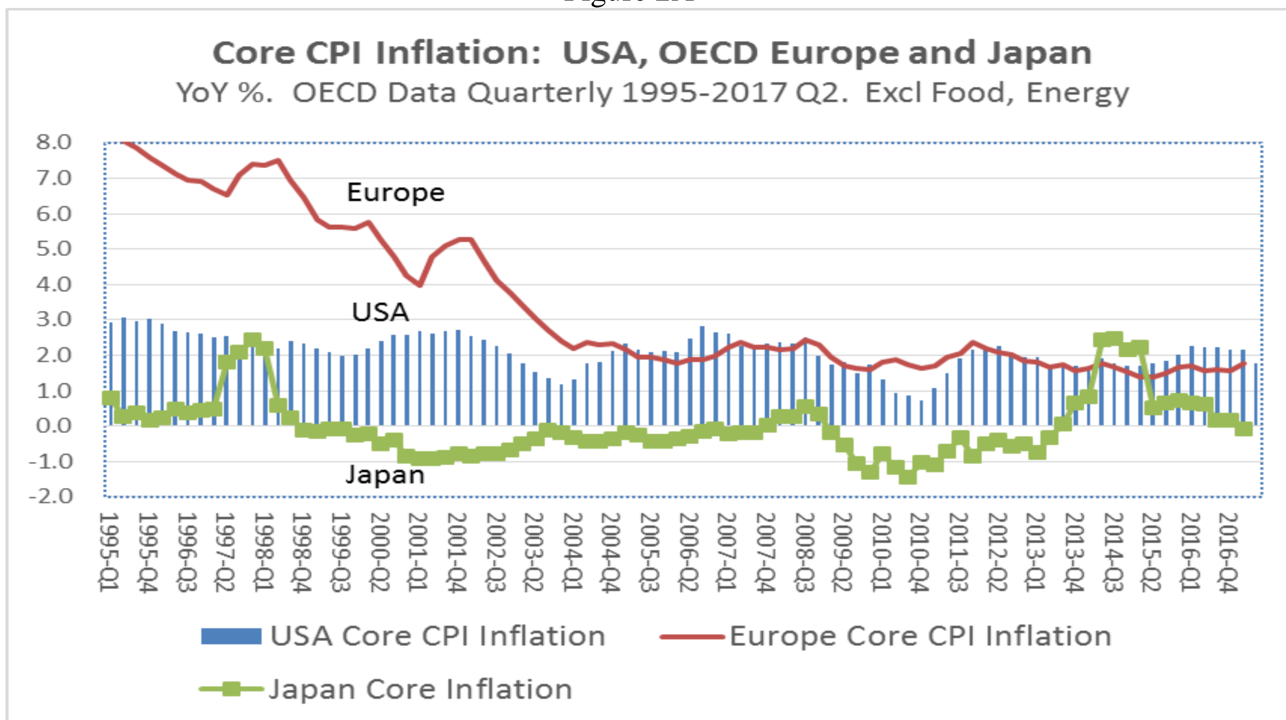


Figure 2B

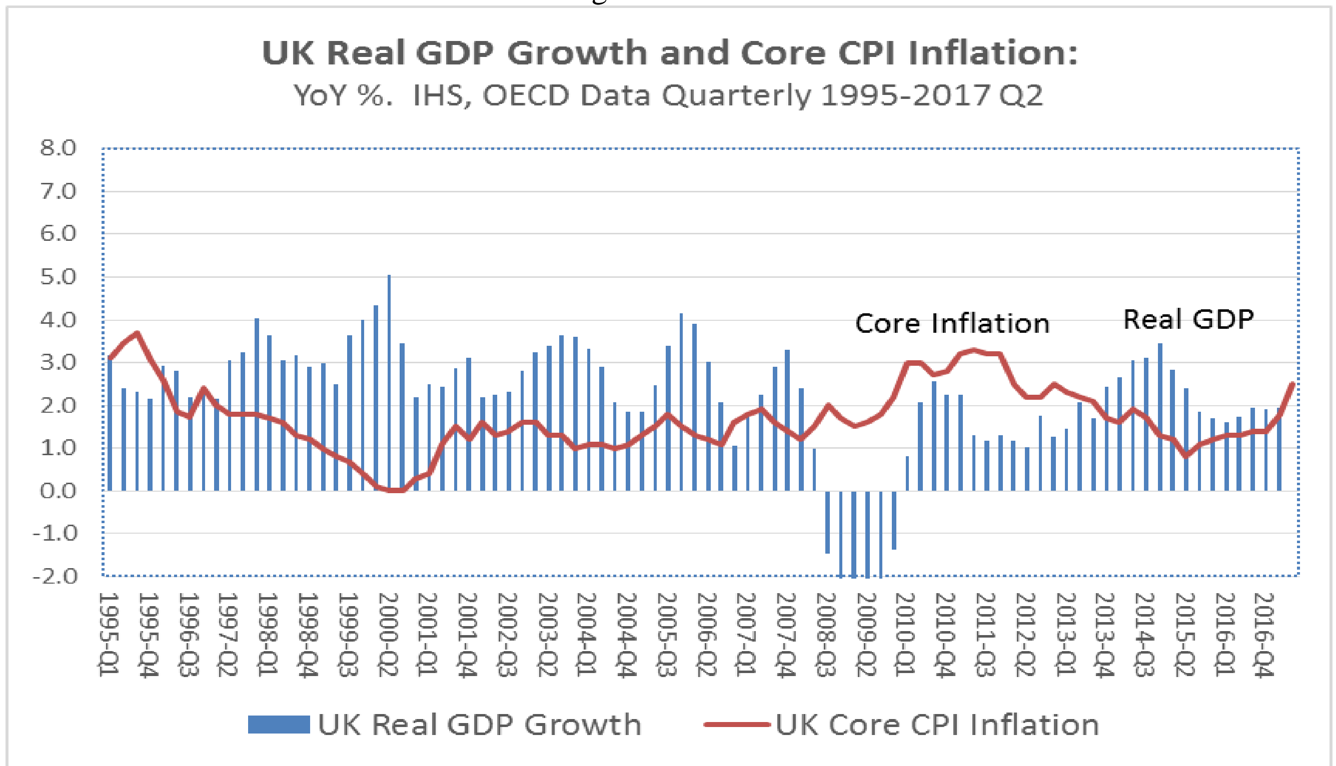


Figure 3A

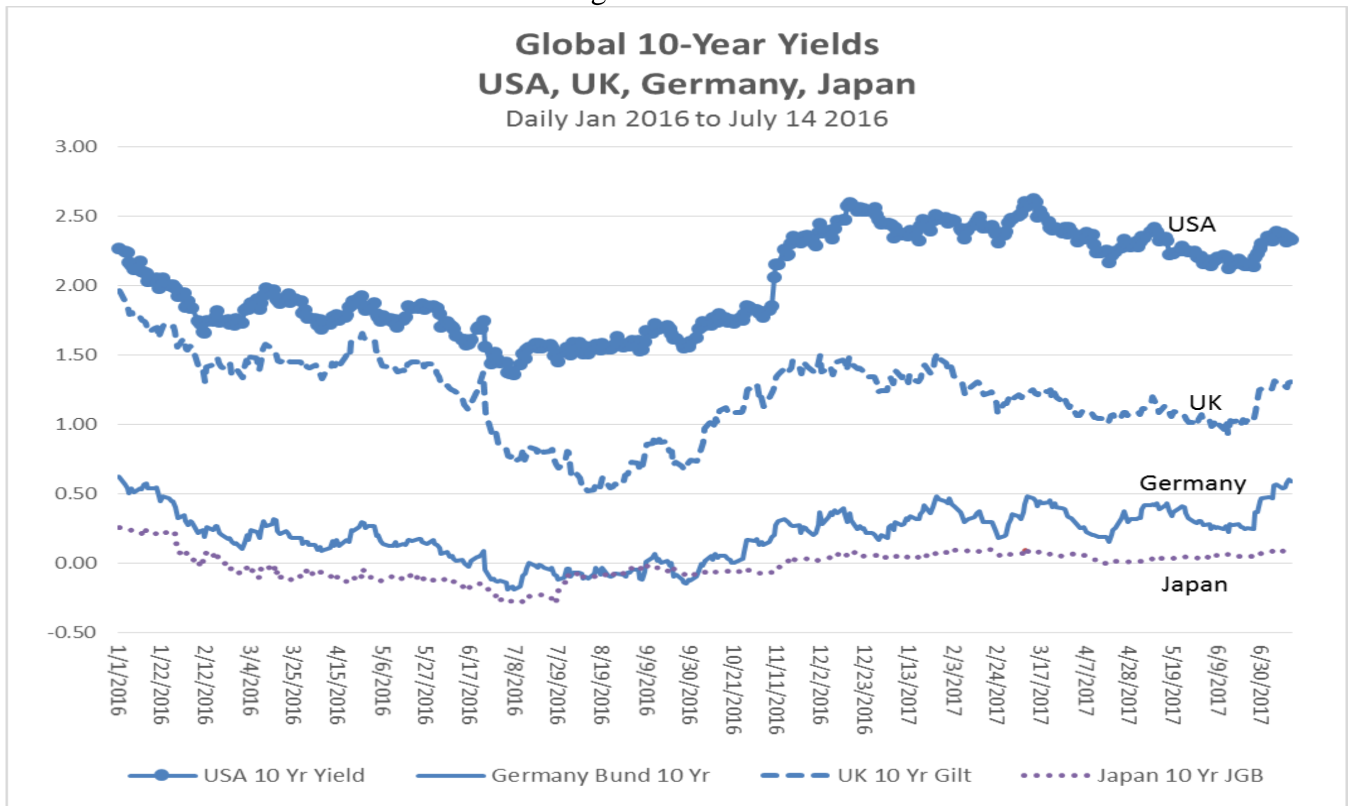


Figure 3B

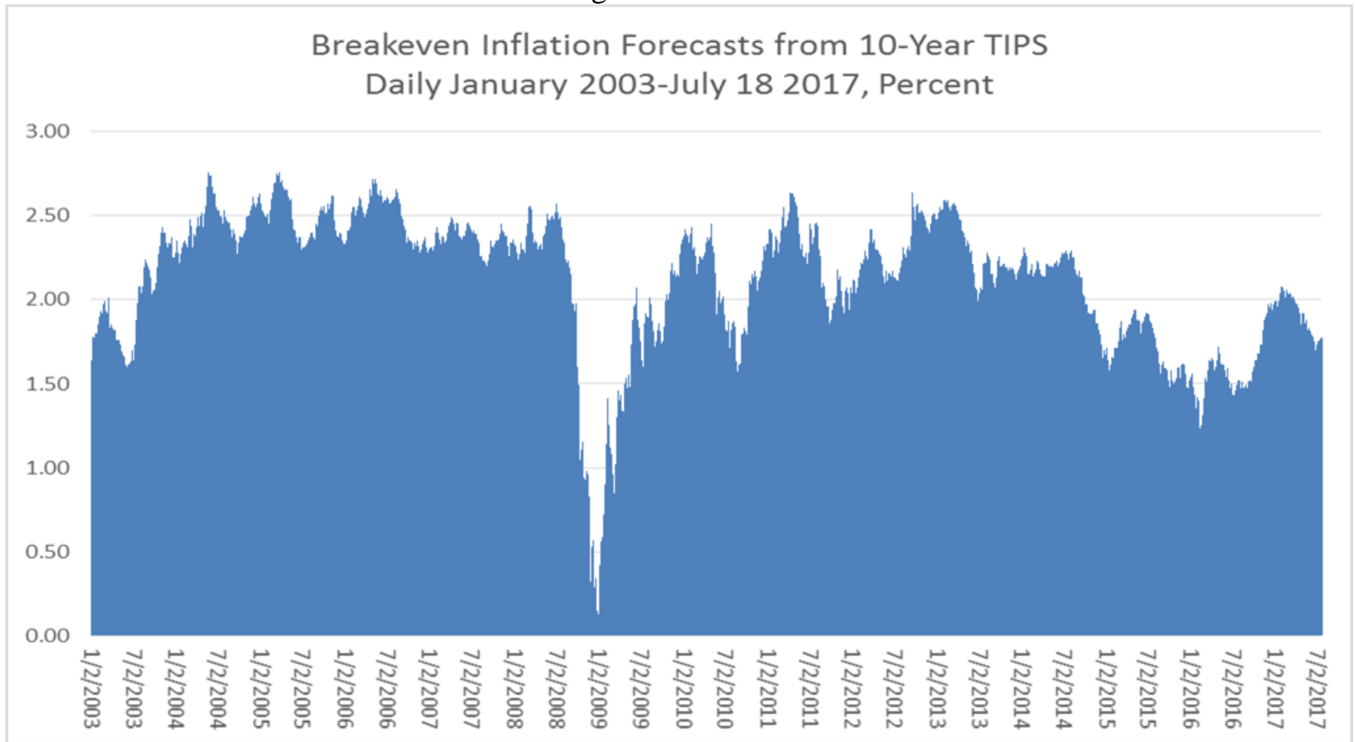


Figure 3C

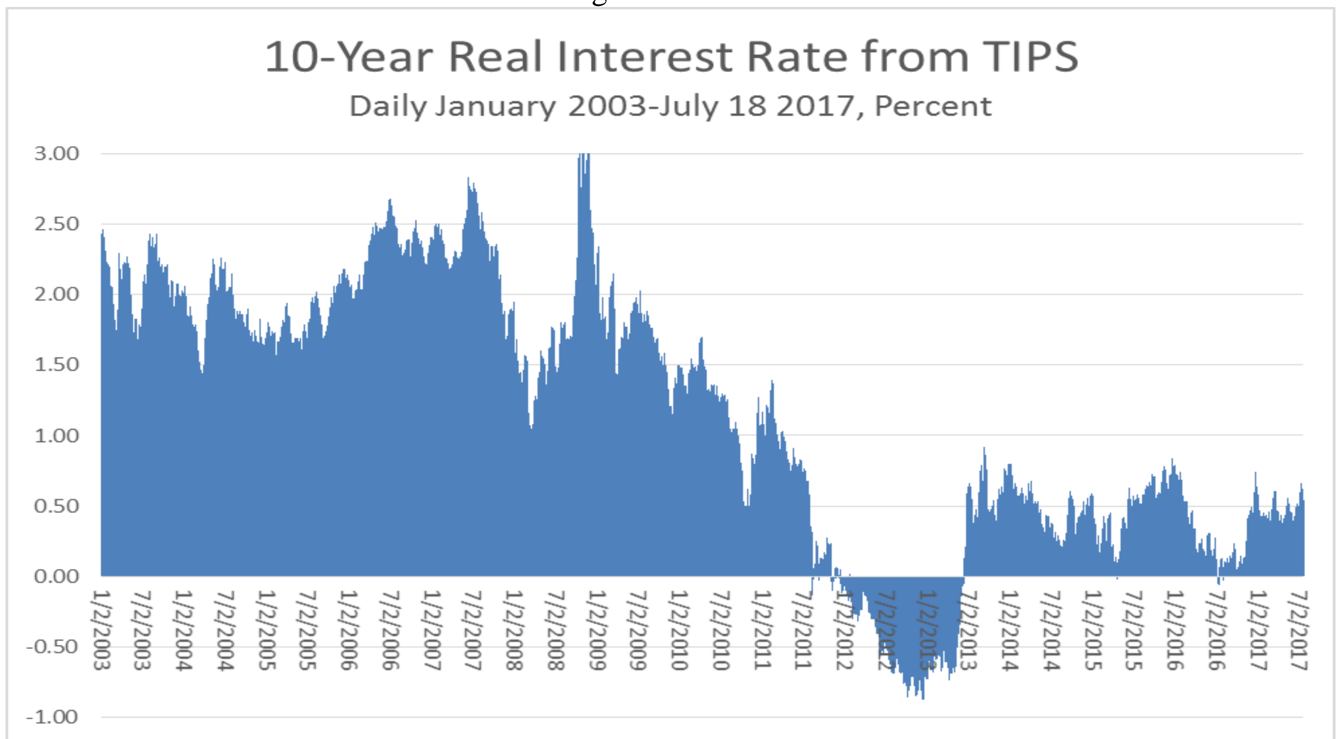


Figure 4

Volatility Index (VIX)

Annualized % Option Implied Volatility of S&P 500 Stocks.
1990-July 19, 2017 Daily

Table 1

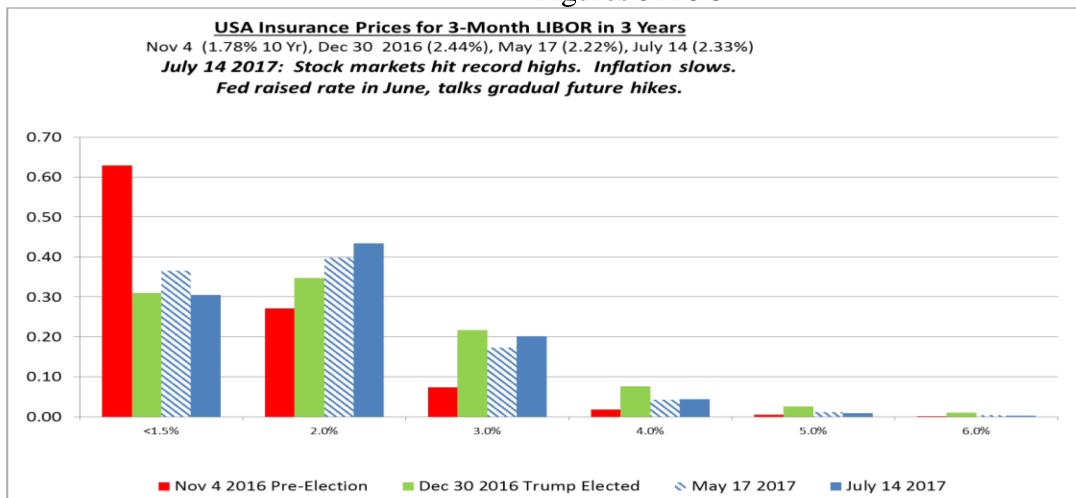
Global Stock Market Valuation: 17 Trillion Dollar GDP Economies															
7/19/2017 11:28					Bloomberg Data with Prices as of close July 14, 2017										
	7/14/2017	5/18/2017	%Price Chg	%Price Chg	7/14/2017	11/4/2016	%Chg Fw12	Last 12mo	Last 12mo	Fwd 12 P/E	Fwd 12 P/E	CPI LTM	Fwd E/P	2-Year	StkPrice
	Price	Price	5/18/2017	12/31/2015	EPS Fwd 12	EPS Fwd 12	EPS Fcst	EPS LTM	P/E LTM	2016	2017	Inflation	Real (-Infl)	Hi Price	Off High
Americas			7/14/2017	7/14/2017				7/14/2017	7/14/2017	6/8/2016	7/14/2017		Eq. Risk Prem		
United States	2,459	2,366	4%	20%	137.7	127.0	8%	129.6	19.0	17.4	17.9	2.1%	3.5	2,459	0%
Canada	15,175	15,277	-1%	17%	956.2	878.9	9%	724.6	20.9	18.2	15.9	1.2%	5.1	15,943	-5%
Brazil	65,436	61,597	6%	51%	5101.7	4436.6	15%	3716.1	17.6	13.3	12.8	3.6%	4.2	69,488	-6%
Mexico	51,162	48,322	6%	19%	2921.8	2616.2	12%	2326.0	22.0	20.1	17.5	5.3%	0.4	51,162	0%
Europe															
France	5,235	5,290	-1%	13%	350.0	318.2	10%	270.2	19.4	14.2	15.0	0.8%	5.8	5,432	-4%
Germany	12,632	12,590	0%	18%	881.0	811.3	9%	622.4	20.3	12.6	14.3	1.6%	5.4	12,807	-1%
Italy	21,492	21,299	1%	0%	1539.5	1261.8	22%	#VALUE!	#N/A N/A	13.7	14.0	1.4%	5.8	24,157	-11%
Spain	10,655	10,685	0%	12%	720.9	631.0	14%	638.0	16.7	13.5	14.8	1.9%	4.9	11,885	-10%
United Kingdom	7,378	7,436	-1%	18%	494.4	454.0	9%	230.1	32.1	16.3	14.9	2.9%	3.8	7,522	-2%
Russia	1,044	1,077	-3%	38%	166.4	146.6	14%	143.4	7.3	7.5	6.3	4.1%	11.9	1,280	-18%
Turkey	105,176	95,147	11%	47%	11238.0	8965.3	25%	9367.9	11.2	8.9	9.4	11.7%	-1.0	105,176	0%
Asia/Pacific															
Japan	20,119	19,554	3%	6%	1159.7	1023.6	13%	1047.6	19.2	16.5	17.3	0.5%	5.2	20,953	-4%
Australia	5,765	5,738	0%	9%	366.0	327.9	12%	293.8	19.6	17.0	15.8	2.5%	3.8	5,997	-4%
South Korea	2,415	2,287	6%	23%	242.3	185.3	31%	138.6	17.4	10.9	10.0	2.0%	8.1	2,415	0%
China	3,222	3,090	4%	-9%	250.7	233.2	7%	186.2	17.3	12.7	12.9	1.5%	6.3	5,178	-38%
India	32,021	30,435	5%	23%	1632.5	1651.7	-1%	1338.6	23.9	18.5	19.6	3.1%	2.0	32,021	0%
Indonesia	5,832	5,645	3%	27%	372.4	325.9	14%	237.6	24.5	15.1	15.7	4.3%	2.1	5,832	0%
Averages			3%	19%			13%		19.3	14.5	14.3	3.0%	4.5		-6%
10-Year TreasYld	2.33	2.23													
VIX	9.5	14.7													

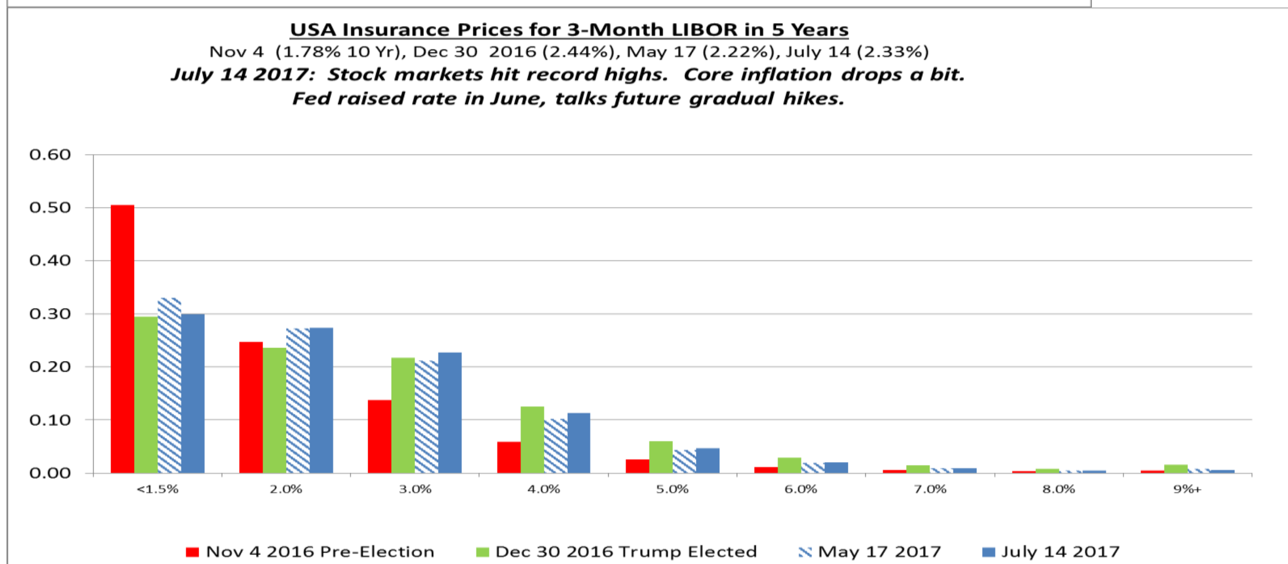
II. <u>USA: Interest Rate Insurance Prices for USA LIBOR 3, 5, and 10 Years Out</u>

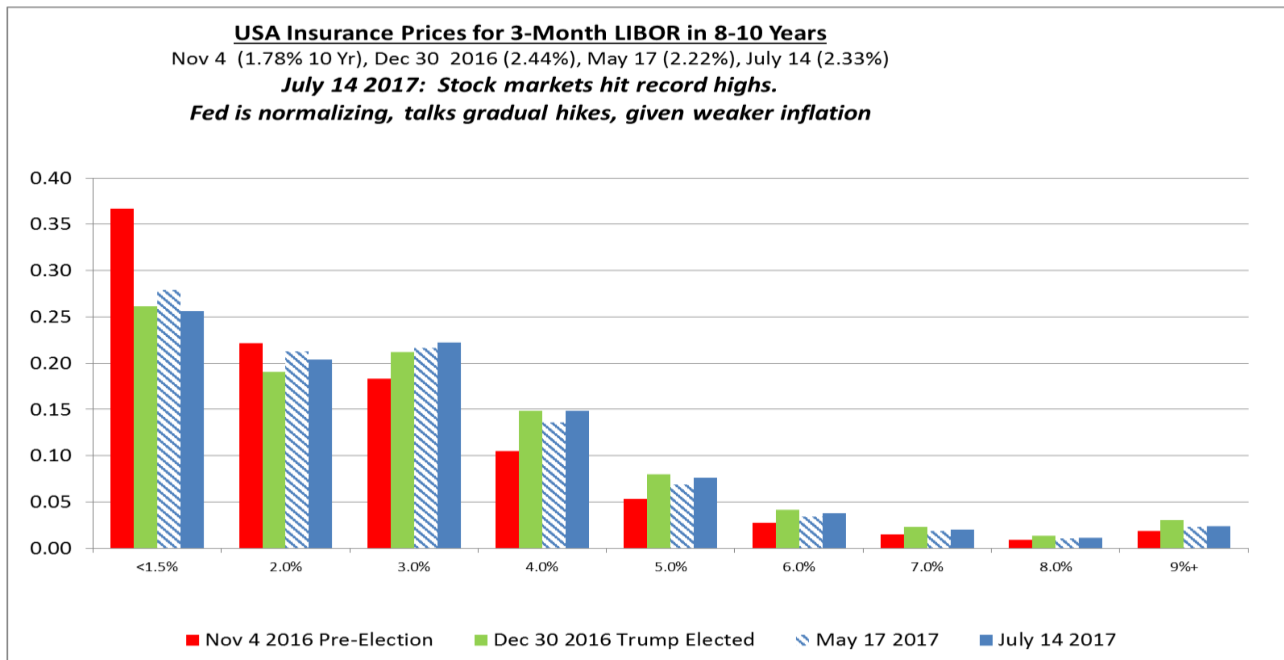
Let's turn to our usual graphic analysis of the interest rate insurance prices that are implicit in the prices of caps and floors, using the technique of Breeden and Litzenberger (1978, 2014). Using prices from Bloomberg Financial Markets and their volatility cube calculations, we see in Figures 5A-5C the prices for interest rate insurance for 3-month LIBOR rates in 3, 5 and 8-10 years. Figure 5A shows that in the past two months, the markets shifted to higher prices for payoffs occurring if in 3 years LIBOR is 2% (1.5%-2.5%) to 3% (2.5%-3.5%), with lower prices for the very low rate scenario of LIBOR less than 1.5%. The 5-year horizon showed shifts in the same direction, but with smaller moves than those for the 3-year horizon, perhaps reflecting a dampening of inflation expectations (Figure 3B).

The USA distribution for LIBOR in 8-10 years is bimodal, with peaks at 1% and 3%, and then a relatively long tail of bets for rates at 4% to as much as 9%+. However, it is notable that the recent shift in the distribution is to the middle rates, rather than the tails, reflecting low volatility expectations.

Figures 5A-5C





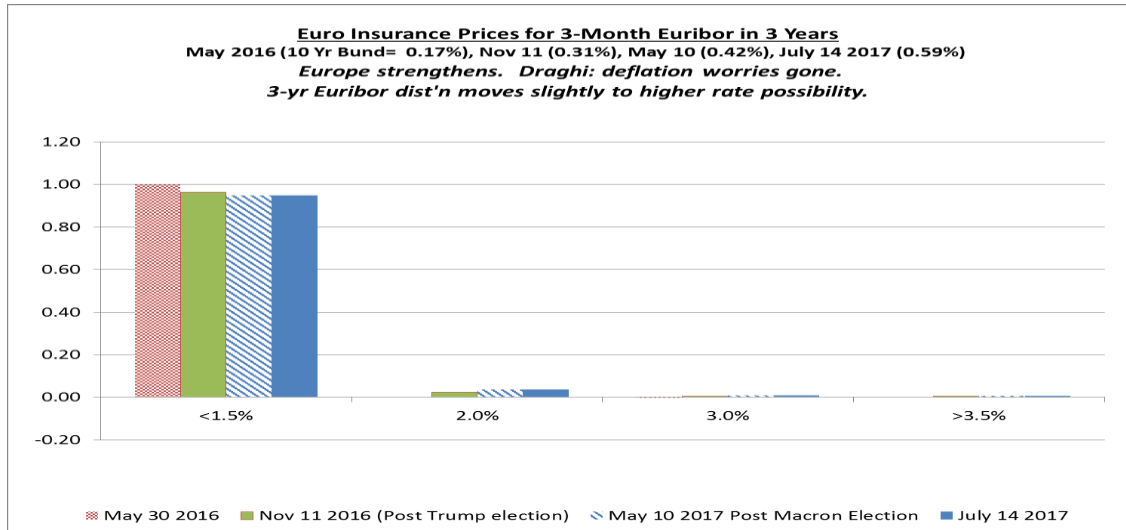


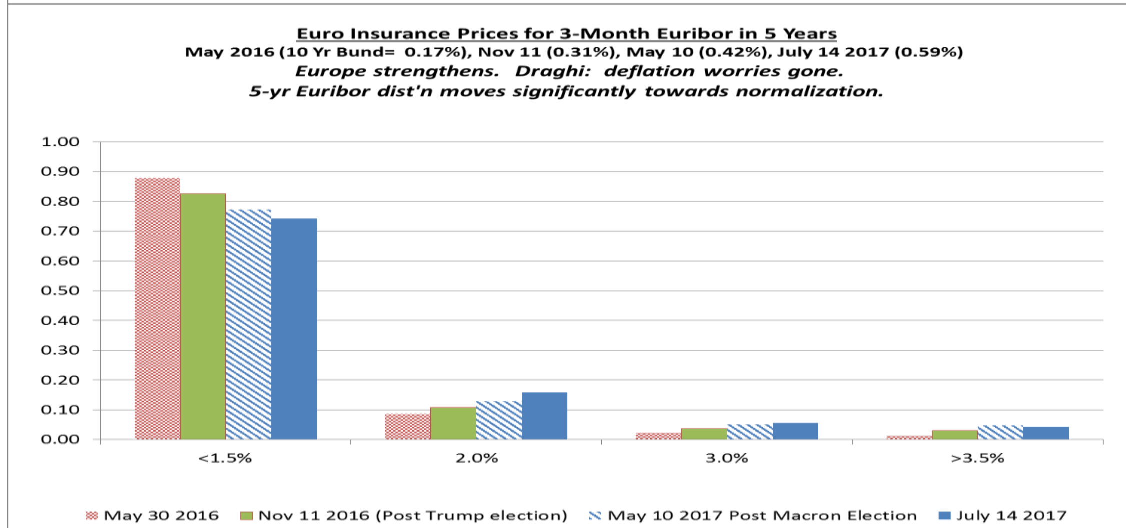
III. Euro Area: Interest Rate Insurance Prices for Euribor 3, 5, nd 8-10 Years Out

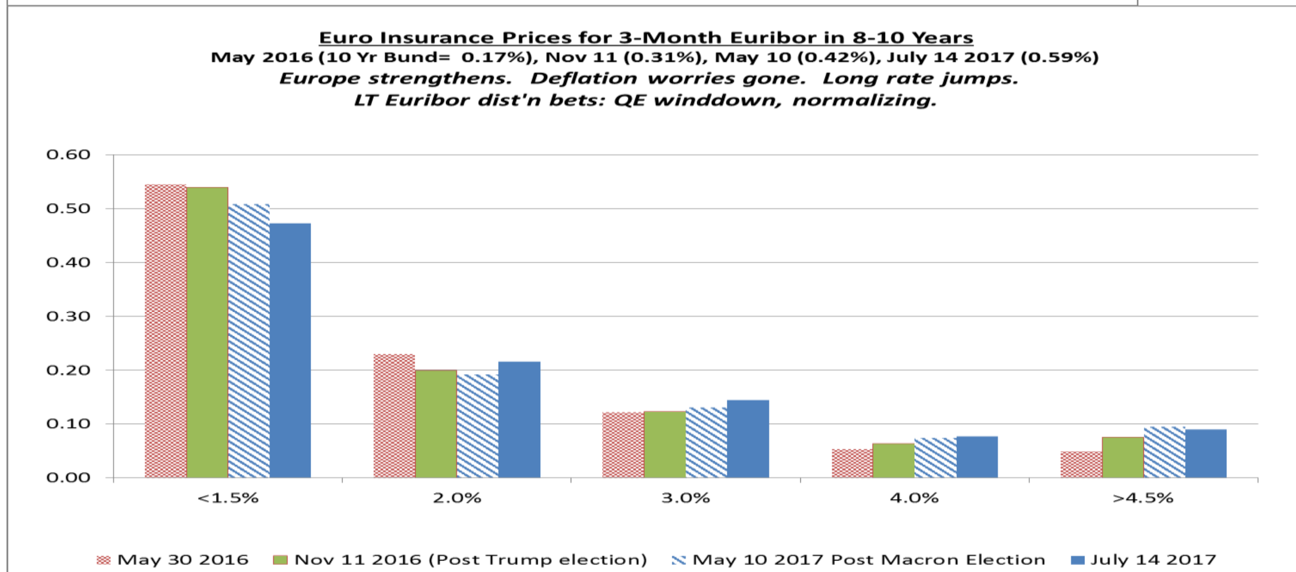
Figures 6A-6C give the options markets' pricing of insurance payoffs on Euribor in 3, 5, and 8-10 years, respectively. Draghi's ECB continues to conduct massive stimulus, but again this month, some statements were slightly more hawkish, indicating a possible lessening of stimulus a bit sooner than before, given the stronger than expected European economy. Core CPI inflation in Europe was 1.8% in the last 12 months, just under the 2% ECB objective, so fears of deflation have largely gone away.

As has been true for more than a year, for Euribor 3 years out, almost all of the betting is on Euribor less than 1.5%, given the ECB's commitment to very low rates at present. However, it is notable that in both the 5-year and 8-10 year distributions, the value bets on Euribor below 1.5% are visibly decreased, though still quite high (reflecting risk aversion as well as probability). Markets are now paying more for insurance against higher rates of 2% and 3% in 5 years, and for 3% and higher for 8-10 years out. I think this shows that the markets are increasingly confident of growth in Europe and a growing belief that the ECB will finally tilt to slowly withdrawing stimulus and letting rates return to more long-term normal levels. The long-term distribution is "bimodal" in the sense that about 50% of value is bet on the very low rate fear scenario and about half is bet on rates of 2% or more that reflect normalization.

Figures 6A-6C







IV. U.K: Interest Rate Insurance Prices for Interbank Rates in 3, 5, and 8-10 Years

While there is a lot of both internal UK and external debate with the EU going on about BREXIT and a lot of uncertainty about the eventual terms, the economy in Britain remains generally strong. Unemployment has just hit 4.7%, the lowest in 40 years. Stocks are within 2% of all-time highs. With strength in Europe, America and Asia and increasing rates in the USA, Britain's rates increased significantly from 1.08% to 1.31% for the 10-year Gilt, following the global trend. Even dovish Governor Mark Carney has indicated that the UK may be strong enough to withstand the beginning of normalization. It's about time, given the UK's strength and very low unemployment! Weakness may occur with BREXIT, but falling off a cliff now seems pretty unlikely in the current economic environment, and zero interest rates seem unnecessary and unwise to me. This week, data came in a little softer on inflation, as the surge in inflation after the fall in the pound is now subsiding. But inflation is still above 2%, despite BREXIT headwinds.

Figures 3A-3C give the insurance price distributions for the UK interbank interest rate 3, 5 and 8-10 years out. Interest rate insurance price distributions for the UK interbank rate have reversed course now and shifted noticeably towards paying higher prices for the higher-rate scenarios of 2% and 3% in 3 years, 5 years and in 8-10 years. Longer term insurance price distributions continue to show quite a considerable amount of positive skewness, with nontrivial prices being paid for rates of 4%, 5% and more than 5.5%, while at the same time having the highest price paid for low rates. Again, the price being paid for the low rate scenario likely reflects risk aversion against a possible bad economy scenario, if rates end up that low. If rates end up high, the UK has probably done well, and marginal utilities are likely low, so smaller prices are paid to hedge against higher rate possibilities.

Figures 7A-7C