Discussion of:

"Diversification and the Volatility Risk Premium"

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"Factor Investing: from Traditional to Alternative Risk Premia"

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Background

- A **volatility swap** is a forward contract on the 'realized' volatility of the underlying asset
  - provides direct exposure to asset return volatility and available for several asset classes.

- The buyer of a volatility swap written at time t and maturing at time T receives

$$Payoff_T = (RV_{t,T} - SW_{t,T}) \times N$$

  - $RV_{t,T}$: (ex-post) realized volatility in annual terms between times t and T,
  - $SW_{t,T}$: (ex-ante) swap rate sets at the inception date t,
  - N: notional amount per volatility point in US dollars.

- A **variance swap** is a forward contract on the 'realized' variance of the underlying asset
  - variance swaps are popular in equity whereas volatility swaps are widely used in FX markets.

Background

- No arbitrage dictates that the present value of future expected future payoffs is zero

$$SW_{t,T} = E_t^{\mathbb{Q}}[RV_{t,T}]$$

  - $E_t^{\mathbb{Q}}[\cdot]$: conditional expectation under the risk-neutral measure.

- Britten-Jones and Neuberger (2000) show that the risk-neutral expectation of realized variance can be computed using a static portfolio of call and put options as

$$E_t^{\mathbb{Q}}[RV_{t,T}^2] = \frac{2e^{r_{t,T}(T-t)}}{(T-t)} \left\{ \int_0^{F_{t,T}} \frac{P_t(K,T)}{K^2} dK + \int_{F_{t,T}}^{\infty} \frac{C_t(K,T)}{K^2} dK \right\}.$$

- The risk-neutral expectation of realized volatility is generally approximated as

$$SW_{t,T} = \sqrt{E_t^{\mathbb{Q}}[RV_{t,T}^2]} \geq E_t^{\mathbb{Q}}[\sqrt{RV_{t,T}^2}]$$

  - this gives rise to a convexity bias, generally small in the data.

Background

- The **volatility risk premium** is generally defined as

$$VRP_{t,T} = E_t^{\mathbb{P}}\left[RV_{t,T}\right] - E_t^{\mathbb{Q}}\left[RV_{t,T}\right]$$

  - $E^{\mathbb{P}}[\cdot]$ is conditional expectation operator under the physical measure $\mathbb{P}$

- **Stylized Facts**
  - the **volatility risk premium** is typically negative,
  - a **volatility swap** is an insurance contract against unexpected volatility shocks,
  - the protection buyer pays on average a premium to the insurance seller.

What's Novel in this Paper?

- This paper provides empirical evidence on three interesting facts:
  1. there exists a substantial volatility risk premium in equity indices, commodities, currencies and government bonds,
  2. returns to short volatility positions are correlated to the volatility of the underlaying instruments,
  3. returns to short volatility positions are not explained by traditional equity risk-factors such as Value, Momentum, Profitability, etc.

- The paper employs
  - monthly at-the-money implied volatility data from January 2006 to May 2016
  - 7 commodities, 4 currency pairs, 10 international equity indices, and 2 government bonds.

My First Reaction

It is a beautiful piece of work!

A Second Thought

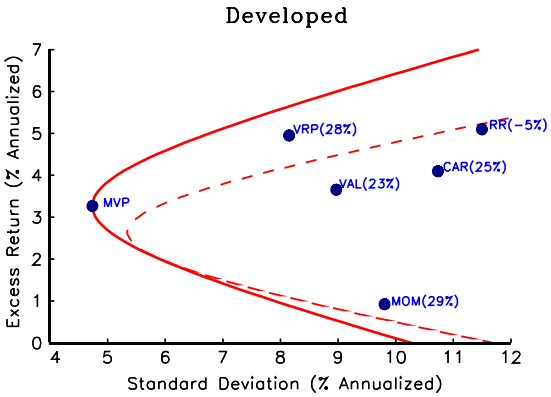
But I would have taken a different direction!

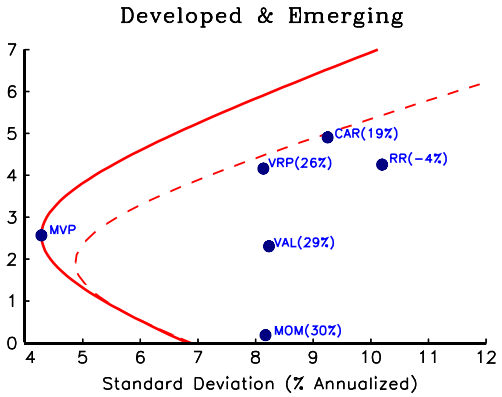
How about Predictability?

- **Bollerslev, Tauchen and Zhou (2009)**
  - variance risk premia can predict aggregate stock market returns,
  - their model builds on the long-run risk model of Bansal and Yaron (2004),
  - variance risk premium as a proxy for the aggregate risk aversion.

- **Della Corte, Ramadorai and Sarno (2016)**
  - volatility risk premia have forecasting power for exchange rate returns,
  - propose a strategy that buys (sells) currencies with cheap (expensive) insurance cost,
  - excess returns are driven by spot return predictability and uncorrelated with carry, value and momentum strategies.

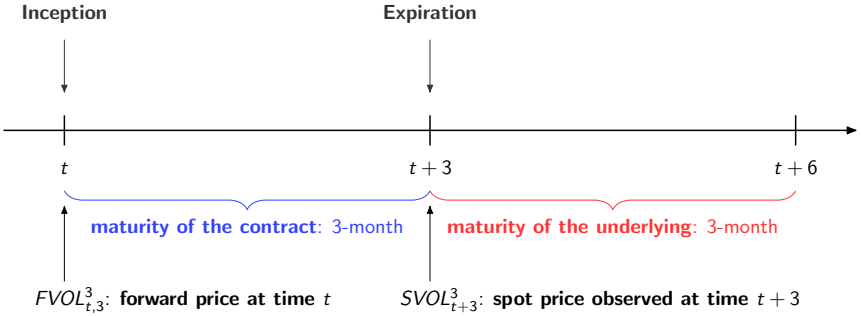
Diversification Benefits





How about the Term Structure?

- An investor can also trade a **forward contract** on future implied volatility

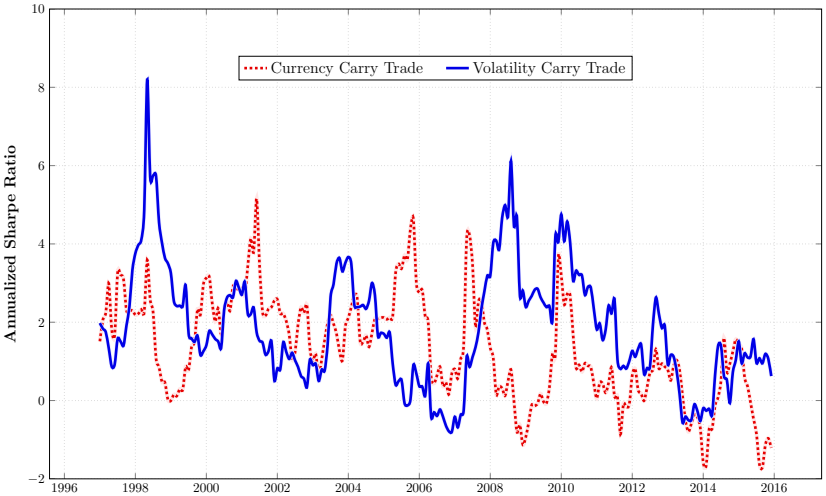


- The **payoff** of the Forward Volatility Agreement on the maturity date $t+3$ is given by

$$\left(SVOL^3_{t+3} - FVOL^3_{t,3}\right) \times M,$$

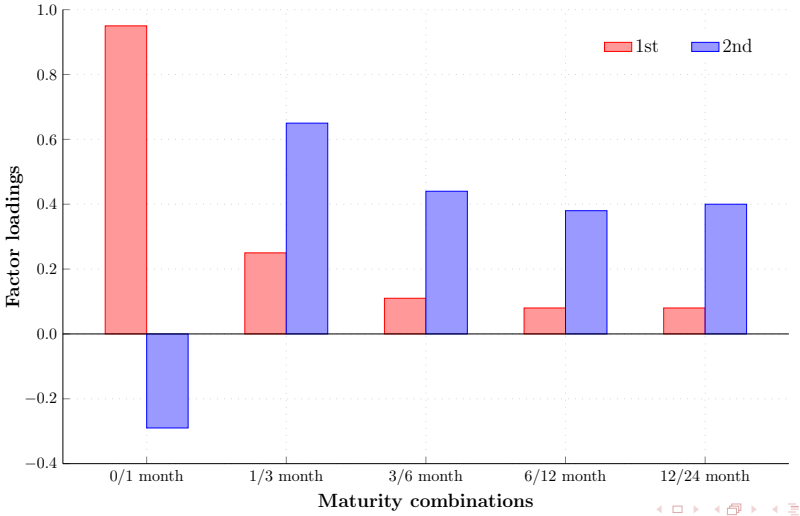
Volatility Carry Strategies

1-year rolling Sharpe Ratios (Della Corte, Kozhan and Neuberger, 2017)



Volatility Carry Strategies

spot risk premia vs forward risk premia (Della Corte, Kozhan and Neuberger, 2017)



Conclusion

- It is a very interesting paper.
- I have enjoyed very much reading it.
- I look forward to reading the revised version of this paper.
- I will definitely add it to my reading list.

Thank you!