Revisiting the valuation effects of the GSCI roll

UNIVERSITÉ DE NEUCHÂTEL

Michel Dubois, **Loïc Maréchal**

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Motivation

- Funds tracking first generation commodity indices (e.g., GSCI) roll their position at dates known in advance.
- The literature is ambiguous concerning the price effect on the nearby and first differed contracts.
- Do (non-informative) roll trades affect commodity futures prices after the introduction of these funds?

Contribution

- The proportion of CITs positions increased significantly (break) by the end of 2003.
- Cumulative spreading abnormal returns (CASRs) are
  - higher before the break.
  - Insignificant, before and after the break, when event-induced variance and auto-correlation is accounted for.
- Two channels weakly explain the individual cumulative abnormal returns (CARs)
  - The passive roll volume which modifies the insurance premium.
  - The (change in) hedging pressure which modifies the liquidity premium.
- The transaction costs explain the CASRs both statistically and economically.

Potential price effects of the roll

- Roll
  - Price pressure: market makers are compensated for order imbalance risk arising from exogenous liquidity shocks. A positive demand shock induces a price increase. Grossman and Miller (1988).
  - Sunshine trading: liquidity traders pre-announce their orders which reduces the price impact of the trades not related to information. Admati and Pfleiderer (1991).
- Pre-roll
  - Predatory trading: distressed traders reveal partial information to predators. Larger price impact with trades ahead and decrease of the distressed trader's liquidating value. Brunnermeier and Pedersen (2005).

Roll effects in the context of commodity futures

- Normal backwardation
  - The Keynes (1930) and Hicks (1946) normal backwardation hypothesis (insurance premium): The hedgers (long physical) push the futures price below the expected future spot price. Speculators bear the risk and collect the premium.
- Extension
  - Kang et al. (forthcoming) find that the insurance premium appears in the long run. In the short run the hedgers get remunerated as they provide liquidity to speculators.

Commodity index funds roll: empirical evidence

- During the roll
  - Price pressure
    - 3 contracts - 2003–2012. Brunetti and Reiffen (2014).
  - Sunshine trading
    - 1 contract (WTI) - 2008–2009. Bessembinder et al. (2016).
    - 12 contracts - 2004–2009. Aulerich et al. (2014).
  - No effect. 13 contracts - 2006–2011. Hamilton and Wu (2015).
  - Little or no effect. 8 contracts - 2006–2009. Stoll and Whaley (2010).
- Before the roll
  - Predatory activity ahead of the GSCI roll.
    - 19 contracts - 2000–2010. Mou (2011).
    - 12 contracts - 2004–2009. Aulerich et al. (2014).

Data

- Sample period: 1999–2010.
- Daily closing prices for the first five consecutive maturities
  - 27 GSCI futures contracts.
  - 18 peer futures contracts.
  - 7 non-peers with CFTC data (controls).
- CFTC weekly data
  - Index investment (Masters, 2008 procedure).
  - commercial long and short positions (hedging pressure).
- GSCI monthly weights.
- individual contract open interest and trading volume.

Dating the financialization (1)

- Ad-hoc dating of the financialization.
  - Mou (2011) uses 2000, Hamilton and Wu (2015) use 2005.

- Measuring the importance of CIT/GSCI
  - *IND* (1)
    - index investment / total open interest.
    - Index investment computed with Masters (2008) procedure.
  - *IND* (2)
    - Commercial long position of legacy CFTC report / total open interest.
    - CFTC classifies index investment hedgers (swap dealers) as commercial positions.
    - Noisier measure but available for non-GSCI commodities (control).

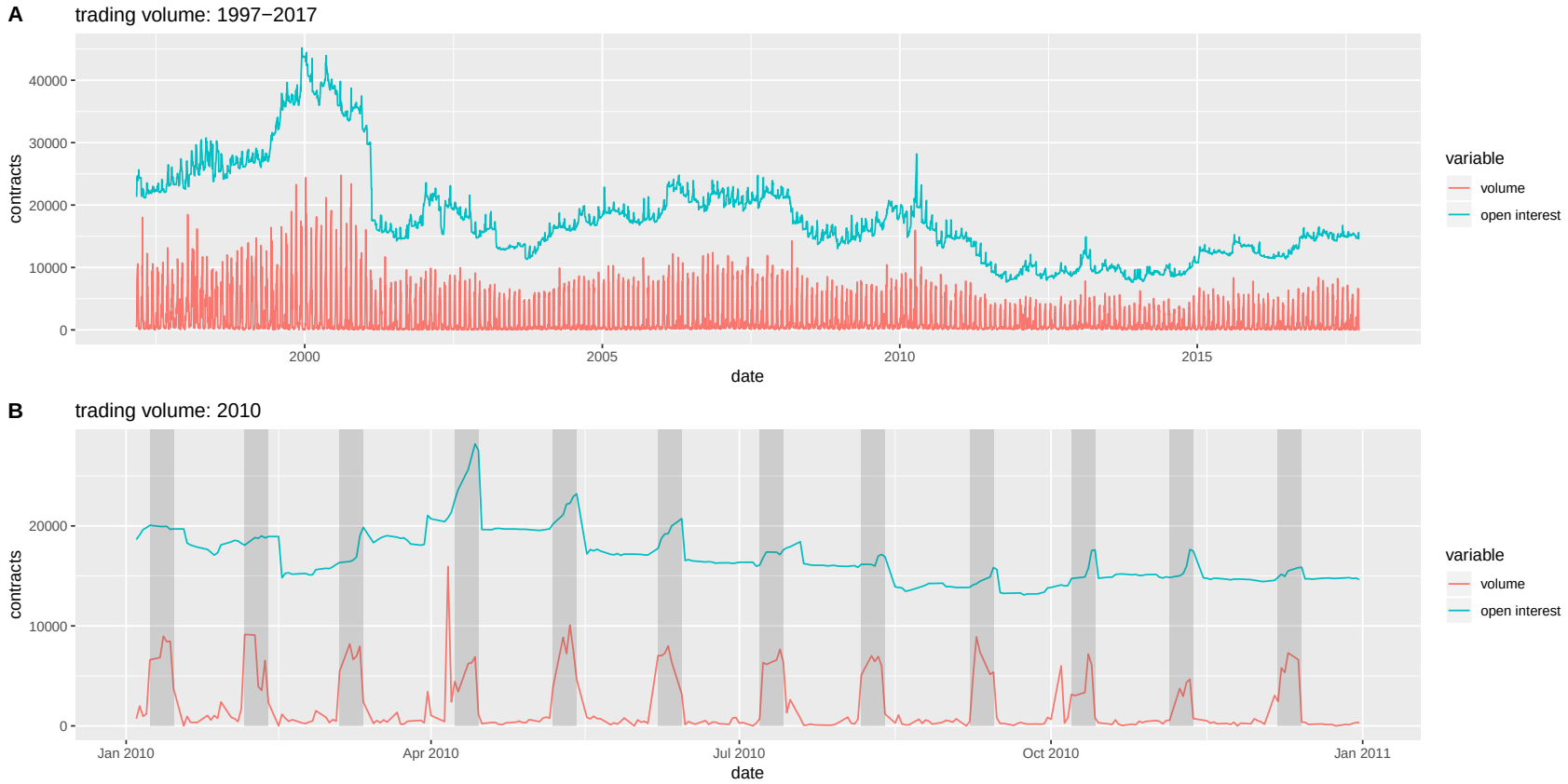
Dating the financialization (2)

Break test on the intercept with Bai et al. (1998) algorithm, confidence intervals (CI) in days.

Variable	#	Date	CI (10%)	CI (5%)	CI (1%)	Size%	F-stat.	Signif.
Panel A: GSCI contracts - 1999–2010								
IND (1)	27	17-Dec-03	$+/-9$	$+/-11$	$+/-15$	1.80	259.14	***
IND (2)	21	15-Oct-03	$+/-30$	$+/-36$	$+/-54$	3.40	141.62	***
Panel B: Non-Indexed contracts - 1999–2010								
IND (2)	7	02-Feb-06	$+/-904$	$+/-1080$	$+/-1418$	7.21	18.78	

Variables: ratio over total open interest of *IND* (1) index investment with Masters (2008) procedure and *IND* (2) commercial long position with legacy CFTC report.

Do GSCI tracking funds roll by the rules?



- Mean difference in volume between the non-roll and roll window: 4812 contracts, t-statistic = 69.30.

Returns (log price changes) and benchmarks

- Log futures price change for every maturity available as, $r^m_{c,t} = \ln\left(F^m_{c,t}\right) - \ln\left(F^m_{c,t-1}\right)$ when no expiry occurs between $t-1$ and t and $r^m_{c,t} = \ln\left(F^m_{c,t}\right) - \ln\left(F^{m+1}_{c,t-1}\right)$ otherwise. $F^m_{c,t}$ is the futures price of commodity c, on day t and for each maturity m.

- The log return on a spread position is, $sr^m_{c,t} = r^{m+1}_{c,t} - r^m_{c,t}$.

- Parametric benchmarks: Henderson et al. (2015) and Bakshi et al. (2019) factors for CARs; back-end of the term-structure for CASRs.
- Non parametric benchmarks: peer contracts and zero (raw returns).

Abnormal returns (peers)

CARs with adjustments for overlapping event-induced variance (Boehmer et al., 1991, BMP) and cross-correlation (Kolari and Pynnonen, 2010, KP).

	pre-roll		roll		post-roll	
period	1999–2003	2004–2010	1999–2003	2004–2010	1999–2003	2004–2010
	Panel A: nearby contract					
CAR (bps)	18.22	−23.38	41.97	17.91	0.86	−34.00
unadj. t-stat.	1.43	−2.21	3.30	1.56	0.06	−2.84
BMP	1.36	−2.20	2.78	1.55	0.06	−2.80
KP	0.53	−0.84	1.02	0.67	0.03	−1.08
	Panel B: first deferred contract					
CAR (bps)	35.85	−13.01	50.69	27.15	−10.12	−33.58
unadj. t-stat.	3.08	−1.24	4.50	2.58	−0.90	−3.67
BMP	2.48	−0.96	3.36	2.40	−0.84	−3.20
KP	0.86	−0.54	1.26	0.88	−0.35	−1.45

Abnormal spreading returns (peers)

CASRs with adjustments for overlapping event-induced variance (Boehmer et al., 1991, BMP) and cross-correlation (Kolari and Pynnonen, 2010, KP).

	pre-roll		roll		post-roll	
period	1999–2003	2004–2010	1999–2003	2004–2010	1999–2003	2004–2010
CASR (bps)	17.63	10.37	8.71	9.24	−10.99	0.42
unadj. t-stat.	3.73	1.23	1.42	2.05	−1.39	0.07
BMP	3.51	1.01	0.97	1.72	−1.26	0.06
KP	1.32	0.52	0.34	0.87	−0.47	0.02

Testing the impact of financialization

- $CAR_{c,t} = \alpha_0 + \alpha_1 DGSCI_{c,t} \times DFIN_t + b' X_{c,t} + \mu_c + \tau_t + \epsilon_{c,t}$
- $CAR_{c,t}$: abnormal returns (HPW) estimated out of pre-roll $\cup$ roll
- $DGSCI_{c,t}$: 1 if GSCI contract, 0 otherwise
- $DFIN_t$: 1 if $t \geq$ Jan 2004, 0 otherwise
- $X_{c,t}$: control variables
- μ_c: contract fixed effect
- τ_t: time fixed effect

Impact of financialization: control variables

- $B_{c,t-1}$, the log basis defined as, $\frac{\ln\left(F_{c,t-1}^{m+1}\right)-\ln\left(F_{c,t-1}^{m}\right)}{\#\text{days between } m \text{ and } m+1}$, in the day preceding the event.
- $CR_{c,t-1}$ the cumulative log returns from five days before the event until the day preceding the event.
- $B_{c,t-1}^{contango} = \max\left(0; B_{c,t-1}\right)$, $B_{c,t-1}^{backwardation} = \min\left(0; B_{c,t-1}\right)$
- Total trading volume, total open interest

Impact of financialization: roll

$$CAR_{c,t} = \alpha_0 + \alpha_1 DGSCI_{c,t} \times DFIN_t + b' X_{c,t} + \mu_c + \tau_t + \epsilon_{c,t}$$

	$CAR^{roll}_{c,t}$			
	nearby		first deferred	
	HPW	raw	HPW	raw
$DGSCI_{c,t} \times DFIN_t$	−48.05*	−59.07*	−54.02**	−59.07**
	(−1.80)	(−1.93)	(−2.03)	(−1.96)
$B_{c,t-1}$		22.20		20.91
		(0.08)		(0.08)
$CR_{c,t-1}$		78.70		62.14
		(0.33)		(0.37)
#Obs: 3852 - #Contracts: 27				

*p<0.1; **p<0.05; ***p<0.01

Newey-West standard errors (four lags)

Impact of financialization: pre-roll

$$CAR_{c,t} = \alpha_0 + \alpha_1 DGSCI_{c,t} \times DFIN_t + b' X_{c,t} + \mu_c + \tau_t + \epsilon_{c,t}$$

	$CASR^{pre-roll}_{c,t}$			
	nearby		first deferred	
	HPW	raw	HPW	raw
$DGSCI_{c,t} \times DFIN_t$	-65.99^{**}	-77.37^{**}	-51.77^{*}	-72.85^{**}
	(-2.13)	(-2.46)	(-1.65)	(-2.40)
$B_{c,t-1}$		4.80		-342.78
		(0.01)		(-1.32)
$CR_{c,t-1}$		-80.00		-92.16
		(-0.35)		(-0.59)
#Obs: 3852 - #Contracts: 27				

*p<0.1; **p<0.05; ***p<0.01

Newey-West standard errors (four lags)

Explaining abnormal returns: liquidity and insurance premia

- For the nearby and the first deferred contract ($m = 1, 2$, resp.):
$$CAR^m_{c,t} = \beta_0 + \beta_1 \frac{VCIT^m_{c,t}}{OI^m_{c,t}} + \beta_2 \frac{\Delta HN_{c,t}}{OI^m_{c,t}} + c' X^m_{c,t} + \mu_c + \tau_t + \epsilon_{c,t}$$

- $VCIT^m_{c,t}$ is the SP-GSCI signed volume approximated in turn by $IND(1)$, the AUM of the iShares SP-GSCI and the minimum abnormal trading volume common to both legs. $\frac{VCIT^m_{c,t}}{OI^m_{c,t}}$ proxies for the insurance premium.

- $\Delta HN_{c,t}$ is the change in net hedging pressure between the first available days before and after the roll. $\frac{\Delta HN_{c,t}}{OI^m_{c,t}}$ proxies for the liquidity premium.

- In both settings, β_1 and β_2 are expected positive and negative resp.

Explaining abnormal returns: nearby

$$CAR^{near}_{c,t} = \beta_0 + \beta_1 \frac{VCIT^{near}_{c,t}}{OI^{near}_{c,t}} + \beta_2 \frac{\Delta HN_{c,t}}{OI^{near}_{c,t}} + c' X^{near}_{c,t} + \mu_c + \tau_t + \epsilon_{c,t}$$

	$CAR^1_{c,t}$			
$VCIT^1_{c,t}(\%)$	2.34*	2.04*	1.14	4.54
	(1.80)	(1.97)	(0.70)	(1.03)
$\Delta HN_{c,t}(\%)$	−5.42	−3.35	1.14	1.36
	(−1.58)	(1.40)	(0.36)	(0.46)
$ILLIQ_{c,t}(\%)$			−2.84**	−2.25
			(−2.06)	(−1.56)
$TC_{c,t}(\%)$			−4.68*	−6.23**
			(−1.74)	(−2.20)
$\overline{HN}_{c,t}(\%)$			−7.93*	−8.61*
			(−1.66)	(−1.80)
$B_{c,t}(\%)$			−1.57	−1.27
			(−0.50)	(−0.35)
FE		y		y
#Obs: 2629 - #Contracts: 21				

*p<0.1; **p<0.05; ***p<0.01

Newey-West standard errors with White estimator.

Explaining abnormal returns: first deferred

$$CAR_{c,t}^{deff} = \beta_0 + \beta_1 \frac{VCIT_{c,t}^{deff}}{OI_{c,t}^{deff}} + \beta_2 \frac{\Delta HN_{c,t}}{OI_{c,t}^{deff}} + c' X_{c,t}^{deff} + \mu_c + \tau_t + \epsilon_{c,t}$$

	$CAR_{c,t}^{deff}$			
$VCIT_{c,t}(\%)$	2.30*	2.06	2.76*	1.56
	(1.71)	(1.52)	(1.78)	(0.71)
$\Delta HN_{c,t}(\%)$	−0.65	−0.70	−2.69	−3.03
	(−0.51)	(−0.53)	(−0.59)	(−0.61)
$ILLIQ_{c,t}(\%)$			−1.10	−0.44
			(−0.78)	(−0.28)
$TC_{c,t}(\%)$			−2.34	−1.24
			(−1.10)	(−1.22)
$\overline{HN}_{c,t}(\%)$			3.36	4.23
			(1.25)	(1.53)
$B_{c,t}(\%)$			−2.52	−3.68*
			(−1.36)	(−1.78)
FE		y		y
#Obs: 2629 - #Contracts: 21				

*p<0.1; **p<0.05; ***p<0.01

Newey-West standard errors with White estimator.

Abnormal returns: market efficiency

- How big are abnormal returns after transaction costs and price impact?
- Transaction costs: bid-ask spread of both legs using the modified Abdi and Ranaldo (2017) methodology,

$$TC = \max\left(\sqrt{4\frac{1}{N}\sum_{t=1}^{N}(c_t - \mu_t)(c_t - \mu_{t+1})}; \text{effective tick}\right)$$

- Market depth: illiquidity using the Amihud (2002) ratio,

$$ILLIQ = \frac{|r_t|}{\text{dollar trading volume}}$$

Explaining the CASRs: transaction costs and liquidity

- $CASR_{c,t} = \gamma_0 + \gamma_1 TC_{c,t} + \gamma_2 ILLIQ_{c,t} + \mu_c + \tau_t + \epsilon_{c,t}$
- $TC_{c,t}^{1+2}$: Abdi and Ranaldo (2017)
- $ILLIQ_{c,t}^{1,2}$: Amihud (2002)
- μ_c: contract fixed effect
- τ_t: time fixed effect

Explaining the CASRs: results

$$CASR_{c,t} = \gamma_0 + \gamma_1 TC_{c,t} + \gamma_2 ILLIQ_{c,t} + \mu_c + \tau_t + \epsilon_{c,t}$$

	$CASR_{c,t}$		
	pre-roll	roll	pre-roll + roll
$TC_{c,t}$	0.63^{***}	0.55^{***}	0.88^{***}
	(3.32)	(4.01)	(3.96)
$ILLIQ_{c,t} \times 10^4$	-6.08	-2.23	-2.61
	(-0.11)	(-0.51)	(-0.28)
Adj. R^2	0.09	0.08	0.09
#Obs: 2661 - #Contracts: 21			

*p<0.1; **p<0.05; ***p<0.01

Conclusion

- We identify a significant change in the market structure around December 2003.
- CASRs and CARs are not significant after controlling for event-induced variance and cross-correlation (explains the variety of previous results). The CARs are lower after the financialization.
- Index investment acting as long speculative investment and net change in hedging pressure are weak predictors of CARs.
- In contrast, the bid-ask spread seems to be a significant determinant of the abnormal returns. Moreover, the economic significance is very close to one.

Thank you!