The Product Market Effects of Hedge Fund Activism*

Hadiye Aslan[a,+], Praveen Kumar[b]

[a] J. Mack Robinson College of Business, Georgia State University, 35 Broad Street NW, Atlanta, GA 30303

[b] C.T. Bauer College of Business, University of Houston, 4800 Calhoun Road, Houston, TX 77204

ABSTRACT

We examine the product market spillover effects of hedge fund activism (HFA) on the industry rivals of target firms. HFA has negative real and stockholder wealth effects on the average rival firm. The effects on rivals' product market performance is commensurate with post-activism improvements in target's productivity, cost and capital allocation efficiency, and product differentiation. Financially constrained rivals accommodate these improvements but those facing high intervention threat respond effectively to them. The spillover effects are strengthened in less concentrated and low entry barrier industries. The results are robust to the alternative hypothesis of strategic target selection by hedge funds.

JEL Classification

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Keywords

Hedge fund activism; Product markets; Spillover effects; Market shares; Markups

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+ Corresponding author: Tel.: (404)-413-7345; Fax: (404)-413-7312

E-mail addresses: haslan@gsu.edu (Aslan); pkumar@uh.edu (Kumar)

1. Introduction

Since the late 1990s, activist hedge funds have become the dominant face of shareholder activism, essentially taking over an arena that was once dominated by pension funds and mutual funds. Hedge fund activism (HFA) has attracted substantial public attention because of the large financial resources — 'huge war chests' (De La Merced and Creswell, 2013) — of activist investors and their ambitious agendas implemented through modifications in targets' business strategy, capital structure, and corporate governance. In contrast to the largely ineffective results of the earlier institutional investor activism (Black, 1998; Gillan and Starks, 2000; Karpoff, 2001), HFA appears to have generated significant positive financial and real effects on target firms (Brav, Jiang, Partnoy, and Thomas, 2008; Brav, Jiang, and Kim, 2013; Bebchuk, Brav, and Jiang, 2015).

The positive effects on target firms' economic performance suggest that HFA is not just a 'stock market sideshow' (Morck, Shleifer, and Vishny, 1990); rather, it appears to induce real effects through some combination of improvements in productive efficiency, lower agency costs, and improved business strategy. These changes should also have product market spillover effects, however. Theoretically, the industrial organization and competitive strategy literatures predict that improvements in cost efficiency and product differentiation in target firms will impact oligopolistic industry equilibrium through a variety of channels. Indeed, we observe anecdotally that firms come under pressure to respond when some of their *rival firms* are targeted by activist investors.[1] But despite intense interest by the media and policy makers, and recent scrutiny by academic economists, the product market spillover effects of HFA are poorly understood. In particular, what are the primary channels for the spillover effects? Are the spillover effects commensurate with the post-activism improvements in target firms? How do rival firms respond as the activism progresses? Do they cut prices to protect market shares, or are some rivals able to effect their own efficiency and product differentiation improvements? What types of rival firms are vulnerable — or protected — from the spillover effects? What is the role of industry attributes? We currently have limited understanding of these important issues.

Using a comprehensive HFA sample covering 1996–2008, with 1,332 (1,610) unique target firms

[1] A recent example is the pressure put on Qualcomm Inc. by activist investor Jana Partners to restructure by spinning off its chip production from its patent-licensing business (Benoit and Clark, 2015). This follows the recent success of activist investors to restructure Qualcomm's rival Microchip Technology (Ovide and Clark, 2015).

(activism events), we attempt to shed light on the product market spillover effects of HFA. Guided by the theoretical industrial organization and strategy literatures, we analyze the channels for the spillovers based on factors related to the nature of the intervention, rival firms, and the type of industry. Specifically, we analyze the spillover effects on industry rivals from targets' productivity gains, operating margin reductions, capital redeployment, and product differentiation improvements proxied by increases in advertising expenditures (Chamberlin, 1933; Nelson, 1974). Moreover, we examine whether rivals are able to protect themselves from post-activism competitive pressure by improving their own productivity, cost and capital allocation efficiency, and product differentiation. We also examine the role of firm-level characteristics that make rivals more likely to accommodate target improvements and suffer adverse consequences— that is, compete on the basis of strategic substitutes (Bulow, Geanakoplos, and Klemper, 1985) — or to respond effectively and compete on the basis of strategic complements. In particular, the literature implicates rivals' financial constraints (Benoit, 1984; Bolton and Scharfstein, 1990) and proactive reforms undertaken in response to industry shocks (Brav, Jiang, and Kim, 2013) or HFA threats (Gantchev, Gredil, and Jotikasthira, 2014; Zhu, 2014). In a related vein, we expect the spillover effects to be influenced by the competitive intensity of the industry (Raith, 2003; Giroud and Mueller, 2010, 2011) and the strength (or weakness) of its entry barriers (Porter, 1980).

Our main findings may be summarized as follows. HFA has significant product market spillover effects on the industry rivals of target firms. These effects are observed on the product market performance of rivals — as measured by their price-cost markups and market shares — and on their operational returns, productivity, and capital investment. The impact on rivals' performance is commensurate with the post-HFA improvements in targets' productivity, cost and capital allocation efficiency, and product differentiation. However, there is substantial heterogeneity in these spillover effects, based on rivals' post-activism improvements, financial constraints, and threat of intervention. The impact of HFA on rivals' product market performance is also significantly influenced by the industry competitive structure. Finally, financial markets appear to anticipate the spillover effects; in particular, the heterogeneity that we observe in the post-HFA spillover effects is reflected in the announcement effects of intervention events on rivals' stock returns.

To explicate further, on average, rivals compete on the basis of strategic substitutes against

targets' post-HFA total factor productivity (TFP) gains, operating margin reductions, capital redeployment across business segments, and product differentiation improvements. We find that the spillover effects are stronger on rivals' price-cost margins rather than their market shares, which is consistent with the argument in the strategy and marketing literatures that the immediate response of firms to low cost competition is typically to reduce prices and protect market shares (Kumar, 2006; Ryans, 2009). The relatively smaller magnitude of the market share loss of the typical rival firm is also consistent with the view that HFA tends to improve the efficiency of target firms rather than expanding their scale (Brav, Jiang, and Kim, 2013; Bebchuk, Brav, and Jiang, 2015).

However, rivals respond to activism not only by reducing prices but also by improving their own productivity, cost and capital allocation efficiency, and product differentiation. We find that rivals that are able to achieve above average improvement levels suffer lower reduction in markups and market shares. Moreover, financially constrained rivals are likely to be in the lower end of the improvements and suffer more adverse product market consequences. But more threatened rivals (who presumably had initiated proactive reforms) are able to compete on the basis of strategic complements — that is, improve their product market performance — after activism, consistent with Zhu (2014) and Gantchev, Gredil, and Jotikasthira (2014).

Furthermore, industry concentration and entry threats have significant influence on the product market spillover effects. The adverse consequences of target HFA on the average rival firm are enhanced in less concentrated industries, which is consistent with the theoretical analysis of Raith (2003) and empirical analysis of Brav, Jiang, and Kim (2013). Meanwhile, the industrial organization literature suggests that the post-HFA competitive pressure on rivals would be enhanced (weakened) for industries with low (high) entry barriers because new firms can enter to exploit weakened rivals. Consistent with this prediction, we find that the adverse effects of HFA on rivals' product market performance are ceteris paribus weaker for industries with greater capital intensity, asset specificity, product differentiation, and entry regulations — that is, with high entry barriers.

These results do not establish that activist investor intervention per se is the *cause* of significant product market effects, however. The selection of targets by activist investors is not generally random (Greenwood and Schor, 2009; Brav, Jiang, and Kim, 2013). In particular, an important component of hedge funds' investment skill is to identify firms that have a higher likelihood of supe-

rior competitive performance. The alternative hypothesis then is that our findings reflect differential sensitivity of target and rival firms to common industry-wide shocks, which is being strategically exploited by activist investors. We use multiple approaches to address the challenge of identifying rivals' product market performance under the counterfactual that the target firms are not exposed to HFA. We analyze the effects of HFA on the residual component of rivals' performance after controlling for changes in their investment opportunities and time-varying industry-wide shocks (Clerides, Lach, and Tybout, 1998). In addition, we examine the differential impact on rivals' performance when hedge funds switch from a passive to an activist posture, and from a non-hostile to hostile posture. We also perform a 'placebo' or falsification test to address the possibility that our results are identifying pre-HFA trends rather than causative effects. Our results remain consistent. In particular, we continue to find significant negative product price responses by rival firms to target HFA, which is difficult to justify based on the alternative hypothesis that the price cuts reflect ongoing response to industry-wide shocks. Given the significant negative announcement effects of target HFA on rivals' stock returns, the alternative requires the unappealing assumption that financial markets are persistently less knowledgeable compared to activist investors. In sum, our analysis indicates that the product market spillover effects of HFA are not due to differential sensitivity to industry shocks between target and rival firms, and nor are they an artifact of skilled target selection (or 'stock picking') by hedge funds. Finally, our results are robust to possible attrition (or selection) bias from the delisting of rivals.

Our study is among the first to analyze the effects of HFA on the product market performance (as measured by price-cost markups and market shares) of the industry rivals of target firms. Building on the predictions of the industrial organization and strategy literatures, we identify intervention-, rival-, and industry-related channels for the transmission of the effects of HFA to the product markets. The results complement the existing HFA literature by showing that the productivity and efficiency improvements of target firms (Brav, Jiang, and Kim, 2013; Bebchuk, Brav, and Jiang, 2015) have significant product market spillover effects, as do product differentiation improvements and investor intervention with respect to business strategy. These findings are consistent with Brav, Jiang, Partnoy, and Thomas (2008) who find relatively high announcement effects on target stock returns for HFA related to specific strategic actions.

However, our study also clarifies effects of rivals' responses to activism. While the typical rival suffers reductions in price-cost markups and market shares, there is a wide distribution on the effects of activism because rivals respond by improving their own productivity, cost and capital allocation efficiency, and product differentiation. Indeed, rival firms that are in the right tail of improvements and those that are subject to high intervention threat are able to compete on the basis of strategic complements. On the other hand, financially constrained rivals are restricted in effecting productivity and cost efficiency improvements. Moreover, the spillover effects are significantly influenced by industry concentration and entry barriers. While the literature has highlighted the role of industry concentration (Brav, Jiang, and Kim, 2013), the role of industry entry barriers in the product markets effects of HFA is a novel feature of our study.

The remaining paper is organized as follows. Section 2 develops the empirical hypotheses. Section 3 describes the data and sample construction. Section 4 analyzes the announcement effects of HFA on rival firms. Section 5 presents the results and Section 6 considers causality. Section 7 performs additional robustness results, and Section 8 concludes.

2. Hypotheses development

In this section, we develop empirical hypotheses regarding the product market effects of HFA. We first describe the principal types of HFA. The industrial organization, financial contracting, and HFA literatures present a variety of factors or *channels* that determine the sign and size of the product market spillover effects of activist intervention in target firms. It is useful to organize these spillover channels in three categories: (1) target-specific channels, (2) rival-specific channels, and (3) industry-specific channels.

HFA can improve targets' cost efficiency or input factor productivity (Brav, Jiang, and Kim, 2013; Bebchuk, Brav, and Jiang, 2014). These improvements effectively result in cost reductions in target firms that put competitive pressure on rival firms (Dixit, 1986; Daughety, 2008). Similarly, HFA that leads to capital redeployment (Smith, 2013; Brav, Jiang, and Kim, 2013), or imposes investment restrictions (Bebchuk, Brav, and Jiang, 2015), or modifies capital structure to reduce agency costs improves target efficiency and upsets the industry equilibrium. Furthermore, if activist investors improve targets' product differentiation by modifying business strategy — for example, by raising product quality, increasing informative advertising, and effecting better product positioning

— then this will raise their market share (Chamberlin, 1933; Grossman and Shapiro, 1984) and generate competitive pressure on rivals to respond by dropping their product prices (Porter, 1980).

However, the medium- to longer-run product market spillover effects of targets' improvements from HFA will ultimately depend on whether rival firms compete on the basis of strategic substitutes or strategic complements (Bulow, Geanakoplos, and Klemper, 1985). If rivals compete on the basis of strategic substitutes, then they accommodate targets' improvements and suffer adverse consequences on their market shares and profits. Furthermore, the magnitude of these adverse effects (on rivals) will be increasing with post-HFA improvements in target firms, based on the comparative statics analysis of oligopolistic equilibrium in the literature (Dixit, 1986; Vives, 2005).[2]

H1: If rivals compete on the basis of strategic substitutes against target improvements, then the spillover effects of HFA are increasing with improvements in targets' production efficiency, capital allocation efficiency, and product differentiation following HFA.

On the other hand, if rivals respond to target activism by implementing their own improvements in efficiency and product differentiation, then they will be able to protect their profit margins and/or market shares, or at least weaken the adverse spillover effects of HFA.

H2: If rivals compete on the basis of strategic complements against target improvements, then the spillover effects of HFA are weaker (less negative) if rivals respond by improving their own productivity, cost and capital allocation efficiency, and product differentiation.

But what type of rival firms are more likely to compete on the basis of strategic substitutes or complements? Theoretical arguments in the literature suggest that rivals will be constrained in effecting improvements in response to activism if they are financially constrained (Benoit, 1984; Bolton and Scharfstein, 1990). As we mentioned before, there is considerable recent evidence that the threat of external interventions induces value-improving responses from peer firms. We posit that improvements (or reforms) by rivals prior to HFA — induced by industry shocks and/or targeting threats — allow a more effective response to activist intervention in targets. Typically, it is difficult to instantaneously generate significant efficiency improvements and to implement major changes in competitive policies. Hence, rivals that have already made efficiency gains and adjusted

[2] The hypotheses stated below are in the form of comparative statics and thus apply only when other things are held fixed. For expositional ease, we do not explicitly note the 'ceteris paribus' nature of these statements.

competitive policies are more likely to compete on the basis of strategic complements.

H3: Rivals are more likely to compete on the basis of strategic substitutes against target improvements if they are financially constrained. However, they are more likely to compete on the basis of strategic complements if they are themselves highly threatened by HFA.

Industry concentration potentially plays a significant role in the effects of HFA on rival firms. For example, if competition counteracts managerial slack, then HFA would have greater effects on rivals in concentrated industries. Indeed, Giroud and Mueller (2010) argue that policy efforts to improve corporate governance could benefit from focusing on non-competitive industries. In contrast, Raith (2003) shows that the advantages of cost improvements are higher in more competitive industries where the firm-level demand function is relatively elastic (the "business stealing effect").

H4: If rivals compete on the basis of strategic substitutes against target improvements, then the spillover effects of HFA are stronger in less concentrated industries.

Industries can also be competitive because of low entry barriers (Porter, 1980). More explicitly, if competitive actions are strategic substitutes, then improved efficiency and/or product differentiation of target firms following HFA will put competitive pressure on weaker rivals — that is, those that are financially constrained or have not initiated reforms due to low HFA threats (cf. Hypotheses 2 and 3). If entry barriers are low and the industry is *contestable* (Baumol, Panzar, and Willig, 1982), then new firms that are relatively efficient can enter to exploit the weakened competitive position of rivals. That is, the spillover effects of HFA on weak rivals can be aggravated in industries with low entry barriers.[3] Conversely, high entry barriers can protect weak rivals from further aggravation of the spillover effects of targets' HFA.

H5: If rivals compete on the basis of strategic substitutes, then the spillover effects of HFA are stronger (weaker) in industries with low (high) entry barriers.

We now describe the data, sample construction, and the main empirical measures or variables that we will use in our tests.

3. Data and important variables

[3]Indeed, there need not be actual entry for the amplification of the competitive spillover effects of HFA. If the industry is contestable because of low entry barriers, then the credibility of the entry threat can force weak rivals to further reduce prices — beyond the cuts forced by target HFA — in order to deter entry.

3.1. Sample construction for target firms

The Securities and Exchange Commission (SEC) requires that any person or entity that owns 5% or more of a public company's stocks file a Schedule 13D, within ten days of purchasing the shares. Schedule 13D contains identifying and background information on the filer(s) and the number of shares and percentage of outstanding equity owned. It also includes the method of purchase, the exact date of the transaction, and the purpose of the transaction (Item 4), which is the most important section of the 13D. Another important section is the "Materials to be Filed as Exhibits" section. This contains any letters sent to management and elaborates on the "Purpose of Transaction" section.[4] We hand-collect the list of activist hedge funds by first performing a search in Factiva for the text strings "activism," "hedge fund," "hedge fund and shareholder activist," "hedge fund and shareholder activism," and "hedge fund and 13D." This search gives us approximately 140 activist hedge funds. We then examine the Securities and Exchange Commission (SEC) EDGAR database Schedule 13D filings that were filed between January 1996 and March 2008 by these activist hedge funds. We identify around 1,610 13D filings (and 1,762 issues targeted). From these 13D filings we manually gather: (1) the date of the filing, (2) the number and the percentage of shares held, and (3) the purpose of the transaction. Importantly, while searching Factiva, we find some instances of HFA where the fund has not accumulated 5% of the shares of the target firm, such as Icahn vs. Time Warner and Pershing Squares vs. McDonald's.[5]

We include in our sample all HFA events even if the hedge fund did not file a 13D. For cases where a Schedule 13D has not been filed, we use as the event date the first date on which the instance of investor activism makes public headlines. Also, for the non-filers, we obtain the percentage of the target firm's shares held by the fund from public media. We further search Factiva to collect data on the activism-related developments following each event and read the subsequent 13D filings and any letters sent to management demanding changes. For those HFA events that made public headlines, we additionally follow the stories and record the date of resolution — either by a proxy contest or by a mutual agreement between the parties. Our HFA sample has 1,332 (1,610) [1,762]

[4] The "Purpose of Transaction" section is the most important section of the 13D because it details exactly what the hedge fund is planning to do with its investment — for example, whether to hold the stocks for investment or to pursue "strategic alternatives."

[5] Icahn Fund Ltd. accumulated 2.6% of Time Warner and Pershing Squares collected a 4.9% stake in McDonald's when they launched their activism attacks.

target firms (events) [issues] over a 12-year period from January 1996 to March 2008.[6]

3.2. Sample construction for rival firms

We obtain financial data on the target firms from Compustat, while stock returns are obtained from the Center for Research in Security Prices (CRSP). Accounting and financial data are winsorized at the 1% and 99% levels to address the problem of extreme outliers. In addition, segment-level financial reporting data are drawn from the Compustat Segment Customer database and supplemented by SEC filings.

Similar to the literature on competitive effects of financial events (Lang and Stulz, 1992), we identify rival firms as all other firms in the same primary four-digit Standard Industry Classificaton (SIC) code on Compustat. To avoid any selection bias, in the rival sample for each year we include those firms that were future targets of HFA (within our sample). However, we use two filters to allow meaningful analysis. First, following He and Huang (2014), we retain firm-years with positive values for sales and total assets and those with available industry classification information (four-digit SIC codes). Second, we exclude firms without complete data around the event date on the CRSP Daily Returns file. There are a total 55,928 rival firms in our sample. On average, we have 42 rivals per target firm, with a minimum of one rival to a maximum of 501 rivals.

3.3. Descriptive statistics

Panel A of Table 1 displays some salient characteristics of target firms and their rivals in the year before activism. When compared to their rivals, target firms are smaller (in market value of equity), more profitable (in terms of return on assets (ROA), and less levered. Target firms also exhibit significantly lower average market-to-book (M/B) ratios, sales growth, and dividend payout ratios compared with their rivals. Thus, it appears that while targets of HFA are not inefficient compared with their rivals, they do tend to have lower market-to-book equity multiples, exhibit slower growth, and have lower dividend payout ratios. The median size (based on total assets) of rival firms in our sample is between the 7^{th} and 8^{th} deciles of the size distribution of firms in the Compustat universe during our sample period. And the median profitability (ROA) and leverage of

[6] We note that a single HFA event can target multiple issues. For example, an activist hedge fund might ask a firm to pay special dividends and may nominate a representative from the fund to the board of directors at the same time. Hence, we consider these two separate issues, but one instance of HFA, if they are addressed at the same time. There are 112 cases where one or more funds targeted the same firm, and 21 of those were targeted by more than two funds. In addition, there are 29 hedge funds taking an activist position in more than ten firms.

rivals lies between the 5^{th} and 6^{th} deciles of the Compustat universe. Thus, our sample rival firms tend to be larger, more profitable, and more levered than the firms in the Compustat universe.

Panel B of Table 1 provides the industry distribution of the rivals' sample at the two-digit SIC bracket. The preponderant majority of sample firms — about 84% — are in manufacturing, wholesale and retail trade, and financial industries. But the representation of the other industries, other than agriculture, is at least 2%. There is a wide intra-industry dispersion of rivals, which essentially represents the dispersion of peer firms at the four-digit levels, and this dispersion is especially large in the finance (ranging from a minimum of two to a maximum of 501), services, and retail trade sectors. Meanwhile, the inter-industry dispersion of the rivals ranges from an average of 19 rivals per target firm in the transportation sector to an average of 66 rivals per target firm in the financial sector.

3.4. Measures of product market spillover effects

We measure the product market effects of HFA on rivals both directly and indirectly. The indirect measures focus on the rivals' operational and financial performance. Here, we examine the ROA, the cash flows (CashFlow), capital expenditures (CAPEX), and annual sales growth (Growth). We provide definitions of all variables in the Appendix. In addition, we estimate the total factor productivity (TFP) from Model 4 of Table A.1 in the Internet appendix. The details of this estimation are also given in the Internet appendix.

The direct product market measures focus on the market shares and price-cost margins (or price markups) of rivals. Following the industrial organization literature, we define a firm's market share as its sales in a year divided by the same four-digit SIC industry's total sales in that year. For estimating the firm-level price-cost markups, we use an empirical model that relies on standard cost minimization conditions for variable inputs free of adjustment costs. These conditions relate the output elasticity of an input to its expenditure share in the total sales. We define the markup μ as the ratio of output price (P) to the marginal cost. To simplify the estimation, we let Γ be the composite input with the input price W. If the firm is a price-taker in the input market, then the marginal cost is $W\left(\frac{\partial \Gamma}{\partial Q}\right)$, where Q is the output. Hence, using the output elasticity with respect to input Γ, namely, $\xi^{\Gamma} \equiv \left(\frac{\partial \Gamma}{\partial Q}\right)^{-1}\left(\frac{\Gamma}{Q}\right)$, we can write the price markup for firm i at t as $\mu_{it} = \xi_i^{\Gamma}\left(\frac{W_t \Gamma_{it}}{P_{it} Q_{it}}\right)^{-1}$. We obtain the output elasticity from the estimation of a production function

and need only to measure the share of an input's expenditure in total sales. Finally, we compute the price markups by using estimates of firm-level estimated productivity and data on firm-level input expenditures and revenues. The details for these computations are given in the Internet appendix.

3.5. Measures of major channels

We now specify the empirical measures for the product market spillover channels identified in the empirical hypotheses in Section 2.

3.5.1. Target-specific factors

Hypothesis 1 relates the product market spillover effects of HFA to the post-activism improvements in production efficiency, capital allocation efficiency, and product differentiation for targets.

Production efficiency improvements: Based on the traditional Dupont ratio analysis (see, e.g., Bodie, Kane, and Marcus, 2004), we use operating margin changes following HFA as a measure of cost efficiency changes in the target firm. In the literature, Brav, Jiang, and Kim (2013) use changes in total factor productivity (TFP) as a measure of productive efficiency effects of HFA. For a given post-HFA year t, we calculate the change in the target's operating margin between the year before the intervention and t ($\Delta\text{OprMargin}^T$) and similarly for the TFP change (ΔTFP^T).

Capital allocation efficiency improvements: Williamson (1975) and Stein (1997) argue that active and well-functioning internal capital markets are conducive to value-creation and capital allocation efficiency. Lamont (1997) finds that firms respond to negative cash flow shocks by reallocating investment away from underperforming segments. Hence, a natural empirical measure of capital allocation efficiency changes following HFA is to examine how active is the level of internal capital reallocation for multi-segment target and rival firms.[7] We employ a measure of internal reallocation utilized by Guedj, Huang, and Sulaeman (2009) (DCapex^T). Firms with high DCapex measures have a relatively high annual internal capital redeployment activity.

Product differentiation improvements: Compared with efficiency and productivity improvements, it is more challenging to identify measures of product differentiation improvement. We build on the large literature on advertising expenditures (see Bagwell, 2007). Advertising enhances product differentiation by reducing consumer ignorance (Nelson, 1974; Tirole, 1988) and/or by persuading buyers (Haan and Moraga-Gonzalez, 2011), and therefore increases product demand and reduces

[7] Brav, Jiang, and Kim (2013) examine plants sold off following HFA as a measure of capital redployment through investor intervention.

price elasticity of demand (Grossman and Shapiro, 1984). Furthermore, firms with higher product quality optimally choose higher advertising expenditures (Chamberlin, 1933) because they get more benefits from informational advertising (Nelson, 1974; Kihlstrom and Riordan, 1984). As indicators of improved differentiation, we therefore use increases in advertising expenses (normalized by assets) by targets between the year before the intervention and t (ΔProductDiff^T).[8]

3.5.2. Rival-specific factors

Hypothesis 2 relates the product market effects of HFA on rivals to their post-activism improvement in productivity, cost and capital allocation efficiency, and product differentiation. We measure these variables as described in Section 3.5.1. However, to identify rivals' improvements, we label these measures as ΔOprMargin^R, ΔTFP^R, DCapex^R, and ΔProductDiff^R. Meanwhile, Hypothesis 3 posits that financially constrained rivals will be hindered in responding competitively to targets' post-activism changes. On the other hand, rivals with a high threat or probability of intervention would be able to respond more effectively to target HFA.

Financial constraints: We identify firms' financial constraints by considering their market leverage ratio (Leverage) and cash assets (Cash). These measures are standard in the literature and consistent with the view that levered firms with low internal liquidity are more likely to suffer financial constraints because of transactions costs of external financing (Froot, Scharfstein, and Stein, 1993).

Probability of intervention(HFA): We estimate the likelihood of activist investor intervention for a firm using a probit model. The HFA probability is modeled as a function of firm fundamentals, macro, and industry controls. The estimated models, with differing utilization of industry and year fixed effects, are shown in Table A.2 in the Internet appendix. We use model (3) in Table A.2 with both industry and year fixed effects.[9] Our results are in line with the findings of Brav, Jiang, Partnoy, and Thomas (2008). A firm's market size, leverage, payout, sales growth, Q-ratio, and industry concentration are negatively correlated with target propensity whereas ROA, cash holdings, and institutional ownership have a positive correlation with targeting. Using this model,

[8] Bagwell (2007) provides an excellent survey of the literature on advertising expenses. Empirical studies that validate the relation of advertising expenses to product differentiation and market performance include Comanor and Wilson (1974), Lambin (1976), Syverson (2004), and Fresard and Valta (2014).

[9] This probit model is similar to that used by Gantchev, Gredil, and Jotikasthira (2014) to estimate a baseline propensity of being threatened by HFA, based on firm-specific characteristics. However, our specification supplements the firm-level characteristics with industry-level variables (such as the Herfindahl-Hirschman index (HHI)) and macro variables (such as the credit spread).

we calculate the propensity that a given firm, conditional on its fundamental characteristics, will be targeted in a given year and call it *HFAProb*. We then sort all firm-year observations based on their estimated target propensities into terciles, labeling top (bottom) 33% as the high (low) *HFAProb* group. In particular, given our interest in the effects of proactive (or preemptive) responses by the more threatened rivals, in our empirical tests below we will use the *HFAProb* for rival firms in the year *preceding* the HFA event.

3.5.3. Industry-specific factors

Hypotheses 4 and 5 relate industry concentration and strength of entry barriers to the product market spillover effects of HFA.

Industry concentration: We utilize the widely used Herfindahl-Hirschman index (HHI), which is calculated as the sum of squared market shares of firms within an industry for each sample year: $HHI_{it} = \sum_{n=1}^{N_i} s_{nit}^2$, where s_{nit} is the market share of firm i in industry n in year t. Market shares are computed from Compustat using firms' sales. When computing the HHI, we use all available Compustat firms and exclude firms for which sales are either missing or negative.

Entry barriers: Industries where entry is regulated, such as utilities and banking, have natural high entry barriers. Furthermore, industries that require large initial expenditures also have high entry barriers. Such industries include highly capital-intensive industries that require large initial capital outlays (Dixit, 1980; Karakaya, 2002) and industries with a high degree of product differentiation that require large initial advertising and marketing expenditures (Porter, 1980). In addition, industries with specialized production technology or assets have high entry barriers because of low salvage value in case of bankruptcy (Porter, 1980). Thus, we use the following proxies for high entry barriers in industries: (a) high capital intensity (CapitalIntensive); (b) relatively large number of five-digit SIC codes within the industry (#5-digit SIC codes) as a measure of high product differentiation (Hallak and Sivadasan, 2013; Nain and Wang, 2013); (c) high asset specificity, where we employ a measure used by Kim and Kung (2014) and Fresard and Valta (2014) (AssetSpecificity); and, (d) regulatory restrictions on entry in the industry (Regulated).

We first study the announcement effects of target HFA initiation on rivals' stock returns. We then test the empirical hypotheses.

4. Announcement effects of hedge fund activism on rivals

A direct measure of the expected wealth effects of HFA on product markets is the stock price reaction of rivals around activism announcements. We choose a short [-5,+5] announcement window — where day 0 is the initial Schedule 13D filing date by hedge fund activists — to avoid the noise in longer windows that may obfuscate reliable inference (see Servaes and Tamayo, 2014).[10] Following Lang and Stulz (1992), we use a portfolio approach and place all rivals at the time of HFA into one portfolio and treat the returns to this portfolio as a single observation. This gives equal weight to rival firms in each portfolio and accounts for any contemporaneous cross-correlation among returns in the industry. The abnormal return of each rival portfolio p for each day t in the event window is computed as $AR_{pt} = R_{pt} - R_{m,t}$, where R_{pt} is the daily return on the portfolio at t, and $R_{m,t}$ is the return on the CRSP value-weighted market index for that day.

4.1. Univariate analysis

Panel A of Table 2 presents the market-adjusted mean excess stock cumulative abnormal returns (CARs) over the event window for the full sample (Panel A.I) and for different groups segmented by the purpose of hedge fund activity (Panel A.II). For the overall HFA sample, we find that rivals, on average, experience negative CARs of about -1.4% (over the announcement window). However, these effects are only marginally significant and relatively smaller than the large positive announcement effects of HFA for *target* firms reported by Brav, Jiang, Partnoy, and Thomas (2008) for longer event windows.[11] These results thus suggest substantial *heterogeneity* in the announcement effects across various types of rivals and industries, which is consistent with the empirical hypotheses derived in Section 2.

Panel A.II shows significant variance in the announcement effects based on the types of intervention. General or non-specific demands for change, where hedge funds make different types of demands over time and keep communications with target firm management open, do not have significant effects, while specific demands do. Among the specific proposals, demands for changes in firm governance, such as changing the composition of the board and trimming executive compensation, have insignificant announcement effects, consistent with the literature that finds insignificant stock return effects of governance proposals for *target* returns (Gillan and Starks, 2000). In contrast,

[10] However, untabulated results using a [-22,+22] day window are qualitatively similar to the short event window.

[11] Brav, Jiang, Partnoy, and Thomas (2008) report average abnormal returns for target firms in the range of 7% to 8% during the [–20,+20] announcement window.

demands for changes in business strategy and capital structure of target firms have statistically significant and economically sizeable negative effects on rivals' stock returns.[12] The size and significance of the negative announcement effects on *rivals* when HFA focuses on changes in the business strategy of target firms is of substantial interest from the viewpoint of industrial organization and strategy literatures. Our findings indicate that financial markets expect HFA to raise target performance through improvements in production efficiency, product differentiation, and business strategy rather than through tacit collusion with rivals (Green and Porter, 1984). These results also complement the analysis of Brav, Jiang, Partnoy, and Thomas (2008) who find that HFA related to specific investment actions and changes in business strategy generates the largest abnormal returns for target firms. Moreover, the results are consistent with the view that financial markets expect capital structure changes in target firms to improve investment efficiency and reduce agency costs of target firms rather than increase their financial fragility, complementing the findings of Bebchuk, Brav, and Jiang (2015).

Turning to Panel B.I, we find initial support for Hypothesis 2 on the role of rivals' financial constraints. Highly levered rival firms (with leverage above the sample median) have significantly greater negative announcement effects of HFA compared with low leverage rivals. Indeed, low leverage rivals do not suffer significant negative announcement effects from the initiation of HFA. In a similar vein, Panel B.II shows that the negative announcement effects of target HFA are significant only for rival firms with low cash holdings. Next, in Panel B.III, we decompose the announcement effects on rivals according to their likelihood of being exposed to HFA. Consistent with Hypothesis 3, there are significant negative announcement effects of target HFA initiation only for low threat rivals. Indeed, the announcement effects are significant and positive for highly threatened rivals, which complements the findings of Gantchev, Gredil, and Jotikasthira (2014). Finally, Panel B.IV shows that rival firms in highly concentrated industries, with an HHI above the median, experience significantly negative announcement effects, but not so for rivals in more competitive industries. These findings are consistent with the view that efficiency improvements in HFA target firms will be more beneficial in concentrated industries, as we discussed earlier. We note that the higher *stock return* response of rival firms (to HFA) in concentrated industries does

[12] The negative abnormal returns of rivals' stocks are similar in magnitude to the effects of HFA on rivals' returns in Germany (see Mietzner, Schweizer, and Tyrell, 2011).

not necessarily contradict Hypothesis 4, which refers to the magnitude of product market quantities (such as, market shares) that are driven by the elasticity of demand (Raith, 2003).

4.2. Cross-sectional determinants of abnormal returns

Table 3 presents the cross-sectional relation of abnormal stock returns of rival firms of HFA targets (in the [-5,+5] day announcement window) and a set of explanatory variables. Moreover, we report robust standard errors clustered at the industry level to address the possibility of error terms that are correlated across a given industry. In Panel A, the estimates of model 1A complement the conclusions from Table 2 with respect to types of intervention. The negative effects of HFA are ceteris paribus higher for rivals that are more likely to be financially constrained: A one-standard deviation increase in a rival firm's leverage (cash assets) ceteris paribus reduces (increases) its abnormal returns by 0.8% (0.6%). The interaction effects in model 2A indicate that the negative effects of strategy-related activism on targets is significantly greater for more levered rivals with lower internal liquidity. Meanwhile, the estimates in model 4A show that the negative announcement effects of specific proposals are significantly moderated for rivals with a high likelihood of being targeted by HFA.[13] Indeed, the announcement effects for governance-related proposals on the more threatened rivals are significantly positive, and similarly for the more threatened rivals with high cash holdings. Notably, the announcement effects are significantly negative for HFA that focuses on targets' business strategy and capital structure even for the highly threatened rivals.

In Panel B of Table 3, we examine the influence of industry factors. Consistent with the univariate results, model 1B indicates that the negative announcement effects on rivals' stock returns are stronger in more concentrated industries. However, model 2B indicates that industry concentration does not significantly modify the effects of different types of HFA. Finally, model 3B examines the interaction of the likelihood of investor intervention and industry concentration. For this purpose, we use an industry-level measure of the ex ante HFA threat, namely, *HFAFreq,* which is calculated for each sample year t as the number of firms that were targeted in a firm's industry in year $t-1$ divided by the total number of firms in the industry. We expect the negative

[13] In Panel A of Table 3, the observation unit for models 1A, 2A, and 3A is portfolios. The observations in models 4A and 5A refer to rival firms. We note that the number of rivals in models 4A and 5A are lower than the overall number of rival firms (55,928) because we use the HFAProb≥q33 dummy, which excludes firms in the middle tercile of HFA probabilities (see Section 3.5.2).

announcement effects of HFA on rivals in less competitive industries to be moderated in industries where firms on average have a higher threat of being exposed to HFA. The results support this hypothesis. Controlling for industry concentration, there are significant negative announcement effects only for strategy-related proposals for rivals in highly threatened industries. Indeed, the stockholder wealth effects for governance-related proposals are actually positive for the rivals in such industries.

We now turn to our main empirical tests of the empirical hypotheses of Section 2. We first present the results of our baseline empirical model for testing the hypotheses. We then examine the causality of HFA on product market spillovers, and perform robustness tests.

5. Product market effects of HFA

5.1. Baseline empirical specification

Our tests of the empirical hypotheses of Section 2 build on the following baseline regression model. For each target firm k in industry m (at the four-digit SIC level), let i be a rival firm (i.e., be in the same industry). We denote by $y_{i,k,t}$ the year t product market performance measure (cf. Section 3.4) of firm i. Then we estimate

$$y_{i,k,t} = \alpha + \boldsymbol{\delta}' \mathbf{X}_{i,k,t-1} + \beta_0 \; PostActivism_{k,t} + \psi_m + \xi_t + \varepsilon_{i,k,t}. \tag{1}$$

Here, $\mathbf{X}_{i,k,t-1}$ is vector of lagged control variables for firm performance; $PostActivism_{k,t}$ is an indicator variable for post-HFA periods, that is, $PostActivism_{k,t} = 1$ if the firm-year (i,t) is within $[t+1, t+3]$ years of an activism event for target k — which is a pseudo-event year for rival firm i. ψ_m and ξ_t are industry and year fixed effects, respectively. The inclusion of these fixed effects ensures that our difference-in-difference estimates are robust to industry- and time-specific unobservable (or omitted) variables that might otherwise confound our analysis (Gormley and Matsa, 2014a). The coefficient β_0 is thus a measure of the average spillover effects of HFA events on industry rivals in the three years following the intervention, after controlling for the observable rival characteristics and unobservable industry-, time-effects. We test the empirical hypotheses using *interaction effects* of target-, or rival-, or industry-specific factors with the post-HFA time dummy variable. Finally, we control for firm-level unobserved heterogeneity in Eq. (1) — that is, remove the firm fixed effects in the levels equation — by using first differences of all variables (see, e.g., Heider and Ljungqvist,

2015).

As we mentioned earlier, in the construction of the rivals' sample, we include in year t even those rivals that are targeted in future years to avoid any bias that may result from excluding firms that are targeted for their high performance potential. We note, however, that because we use the targets and rivals in our sample for each sample year, our test design does not account for the attrition (or delisting) of target and rival firms during our sample period. This may lead to an attrition bias in the results if, for example, stronger (weaker) rival firms (target firms) are more likely to delist because of acquisitions. In Section 7, we will explicitly address this issue and test for any attrition bias due to the delisting of rivals. We now present the results.

5.2. Unconditional HFA effects

The results of the baseline regression (Eq. (1)) are provided in Table 4 for both the direct and indirect product performance measures. We use only firm size (log of market value), age (in natural logs), and M/B ratio as the control variables. The industrial organization literature identifies firm size and age as the critical firm-specific characteristics in industry evolution (Audretsch, 1995; Caves, 1998), while the M/B ratio is a control for investment opportunities. This parsimonious specification is also consistent with the recent HFA literature (Bebchuk, Brav, and Jiang, 2015).

Panel A of Table 4 presents the estimates of Eq. (1) and Panel B shows the estimated model in first differences to remove firm fixed effects in this equation, but includes industry and year fixed effects to remove industry- and macro-level shocks, respectively. For the entire sample, the results in both panels are consistent with rivals on average competing on the basis of strategic substitutes rather than complements because the unconditional average effect of HFA is associated with negative operating and product market performance for rivals. This finding complements related empirical studies, such as Sundaram, John, and John (1996).[14] In terms of operating performance, HFA on average pressures profitability, cash flows, and productivity of rival firms, but not their capital investment, presumably because competitors may be forced to increase investment in response to improvements in target firms.

Notably, the direct product market spillover effects on rivals' price-cost margins and market

[14] Sundaram, John, and John (1996) study the announcement effects of research and development (R&D) changes on peer firms in the same industry and find that the average firm in their sample behaves on the basis of strategic substitutes.

shares in Table 4 indicate that the competitive pressure from target HFA has stronger effects — in terms of higher statistical and economic significance — on price-cost margins rather than market shares. Since activism generally leads to higher cost efficiency and factor productivity in target firms (Brav, Jiang, and Kim, 2013), this finding is consistent with the view that firms' immediate response to low cost competition is typically to reduce prices and protect market shares (Ryans, 2009). Prices are flexible, while alternative responses to lower competitor costs, such as improving product quality and brand image or withdrawing from the product segment, are costly and typically only practicable in the medium to longer run. Meanwhile, losing market share can have substantial negative repercussions for long-run profits — for example, in the case of experience goods (Nelson, 1970) or when maintaining transactional relationships with customers is important (Williamson, 1975). More generally, protecting market shares by lowering prices allows firms the opportunity to devise longer-term solutions to new competitive threats (Kumar, 2006). We note that similar considerations apply for rivals when activism improves targets' product differentiation. Finally, the relatively smaller magnitude of market losses of rivals on average is consistent with the view that HFA tends to improve the efficiency of target firms rather than necessarily expanding their scale.

Turning to the other performance measures, the negative spillover effects are strongest for rivals' productivity, which may be the flip side of the productivity gain for targets documented by Brav, Jiang, and Kim (2013) using plant-level data. In a similar vein, the unconditional average effects on rivals are similar in magnitude — but opposite in sign — to the ROA improvements found for target firms by Bebchuk, Brav, and Jiang (2015). We notice that the unconditional average effects on rivals' investment are negative but relatively weak in terms of statistical significance, possibly due to the high degree of heterogeneity on the effects of HFA in this variable. However, this result is consistent with rivals strategically decreasing investment to accommodate targets' improvements — that is, competing on the basis of strategic substitutes on average. This type of response will be enhanced in low entry barrier industries, where these peer firms would strategically decrease investment to accommodate entry with the objective of softening the new entrants' actions (Fudenberg and Tirole, 1984). Moreover, the anticipation of higher entry lowers expected profits, thereby making investment less attractive.

We note that controlling for industry and time fixed effects can be challenging because there

may be unobserved time-varying differences across industries as activism progresses. Therefore, for robustness, we also re-do the analysis of Panel A of Table 4 using industry-year fixed effects, where (ψ_m, ξ_t) in Eq. (1) are replaced by a joint industry-year fixed effect, say, f_{mt}. This approach is similar to that adopted by Clerides, Lach, and Tybout (1998) and Gormley and Matsa (2014b). Untabulated results show real effects of HFA on rivals that are qualitatively very similar, but somewhat lower in magnitude, to those seen in Table 4.

As we identified in the empirical hypotheses of Section 2, the spillover effects of HFA will depend on various channels. We now turn to test these hypotheses, focusing on the direct product market spillover effects on rivals' market shares and price-cost margins.

5.3. Target-specific channels

Tables 5 and 6 (Panel A) test Hypothesis 1 by analyzing the role of target-specific factors on the post-HFA effects on rivals for market shares and price-cost margins, respectively. Ceteris paribus, post-HFA cost reductions and productivity improvements are positively related to the deterioration in rivals' market shares and price-cost margins. Target TFP (operating margin) improvements have more significant effects on rivals' market shares (price-cost margins). Reducing operating margins or increasing TFP by one standard deviation lowers the rivals' market shares and price-cost margins by an additional 1%, other things held fixed. We also find that intervention that improves internal capital allocation efficiency (higher DCapex) in multi-segment firms imposes greater competitive pressure on peer firms, consistent with the argument that HFA has an impact not only on the level but also (perhaps more importantly) on the efficiency of investment (Brav, Jiang, and Kim, 2013; Bebchuk, Brav, and Jiang, 2015).

Finally, product differentiation improvement (measured by changes in advertising expenses) has a negative incremental effect on rivals' performance, but this effect is relatively weak compared with the production and capital allocation channels. This finding could, in part, be because changes in advertising expenses are a noisy empirical proxy for more effective differentiation. But the relatively weak magnitude of spillover effects from product differentiation improvements is also consistent with the theory of the firm. In markets with *horizontal* differentiation, where there is a relatively wide dispersion in buyers' preferred product attributes, targets' improvements in product quality or differentiation will tend to have limited effects on rivals' profit margins and market shares

because the price and quality elasticity of demand across product locations can be low (Hotelling, 1929; Tirole, 1988).

5.4. Rival-specific channels

Panel B of Tables 5 and 6 shows that the adverse effects of target HFA are significantly weaker when rivals respond to activism by implementing their own improvements in productivity, cost and capital allocation efficiency, and product differentiation. For example, rivals that raised their post-activism TFP by one standard deviation ceteris paribus increased their market shares and price-cost markups by 1.2% and 1.1%, respectively. Differently put, rivals whose post-activism change in TFP was at least one standard deviation above the mean (TFP change) lost no more than 0.4% market share and did not suffer markup declines exceeding 1.4%. The beneficial effects of rivals' post-activism improvement in operating margin, DCapex, and product differentiation are of similar magnitude. In particular, improvements in TFP and DCapex were most beneficial to rivals in terms of protecting their market shares and price-cost markups, respectively. These results support Hypothesis 2.

Tables 5 and 6 (Panel B in each table) also test Hypothesis 3. Ceteris paribus, high leverage and low liquidity are associated with greater declines in rivals' market shares (Table 5). Increasing the rivals' leverage by one standard deviation results in an additional market share loss of 0.7%. However, we do not observe significant effects of leverage on price-cost margins. On the other hand, rivals with high internal liquidity (or cash) are able to significantly reduce the competitive pressures form target firms. Increasing the cash-to-asset ratio of rivals by one standard deviation, ceteris paribus, raises peer firms' price-cost margins by about 2% and market shares by about 1%. Thus, the evidence in Tables 5 and 6 supports the hypothesis that firms with high leverage and/or low liquidity are more likely to compete on the basis of strategic substitutes against target improvements. For example, the financial constraints would limit their ability to effect significant improvements in production efficiency and product differentiation (for example, by raising advertising expenditures). In untabulated analysis, we examine the relation of leverage and liquidity to changes in rivals' TFP and operating margin between one year before and three years after the HFA event. On average, low-levered rival firms (in the bottom tercile of leverage) had 3.8% greater change in TFP compared with highly levered rivals (in the top leverage tercile). The corresponding

difference in operating margin changes across the low and highly levered firms is 2.6%. Finally, the differences in TFP and operating margin across high cash (top tercile) and low cash (bottom tercile) is 2.9% and 1.8%, respectively.

To examine the role of HFA threat probabilities on rivals, we use interaction of the post-HFA event window with the dummy variable *HFAProb*$\geq$*q33* (see Section 3.5.2). Consistent with Hypothesis 3, highly threatened rivals compete on the basis of being strategic complements: the net effect of HFA on such rivals is a slight improvement in their market shares and price-cost margins. Such firms, ceteris paribus, have over 3% higher profit margin and over 2% higher market share compared to less threatened rivals. The results support the view that rival firms that have initiated improvements in response to investor intervention threats are also able to mount more timely and effective reactions to target firms.[15]

5.5. Industry-specific channels

Panel C of Tables 5 and 6 shows that the adverse product market spillover effects of target HFA on peer firms are stronger in more competitive (or less concentrated) industries, consistent with Hypothesis 4 and the theoretical predictions of Raith (2003). This result complements Brav, Jiang, and Kim (2013) who use plant-level data and find greater post-HFA productivity improvements in target firms in less concentrated industries.[16] We recall that the negative announcement effects (of HFA) on rival firms' stock returns is higher in more concentrated industries (see Tables 2 and 3). However, these findings are not necessarily in conflict. The stronger announcement effects on the stock prices of rivals in more concentrated industries is consistent with the notion that competition tends to eliminate managerial slack (Giroud and Mueller, 2010, 2011). However, the analysis in Tables 5 and 6 examines the effects of targets' HFA on rivals' market shares and price-cost margins, which are positively related to the higher elasticity of demand functions that operate for firms in more competitive industries (Raith, 2003).

[15] However, in untabulated results we find that the negative product market spillover effects on all types of rivals are stronger for HFA that is focused on business strategy changes.

[16] Untabulated results also show that location in more threatened industries reinforces the positive effects of high firm-level HFA threats on rivals' product market performance following HFA on targets. These results are consistent with Gantchev, Gredil, and Jotikasthira (2014) who find that peers in more threatened industries earn higher stock returns in the year of the HFA. Our analysis indicates that such stock market gains presumably rest on expectations of superior competitive responses of rivals in these HFA-threatened industries, especially those that face a relatively high likelihood of intervention at the firm level.

The results in Panel C of Tables 5 and 6 also show that high industry entry barriers weaken the competitive pressure from HFA on rival firms, consistent with Hypothesis 5. On average, rival firms in highly capital-intensive industries have significantly lower profit margin reductions (by 1.2%) compared with rivals in low capital-intensive industries. The effects of high asset specificity in the industry, regulated entry, and relatively high levels of product differentiation are also similarly statistically and economically significant. In particular, the role of high product differentiation in the industry is consistent with the view that efficiency and productivity improvements in target firms put greater competitive pressure on rivals in relatively homogeneous or similar product segments (Porter, 1980; Hoberg and Phillips, 2011). Finally, we create an index of the strength of the industry entry barriers using principal component analysis similar to Custódio, Ferreira, and Matos (2013) based on the four variables that proxy for entry/exit barriers (see Section 3.5.3). By employing a single factor we increase power by avoiding multicollinearity problems and minimizing measurement errors. We find that the industry index of strong entry barriers has a significantly positive influence in rivals' post-HFA product market performance, other things held fixed. Indeed, in terms of both statistical and economic significance, the industry index has a stronger positive influence on rivals' market shares (2%) and markups (1.7%) compared with the individual proxies for entry barriers.

It is useful to provide an overall perspective on the product market spillover effects of HFA, based on the foregoing analysis. The initial result (see Table 4) that target activism on average has a greater effect on rivals' price-cost margins compared with their market shares remains robust even after conditioning on intervention-, rival-, and industry-related characteristics. However, the magnitude of the price drop does not support the view that rivals respond to target activism by unconstrained 'price wars.' For example, the maximum reduction in rivals' margins is about 4.2%, which occurs with activism that generates extraordinary improvement in targets' cost efficiency and productivity (see Table 6). Furthermore, activism that improves targets' cost or allocation efficiency, or productivity, has stronger spillover effects on rivals compared with the impact of targets' product differentiation improvements, consistent with the industrial organization and strategy literatures. Meanwhile, rivals respond to activism not only by reducing prices but also by improving their own productivity, cost and capital allocation efficiency, and product

differentiation. More financially constrained rivals accommodate target improvements, while more threatened rivals (that had presumably already initiated proactive reforms) compete on the basis of strategic complements. Finally, rivals in industries with high entry barriers are able to avoid reducing prices without suffering significant loss of market share.

6. Causality and identification

The results above show significant product market spillover effects of HFA based on intervention-, rival-, and industry-related channels. This analysis does not establish causality, however, because the selection of targets by hedge funds is not random. An important component of hedge funds' investment skill is to identify firms that have a higher likelihood of superior competitive performance because of differential response to underlying industry trends and/or threats of activist intervention. For example, firms that have already initiated operational improvements, alterations in product market strategy, or changes in financial policies in response to industry shocks would, ceteris paribus, impose competitive pressure on rival firms with slower responses. Thus, instead of identifying causative spillover effects of HFA, our results could reflect a differential sensitivity to underlying common industry shocks by target and rival firms that are observed through strategic target selection by hedge funds.

In sum, the challenge at hand is to identify rivals' product market performance under the counterfactual event that the target firms are not exposed to (or "treated by") HFA. Of course, one cannot expect to devise a 'perfect' identification test that fully addresses this challenge. We therefore use multiple approaches that identify the product market spillover effects of HFA relative to a variety of untreated benchmarks.

6.1. Purged residuals regressions

To address the possibility of spurious correlation in our results (induced by strategic target selection by hedge funds), we follow a two-stage regressions approach. In the first stage, we obtain residuals of firm performance that are purged of the effects of unobservable firm-specific investment opportunities and time-varying industry shocks. We then regress the purged residuals on the control variables and a time dummy for post-HFA activism. Similar to Clerides, Lach, and Tybout (1998) and Gormley and Matsa (2014b), we include the industry-by-year fixed effects to control for unobserved, time-varying differences across industries. Specifically, for each target firm k in

industry m (at the four-digit SIC level), we first run a regression on performance of rival firm i using *industry-year* fixed effects f_{mt} and a vector of control variables

$$y_{i,k,t} = \alpha + \boldsymbol{\delta}' \mathbf{X}_{i,k,t-1} + f_{mt} + \eta_{i,k,t}. \tag{2}$$

In the control vector $\mathbf{X}$, we include $Q_{i,k,t}$, the Tobin's-Q at time t for firm i, in addition to the three baseline variables (firm size, age, and the M/B ratio) to help control for time-varying investment opportunities for rival firms. By construction, $\eta_{i,k,t}$ (the residual) captures the portion of an outcome variable that is orthogonal to (or purged of) time-varying investment opportunities and industry effects. We then estimate:

$$\eta_{i,k,t} = \gamma + \beta_0 \; PostActivism_{k,t} + \upsilon_{i,k,t}, \tag{3}$$

where, as before, $PostActivism_{k,t} = 1$ if the firm-year (i,t) is within $[t+1, t+3]$ years of an activism event for target k.

In effect, the two-stage regression procedure sets up a performance benchmark for rival firms — namely, their performance in response to time-varying investment opportunities and industry trends — to help evaluate the spillover effects of HFA on target firms. Column 1 of Table 7 shows the result of this analysis. We find that target HFA has significant adverse effects on both the profit margins and market shares of the average rival firm in the sample. Holding fixed firm-specific controls, the average rival firm's profit margin drops by 2.2% in the three years after the HFA event. The effects on market share are smaller but statistically significant. The magnitude of the average product market spillover effects on rivals here is consistent with that observed in the tests presented in the previous section.

Thus, we conclude that HFA on target firms significantly affects the product market performance of their industry rivals even when we control for the peers' performance based on time-varying investment opportunities and industry-specific fixed effects. However, we cannot rule out the possibility that there are latent variables correlated with rivals' performance that are not captured by the empirical specification in Eqs. (2)–(3). For example, there can be no perfect empirical measure that captures all aspects of firms' investment opportunities. In addition, the purged resid-

uals test does not directly address the hypothesis of 'stock picking' by activist investors. Therefore, we utilize alternative benchmarks below that directly condition on observed hedge fund behavior.

6.2. Effects of filing switch from passive to activist intervention

Brav, Jiang, and Kim (2013) argue that hedge funds' skill in picking stocks can be separated from the improvements facilitated by their intervention by considering changes in their investment posture from passive to activist. Specifically, the SEC's ownership disclosure rules allow hedge funds (with a beneficial ownership between 5% and 20%) to file Form 13G (rather than the longer form 13D) if the fund does not intend to exert control. However, the fund has to file a 13D if they change their investment posture from passive to active. Thus, we examine the effects of those instances in our sample where the hedge fund switched their filing from 13G to 13D, thereby indicating a more activist intervention in the firm's control. To gain empirical identification from hedge funds' switches from 13G to 13D, we posit the following hypothesis. If hedge funds view the true value in their investment from 'stock picking,' that is, from choosing targets with better performance potential because of differential sensitivity to industry shocks (relative to rival firms), then there should be no value gain to them from switching to 13D. In contrast, if hedge funds expect a value gain from activist intervention that modifies the target's operational, product market, and financial policies, then they should switch to 13D.

Similar to Kim, Kim, and Kwon (2009) and Brav, Jiang, and Kim (2013), we construct a new sample using all 346 activist funds in our sample and searching for their 13G filings (for their passive block holdings). Then we identify cases where hedge funds have switched from 13G filings to the 13D filings, and we call this event "Switch." We find 228 cases where the filers switched from 13G (being passive holders) to 13D filings (being active holders) in our sample period. Then using the same notation as in Eq. (1), we estimate

$$y_{i,k,t} = \alpha + \boldsymbol{\delta}'\mathbf{X}_{i,k,t-1} + \beta_0 PostSwitch_{k,t} + \psi_m + \xi_t + \gamma_{hf} + \varepsilon_{i,k,t}. \tag{4}$$

Here, $PostSwitch_{k,t}$ is a dummy variable that is set to one if the firm-year (i,t) is within $[t+1, t+3]$ years of a filing switch event for target k.[17] And γ_{hf} is a hedge-fund fixed effect. Under the

[17] A filing switch event is defined as the year in which a hedge fund switches its filing of 13G to 13D for target k.

alternative hypothesis of non-causative product market effects of HFA, we expect β_0 to be not significantly differently from zero.

Column 2 of Table 7 examines the product market effects on rivals three years after hedge funds switched their filing from Forms 13G (passive) to 13D (activist). We find significantly negative effects on the market shares and profit margins of rival firms in the three years after hedge fund filings switch from 13G to 13D. Specifically, ceteris paribus, rival firms on average lose 2.9% in profit margins in the three years following the switch in posture from passive to activist intervention by hedge funds. As seen in the results in the previous section, the market share loss for rivals is smaller in magnitude than the reduction in their profit margins, but is statistically significant. Thus, finding β_0 to be significantly negative is inconsistent with the view that hedge fund intervention has no causative product market spillover effects relative to the benchmark of passive investment in target firms.

We note that in this test using 13G to 13D switches, the benchmark is rival firms' performance in response to *all* the 13G filings on target firms by activist funds. But because the switching decision by hedge funds is endogenous, we cannot rule out the possibility of latent variables correlated with rivals' performance. We therefore employ another benchmark based on rivals' response to non-hostile filings by activist hedge funds.

6.3. Effects of hostile intervention

As we noted in Section 2, 13D filings are quite diverse in terms of the types of demands from and posture towards target management. But under the alternative hypothesis that our results above reflect only differential sensitivity of target and rival firms to common industry shocks, there should be no significant distinction between the impact on rivals' performance of hostile versus relatively non-hostile filings by activist investors. On the other hand, anecdotal observations and evidence in the HFA literature point to a real impact on managerial policies when activist investors adopt a confrontational posture. Hence, the hypothesis that HFA has causative impact on rivals' performance would suggest that switching to hostile activism would significantly worsen rivals' performance relative to the non-hostile benchmark. To test this prediction, we classify hedge fund interventions as *hostile* when the initial (or amended) 13D filing by the activist investor threatens or opens the door to a proxy contest, a lawsuit, or public campaigns involving confrontation —

similar to the approach adopted by Brav, Jiang, and Kim (2013). We have 451 cases where a firm was targeted in a hostile way. Adapting Eq. (1), we estimate

$$\begin{aligned} y_{i,k,t} &= \alpha + \boldsymbol{\delta}'\mathbf{X}_{i,k,t-1} + \beta_0 PostActivism_{k,t} + \beta_1 Hostile + \beta_2 PostActivism_{k,t} * Hostile + \\ &\quad \psi_m + \xi_t + \varepsilon_{i,k,t}. \end{aligned} \tag{5}$$

Here, *Hostile* is an indicator variable for 13D filings that are considered hostile. Thus, the benchmark here is rivals' response to *non-hostile* intervention by activist investors.

Under the alternative hypothesis of non-causative product market effects of HFA, we expect β_2 to be not significantly different from zero. Column 3 of Table 7 shows the estimation results. We find, however, that the estimates of β_2 are negative and statistically significant at conventional levels. On average, hostile HFA results in an additional reduction of 0.7% in rivals' price-cost margins (with a similar magnitude of the effects on rivals' market shares) compared to relatively non-hostile filings, other things held fixed. Thus, the data indicate that more aggressive and hostile intervention does have statistically significant differential impact on rivals' product market performance on average, which supports the view that activist investor intervention has causative product market spillover effects.

6.4. Placebo test

To further allay concerns about spurious correlation in our estimates, we employ another benchmark by setting up a placebo test wherein we define a pseudo-event year and examine the rivals' response to this pseudo-event. Specifically, in the baseline model in Eq. (1), $PostActivism_{k,t}$ takes the value of one if the rival firm-year (i,t) is within $[t+1, t+3]$ years of a placebo activism event for target firm k, which we take to be three years before the recorded HFA event year. We choose this placebo event date to avoid any overlap with the target firm's *actual* HFA date. If the HFA dummy is picking up some existing trends in the tests that we undertake above, then these trends should also be captured by the placebo dummy. In contrast, column 4 of Table 7 shows that the placebo dummy is insignificant for both measures of rivals' product market performance. Thus, we find no evidence that out results are due to underlying trends in rivals' product market performance that existed prior to the onset of HFA on target firms.

Overall, Table 7 shows significant product market spillover effects of HFA on target's rival firms relative to a variety of benchmarks. These benchmarks include rivals' performance in response to time-varying investment opportunities and industry shocks; to passive and non-hostile filings by activist investors; and to pseudo-events. In particular, we continue to find a significant negative product price response by rival firms to target HFA, which is difficult to justify based on the alternative hypothesis of ongoing reactions to industry-wide shocks. If rival firms were dropping prices to respond to common industry threats — due to industry obsolescence or competitive threats from imports, for example — then this should already be internalized by the financial markets and we should not observe the negative target HFA announcement effects on rivals' stock returns shown in Tables 2 and 3. Thus, the alternative requires the unappealing assumption that financial markets are persistently less knowledgeable compared to activist investors. Overall, our analysis indicates that the observed product market spillover effects of HFA are not due to differential sensitivity to underlying industry shocks between target and rival firms, nor are they an artifact of skilled target selection (or 'stock picking') by hedge funds.

7. **Robustness tests**

7.1. Attrition bias

In our analysis thus far we have not accounted for the attrition (or delisting) of target and rival firms during our sample period. The attrition rate of target firms in our sample is 15.9%, which is comparable to the average attrition rate of Compustat firms (Brav, Jiang, and Kim, 2013). Moreover, attrition from targets' delisting is unlikely to induce a selection bias on the product market spillover effects because Brav, Jiang, and Kim (2009, 2013) find that targets' with greater propensity for attrition also have better operational performance. But if there is a tendency for superior *rival* firms to be delisted due to acquisitions, then there is a possibility of a negative attrition bias in the adverse product market spillover effects of HFA that we have observed above. We take delisted rival firms to be 'treated' firms and model their attrition behavior through the Heckman (1979) selection model.[18] The propensity for attrition by rival firm j at time t is

$$Attrition^{*}_{j,t} = \gamma_0 + \gamma_1' Y_{j,t-1} + \gamma_2 Z_{j,t} + \upsilon_{j,t}. \tag{6}$$

[18] This follows Brav, Jiang, and Kim (2009) who conduct attrition bias analysis for target (but not rival) firms.

Here, $Y_{j,t-1}$ is a vector of firm-specific control variables *measured the year prior* to the delisting event. $Z_{j,t}$ is an instrumental variable (IV) that influences the likelihood of attrition in year t, but not the post-HFA performance of the rival. The post-HFA attrition of rival firms occurs according to

$$Attrition_{j,t} = \begin{cases} 1 & \text{if } Attrition^*_{j,t} > 0 \\ 0 & \text{if } Attrition^*_{j,t} \leq 0. \end{cases} \tag{7}$$

We estimate this model for the full sample of rival firms that includes those that were delisted (or suffered attrition) during the sample period. For the IV, we use Amihud's (2002) illiquidity measure (prior to the HFA event) that is positively related to firms' stock trading liquidity. The literature argues that firms' stock trading liquidity is negatively related to their propensity for attrition (see Brav, Jiang, and Kim, 2009). Arguably, rivals' stock trading liquidity *prior* to the intervention in target firms influences the likelihood of rivals' attrition but does not affect their product market performance. We obtain the inverse Mills' ratio from the selection Eqs. (6)–(7) and use it as an additional factor in the regression Eq. (1). If the coefficient of the inverse Mills' ratio is significantly negative, then our prior results (Tables 4–6) likely underestimate the negative impact of target HFA on rivals because firms with greater propensity for attrition also have significantly lower product market performance. Of course, if this coefficient is insignificant, then this would indicate no significant selection bias in results due to rivals' attrition.

The results are shown in Table 8. The estimates of the first stage show that rivals' propensity for attrition is significantly negatively related to their stock trading liquidity. Furthermore, the coefficients for the inverse Mills' ratio in the performance equations are negative but statistically insignificant for all measures except rivals' cash flows (where the Mills' ratio coefficient is marginally significant) and profit margin (where the coefficient is positive but statistically insignificant). We continue to find significant adverse spillover effects of target HFA on the average rival firm in our sample. Consistent with Table 4, the negative spillover effects are especially sizeable for rivals' productivity (TFP) on average. Furthermore, the average spillover effects on markups and profit margins are significant and about the same magnitude as those found in Tables 5 and 6. In sum, the results in Table 8 do not indicate significant selection bias due to rival attrition.

7.2. Other robustness tests

We also conduct a variety of additional robustness checks that are untabulated for brevity. We add industry sales and productivity shocks, calculated as the absolute value of the difference between a particular industry's sales or TFP growth and the average sales or TFP growth across all four-digit SIC industries, directly as control variables in the baseline Eq. (1). To address the possibility that hedge funds are strategically choosing firms that are proactively undertaking operational improvements and strategy reforms in response to HFA threats or industry shocks, we also use an instrumental variable (IV) approach estimated through full information maximum likelihood (FIML). We first simultaneously model the direct and indirect effects of HFA on industry rivals while endogenizing target selection by hedge funds in a manner that is (arguably) unrelated to the performance of the targets. We describe this test and its estimation details in the Internet appendix, but find similar results to those reported above.

8. Conclusion

Shareholder activism is the most direct method for equity holders in large public companies to address the agency problems from the separation of ownership and control. Since the late 1990s, hedge funds have become the dominant face of shareholder activism. In contrast to the results of the earlier institutional investor activism, hedge fund activism (HFA) has effected significant financial and real effects on target firms. But the product market spillover effects of HFA are still relatively unexplored. Using a comprehensive sample of activism events covering 1996–2008, we find that HFA has significant product market spillover effects on the industry rivals of target firms. These effects are observed on the product market performance of rivals — as measured by their profit margins (or price-cost markups) and market shares — and on their operational returns, productivity, and capital investment.

Our analysis highlights the substantial heterogeneity in these spillover effects and uncovers various channels — specific to the intervention, rivals, and industries — for their transmission. In particular, the impact on rivals' performance is positively related to the improvements in factor productivity, capital allocation efficiency, and product differentiation following intervention. Thus, the post-HFA target productivity improvements documented in the recent literature are also a major channel for the spillover effects on industry peers. Conversely, rivals respond to activism not just by cutting prices, but by effecting their own efficiency and product differentiation improve-

ments; and the distribution of the spillover effects of HFA is commensurate with the distribution of these improvements across rival firms. Moreover, financially constrained rivals accommodate target improvements but those peers that are themselves highly threatened by intervention are able to improve their product market performance following HFA on target firms. Industry concentration and entry barriers also play an important role in determining the nature and magnitude of the spillover effects. Our analysis is consistent with the predictions of the industrial organization, strategy, and agency literatures and provides a fuller perspective on the real effects of HFA.

Appendix. Variable definitions

 # 5-digit SIC codes: number of five-digit SIC codes within each four-digit SIC code (e.g., Hallak and Sivadasan, 2013; Nain and Wang, 2013).

ΔX^j: the change in X for a firm j (where j = target (T) firm or rival (R) firm) between the year before activism took place ($HFA-1$) and time t.

Age: number of years since initial public offer (IPO). The natural logarithm of this variable is used in the paper.

AmihudLiq: Amihud (2002) illiquidity measure calculated as $100\sqrt{|\text{Return}| \,/\, (\text{Dollar trading volume})}$ (using daily data).

AssetSpecificity: measure of asset redeployability developed by Kim and Kung (2014) that accounts for the usability of assets across industries, based on the 1992 Bureau of Economic Analysis (BEA) capital flow table, which breaks down the capital expenditures of industries into a variety of asset categories (e.g., software, cars, or office equipment). Following Kim and Kung (2014), an asset redeployability score is defined as the proportion of industries by which a given asset is used. Finally, industry-level asset specificity is calculated as the value-weighted average of the asset redeployability score for each industry.

CAPEX: capital expenditures over property, plant, and equipment over total assets. Following Edmans, Goldstein, and Jiang (2012) we set missing capital expenditures to zero, but verify if the results are robust to removing an observation if capital expenditures are missing.

CapitalIntensive: ratio of property, plant, and equipment to total assets.

Cash: cash plus short-term investments over total assets.

CashFlow: the sum of net income, depreciation scaled by total assets.

DCapex: CAPEX reallocation between divisions showing the change in fractional capital allocation across business segments over the sample period. It is measured as

$$DCapex_{k,t} = \frac{1}{2} \sum_{d \epsilon D} \left| \frac{CAPEX_{d,t}}{\sum_{l \epsilon D} CAPEX_{l,t}} - \frac{CAPEX_{d,HFA-1}}{\sum_{l \epsilon D} CAPEX_{l,HFA-1}} \right|.$$

This is for all divisions d in the set D of divisions of firm k in year t. Since the Segments file might contain repeated data years if the reported segments appear on multiple source documents, we only consider the latest source year of each segment-year observation.

Growth: growth in sales over the previous year.

HFAProb: likelihood that a firm will be subject to an HFA conditional on firm-specific characteristics and calculated using model (3) of Table A.2.

HFAProb$\geq$*q33*: a dummy that equals one if in the previous year a firm is in the top HFA probability tercile, equals zero if the firm is in the bottom HFA probability (*HFAProb*) tercile.

HFAFreq: number of firms that were targeted in a firm's industry in year $t-1$ divided by the total number of firms in the industry.

HHI: Herfindahl-Hirschman index, calculated as the sum of squared market shares of each company within an industry.

Hostile: a dummy variable that takes a value of one if hedge funds are targeting a firm with hostile tactics.

IndustryIndex: an index created using principal component analysis similar to Custódio, Ferreira, and Matos (2013) based on the four industry entry/exit barriers using *CapitalIntensive*, *AssetSpecificity*, *Regulated,* and *# 5-digit SIC codes*.

InvMill: Heckman's inverse Mills' ratio.

Leverage: market leverage ratio defined as the ratio of debt to market value of equity.

Market-to-book: ratio of market-to-book value of equity.

Market share: a firm's sales divided by the same four-digit SIC industry's total sales in that year.

Markup: firm-specific and time-varying price-cost markups, estimated for each sample firm using model 4 of Table A.1.

MV of equity: market capitalization in millions of dollars. The natural logarithm of this variable is used in the paper.

OprMargin: the ratio of EBIT to sales.

Payout: ratio of the sum of total dividends and share repurchases divided to operating cashflows.

PostActivism: a dummy variable that takes a value of one if the rival of a target firm is within $[t+1, t+3]$ years after the HFA event year (that is, pseudo-event year for rival firm).

PostSwitch: a dummy variable that takes a value of one if the rival is within $[t+1, t+3]$ years after the year of switching from 13G to 13D filing.

ProductDiff: the ratio of advertising expenses to sales. Following Edmans, Goldstein, and Jiang (2012) we set missing advertising expenditures to zero, but verify if the results are robust to removing an observation if advertising expenditures are missing.

Regulated: a dummy variable that takes a value of one for regulated industries such a banking, insurance, real estate, trading, and utilities.

ROA: earnings before interest, taxes, depreciation, and amortization scaled by lagged total assets.

TFP: total factor productivity estimated from model 4 of Table A.1. We compute TFPs for each year and firm using that year's data and the corresponding production function estimates for that year.

Tobin's Q: (book value of debt + market value of equity)/(book value of debt + book value of equity).

References

Amihud, Y., 2002. Illiquidity and stock returns: Cross-section and time-series effects. Journal of Financial Markets 5, 31–56.

Audretsch, D., 1995. Innovation and Industry Evolution. MIT Press, Cambridge, MA.

Bagwell, K., 2007. The economic analysis of advertising. In: Armstrong, M., Porter, R. (Eds.), Handbook of Industrial Organization. North-Holland, Amsterdam, pp. 1701–1844.

Baumol, W., Panzar, J., and Willig, R., 1982. Contestable Markets and the Theory of Industry Structure. Harcourt Brace Jovanovich, New York.

Bebchuk, L., Brav, A., Jiang, W., 2015. The long-term effects of hedge fund activism. Columbia Law Review 115, 1085–1156.

Benoit, D., Clark, D., 2015. Activist puts pressure on Qualcomm. Wall Street Journal, April 15.

Benoit, J.P., 1984. Financially constrained entry in a game with incomplete information. Rand

Journal of Economics 15, 490–499.

Black, B., 1998. Shareholder activism and corporate governance in the United States. In: Newman, P. (Ed.), The New Palgrave Dictionary of Economics and the Law, vol. 3. Palgrave Macmillan, New York, pp. 459–465.

Bodie, Z., Kane, A., Marcus, A., 2004. Essentials of Investments. McGraw-Hill Irwin, New Jersey.

Bolton, P., Scharfstein, D., 1990. A theory of predation based on agency problems in financial contracting. American Economic Review 80, 93–106.

Brav, A., Jiang, W., Partnoy, F., Thomas, R., 2008. Hedge fund activism, corporate governance, and firm performance. Journal of Finance 63, 1729–1775.

Brav, A., Jiang, W., Kim, H., 2009. Hedge fund activism: a review. Foundations and Trends in Finance 4, 185–246.

Brav, A., Jiang, W., Kim, H., 2013. The real effects of hedge fund activism: productivity, asset allocation, and industry concentration. Unpublished working paper. Duke University, Columbia Business School, and Duke University.

Bulow, J., Geanakoplos, J., Klemperer, P., 1985. Multimarket oligopoly: strategic substitutes and complements. Journal of Political Economy 93, 488–511.

Caves, R., 1998. Industrial organization and new findings on the turnover and mobility of firms. Journal of Economic Literature 36, 1947–1982.

Chamberlin, E., 1933. The Theory of Monopolistic Competition. Harvard University Press, Cambridge, MA.

Clerides, S., Lach, S., Tybout, J., 1998. Is learning by exporting important? Micro-dynamic evidence from Colombia, Mexico, and Morocco. Quarterly Journal of Economics 113, 903–947.

Comanor, W., Wilson, T., 1974. Advertising and Market Power. Harvard University Press, Cambridge, MA.

Custódio, C., Ferreira, M., Matos, P., 2013. Generalists versus specialists: Lifetime work experience and chief executive officer pay. Journal of Financial Economics 108, 471–492.

Daughety, A., 2008. Cournot competition. In: Durlauf, S., Blume L. (Eds.), The New Palgrave Dictionary of Economics. Macmillan, New York.

De La Merced, M., Creswell, J., 2013. With huge war chests, activist investors tackle big companies.

New York Times, August 30.

Dixit, A., 1980. The role of investment in entry-deterrence. Economic Journal 90, 95–106.

Dixit, A., 1986. Comparative statics for oligopoly. International Economic Review 27, 107–122.

Edmans, A., Goldstein, I., Jiang, W., 2012. The real effects of financial markets: the impact of prices on takeovers. Journal of Finance 67, 933–971.

Frésard, L., Valta, P., 2014. How does corporate investment respond to increased entry threat? Unpublished working paper. University of Maryland and University of Geneva.

Froot, K., Scharfstein, D., Stein, J., 1993. Risk management: coordinating corporate investment and financing policies. Journal of Finance 48, 1629–1658.

Fudenberg, D., Tirole, J., 1984. The fat-cat effect, the puppy-dog ploy, and the lean and hungry look. American Economic Review 74, 361–366.

Gantchev, N., Gredil, O., Jotikasthira, C., 2014. Governance under the gun: the spillover effects of hedge fund activism. Unpublished working paper. University of North Carolina and Tulane University.

Gillan, S., Starks, L., 2000. Corporate governance proposals and shareholder activism: the role of institutional investors. Journal of Financial Economics 57, 275–305.

Giroud, X., Mueller, H., 2010. Does corporate governance matter in competitive industries? Journal of Financial Economics 95, 312–331.

Giroud, X., Mueller, H., 2011. Corporate governance, product market competition, and equity prices. Journal of Finance 65, 563–660.

Gormley, T., Matsa, D., 2014a. Common errors: how to (and not to) control for unobserved heterogeneity. Review of Financial Studies 27, 617–661.

Gormley, T., Matsa, D., 2014b. Playing it safe? Managerial preferences, risk, and agency conflicts. Unpublished working paper. University of Pennsylvania.

Green, E., Porter, R., 1984. Noncooperative collusion under imperfect information. Econometrica 52, 87–100.

Greenwood, R., Schor, M., 2009. Investor activism and takeovers. Journal of Financial Economics 92, 362–375.

Grossman, G., Shapiro, C., 1984. Informative advertising with differentiated products. Review of

Economic Studies 51, 63–81.

Guedj, I., Huang, J., Sulaeman, J., 2009. Internal capital allocation and firm performance. Unpublished working paper. University of Texas-Austin.

Haan, M., Moraga-Gonzalez, J., 2011. Competing for attention in a consumer search model. Economic Journal 121, 552–579.

Hallak, J., Sivadasan, J., 2013. Product and process productivity: implications for quality choice and conditional exporter premia. Journal of International Economics 91, 53–67.

He, J., Huang, J., 2014. Product market competition in a world of cross ownership: evidence from institutional blockholdings. Unpublished working paper. University of Georgia.

Heckman, J., 1979. Sample selection bias as a specification error. Econometrica 47, 153-161.

Heider, F., Ljungqvist, A., 2015. As certain as debt and taxes: Estimating the tax sensitivity of leverage from exogenous state tax changes. Journal of Financial Economics, Forthcoming.

Hoberg, G., Phillips, G., 2011. Text-based network industries and endogenous product differentiation. Unpublished working paper. University of Southern California.

Hotelling, E., 1929. Stability in competition. Economic Journal 39, 41–57.

Karakaya, J., 2002. Barriers to entry in industrial markets. Journal of Business and Industrial Marketing 17, 379–388.

Karpoff, J., 2001. The impact of shareholder activism on target companies: a survey of empirical findings. Unpublished working paper. University of Washington.

Kihlstrom, R., Riordan, M., 1984. Advertising as a signal. Journal of Political Economy 92, 427–450.

Kim, W., Kim, W., Kwon, K.S., 2009. Value of outside blockholder activism: evidence from the switchers. Journal of Corporate Finance 15, 505–522.

Kim, H., Kung, H., 2014. The asset redeployability channel: how uncertainty affects investment. Unpublished working paper. Cornell University.

Kumar, N., 2006. Strategies to fight low-cost rivals. Harvard Business Review 84, 104–112.

Lambin, J., 1976. Advertising, Competition and Market Conduct in Oligopoly Over Time. North-Holland, Amsterdam.

Lamont, O., 1997. Cash flow and investment: evidence from internal capital markets. Journal of

Finance 52, 83–109.

Lang, L., Stulz, R., 1992. Contagion and competitive intra-industry effects of bankruptcy announcements: an empirical analysis. Journal of Financial Economics 32, 45–60.

Mietzner, M., Schweizer, D., Tyrell, M., 2011. Intra-industry effects of shareholder activism in Germany - Is there a difference between hedge fund and private equity investments? Schmalenbach Business Review 63, 151–185.

Morck, R., Shleifer, A., Vishny, R., 1990. Stock market and investment: is the market a sideshow? Brookings Papers on Economic Activity 2, 157–215.

Nain, A., Wang, Y., 2013. The product market impact of minority stake acquisitions. Unpublished working paper. University of Iowa.

Nelson, P., 1970. Information and consumer behavior. Journal of Political Economy 78, 311–329.

Nelson, P., 1974. Advertising as information. Journal of Political Economy 82, 729–754.

Ovide, S., Clark, D., 2015. Tech firms seek ways to fend off activist investors. Wall Street Journal, May 26.

Porter, M., 1980. Competitive Strategy. Free Press, New York.

Raith, M., 2003. Competition, risk, and managerial incentives. American Economic Review 93, 1425–1436.

Ryans, A., 2009. Beating Low-Cost Competition: How Premium Brands Can Respond to Cut-Price Rivals. Wiley, New York.

Servaes, H., Tamayo, A., 2014. How do industry peers respond to control threats? Management Science 60, 380–399.

Smith, M., 2013. Does hedge fund activism facilitate more efficient capex reallocation? Unpublished working paper. University of Cambridge.

Stein, J., 1997. Internal capital markets and the competition for corporate resources. Journal of Finance 52, 111–133.

Sundaram, A., John, K., John, T., 1996. An empirical analysis of strategic competition and firm values: the case of R&D competition. Journal of Financial Economics 40, 459–486.

Syverson, C., 2004. Product substitutability and productivity dispersion. Review of Economics and Statistics 86, 534–550.

Tirole, J., 1988. The Theory of Industrial Organization. MIT Press, Cambridge, MA.

Vives, X., 2005. Games with strategic complementarities: new applications to industrial organization. International Journal of Industrial Organization 23, 625–637.

Williamson, O.E., 1975. Markets and Hierarchies: Analysis and Antitrust Implications. Macmillan, New York.

Zhu, H., 2014. The preventive effect of hedge fund activism. Unpublished working paper. Duke University.

Table 1
Descriptive statistics for targets and rivals

The analysis in this table is based on a sample of 1,332 target firms subject to hedge fund activism (HFA) between January 1996 and October 2008, and 55,928 of their industry peer firms (rival) firms. Panel A of this table displays the various characteristics of target firms subject to hedge fund activism (HFA) and their industry peer firms (rivals) in the year before the HFA took place. All variables are defined in the Appendix. Panel B shows the industry distribution at the level of two-digit Standard Industrial Classification (SIC) codes of the number of targets and the percentage, mean, minimum, and maximum number of rivals.

Panel A: Firm-specific characteristics

	Targets			Rivals		
	No. of obs.	Mean	Median	No. of obs.	Mean	Median
MV of equity	1,332	681.53	163.55	55,928	804.77	369.72
Payout	1,332	0.326	0.265	55,928	0.366	0.270
Leverage	1,258	0.379	0.352	52,734	0.324	0.405
Cash	1,329	0.202	0.098	51,297	0.229	0.100
Growth	1,320	0.069	0.050	55,928	0.080	0.061
Market-to-book	1,296	1.320	1.231	51,766	1.477	1.004
ROA	1,270	0.049	0.072	52,122	0.034	0.045

Panel B: Industry distribution

Two-digit SIC bracket	Industry	# Targets	% Rivals	# Rivals per target		
				Mean	Min	Max
01—09	Agriculture	27	1.16%	24	2	118
10—14	Mining	48	3.43%	40	3	91
15—17	Construction	29	3.37%	65	1	105
20—39	Manufacturing	364	21.48%	33	4	282
40—49	Transportation*	133	4.48%	19	2	138
50—51	Wholesale trade	217	14.74%	38	3	197
52—59	Retail trade	205	19.06%	52	3	392
60—67	Finance, insurance & real estate	238	28.09%	66	2	501
70—89	Services	71	4.19%	33	2	295

**includes communications and utilities*

Table 2

Announcement effects on rivals around hedge fund activism filings

The analysis in this table is based on a sample of 1,332 target firms subject to hedge fund activism (HFA) between January 1996 and October 2008, and 55,928 of their industry peer firms (rival) firms. Panel A of the table presents market-adjusted mean excess stock returns for the full sample (Panel A.I) and for different groups segmented by the purpose of hedge fund activity (Panel A.II). Panel B provides benchmark-adjusted mean excess stock returns by rivals' leverage (Panel B.I), cash holdings (Panel B.II), and target's industry concentration (Panel B.III). Panel B.IV reports market-adjusted mean excess returns for the subsamples of rivals in the top and bottom baseline HFA probability terciles. We define a target's rivals as all firms with the same four-digit Standard Industrial Classification (SIC) code. Firms without complete data on the CRSP Daily Returns are not included in the sample. We measure abnormal returns within the event window of [-5,+5] where day 0 is the initial Schedule 13D filing date by hedge fund activists. We use a portfolio approach following Lang and Stulz (1992), place all rivals at the time of HFA into one portfolio and treat the returns to this portfolio as a single observation. The abnormal return of each rival portfolio *p* for each day *t*, is computed as $AR_{pt} = R_{pt} - R_{mt}$, where R_{pt} is the daily return of the rival portfolio *p*, and R_{mt} is the return on the CRSP value-weighted market index for day *t*. All filings under the '*General*' category reveal no specific agenda. The specific activism categories cover governance-related issues (*Corporate governance)*, strategic alternatives (*Strategic*), and capital structure related issues (*Capital structure)*. The specific proposal categories need not generally be mutually exclusive. The number of rival portfolios used in each subsample is provided in brackets. Targets' industry concentration is determined by the Herfindahl-Hirschman index (*HHI*), calculated as the sum of squared market shares of each company within an industry. *Leverage* is the market leverage and *Cash* is the cash assets. In any given year, $HFAProb \geq q33$ is a dummy that equals one (zero) if a firm is in the top (bottom) HFA probability tercile in the previous year calculated from model 3 of Table A.2.
All variables are defined in the Appendix. Sample period is January 1996 and March 2008. Robust levels of significance are provided in parentheses. *, **, And *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 2 (Continued)
Announcement effects on rivals around hedge fund activism filings

Panel A: CARs by activism characteristics			
Panel A.I: Baseline results			-1.37%*
[# of portfolios: 1,610]			
Panel A.II: Segmented by objective			
General *[# of portfolios: 953]*			-1.18%*
Specific *[# of portfolios : 837]*			-1.57%*
[# of portfolios: 281]		Governance	-0.59%
[# of portfolios: 358]		Strategic	-2.24%**
[# of portfolios: 198]		CapStructure	-1.72%*
		General-Specific	0.39%
		General-Governance	-0.59%
		General-Strategic	1.06%*
		General- CapStructure	0.54%
Panel B: CARs by firm and industry characteristics			
Panel B.I: Leverage effects			
[# of portfolios: 805]	*(High)*	Leverage $\geq q50$	-2.05%**
[# of portfolios: 805]	*(Low)*	Leverage $\leq q50$	-0.68%
		High-Low	-1.37%*
Panel B.II: Cash effects			
[# of portfolios: 804]	*(High)*	Cash $\geq q50$	-0.64%
[# of portfolios: 806]	*(Low)*	Cash $\leq q50$	-2.08%**
		High-Low	1.44%*
Panel B.III: Threat effects			
[# of portfolios: 532]	*(High)*	HFAProb $\geq q33$	1.14%*
[# of portfolios: 541]	*(Low)*	HFAProb $\leq q33$	-2.19%**
		High-Low	3.33%***
Panel B.IV: Competition effects			
[# of portfolios: 805]	*(High)*	HHI $\geq q50$	-1.87%**
[# of portfolios: 805]	*(Low)*	HHI $\leq q50$	-0.95%
		High-Low	-1.61%*

Table 3
Cross-sectional regression analysis of hedge fund activism filings on rivals

This table presents the relation between (value-weight) abnormal returns and a set of explanatory variables within the event window of [-5,+5] for the rivals of target firms. Columns 1A—3A use a portfolio approach following Lang and Stulz (1992), columns 4A and 5A use individual rival firms in the analysis. All variables are defined in the Appendix. The base sample is described in Table 1. Intercept is suppressed to avoid perfect multicollinearity. We scale the coefficient estimates by the standard deviation to ease the interpretation and comparison of the estimates. Robust levels of significance are provided in parentheses. *, **, And *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Activism type and firm characteristics

	(1A)		(2A)		(3A)		(4A)		(5A)	
	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat
lnMV of Equity	0.206	(1.50)	0.214	(1.42)	0.197	(1.20)	0.167	(1.18)	0.199	(1.39)
Leverage	-0.788**	(-2.22)	-0.734*	(-1.99)	-0.714*	(-1.95)	0.655*	(1.83)	0.548*	(1.72)
Cash	0.589*	(1.67)	0.576*	(1.65)	0.504	(1.60)	0.498	(1.52)	0.310	(1.41)
HFAProb ≥ $q33$							0.104*	(1.78)	0.096*	(1.67)
General	-0.826*	(-1.76)	-0.797*	(-1.71)	-0.704*	(-1.67)	-0.669	(-1.62)	-0.425	(-1.47)
Governance	0.304	(1.42)	0.278	(1.38)	0.102	(1.30)	0.085	(1.17)	0.094	(1.29)
Strategic	-1.970**	(-2.33)	-1.916**	(-2.20)	-1.804**	(-2.00)	-1.715*	(-1.86)	-1.586*	(-1.68)
CapStructure	-1.276*	(-1.94)	-1.119*	(-1.85)	-1.077*	(-1.77)	-1.066*	(-1.70)	-1.002*	(-1.66)
Leverage × Governance	-0.654	(-1.62)								
Cash × Governance	0.326	(1.50)								
HFAProb ≥ $q33$ × Governance							0.915*	(1.97)		
Leverage × Strategic			-0.816*	(-1.78)						
Cash × Strategic			0.768*	(1.67)						
HFAProb ≥ $q33$ × Strategic							0.900*	(1.81)		
Leverage × CapStructure					-0.519	(-1.47)				
Cash × CapStructure					0.505	(1.34)				
HFAProb ≥ $q33$ × CapStructure							0.767*	(1.72)		
Leverage × HFAProb ≥ $q33$									-0.166	(-0.99)
Cash × HFAProb ≥ $q33$									0.615*	(1.82)
Adj. *R*-squared	0.056		0.059		0.055		0.065		0.060	
No. of portfolios or observations	1,610		1,610		1,610		34,618		34,618	

Table 3 (Continued)
Cross-sectional regression analysis of hedge fund activism filings on rivals.

Panel B: Industry characteristics

	(1B)		(2B)		(3B)	
	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat
lnMV of equity	0.175	(1.06)	0.166	(0.98)	0.159	(0.87)
Leverage	-0.904**	(-2.04)	-0.850*	(-1.96)	-0.817*	(-1.79)
Cash	-0.577	(-1.48)	-0.519	(-1.31)	-0.465	(-1.15)
General	-0.815*	(-1.79)	-0.724*	(-1.72)	-0.615*	(-1.64)
Governance	0.259	(0.76)	0.210	(0.65)	0.177	(0.62)
Strategic	-2.006*	(-1.89)	-1.804*	(-1.76)	-1.688*	(-1.73)
CapStructure	-0.917*	(-1.70)	-0.798*	(-1.65)	-0.716	(-1.57)
lnHHI	-0.805*	(-1.82)	-0.679*	(-1.77)	-0.614*	(-1.75)
HFAFreq					0.559*	(1.68)
lnHHI × Governance			-0.187	(-0.90)		
lnHHI × Strategic			-0.600	(-1.61)		
lnHHI × CapStructure			-0.473	(-1.63)		
HFAFreq × Governance					0.748*	(1.88)
HFAFreq × Strategic					0.575*	(1.75)
HFAFreq × CapStructure					0.648*	(1.80)
HFAFreq × lnHHI					-0.398	(-1.39)
Adj. *R*-squared	0.049		0.055		0.058	
No. of portfolios	1,610		1,610		1,610	

Table 4

The impact of hedge fund activism on operating performance, market shares, and price-cost markups of rivals: Baseline results

Panel A presents the results of regressions examining the effects of the HFA on operating performance and product market measures for rivals of target firms. Dependent variables are return on assets (*ROA),* the sum of net income, depreciation scaled by total assets (*CashFlow),* capital expenditures over total assets (*CAPEX),* and total factor productivity *(TFP)* estimated from model 4 of Table A.1, *Market shares,* and the price-cost markups (*Markups).* The explanatory variables including ln*MV of equity* , ln*Age,* and *Market-to-book* are measured as of time *t*–1 and defined in the Appendix. *PostActivism* is a dummy variable that takes a value of one if the rival of a target firm is within [*t*+1,*t*+3] years after the HFA event year. We also use industry and year fixed effects and pre-event dummies (up to 3 years). Panel B specifications are estimated in first differences to remove firm fixed effects in the levels equations and include industry fixed effects and year fixed effects to remove industry and macro-level shocks, respectively. The base sample is described in Table 1. We scale the coefficient estimates (of non-dummy variables) by their respective standard deviations to ease the interpretation and comparison of the estimates. The estimations correct the error structure for heteroskedasticity and are clustered at the industry level. We report *t*-statistics in brackets. *, **, And *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Industry fixed effects and year fixed effects

	(1) ROA		(2) CashFlow		(3) CAPEX		(4) TFP		(5) Market shares		(6) Markups	
	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	t-stat	Coeff.	*t*-Stat
PostActivism	-0.018**	(-2.06)	-0.011**	(-2.32)	-0.012*	(-1.69)	-0.020**	(-2.14)	-0.021**	(-2.21)	-0.032***	(-3.18)
lnMV of equity	0.023**	(2.47)	0.014**	(2.10)	0.029**	(2.24)	0.015*	(1.76)	0.017**	(2.15)	0.020***	(-2.71)
Market-to-book	0.011**	(2.10)	0.008*	(1.86)	0.010	(1.60)	0.010	(1.45)	0.008	(1.39)	0.012*	(1.69)
lnAge	0.006*	(1.75)	0.003*	(1.99)	0.005	(1.53)	0.005**	(2.09)	0.011**	(2.21)	0.015**	(2.33)
Industry fixed effects	yes		yes		yes		yes		yes		yes	
Year fixed effects	yes		yes		yes		yes		yes		yes	
No. of portfolios or observations	0,409		48,215		52,818		47,409		53,017		47,409	
Model *p*-value	0.000		0.009		0.004		<0.000		0.001		<0.000	
R-squared	0.359		0.303		0.382		0.275		0.348		0.325	

Table 4 (Continued)
The impact of hedge fund activism on operating performance, market shares, and price-cost markups of rivals: Baseline results

Panel B: Fist-differenced baseline results

	(1) ROA		(2) CashFlow		(3) CAPEX		(4) TFP		(5) Market shares		(6) Markups	
	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat
PostActivism	-0.015*	(-1.96)	-0.010*	(-1.92)	-0.009	(-1.55)	-0.016*	(-1.84)	-0.018*	(-1.88)	-0.026**	(-2.24)
lnMV of equity	0.020**	(2.11)	0.012**	(2.00)	0.021**	(2.06)	0.013*	(1.72)	0.016**	(2.04)	0.017**	(-2.36)
Market-to-book	0.008*	(1.85)	0.007*	(1.72)	0.009	(1.58)	0.008	(1.38)	0.008	(1.35)	0.011*	(1.66)
lnAge	0.004	(1.50)	0.001	(1.47)	0.004	(1.50)	0.004*	(1.69)	0.007*	(1.97)	0.014**	(2.00)
Industry fixed effects	yes		yes		yes		yes		yes		yes	
Year fixed effects	yes		yes		yes		yes		yes		yes	
Firm fixed effects	yes		yes		yes		yes		yes		yes	
No. of observations	50,409		48,215		52,818		47,409		53,017		47,409	
Model *p*-value	0.002		0.004		0.010		<0.000		0.000		<0.000	
R-squared	0.377		0.420		0.429		0.303		0.359		0.366	

Table 5

The impact of hedge fund activism on market shares: Interaction effects

This table presents the estimation results of the market share (*Market shares*) effects of hedge fund activism for rivals of target firms. For brevity, we only present the estimation results for the variables of interest. Unreported controls are ln*MV of equity*, ln*Age,* and *Market-to-book*, target-specific (in Panel A), rival firm-specific (in Panel B), and industry-specific (in Panel C) characteristics of the interaction terms, used as standalone regressors. ΔX^j is the change in X for a firm j (where j=target (T) or rival (R) firm) between the year before activism took place (*HFA-1*) and time t. *IndustryIndex* is created using principal component analysis based on the four industry entry/exit barriers using *CapitalIntensive*, *AssetSpecificity*, *Regulated*, and # *5-digit SIC* codes. All variables are formally defined in the Appendix. We also use industry and year fixed effects and pre-event dummies (up to 3 years). The base sample is described in Table 1. We scale the coefficient estimates (of non-dummy variables) by their respective standard deviations to ease the interpretation and comparison of the estimates. Standard errors are White heteroskedasticity-adjusted and are clustered for the same industry. We report *t*-statistics in parentheses. *, **, And *** mean the coefficient is significant at the 10%, 5%, or 1% level, respectively.

Table 5 (Continued)

The impact of hedge fund activism on market shares: Interaction effects

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Panel A: Target-specific	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat						
PostActivism	-0.018**	(-2.29)	-0.015**	(-2.13)	-0.015**	(-2.12)	-0.014**	(-2.09)						
PostActivism × Δ OprMargin^{T}	-0.008*	(-1.90)												
PostActivism × Δ TFP^{T}			-0.010**	(-2.01)										
PostActivism × DCapex^{T}					-0.009*	(-1.95)								
PostActivism × Δ ProductDiff^{T}							-0.006*	(-1.68)						
No. of observations	48,114		52,214		41,575		53,017							
R-squared	0.355		0.263		0.402		0.395							
Panel B: Rival-specific	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat
PostActivism	-0.015**	(-2.16)	-0.017**	(-2.20)	-0.019**	(-2.22)	-0.015**	(-2.12)	-0.016**	(-2.19)	-0.016**	(-2.20)	-0.017**	(-2.21)
PostActivism × Leverage	-0.007*	(-1.72)												
PostActivism × Cash			0.009*	(1.86)										
PostActivism × HFAProb ≥ *q*33					0.023***	(2.56)								
PostActivism × Δ OprMargin^{R}							0.010*	(1.86)						
PostActivism × Δ TFP^{R}									0.012*	(1.95)				
PostActivism × DCapex^{R}											0.009*	(1.80)		
PostActivism × Δ ProductDiff^{R}													0.007*	(1.72)
No. of observations	49,272		48,939		33,006		48,129		47,409		40,125		52,006	
R-squared	0.377		0.304		0.365		0.290		0.304		0.388			
Panel C: Industry-specific	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat		
PostActivism	-0.018**	(-2.34)	-0.021**	(-2.45)	-0.018**	(-2.32)	-0.019**	(-2.40)	-0.017**	(-2.28)	-0.018**	(-2.45)		
PostActivism × lnHHI	0.012**	(2.00)												
PostActivism × CapitalIntensive			0.015**	(2.10)										
PostActivism × AssetSpecificity					0.014**	(2.10)								
PostActivism × Regulated							0.009*	(1.88)						
PostActivism × # 5-digit SIC code									0.010**	(2.02)				
PostActivism × IndustryIndex											0.020***	(3.96)		
No. of observations	53,017		53,017		53,017		53,017		53,017		53,017			
R-squared	0.404		0.330		0.315		0.288		0.325		0.455			

Table 6

The impact of hedge fund activism on price-cost markups of rivals: Interaction effects

This table presents the estimation results of the price-cost markup (*Markups*) effects of hedge fund activism for rivals of target firms. For brevity, we only present the estimation results for the variables of interest. Unreported controls include ln*MV of equity*, ln*Age*, and *Market-to-book*. Also unreported are target-specific (in Panel A), rival firm (intervention)-specific (in Panel B), and industry-specific (in Panel C) characteristics in interaction terms, used as standalone regressors. ΔX^j is the change in X for a firm j (where j=target (T) or rival (R) firm) between the year before activism took place (*HFA-1*) and time t. *IndustryIndex* is created using principal component analysis based on the four industry entry/exit barriers using *CapitalIntensive*, *AssetSpecificity*, *Regulated*, and # *5-digit SIC* codes. All variables are formally defined in the Appendix. The base sample is described in Table 1. We also use industry and year fixed effects and pre-event dummies (up to 3 years). We scale the coefficient estimates (of non-dummy variables) by their respective standard deviations to ease the interpretation and comparison of the estimates. Standard errors are White heteroskedasticity-adjusted and are clustered for the same industry. We report t-statistics in parentheses. *, **, And *** mean the coefficient is significant at the 10%, 5%, or 1% level, respectively.

Table 6 (Continued)
The impact of hedge fund activism on price-cost markups of rivals: Interaction effects

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Panel A: Target-specific	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat						
PostActivism	-0.030***	(-2.91)	-0.032***	(-2.95)	-0.031***	(-2.93)	-0.030***	(-2.90)						
PostActivism × Δ OprMargin^{T}	-0.012**	(-2.10)												
PostActivism × Δ TFP^{T}			-0.010*	(-1.89)										
PostActivism × DCapex^{T}					-0.011**	(-2.02)								
PostActivism × Δ ProductDiff^{T}							-0.009*	(-1.70)						
No. of observations	45,414		47,409		40,186		47,409							
R-squared	0.272		0.238		0.311		0.276							
Panel B: Rival-specific	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat
PostActivism	-0.029***	(-2.69)	-0.033***	(-2.85)	-0.029***	(-2.84)	-0.020**	(-2.24)	-0.025**	(-2.39)	-0.030***	(-2.70)	-0.026**	(-2.33)
PostActivism × Leverage	-0.004	(-1.55)												
PostActivism × Cash			0.019**	(2.38)										
PostActivism × HFAProb ≥ *q*33					0.031***	(3.16)								
PostActivism × Δ OprMargin^{R}							0.008*	(1.77)						
PostActivism × Δ TFP^{R}									0.011*	(1.96)				
PostActivism × DCapex^{R}											0.014**	(2.02)		
PostActivism × Δ ProductDiff^{R}													0.010*	(1.94)
No. of observations	44,886		43,018		31,004		47,012		47,409		39,404		50,129	
R-squared	0.281		0.244		0.305		0.405		0.326		0.218		0.303	
Panel C: Industry-specific	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat		
PostActivism	-0.033***	(-3.04)	-0.029***	(-3.11)	-0.031***	(-3.12)	-0.033***	(-3.05)	-0.027***	(-3.14)	-0.025***	(-2.99)		
PostActivism × lnHHI	0.014**	(2.15)												
PostActivism × CapitalIntensive			0.012**	(2.10)										
PostActivism × AssetSpecificity					0.017**	(2.44)								
PostActivism × Regulated							0.011**	(2.08)						
PostActivism × # 5-digit SIC									0.013**	(2.17)				
PostActivism × IndustryIndex											0.017***	(3.11)		
No. of observations	47,409		47,409		47,409		47,409		47,409		47,409			
R-squared	0.259		0.303		0.315		0.288		0.411		0.508			

Table 7

The impact of hedge fund activism on market shares and price-cost markups of rivals: Purged residuals, stock picking, and placebo tests

Column 1 of this table reports the estimates from purged residuals regressions (Eqs. (2) and (3)) for the effects of the HFA on market shares and price-cost markups for rival firms. Columns 2 and 3 provide additional evidence on the causal effects of hedge fund activism on the product market outcomes of rival firms. Column 2 replicates Panel A of Table 4 using a new dummy variable *Hostile,* which takes a value of one if hedge funds are targeting a firm with hostile tactics and interacting this dummy with the *PostActivism* indicator. Similar to Brav et al. (2013), we classify activist interventions as hostile when the initial or amended 13D filing by the activist threatens or opens the door to a proxy contest, a lawsuit, or public campaigns involving confrontation. Column 3 examines the effects of switches in filing status from Schedule 13G to Schedule 13D. For that purpose, we construct a new sample using all 346 activist funds in our sample and searching for their 13G filings (i.e., passive block holdings). Then we identify cases where hedge funds have switched from 13G filings to the 13D filings, and we call this event "Switch." *PostSwitch* is a dummy variable that takes a value of one if the rival of a target firm is within [*t*+1,*t*+3] years after the year of switching. Column 4 conducts a falsification test by creating a placebo dummy, *PostActivism*, which is one if the firm-year (*i,t*) is within [*t*+1,*t*+3] years of a *placebo activism* event for target, where the placebo event year now is three years before the actual event date. The base sample is described in Table 1. We scale the coefficient estimates (of non-dummy variables) by their respective standard deviations to ease the interpretation and comparison of the estimates. The estimations correct the error structure for heteroskedasticity and are clustered at the industry level. We report *t*-statistics in brackets. *, **, And *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1) Purged residuals				(2) Hostile vs. non-hostile				(3) 13G to 13D Switchers				(4) Placebo tests			
	Market shares		Markups		Market shares		Markups		Market shares		Markups		Market shares		Markups	
	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat
PostSwitch									-0.016**	(-2.00)	-0.029**	(-2.05)				
PostActivism	-0.015*	(-1.80)	-0.021**	(-2.05)	-0.014*	(-1.97)	-0.022**	(-2.36)					-0.006	(-1.33)	-0.009	(-1.61)
Hostile					0.002	(1.16)	-0.001	(-1.05)								
PostActivism × Hostile					-0.007*	(-1.86)	-0.009*	(-1.99)								
lnMV of equity					0.007	(1.47)	0.009	(1.60)	0.007*	(1.69)	0.005	(1.57)	0.008*	(1.66)	0.014*	(1.92)
Market-to-book					0.005	(1.39)	0.008	(1.58)	0.006	(1.61)	0.005	(1.53)	0.010*	(1.98)	0.009	(1.58)
lnAge					0.006	(1.44)	0.005	(1.33)	0.008*	(1.70)	0.007	(1.62)	0.006	(1.50)	0.007	(1.42)
Industry fixed effects	no		no		yes		yes		yes		yes		yes		yes	
Year fixed effects	no		no		yes		yes		yes		yes		yes		yes	
Industry-year fixed	yes		yes		no		no		no		no		no		no	
Fund fixed effects	no		no		no		no		yes		yes		no		no	
No. of observations	53,017		47,409		51,017		47,409		19,115		18,004		50,627		44,214	
Model *p*-value	0.011		0.008		0.000		0.024		0.030		0.052		0.026		0.033	
R-squared	0.277		0.198		0.319		0.248		0.209		0.188		0.107		0.188	

Table 8

The impact of hedge fund activism on operating performance, market shares, and price-cost markups of rivals: Controlling for attrition bias

This table presents the effects of the HFA on market shares and price-cost markups for rival firms after controlling for attrition bias in our sample using the model in Eqs. (6) and (7). *InvMill* is Heckman's inverse Mills' ratio estimated first stage, and *AmihudLiq* is the Amihud (2002) illiquidity measure, used as an instrument in the first stage. Standard errors are heteroskedasticity-adjusted and are clustered for the same industry. The table also reports the test statistics for the relevance and validity of the instrument. The base sample is described in Table 1. We scale the coefficient estimates (of non-dummy variables) by their respective standard deviations to ease the interpretation and comparison of the estimates. We report *t*-statistics in parentheses. *, **, And *** mean the coefficient is significant at the 10%, 5%, or 1% level, respectively.

	(1) ROA				(2) CashFlow				(3) CAPEX			
	1st Stage		2nd Stage		1st Stage		2nd Stage		1st Stage		2nd Stage	
	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat
PostActivism			-0.015*	(-1.95)			-0.017**	(-2.47)			-0.014*	(-1.72)
lnMV of equity	-0.091**	(-2.17)	0.020**	(2.10)	-0.076*	(-1.97)	0.022**	(2.38)	-0.114**	(-2.25)	0.026**	(2.45)
Market-to-book	0.145**	(2.39)	0.008*	(1.82)	0.101**	(2.02)	0.007*	(1.75)	0.093*	(1.99)	0.006*	(1.66)
lnAge	-0.033*	(-1.68)	0.004	(1.58)	-0.019	(-1.55)	0.003	(1.49)	-0.006	(-1.55)	0.002	(1.35)
Stock return	-0.120**	(-2.37)	0.008*	(1.84)	-0.085**	(-2.10)	0.010*	(1.88)	-0.107**	(-2.02)	0.010*	(1.89)
Leverage	0.109**	(2.16)	-0.010*	(-1.99)	0.114**	(2.28)	-0.015**	(-2.00)	0.088**	(2.11)	-0.017**	(-2.04)
Tobin's *Q*	0.136**	(2.20)	0.014**	(2.04)	0.077*	(1.90)	0.017**	(2.16)	0.005	(1.57)	0.005	(1.59)
AmihudLiq	-0.203***	(-2.65)			-0.116**	(-2.38)			-0.156**	(-2.39)		
InvMill			-0.003	(-1.19)			0.012*	(1.72)			-0.006	(-1.44)
Industry fixed effects	yes		yes		yes		yes		yes		yes	
Year fixed effects	yes		yes		yes		yes		yes		yes	
Anderson-*LR* statistics (*p*-value)		0.009				0.027				0.014		
Shea Partial *R*-sqr.(%)		13.65				13.65				11.88		
First-stage *F*-stat (Prob>*F*)		0.005				0.010				0.046		
No. of observations	47,613		47,098		45,320		44,909		49,905		48,114	
R-squared	0.025		0.298		0.019		0.307		0.014		0.255	

Table 8 (Continued)

The impact of hedge fund activism on operating performance, market shares, and price-cost markups of rivals: Controlling for attrition bias

	(4) TFP				(5) Market shares				(6) Markups			
	1st Stage		2nd Stage		1st Stage		2nd Stage		1st Stage		2nd Stage	
	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat
PostActivism			-0.020**	(-2.32)			-0.017**	(-2.02)			-0.026**	(-2.42)
lnMV of equity	-0.078*	(-1.99)	0.014*	(1.99)	-0.106**	(-2.17)	0.025**	(2.40)	-0.095**	(-2.32)	0.016**	(2.08)
Market-to-book	0.122**	(2.15)	0.005	(1.62)	0.082**	(2.05)	0.009*	(1.85)	0.088*	(1.99)	0.007*	(1.77)
lnAge	-0.028	(-1.56)	0.004	(1.57)	-0.024	(-1.49)	0.006	(1.59)	-0.015*	(-1.83)	0.001	(1.29)
Stock return	-0.100**	(-2.08)	0.006	(1.63)	-0.125**	(-2.33)	0.014*	(1.98)	-0.116**	(-2.14)	0.012*	(1.80)
Leverage	0.117**	(2.24)	-0.009*	(-1.87)	0.209***	(2.57)	-0.016**	(-2.00)	0.095**	(2.01)	-0.019**	(-2.11)
Tobin's *Q*	0.144**	(2.33)	0.010*	(1.95)	0.085*	(1.91)	0.007	(1.63)	0.005	(1.52)	0.004	(1.52)
AmihudLiq	-0.166**	(-2.30)			-0.177**	(-2.45)			-0.072*	(-1.68)		
InvMill			-0.014	(-1.44)			-0.020	(1.52)			0.009	(1.60)
Industry fixed effects	yes		yes		yes		yes		yes		yes	
Year fixed effects	yes		yes		yes		yes		yes		yes	
Anderson-*LR* statistics (*p*-value)		0.030				0.006				0.010		
Shea Partial *R*-sqr.(%)		16.72				15.29				18.66		
First-stage *F*-stat (Prob>*F*)		0.011				0.025				0.007		
No. of observations	46,005		45,537		49,714		49,022		46,005		45,537	
R-squared	0.016		0.334		0.020		0.355		0.021		0.306	