ETF Arbitrage and Return Predictability

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Demand Shocks and Absolute Price Efficiency

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- Sources of demand shocks are often unknown for long periods of time, leading to predictable returns
  - Fire sales (Coval and Stafford 2007)
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- Thus, demand shocks often result in **absolute** price inefficiency

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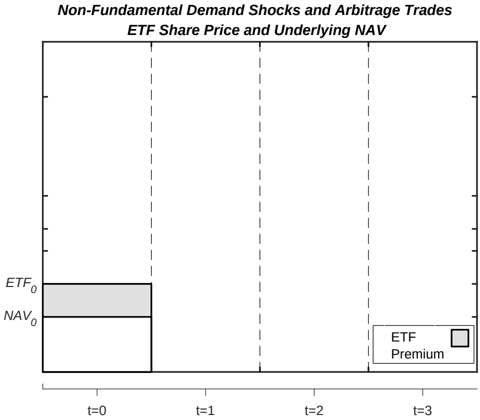
- Authorized participants make arbitrage trades to maintain **relative** price efficiency (Petajisto 2017, Engle and Sarkar 2006)
- **Relative** price efficiency does not imply **absolute** price efficiency

ETF Arbitrage Example



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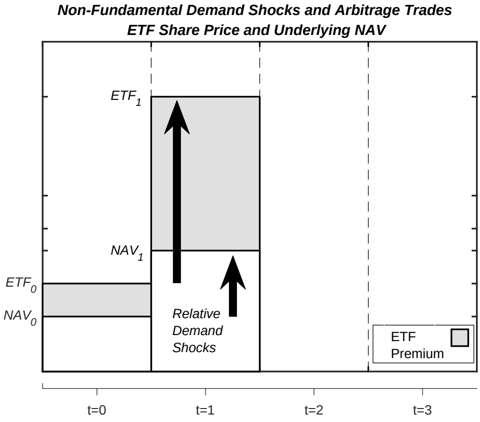

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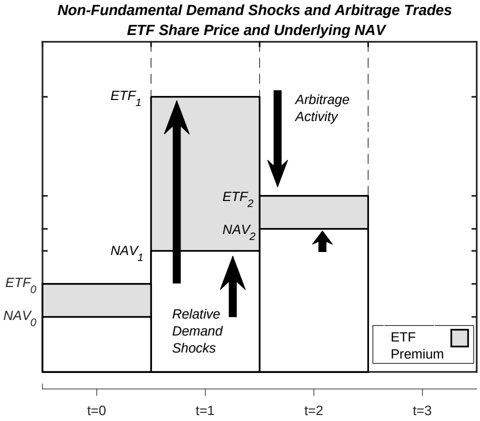

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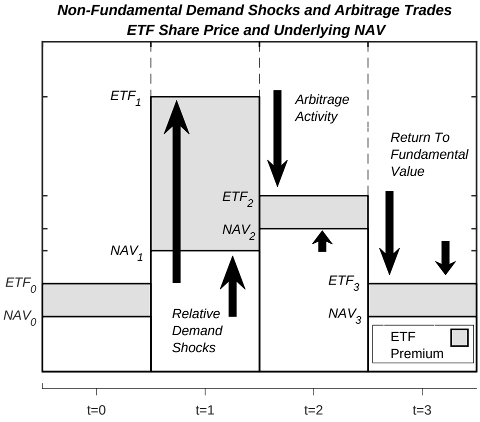

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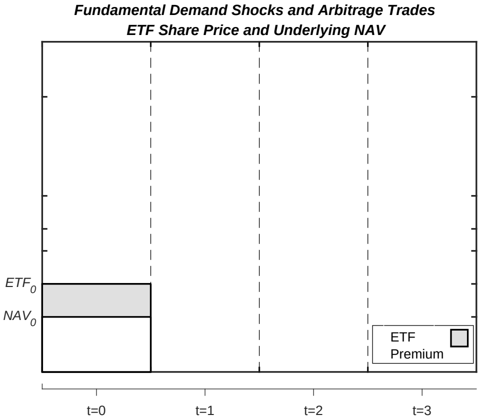

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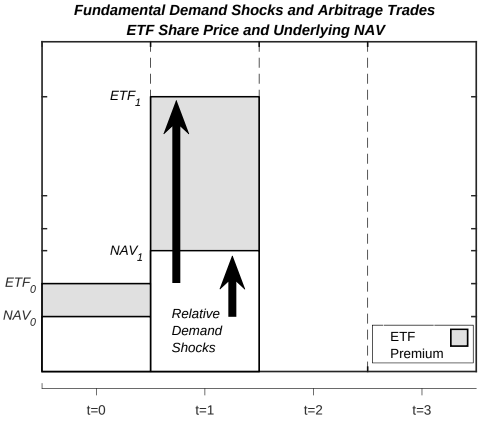

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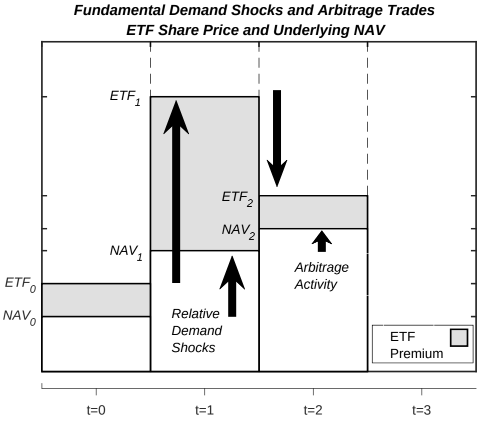

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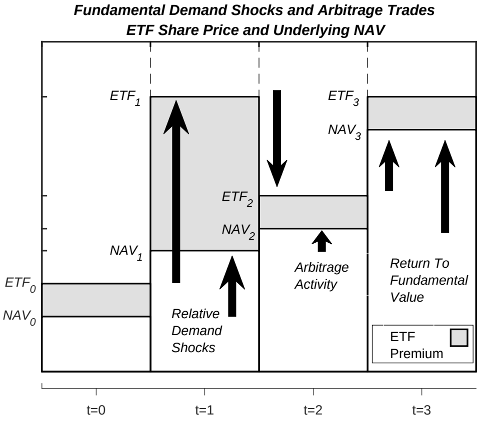

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- Null hypothesis: Monthly arbitrage activity does not predict monthly returns

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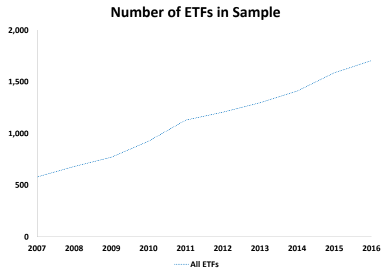
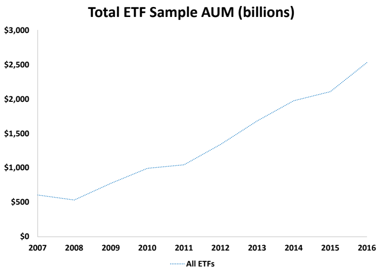
- ETF investors collectively mistime the market

ETF Sample

- Monthly data for 2,196 ETFs spanning 2007 to 2016





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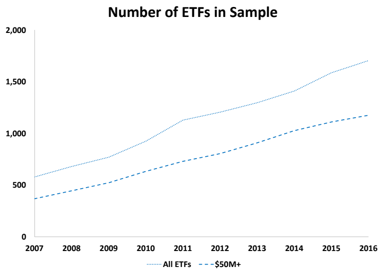

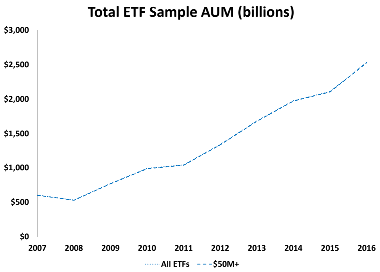

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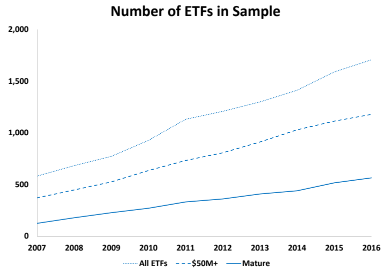

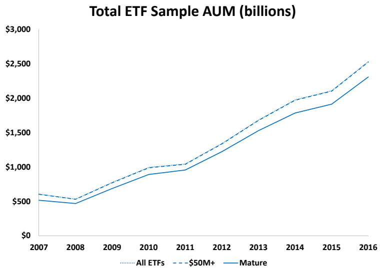

ETFs "mature" once creation/redemption activity exceeds 50% of days

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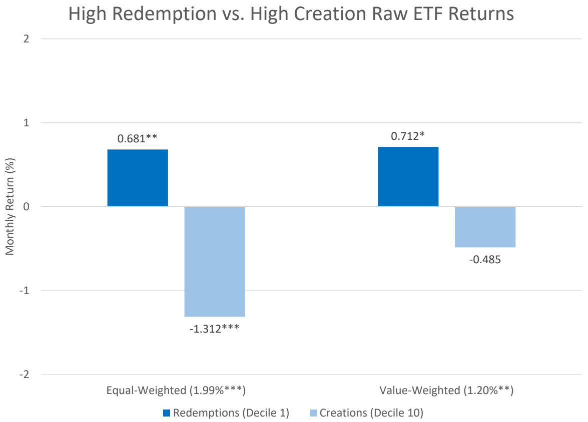
  - Consistent results for stock-level returns using aggregated ETF creations and redemptions

ETF Arbitrage Negatively Predicts Returns



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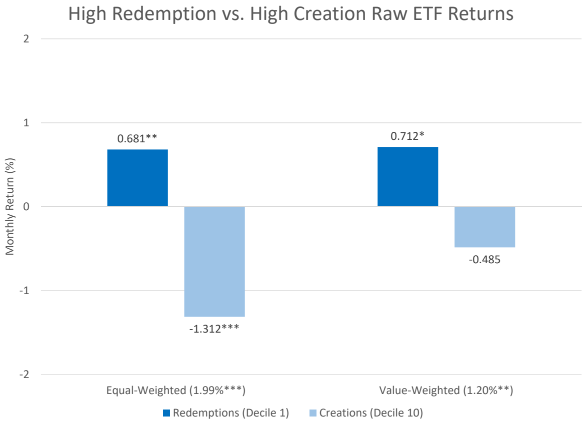

Equal-weighted → 26.7% annualized raw return

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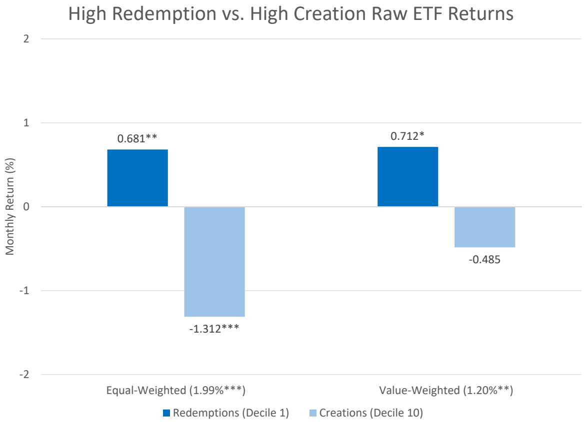

Value-weighted → 15.4% annualized raw return

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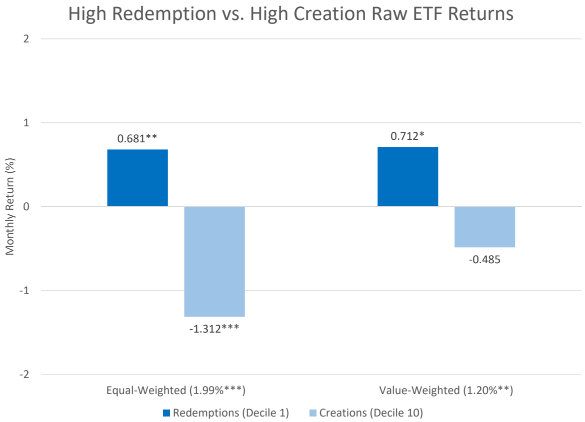

Return reversion suggests relative demand shocks are non-fundamental, consistent with Ben-David, Franzoni, Moussawi (Forthcoming JF)

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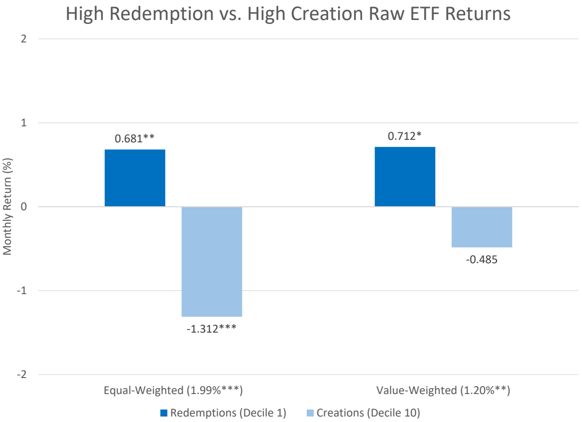
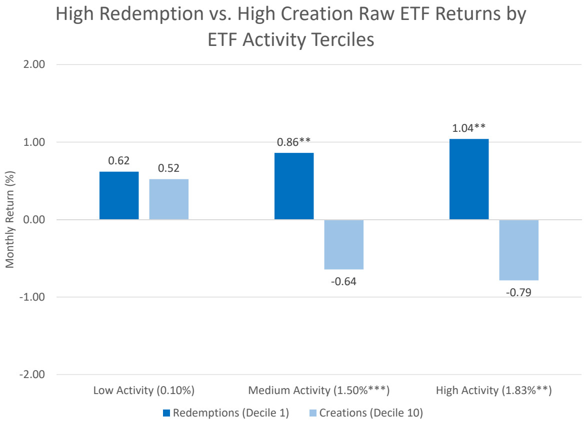


Similar results using factor-based alphas or NAVs

Predictability Stronger in High-Activity ETFs



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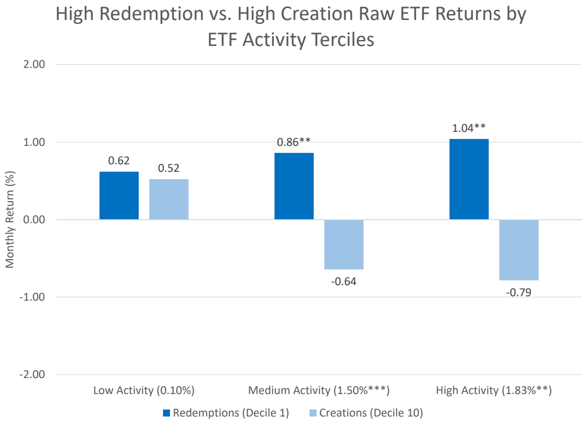
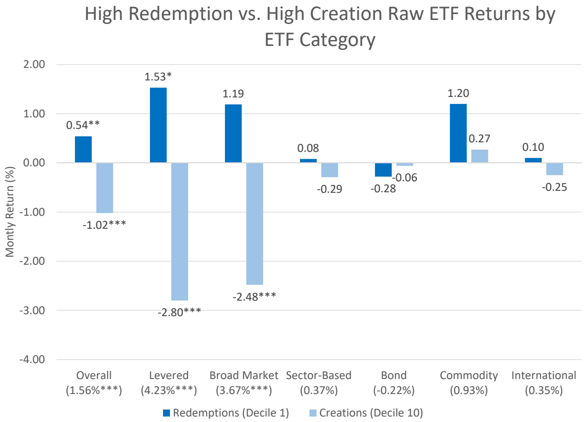


More arbitrage activity is associated with more return predictability

Results Concentrated in Levered and Broad-Market ETFs



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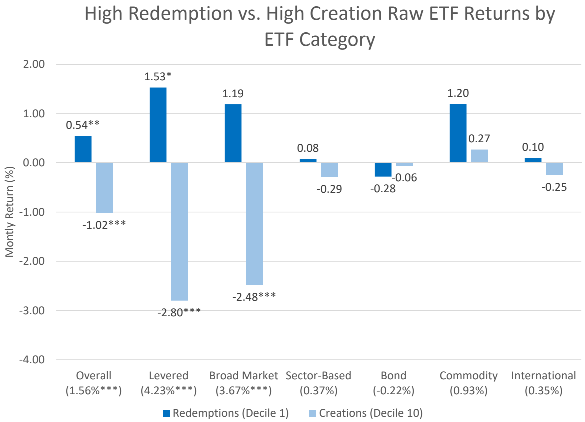

Levered ETFs show the strongest predictability

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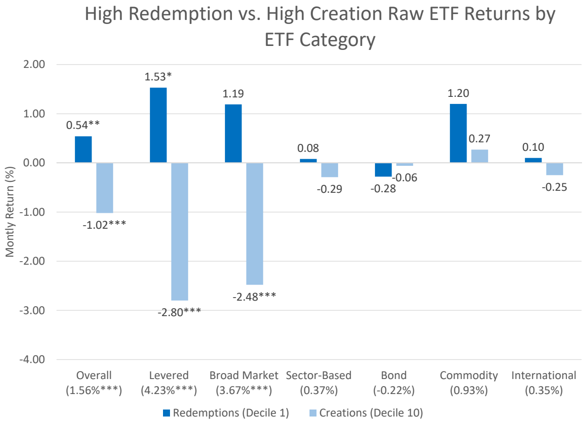

Broad market ETFs, not niche ETFs, drive our results

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- We consider a representative investor who re-balances according to creations/redemptions

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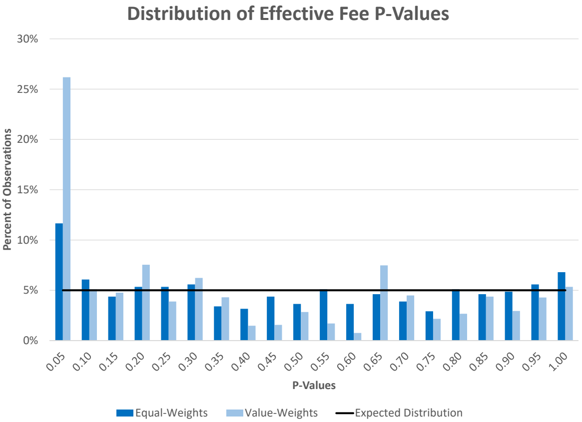
- Effective fees capture difference between actual and asset-weighted returns
- We randomize ETF flows using block-bootstrap Monte Carlo methods to:
  - Generate test statistics (p-values based on 1,000,000 simulations)
  - Control for growth of ETF industry over time

Effective Fees Are More Negative Than Positive



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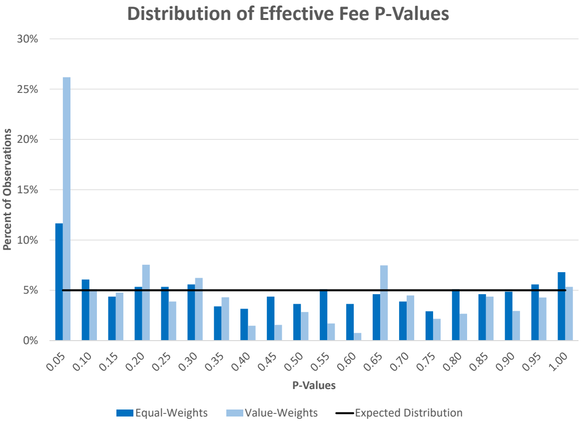

Equal-weighted $\rightarrow$ 12% $<$ 0.05 p-value threshold

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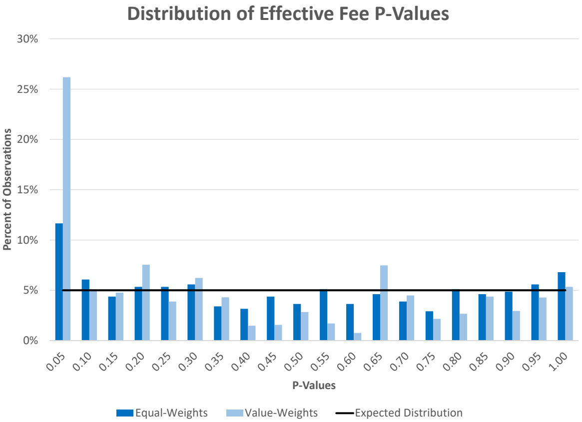

Value-weighted $\rightarrow$ 26% $<$ 0.05 p-value threshold

Negative Effective Fee Examples: SPY & Total ETF AUM

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  - Annualized effective fee (2012–2016): 0.07%
  - 0.07% on $2.3 trillion AUM → **$1.6 billion** of underperformance in 2016

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2. **Observable, non-fundamental demand shocks are not quickly offset by market participants**
3. **Information conveyed by arbitrage trades is not fully incorporated into prices**