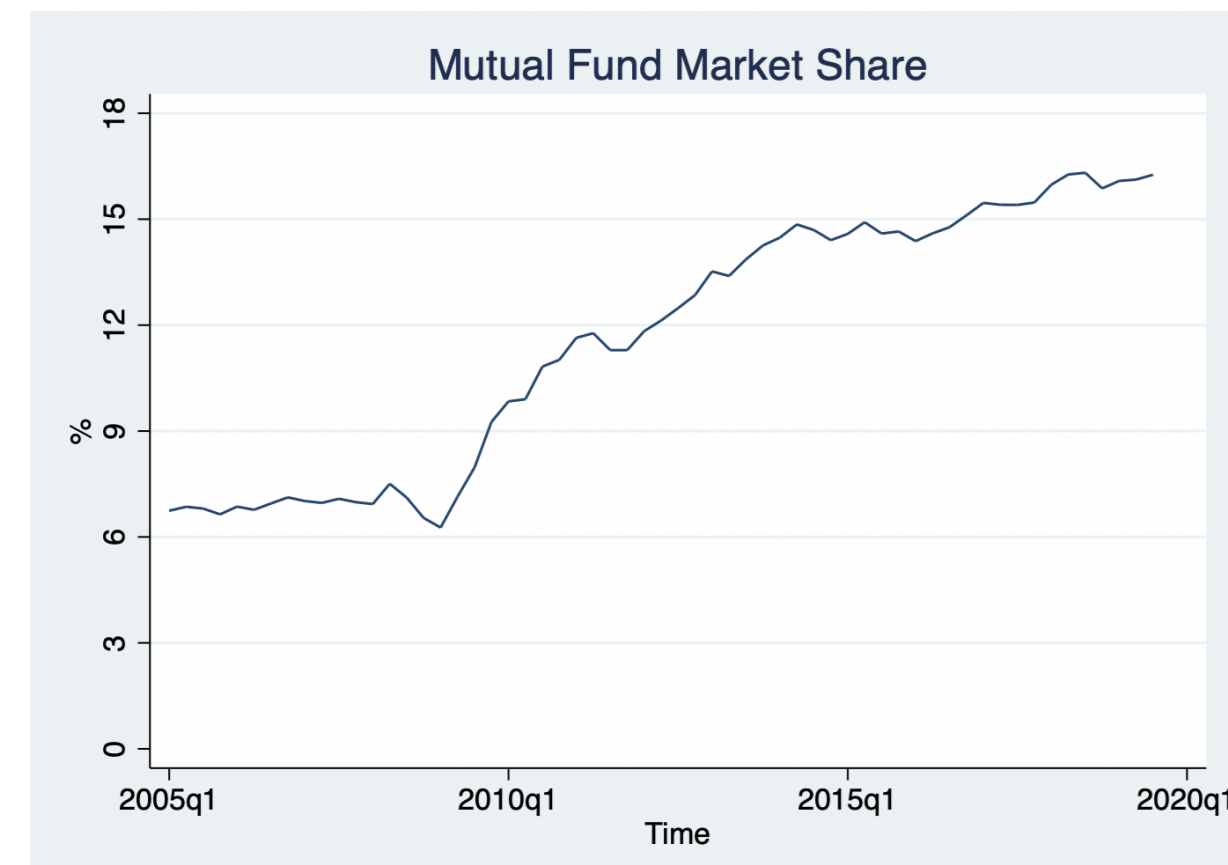


Introduction

- March 2020 bond market disruption suggests fragility in the bond market
- We show that credit spreads have become more sensitive to secondary market frictions over the past decade in the United States, due to the rise of mutual funds



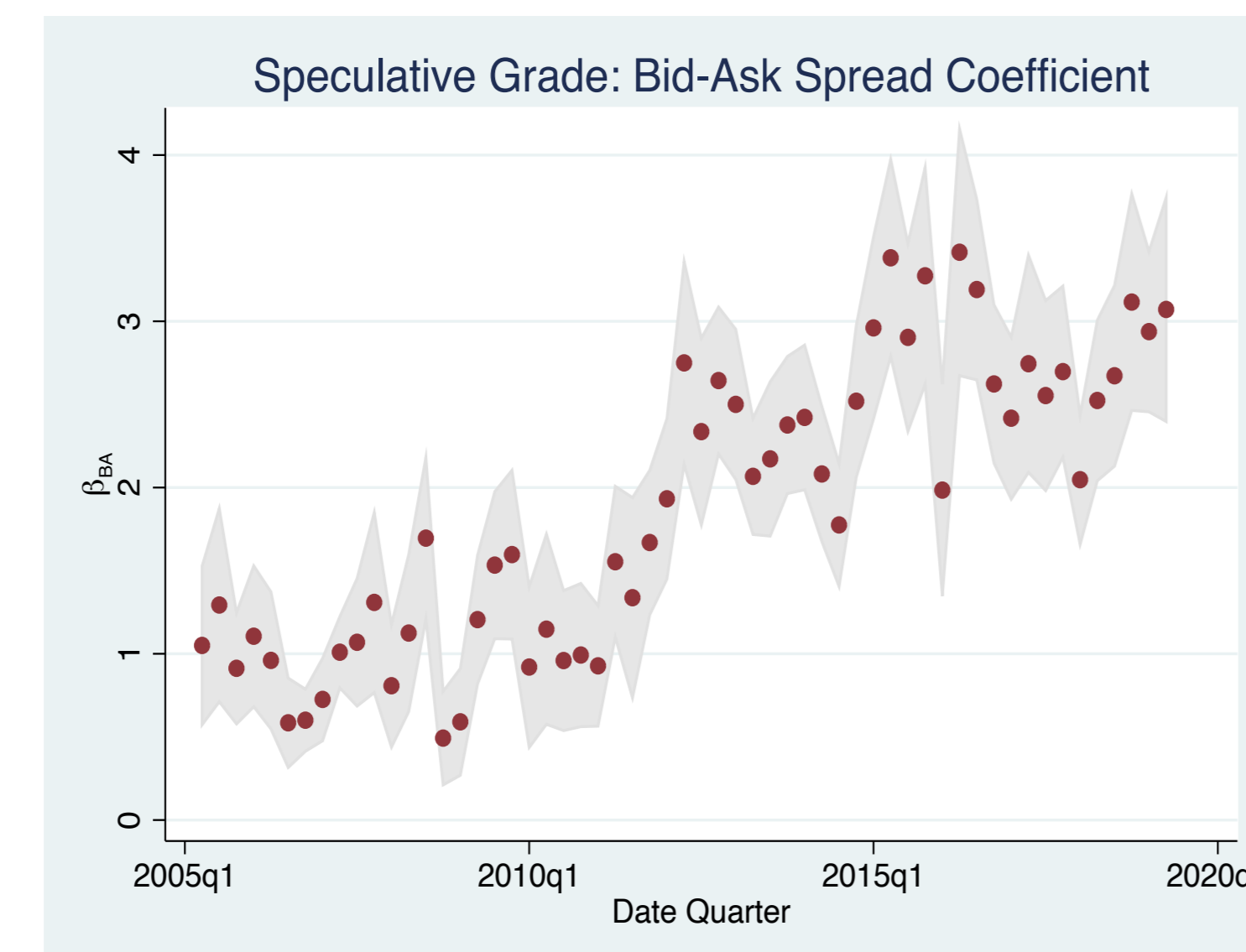
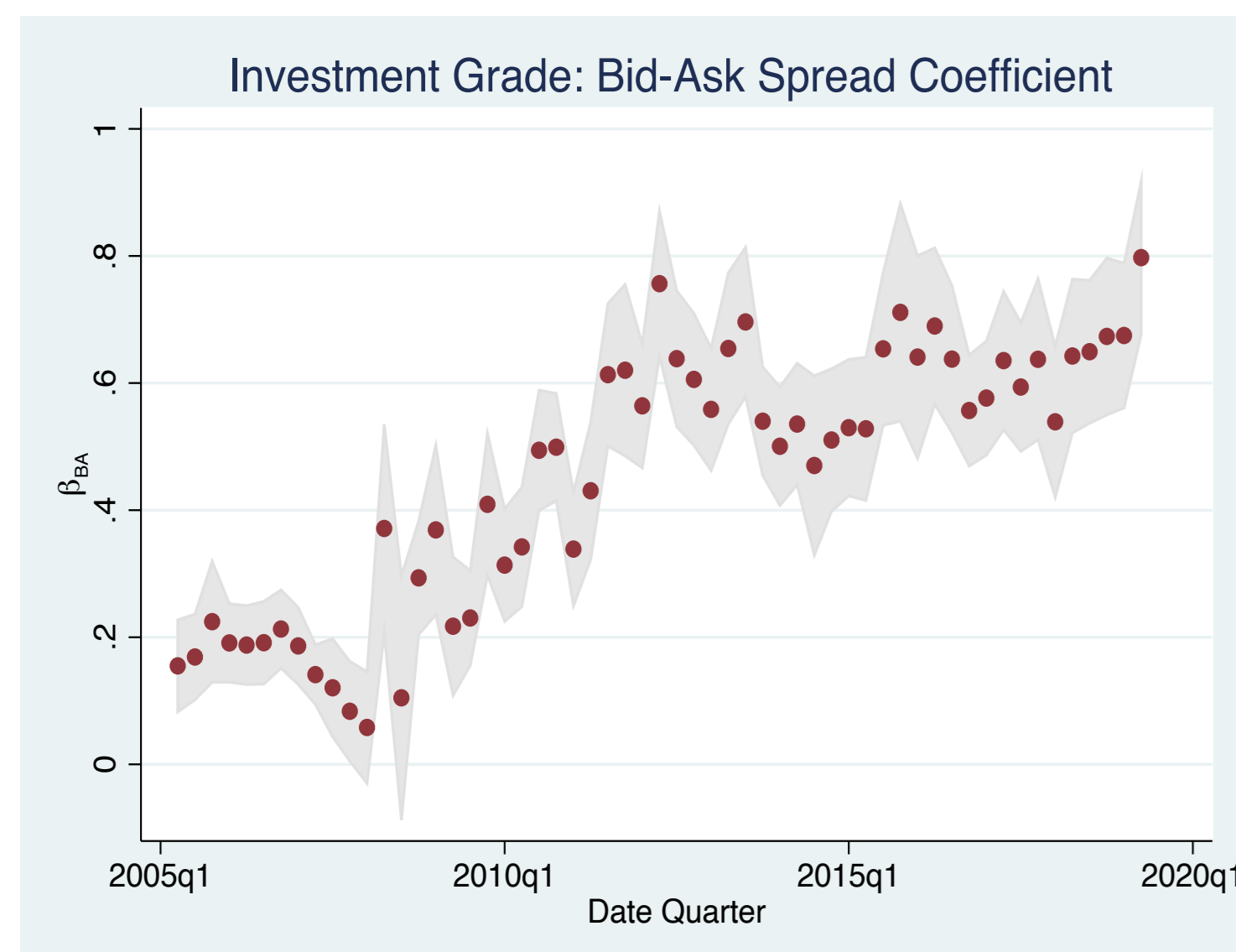
Mutual funds trade more frequently than traditional bond market participants such as insurance companies and pension funds

- Investor heterogeneity plays a key role in determining how liquidity is priced into corporate bond yields and affecting firms' financing conditions
- Important for understanding the impact of dealer regulation changes and quantitative easing programmes

Motivating Facts

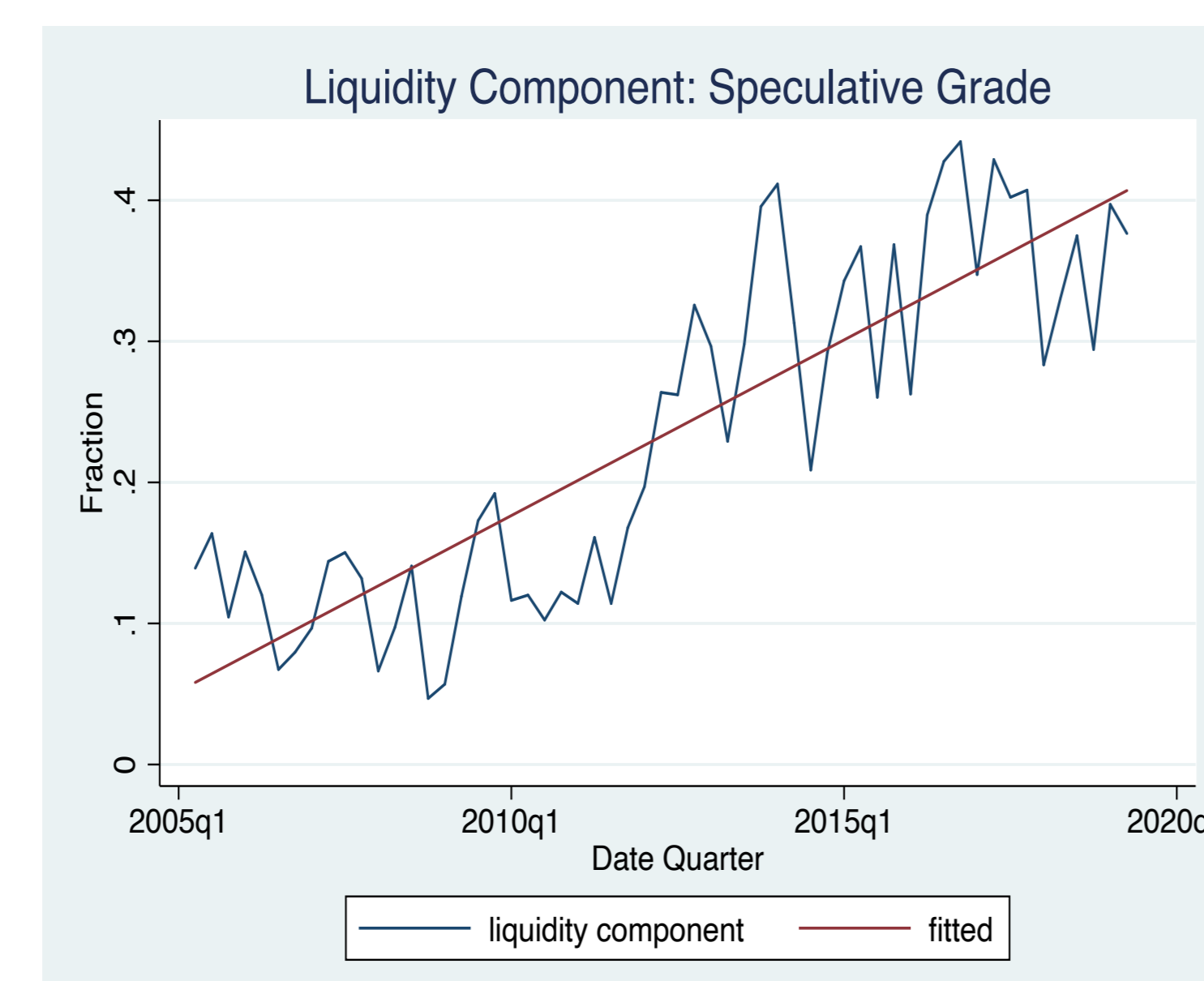
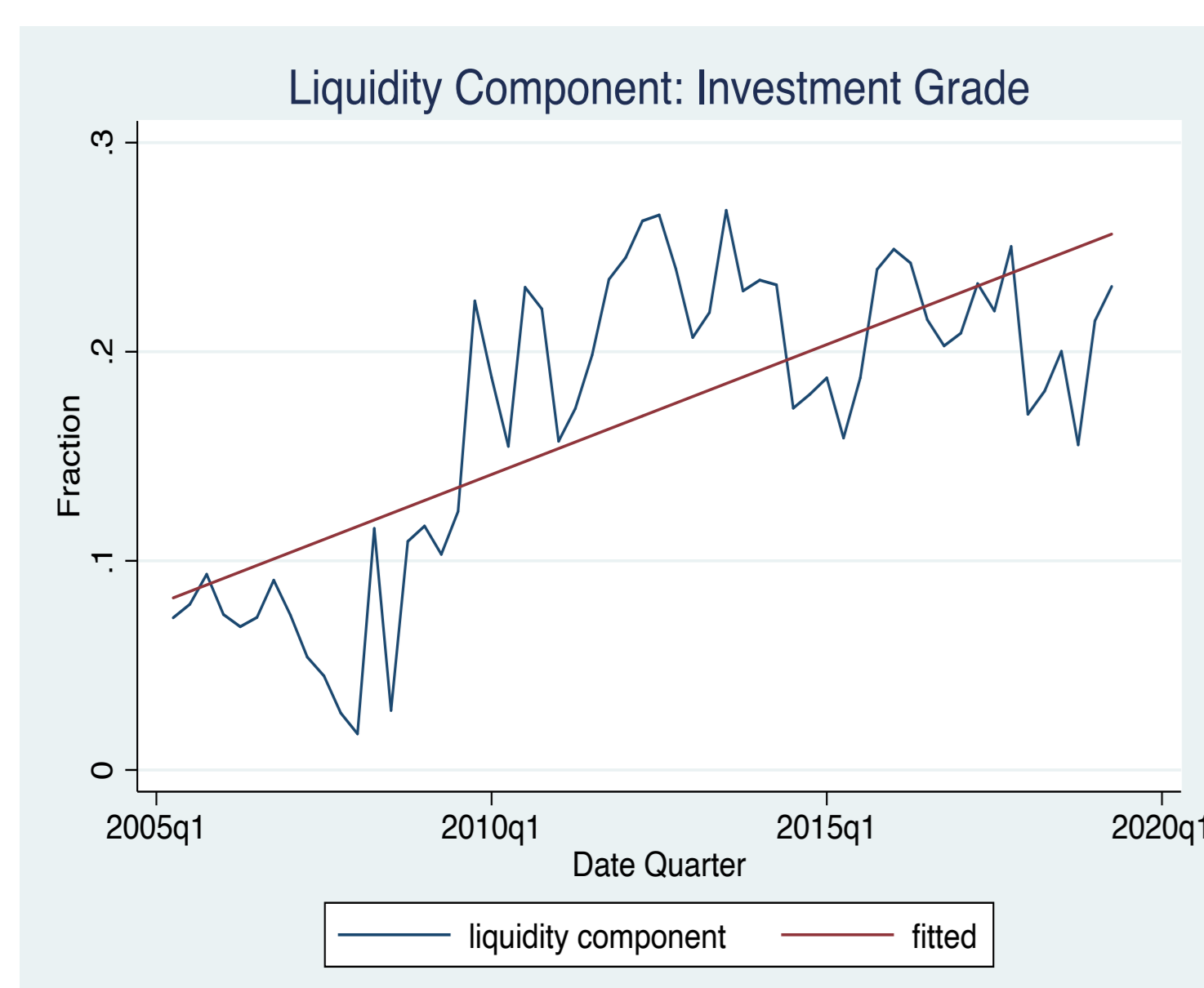
- Data: WRDS, TRACE (bond transaction data), Mergent (bond characteristics)
- Bid-ask spreads have been declining over time
- We run the following cross-sectional regression quarter by quarter and plot the coefficient for bid-ask spreads (β_t) over time ($X_{i,t}$ includes bond/firm characteristics)

$$\text{credit spread}_{i,t} = \alpha_t + \beta_t \text{bid-ask}_{i,t} + \gamma_t^T X_{i,t} + \epsilon_{i,t}$$



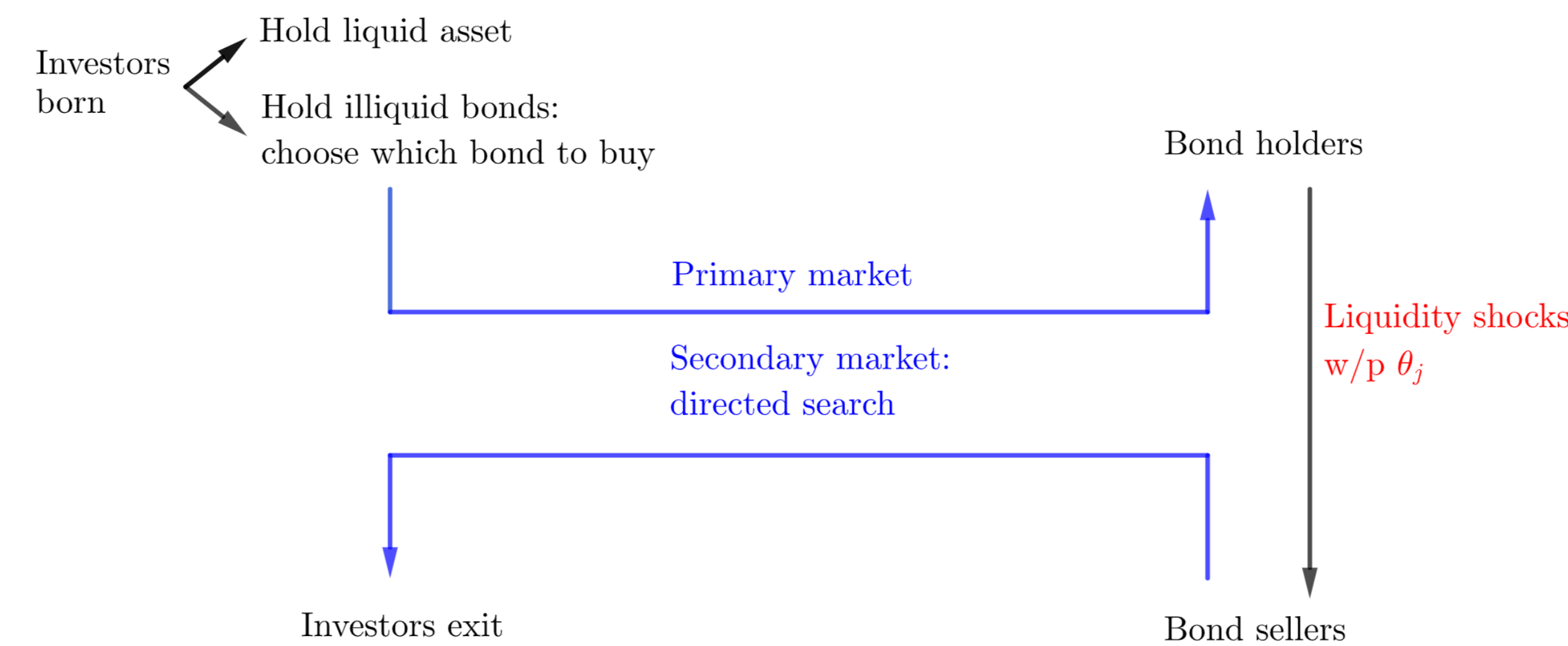
- The coefficient for bid-ask spreads increased significantly, both for investment grade and high yield bonds
- As a result, the liquidity component of credit spreads has increased from 5-10% to 20-30%

$$\text{liquidity component}_t = \text{median} \left[\frac{\beta_t \times \text{bid-ask}_{i,t}}{\text{credit spread}_{i,t}} \right]$$



Model

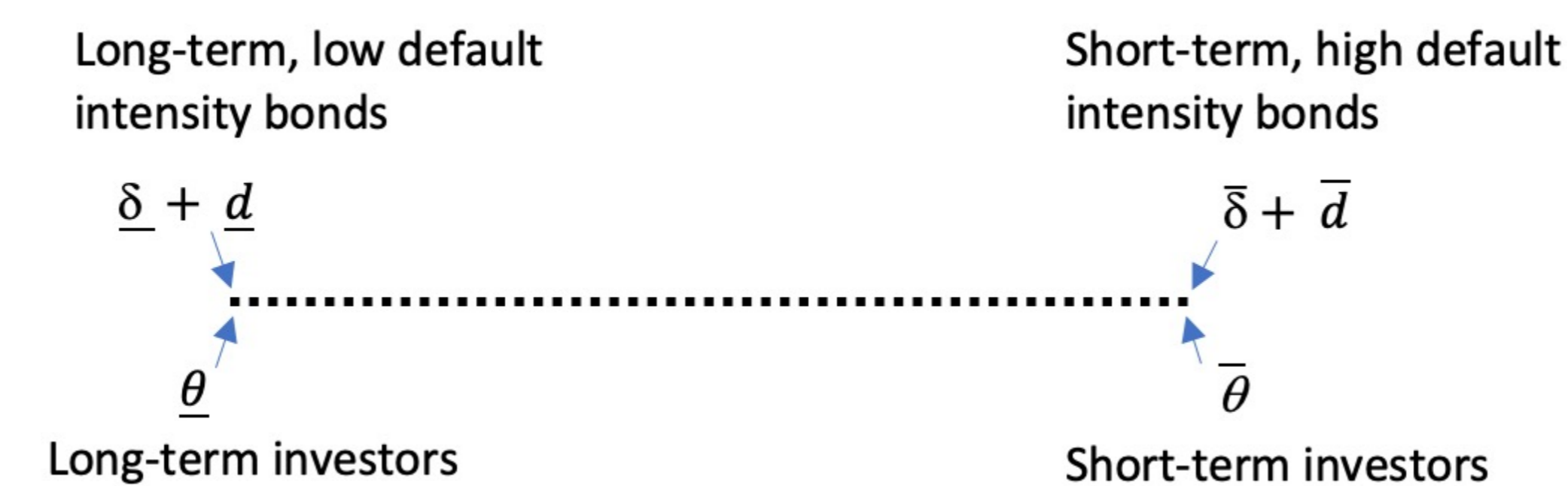
We build a heterogeneous investor model linking this increase in sensitivity to the observed rapid growth in mutual fund shares



- **Assets:**
 - Liquid risk free asset, pays interest rate r_f
 - N types of illiquid bonds indexed by i ($N \rightarrow \infty$)
 - Bonds differ by maturity intensity δ_i and default intensity d_i
- **Investors:**
 - Each period, constant measure of patient investors arrive, with discount rate ρ
 - Patient bond holder j subject to idiosyncratic liquidity shocks that arrive at Poisson rate θ_j , and becomes impatient
 - Heterogeneous θ_j , $\theta_j \sim F(\cdot)$: small $\theta_j \Rightarrow$ long-term investor
 - Impatient investors value bond cash flow at a discount \Rightarrow better off selling the bonds
- **Primary Markets:** centralised bidding process \Rightarrow pin down offering yield
- **Secondary Markets:** decentralised search process
 - Sellers with bond i (measure $\alpha_{s,i}$) matched with buyers of type θ_j (measure $\alpha_{b,j}$) at rate $\eta \alpha_{s,i}^{1-\gamma} \alpha_{b,j}^\gamma$
 - Sellers post prices
 - Buyers observe bond characteristics, prices, bid-ask spreads and waiting time, and choose which bond market to participate in or to hold the liquid asset (directed search)
 - Bid-ask spread ξ increase in seller-buyer ratio

Model Results

- **Cross-sectional:**
 - Positive assortative matching: long-term (short-term) investors buy long-term (short-term) and low (high) default intensity bonds
 - Short-term investors with $\theta_j > \bar{\theta}$ hold the risk free asset

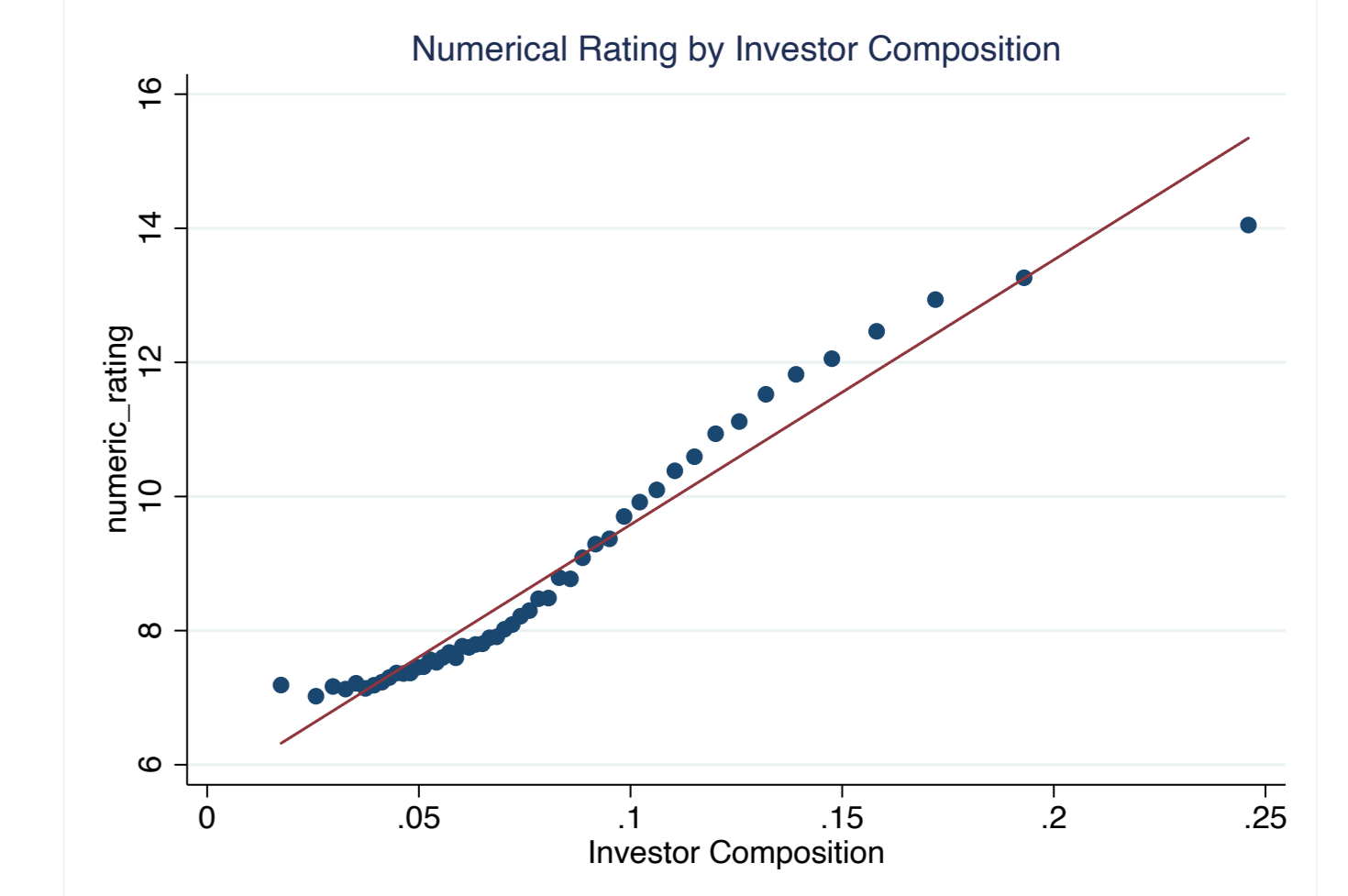
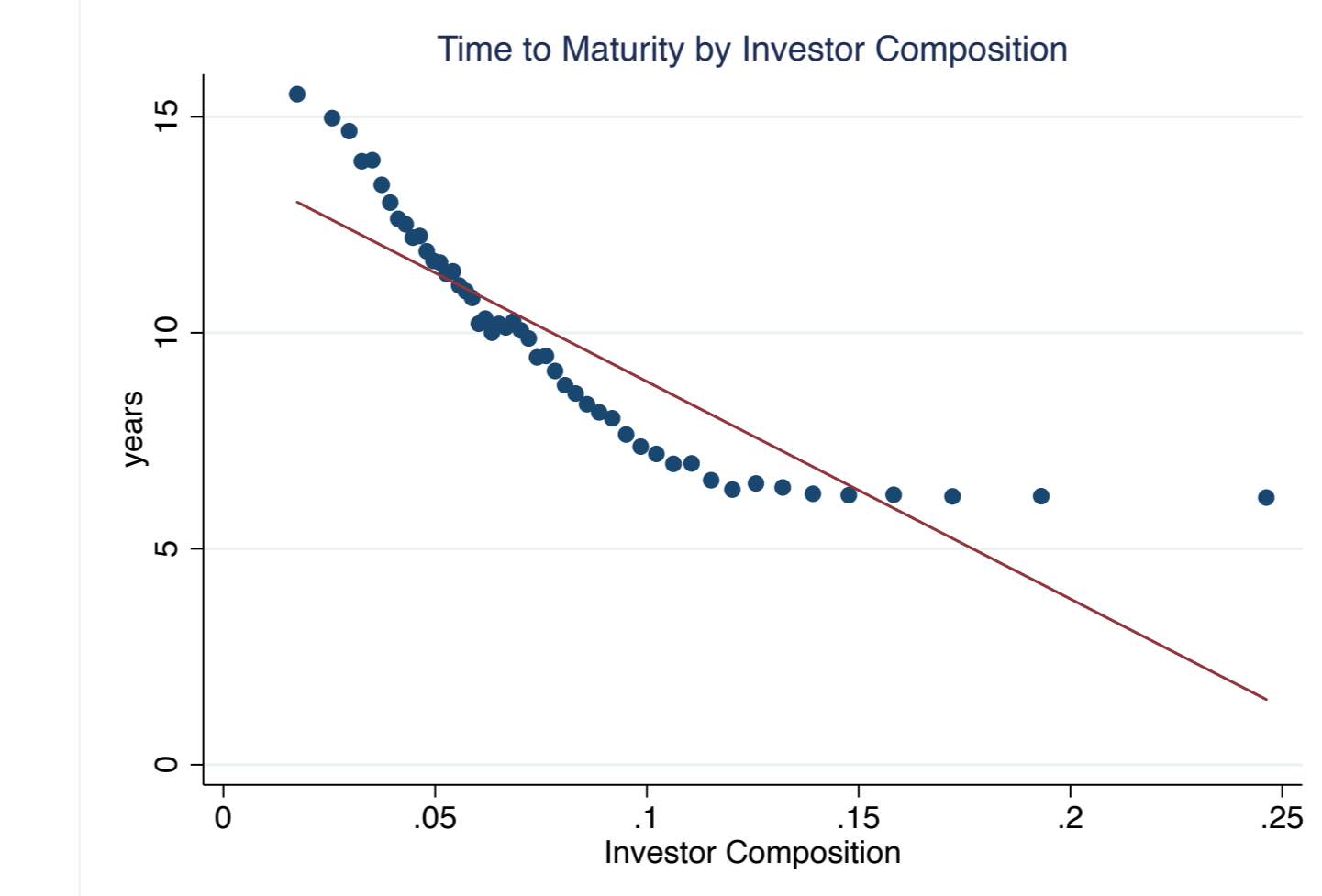


- **Over time:**
 - Risk-free rate $r_f \downarrow \Rightarrow$ short-term investors (e.g. mutual funds) reach for yield and enter the bond market
 - Number of market participants $\uparrow \Rightarrow$ easier to find counterparties \Rightarrow bid-ask spreads \downarrow
 - With more short-term investors, average trading needs $\uparrow \Rightarrow$ sensitivity of credit spreads to bid-ask spreads \uparrow
 - The sensitivity coefficient can be decomposed into two parts
 - Part 1: direct effect from more frequent trading
 - Part 2: indirect effect from higher valuation for trade-immediacy

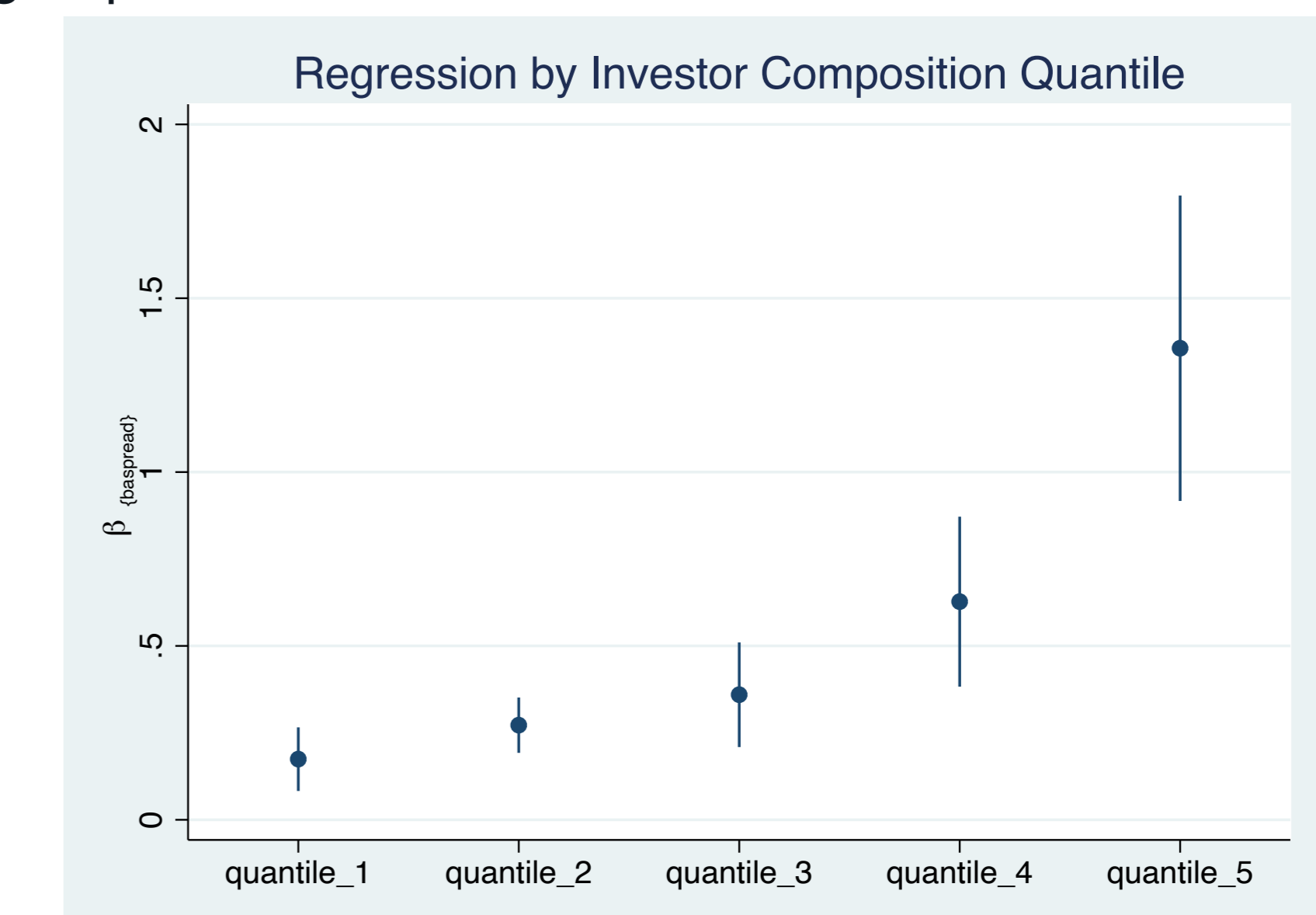
Quantitatively, part 2 contributes more than half to the increase in the sensitivity coefficient

Empirical Tests

- Data: eMAXX special report, TRACE, IMF, Morningstar
- Using detailed investor-bond holding data, we construct "investor composition" at the bond level to measure the average investor turnover rate
- Short-term investors hold more short-term and riskier bonds



- Bonds held by short-term investors are more sensitive to bid-ask spreads: sort bonds by investor composition into 5 groups, then regress credit spreads on bid-ask spreads with controls group by group



- Internationally, we find countries with a larger decline in risk free rates are associated with faster growth in bond mutual funds

Calibration and Policy Implications

- **Calibration:**
 - Feed in 10-year treasury rates from 2005-2019
 - Target moments: average investor turnover, sensitivity coefficient of bid-ask spreads, standard deviation of bid-ask spreads and credit spreads
 - **The model can match the change in liquidity components:** at the end of the sample period, liquidity component is 0.216 in the model vs 0.26 in the data
- **Evaluate the interactive effect of Volcker Rule dealer regulation changes and more short-term investors:**
 - Dealer regulation changes increase inventory costs \Rightarrow worsen liquidity
 - Force 1: more short-term investors makes credit spreads more sensitive to secondary market frictions \Rightarrow amplify regulation impact
 - Force 2: more short-term investors makes it easier to find counterparties \Rightarrow the market relies less on dealers to hold inventory and intermediate trades \Rightarrow mitigates regulation impact
 - We find the second force dominates: **the inflow of mutual funds is masking the negative impact of dealer regulation changes**
- **How does the market respond differentially to aggregate liquidity shocks depending on investor composition?**
 - The same magnitude of aggregate shock leads to **an additional 20% increase in credit spreads** today compared with 15 years ago, due to the presence of more short-term investors in the market today