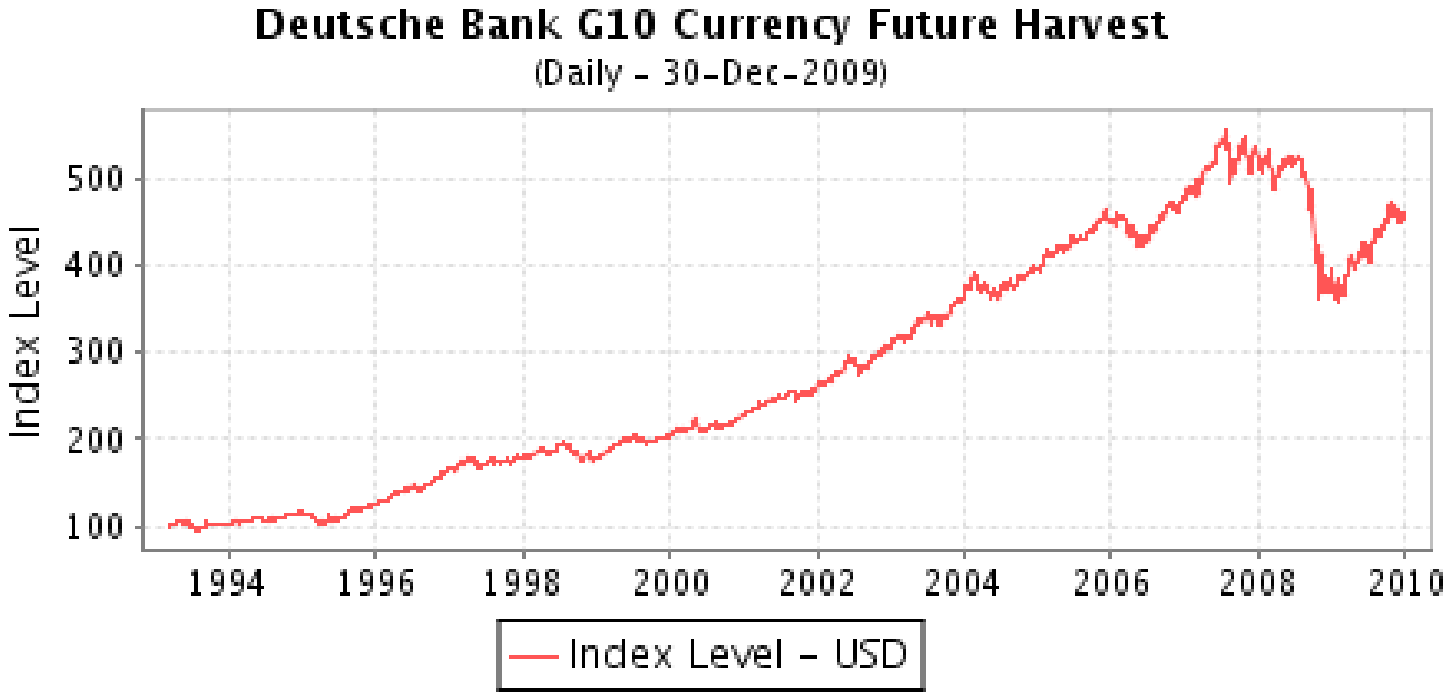
Crash - Neutral Currency Carry Trades

by Jakub Jurek

Discussed by
Mikhail Chernov, London Business School and CEPR

DB G10 Currency Harvest Fund



- Long futures contracts on the three currencies associated with the highest interest rates
- Short futures contracts on the three currencies associated with the lowest interest rates
- Quarterly rebalancing

DBV vs S&P 500

DBV vs S&P 500

- Daily excess returns; relevant numbers are annualized

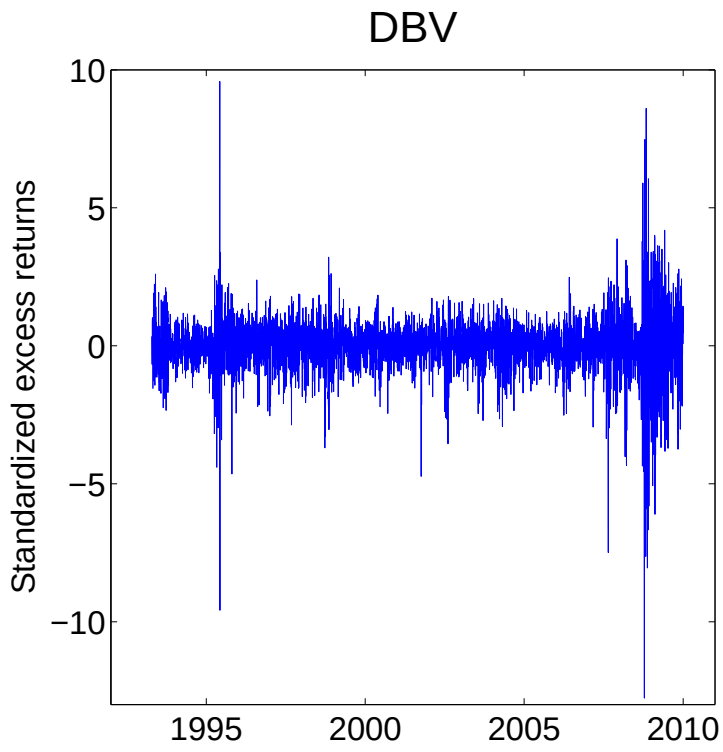
	Mean	Vol	Skew	Kurt	SR
DBV					
03.1993 – 12.2009	0.06	0.10	-1.11	18.24	0.55
03.1993 – 05.2008	0.07	0.08	-0.69	14.10	0.85
03.1993 – 03.2009	0.05	0.10	-1.19	20.17	0.50

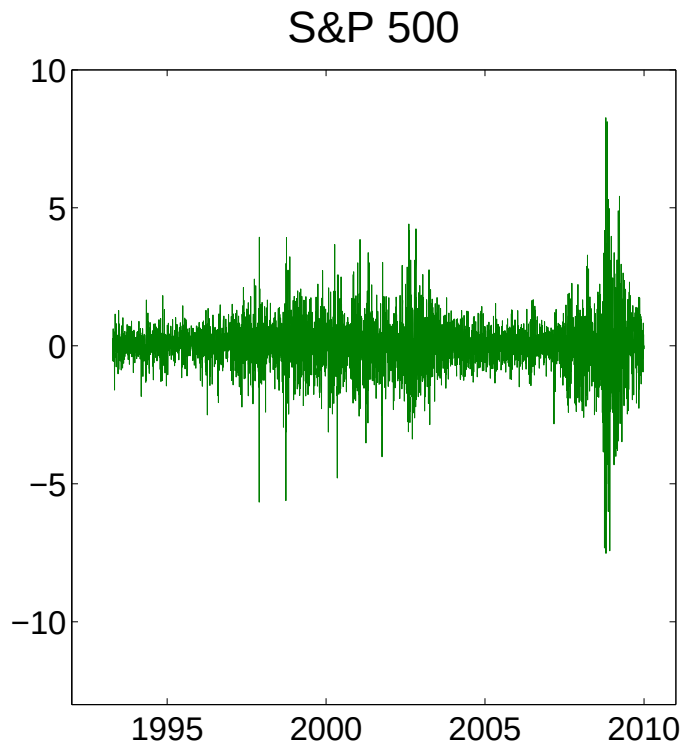
DBV vs S&P 500

- Daily excess returns; relevant numbers are annualized

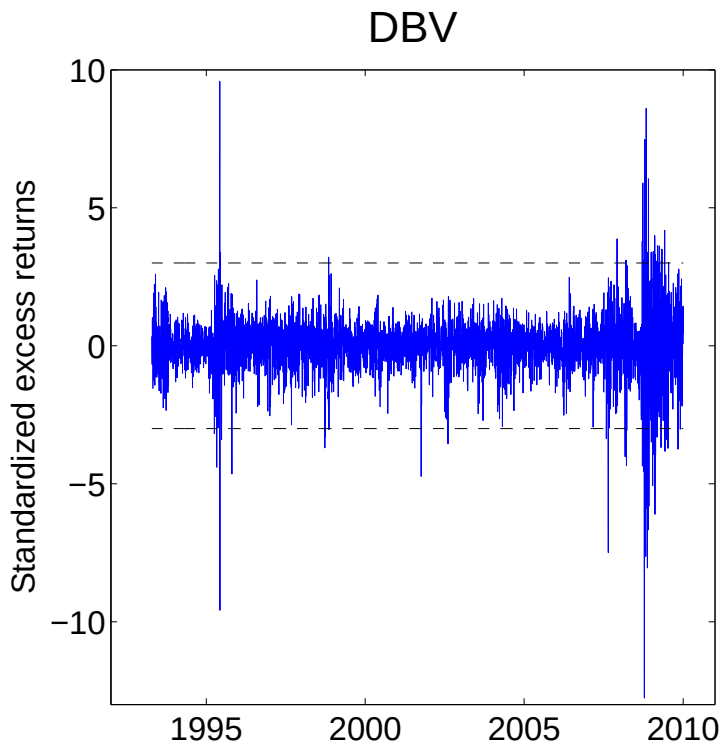
	Mean	Vol	Skew	Kurt	SR
DBV					
03.1993 – 12.2009	0.06	0.10	-1.11	18.24	0.55
03.1993 – 05.2008	0.07	0.08	-0.69	14.10	0.85
03.1993 – 03.2009	0.05	0.10	-1.19	20.17	0.50
S&P					
03.1993 – 12.2009	0.02	0.20	-0.24	8.83	0.10
03.1993 – 05.2008	0.03	0.17	-0.11	3.69	0.18
03.1993 – 03.2009	0.01	0.20	-0.24	9.13	0.03

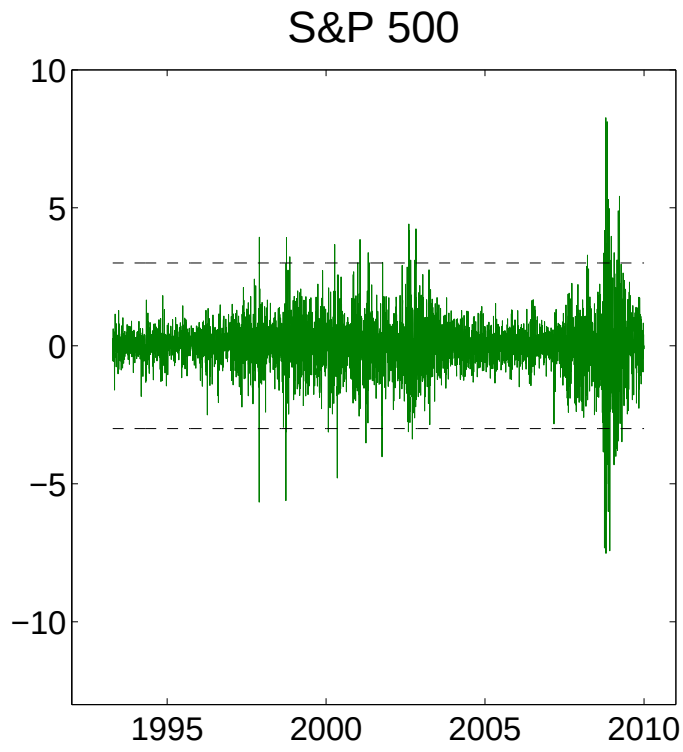
Time Series


DBV
Standardized excess returns
10
5
0
−5
−10
1995
2000
2005
2010


S&P 500
10
5
0
−5
−10
1995
2000
2005
2010

Time Series


DBV
Standardized excess returns
10
5
0
−5
−10
1995
2000
2005
2010


S&P 500
10
5
0
−5
−10
1995
2000
2005
2010

Questions

- What is the timing of currency crashes?
- What are the magnitudes of crashes?
- How is the crash risk priced?
- Is the price of crash risk sufficient to explain returns to carry trades?

Questions

- What is the timing of currency crashes?
- What are the magnitudes of crashes?
- How is the crash risk priced?
- Is the price of crash risk sufficient to explain returns to carry trades?
- What are the best tools (data, methods) to address these questions?

This paper...

- ... pursues a dual strategy:
  - Assess the impact of crash risk via option-hedged portfolios
  - Assess the effect of net USD exposure in currency portfolios

This paper...

- ... pursues a dual strategy:
  - Assess the impact of crash risk via option-hedged portfolios
  - Assess the effect of net USD exposure in currency portfolios

- ... finds that if both are implemented, the excess returns on portfolios are equal to zero as in UIP

This paper...

- ... pursues a dual strategy:
  - Assess the impact of crash risk via option-hedged portfolios
  - Assess the effect of net USD exposure in currency portfolios
- ... finds that if both are implemented, the excess returns on portfolios are equal to zero as in UIP
- What does this mean?

UIP and AP

- UIP tells us that:

$$\begin{aligned} E_t(\Delta s_{t+1}) &= f_t - s_t \\ E_t(rx_{t+1}) &\equiv E_t(f_t - s_t - \Delta s_{t+1}) = 0 \end{aligned}$$

UIP and AP

- UIP tells us that:

$$\begin{aligned} E_t(\Delta s_{t+1}) &= f_t - s_t \\ E_t(rx_{t+1}) &\equiv E_t(f_t - s_t - \Delta s_{t+1}) = 0 \end{aligned}$$

- AP tells us that:

$$\begin{aligned} E_t(\Delta s_{t+1}) &= E_t \log m^*_{t+1} - E_t \log m_{t+1} \\ E_t(rx_{t+1}) &\equiv E_t(f_t - s_t - \Delta s_{t+1}) \\ &= [\log E_t m^*_{t+1} - E_t \log m^*_{t+1}] \\ &- [\log E_t m_{t+1} - E_t \log m_{t+1}] \\ &= \sum_{j=2}^{\infty} (\kappa^*_j - \kappa_j)/j! \end{aligned}$$

Implications

- We have a portfolio that produces $E(rx_{t+1}^{port}) \approx 0$
  - Does it mean that UIP holds?
  - Does it tell us that currencies / options are fairly priced?

Implications

- We have a portfolio that produces $E(rx_{t+1}^{port}) \approx 0$
  - Does it mean that UIP holds?
  - Does it tell us that currencies / options are fairly priced?

- According to AP, we have a strategy that kills off the contributions of the higher moments of the pricing kernels

Implications

- We have a portfolio that produces $E(rx_{t+1}^{port}) \approx 0$
  - Does it mean that UIP holds?
  - Does it tell us that currencies / options are fairly priced?

- According to AP, we have a strategy that kills off the contributions of the higher moments of the pricing kernels

- It is not a total surprise:

Implications

- We have a portfolio that produces $E(rx_{t+1}^{port}) \approx 0$
  - Does it mean that UIP holds?
  - Does it tell us that currencies / options are fairly priced?

- According to AP, we have a strategy that kills off the contributions of the higher moments of the pricing kernels

- It is not a total surprise:
  - The farthest out-of-the-money options are 1.4 std.dev. away from the forward price

Implications

- We have a portfolio that produces $E(rx_{t+1}^{port}) \approx 0$
  - Does it mean that UIP holds?
  - Does it tell us that currencies / options are fairly priced?

- According to AP, we have a strategy that kills off the contributions of the higher moments of the pricing kernels

- It is not a total surprise:
  - The farthest out-of-the-money options are 1.4 std.dev. away from the forward price
  - The strongest results are for the at-the-money options

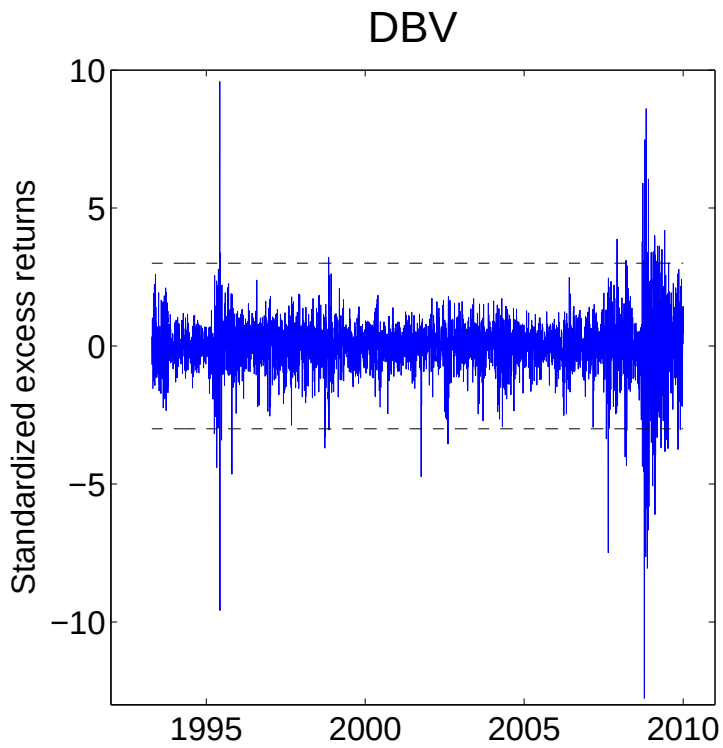
Implications

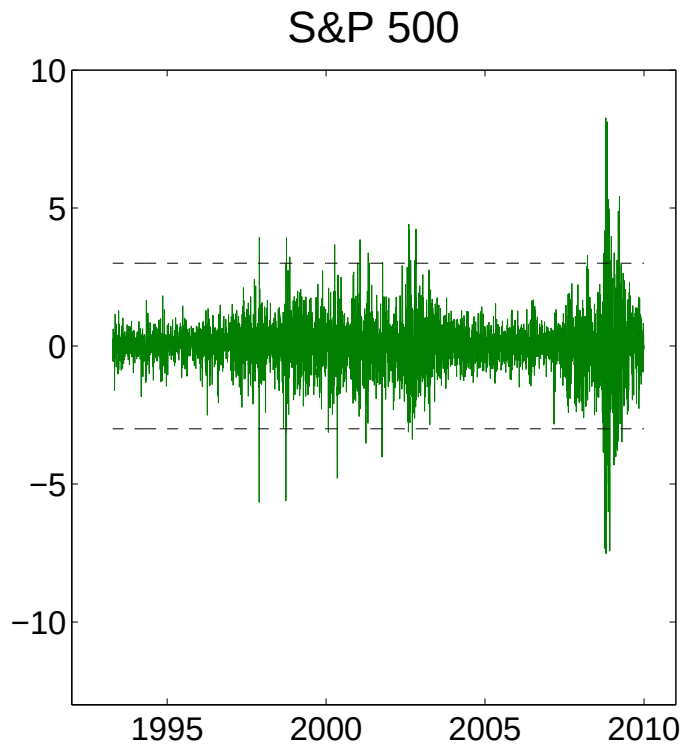
- We have a portfolio that produces $E(rx_{t+1}^{port}) \approx 0$
  - Does it mean that UIP holds?
  - Does it tell us that currencies / options are fairly priced?

- According to AP, we have a strategy that kills off the contributions of the higher moments of the pricing kernels

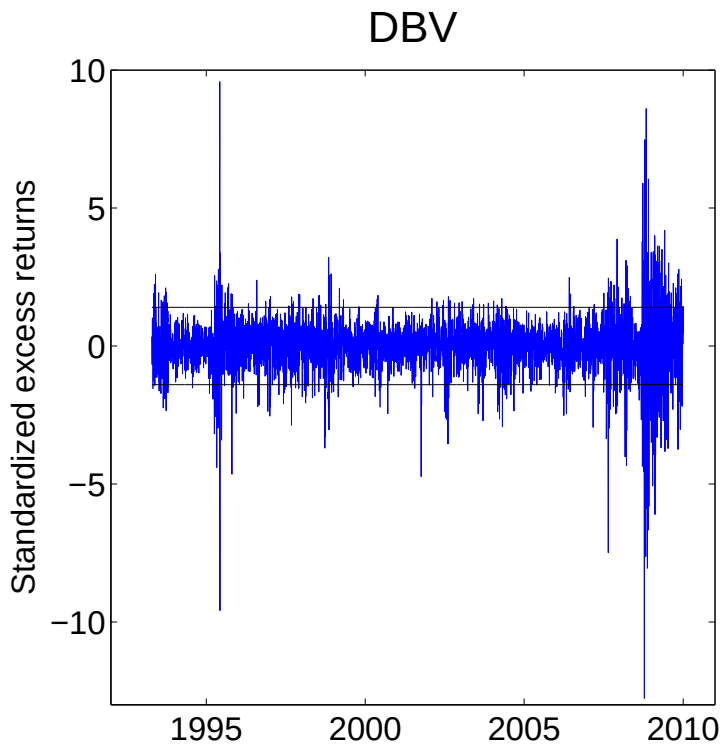
- It is not a total surprise:
  - The farthest out-of-the-money options are 1.4 std.dev. away from the forward price
  - The strongest results are for the at-the-money options
  - We are cutting off (almost) all downside risk to achieve $E(rx_{t+1}^{port}) \approx 0$

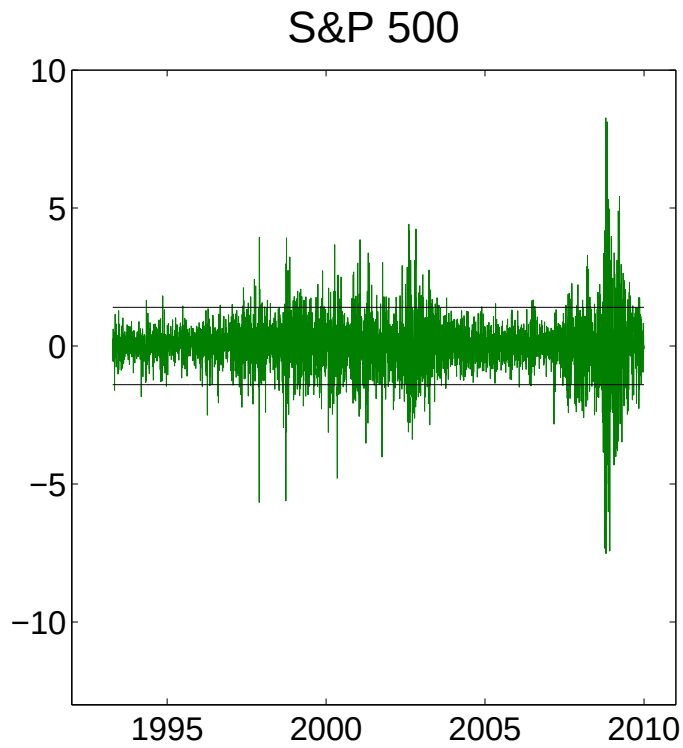
Implications





Implications





Comments

- I still do not know how the crash risk is priced. Is it fairly priced?
- It is extremely hard to separate effects of crashes from “regular” changes

Comments

- I still do not know how the crash risk is priced. Is it fairly priced?
- It is extremely hard to separate effects of crashes from “regular” changes
- To paraphrase Bates (2009):

> *This task is complicated by two features of currency returns: the fact that conditional volatility evolves over time, and the fat-tailed nature of daily returns. Each issue affects the other. What we identify as outliers depends upon that days assessment of conditional volatility. Conversely, our estimates of current volatility from past returns can be disproportionately affected by outliers.*

Comments

- I still do not know how the crash risk is priced. Is it fairly priced?
- It is extremely hard to separate effects of crashes from “regular” changes
- To paraphrase Bates (2009):

  > *This task is complicated by two features of currency returns: the fact that conditional volatility evolves over time, and the fat-tailed nature of daily returns. Each issue affects the other. What we identify as outliers depends upon that days assessment of conditional volatility. Conversely, our estimates of current volatility from past returns can be disproportionately affected by outliers.*

- We need a model

Conclusion

- Very interesting topic
- Crash risk must be important for understanding returns to carry trades
- Options should be exceptionally useful in measuring market prices of crash risk
- Next step: develop models to correctly measure these objects and assess whether they are correctly priced