How do Funds Deviate from Benchmarks?
Evidence from MSCI's Inclusion of Chinese A-shares

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Motivation

- Demand for benchmark securities has substantial pricing implications for underlying constituents (Pavlova and Sikorskaya, 2021). In particular, after index inclusion, stocks tend to comove more with the index because flows in and out of passive funds lead to correlated trading in the index constituents (Barberis et al., 2005).

- The literature often assumes that passive investors perfectly replicate their benchmark index. However, sampling by passive investors might lead to systematic deviations from benchmarks (Brogaard et al., 2021).

- If sampling is persistent, changes in the benchmark will not affect all securities homogeneously, but the impact of benchmarking on the underlying securities will be moderated by stock characteristics associated with sampling.

- We exploit the staggered introduction of Chinese A-shares in the MSCI Emerging Markets (EM) Index, which has some attractive features:
  - Close to 500 A-shares treated $\implies$ rare opportunity to exploit cross-sectional variation in the treated firms (unlike the often-studied Russell experiment)
  - Introduction in several stages $\implies$ dif-in-dif with multiple events and treatment intensities
  - Rich pool of control stocks: non-included A-shares and H-shares traded in Hong Kong

We then study the following main research questions:

1. **How do different funds respond to the introduction of Chinese A-shares in the MSCI Emerging Markets Index?**

2. **Does sampling by passive funds moderate the impact of index inclusion on the comovement of Chinese A-shares with respect to the MSCI EM Index?**

Empirical Setting

- On June 20th, 2017 MSCI announced partial inclusion of large-cap Chinese A-shares in the MSCI EM as of May 31st, 2018.

- On February 28th, 2019, MSCI announced to increase the weights of the included large-cap A-shares during the quarterly rebalancings in May, August, and November of 2019, and to add mid-cap A-shares in November 2019.

- As a result, the total weight of Chinese stocks in the MSCI EM index increased from 28% to 33%.

- Apart from the MSCI EM Index, this change also affected the MSCI China Index and the MSCI All Country World Index (ACWI).

Inclusion factor (%) of Chinese stocks in the MSCI EM								
Year		2018				2019		
Month	3	6	9	12	3	6	9	12
Large-cap A-shares	0	2.5	5	5	5	10	15	20
Mid-cap A-shares	0	0	0	0	0	0	0	20
Small-cap A-shares	0	0	0	0	0	0	0	0
Included H-shares	100	100	100	100	100	100	100	100

How do funds respond to changes in benchmark?

Using FactSet's quarterly holdings data for international funds benchmarked against the affected MSCI indices, we find that the response by passive funds is closely aligned with MSCI's rebalancing dates (indicated by the grey vertical lines).

Benchmark: MSCI ACWI, MSCI China, MSCI EM
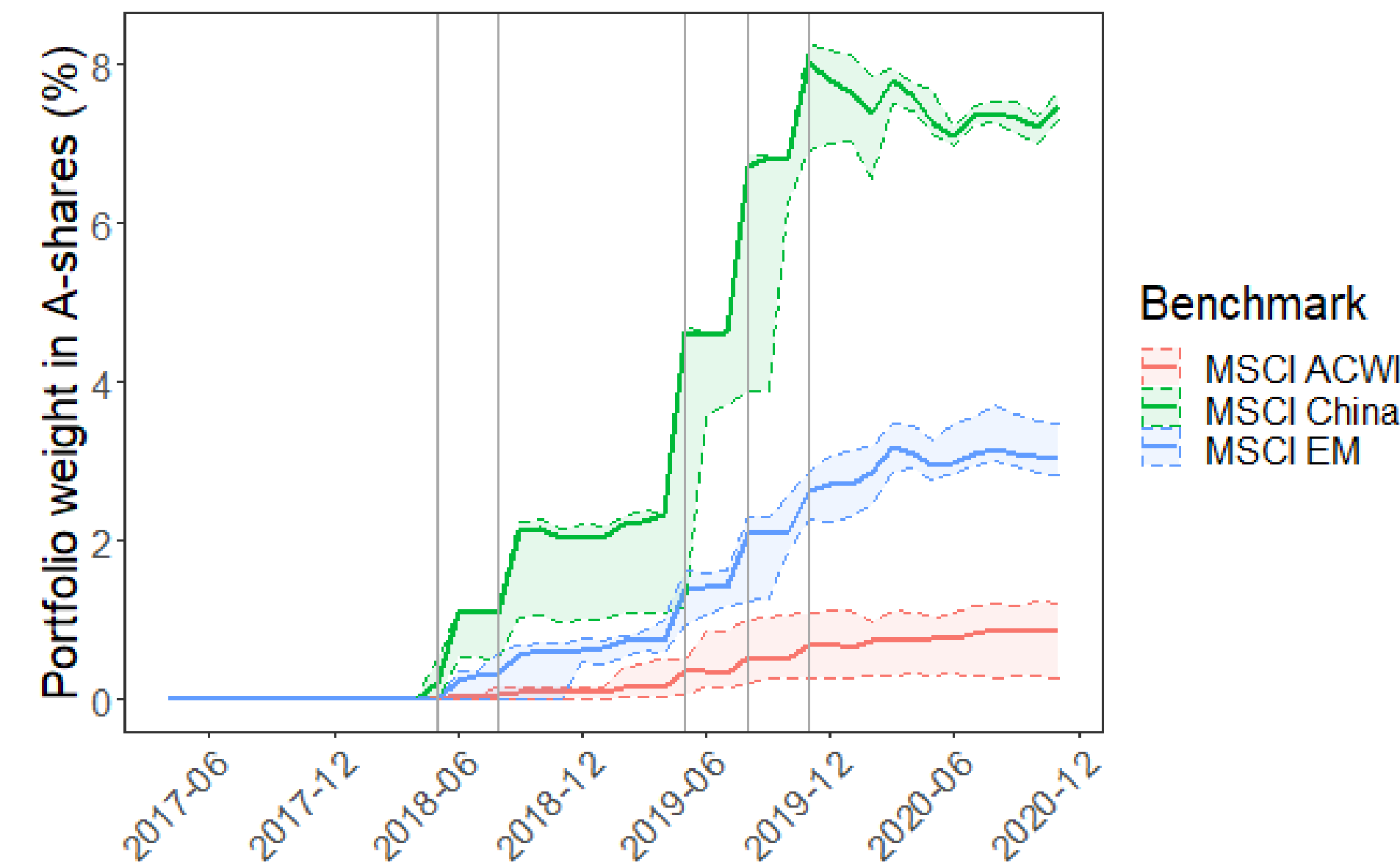
Is the change in passive ownership homogeneous across A-shares?

$$y_{it} = \alpha_t + \beta IF_{it} + \gamma'(IF_{it} \cdot X_{i,t-1}) + \delta' X_{i,t-1} + \eta Ineligible_i + \varepsilon_{it}$$

- y_{it} is the % of eligible market cap of stock i held by passive investors
- $IF_{it} \in \{0\%, 5\%, 10\%, 15\%, 20\%\}$ is the inclusion factor in the MSCI EM
- $X_{i,t-1}$ is a vector containing lagged stock characteristics
- $Ineligible_i$ is a dummy equal to 1 if stock i is never included in the MSCI EM

	Dep. var.: stock-level ownership by passive funds				
	(1)	(2)	(3)	(4)	(5)
IF	1.944**	1.359**	1.130**	1.936**	1.095**
	(140.257)	(91.436)	(58.455)	(140.082)	(59.256)
Ineligible	0.002	0.002	0.001	0.002	0.001
	(1.090)	(1.126)	(0.616)	(1.121)	(0.872)
log(MC)		−0.001			−0.00003
		(−0.737)			(−0.028)
IF × log(MC)		0.641**			0.472**
		(62.776)			(37.048)
Illiq			0.0003		0.001
			(0.366)		(1.030)
IF×Illiq			− 1.404**		−0.702**
			(−55.840)		(−22.294)
Vol				−0.001	−0.0002
				(−0.856)	(−0.298)
IF×Vol				− 0.130**	−0.181**
				(−13.373)	(−20.941)
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	17,864	17,864	17,864	17,864	17,864
Adjusted R^2	0.612	0.699	0.671	0.617	0.712

Benchmark weights A-shares ↑ $\implies$ Passive funds respond by buying larger, more liquid, and less volatile A-shares.

Impact of index changes on comovement

Does this sampling behavior lead to cross-sectional heterogeneity in the effect of benchmark changes on comovement?
Correlated trading in index constituents by passive investors leads to excess comovement (Barberis et al., 2005). However, if passive investors involve in sampling, this effect should be stronger for stocks that are more frequently held by passive funds.

$$R^2_{it} = \alpha_t + \beta IF_{it} + \gamma'(IF_{it} \cdot X_{i,t-1}) + \delta' X_{i,t-1} + \eta Ineligible_i + \varepsilon_{it}$$

- R^2_{it} is the R^2 of stock i with respect to the MSCI EM index in quarter t

	Dep. var.: comoveneut wrt MSCI EM				
	(1)	(2)	(3)	(4)	(5)
IF	0.280**	0.222**	0.223**	0.254**	0.075
	(9.989)	(6.521)	(4.884)	(9.046)	(1.609)
Ineligible	−0.011**	0.007	−0.0001	−0.009**	0.010**
	(−3.462)	(1.726)	(−0.016)	(−2.940)	(2.578)
log(MC)		0.015**			0.007**
		(7.481)			(3.219)
IF×log(MC)		0.022			0.021
		(0.988)			(0.748)
Illiq			−0.013**		−0.012**
			(−8.111)		(−6.661)
IF×Illiq			− 0.088		−0.225**
			(−1.502)		(−2.891)
Vol				−0.017**	−0.019**
				(−10.634)	(−11.683)
IF×Vol				− 0.213**	−0.226**
				(−10.697)	(−10.910)
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	17,974	17,938	17,694	17,694	17,681
Adjusted R^2	0.011	0.016	0.015	0.031	0.039

Benchmark weights A-shares ↑ $\implies$ comovement increases more for larger, more liquid, and less volatile A-shares.

Conclusion

- We examine how a variety of investors respond to the inclusion of Chinese A-shares in the MSCI Emerging Markets Index.

- Contrary to the common assumption that index-tracking investors closely replicate their benchmark index, we find passive funds engage in sampling, resulting in substantial, yet predictable deviations from the benchmark.

- The same characteristics that predict deviations from the benchmark are important for explaining cross-sectional heterogeneity in the treatment effect: larger, more liquid, and less volatile stocks experience a higher increase in comovement with respect to the MSCI EM Index after an increase in benchmark weights.

- **Broader implication: deviations from the benchmark lead to a heterogeneous effect of passive investing on the underlying securities.**