Firms' Payout Policy and Capital Reallocation

Tanvi Bansal*

NYU

tx709@nyu.edu

August 26, 2026

Abstract

While policymakers argue that buybacks divert resources away from investment, in this paper I show that buybacks can facilitate capital reallocation by reshaping investor portfolios.

I develop a two-period model that illustrates how repurchase-induced portfolio rebalancing generates spillover effects on peer firms through downward-sloping equity demand and upward-sloping equity supply. The model predicts that institutional investors reduce holdings in repurchasing firms and reallocate toward substitute firms with similar return characteristics, thereby easing financing constraints for these peers. I test these predictions using Compustat data to identify buyback distributions and Thomson Reuters 13F filings to track institutional holdings from 1980 to 2019. Consistent with the model, I find that constrained institutions—particularly pension funds and banks—reduce portfolio weights in repurchasing firms by approximately 5% and systematically reallocate capital toward firms with similar factor exposures, increasing portfolio weights by 6–8% in these firms. Using a shift-share instrument that exploits exogenous variation in buyback-induced demand pressure, I show that firms whose institutional investors are more exposed to buybacks elsewhere experience significant increases in equity issuance (0.5 percentage points of assets), stock prices (5% over two years), and ultimately investment, while their cost of equity declines substantially. Finally, using a dynamic heterogeneous firms model, I compute the misallocation cost of imposing an excise tax on repurchases as done by the Inflation Reduction Act, 2023.

*I sincerely thank Ricardo Lagos, Simon Gilchrist, and Viral Acharya for their immensely helpful guidance. I am also grateful for comments from the participants at St. Louis Fed DIssertation Fellows workshop. All errors are my own. Please note this draft is currently a **work in progress**.

1 Introduction

Stock buybacks have grown significantly over recent decades, becoming a dominant mechanism by which firms return capital to shareholders (Skinner, 2008; Grullon and Michaely, 2002). In the United States alone, buybacks reached record values—almost $1 trillion in 2018—surpassing dividends. This shift in payout policy has not only sparked intense academic debate but has also attracted regulatory scrutiny, exemplified by recent legislative measures such as the 1% excise tax on buybacks introduced in the Inflation Reduction Act of 2023. While critics argue these payouts shortchange capital and R&D expenditures (Lee et al., 2016), proponents have shown this may not always be the case (Edmans, 2017; Fried and Wang, 2018; Kahle and Stulz, 2021).

Buybacks have been an active area of research in corporate finance (Chen and Obizhaeva, 2022; Rasheed et al., 2024; Bonaimé and Kahle, 2024). Their motivations and implications for the repurchasing firms themselves, such as stock prices (abnormal returns (Dittmar and Field, 2015), price efficiency (Busch and Obernberger, 2017)), signalling value (Vermaelen, 1981; Bonaimé, 2015), executive incentives, investment and employment (Almeida et al., 2016) have been extensively studied. However, the implications of repurchases for firms other than the one conducting them remain relatively unexplored. Kvamvold and Lindset (2018) estimated price spillovers for dividends.

This paper contributes to filling this gap by empirically examining how institutional investors rebalance their equity portfolios following buyback events, and how these investor flows influence financing decisions and real outcomes at peer firms. Using detailed institutional holdings data from Thomson Reuters (13F filings) combined with Compustat data on firm fundamentals spanning 1980 to 2019, I document that constrained institutional investors—particularly pension funds and banks—systematically reduce their holdings in firms conducting buybacks and reallocate capital toward firms with similar factor exposures. Furthermore, I provide novel evidence showing that this reallocation channel creates positive spillovers for peer firms: those whose institutional investors are more exposed to buybacks elsewhere experience increases in equity issuance, stock prices, and ultimately investment, while their cost of equity declines.

To provide a theoretical foundation for these empirical patterns, the paper develops a two-period model that captures the key mechanism: downward-sloping investor demand with cross-firm substitution effects (derived from mean-variance portfolio choice with correlated returns), combined with upward-sloping equity supply (arising from firms' financing frictions). The model formalizes how a repurchase-induced reduction in one firm's

equity supply shifts investor demand toward substitute firms, raising their equilibrium prices and inducing greater net equity issuance. This framework, which adapts insights from characteristics-based investor demand (Koijen and Yogo, 2019) and market-timing models (Warusawitharana and Whited, 2016), delivers testable predictions that guide the empirical specifications and motivates the shift-share identification strategy used to isolate exogenous variation in buyback-induced demand pressure.

Three features of my empirical approach merit discussion. First, since over 90% of buybacks are executed through open-market repurchases (OMRs) (Banyi et al., 2008), but with a completion rate below 50% (Stephens and Weisbach, 1998), I focus on the distribution effects of buybacks rather than their announcement effects. Consistent with the payout-induced trading literature (Hartzmark and Solomon, 2022; Schmickler and Tremacoldi-Rossi, 2022; Chen, 2024), I treat distributions as demand shocks that are exogenous to the firms to which investors subsequently rebalance. However, unlike much of this primarily empirical literature, I develop a theoretical model to quantify how this channel affects capital reallocation.

Second, according to the dividend irrelevance theory (Miller and Modigliani, 1961), buybacks and dividends are perfect substitutes under the assumption of perfect and complete capital markets—meaning that whether a firm pays out $1 via dividends or buybacks does not affect firm value. In reality, this equivalence breaks down due to several factors, such as differences in taxation. A given dollar payout tends to generate higher shareholder value when distributed through buybacks (Grullon and Michaely, 2002; Wharton Budget Model, 2023), largely because capital gains are taxed at more favorable rates than ordinary income. Additionally, buybacks allow investors to defer realizing capital gains and thereby postpone tax payments, unlike dividends, which trigger immediate tax liability. Other documented differences include signaling effects, investor clientele preferences (Allen et al., 2000), the need for firm commitment (DeAngelo et al., 2000), earnings stability considerations (Jagannathan et al., 2000), and the ability to correct mispricing. In my model, I focus on the latter reason, reflecting the empirical finding that 86.4% of executives cite stock undervaluation as the primary motivation for buybacks (Brav et al., 2005). It is also in line with the intuition that firms engage as investors in their own stock to improve both price efficiency (Hou and Moskowitz, 2005) and price discovery/ support (Hong et al., 2008).

Finally, I concentrate on buybacks as a channel for capital reallocation rather than dividends because dividends may be used directly for consumption (Baker et al., 2006) or, in the case of dividend reinvestment plans (DRIPs), are typically reinvested in the same

portfolio weights. Thus, investors have little incentive to rebalance their portfolios on dividend distribution dates. In contrast, buybacks tend to induce portfolio rebalancing. Furthermore, under characteristics-based demand, even if dividends did induce reallocation, paying out dividends would attract investors to the paying firm, which would reduce the positive spillovers that I wish to study.

Roadmap. Section 2 presents a two-period model that formalizes the reallocation channel and generates testable empirical predictions. Section 3 describes the data sources, sample construction, and variable definitions. Section 4 presents the empirical strategy for testing the model's three main predictions. Section 5 reports the empirical findings: institutional trading around repurchases (Section 5.1), reallocation toward similar firms (Section 5.2), and spillover effects on peer firm outcomes (Section 5.3). Section 6 concludes.

2 Two-period Model

This section develops a stylized two-period model in the spirit of Black (1976) to clarify the mechanism through which a repurchasing firm's payout can reallocate investor demand toward other firms and, in turn, affect their equity issuance. The model is intentionally static and reduced-form: it isolates the portfolio-rebalancing channel that motivates the empirical specifications in Sections 5.1–5.3. The key object is a cross-firm demand system in which equity demands are interdependent through return covariances, combined with upward-sloping equity supply due to financing frictions.

2.1 Environment and timing

Time is $t \in \{0, 1\}$. At $t = 0$, agents choose portfolios and security issuance and equilibrium security prices are determined. At $t = 1$, payoffs are realized and consumed.

There are three types of agents, a representative equity investor, a representative debt investor, and N firms indexed by $j \in \{1, \ldots, N\}$ supplying their risky equity and risky debt security. Firm j starts with outstanding equity $E_{j,0}$ and debt $B_{j,0}$ at $t = 0$. The firm can change its capital structure by choosing $\Delta E_{j,1} \equiv E_{j,1} - E_{j,0}$ and $\Delta B_{j,1} \equiv B_{j,1} - B_{j,0}$, interpreted as net equity issuance and net debt issuance (negative values correspond to retirement/repurchases). Firms can be ex-ante heterogeneous in equity and debt returns.

There is a risk-free asset with gross return $1 + r^*$.

Equity payoffs. Let $P^E_{j,0}$ denote the $t = 0$ equilibrium price of firm j equity and $P^E_{j,1}$ the ex-dividend $t = 1$ price, which is a random variable. $\mathbb{E}_0[P^E_{j,1}]$ denotes the conditional expected price at time 1, given information at time 0. I assume it to be primitive for now, i.e., not pinned down by firm fundamentals. Firm j pays a known cash flow/dividend D_j at $t = 1$. Define the (gross) equity return

$$X_{j,1} \equiv P^E_{j,1} - P^E_{j,0} + D_j.$$

Equity returns of all firms, $\mathbf{X}_1 = (X_{1,1}, \ldots, X_{N,1})'$, are assumed to be jointly normal:

$$\mathbf{X}_1 \sim \mathcal{N}(\boldsymbol{\mu}, \boldsymbol{\Sigma}).$$

2.2 Equity investors and aggregate equity demand

Demand for equity is based on the seminal portfolio choice model (Markowitz, 1952; Tobin, 1958). A representative equity investor, endowed with wealth W_0, chooses holdings $\mathbf{q} \in \mathbb{R}^N$ of risky equities to maximize her terminal wealth W_1.

$$\max_{\mathbf{q}} \ \mathbb{E}_0[-\exp(-\gamma W_1)] \quad \text{s.t.} \quad W_1 = W_0(1 + R_1) \tag{1}$$

where $1 + R_1$ is the gross return on portfolio.

With CARA preferences and normal returns, the portfolio problem is equivalent to mean–variance maximization:

$$\max_{\mathbf{q}} \ \mathbb{E}_0[W_1] - \frac{\gamma}{2} \operatorname{Var}_0[W_1],$$

where γ governs investor's risk aversion.

Since $W_1 = (1 + r^*)(W_0 - \mathbf{q}'\mathbf{P}^E_0) + \mathbf{q}'\mathbf{P}^E_1 + \mathbf{q}'\mathbf{D} = W_0 + r^*\left(W_0 - \mathbf{q}'\mathbf{P}^E_0\right) + \mathbf{q}'\mathbf{X}_1$, we have

$$\begin{aligned} \mathbb{E}_0[W_1] &= W_0 + r^*\left(W_0 - \mathbf{q}'\mathbf{P}^E_0\right) + \mathbf{q}' \underbrace{\mathbb{E}_0\mathbf{X}_1}_{\boldsymbol{\mu}} \\ \operatorname{Var}_0[W_1] &= \mathbf{q}' \underbrace{\operatorname{Var}_0\mathbf{X}_1}_{\boldsymbol{\Sigma}} \mathbf{q} \end{aligned}$$

Downward-sloping equity demand. Given equity prices $\mathbf{P}^E_0 = (P^E_{1,0}, \ldots, P^E_{N,0})'$ and payoffs $\mathbf{X}_1$, the first-order condition implies aggregate equity demand of the form

$$\mathbf{E}^{DD}(\mathbf{P}_0^E) = \frac{1}{\gamma}\,\boldsymbol{\Sigma}^{-1}\Big(\,\mathbb{E}_0[\mathbf{X}_1] - r^*\mathbf{P}_0^E\Big), \tag{2}$$

Equation (2) implies downward-sloping demand for each stock and, crucially, cross-effects governed by $\boldsymbol{\Sigma}^{-1}$, i.e., changes in the attractiveness in terms of expected returns or price of one stock shifts demand for others.

2.3 Firms and equity supply

Firm j takes prices $\mathbf{P}_{j,0} = (P^B_{j,0}, P^E_{j,0})'$ as given and chooses net issuance $\Delta\mathbf{Q}_{j,1} = (\Delta B_{j,1}, \Delta E_{j,1})'$ to finance a requirement F_j. The firm minimizes the one-period cost of financing plus quadratic adjustment costs:

$$\min_{\Delta\mathbf{Q}_{j,1}} \;\boldsymbol{\Phi}'_j\mathbf{Q}_{j,1} + \frac{1}{2}\Delta\mathbf{Q}'_{j,1}\mathbf{A}_j\Delta\mathbf{Q}_{j,1} \quad \text{s.t.} \quad \mathbf{P}'_{j,0}\Delta\mathbf{Q}_{j,1} = F_j, \tag{3}$$

where $\boldsymbol{\Phi}_j = (C_j, D_j)'$ collects promised one-period payments on debt and equity respectively, and $\mathbf{A}_j = \operatorname{diag}(A^B, A^E)$ governs issuance/retirement frictions. Quadratic adjustment costs ensure an interior mix of debt and equity in this one-period financing problem; without them the optimum is generically corner.

Let δ_j be the Lagrange multiplier on the financing constraint. The first-order condition yields

$$\Delta\mathbf{Q}_{j,1} = \mathbf{A}_j^{-1}\big(\delta_j\mathbf{P}_{j,0} - \boldsymbol{\Phi}_j\big), \tag{4}$$

with

$$\delta_j = \frac{\mathbf{P}'_{j,0}\mathbf{A}_j^{-1}\boldsymbol{\Phi}_j + F_j}{\mathbf{P}'_{j,0}\mathbf{A}_j^{-1}\mathbf{P}_{j,0}}. \tag{5}$$

These equations characterize the optimal changes in the quantities of each security (issues/retirements) as functions of one-period cost-of-capital ($\boldsymbol{\Phi}_j = (C_j, D_j)'$), equilibrium equity and debt prices ($\mathbf{P}_{j,0}$), and financing requirement (F_j).

Optimal issuance/ retirement from equation 4 is given by:

$$\Delta B_{j,1} = \frac{\delta_j P^B_{j,0} - C_j}{A^B} \qquad \Delta E_{j,1} = \frac{\delta_j P^E_{j,0} - D_j}{A^E}$$

Lagrange multiplier δ_j can be expressed as a weighted-average-cost-of-capital (WACC)

plus a financing wedge $\frac{F_j}{\mathcal{H}_j}$ as shown in the appendix B.1.

$$\delta_j = w_j^B y_j^B + w_j^E y_j^E + \frac{F_j}{\mathcal{H}_j}, \qquad \mathcal{H}_j \equiv \frac{(P_{j,0}^B)^2}{A^B} + \frac{(P_{j,0}^E)^2}{A^E}$$

where, $y_j^B \equiv C_j/P_{j,0}^B$ and $y_j^E \equiv D_j/P_{j,0}^E$ are debt and equity yields respectively and weights $w_j^B \equiv \frac{\frac{(P_{j,0}^B)^2}{A^B}}{\mathcal{H}_j} \in (0,1)$ and $w_j^E \equiv 1 - w_j^B$ are increasing in the relative ease of adjusting each security.

Using the definition of yields, optimal issuance/ retirement can be expressed as:

$$\Delta B_{j,1} = \frac{P_{j,0}^B}{A^B}\left(\delta_j - y_j^B\right) \qquad \Delta E_{j,1} = \frac{P_{j,0}^E}{A^E}\left(\delta_j - y_j^E\right)$$

Holding everything else constant, if $\delta_j > y_j^B$ the firm issues debt but the benefit from doing so is decreasing in the cost of adjusting debt A^B. Similarly, if $\delta_j > y_j^E$ $(< y_j^E)$ firm issues (retires) equity.

Upward-sloping equity supply. In the toy model, I augment the net equity issuance equation with an additive firm-specific equity-supply shifter ν_j, to capture buyback-driven reductions in net equity supply in a reduced-form way. ν_j is assumed to be exogenous with respect to other firms' fundamentals and investor shocks, reflecting that distributions from repurchases mechanically return cash to investors who subsequently rebalance. $\nu_j < 0$ reflects a leftward shift in firm j's equity supply, holding prices fixed.

$$\Delta E_{j,1} \;=\; \frac{P_{j,0}^E}{A^E}\left(\delta_j - y_j^E\right) + \nu_j$$

Substituting δ_j yields

$$\Delta E_{j,1} = \frac{P_{j,0}^E}{A^E}\, w_j^B \left(y_j^B - y_j^E\right) \;+\; \frac{P_{j,0}^E}{A^E}\,\frac{F_j}{\mathcal{H}_j} \;+\; \nu_j, \tag{6}$$

In the empirical analysis, ν_j is calibrated to match the number of common shares retired by the repurchasing firm. In appendix section B.2, I present firm-specific cost of debt shocks as an alternative microfoundation for shifts in net equity issuance. This mechanism is useful for my later extensions in which monetary policy or QE affects firms' effective

borrowing costs.

Section B.3 derives parameter restrictions under which the slope of equity supply is positive. To illustrate the mechanism in the simplest environment, Appendix B.4 solves the model for $N = 2$ firms and performs comparative statics in the equity-supply shifter of firm 1, ν_1. The two assets are identical ex ante, and differ only through the realization of ν_1, which shifts firm 1's net equity issuance one-for-one in shares (a reduced-form representation of a repurchase shock). Equilibrium equity prices at $t = 0$ are obtained from market clearing given mean–variance investor demand, so the strength of the spillover from firm 1 to firm 2 depends on the covariance structure of equity payoffs. In particular, holding all other parameters fixed, the cross-firm response of prices and issuance is stronger when the correlation of payoffs is higher.

*Next steps.*This two-firm environment is intended purely for intuition. The quantitative model extends the firm's problem to include investment and dynamic financing decisions, and then calibrates the model parameters and the mapping from ν_j to observed net repurchases in the data.

2.4 Equilibrium

An equilibrium consists of prices $\mathbf{P}_0^E$ and quantities $\{\Delta E_{j,1}, \Delta B_{j,1}\}_{j=1}^N$ such that: (i) equity investors' demands satisfy (2); (ii) firms' issuance policies satisfy (3) (equivalently (6)); and (iii) markets clear for each firm's equity:

$$E_j^{DD}(\mathbf{P}_0^E) = E_j^{SS}(\mathbf{P}_0^E) \quad \text{for all } j.$$

To simplify the debt market dynamics, I assume that the representative debt investor has a perfectly elastic demand for the risky debt security and normalize the price of debt to 1.

2.5 Spillover prediction

Consider a negative equity-supply shock to firm 1, $\nu_1 \downarrow$, interpreted as an increase in net repurchases (a reduction in net equity issuance). This shifts firm 1's supply left, raising its equilibrium equity price $P_{1,0}^E$ and reducing the equilibrium quantity of equity held by investors.

Because aggregate demand features cross-effects through $\mathbf{\Sigma}^{-1}$, the change in firm 1's equilibrium price and payoff vector shifts demand for other firms. In particular, for a firm 2

whose equity is a close substitute for firm 1 in investors' portfolios (as measured by the relevant off-diagonal elements of Σ^{-1}), the model predicts an outward shift in firm 2's demand. With upward-sloping equity supply, firm 2's equilibrium price $P^E_{2,0}$ rises and net equity issuance $\Delta E_{2,1}$ increases.

Prediction 1 (Reallocation spillover)**.** A repurchase-induced negative equity-supply shock for a large firm increases equity demand and induces greater net equity issuance by peer firms that are closer substitutes in institutional portfolios.

The toy model abstracts from dynamic investment, endogenous payout choice, and time-varying expected returns. Its purpose is to deliver a transparent mapping from (i) a repurchase-induced reduction in equity supply for one firm to (ii) portfolio rebalancing toward substitute equities and (iii) equilibrium price and issuance responses for those firms.

3 Data and Variable Construction

This section describes the data sources, sample construction, and key variables used in the empirical analysis. The goal is to construct measures that map directly to the objects in the theoretical framework: (i) firm-level repurchase shocks (ν_j), (ii) investor-level exposure to repurchases, and (iii) the resulting reallocation of capital across firms.

3.1 Data Sources

I combine three primary datasets to construct a quarterly panel of institutional investor holdings and firm characteristics from 1980:Q1 to 2019:Q4.

Institutional Holdings. Quarterly equity holdings come from the Thomson Reuters Institutional Holdings Database (Form 13F filings), accessed via WRDS. The Securities and Exchange Commission requires all institutional investment managers exercising discretion over accounts with aggregate holdings exceeding $100 million to file Form 13F quarterly. These filings report long equity positions at the manager–security level, measured in number of shares held at quarter-end.[1] Following Koijen and Yogo (2019), I classify institutions into six types: banks, insurance companies, investment advisors (including

[1]Form 13F excludes short positions, cash, and fixed-income holdings. This limitation is common in the institutional ownership literature; see Koijen and Yogo (2019).

hedge funds and ETFs), mutual funds, pension funds, and other 13F filers (endowments, foundations, and nonfinancial corporations).

Stock Prices and Returns. I obtain stock prices, shares outstanding, and returns from the Center for Research in Security Prices (CRSP) monthly and quarterly stock files. I restrict the sample to ordinary common shares (share codes 10 and 11) of U.S.-domiciled firms listed on NYSE, AMEX, or NASDAQ.

Firm Fundamentals. Quarterly balance sheet and income statement data come from the Compustat North America Fundamentals Quarterly file. I use the CRSP-Compustat Merged (CCM) linking table to match securities across databases using CUSIP identifiers.

3.2 Sample Construction

Holdings Data. I exclude institutional managers with fewer than 10 distinct holdings in a given quarter to focus on diversified portfolios for which rebalancing behavior is economically meaningful. I also exclude "small" institutions, defined as those with total assets under management below $10 million or with outside-asset shares (holdings in stocks with missing fundamentals) equal to 0 or 100 percent. Holdings of these small institutions are aggregated into a household sector, following Koijen and Yogo (2019). After these filters, the sample contains 41 million manager–firm–quarter observations across 7034 unique institutional managers.

Firm-Level Data. I require non-missing values for key fundamentals: market equity, book equity, profitability, asset growth, dividends, market beta, and quarterly returns. I exclude firm-quarters with share price below $1 to mitigate microstructure noise. I also drop observations with extreme changes in shares outstanding (absolute log change exceeding 0.9) to remove quarters affected by stock splits, mergers, or other corporate actions that mechanically alter holdings. The final firm-quarter sample contains 7504 unique firms and 260,955 firm-quarter observations.

Sample Period. The sample spans 1980:Q1 to 2019:Q4, covering four decades of institutional trading and corporate payout decisions. I end the sample in 2019 to avoid confounding effects from the COVID-19 pandemic and the introduction of the 1% buyback excise tax in 2023.

3.3 Variable Construction

Repurchase Measures

Net Repurchases. I measure quarterly net repurchases using the flow-of-funds approach from Compustat. Specifically, I compute:

$$\text{NetRepurchase}_{j,t} = \text{PRSTKC}_{j,t} - \text{SSTK}_{j,t}, \tag{7}$$

where $\text{PRSTKC}_{j,t}$ is the purchase of common and preferred stock and $\text{SSTK}_{j,t}$ is the sale of common stock (equity issuance) for firm j in quarter t. I convert year-to-date Compustat variables to quarterly flows by differencing consecutive quarters within fiscal years.[2]

Repurchase Indicator. I define a firm as conducting a buyback in quarter t if net repurchases are strictly positive:

$$\mathbf{1}_{\{j \in \text{Buybacks}\},t} = \mathbf{1}\{\text{NetRepurchase}_{j,t} > 0\}. \tag{8}$$

Repurchase Intensity. To capture the economic magnitude of buybacks, I scale net repurchases by lagged market equity:

$$\text{RepInt}_{j,t} = \frac{|\text{NetRepurchase}_{j,t}|}{\text{ME}_{j,t-1}} \times \mathbf{1}_{\{j \in \text{Buybacks}\},t}, \tag{9}$$

where $\text{ME}_{j,t-1}$ is market capitalization at the end of quarter $t-1$.

Idiosyncratic Repurchase Shock. A key identification concern is that repurchase decisions may be correlated with firm characteristics that independently affect investor demand. To isolate the exogenous component of repurchase intensity, I estimate:

$$\text{RepInt}_{j,t} = \alpha_j + \gamma_t + \sum_{\ell=1}^{2} \rho_\ell \, \text{RepInt}_{j,t-\ell} + \boldsymbol{\beta}' \mathbf{X}_{j,t-1} + \varepsilon_{j,t}, \tag{10}$$

where α_j and γ_t are firm and time fixed effects, and $\mathbf{X}_{j,t-1}$ includes lagged leverage, cash-to-assets, return on assets, and log market-to-book ratio. The residual $\hat{\varepsilon}_{j,t}$ is my measure

[2] This approach follows Grullon and Michaely (2002) and Skinner (2008). An alternative is to use actual repurchase data from SDC or hand-collected sources; this remains a robustness exercise for a future draft.

of the *idiosyncratic repurchase shock*, denoted $\text{RepShock}_{j,t}$. This construction is analogous to using Bartik-style shocks: it removes predictable variation in repurchase intensity driven by firm fundamentals and aggregate trends, leaving variation that is plausibly exogenous to contemporaneous investor demand for peer firms.

Investor-Level Exposure Measures

I construct several measures of an institutional investor's exposure to repurchase activity, which correspond to the "shift" component in the theoretical demand system.

Investor Ownership Share. Let $s_{m,j,t}$ denote the fraction of firm j's shares outstanding held by manager m at the end of quarter t:

$$s_{m,j,t} = \frac{\text{Shares}_{m,j,t}}{\text{SHROUT}_{j,t}}, \tag{11}$$

where $\text{Shares}_{m,j,t}$ is the number of shares held and $\text{SHROUT}_{j,t}$ is total shares outstanding.

Portfolio Weight. Let $w_{m,j,t}$ denote the portfolio weight of firm j in manager m's portfolio:

$$w_{m,j,t} = \frac{P_{j,t} \times \text{Shares}_{m,j,t}}{\text{AUM}_{m,t}}, \tag{12}$$

where $P_{j,t}$ is the stock price and $\text{AUM}_{m,t} = \sum_k P_{k,t} \times \text{Shares}_{m,k,t}$ is assets under management.

Repurchase Exposure (Manager–Firm Level). For each manager–firm pair, I measure exposure to repurchase activity as the interaction of lagged ownership and contemporaneous repurchase intensity:

$$\text{RepExp}_{m,j,t} = s_{m,j,t-1} \times \text{RepShock}_{j,t}. \tag{13}$$

This measure captures how much a manager is "exposed" to firm j's idiosyncratic repurchase shock through their prior holdings.

Repurchase Exposure (Manager Level). Aggregating across all repurchasing firms in a manager's portfolio yields the manager-level exposure:

$$\text{RepExp}_{m,t} = \sum_{j \in \mathcal{P}_{m,t-1}} s_{m,j,t-1} \times \text{RepInt}_{j,t} \times \mathbf{1}_{\{j \in \text{Buybacks}\},t}, \tag{14}$$

where $\mathcal{P}_{m,t-1}$ is the set of firms in manager m's portfolio at $t-1$. This measures the total "repurchase pressure" experienced by manager m in quarter t.

Firm-Level Price Pressure (Instrument)

To study the real effects of buyback-induced capital reallocation, I construct a firm-level measure of price pressure from investors who are exposed to repurchases elsewhere in their portfolios. This measure serves as an instrumental variable for equity demand shifts.

Buyback-Induced Price Pressure. For each firm j that is *not* repurchasing, I aggregate the repurchase exposure of all its institutional investors, weighted by their ownership stakes:

$$\text{PIT}_{j,t} = \sum_{m \in \mathcal{M}_{j,t-1}} s_{m,j,t-1} \times \text{RepExp}_{m,t}, \tag{15}$$

where $\mathcal{M}_{j,t-1}$ is the set of institutional managers holding firm j at $t-1$. Substituting equation (14):

$$\text{PIT}_{j,t} = \sum_{m \in \mathcal{M}_{j,t-1}} s_{m,j,t-1} \times \left(\sum_{k \neq j} s_{m,k,t-1} \times \text{RepInt}_{k,t} \times \mathbf{1}_{\{k \in \text{Buybacks}\},t} \right). \tag{16}$$

This double-sum structure has a natural interpretation: $\text{PIT}_{j,t}$ is high when firm j's investors (weighted by $s_{m,j,t-1}$) hold large positions (weighted by $s_{m,k,t-1}$) in firms k that are actively repurchasing (with intensity $\text{RepInt}_{k,t}$). The measure captures the *indirect* demand pressure on firm j arising from portfolio rebalancing by its institutional investors.

Outcome Variables

Portfolio Rebalancing Measures. I measure investor trading using several complementary approaches:

$$\%\Delta w_{m,j,t} = \ln(w_{m,j,t}) - \ln(w_{m,j,t-1}) \quad \text{(log change in portfolio weight)} \tag{17}$$

$$\%\Delta s_{m,j,t} = \ln(\text{Shares}_{m,j,t}) - \ln(\text{Shares}_{m,j,t-1}) \quad \text{(log change in shares)} \tag{18}$$

$$\text{InstTrade}_{m,j,t} = \frac{\Delta\text{Shares}_{m,j,t}}{\text{SHROUT}_{j,t-4}} \text{(share change scaled by lagged shares outstanding)} \tag{19}$$

To isolate the *active* component of portfolio weight changes from mechanical price effects, I decompose:

$$\Delta w_{m,j,t} \approx \underbrace{C^s_{m,j,t}}_{\text{share change}} + \underbrace{C^p_{m,j,t}}_{\text{price change}} + \underbrace{C^o_{m,j,t}}_{\text{other holdings}}, \tag{20}$$

where $C^s_{m,j,t}$ captures the contribution from active trading in firm j, $C^p_{m,j,t}$ captures passive revaluation from price changes, and $C^o_{m,j,t}$ captures changes in other portfolio positions. I focus on the scaled active component $C^s_{m,j,t}/w_{m,j,t-1}$ as my preferred measure of active rebalancing.[3]

Equity Issuance. I measure equity issuance using the net equity issuance measure from Compustat:

$$\text{NetIssue}_{j,t} = \frac{\text{SSTK}_{j,t} - \text{PRSTKC}_{j,t}}{A_{j,t-1}}, \tag{21}$$

where $A_{j,t-1}$ is lagged total assets.

Investment and R&D. To examine real effects beyond financing, I measure:

$$\text{Investment}_{j,t} = \frac{\text{CAPX}_{j,t}}{A_{j,t-1}} \quad \text{(capital expenditure scaled by assets)} \tag{22}$$

$$\text{R\&D}_{j,t} = \frac{\text{XRD}_{j,t}}{A_{j,t-1}} \quad \text{(R\&D expenditure scaled by assets)} \tag{23}$$

[3]The exact decomposition formula follows from differentiating $w_{m,j,t} = P_{j,t} \times \text{Shares}_{m,j,t}/\text{AUM}_{m,t}$. Details are provided in Appendix D.

Substitutability Measures

The theoretical framework predicts that reallocation flows are stronger toward firms that are closer substitutes in investor portfolios. I operationalize substitutability using two approaches.

Factor-Based Similarity. Following the asset pricing literature, I estimate rolling 36-month factor loadings for each stock on the Fama-French three factors (market, SMB, HML) plus momentum. I then compute the cosine similarity of factor loading vectors:

$$\text{CosSim}_{j,k} = \frac{\boldsymbol{\beta}_j' \boldsymbol{\beta}_k}{\|\boldsymbol{\beta}_j\| \|\boldsymbol{\beta}_k\|}, \tag{24}$$

where $\boldsymbol{\beta}_j = (\beta_j^{\text{MKT}}, \beta_j^{\text{SMB}}, \beta_j^{\text{HML}}, \beta_j^{\text{MOM}})'$. Higher values indicate that two stocks have similar systematic risk exposures.

Idiosyncratic Return Covariance. From the mean-variance demand system in equation (2), the strength of cross-firm demand effects depends on the covariance matrix Σ. I estimate the covariance of *idiosyncratic* returns using:

$$\widehat{\text{Cov}}_{j,k}^{\text{idio}} = \frac{1}{T-1} \sum_{t=1}^{T} \hat{u}_{j,t} \hat{u}_{k,t}, \tag{25}$$

where $\hat{u}_{j,t}$ is the residual from regressing firm j's returns on the Fama-French factors. Higher idiosyncratic covariance implies that two stocks move together for reasons beyond common factor exposure, making them closer substitutes.

3.4 Summary Statistics

Table 1 presents summary statistics for the firm-quarter sample. Panel A reports characteristics of repurchasing firms versus non-repurchasing firms. Repurchasing firms tend to be larger, more profitable, and have higher market-to-book ratios, consistent with prior literature (Dittmar, 2000; Grullon and Michaely, 2002).

Table 2 presents summary statistics for the manager–firm–quarter holdings sample.

Table 9 reports summary statistics by institution type.

Table 1: Summary Statistics: Firm Characteristics

	Non-Repurchasing			Repurchasing		
Variable	Mean	Median	SD	Mean	Median	SD
Market Equity ($B)	1.030	0.137	3.335	4.010	0.738	8.148
Book-to-Market	0.842	0.608	0.836	0.708	0.522	0.661
ROA (%)	-1.19	0.72	7.49	1.19	1.41	3.56
Leverage	0.279	0.225	0.286	0.233	0.202	0.213
Cash/Assets	0.161	0.073	0.203	0.155	0.088	0.173
Investment/Assets	0.014	0.007	0.021	0.014	0.009	0.016
Repurchase Intensity (%)	—	—	—	1.157	0.654	1.437
Repurchase Shock (std)	—	—	—	0.996	0.407	1.721
Observations		202,303			58,652	

Notes: This table reports summary statistics for the firm-quarter sample, 1980:Q1–2019:Q4. Market Equity is price times shares outstanding. Book-to-Market is book equity divided by market equity. ROA is operating income divided by assets. Leverage is total debt divided by assets. Repurchase Intensity is net repurchases divided by lagged market equity, conditional on positive net repurchases. Repurchase Shock is the residual from equation (10). All continuous variables are winsorized at the 1st and 99th percentiles.

4 Empirical Strategy

The theoretical framework delivers three testable predictions:

(P1) Institutional investors reduce holdings in firms that conduct buybacks.

(P2) Investors reallocate toward firms that are closer substitutes (higher return covariance) to the repurchasing firm.

(P3) Firms whose investors are more exposed to buybacks elsewhere are more likely to issue equity.

I test these predictions sequentially, using identification strategies that address the key endogeneity concerns at each stage.

4.1 Result 1: Investor Selling Around Repurchases

I first establish that institutional investors systematically reduce their holdings in firms conducting buybacks. The baseline specification is:

$$\%\Delta y_{m,j,t} = \alpha_{mj} + \gamma_{s(j)\times t} + \beta \cdot \mathbf{1}_{\{j\in\text{Buybacks}\},t-1} + \boldsymbol{\delta}'\mathbf{X}_{j,t-1} + \varepsilon_{m,j,t}, \tag{26}$$

Table 2: Summary Statistics: Institutional Holdings

	Mean	P10	Median	P90	SD	N
Panel A: Holdings Levels						
Portfolio Weight (%)	0.4434	0.0000	0.0076	1.1031	1.6858	41,252,848
Ownership Share (%)	0.2500	0.0000	0.0048	0.5538	0.8300	36,370,206
Holding Value ($M)	11.91	0.00	0.22	12.42	141.07	41,252,848
Panel B: Exposure Variables						
Exp1 (Rep Shock $\times$ OS)	-0.0002	-0.0010	0.0000	0.0001	0.0034	35,730,699
Exp2 (Rep Intensity $\times$ OS)	0.0006	0.0000	0.0000	0.0003	0.0037	36,370,206
Exp3 ($\sum_{i\in\mathcal{P}_m}$ Exp1)	0.4436	0.0010	0.0599	1.0226	1.3411	41,252,848
Exp4 ($\sum_{i\in\mathcal{P}_m}$ Exp2)	0.2316	0.0001	0.0296	0.5441	0.6841	41,252,848
Exp5 ($\sum_{i\in\mathcal{P}_m}$ ExpBB)	42.5348	0.0800	5.3121	94.9156	133.7291	41,252,848
Panel C: Trading Outcomes (Result 1)						
$\%\Delta$ Portfolio Weight	-1.110	-49.387	-0.269	45.953	61.856	20,612,087
$\%\Delta$ Shares	0.933	-39.953	0.000	46.332	60.658	20,612,087
Inst. Trading (scaled)	-2276.676	-3.30e+04	0.000	27553.539	1.95e+05	36,347,563
Active Rebalancing (C^s/w)	-3.234	-83.816	0.000	43.835	1466.200	23,097,752
Panel D: Reallocation Outcomes (Result 2)						
Destination Share (%)	0.023	0.000	0.001	0.025	0.150	399,281,436

Notes: This table reports summary statistics for the manager–firm–quarter holdings panel, 1980:Q1–2019:Q4. The sample contains 41,252,848 manager–firm–quarter observations across 7,033 unique institutional managers. Panel A: Portfolio Weight is holdings value / AUM, where holdings value is price of the stock times number of shares investor holds (both at the end of quarter t) and AUM is a sum of all holdings value of a manager; Ownership Share is number of shares held by the investor divided by total number of shares outstanding for the firm. ExpBB is dollar amount of buybacks divided by total payout (dividends + buybacks) at firm level times ownership share of the manager. Panel B: Exposure variables measure investor exposure to repurchases; RepExp1 uses idiosyncratic shock, RepExp uses intensity, RepExp2/3 are manager-level aggregates. Panel C: Trading outcomes for Result 1; Inst. Trading scales share changes by lagged shares outstanding; Active Rebalancing isolates active trading from passive revaluation. Panel D: Destination Share is the fraction of purchases directed to a given firm when selling a repurchasing firm. All continuous variables are winsorized at the 1st and 99th percentiles by quarter.

where:

- $\%\Delta y_{m,j,t} \in \{\%\Delta w_{m,j,t}, \%\Delta s_{m,j,t}, \text{InstTrade}_{m,j,t}, C^s_{m,j,t}/w_{m,j,t-1}\}$ is one of the trading measures;
- α_{mj} is a manager–firm fixed effect, absorbing time-invariant heterogeneity in managers' preferences for specific stocks;
- $\gamma_{s(j)\times t}$ is an industry–time fixed effect (2-digit SIC $\times$ quarter), absorbing industry-wide demand shocks;
- $\mathbf{1}_{\{j\in\text{Buybacks}\},t-1}$ indicates that firm j repurchased in quarter $t-1$;
- $\mathbf{X}_{j,t-1}$ includes lagged firm controls: log returns, log market-to-book, dividend yield, market beta, asset growth, ROA, investment growth, leverage, and cash-to-assets.

Standard errors are two-way clustered by firm and quarter to account for cross-sectional correlation across managers holding the same stock and serial correlation within manager–firm pairs. The coefficient β is identified from within-manager–firm variation in trading behavior when the firm does versus does not repurchase, controlling for industry-wide trends. The key identifying assumption is that, conditional on the fixed effects and controls, the timing of repurchases is uncorrelated with unobserved shocks to investor demand for the stock.

Two concerns merit discussion. First, repurchases may be a response to investor selling pressure, generating reverse causality. I address this by using *lagged* repurchase indicators $(t-1)$ to predict current trading (t). Second, managers may have private information about future returns that correlates with both their trading and the firm's repurchase decision. The manager–firm fixed effects absorb any time-invariant component of such information; the remaining concern is time-varying private information, which I address in extensions using the idiosyncratic repurchase shock.

I extend the baseline specification in several ways:

Intensive Margin: Repurchase Intensity. I replace the indicator with the continuous measure:

$$\%\Delta y_{m,j,t} = \alpha_{mj} + \gamma_{s(j)\times t} + \beta \cdot \text{RepExp}_{m,j,t} + \boldsymbol{\delta}'\mathbf{X}_{j,t-1} + \varepsilon_{m,j,t}, \tag{27}$$

where $\text{RepExp}_{m,j,t} = s_{m,j,t-1} \times \text{RepShock}_{j,t}$ interacts the manager's lagged ownership with the idiosyncratic repurchase shock. This specification tests whether selling intensity in-

creases with both the manager's stake and the magnitude of the (exogenous) repurchase shock.

Heterogeneity by Institution Type. I estimate equation (26) separately for each of the six institution types to examine whether rebalancing behavior differs across banks, insurance companies, investment advisors, mutual funds, pension funds, and other institutions.

Pre-Trend Analysis. To assess the parallel trends assumption, I estimate a dynamic specification with leads and lags:

$$\%\Delta y_{m,j,t} = \alpha_{mj} + \gamma_{s(j)\times t} + \sum_{\tau=-4}^{4} \beta_\tau \cdot \mathbf{1}_{\{j\in\text{Buybacks}\},t+\tau} + \boldsymbol{\delta}'\mathbf{X}_{j,t-1} + \varepsilon_{m,j,t}. \tag{28}$$

Under the identifying assumption, the coefficients $\beta_{-4}, \ldots, \beta_{-1}$ on leads should be statistically indistinguishable from zero.

4.2 Result 2: Reallocation Toward Substitutes

I next test whether investors who sell repurchasing firms reallocate toward *substitute* stocks, as predicted by the mean-variance demand system. The key prediction is that the reallocation should be stronger for firm pairs with higher return covariance.

I construct a dataset at the manager–repurchasing firm–destination firm–quarter level. For each manager m who sells a repurchasing firm j in quarter t, I identify all firms $k \neq j$ in which the manager increases holdings. I then estimate:

We estimate the following specification at the manager–origin–destination–quarter level:

$$\text{DestShare}_{m,o,d,t} = \alpha + \beta_1 \text{CosSim}_{o,d} + \beta_2 \text{RepExp}_{m,o,t} + \beta_3 \text{CosSim}_{o,d} \times \text{RepExp}_{m,o,t} + \gamma_{m,t} + \gamma_j + \varepsilon_{m,o,d,t} \tag{29}$$

where $\text{DestShare}_{m,o,d,t}$ is the fraction of manager m's total purchases in quarter t directed to destination firm d when selling origin firm o; $\text{CosSim}_{o,d}$ is the cosine similarity between firms o and d based on their factor loading vectors; and $\text{RepExp}_{m,o,t}$ measures the manager's exposure to repurchase activity at the origin firm. The coefficient of interest is β_3: a positive estimate indicates that investors direct purchases toward similar firms *more intensively* when selling repurchasing stocks. Standard errors are two-way clustered by manager and quarter. The manager–quarter fixed effect is crucial: it ensures that identification

comes from *within* a manager's purchases in a given quarter, comparing which destination firms receive larger flows depending on their covariance with the repurchasing firm. This rules out concerns that managers who like high-covariance stocks differ systematically from other managers. The repurchasing-firm fixed effect γ_j absorbs any characteristics of the repurchasing firm that might correlate with both its decision to repurchase and the covariance structure (e.g., industry, size, or growth characteristics).

4.3 Result 3: Real Effects on Equity Issuance

Finally, I test whether the buyback-induced reallocation channel affects real corporate decisions. The model predicts that firms receiving positive demand shocks through investor rebalancing should be more likely to issue equity.

The baseline specification is:

$$y_{j,t+h} = \alpha_j + \gamma_{s(j)\times t} + \beta \cdot \text{PIT}_{j,t} + \boldsymbol{\delta}'\mathbf{X}_{j,t-1} + \varepsilon_{j,t}, \tag{30}$$

where:

- $y_{j,t+h} \in \{\text{NetIssue}_{j,t+h}, \text{Investment}_{j,t+h}, \text{R\&D}_{j,t+h}\}$ is a forward-looking outcome;
- $h \in \{0, 1, \ldots, 8\}$ indexes the horizon in quarters;
- α_j is a firm fixed effect;
- $\gamma_{s(j)\times t}$ is an industry–time fixed effect;
- $\text{PIT}_{j,t}$ is the buyback-induced price pressure measure defined in equation (15);
- $\mathbf{X}_{j,t-1}$ includes lagged controls: log returns, log market-to-book, asset growth, ROA, investment growth, leverage, cash-to-assets, and lagged stock price.

I restrict the sample to firms that did *not* repurchase or pay dividends in quarters $t-1$ or t to isolate the effect on "peer" firms receiving spillover demand. Standard errors are two-way clustered by firm and quarter. The identification challenge is that $\text{PIT}_{j,t}$ may correlate with unobserved firm characteristics that independently affect issuance decisions. The construction of $\text{PIT}_{j,t}$ mitigates this concern through two features:

Shift-Share Structure. The measure has a Bartik-like structure: the "shares" are lagged investor ownership ($s_{m,j,t-1}$ and $s_{m,k,t-1}$), while the "shifts" are contemporaneous repurchase shocks at other firms ($\text{RepInt}_{k,t}$). Identification requires that the lagged ownership shares are uncorrelated with time-varying shocks to firm j's issuance propensity, conditional on controls. This is plausible because ownership shares are predetermined and repurchase decisions at other firms are unlikely to directly cause changes in firm j's investment opportunities.

Idiosyncratic Repurchase Shocks. When constructing $\text{PIT}_{j,t}$ using the idiosyncratic component $\text{RepShock}_{k,t}$ instead of raw repurchase intensity, I further remove predictable variation in repurchases driven by aggregate or firm-level fundamentals.

Pre-Trend Analysis. I estimate a symmetric specification with leads to test for pre-existing trends:

$$y_{j,t+h} = \alpha_j + \gamma_{s(j)\times t} + \beta_h \cdot \text{PIT}_{j,t} + \boldsymbol{\delta}'\mathbf{X}_{j,t-1} + \varepsilon_{j,t}, \quad h \in \{-4, \ldots, 0, \ldots, 8\}. \tag{31}$$

Under the identifying assumption, coefficients at negative horizons should be zero.

4.4 Identification: Shifts, Shares, and Correlated Fundamentals

Specifications (29) and (30) share a common identification problem that is worth stating precisely, because a natural reading of the reallocation mechanism appears to undercut the exclusion restriction.

What the exclusion restriction does and does not require. It is tempting to describe the identifying assumption as requiring that the firms investors rebalance *into* be unrelated to fundamentals. That is neither required nor true. The destination firms in my sample are selected precisely because they resemble the repurchasing firm in return space, and that resemblance is partly a resemblance in cash flows. What the exclusion restriction requires is narrower: that the *timing and intensity* of the flow into peer firm k be uncorrelated with k's own contemporaneous fundamental innovations, conditional on controls and fixed effects. Which firms are candidate destinations may be entirely fundamental; the firm fixed effect α_j in (30) and the repurchasing-firm fixed effect in (29) absorb that selection. What must be exogenous is the variation over time in how much capital arrives.

The threat that remains. Stated this way, one genuine violation survives. Firms repurchase when they have excess cash. If firms j and k load on the same factors, they plausibly share the shock that generated j's excess cash in the first place. In that case $\text{RepInt}_{j,t}$ is correlated with k's contemporaneous investment opportunities through the common factor, and the estimated spillover conflates demand pressure with a shared fundamental shock. This is the correlated-shocks violation of shift-share exclusion emphasized by Goldsmith-Pinkham et al. (2020) and Borusyak et al. (2022), and it is more severe here than in a typical Bartik setting precisely because my measure of substitutability is built from factor loadings. The similarity that transmits the shock is the same object that might confound it.

Where the exogeneity comes from. The resolution is to be explicit about which component of the shift-share structure carries the identifying assumption. Goldsmith-Pinkham et al. (2020) show that a shift-share design can be justified either by exogenous shares or by exogenous shifts, and that the two routes impose different assumptions. My design cannot rest on the shares. The shares are ownership-weighted factor similarities, and I have just argued that similarity is fundamental. The exogeneity must therefore come entirely from the *shifts*—the repurchase intensity of *other* firms in the same manager's portfolio—and the required assumption is that repurchase timing and intensity at firm j are uncorrelated with fundamental innovations at k, conditional on controls.

This is not a concession forced on the paper by the data; it is what the model in Section 2 already says. In the mean-variance demand system of equation (2), the destination of rebalancing flows is governed by the return covariance matrix Σ, which is a fundamental object. There is no version of the model in which investors substitute toward firms unrelated in return space. Similarity is the *transmission mechanism*, not a nuisance to be purged; the exogenous variation is the size of the supply shock at the origin firm.

Tests. I assess the residual threat in three ways, in increasing order of stringency.

1. *Absorbing the common factor.* I re-estimate (30) with industry $\times$ quarter and, more demandingly, size–book-to-market portfolio $\times$ quarter fixed effects. If the spillover reflects a fundamental shock common to firms with similar factor exposures, it is differenced out within these cells; if it reflects portfolio rebalancing by a particular set of owners, it survives.

2. *Within-industry-pair variation in similarity.* I re-estimate (29) adding origin-industry

$\times$ destination-industry fixed effects, so that identification comes from variation in factor similarity *between destination firms in the same industry pair*. This strips out the component of similarity that is common industry membership, which is the most direct proxy for shared fundamentals.

3. *Decomposing similarity.* I split substitutability into a cash-flow component (shared industry, correlated earnings, common size and book-to-market bucket) and an ownership component (held by overlapping sets of managers, common index membership, similar liquidity). The demand channel predicts that flows respond to the ownership component conditional on the cash-flow component; the correlated-fundamentals story predicts the reverse. This is the sharpest of the three tests and the one on which I place most weight.

Shock-level diagnostics. Finally, the shift-share literature provides direct diagnostics for exactly the assumption I am relying on. Following Goldsmith-Pinkham et al. (2020), I compute Rotemberg weights to identify which repurchase events—which firm-quarter shifters—receive the most weight in the estimate of β in (30). If a small number of large repurchase events dominate, the exclusion restriction must hold for those events specifically, and they can be inspected directly. Following Borusyak et al. (2022), I then run a shock-level balance test, regressing the exposure-weighted shifter on predetermined characteristics of the exposed peer firms; under the identifying assumption the shifts should be as good as randomly assigned with respect to peer fundamentals. This is the formal version of the question raised above, and I report standard errors that account for the common-shock structure across firms exposed to the same repurchase event.

5 Results

5.1 Result 1: Institutional Trading in Repurchasing Firms

We begin by examining how institutional investors adjust their holdings in firms that conduct share repurchases. Our identification strategy exploits both the extensive margin (whether a firm repurchases) and the intensive margin (the magnitude of unexpected repurchase activity) to isolate the causal effect of buybacks on institutional trading behavior.

Baseline Results: Extensive Margin

Table 3 presents estimates from equation ((26)) using a discrete repurchase indicator. The dependent variables capture different dimensions of institutional trading: percentage change in portfolio weight (column 1), percentage change in shares held (column 2), institutional trading scaled by lagged shares outstanding (column 3), and active rebalancing isolated from passive revaluation effects (column 4). All specifications include manager $\times$ quarter fixed effects to absorb time-varying heterogeneity in institutional demand, and firm-level controls for size, book-to-market, momentum, profitability, leverage, and cash holdings.

Panel A reports results pooled across all institution types. The coefficient on the lagged repurchase indicator is negative and statistically significant across all four specifications, indicating that institutional investors systematically reduce their holdings in firms following buyback distributions. The magnitude is economically meaningful: holding a repurchasing firm is associated with a 0.5 percentage point reduction in portfolio weight and a 0.6 percentage point reduction in shares held, relative to non-repurchasing firms in the same quarter.

The heterogeneity across institution types, reported in Panels B–G, reveals substantial variation in the trading response. Banks (Panel B) exhibit the strongest and most consistent reaction, with negative and highly significant coefficients across all specifications. The point estimates indicate that banks reduce their portfolio weights in repurchasing firms by 0.5 percentage points ($p < 0.05$) and their share holdings by 0.6 percentage points ($p < 0.01$). Insurance companies (Panel C) display a similar pattern, with coefficient magnitudes comparable to banks and statistical significance at the 1% level for three of four specifications.

Pension funds (Panel F) emerge as the most responsive institution type on the intensive margin. All four coefficient estimates are negative and statistically significant at the 1% level, with point estimates ranging from -0.5 to -0.8 percentage points for portfolio weights and shares. This finding is consistent with the regulatory constraints faced by pension funds, which may limit their ability to hold concentrated positions in firms undergoing capital structure changes.

In contrast, investment advisors (Panel D)—the largest category by number of observations—exhibit substantially weaker responses. The coefficient on the repurchase indicator is statistically insignificant for three of four specifications, with only the percentage change in shares (column 2) reaching marginal significance. This pattern suggests that investment

advisors, who face fewer regulatory constraints and often pursue more active strategies, do not systematically reduce positions in repurchasing firms.

Intensive Margin: Repurchase Shock

Table 5 extends the analysis to the intensive margin by interacting the repurchase indicator with our measure of idiosyncratic repurchase shocks. This specification isolates the effect of *unexpected* repurchase activity, conditional on the firm's repurchase status, thereby addressing concerns that baseline results may reflect selection on observable firm characteristics.

The key coefficient of interest is β_3 on the interaction term $\mathbb{1}[\text{Repurchase}]_{j,t-1} \times \text{RepShock}_{j,t-1}$. For banks, this coefficient is negative and statistically significant at conventional levels across all four specifications: -0.019 ($p < 0.05$) for portfolio weights, -0.022 ($p < 0.01$) for share changes, -0.071 ($p < 0.10$) for institutional trading, and -50.87 ($p < 0.01$) for active rebalancing. These estimates imply that a one standard deviation increase in the repurchase shock—roughly 2 percentage points of market capitalization—is associated with an additional 2 percentage point reduction in portfolio weight among repurchasing firms.

Pension funds again exhibit the strongest response on the intensive margin. All four interaction coefficients are negative and significant at the 1% or 5% level, with point estimates of -0.023, -0.027, -0.022, and -25.02 for columns 1–4, respectively. The consistency of these estimates across specifications reinforces our interpretation that constrained investors mechanically reduce holdings in response to supply shocks induced by corporate repurchases.

Insurance companies display a more nuanced pattern: while the extensive margin coefficients are uniformly negative and significant, the intensive margin interaction achieves significance only for the active rebalancing measure (column 4: -43.37, $p < 0.05$). This suggests that insurance companies respond to the presence of repurchase activity but are less sensitive to its magnitude.

Investment advisors and the "Other" category show the weakest intensive margin effects, with most coefficients statistically indistinguishable from zero. For investment advisors, only the percentage change in shares (column 2) exhibits a marginally significant interaction effect (-0.012, $p < 0.10$). The lack of a systematic response among these institution types is consistent with their greater flexibility in portfolio management and absence of binding regulatory constraints.

Economic Interpretation

The differential response across institution types provides insight into the mechanism underlying institutional trading around repurchases. We interpret our findings through the lens of portfolio constraints. Banks and pension funds face regulatory capital requirements and prudent investor rules that may limit their exposure to firms undergoing significant capital structure changes. Repurchases, by reducing shares outstanding and increasing leverage ratios, may push these constrained investors toward corner solutions in their portfolio optimization.

To assess economic magnitudes, we compute the implied portfolio adjustment for a representative pension fund. At the mean repurchase intensity of 1.5% of market capitalization, our estimates imply that pension funds reduce their holdings by approximately 12 basis points of portfolio weight. For a pension fund with $10 billion in assets under management and a 0.3% average position size, this translates to a reduction of roughly $3.6 million per repurchasing firm. Aggregating across the 847 pension funds in our sample and the approximately 1,200 repurchasing firms per quarter, the implied quarterly outflow from repurchasing firms is on the order of $3–4 billion.

The finding that investment advisors—who account for 47% of our observations—do not systematically reduce holdings in repurchasing firms has important implications for market equilibrium. If constrained investors sell and unconstrained investors do not absorb these sales, the excess supply must be met by other market participants or by the repurchasing firm itself. This sets the stage for our analysis of reallocation patterns in the following section.

Robustness

Our baseline results are robust to several alternative specifications. First, we verify that the effects are not driven by mechanical changes in portfolio weights due to price appreciation following repurchase announcements. The active rebalancing measure (column 4), which explicitly isolates share changes from passive revaluation effects, yields qualitatively similar results to the raw trading measures.

Second, we confirm that results are not sensitive to the choice of fixed effects structure. Specifications with firm $\times$ quarter fixed effects, which absorb all time-varying firm characteristics, yield similar point estimates (not reported for brevity).

Third, we examine whether results are driven by extreme observations. Re-estimating

our specifications on samples trimmed at the 5th and 95th percentiles of the dependent variable distribution yields nearly identical coefficients, confirming that outliers do not drive our findings.

5.2 Result 2: Reallocation Toward Similar Firms

Having established that institutional investors—particularly pension funds—reduce holdings in repurchasing firms, we now examine where the proceeds are reallocated. Our theoretical framework predicts that investors seeking to maintain factor exposures will substitute toward firms with similar risk characteristics. We test this prediction by examining whether the share of purchases directed to a destination firm increases with its similarity to the repurchasing firm.

Table 6 presents estimates of equation (29) separately by institution type. The results reveal striking heterogeneity that mirrors the trading patterns documented in Section 5.1.

Pension funds exhibit the strongest substitution behavior. The interaction coefficient $\hat{\beta}_3 = 1.297$ is statistically significant at the 1% level, indicating that when pension funds sell shares in repurchasing firms, they systematically direct a larger fraction of their purchases toward firms with similar factor exposures. To interpret the magnitude, consider a pension fund selling a repurchasing firm with one standard deviation higher repurchase exposure. For destination firms at the 90th percentile of cosine similarity (relative to the 10th percentile), this fund allocates approximately 1.3 percentage points more of its purchases to the high-similarity firm. Given the mean destination share of 1.0% in our sample, this represents a substantial reallocation.

Mutual funds display a similar pattern, though with a smaller magnitude. The interaction coefficient of 0.206 is marginally significant ($p < 0.10$), suggesting that mutual funds also substitute toward similar firms when exposed to repurchase activity, but with less intensity than pension funds. This finding is consistent with mutual funds facing portfolio constraints—such as style mandates or tracking error limits—that incentivize maintaining factor exposures, but with greater flexibility than pension funds.

The remaining institution types—banks, insurance companies, investment advisors, and other institutions—show no significant interaction effects. This pattern reinforces the interpretation from Result 1: unconstrained institutions that do not systematically sell repurchasing stocks also do not exhibit factor-based substitution in their purchase decisions. Investment advisors, in particular, show a point estimate of -0.228 that is statistically in-

Table 3: Institutional Trading Response to Repurchases: Extensive Margin

	(1) %Δ Weight	(2) %Δ Shares	(3) Inst. Trading	(4) Active Rebal.
Panel A: All Institution Types				
$\mathbb{1}$[Repurchase]$_{t-1}$	-0.004^{***}	-0.006^{***}	-0.012^{***}	-12.85^{***}
	(0.001)	(0.001)	(0.002)	(1.48)
Observations	20,030,798	20,030,798	22,367,303	35,656,108
R^2	0.086	0.069	0.106	0.054
Panel B: Banks (Type 1)				
$\mathbb{1}$[Repurchase]$_{t-1}$	-0.005^{**}	-0.006^{***}	-0.010^{**}	-18.46^{***}
	(0.002)	(0.001)	(0.005)	(2.41)
Observations	3,750,596	3,750,596	3,997,173	5,472,023
R^2	0.079	0.056	0.084	0.043
Panel C: Insurance Companies (Type 2)				
$\mathbb{1}$[Repurchase]$_{t-1}$	-0.005^{*}	-0.007^{***}	-0.012^{***}	-16.35^{***}
	(0.002)	(0.002)	(0.004)	(4.04)
Observations	1,352,604	1,352,604	1,433,955	1,915,163
R^2	0.073	0.053	0.110	0.046
Panel D: Investment Advisors (Type 3)				
$\mathbb{1}$[Repurchase]$_{t-1}$	-0.001	-0.003^{***}	-0.003	0.20
	(0.002)	(0.001)	(0.002)	(1.13)
Observations	7,971,992	7,971,992	9,284,007	16,489,026
R^2	0.095	0.085	0.137	0.067
Panel E: Mutual Funds (Type 4)				
$\mathbb{1}$[Repurchase]$_{t-1}$	-0.004^{*}	-0.007^{***}	-0.049	-21.72^{***}
	(0.002)	(0.001)	(.)	(4.35)
Observations	5,032,458	5,032,458	5,565,420	8,889,843
R^2	0.071	0.058	0.084	0.043
Panel F: Pension Funds (Type 5)				
$\mathbb{1}$[Repurchase]$_{t-1}$	-0.005^{***}	-0.008^{***}	-0.007^{***}	-8.22^{***}
	(0.002)	(0.001)	(0.002)	(2.13)
Observations	1,409,177	1,409,177	1,474,693	1,861,769
R^2	0.104	0.065	0.089	0.068
Panel G: Other Institutions (Type 6)				
$\mathbb{1}$[Repurchase]$_{t-1}$	-0.009^{**}	-0.010^{***}	-0.055	-8.38^{***}
	(0.003)	(0.003)	(0.040)	(2.83)
Observations	513,971	513,971	612,355	1,028,284
R^2	0.107	0.099	0.129	0.082

Notes: This table reports estimates of institutional trading responses to firm repurchase activity. The dependent variables are: percentage change in portfolio weight (column 1), percentage change in shares held (column 2), change in shares scaled by lagged shares outstanding (column 3), and active rebalancing that isolates share changes from passive revaluation (column 4). $\mathbb{1}$[Repurchase]$_{t-1}$ is an indicator for positive net repurchases in the prior quarter. All specifications include manager × quarter fixed effects and firm-level controls for lagged returns, market-to-book, dividend yield, beta, S&P 500 membership, assets, ROA, investment growth, leverage, and cash holdings. Standard errors clustered by firm are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Institutional Trading Response to Repurchases: Intensive Margin

	(1) %Δ Weight	(2) %Δ Shares	(3) Inst. Trading	(4) Active Rebal.
Panel A: Banks (Type 1)				
$\mathbb{1}$[Repurchase]$_{t-1}$	-0.036^{***}	-0.011^{***}	-0.031^{***}	-29.46^{***}
	(0.004)	(0.003)	(0.007)	(4.97)
RepShock$_{t-1}$	0.013	0.016^{**}	0.062^{*}	38.93^{***}
	(0.008)	(0.006)	(0.035)	(11.83)
$\mathbb{1}$[Rep]$_{t-1}\times$ RepShock$_{t-1}$	-0.019^{**}	-0.022^{***}	-0.071^{*}	-50.87^{***}
	(0.008)	(0.006)	(0.036)	(12.20)
Observations	3,733,371	3,733,371	3,978,655	5,459,500
R^2	0.079	0.056	0.083	0.043
Panel B: Insurance Companies (Type 2)				
$\mathbb{1}$[Repurchase]$_{t-1}$	-0.038^{***}	-0.012^{***}	-0.019^{***}	-27.60^{***}
	(0.005)	(0.003)	(0.007)	(7.71)
RepShock$_{t-1}$	-0.001	0.004	-0.017	29.40^{*}
	(0.010)	(0.008)	(0.019)	(17.00)
$\mathbb{1}$[Rep]$_{t-1}\times$ RepShock$_{t-1}$	-0.007	-0.011	0.012	-43.37^{**}
	(0.010)	(0.008)	(0.020)	(17.14)
Observations	1,346,526	1,346,526	1,427,369	1,910,643
R^2	0.074	0.053	0.110	0.046
Panel C: Investment Advisors (Type 3)				
$\mathbb{1}$[Repurchase]$_{t-1}$	-0.025^{***}	-0.003	-0.001	2.14
	(0.004)	(0.003)	(0.005)	(2.38)
RepShock$_{t-1}$	0.001	0.007	-0.004	-11.67^{*}
	(0.010)	(0.006)	(0.013)	(6.32)
$\mathbb{1}$[Rep]$_{t-1}\times$ RepShock$_{t-1}$	-0.009	-0.012^{*}	-0.005	3.92
	(0.010)	(0.006)	(0.013)	(6.40)
Observations	7,949,674	7,949,674	9,256,867	16,462,871
R^2	0.095	0.085	0.137	0.067

Notes: This table reports estimates of institutional trading responses to repurchase shocks. RepShock$_{t-1}$ is the standardized idiosyncratic repurchase shock from equation (**??**). Other variables and specifications are as described in Table 3. Standard errors clustered by firm are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Institutional Trading Response to Repurchases: Intensive Margin

	(1) %Δ Weight	(2) %Δ Shares	(3) Inst. Trading	(4) Active Rebal.
Panel D: Mutual Funds (*Type 4*)				
$\mathbb{1}$[Repurchase]$_{t-1}$	-0.040^{***}	-0.012^{***}	-0.148	-39.36^{***}
	(0.005)	(0.003)	(0.117)	(10.25)
RepShock$_{t-1}$	0.003	0.006	0.301	5.85
	(0.009)	(0.006)	(0.291)	(24.01)
$\mathbb{1}$[Rep]$_{t-1}\times$ RepShock$_{t-1}$	-0.011	-0.013^{**}	-0.322	-38.82
	(0.010)	(0.006)	(0.302)	(24.04)
Observations	5,013,377	5,013,377	5,543,789	8,870,081
R^2	0.072	0.058	0.083	0.043
Panel E: Pension Funds (*Type 5*)				
$\mathbb{1}$[Repurchase]$_{t-1}$	-0.036^{***}	-0.012^{***}	-0.011^{***}	-12.50^{***}
	(0.003)	(0.002)	(0.003)	(4.50)
RepShock$_{t-1}$	0.018^{**}	0.024^{***}	0.019^{**}	18.73^{*}
	(0.008)	(0.006)	(0.007)	(10.67)
$\mathbb{1}$[Rep]$_{t-1}\times$ RepShock$_{t-1}$	-0.023^{***}	-0.027^{***}	-0.022^{***}	-25.02^{**}
	(0.008)	(0.006)	(0.008)	(10.71)
Observations	1,404,826	1,404,826	1,470,139	1,857,374
R^2	0.105	0.065	0.089	0.068
Panel F: Other Institutions (*Type 6*)				
$\mathbb{1}$[Repurchase]$_{t-1}$	-0.035^{***}	-0.009	-0.005	-2.94
	(0.009)	(0.009)	(0.041)	(6.89)
RepShock$_{t-1}$	0.008	0.010	-0.153^{*}	-4.62
	(0.022)	(0.020)	(0.081)	(18.37)
$\mathbb{1}$[Rep]$_{t-1}\times$ RepShock$_{t-1}$	-0.016	-0.015	0.133^{*}	-3.26
	(0.022)	(0.020)	(0.077)	(18.71)
Observations	512,607	512,607	610,681	1,026,638
R^2	0.108	0.099	0.129	0.082

Notes: This table reports estimates of institutional trading responses to repurchase shocks. RepShock$_{t-1}$ is the standardized idiosyncratic repurchase shock from equation (**??**). Other variables and specifications are as described in Table 3. Standard errors clustered by firm are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

significant, consistent with their pursuit of active strategies that are not anchored to maintaining passive factor exposures.

Economic Interpretation

The finding that pension funds substitute toward similar firms has important implications for understanding how repurchase-induced supply shocks propagate through the cross-section of stocks. When a firm conducts a buyback, pension funds selling that firm's shares do not simply exit to cash or purchase a random basket of stocks. Instead, they systematically channel capital toward firms with correlated factor loadings. This substitution behavior implies that the initial repurchase shock generates *buying pressure* on similar firms, even though those firms did not themselves conduct buybacks.

The high adjusted R^2 values across specifications (ranging from 0.57 to 0.81) indicate that our fixed effects structure, which includes manager $\times$ quarter interactions, captures substantial variation in purchase allocation decisions. The residual variation explained by cosine similarity and its interaction with repurchase exposure identifies the factor-based substitution channel.

Table 6: Reallocation Toward Similar Firms

	(1) Banks	(2) Ins Cos	(3) Inv Adv	(4) MFs	(5) PFs	(6) Other
CosSim	-0.104	0.069	-0.101	-0.194	0.473	-0.766
	(1.275)	(0.635)	(0.518)	(0.661)	(0.748)	(0.738)
RepExp	-0.066	-0.047	0.227	-0.204^{*}	-1.280^{***}	-0.087
	(0.330)	(0.119)	(0.237)	(0.114)	(0.409)	(0.090)
CosSim $\times$ RepExp	0.068	0.048	-0.228	0.206^{*}	1.297^{***}	0.089
	(0.333)	(0.120)	(0.238)	(0.115)	(0.413)	(0.091)
Observations	302,102	122,792	462,971	381,984	99,377	43,615
Adj. R^2	0.569	0.766	0.717	0.630	0.727	0.812

Notes: This table reports estimates of equation (29). The dependent variable is destination share: the fraction of a manager's total purchases directed to destination firm d when selling origin firm o. CosSim is the cosine similarity between origin and destination firm factor loadings. RepExp is the manager's standardized repurchase exposure at the origin firm. All specifications include manager $\times$ quarter fixed effects. Standard errors clustered by manager are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.3 Result 3: Spillover Effects on Peer Firm Outcomes

The reallocation patterns documented above suggest that share repurchases generate demand spillovers to non-repurchasing peer firms. In this section, we test whether these spillovers have real effects on peer firm outcomes. Figure 1a presents the impulse response of net equity issuance to a one standard deviation increase in PIT. The effect rises from 0.045 standard deviations on impact to a peak of approximately 0.14 at horizons 3–4 and remains positive through horizon 8. The positive response of equity issuance to buyback-induced demand pressure is consistent with firms exploiting elevated valuations to issue shares.

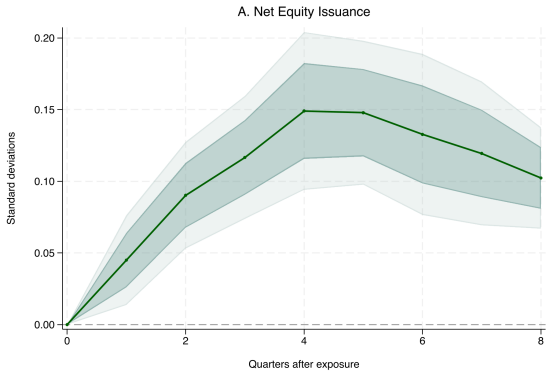
Figure 1b shows positive and persistent price effects, becoming statistically distinguishable from zero around horizon 3 and reaching roughly 0.05–0.06 standard deviations at horizons 4–8. Figure 1c documents a decline in the implied cost of equity, reaching about -0.05 standard deviations at horizon 5. The estimates are consistent with demand pressure raising valuations and lowering required returns, although the local projections do not separately identify liquidity, information, and pure demand mechanisms.

Figure 1d reveals a delayed investment response: estimates are close to zero through horizon 4 and become positive at horizons 5–8, reaching approximately 0.05 standard deviations. Debt issuance is smaller and less persistent. Most horizons are imprecisely estimated, although horizons 4 and 8 are positive at the 5% level. It is therefore more accurate to describe the debt response as lacking a stable dynamic pattern than as uniformly zero.

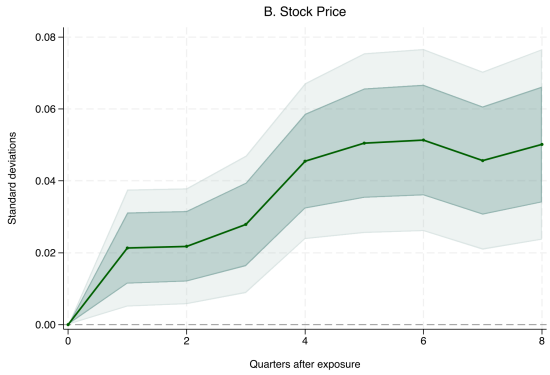
Taken together, the impulse responses are consistent with a sequence in which institutional demand pressure raises peer-firm valuations and lowers the cost of equity, followed by equity issuance and a delayed investment response. This interpretation remains conditional on the shift-share exclusion restriction discussed in Section 4.4; Result 2 establishes average buying toward similar firms but does not show that repurchase exposure strengthens that similarity tilt.

The much clearer equity-issuance response relative to debt issuance is consistent with an equity-market demand channel. Because a few debt horizons are positive, however, the evidence does not warrant a literal "no debt response" conclusion.

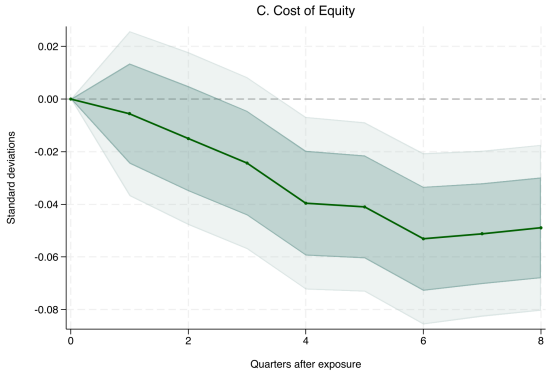
Figure 1: Effect of Price-Insensitive Trading Pressure on Firm Outcomes



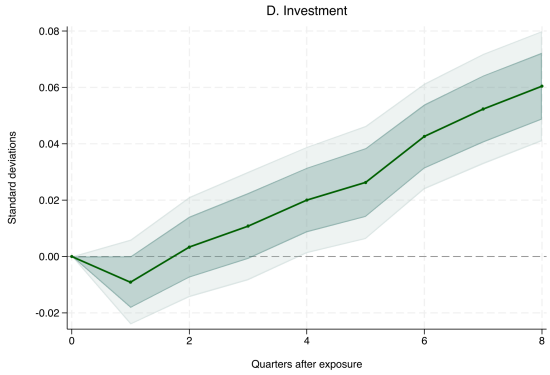
(a) Net Equity Issuance



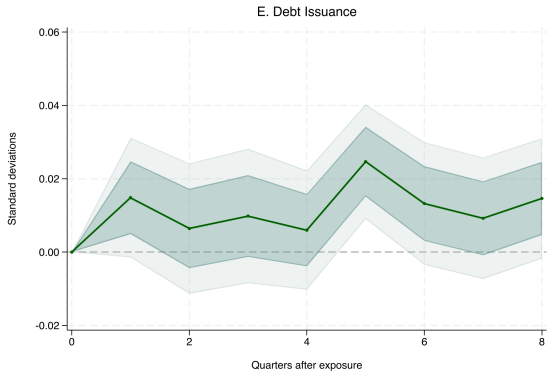
(b) Stock Price



(c) Cost of Equity



(d) Investment



(e) Debt Issuance

This figure plots impulse responses of firm outcomes to a one standard deviation increase in price-insensitive trading pressure (PIT), estimated using local projections. Panel (a) uses PIT5 (payout share-weighted); panels (b)–(e) use PIT2 for comparability. The solid line shows point estimates; the dark band is ± 1 standard error and the light band is the 90% confidence interval. Standard errors are two-way clustered by firm and quarter. All variables are standardized. The sample period is 1980:Q1–2019:Q4.

6 Conclusion

This paper provides new evidence that stock buybacks have important spillover effects across firms through institutional investor rebalancing. I develop a stylized two-period model showing how repurchase-induced reductions in equity supply shift institutional demand toward substitute firms with similar return characteristics, raising their equilibrium prices and inducing greater equity issuance. Using detailed institutional holdings data spanning four decades, I document three main empirical findings consistent with this mechanism.

First, constrained institutional investors—particularly pension funds and banks—systematically reduce their portfolio weights in repurchasing firms by approximately 5%, while unconstrained investors such as investment advisors show little response. Second, when selling repurchasing firms, constrained investors direct their purchases disproportionately toward firms with similar factor exposures, as measured by cosine similarity of factor loadings. Pension funds exhibit the strongest substitution behavior, consistent with regulatory constraints incentivizing them to maintain factor exposures. Third, using a shift-share instrument that exploits exogenous variation in buyback-induced demand pressure, I show that firms whose institutional investors are more exposed to buybacks elsewhere experience significant increases in equity issuance (0.5 percentage points of assets), stock prices (5% over two years), and cost-of-equity declines. These valuation improvements ultimately translate into higher investment, though with a lag, while debt issuance remains unaffected.

These findings have important implications for policy debates surrounding corporate payout policies. Critics of buybacks often focus on their potential to divert resources from investment at the repurchasing firm. My results suggest that this narrow focus misses an important general equilibrium effect: by inducing portfolio rebalancing among institutional investors, buybacks can facilitate capital reallocation toward firms—particularly mid-sized firms—that face more binding financing constraints. The effectiveness of this channel depends critically on the presence of constrained institutional investors who maintain diversified portfolios and face incentives to preserve factor exposures. As such, regulatory interventions such as the 1% excise tax on buybacks may have unintended consequences by disrupting this reallocation mechanism. Overall, my results highlight the importance of considering cross-firm spillovers and institutional investor behavior when evaluating the broader consequences of corporate payout policies.

References

Douglas J Skinner. The evolving relation between earnings, dividends, and stock repurchases. *Journal of financial economics*, 87(3):582–609, 2008.

Gustavo Grullon and Roni Michaely. Dividends, share repurchases, and the substitution hypothesis. *the Journal of Finance*, 57(4):1649–1684, 2002.

Dong Lee, Han Shin, and René M Stulz. Why does capital no longer flow more to the industries with the best growth opportunities? Technical report, National Bureau of Economic Research, 2016.

Alex Edmans. The case for stock buybacks. *Harvard Business Review*, 15, 2017.

Jesse M Fried and Charles CV Wang. Are buybacks really shortchanging investment? *Harvard Business Review*, 96(2):88–95, 2018.

Kathleen Kahle and René M Stulz. Why are corporate payouts so high in the 2000s? *Journal of Financial Economics*, 142(3):1359–1380, 2021.

Alvin Chen and Olga A Obizhaeva. Stock buyback motivations and consequences: A literature review. 2022.

Abdul A Rasheed, Jenny Gu, and Greg Bell. Stock repurchases: Antecedents, outcome, and implications. In *Oxford Research Encyclopedia of Business and Management*. 2024.

Alice Bonaimé and Kathleen Kahle. Share repurchases. *Handbook of corporate finance*, pages 176–222, 2024.

Amy Dittmar and Laura Casares Field. Can managers time the market? evidence using repurchase price data. *Journal of Financial Economics*, 115(2):261–282, 2015.

Pascal Busch and Stefan Obernberger. Actual share repurchases, price efficiency, and the information content of stock prices. *The review of financial studies*, 30(1):324–362, 2017.

Theo Vermaelen. Common stock repurchases and market signalling: An empirical study. *Journal of financial economics*, 9(2):139–183, 1981.

Alice Adams Bonaimé. Mandatory disclosure and firm behavior: Evidence from share repurchases. *The Accounting Review*, 90(4):1333–1362, 2015.

Heitor Almeida, Vyacheslav Fos, and Mathias Kronlund. The real effects of share repurchases. *Journal of Financial Economics*, 119(1):168–185, 2016.

Joakim Kvamvold and Snorre Lindset. Do dividend flows affect stock returns? *Journal of Financial Research*, 41(1):149–174, 2018.

Ralph SJ Koijen and Motohiro Yogo. A demand system approach to asset pricing. *Journal of Political Economy*, 127(4):1475–1515, 2019.

Missaka Warusawitharana and Toni M Whited. Equity market misvaluation, financing, and investment. *The Review of Financial Studies*, 29(3):603–654, 2016.

Monica L Banyi, Edward A Dyl, and Kathleen M Kahle. Errors in estimating share repurchases. *Journal of Corporate Finance*, 14(4):460–474, 2008.

Clifford P Stephens and Michael S Weisbach. Actual share reacquisitions in open-market repurchase programs. *The Journal of finance*, 53(1):313–333, 1998.

Samuel M Hartzmark and David H Solomon. Reconsidering returns. *The Review of Financial Studies*, 35(1):343–393, 2022.

Simon Schmickler and Pedro Tremacoldi-Rossi. Spillover effects of payouts on asset prices and real investment. *Available at SSRN 4287300*, 2022.

Huaizhi Chen. Cash induced demand. *Journal of Financial and Quantitative Analysis*, 59(1): 195–220, 2024.

Merton H Miller and Franco Modigliani. Dividend policy, growth, and the valuation of shares. *the Journal of Business*, 34(4):411–433, 1961.

Penn Wharton Budget Model. The excise tax on stock repurchases: Effects, March 2023. URL https://budgetmodel.wharton.upenn.edu/issues/2023/3/9/the-excise-tax-on-stock-repurchases-effects. Accessed: 2025-05-14.

Franklin Allen, Antonio E Bernardo, and Ivo Welch. A theory of dividends based on tax clienteles. *The journal of finance*, 55(6):2499–2536, 2000.

Harry DeAngelo, Linda DeAngelo, and Douglas J Skinner. Special dividends and the evolution of dividend signaling. *Journal of Financial Economics*, 57(3):309–354, 2000.

Murali Jagannathan, Clifford P Stephens, and Michael S Weisbach. Financial flexibility and the choice between dividends and stock repurchases. *Journal of financial Economics*, 57(3):355–384, 2000.

Alon Brav, John R Graham, Campbell R Harvey, and Roni Michaely. Payout policy in the 21st century. *Journal of financial economics*, 77(3):483–527, 2005.

Kewei Hou and Tobias J Moskowitz. Market frictions, price delay, and the cross-section of expected returns. *The Review of Financial Studies*, 18(3):981–1020, 2005.

Harrison Hong, Jiang Wang, and Jialin Yu. Firms as buyers of last resort. *Journal of Financial Economics*, 88(1):119–145, 2008.

Malcolm Baker, Stefan Nagel, and Jeffrey Wurgler. The effect of dividends on consumption, 2006.

Stanley W Black. Rational response to shocks in a dynamic model of capital asset pricing. *The American economic review*, 66(5):767–779, 1976.

Harry M. Markowitz. Portfolio selection. *The Journal of Finance*, 7(1):77–91, 1952.

James Tobin. Liquidity preference as behavior toward risk. *The Review of Economic Studies*, 25:65–86, 1958.

Amy K. Dittmar. Why do firms repurchase stock? *Journal of Business*, 73(3):331–355, 2000.

Paul Goldsmith-Pinkham, Isaac Sorkin, and Henry Swift. Bartik instruments: What, when, why, and how. *American Economic Review*, 110(8):2586–2624, 2020.

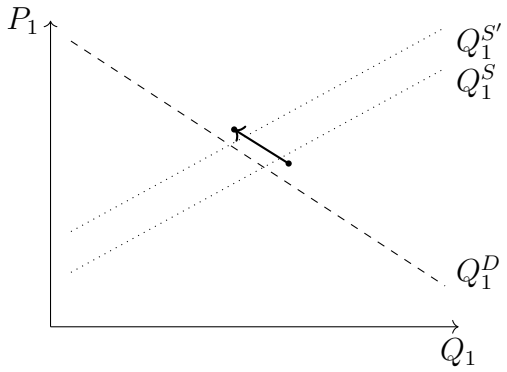
Kirill Borusyak, Peter Hull, and Xavier Jaravel. Quasi-experimental shift-share research designs. *The Review of Economic Studies*, 89(1):181–213, 2022.

A Tables and Figures

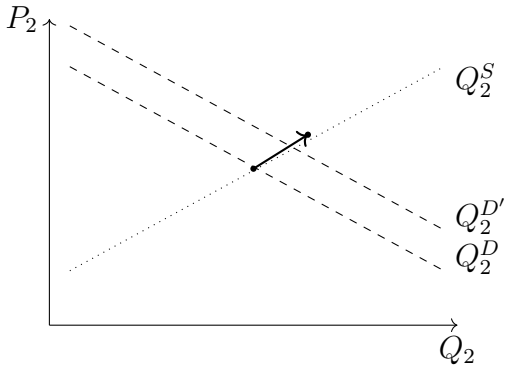
Manager	mgrno	Type	CUSIP	Shares	gvkey	Year-Qtr
VANGUARD CAP WEALTH ADVISORS L	21720	Investment advisors	80360710	5300	64857	2017q4
VANGUARD CAP WEALTH ADVISORS L	21720	Investment advisors	85524410	29063	25434	2017q4
VANGUARD CAP WEALTH ADVISORS L	21720	Investment advisors	88160R10	1350	184996	2017q4
VANGUARD CAP WEALTH ADVISORS L	21720	Investment advisors	88250810	12000	10499	2017q4
VANGUARD CAP WEALTH ADVISORS L	21720	Investment advisors	92343V10	20681	2136	2017q4
BALLEW ADVISORS, INC	21722	Investment advisors	00206R10	31064	9899	2017q4
BALLEW ADVISORS, INC	21722	Investment advisors	03783310	2335	1690	2017q4
BALLEW ADVISORS, INC	21722	Investment advisors	12803020	14762	64275	2017q4
BALLEW ADVISORS, INC	21722	Investment advisors	16676410	1757	2991	2017q4
CARILLON TOWER ADVISERS INC	21723	Investment advisors	00206R10	517542	9899	2017q4
CARILLON TOWER ADVISERS INC	21723	Investment advisors	00282410	242099	1078	2017q4

Table 7: A snapshot of holdings data.

B Model



(a) Shift in equity supply (due to buybacks) for firm 1..



(b) ..causing demand shift for firm 2, thus inducing equity issuance (movement along supply curve).

B.1 Equity supply equation

This section derives the firm's net equity issuance $\Delta E_{j,1}$ when the financing requirement F_j is nonzero.

Firm problem and first-order conditions. Firm j chooses net issuance/retirement $\Delta \mathbf{Q}_{j,1} = (\Delta B_{j,1}, \Delta E_{j,1})'$ to minimize financing costs plus quadratic adjustment costs subject to the financing constraint:

$$\min_{\Delta \mathbf{Q}_{j,1}} \ \mathbf{\Phi}_j' \mathbf{Q}_{j,1} + \frac{1}{2} \Delta \mathbf{Q}_{j,1}' \mathbf{A}_j \Delta \mathbf{Q}_{j,1} \quad \text{s.t.} \quad P_{j,0}^B \Delta B_{j,1} + P_{j,0}^E \Delta E_{j,1} = F_j, \qquad \text{(Firm-}j\text{)}$$

where $\mathbf{Q}_{j,1} = \mathbf{Q}_{j,0} + \Delta\mathbf{Q}_{j,1}$, $\mathbf{\Phi}_j = (C_j, D_j)'$, and $\mathbf{A}_j = \text{diag}(A^B, A^E)$.

Let δ_j denote the Lagrange multiplier on the financing constraint. The Lagrangian is

$$\mathcal{L} = \mathbf{\Phi}_j'\mathbf{Q}_{j,1} + \frac{1}{2}\Delta\mathbf{Q}_{j,1}'\mathbf{A}_j\Delta\mathbf{Q}_{j,1} - \delta_j\Big(P^B_{j,0}\Delta B_{j,1} + P^E_{j,0}\Delta E_{j,1} - F_j\Big).$$

The first-order conditions imply

$$\mathbf{A}_j\Delta\mathbf{Q}_{j,1} + \mathbf{\Phi}_j - \delta_j\mathbf{P}_{j,0} = 0 \quad \Rightarrow \quad \Delta\mathbf{Q}_{j,1} = \mathbf{A}_j^{-1}\big(\delta_j\mathbf{P}_{j,0} - \mathbf{\Phi}_j\big).$$

With $\mathbf{A}_j = \text{diag}(A^B, A^E)$, this yields component-wise

$$\Delta B_{j,1} = \frac{1}{A^B}\big(\delta_j P^B_{j,0} - C_j\big), \qquad \Delta E_{j,1} = \frac{1}{A^E}\big(\delta_j P^E_{j,0} - D_j\big). \tag{32}$$

Solving for δ_j. Impose the financing constraint:

$$P^B_{j,0}\Delta B_{j,1} + P^E_{j,0}\Delta E_{j,1} = F_j.$$

Substituting (32) gives

$$P^B_{j,0}\frac{1}{A^B}\big(\delta_j P^B_{j,0} - C_j\big) + P^E_{j,0}\frac{1}{A^E}\big(\delta_j P^E_{j,0} - D_j\big) = F_j.$$

Collecting terms in δ_j:

$$\delta_j\left(\frac{(P^B_{j,0})^2}{A^B} + \frac{(P^E_{j,0})^2}{A^E}\right) = \frac{P^B_{j,0}C_j}{A^B} + \frac{P^E_{j,0}D_j}{A^E} + F_j.$$

Define

$$\mathcal{D}_j \equiv \frac{(P^B_{j,0})^2}{A^B} + \frac{(P^E_{j,0})^2}{A^E}.$$

Then

$$\delta_j = \frac{\frac{P^B_{j,0}C_j}{A^B} + \frac{P^E_{j,0}D_j}{A^E} + F_j}{\mathcal{D}_j}. \tag{33}$$

Equity supply. Using $\Delta E_{j,1} = \frac{1}{A^E}(\delta_j P^E_{j,0} - D_j)$ and substituting (33) yields

$$\Delta E_{j,1} = \frac{1}{A^E}\left(P^E_{j,0}\frac{\frac{P^B_{j,0}C_j}{A^B} + \frac{P^E_{j,0}D_j}{A^E} + F_j}{\mathcal{D}_j} - D_j\right).$$

To express this in yields, define

$$y_j^B \equiv \frac{C_j}{P_{j,0}^B}, \qquad y_j^E \equiv \frac{D_j}{P_{j,0}^E},$$

and weights

$$w_j^B \equiv \frac{\frac{(P_{j,0}^B)^2}{A^B}}{\mathcal{D}_j}, \qquad w_j^E \equiv \frac{\frac{(P_{j,0}^E)^2}{A^E}}{\mathcal{D}_j} = 1 - w_j^B.$$

Then (33) can be written as

$$\delta_j = w_j^B y_j^B + w_j^E y_j^E + \frac{F_j}{\mathcal{D}_j}.$$

Therefore,

$$\begin{aligned} \Delta E_{j,1} &= \frac{P_{j,0}^E}{A^E}\left(\delta_j - y_j^E\right) \\ &= \frac{P_{j,0}^E}{A^E}\left[w_j^B\left(y_j^B - y_j^E\right) + \frac{F_j}{\mathcal{D}_j}\right]. \end{aligned} \tag{34}$$

B.2 Cost-of-debt shocks and their equivalence to an equity-supply shifter

This section presents an alternative microfoundation for shifts in net equity issuance that operates through firm-specific shocks to the cost of debt. This mechanism is useful for extensions in which monetary policy or QE affects firms' effective borrowing costs. The main text instead models repurchases using an exogenous equity-supply shifter ν_j to transparently isolate the portfolio-rebalancing channel.

Firm problem with a cost-of-debt shock. Let the promised one-period debt payment be

$$C_j = \bar{c}_j + \varepsilon_j, \qquad \varepsilon_j \sim \mathcal{N}(0, \sigma_\varepsilon^2),$$

and keep the rest of the firm's problem as in (Firm-j) in the main text. The first-order condition implies

$$\Delta \mathbf{Q}_{j,1} = \mathbf{A}_j^{-1}\left(\delta_j \mathbf{P}_{j,0} - \mathbf{\Phi}_j\right), \qquad \mathbf{\Phi}_j = (C_j, D_j)'.$$

Imposing the financing constraint yields the multiplier

$$\delta_j = \frac{\mathbf{P}'_{j,0}\mathbf{A}_j^{-1}\mathbf{\Phi}_j + F_j}{\mathbf{P}'_{j,0}\mathbf{A}_j^{-1}\mathbf{P}_{j,0}}.$$

Equity supply and comparative statics Normalize $P^B_{j,0} = 1$ and define yields $y^B_j = C_j$ and $y^E_j = D_j/P^E_{j,0}$. Then net equity issuance can be written as

$$\Delta E_{j,1} = \frac{P^E_{j,0}}{A^E}\, w^B_j(P^E_{j,0})\Big(\bar{c}_j + \varepsilon_j - \frac{D_j}{P^E_{j,0}}\Big), \qquad \text{(SS-}j\text{-COD)}$$

where $w^B_j(P^E_{j,0}) \equiv \frac{\frac{1}{A^B}}{\frac{1}{A^B}+\frac{(P^E_{j,0})^2}{A^E}} > 0$.

A decrease in the cost of debt, $\varepsilon_j \downarrow$, lowers net equity issuance:

$$\frac{\partial \Delta E_{j,1}}{\partial \varepsilon_j} = \frac{P^E_{j,0}}{A^E}\, w^B_j(P^E_{j,0}) \;>\; 0 \quad \Rightarrow \quad \varepsilon_j \downarrow \Rightarrow\; \Delta E_{j,1} \downarrow,$$

i.e., the firm retires equity (repurchases) and substitutes toward debt financing. [*TO ADD: connect ε_j to QE: e.g., a reduction in firm-specific spreads or borrowing rates induced by policy.*]

Mapping to the main-text shifter ν_j Comparing (SS-j) in the main text with (SS-j-COD) above shows that a cost-of-debt shock is equivalent to an additive equity-supply shifter:

$$\nu^{\text{equiv}}_j(\varepsilon_j) \equiv \frac{P^E_{j,0}}{A^E}\, w^B_j(P^E_{j,0})\, \varepsilon_j.$$

Thus, a negative debt-cost shock $\varepsilon_1 < 0$ corresponds to $\nu_1 < 0$ in the main-text reduced-form representation, shifting firm 1's equity supply left and generating the same spillover logic through the demand system.

B.3 Slope of equity supply equation

Lemma B.1 (Upward-sloping equity supply with an additive shifter)**.** *Fix firm j and hold $(C_j, D_j, F_j, A^B, A^E)$ constant with $A^B, A^E > 0$ and $D_j \geq 0$. Normalize the one-period debt price to $P^B_{j,0} = 1$ and let $P \equiv P^E_{j,0} > 0$. Let the firm face the financing constraint $\Delta B_{j,1} + P\,\Delta E_{j,1} = F_j$ and quadratic adjustment costs $\mathbf{A}_j = \mathrm{diag}(A^B, A^E)$.*

Define

$$\mathcal{D}_j(P) \equiv \frac{1}{A^B} + \frac{P^2}{A^E}, \qquad w_j^B(P) \equiv \frac{\frac{1}{A^B}}{\mathcal{D}_j(P)} \in (0,1), \qquad y_j^B \equiv C_j, \quad y_j^E(P) \equiv \frac{D_j}{P}.$$

Then the firm's net equity issuance can be written as

$$\Delta E_{j,1}(P) = \frac{P}{A^E}\, w_j^B(P)\big(y_j^B - y_j^E(P)\big) + \frac{P}{A^E}\,\frac{F_j}{\mathcal{D}_j(P)} \;+\; \nu_j, \tag{35}$$

where ν_j is an additive *firm-specific equity-supply shifter (measured in shares). In particular, $\nu_j < 0$ shifts the equity supply curve left one-for-one at each price P.*

Moreover, the slope of the supply curve with respect to the equity price P is

$$\frac{d\,\Delta E_{j,1}(P)}{dP} = \frac{1}{A^E}\,\frac{\left(\frac{C_j}{A^B} + F_j\right)\left(\frac{1}{A^B} - \frac{P^2}{A^E}\right) + \frac{2D_jP}{A^BA^E}}{\left(\frac{1}{A^B} + \frac{P^2}{A^E}\right)^2}, \tag{36}$$

which does not *depend on ν_j. A sufficient condition for the supply curve to be upward sloping at P is*

$$\left(\frac{C_j}{A^B} + F_j\right)\left(\frac{1}{A^B} - \frac{P^2}{A^E}\right) + \frac{2D_jP}{A^BA^E} \;>\; 0. \tag{37}$$

In particular, if $P^2 \le A^E/A^B$, $\frac{C_j}{A^B} + F_j \ge 0$, and $D_j > 0$, then $\frac{d\,\Delta E_{j,1}(P)}{dP} > 0$.

Proof. From the firm's FOCs (with multiplier δ_j on the financing constraint),

$$\Delta B_{j,1} = \frac{1}{A^B}\big(\delta_j - C_j\big), \qquad \Delta E_{j,1} = \frac{1}{A^E}\big(\delta_j P - D_j\big).$$

Imposing the financing constraint $\Delta B_{j,1} + P\Delta E_{j,1} = F_j$ yields

$$\delta_j(P) = \frac{\frac{C_j}{A^B} + \frac{PD_j}{A^E} + F_j}{\frac{1}{A^B} + \frac{P^2}{A^E}} = \frac{\frac{C_j}{A^B} + \frac{PD_j}{A^E} + F_j}{\mathcal{D}_j(P)}.$$

Substituting this expression into $\Delta E_{j,1} = \frac{1}{A^E}(\delta_j P - D_j)$ and rewriting using $y_j^E(P) = D_j/P$ and $w_j^B(P) = \frac{(1/A^B)}{\mathcal{D}_j(P)}$ gives (35). The additive shifter ν_j enters as $\Delta E_{j,1}(P) = \Delta E_{j,1}^{\text{baseline}}(P) + \nu_j$, so it affects the level but not the slope.

To obtain the slope, differentiate the baseline part of (35) with respect to P. Using the quotient rule and $\frac{d}{dP}\mathcal{D}_j(P) = \frac{2P}{A^E}$, one obtains (36). Condition (37) is equivalent to $\frac{d\,\Delta E_{j,1}(P)}{dP} > 0$. Finally, if $P^2 \le A^E/A^B$, then $\left(\frac{1}{A^B} - \frac{P^2}{A^E}\right) \ge 0$, and with $\frac{C_j}{A^B} + F_j \ge 0$ and $D_j > 0$ the numerator in (36) is strictly positive. □

B.4 A simple calibration

This appendix provides a numerical illustration of the equilibrium with $N = 2$ firms, focusing on how the covariance of equity payoffs affects the strength of the investor-rebalancing channel. I solve for equilibrium prices $P^E_{1,0}$ and $P^E_{2,0}$ that clear both equity markets given (i) mean–variance investor demand with a two-asset covariance matrix $\mathbf{\Sigma}$ and (ii) upward-sloping equity supply with an additive equity-supply shifter. The exercise varies the firm-1 shifter ν_1 and compares a low-covariance environment to a high-covariance environment.

Calibration (illustrative). I use the following parameter values:

$$\gamma = 1, \quad r = 0.02, \quad A^E = A^B = 0.01, \quad E_0 = 1, \quad \bar{c} = (0.2, 0.2)', \quad D = (0.03, 0.03)',$$

$$\mathbb{E}_0[P^E_{1,1}] = \mathbb{E}_0[P^E_{2,1}] = 1,$$

and equal return volatilities $\sigma_1 = \sigma_2 = 0.2$. The covariance matrix is

$$\mathbf{\Sigma} = \begin{pmatrix} \sigma_1^2 & \rho\sigma_1\sigma_2 \\ \rho\sigma_1\sigma_2 & \sigma_2^2 \end{pmatrix},$$

with two cases: $\rho \in \{0.2, 0.8\}$. I vary ν_1 over a grid $\nu_1 \in [-1, 1]$ holding $\nu_2 = 0$. These values are chosen only to visualize the mechanism; they are not yet disciplined by data.

Numerical procedure. For each value of ρ, I compute $\mathbf{\Sigma}^{-1}$ and solve the two market-clearing conditions for $(P^E_{1,0}, P^E_{2,0})$ using `fsolve`. I warm-start the solver at $\nu_1 = 0$ and then use the previous grid-point solution as the initial guess when stepping through the ν_1 grid. Given equilibrium prices, I compute firm-level net equity issuance as $\Delta E_j = E_j^{SS} - E_0$ from the equity-supply schedule. Appendix Figures 3–4 plot equilibrium prices and issuance as functions of ν_1 for low vs. high ρ.

Two patterns stand out. First, firm 1's own outcomes respond mechanically: a negative ν_1 (repurchase shock) reduces net equity issuance and increases its equilibrium price. Second, the magnitude of spillovers to firm 2 is governed by covariance: higher ρ implies a larger cross-price response in mean–variance demand, which amplifies the increase in firm 2 price and thus its net equity issuance. This motivates the empirical focus on estimating (time-varying) covariance- and demand-based measures of "closeness" across firms, which pin down the strength of the reallocation channel in the quantitative model.

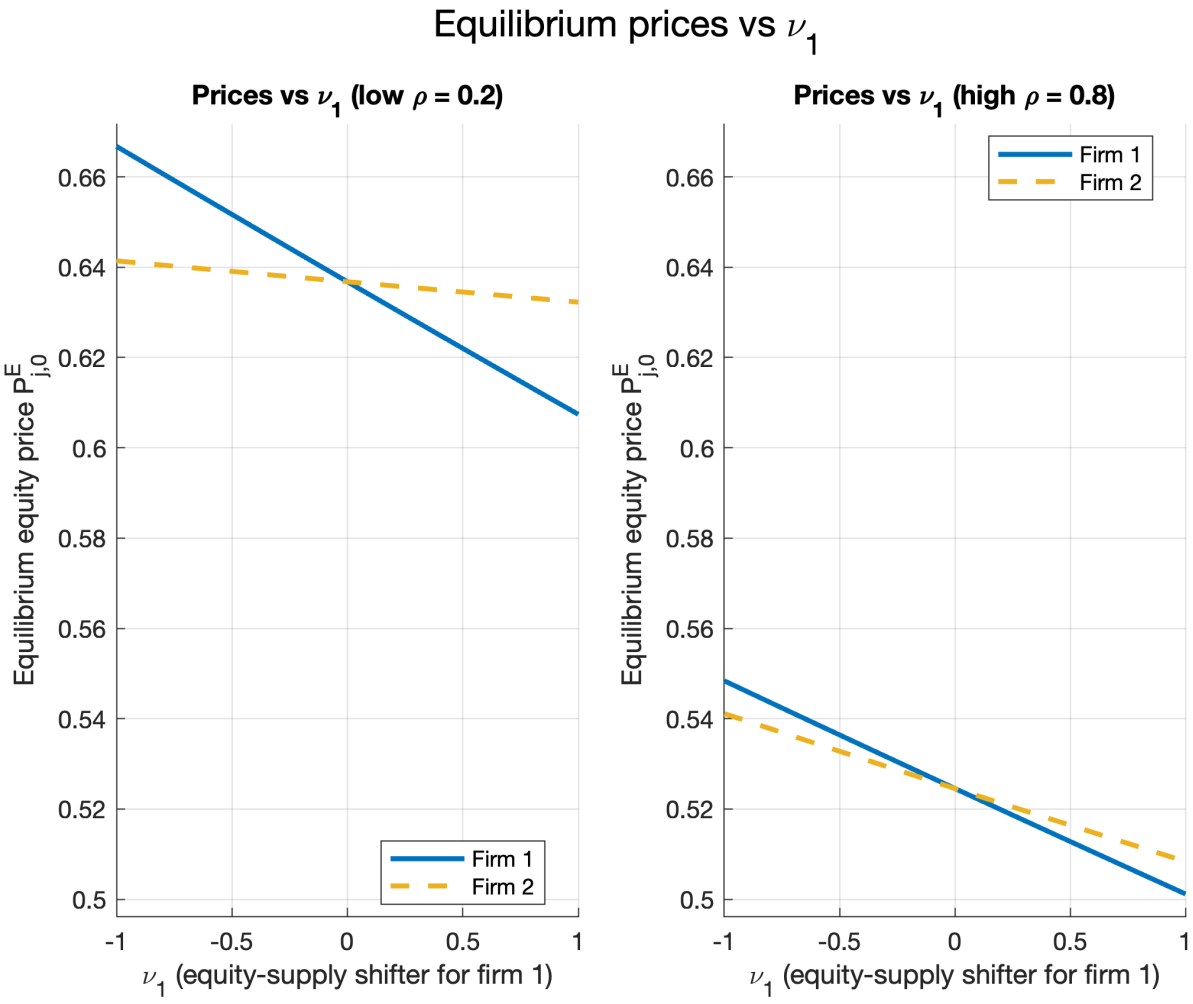


Figure 3: **Equilibrium equity prices vs. the firm-1 equity-supply shifter ν_1.** The figure plots $(P^E_{1,0}, P^E_{2,0})$ as ν_1 varies, comparing low correlation $(\rho = 0.2)$ to high correlation $(\rho = 0.8)$. A negative ν_1 corresponds to a repurchase-type shock (lower net equity supply), which raises firm 1's price. The cross-firm price response is stronger when ρ is higher, reflecting stronger portfolio rebalancing when the assets are closer substitutes in mean–variance demand.

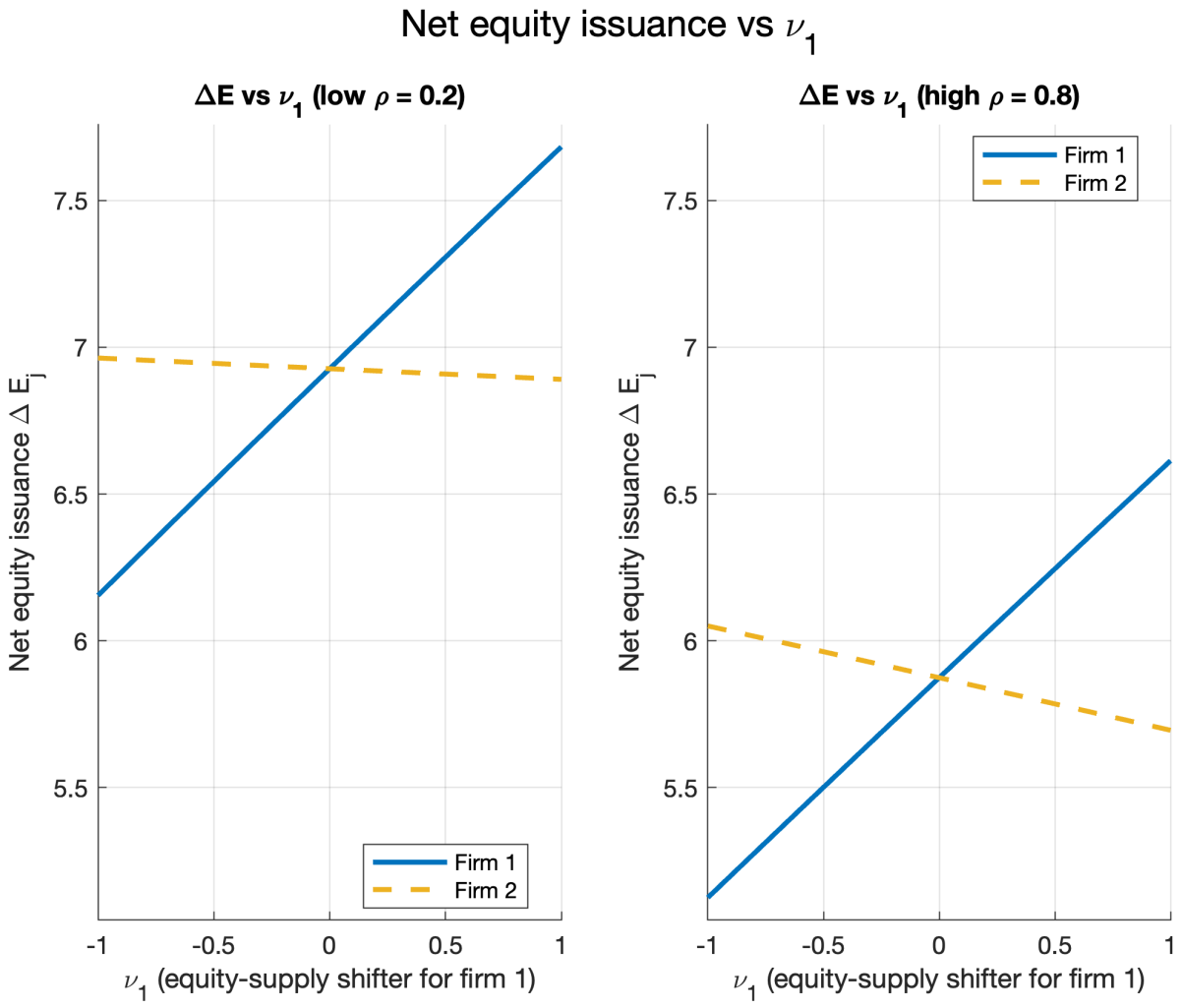


Figure 4: **Net equity issuance vs. the firm-1 equity-supply shifter ν_1.** The figure plots net issuance $(\Delta E_1, \Delta E_2)$ as ν_1 varies for low vs. high correlation. A negative ν_1 shifts firm 1's equity supply left one-for-one (repurchase), reducing ΔE_1. The spillover to firm 2 operates through investor demand: when ρ is higher, the rebalancing away from firm 1 induces a larger increase in firm 2 demand and price, leading firm 2 to issue more equity (movement along its upward-sloping supply curve).

C Variable Definitions

Table 8: Variable Definitions

Variable	Definition
Panel A: Firm Characteristics (Compustat/CRSP)	
Market Equity	Price $\times$ shares outstanding (CRSP: PRC $\times$ SHROUT)
Book Equity	Stockholders' equity + deferred taxes $-$ preferred stock (CEQ + TXDB $-$ PSTKL)
Market-to-Book	Market equity / Book equity
ROA	Operating income / Total assets (OIADP / ATQ)
Leverage	Total debt / Total assets ((DLTTQ + DLCQ) / ATQ)
Cash/Assets	Cash and short-term investments / Total assets (CHEQ / ATQ)
Investment	Capital expenditures / Lagged assets (CAPX / L.ATQ)
R&D	R&D expense / Lagged assets (XRDQ / L.ATQ)
Panel B: Repurchase Variables	
Net Repurchases	Purchase of stock $-$ Sale of stock (PRSTKC $-$ SSTK), quarterly
Repurchase Indicator	$\mathbf{1}\{\text{Net Repurchases} > 0\}$
Repurchase Intensity	|Net Repurchases|/Lagged ME if repurchasing, else 0
Repurchase Shock	Residual from equation (10)
Panel C: Holdings Variables (13F)	
Ownership Share ($s_{m,j,t}$)	Shares held / Shares outstanding
Portfolio Weight ($w_{m,j,t}$)	Position value / AUM
AUM	Sum of all position values for manager m
Panel D: Trading Variables	
$\%\Delta w$	$\ln(w_{m,j,t}) - \ln(w_{m,j,t-1})$
$\%\Delta s$	$\ln(\text{Shares}_{m,j,t}) - \ln(\text{Shares}_{m,j,t-1})$
Inst. Trading	$\Delta\text{Shares}_{m,j,t}/\text{SHROUT}_{j,t-4}$
Active Component (C^s/w)	Equation (45) divided by $w_{m,j,t-1}$
Panel E: Exposure and Pressure Variables	
RepExp (mgr–firm)	$s_{m,j,t-1} \times \text{RepShock}_{j,t}$
RepExp (manager)	$\sum_j s_{m,j,t-1} \times \text{RepInt}_{j,t} \times \mathbf{1}_{\text{BB}}$
PIT (firm)	$\sum_m s_{m,j,t-1} \times \text{RepExp}_{m,t}$
Panel F: Substitutability Variables	
Cosine Similarity	Cosine of angle between factor loading vectors
Idio. Covariance	Covariance of FF3-residual returns
Panel G: Issuance Variables	
Net Equity Issuance	(SSTK $-$ PRSTKC) / Lagged assets
Gross Equity Issuance	SSTK / Lagged assets
Net Debt Issuance	(DLTIS $-$ DLTR + DLCCH) / Lagged assets

Notes: Compustat variable mnemonics are in parentheses. All ratio variables are winsorized at the 1st and 99th percentiles by quarter unless otherwise noted. Dollar values are in millions.

D Portfolio Weight Decomposition

This appendix derives the decomposition of portfolio weight changes into active trading and passive revaluation components, referenced in Section 3.

D.1 Setup

Let $w_{m,j,t}$ denote the portfolio weight of firm j in manager m's portfolio:

$$w_{m,j,t} = \frac{P_{j,t} \cdot S_{m,j,t}}{\text{AUM}_{m,t}}, \tag{38}$$

where $P_{j,t}$ is the stock price, $S_{m,j,t}$ is the number of shares held, and

$$\text{AUM}_{m,t} = \sum_{k=1}^{N} P_{k,t} \cdot S_{m,k,t} \tag{39}$$

is assets under management.

D.2 First-Order Approximation

Taking a first-order Taylor expansion of $\Delta w_{m,j,t} = w_{m,j,t} - w_{m,j,t-1}$ around $(P_{j,t-1}, S_{m,j,t-1}, \text{AUM}_{m,t-1})$:

$$\Delta w_{m,j,t} \approx \frac{\partial w}{\partial S_j} \Delta S_{m,j,t} + \frac{\partial w}{\partial P_j} \Delta P_{j,t} + \frac{\partial w}{\partial \text{AUM}} \Delta \text{AUM}_{m,t} \tag{40}$$

Computing the partial derivatives:

$$\frac{\partial w}{\partial S_j} = \frac{P_j}{\text{AUM}} - \frac{P_j^2 S_j}{\text{AUM}^2} = \frac{P_j}{\text{AUM}} (1 - w) \tag{41}$$

$$\frac{\partial w}{\partial P_j} = \frac{S_j}{\text{AUM}} - \frac{P_j S_j^2}{\text{AUM}^2} = \frac{S_j}{\text{AUM}} (1 - w) \tag{42}$$

$$\frac{\partial w}{\partial \text{AUM}} = -\frac{P_j S_j}{\text{AUM}^2} = -\frac{w}{\text{AUM}} \tag{43}$$

D.3 Decomposition

Substituting and rearranging, the change in portfolio weight can be decomposed as:

$$\Delta w_{m,j,t} \approx \underbrace{C^s_{m,j,t}}_{\text{Active: shares}} + \underbrace{C^p_{m,j,t}}_{\text{Passive: own price}} + \underbrace{C^o_{m,j,t}}_{\text{Passive: other holdings}}, \tag{44}$$

where:

$$C^s_{m,j,t} = \left(\frac{P_{j,t}}{\text{AUM}_{m,t}} - \frac{P^2_{j,t} S_{m,j,t}}{\text{AUM}^2_{m,t}} \right) \Delta S_{m,j,t} \tag{45}$$

$$C^p_{m,j,t} = \left(\frac{S_{m,j,t}}{\text{AUM}_{m,t}} - \frac{P_{j,t} S^2_{m,j,t}}{\text{AUM}^2_{m,t}} \right) \Delta P_{j,t} \tag{46}$$

$$C^o_{m,j,t} = -\frac{w_{m,j,t}}{\text{AUM}_{m,t}} \left(\sum_{k \neq j} P_{k,t} \Delta S_{m,k,t} + \sum_{k \neq j} S_{m,k,t} \Delta P_{k,t} \right) \tag{47}$$

D.4 Interpretation

- $C^s_{m,j,t}$: Contribution from *active trading* in firm j. This is the component I focus on as the measure of intentional rebalancing.
- $C^p_{m,j,t}$: Contribution from price changes in firm j. This is *passive* revaluation—even if the manager holds shares constant, the weight changes mechanically with price.
- $C^o_{m,j,t}$: Contribution from changes in *other* portfolio positions. This captures how trades or price changes in other stocks affect the denominator (AUM).

D.5 Scaled Active Component

To obtain a scale-free measure of active trading, I divide by the lagged weight:

$$\frac{C^s_{m,j,t}}{w_{m,j,t-1}} \approx \frac{\Delta S_{m,j,t}}{S_{m,j,t-1}} \cdot (1 - w_{m,j,t}). \tag{48}$$

For small weights ($w \approx 0$), this approximates the percentage change in shares. For larger weights, it adjusts for the mechanical AUM effect.

E Additional Summary Statistics

Table 9: Summary Statistics by Institution Type

	Banks	Insurance	Inv Advisors	Mutual Funds	Pensions	Other
Panel A: Holdings Levels (*Mean*)						
Portfolio Weight (%)	0.3340	0.3028	0.5874	0.3016	0.2158	0.5233
Ownership Share (%)	0.2370	0.2036	0.1166	0.5506	0.1739	0.0901
Holding Value ($M)	15.10	11.38	5.70	22.96	10.38	6.87
Panel B: Exposure Variables (*Mean*, $\times 10^3$)						
Exp1	-0.0001	-0.0001	-0.0001	-0.0004	-0.0000	-0.0000
Exp2	0.0006	0.0005	0.0002	0.0013	0.0005	0.0002
Exp3	0.6177	0.4210	0.0995	1.0465	0.4114	0.1526
Exp4	0.3309	0.2294	0.0492	0.5388	0.2449	0.0728
Exp5	53.7607	40.4114	10.8713	102.4637	31.0976	18.2949
Panel C: Trading Outcomes (*Mean*)						
%Δ Portfolio Weight	-1.186	-0.208	-1.248	-1.469	-0.112	0.021
%Δ Shares	1.008	2.064	0.783	0.749	0.802	1.920
Inst. Trading (scaled)	1599.364	-949.834	-4231.840	-1588.401	-329.186	-3421.528
Active Rebalancing (C^s/w)	3.169	5.454	1.915	-22.226	0.367	18.850
Panel D: Reallocation Outcomes (*Mean*)						
Destination Share (%)	0.013	0.008	0.046	0.015	0.010	0.019
Observations	6,270,334	2,147,871	19,415,985	10,064,982	2,113,326	1,240,350

Notes: This table reports mean summary statistics by institution type for the manager–firm–quarter holdings panel, 1980:Q1–2019:Q4. Institution types follow Koijen and Yogo (2019): banks (bank trust departments), insurance companies, investment advisors (including hedge funds and ETFs), mutual funds, pension funds, and other 13F filers. Variable definitions are the same as in Table 2. All continuous variables are winsorized at the 1st and 99th percentiles by quarter.